Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards [1]		National Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O_3)[8]	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m^3)		0.070 ppm (137 µg/m^3)		
Respirable Particulate Matter (PM10)[9]	24 Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		—		
Fine Particulate Matter (PM2.5)[9]	24 Hour	—	—	35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	12.0 µg/m^3	15 µg/m^3	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m^3)	—	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)	—	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	
Nitrogen Dioxide (NO_2)[10]	1 Hour	0.18 ppm (339 µg/m^3)	Gas Phase Chemiluminescence	100 ppb (188 µg/m^3)	—	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)		0.053 ppm (100 µg/m^3)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[11]	1 Hour	0.25 ppm (655 µg/m^3)	Ultraviolet Fluorescence	75 ppb (196 µg/m^3)	—	Ultraviolet Flourescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	—		—	0.5 ppm (1300 µg/m^3)	
	24 Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (for certain areas)[11]	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)[11]	—	
Lead[12,13]	30 Day Average	1.5 µg/m^3	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m^3 (for certain areas)[12]	Same as Primary Standard	
	Rolling 3-Month Average	—		0.15 µg/m^3		
Visibility Reducing Particles[14]	8 Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24 Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[12]	24 Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

See footnotes on next page …

1. California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

2. National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national policies.

3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4. Any equivalent measurement method which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

7. Reference method as described by the U.S. EPA. An “equivalent method” of measurement may be used but must have a “consistent relationship to the reference method” and must be approved by the U.S. EPA.

8. On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.

9. On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 $\mu g/m^3$ to 12.0 $\mu g/m^3$. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at 35 $\mu g/m^3$, as was the annual secondary standard of 15 $\mu g/m^3$. The existing 24-hour PM10 standards (primary and secondary) of 150 $\mu g/m^3$ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

10. To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.

11. On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

    Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

12. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

13. The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 $\mu g/m^3$ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

14. In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

Maps of State and Federal Area Designations

Maps of Current State and Federal Area Designations

CATEGORIES

Topics Air Quality Plans, Air Pollution

Programs State and Federal Area Designations

Type Information

These are area designation maps of California for all criteria pollutants that are designated for the State and national standards.

State Area Designations

These maps are updated annually for the State area designations, as required by the Health and Safety Code (H&SC) section 39608, and after formal approval of the Office of Administrative Law. CARB makes State area designations for ten criteria pollutants: ozone, suspended particulate matter (PM_{10}), fine suspended particulate matter ($PM_{2.5}$), carbon monoxide, nitrogen dioxide, sulfur dioxide, sulfates, lead, hydrogen sulfide, and visibility reducing particles.

The following maps are the most current available and represent air quality based on the most recent monitoring data. All maps are in Adobe pdf format.

- Ozone (area designation map)
- $PM_{2.5}$ (area designation map)
- PM_{10} (area designation map)
- Carbon Monoxide (area designation map)
- Nitrogen Dioxide (area designation map)
- Sulfur Dioxide (area designation map)
- Sulfates (area designation map)
- Lead (area designation map)
- Hydrogen Sulfide (area designation map)
- Visibility Reducing Particles (area designation map)

Federal Area Designations

In contrast to the State area designations, the U.S. EPA makes national area designations for six criteria pollutants: ozone, PM_{10}, $PM_{2.5}$, carbon monoxide, nitrogen dioxide, and sulfur dioxide. Although maps for the national area designations are provided below, please refer to the U.S. EPA website for the most current information on the national area designations.

- Ozone 8-Hour Standard (area designation map)
- PM_{10} (area designation map)
- $PM_{2.5}$ (area designation map)
- Carbon Monoxide (area designation map)
- Lead (area designation map)
- Nitrogen Dioxide (area designation map)
- Sulfur Dioxide (area designation map)

RELATED RESOURCES

2023 Eastern Kern 8-Hour Ozone Plan

Western Mojave Desert 70 ppb Ozone Attainment Plan

2023 Yuba City-Marysville Planning Area PM2.5 2nd Maintenance Plan

(800) 242-4450 | helpline@arb.ca.gov
1001 I Street, Sacramento, CA 95814
P.O. Box 2815, Sacramento, CA 95812

Welcome to EMFAC

This website provides California's emissions inventories of onroad and offroad mobile sources and tools to perform project-level assessment with custom meteorological conditions and scenario analysis with custom vehicle activity. It also provides detailed vehicle registration information aggregated up to the census block group level. This website is named after EMission FACtor (EMFAC), a model that estimates the official emissions inventories of onroad mobile sources in California.

Updates

- May 2023: Fleet Database provides data generated from the 2021 vehicle registration database.
- Source code for EMFAC2021 v1.0.2 available upon request at emfac@arb.ca.gov.
- April 2022: EMFAC2021 is updated to v1.0.2. For more details about this update, please check the public notice.
- April 2021: EMFAC2021 is updated to v1.0.1 and the Technical Document is available online.
- January 2021: EMFAC2021 is released. EMFAC2021 is now provided on this website, too.

- March 2020: This new EMFAC website is available, starting to provide Emissions Inventory, Project Analysis, Scenario Analysis with results from EMFAC2017 v1.0.2 that is approved by USEPA in 2019 and OFFROAD ORION v1.0.1. It also provides Fleet Database with DMV vehicle registration data. Please also try our website on your mobile devices as it is designed to be mobile friendly.

Tutorials on how to use EMFAC Web Platform

1. Introduction to the website

Related Resources

- EMFAC2014 Web Database
- EMFAC Onroad Documentation
- EMFAC Offroad Documentation
- Mobile Source Emissions Inventory

Contact Us

This website is developed by the Mobile Source Analysis Branch in the Air Quality Planning and Science Division at California Air Resources Board. Please contact the EMFAC team (emfac@arb.ca.gov) with any questions or comments.

Off-Road Diesel Regulation

Program Homepage ► (https://ww2.arb.ca.gov/our-work/programs/use-road-diesel-fueled-fleets-regulation) **(https://ww2.arb.ca.gov/our-work/programs/use-road-diesel-fueled-fleets-regulation)**

Background

Learn More ▼

On July 26, 2007, the California Air Resources Board (CARB) adopted the Regulation for In-Use Off-Road Diesel-Fueled Fleets (Off-Road Diesel Regulation) to reduce diesel particulate matter (PM) and oxides of nitrogen (NOx) emissions from in-use (existing) off-road heavy-duty diesel vehicles in California. These vehicles are used in construction, mining, industrial operations and other industries.

The Regulation applies to:

- Vehicles with off-road engines of 25 hp or greater.
- Workover rigs.
- 2-engine cranes.
- 2-engine water well drilling rigs
- 2-engine vehicles with auxiliary engines of greater than or equal to 50bhp that
  - Are not subject to the Public Agencies & Utilities (PAU) fleet rule
  - Are not sweepers subject to Truck & Bus rule
  - Do not contain a Tier 0 auxiliary engine

The Regulation does not apply to:

- Locomotives
- Commercial marine vessels and marine engines
- Recreational off-highway vehicles
- Combat and tactical support equipment
- Stationary equipment
- Personal use motor homes or recreational vehicles
- Portable engines, except auxiliary engines on 2-engine vehicles
- Equipment used exclusively for agricultural operations
- Implements of husbandry
- Certain 2-engine vehicles
- 2-engine street sweepers subject to Truck & Bus rule
- Equipment subject to the mobile Cargo Handling
- Equipment (CHE) rule

- Equipment owned and operated for personal, non-commercial, and non-governmental use
- Vehicles awaiting sale (i.e., dealers)

⤓ **Overview Fact Sheet (https://ww2.arb.ca.gov/sites/default/files/classic/msprog/ordiesel/faq/overview_fact_sheet_dec_2 final.pdf)** (**English (https://ww2.arb.ca.gov/sites/default/files/classic/msprog/ordiesel/faq/overview_fact_sheet_dec_2 final.pdf)** or **Español (https://ww2.arb.ca.gov/sites/default/files/classic/msprog/ordiesel/faq/ordspanish.pdf)**)
⤓ **Regulation Text (https://ww2.arb.ca.gov/sites/default/files/classic/msprog/ordiesel/documents/finalregorder-dec2011.pdf)**

Requirements

Learn More ▼

The Off-Road Diesel Regulation:

- Imposes limits on idling, requires a written idling policy, and requires a disclosure when selling vehicles;
- Requires all vehicles to be reported to CARB in the online reporting system **DOORS (https://ssl.arb.ca.gov/ssldoors/doors_reporting/doors_login.html)** and labeled;
- Restricts the adding of older vehicles into fleets starting on January 1, 2014; and
- Requires fleets to reduce their emissions by retiring, replacing, or repowering older engines, or installing Verified Diesel Emission Control Strategies, VDECS (i.e., exhaust retrofits).

The Off-Road Diesel Regulation's restricts adding vehicles with older tier engines:

- BAN ON ADDING TIER 0 ENGINES – Effective January 1, 2014, a fleet may not add a vehicle with a Tier 0 engine to its fleet.
- BAN ON ADDING TIER 1 ENGINES – Also effective January 1, 2014, for large and medium fleets, and January 1, 2016 for small fleets, a fleet may not add any vehicle with a Tier 1 engine. The engine tier must be Tier 2 or higher.
- BAN ON ADDING TIER 2 ENGINES – Beginning January 1, 2018, for large and medium fleets, and January 1, 2023, for small fleets, a fleet may not add a vehicle with a Tier 2 engine to its fleet. The engine tier must be Tier 3 or higher.

Reporting

Learn More ▼

Off-road diesel vehicle owners are required to report their applicable diesel vehicles into **DOORS (https://ssl.arb.ca.gov/ssldoors/doors_reporting/doors_login.html)**, an online reporting system.

Beginning in 2009, all applicable off-road diesel vehicles were required to be reported to CARB. When a diesel vehicle is reported in DOORS, the engine is assigned a unique EIN. The vehicle must be labeled within 30 days of receiving this EIN. You can learn more about labeling and reporting in DOORS on the **DOORS Resources (https://ww3.arb.ca.gov/msprog/offroadzone/landing/doorsresources.htm)** page. This page contains userguides and training videos to help you report in DOORS.

DOORS Reporting System ► (https://ssl.arb.ca.gov/ssldoors/doors_reporting/doors_login.html)
DOORS Resources ► (https://ww3.arb.ca.gov/msprog/offroadzone/landing/doorsresources.htm)

Frequently Asked Questions

Learn More ▼

Click a topic from the left sidebar to view available resource documents. These documents answer commonly asked questions regarding the Off-Road Diesel Regulation:

Overview Applicabilty Definitions	## Overview ⤓**Compliance Overview: (https://ww2.arb.ca.gov/sites/default/files/classic/msprog/ordiesel/f road-requirements.pdf)**Overview of off-road regulation requirements, including those in effect now and future requirements. ⤓**Regulation Overview**

Compliance Reporting Two-Engine Vehicles Retrofits Funding and Other Topics	**(https://ww2.arb.ca.gov/sites/default/files/classic/msprog/ordiesel/f final.pdf)** (**English (https://ww2.arb.ca.gov/sites/default/files/classic/msprog/ordiesel/f final.pdf)** or **Español (https://ww2.arb.ca.gov/sites/default/files/classic/msprog/ordiesel/f** Explanation of the applicability of the rule and a summary of requirements.

Forms

Learn More ▼

↓ **Responsible Official Affirmation of Reporting (ROAR) (https://ww2.arb.ca.gov/sites/default/files/2020-05/MSCD_HDORSB_143_Regulation_for_inuse_offroad_diesel_fueled_fleets_responsible_officia**
Required for large fleets beginning in 2012, for medium fleets beginning in 2016, and for small fleets beginning in 2018. Must be completed and submitted to CARB by March 1st each year annual reporting is required.

↓ **Designated Official (https://ww2.arb.ca.gov/sites/default/files/2020-05/mscd_hdorsb_178_regulation_for_in-use_off-road_diesel_fueled_fleets_designated_official_form.pdf)**
The Responsible Official will use this form to designate a person to be responsible for signing the ROAR and/or other forms required under the Off-Road Regulation.

↓ **Hour Meter Reading Log for Designated Low-Use Vehicles Operated Inside and Outside of California (https://ww2.arb.ca.gov/sites/default/files/2020-06/MSCD_HDORSB_144_regulation_for_in_use_off_road_diesel_fueled_fleets_low_use_vehicle_**
Required for large fleets beginning March 1, 2012 for vehicles designated as low-use that operate both inside and outside of California.

↓ **Hour Meter Reading Log for Vehicles Designated as Agricultural (https://ww2.arb.ca.gov/sites/default/files/2020-06/MSCD_HDORSB_145_regulation_for_in_use_off_off_road_diesel_fueled_fleets_vehicles_usec**
Required for large fleets beginning March 1, 2012 for vehicles designated as agricultural (used for agricultural purposes 51-99% of the time).

Important Deadlines

Learn More ▼

JANUARY 1, 2022 - All fleets must meet emission performance and reporting requirements.

MARCH 1, 2022 - Deadline to complete annual reporting requirements, including the Responsible

Official Affirmation of Reporting form.

<u>JANUARY 1, 2023</u> - Small fleets may no longer add a vehicle with a Tier 2 engine to its fleet. The engine tier must be Tier 3 or higher. Medium and large fleets may not add tier 2 engines as of January 1, 2018.

WE THE PEOPLE

of Ventura, in order to ensure that our City continues to be a great place for us to live . . .

ACHIEVING THE VISION

2005 ventura general plan

CITY OF SAN BUENAVENTURA

2005 VENTURA GENERAL PLAN

ADOPTED AUGUST 8, 2005

RESOLUTION NOS.2005-072 AND 2005-073

The following people contributed to the preparation of the 2005 Ventura General Plan:

CITY COUNCIL
Brian Brennan, Mayor
Carl E. Morehouse, Deputy Mayor
Neal Andrews, Council Member
Bill Fulton, Council Member
James L. Monahan, Council Member
Sandy E. Smith, Council Member
Christy Weir, Council Member

PLANNING COMMISSION
Carolyn Briggs, Chair
Curt Stiles, Vice Chair
Ronald Allen, Commissioner
Michael Faulconer, Commissioner
Martel Fraser, Commissioner
Bill Growdon, Commissioner
John Hecht, Commissioner

GENERAL PLAN COMMITTEE
Carolyn Briggs, Planning Commission Chair
Michael Faulconer, Commissioner
Bill Fulton, Council Member
John Hecht, Commissioner
Sandy E. Smith, Council Member
Christy Weir, Council Member

VENTURA VISION SEIZE THE FUTURE STEERING COMMITTEE
Sandy Smith
Brian Brennan
Lauri Flack
Bill Fulton
Lynn Jacobs
James Monahan
Ted Temple

COMPREHENSIVE PLAN ADVISORY COMMITTEE
Dan Long, Chair
Rob Corley, Vice Chair
Darlene Benz
Bart Bleuel
Don Bowles
Holly Breiner
Carolyn Briggs
Dan Cormode
Tim Dagodag
Karen Flock
Fred Gientke
Rondi Guthrie
Jorge Gutierrez
Margaret Merryman
Carl E. Morehouse
Kioren Moss
Jaime Santana
Bob Tobias
Dan Wolnick

SEIZE THE FUTURE CITIZENS OUTREACH COMMITTEE (Ventura Vision – 2000)

Bill Fulton, Chair
Roma Armbrust, At-large
John Ashkar, Building Industry Association
Michael Carney, Utilities
Geoff Cline, Patagonia/Large employer
Mary Cook, At-large
Curtis Cormane, Midtown Community Council
John Correa, At-large
Jerry Dannenberg, Ventura Unified School District
Jim DaPra, Small employer
Mike Del Dosso, Westside Community Council
Kenneth R. Edwardsen, At-large
Kay Faulconer, Ventura Community College District
Darlene Fuller, South Coast Area Transit
Debbie Giles, At-large
Jannes Gofourth, Red Land Clearing, Small employer
Doug Halter, Downtown Community Council
Gary Jacobs, Ventura Port District
John S. Jones, At-large
Joe Kreutz, Banking
Leslie Leavens-Crowe, Cultural Affairs Commission
Greg Lowe, Kinkos/Large employer
Lanette McCaslin, Pierpont Community Council
Carl Morehouse, American Planning Association
Glen Morris, Public Art Commission
Paul E. Newman, Parks & Recreation Commission
Clark Owens, At-large
Michael Paluszak, Seaside Park/Ventura County Fairgrounds
Marcia Rhodes, Tourism Commission
Marty Robinson, County of Ventura
Betty Sherman, League of Women Voters
Chris Stephens, Ventura County Transportation Commission
Neal K. Subic, American Institute of Architects
Zoe Taylor, Greater Ventura Chamber of Commerce
Paul Thompson, East Ventura Community Council
Stephen B. Thompson, American Society of Civic Engineers
George Tillquist, Library Commission
Bob Tobias, Agriculture
Eric Werbalowsky, Environmental Organizations

CITY STAFF
Rick Cole, City Manager
Mary Walsh, Deputy City Manager
Bob Boehm, City Attorney
Susan J. Daluddung, Community Development Director

Lead Staff
Ann B. Daigle, Urban Development Manager
Kari Gialketsis, Principal Planner
Jim Neuerburg, Assistant City Attorney II
Lisa Y. Porras, AICP, Senior Planner, Project Manager
Eric W. Lentz, Associate Planner
V.S. Chandrashaker, Associate Transportation Engineer

TECHNICAL CONSULTANTS
TO THE CITY -
Lead Consultants

Crawford Multari and Clark Associates
Paul Crawford, Prinicipal
Charlie Knox, Senior Associate
Lisa Wise, Associate

Rincon Consultants, Inc.
Stephen Svete, AICP, President
Joseph Power, AICP, Principal

TECHNICAL CONSULTANTS
TO THE CITY -
Supporting Consultants
Austin Foust Associates
Terry Austin

Cotton/Bridges/Associates - A Division of P&D Consultants
Karen Warner

Moore Iacofano Goltsman, Inc.
Sam Gennawey
Steve Reiner

Moule & Polyzoides
Stefanos Polyzoides
Bill Dennis

PSOMAS
Mike Swan

Stanley R. Hoffman Associates
Stan Hoffman

CITY STAFF
Supporting Staff
Houshang Abbassi, Deputy Building Official
Roger Adams, GIS, Systems Analyst II
Alvin Adora, Mail/Print Shop Aide
Lisette Alivandivafa, Office Services Supervisor
Dave Armstrong, Downtown Project Manager
Kyle Ashby, Website Specialist
Dori Boyer, Secretary
Joey Briglio, Assistant Planner
Elena Brokaw, Community Services Director
Martin Brown, Senior Inspector
Peter Brown, Community Services Manager
Shelly Brown, Executive Assistant
Jennie Buckingham, CDBG Associate Planner
Ron Calkins, Public Works Director
Kevin Colin, Interim Senior Planner
Judy Devine, Community Services Manager
Annett Ewing, Senior Office Assistant
Quinn Fenwick, Lieutenant, Police
Roxanne Fiorillo, Assistant City Clerk
Kelly Flanders, Senior Office Assistant
Robert Garven, Print Services Leadworker
Greg Gilmer, Golf Services Manager
Cary Glenn, Public Services Assistant
Bill Hatcher, Housing, Senior Planner
Brian Haworth, Associate Planner
Suzanne Hense, Word Processing
Alex Herrera, Senior Planner
Priscilla Holmes, Graphics
Iain Holt, Associate Planner
Margaret A. Ide, Associate Planner
Luz Juachon, Secretary
Mike Lavery, Fire Chief
Veronica Ledesma, Junior Planner
Tom Mericle, Transportation and Traffic Engineer
Pat Miller, Police Chief
Kaye Mirabelli, Administrative Services Director
Mike Montoya, Parks Manager
Frank Nelson, Civic Engineer
Richard Newsham, Marketing Specialist
Kelly Nicely, Marketing Specialist
Jim Passanisi, Water Superintendent
Stratis Perros, Interim Senior Planner
Mabi Plisky, City Clerk
Ventura Police Department
Andrew Powers, Marketing Specialist
Elaine Preston, Deputy City Clerk
Teresa Purrington, Management Technician
Rick Raives, City Engineer
Brian Randall, Associate Planner
Robert Sanchez, Secretary
Andrew Stuffler, Building Official/Fire Marshall
Anne Simmons, Administrative Secretary
Alison Sweet, Associate Civic Engineer
Don Taylor, GIS, Systems Analyst I
Sue Torres, Administrative Secretary
Yvonne Velasco, Printer II
Jenise Wagar, Civic Engagement Manager
Roger Wang, Management Analyst I
Debby Welch, Senior Office Assistant
Sid White, Economic Development Manager
Bob Williams, Principal Civil Engineer
Pat Womack, IT/Word Processing
Felix Yzaguirre, Engineering Technician

…and to the countless citizens who gave their time and energy towards the making of this plan.

This plan is dedicated to the citizens of Ventura.

August 8, 2005

In loving memory of Roma Armbrust and
Dennis R. Mackay

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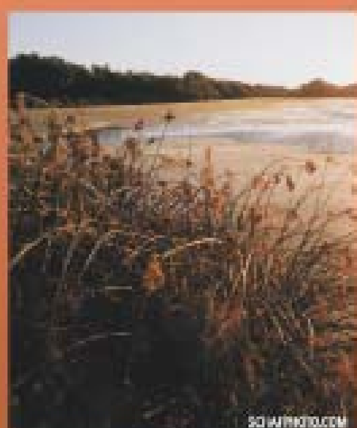
ATTACHMENTS

TABLES

FIGURES

ventura's general plan

OVERVIEW



"The building of cities is one of man's greatest achievements. The form of his city always has been and always will be a pitiless indicator of the state of his civilization. This form is determined by the multiplicity of decisions made by the people who live in it."
— Edmund N. Bacon
Design of Cities, 1967

CITY OF VENTURA

We, the people of Ventura, in order to ensure that our City remains a great place for us to live ...

. . . establish these goals for our community's future:

OUR NATURAL COMMUNITY

Our goal is to be a model for other communities of environmental responsibility, living in balance with our natural setting of coastline, rivers, and hillside ecosystems.

OUR PROSPEROUS COMMUNITY

Our goal is to attract and retain enterprises that provide high-value, high wage jobs; to diversity the local economy; to increase the local tax base; and to anticipate our economic future in order to strengthen our economy and help fund vital public services.

OUR WELL-PLANNED COMMUNITY

Our goal is to protect our hillsides, farmlands, and open spaces; enhance Ventura's historic and cultural resources; respect our diverse neighborhoods; reinvest in older areas of our community; and make great places by insisting on the highest standards of quality in architecture, landscaping and urban design.

OUR ACCESSIBLE COMMUNITY

Our goal is to provide residents with more transportation choices by strengthening and balancing bicycle, pedestrian and transit connections in the City and surrounding region.

OUR SUSTAINABLE INFRASTRUCTURE

Our goal is to safeguard public health, well being and prosperity by providing and maintaining facilities that enable the community to live in balance with natural systems.

OUR ACTIVE COMMUNITY

Our goal is to add to and enhance our parks and open spaces to provide enriching recreation options for the entire community.

OUR HEALTHY AND SAFE COMMUNITY

Our goal is to build effective community partnerships that protect and improve the social well being and security of all our citizens.

OUR EDUCATED COMMUNITY

Our goal is to encourage academic excellence and life-long learning resources to promote a highly-educated citizenry.

OUR CREATIVE COMMUNITY

Our goal is to become a vibrant cultural center by weaving the arts and local heritage into everyday life.

OUR INVOLVED COMMUNITY

Our goal is to strive to work together as a community to achieve the Ventura Vision through civic engagement, partnerships, and volunteer service.

State law requires each California city to adopt a comprehensive, long-term General Plan for the physical development of the community that guides local decision-making by expressing community goals about the future distribution and character of land uses and activities. The plan should be comprehensive by both covering the City's entire planning area and addressing the broad range of issues facing the community, including physical, social, aesthetic and economic concerns. The plan must be internally consistent and serve as a long-term guide, establishing policies for day-to-day land use decisions over an approximately 20-year period.

Introduction and Background

"To remain successful, Ventura must periodically renew itself, re-examine its goals and create a shared vision to guide the community into the future."

With these opening words, the citizens of our community proclaimed the **Ventura Vision,** which was unanimously accepted by the City Council in March 2000. That landmark report captured the results of "a partnership encompassing city government, non-profit organizations, community groups, businesses, schools and individual residents to chart the community's future through a process of visioning."

Building on that shared vision, the City embarked on an effort to revise the 1989 Comprehensive Plan that served as the General Plan that all cities are required by State law to use to guide land use, transportation and other important policy decisions. This new General Plan is the culmination of that effort to translate the Ventura Vision into a coherent and comprehensive implementation plan to guide future development and preservation.

Throughout the visioning process and at the ballot box, Ventura residents have made clear we want a well-planned approach to managing growth. We don't want continued suburban sprawl paving over farm land and sensitive hillside areas. Instead, we want vacant or run-down properties to be improved with high quality "infill" to provide new jobs, new homes and new stores and services.

Managing growth to improve our quality of life and standard of living is the smart thing to do. Ventura residents don't want uncontrolled growth and suburban sprawl. We also don't want traffic gridlock, more "cookie cutter" tract houses or housing prices that make Ventura unaffordable for working families. By targeting new development to areas that would benefit from reinvestment – and by respecting our historic character and sense of place – "smart growth" is a better alternative.

Our vision is for a prosperous and well-planned community. Smart Growth emphasizes reusing existing buildings and land, revitalizing our historic downtown and neighborhoods, and protecting the environment for future generations. Smart Growth channels new businesses and homes into appropriate areas. It also provides options for public transportation, creates neighborhoods where homes are in walking distance of local services and ensures green space for public use.

We seek to protect and enhance our unique "sense of place" that builds on our pride in Ventura's history and natural setting. Instead of new development that looks like everywhere else, our vision is for interesting, unique neighborhoods and districts, which reflect our values and heritage. The policies for pursuing these goals are spelled out in this new General Plan.

The Ventura General Plan

The *2005 Ventura General Plan* is the second in a series of three connected documents that will guide future conservation and change in the city. The *Ventura Vision* set the stage for this plan and enumerated four overarching principles that were affirmed by the community to guide Ventura into the future:

- Reach broadly and deeply into the community.
- Build on existing cultural, natural, and economic assets.
- Emphasize and encourage connections within the community.
- Work proactively and collaboratively to achieve the community's shared vision.

The final piece of the trilogy is a form-based *Development Code*. This code represents a new approach to zoning that prioritizes the appearance of development, while still ensuring that neighboring land uses are compatible and appropriate.

The *General Plan* will be put into action through the Development Code and a variety of other mechanisms, such as a mobility plan, specific plans, community plans, and capital improvement projects that will together shape the future of Ventura. The *General Plan* purposefully anticipates the *Code* focusing on the districts, corridors, and neighborhood centers where future change will be most pronounced.

The following vision statements reflect a high level of community consensus about a desired future for Ventura.

In the future, Ventura is a community that…

Environment

- Seeks sustainability by simultaneously promoting ecological health, economic vitality, and social well-being for current and future generations.
- Acts as an environmentally responsible model for other coastal areas.
- Protects and restores the natural character of its beaches, ocean views, hillsides, barrancas, and rivers as a scenic backdrop for its high quality urban environment.

Economy

- Develops a flourishing and balanced economy by encouraging a broad range of high quality employment and entrepreneurial opportunities.
- Encourages private economic development that supports public services and amenities associated with high quality of life.
- Has a vital, prosperous, and stable economy while maintaining its small-town feel.
- Is noted for private and public sector cooperation that enhances economic vitality.
- Actively participates in regional economic development efforts.

Planning, Design, and Circulation

- Retains its character as an attractive coastal town by growing slowly and sustainably, and by emphasizing its history, diversity, and natural environment.
- Cherishes its distinctive, diverse, and eclectic neighborhoods, and preserves their character.
- Has safe, accessible, and balanced transportation that promotes multiple modes of travel to local and regional destinations.

Social Activity

- Is known as an inclusive, diverse, and tolerant place that welcomes and celebrates all people.
- Provides all residents access to quality and affordable health and social services.
- Recognizes the importance of children and seniors by providing exceptional cultural, educational, and social support programs.
- Offers a diverse range of active and passive recreation for residents and visitors of all ages and abilities.
- Is dedicated to educational excellence and an emphasis on lifelong learning.
- Celebrates and is enriched by the arts and diverse cultural opportunities.

Collaboration

- Encourages residents to collaborate with each other and City government in an informed, active, and constructive manner to assess and resolve common issues.

ventura
seize the future

Building on the Vision

Following adoption of the *Ventura Vision*, the City Council established a 19-member Comprehensive Plan Advisory Committee (CPAC) to shape the *Vision* concepts into issues and priorities for revision of the 1989 Comprehensive Plan. The CPAC included representatives of varied interests, including neighborhoods, agriculture, seniors and schools, as well as one member from the Planning Commission and one from the City Council. The committee met more than 30 times over almost three years. During that effort, the City published the August 2002 *Comprehensive Plan Update Background Report*, which provides a highly detailed account and analysis of opportunities and constraints that affect planning and land use in Ventura. This ultimately led to their findings, contained in the September 2003 *CPAC Issues & Alternatives Report*.

CPAC endeavored to create strategies to resolve planning and land use issues in Ventura utilizing the smart growth principles formulated by the U.S. Environmental Protection Agency:

- Mix land uses.
- Achieve compact building design.
- Provide a range of housing opportunities.
- Create walkable neighborhoods.
- Foster distinctive, attractive communities with a strong sense of place.
- Preserve open space, farmland, natural beauty, and critical environmental areas.
- Strengthen and direct development toward existing communities.
- Provide a variety of transportation choices.
- Make development decisions predictable, fair, and cost effective.
- Encourage community collaboration in planning decisions.

The recommendations of the CPAC were presented to the Planning Commission and City Council. After several months of reviewing the CPAC recommendations, the Planning Commission in December 2003 made some modifications to the CPAC's recommended land use scenario.

The City Council met 11 times from February through August 2004 to consider the CPAC and Planning Commission recommendations, review relevant data, and formulate broad goals, policies, and a diagram to guide growth and change in the City until 2025. In September 2004, the City Council established an ad-hoc General Plan Committee consisting of three Planning Commissioners and three City Council members to work with City staff and consultants to ensure that the *General Plan* would be completed expeditiously and with ample public participation, and to ensure open communication, transparency, and coordination among all parties interested in the creation of the *Plan*. All of the CPAC, Planning Commission, City Council, and General Plan Committee workshops, meetings, and hearings were open to the public and included significant, meaningful, and often extensive citizen input and participation.

Goals *summarize how conservation, development, and future growth should occur by identifying physical, economic and social ends that the community wishes to achieve.*

Policies *establish basic courses of action for the Planning Commission and City Council to follow in working to achieve community goals, by directly guiding the response of elected and appointed officials to development proposals and related community actions.*

Actions *need to be undertaken by the City to implement policies.*

Plan Format

The comprehensive and involved process of creating what is really a totally new (not just updated) *General Plan* – based on a new community vision and smart growth principles – resulted in a new set of goals, policies, and actions to guide future decision-making in Ventura that truly reflect the planning objectives of the community. These policy directives are organized by subject area in *General Plan* Chapters 1 through 10, which follow the organizational framework established in the *Ventura Vision* (see Table 1). Each topic is introduced with an overarching goal that carries forward the *Vision*, a description of issues needing resolution and methods for remedying them, and finally measurable policies and actions to achieve those solutions. Each of the policies contained within the Plan are intended to be understood and read with the following preface: "It is the intent of the City of San Buenaventura to...". All of the actions are summarized in table form in Appendix A, along with the City department or division responsible for implementing each action and timeframe for completion. Also included in the Plan are the legally binding Appendices B through E. Attachment A is provided as a reference, while Attachment B is provided to serve as guidelines for future development until an update to the Zoning Ordinance is completed.

Table 1
General Plan Organization

Vision/General Plan Chapter	Required/*Optional* Elements	Examples of Topics Covered
1. Our Natural Community	Conservation Open Space	Open space, hillsides, watersheds, riparian areas, sensitive plants and animals
2. Our Prosperous Community	*Economic Development*	Commercial and industrial growth, economic diversification, job opportunities, tourism
3. Our Well-Planned and Designed Community	Land Use/*Design* Housing *Park & Recreation*	Development patterns, neighborhoods, visual character, urban design, streetscapes, demographics, housing needs, affordability, constraints on production
4. Our Accessible Community	Circulation	Traffic, street network, parking, transit services, bike routes
5. Our Sustainable Infrastructure	Land Use	Water supply, wastewater treatment, drainage
6. Our Active Community	Land Use *Park & Recreation*	Park and recreation facilities, youth and senior programs
7. Our Healthy and Safe Community	Safety Noise Land Use	Development in hazardous areas, hazardous waste management, seismicity, flood control, water quality, brownfields, noise, police, fire, air quality
8. Our Educated Community	Land Use	Schools and libraries
9. Our Creative Community	*Culture*	Arts, events, community programs, cultural and historic resources
10. Our Involved Community	*Citizen Input*	Participation in governance

The format of the *General Plan* satisfies the State requirement that every general plan include policies for seven "elements," as follows:

Land use – establishes the general distribution and intensity of land uses, including housing, commerce, industry, open space, education, and public facilities.

Circulation – identifies the location and type of existing and proposed highways, arterial and collector roadways, bicycle routes, and other transportation facilities.

Conservation – addresses treatment of natural and cultural resources, including watersheds, wetlands, trees, rivers and barrancas, and cultural and historic landmarks.

Housing – assesses current and projected housing needs of all segments of the community and identifies land to provide adequate housing to meet those needs. Although the City's Housing Element and Technical Report is contained in a separate document to facilitate the frequent updating required by the State, the goals, policies and programs of the Housing Element must be and are consistent with the goals, policies, and actions of the *2005 Ventura General Plan.* (See Chapter 3, page 3-28, for 2004 Housing Element Goals and Policies.)

Noise – appraises noise sources in the community and develops means to mitigate nuisances.

Open Space – details techniques for preserving open space areas for natural resources, outdoor recreation, public health and safety, and agricultural activities.

Safety – establishes policies to protect the community from risks associated with seismic, geologic, flood, fire, and other hazards.

The *General Plan* also contains a number of special elements that aren't required by State law but are integral to the unique identity of Ventura. These cover a range of topics including education, recreation, arts and culture, and community involvement in local government. Another chapter treats the very important subject of the local economy, providing guidance to citizens, City staff and policy makers regarding strategies and priorities for economic development in Ventura.

California Coastal Act

The *General Plan* also satisfies State requirements for the City's **Local Coastal Program** in accordance with the California Coastal Act (*Public Resources Code § 30000 et seq.)*. Actions in the *General Plan* that affect coastal resources are intended to become part of the Land Use Plan of the Local Coastal Program, which will be accomplished through specific or community plans for those areas. These actions are identified with the logo of the California Coastal Commission (which oversees all Local Coastal Programs). The basic goals of the State for the coastal zone are to:

- Protect, maintain, and where feasible, enhance and restore the overall quality of the coastal zone environment and its natural and artificial resources.
- Assure orderly, balanced utilization and conservation of coastal zone resources taking into account the social and economic needs of the people of the state.
- Maximize public access to and along the coast and maximize public recreational opportunities in the coastal zone consistent with sound resources conservation principles and constitutionally protected rights of the private property owners.
- Assure priority for coastal-dependent and coastal-related development over other development on the coast.
- Encourage state and local initiatives and cooperation in preparing procedures to implement coordinated planning and development for mutually beneficial uses, including educational uses, in the coastal zone.

(Public Resources Code § 30001.5)

"As age comes on, one source of enjoyment after another is closed, but Nature's sources never fail. Like a generous host, she offers her brimming cups in endless variety, served in a grand hall, the sky its ceiling, the mountains its walls, decorated with glorious paintings and enlivened with bands of music ever playing."

— John Muir
20th Century Naturalist

CITY OF
VENTURA

1. OUR NATURAL COMMUNITY

Our goal is to be a model for other communities of environmental responsibility, living in balance with our natural setting of coastline, rivers, and hillside ecosystems.

Natural Context

Ventura's natural setting is one if its greatest assets, and preserving the environment is a top community priority. Situated between the ocean, hills, and two rivers, the city affords its residents and visitors with a significant amount of accessible, beautiful, and biologically diverse open space. Although a number of programs are in place to protect coastal and watershed ecosystems and to maintain and preserve existing open lands, some natural features in and around the city have been compromised by the impacts of human activity.

As in many communities across the nation, concern is growing in Ventura about human impacts on natural resources. The historic spread of local development has given rise to grassroots efforts aimed at preserving Ventura's viable agricultural land, open space, and hillsides. The 1995 Save Our Agricultural Resources initiative (see Appendix B) and the 2001 Hillside Voter Participation Area (Appendix C) measure require voter approval before the city can expand into open space areas. The Ventura Hillsides Conservancy formed in 2003 seeks to preserve local hillsides, canyons, and open space.

Ventura, Oxnard, Ventura County, and the County Local Agency Formation Commission have adopted agreements to preserve agricultural and open space land located between the cities. A change that amends these greenbelts requires the approval of all signatories.

Protecting Ventura's fragile natural resources is a fundamental focus of the *2005 Ventura General Plan*. Policies and actions in this chapter intend to ensure that coastal, hillside, and watershed features are preserved, remain visible and accessible, and demarcate boundaries for urban development to define and enhance the city's identity.

The community cherishes the shoreline as one of Ventura's best features. Coastal facilities in the city include:

- Emma Wood State Beach
- Ventura Seaside Park and Fairgrounds
- Surfers Point at Seaside Park
- Beachfront Promenade Park
- San Buenaventura State Beach
- Pierpont Community Beach
- Marina Beach/Cove Port District Beach
- Channel Islands National Park Headquarters
- Surfers Knoll
- Santa Clara River Mouth

Coastal Resources

Ventura boasts seven miles of beautiful sand beaches and valuable shoreline habitat. This "string of pearls" has long been identified by the community as one of the city's most prized features. At its eastern end, the Ventura Harbor offers opportunities for residents and visitors to explore the local marine environment, including the Channel Islands National Park and Marine Sanctuary. Elsewhere along the coast, shoreline and dune habitat provide nesting, feeding, and mating grounds for a wide variety of wildlife, including threatened or endangered species such as the western snowy plover and the least tern.

Shoreline conservation programs underway include the Surfers Point Managed Shoreline Retreat, San Buenaventura State Beach restoration, Ventura Harbor wetland rehabilitation, and coastline water quality monitoring. The City will continue to invest in restoration to enhance the shoreline ecosystem, with the actions in this chapter augmenting current efforts.

Hillsides

The hills of the Transverse Range rise 1,200 feet above Ventura, providing an important visual backdrop that frames the City. Not only do these hills provide residents and visitors with scenic vistas, they are also part of a larger integrated ecosystem comprised by the hillsides, coastal areas, rivers and barrancas that together provide a rich habitat for many species. It is vital to the community that these hillsides that lie outside the city limits (with a County land use designation of either Open Space or Agriculture), are protected and preserved.

These hillsides, by definition, are coterminous with the Hillside Voter Participation Area, and comprise the Hillside Open Space community as depicted on the General Plan Diagram (page 3-22). Because the Hillside Voter Participation Area measure prohibits the extension of City urban services to the hillsides through 2030 without voter approval, the General Plan Diagram identifies the hillsides affected by the measure with a Planning Designation of Open Space. The full text and map of the Hillside Voter Participation Area appears in Appendix C (as required by the act). This chapter calls working with land conservation organizations to establish a Ventura hillsides preserve, and Chapter 6, *Our Active Community*, contains actions to work with the County to create public trails in the hillsides.

Definitions for “Hillside Open Space,” “Hillside Area,” “hillsides,” and “Hillside Voter Participation Area” can be found in the Glossary (Attachment A).

Rivers and Barrancas

The Ventura River flows south to the Pacific Ocean along the western edge of the city, and the Santa Clara River bisects the Oxnard coastal plain south of Ventura. A series of seasonal watercourses called barrancas traverse the city in narrow incised drainage channels running down from the hillsides. The rivers and barrancas and their larger watersheds provide undeveloped open space, riparian vegetation, wildlife habitat and corridors, recreational opportunities, and aesthetic beauty.

Where local watercourses have not been channelized, riparian trees and shrubs grow in fringing woodlands and thickets. Several sensitive bird species breed in these areas, including the least Bell's vireo, willow flycatcher, yellow warbler, and yellow-breasted chat. Steelhead and rainbow trout seasonally inhabit both the Ventura and Santa Clara Rivers.

Riparian and freshwater marsh areas in Ventura represent only a remnant of pre-human coverage, but the City has initiated conservation and restoration efforts such as the Ventura River Estuary Program to help reverse this trend. The estuaries at the mouths of the Ventura and Santa Clara Rivers serve as breeding grounds and feeding areas for migratory and resident shorebirds and waterfowl, as well as home to many terrestrial animals, fish, and free-swimming invertebrates.

Actions in this chapter – such as maintaining adequate buffers from watercourses, requiring restoration of natural drainage features, and prohibiting the placement of manmade materials in drainages – can protect and improve water and habitat quality in local watersheds. The bolder action of removing concrete channel structures would further enhance natural functions and aesthetics.

Resource Conservation

As Ventura continues to grow, conserving resources, increasing energy efficiency, and achieving environmental sustainability become ever more important. The City desires to incorporate green building measures into the design, construction, and maintenance of public and private buildings which can result in significant cost savings and promote overall health and productivity of residents, workers, and visitors to the city. Raising conservation awareness can help minimize waste and pollution released into the natural environment. Improving energy efficiency in buildings, expanding recycling programs, and reducing transportation-related energy consumption will make the city a greener place. The policies and actions in this chapter provide clear direction to guide conservation, green practices, and responsible use of resources.

Policy 1A: Reduce beach and hillside erosion and threats to coastal ecosystem health.

Action 1.1: Adhere to the policies and directives of the California Coastal Act in reviewing and permitting any proposed development in the Coastal Zone.

Action 1.2: Prohibit non-coastal-dependent energy facilities within the Coastal Zone, and require any coastal-dependent facilities including pipelines and public utility structures to avoid coastal resources (including recreation, habitat, and archaeological areas) to the extent feasible, or to minimize any impacts if development in such areas is unavoidable.

Action 1.3: Work with the State Department of Parks and Recreation, Ventura County Watershed Protection Agency, and the Ventura Port District to determine and carry out appropriate methods for protecting and restoring coastal resources, including by supplying sand at beaches under the Beach Erosion Authority for Control Operations and Nourishment (BEACON) South Central Coast Beach Enhancement program.

Action 1.4: Require new coastal development to provide non-structural shoreline protection that avoids adverse impacts to coastal processes and nearby beaches.

Action 1.5: Collect suitable material from dredging and development, and add it to beaches as needed and feasible.

Action 1.6: Support continued efforts to decommission Matilija Dam to improve the sand supply to local beaches.

Action 1.7: Update the Hillside Management Program to address and be consistent with the Planning Designations as defined and depicted on the General Plan Diagram.

Policy 1B: Increase the area of open space protected from development impacts.

Action 1.8: Buffer barrancas and creeks that retain natural soil slopes from development according to State and Federal guidelines.

Action 1.9: Prohibit placement of material in watercourses other than native plants and required flood control structures, and remove debris periodically.

Action 1.10: Remove concrete channel structures as funding allows, and where doing so will fit the context of the surrounding area and not create unacceptable flood or erosion potential.

Action 1.11: Require that sensitive wetland and coastal areas be preserved as undeveloped open space wherever feasible and that future developments result in no net loss of wetlands or "natural" coastal areas.

Action 1.12: Update the provisions of the Hillside Management Program as necessary to ensure protection of open space lands.

Action 1.13: Recommend that the City's Sphere of Influence boundary be coterminous with the existing City limits in the hillsides in order to preserve the hillsides as open space.

Action 1.14: Work with established land conservation organizations toward establishing a Ventura hillsides preserve.

Action 1.15: Actively seek local, State, and federal funding sources to achieve preservation of the hillsides.

Policy 1C: Improve protection for native plants and animals.

Action 1.16: Comply with directives from regulatory authorities to update and enforce stormwater quality and watershed protection measures that limit impacts to aquatic ecosystems and that preserve and restore the beneficial uses of natural watercourses and wetlands in the city.

Action 1.17: Require development to mitigate its impacts on wildlife through the development review process.

Action 1.18: Require new development adjacent to rivers, creeks, and barrancas to use native or non-invasive plant species, preferably drought tolerant, for landscaping.

Action 1.19: Require projects near watercourses, shoreline areas, and other sensitive habitat areas to include surveys for State and/or federally listed sensitive species and to provide appropriate buffers and other mitigation necessary to protect habitat for listed species.

Action 1.20: Conduct coastal dredging in accordance with the U.S. Army Corps of Engineers and California Department of Fish and Game requirements in order to avoid impacts to sensitive fish and bird species.

Action 1.21: Work with State Parks on restoring the Alessandro Lagoon and pursue funding cooperatively.

Action 1.22: Adopt development code provisions to protect mature trees, as defined by minimum height, canopy, and/or trunk diameter.

Action 1.23: Require, where appropriate, the preservation of healthy tree windrows associated with current and former agricultural uses, and incorporate trees into the design of new developments.

Action 1.24: Require new development to maintain all indigenous tree species or provide adequately sized replacement native trees on a 3:1 basis.

Policy 1D: Expand the use of green practices.

Action 1.25: Purchase and use recycled materials and alternative and renewable energy sources as feasible in City operations.

Action 1.26: Reduce pesticide use in City operations.

Action 1.27: Utilize green waste as biomass/compost in City operations.

Action 1.28: Purchase low-emission City vehicles, and convert existing gasoline-powered fleet vehicles to cleaner fuels as technology becomes available.

Action 1.29: Require all City funded projects that enter design and construction after January 1, 2006 to meet a design construction standard equivalent to the minimum U.S. Green Building Council LEED™ Certified rating in accordance with the City's Green Building Standards for Private and Municipal Construction Projects.

Action 1.30: Provide information to businesses about how to reduce waste and pollution and conserve resources.

Action 1.31: Provide incentives for green building projects in both the public and private sectors to comply with either the LEED™ Rating System, California Green Builder, or the Residential Built Green program and to pursue registration and certification; incentives include "Head-of-the-Line" discretionary processing and "Head-of-the-Line" building permit processing.

Action 1.32: Apply for grants, rebates, and other funding to install solar panels on all City-owned structures to provide at least half of their electric energy requirements.

Action 1.33: Publicly acknowledge individuals and businesses that implement green construction and building practices.

"Every increment of construction should be done in such a way as to heal the city."

— Christopher Alexander
Author of *A Pattern Language*, 1977

CITY OF
VENTURA

2. OUR PROSPEROUS COMMUNITY

Our goal is to attract and retain enterprises that provide high-value, high wage jobs; to diversify the local economy; to increase the local tax base; and to anticipate our economic future in order to strengthen our economy and help fund vital public services.

Adapting in the 21st Century

Great communities are prosperous communities. A successful city brings people, institutions, ideas, and capital together in creative ways that enrich the lives of those who live and work there. In today's global economy, high-wage high-value jobs are the foundation of the prosperity that instills a city with the financial resources necessary to provide high quality of life and excellent community amenities.

Ventura has been blessed with a history of prosperity, thanks in large part to success in harnessing the area's natural assets for economic benefit. For most of the 20th Century, Ventura was sustained largely by its role as the hub of the region's oil and agriculture industries. These two sectors not only provided a stable source of jobs and business opportunities, but also helped to shape Ventura's role as the legal, governmental, and cultural center of the County.

In the 21st Century, however, Venturans can't take continued prosperity for granted. Competition occurs regionally, nationally, and globally for innovative businesses, top talent, and good jobs. The community must build on its resources and constantly be on the lookout for new economic opportunities.

County government will likely remain the city's largest employer, providing an important element of economic stability, but government employment is not likely to grow significantly. Oil and agriculture will continue to be important, but their roles are diminishing. While Ventura is a regional center for healthcare, that industry will continue to face intense pressures to reduce costs. Still, the City of Ventura is positioned to move into an era dominated by innovation and reliant on emerging technologies. Cities and regions that excel in the "New Economy" promote high tech industries and boast a high quality of life. Likewise, to remain competitive, Ventura must continue to support economic development, but also create a more attractive living environment, including by providing appropriate housing for all segments of the local workforce. Efforts to boost economic development must be supported by a high quality of life, including a thriving cultural arts scene, award winning schools, and an engaged community. Tourism is also a strong market for Ventura. The beaches, museums, downtown, harbor and the nearby Channel Islands National Park attract more than 1.5 million visitors a year.

The policies and actions in this chapter seek to identify business niches that can thrive locally to diversify the economic base and ensure future community prosperity.

Economic Challenges

Ventura faces a variety of interrelated challenges to continued economic vitality, including:

1. Capturing a share of high-value job markets, such as biotechnology, computer software, communications, entertainment, multimedia, education, and business and financial services.

2. Diversifying the local economy to reduce dependence on the service, retail, and government sectors.

3. Building on the success of the tourism, manufacturing, business, and financial services sectors through marketing and job training programs that will ensure retention and attraction of these enterprises.

4. Finding appropriate locations for commercial and industrial land, including through revitalization opportunities in the Westside and Downtown and possibly via annexations of sites in the North Ventura Avenue and 101 Business Corridor areas.

5. Expanding the retail base, because sales tax represents a major City revenue source.

6. Providing housing for the full range of workforce households at all income levels.

7. Providing adequate infrastructure and financing resources.

Meeting all of these challenges in an integrated, strategic manner will be necessary to achieve long-term economic stability and success. The City must endeavor to identify the businesses most likely to remain and grow in an area that has very high costs – especially for housing – but also has outstanding community amenities, including good weather, a spectacular natural setting, and a safe and desirable community fabric.

The *Ventura Vision* calls for targeting industries that demonstrate the greatest promise for long-term community prosperity by:

- Providing high-wage, high skilled jobs,
- Possessing a local competitive advantage in the global economy,
- Being committed to local responsibility,
- Growing from local ownership, control or management,
- Practicing environmental leadership in their markets, and
- Strengthening the community's creative, cultural identity.

The *Vision* also offers principles for the City to pursue in charting future strategies for economic development:

- Encourage a broad range of high-quality employment and entrepreneurial opportunities.
- Encourage private economic prosperity that can support public services and quality-of-life amenities.

- Develop a vital, prosperous, and stable economy while maintaining a "small-town" flavor.
- Encourage the public and private sectors to work together to achieve prosperity.
- Participate constructively in regional economic development efforts.

Implementing these strategies will not be simple or easy. For one reason, California's current tax system contains provisions that result in some of the lowest-paying economic sectors providing the city with the most tax revenue, and vice versa.

Pillars for Prosperity

Community prosperity is not something that a city government can create by itself. Any successful economic development effort requires the participation of many partners, including community-based business organizations, educational and training institutions, venture capitalists, individual entrepreneurs and business owners, networks of suppliers, and other government agencies that have a mission to enhance prosperity.

Together, the City and its economic partners must ensure that the building blocks for community prosperity are in place. These foundations include organizations and institutions that can coordinate local economic development efforts, as well as land and other economic infrastructure required to make Ventura an attractive business location.

This organizational infrastructure is evolving in Ventura. Business groups such as the Chamber of Commerce and the Ventura County Economic Development Association (a countywide group) are already active, but a wider network is needed to assemble the resources and capacity of entrepreneurs, venture capitalists, educators, and other stakeholders in building a healthy business climate. Greater synergy is needed among the area's higher education institutions – including California State University Channel Islands, Ventura College, Brooks Institute, and satellite campuses of other colleges and universities.

Appropriate and sufficient land will also be necessary to ensure continued economic prosperity over the next 20 years, even as we seek to protect open space and combat sprawl. Demand for land to support retail and office development is likely to outstrip current supply unless allowable building intensities are significantly increased. While some increased density is likely, and some older industrial land may be recycled for new business uses, the City must take care to reserve sufficient land for these purposes – especially in an environment where short-term pressure is likely to encourage conversion of land to commuter housing.

Thus, the strategy for community prosperity must be coordinated with area-specific planning efforts, especially on the Westside (where industrial land is likely to be recycled), Downtown (which must stress office, studio, and retail business growth as well as an emerging residential component), and in the 101 Corridor between Mills Road and

Johnson Drive (where most of the city's business activity now takes place). The City will advance on a set of defined focused areas:

Auto Center – efforts over the short term will focus on making the area a regional retail destination. The City will strengthen its partnership with Auto Center dealers to realize beautification projects and facilitate land use entitlements for additional dealerships.

McGrath Property – the 76-acre site provides Ventura with the very best opportunity to attract new industry with high-value, high-wage jobs. The City and property owners will work on securing project entitlement approvals and recruiting desired tenants. The objective is to attract targeted industries and provide the impetus for initial site development over the short-term.

Westside – the feasibility of establishing a redevelopment project area will be considered by the City and Westside citizens. Such legal designation would provide the resources needed to leverage and implement planned initiatives in various Westside plans. Brownfield reuse efforts will also continue to secure funding for much needed site assessment and remediation activities.

Upper North Avenue – the objective is to transform this area from an oilfield industrial area to a dynamic economic engine. Development efforts will address reuse of the former USA Petroleum site, including and evaluation of the site's potential to emerge as a component of a campus expansion opportunity for Brooks Institute. Keys to this effort are site remediation, compatibility issues, and future annexation to the City.

Downtown – proposed initiatives include well defined design standards in the updated Downtown Specific Plan, enhanced efforts to market the Downtown Cultural District, formation of a downtown management entity, and attracting uses that create "around–the-clock" activity.

Anticipating Our Economic Future – Ventura's economic growth is built on a foundation of concerted efforts that fuel innovation, collaboration, and continuous learning. The focus will be on attracting high technology and knowledge-based businesses including biotechnology, non-durable manufacturing, and business and financial services. Continuous learning opportunities for job seekers, workers, and employers will acknowledge demographic pressures and rapidly changing skill needs. Through specific strategies, the community will develop leaders for tomorrow, and attract and retain new graduates and skilled employees. Critical players will include the Workforce Investment Board, Ventura College, California State Channel Islands, and the Brooks Institute.

The policies and actions in this chapter attempt to provide the means to support these targeted efforts to achieve a stable and balanced economic base.

Policy 2A: Establish a clear economic strategy.

Action 2.1: Track economic indicators for changes that may affect City land resources, tax base, or employment base, such as terms and conditions of sale or lease of available office, retail, and manufacturing space.

Action 2.2: Prepare an economic base analysis that identifies opportunities to capture retail sales in sectors where resident purchasing has leaked to other jurisdictions.

Action 2.3: Maintain and update an Economic Development Strategy to implement City economic goals and objectives.

Policy 2B: Make the local economic climate more supportive of businesses investment.

Action 2.4: Map priority locations for commercial and industrial development and revitalization, including a range of parcel sizes targeted for high-technology, non-durables manufacturing, finance, business services, tourism, and retail uses.

Action 2.5: Share economic and demographic information with organizations that may refer businesses to Ventura.

Action 2.6: Encourage intensification and diversification of uses and properties in districts, corridors, and neighborhood centers, including through assembly of vacant and underutilized parcels.

Action 2.7: Partner with local commerce groups to recruit companies and pursue funding for business development and land re-utilization.

Action 2.8: Carry out Housing Element programs that provide housing to all segments of the local workforce.

Action 2.9: Expedite review for childcare facilities that will provide support to local employees.

Policy 2C: Encourage niche industries.

Action 2.10: Expedite review of the entitlement process for installation of infrastructure necessary to support high technology and multimedia companies.

Action 2.11: Allow mixed-use development in commercial and industrial districts as appropriate.

Action 2.12: Allow uses such as conference centers with resort amenities on appropriately sized and located parcels.

Action 2.13: Market the city to businesses that link agriculture with high technology, such as biotechnology enterprises.

Action 2.14: Partner with local farms to promote farmers markets and high quality locally grown food.

Policy 2D: Expand tourism opportunities.

Action 2.15: Provide incentives for use of waterfront parcels for recreation, visitor-serving commerce, restaurant, marina, and fishing uses.

Action 2.16: Work with the State to create year-round commercial opportunities at the fairgrounds.

Action 2.17: Partner with the Harbor District and National Park Service to promote Channel Islands tours and develop a marine learning center.

Action 2.18: Prioritize uses within the Harbor master plan area as follows: (1) coastal dependent, (2) commercial fishing, (3) coastal access, and (4) visitor serving commercial and recreational uses.

Action 2.19: Partner with hotels and the Chamber of Commerce to promote city golf courses.

Action 2.20: Promote outdoor recreation as part of an enhanced visitor opportunities strategy.

ventura's general plan

OUR WELL PLANNED COMMUNITY

"Communities should be designed to serve the cycle of the day and the cycle of the lifetime."

— Andres Duany
Architect & Town Planner

CITY OF
VENTURA

3. OUR WELL PLANNED & DESIGNED COMMUNITY

Our goal is to protect our hillsides, farmlands and open spaces; enhance Ventura's historic and cultural resources; respect our diverse neighborhoods; reinvest in older areas of our community; and make great places by insisting on the highest standards of quality in architecture, landscaping and urban design.

Our City

Ventura is a unique coastal community, proud of our heritage and dedicated to being a national model for effectively managing growth to protect our natural environment and continue to be a great place for us to live.

It is our public responsibility to plan and shape the physical realm to achieve these goals. Past policies, particularly the 1989 Comprehensive Plan, reined in rapid outward suburban sprawl. The 1992 Downtown Specific Plan set the direction for revitalization of the historic heart of our community. Voter-approved measures clearly underscored a mandate to protect agricultural resources and open space, particularly in our hillsides.

Guided by the Ventura Vision of 2000, the centerpiece for this General Plan is creating a "well-planned and designed community." The policies build on the foundation of the past. This plan also represents an historic commitment to *smart* growth:

1. Mix land uses
2. Take advantage of compact building design
3. Create a range of housing opportunities and choices
4. Create walkable communities
5. Foster distinctive, attractive communities with a strong sense of place
6. Preserve open space, farmland, natural beauty, and critical environmental areas
7. Strengthen and direct development toward existing communities
8. Provide a variety of transportation choices
9. Make development decisions predictable, fair, and cost effective
10. Encourage community and stakeholder collaboration in development decisions

Source: U.S. Environmental Protection Agency

"**Smart growth** is about being good stewards of our communities and of our rural lands, parks, and forests. It is about ensuring that the best of the past is preserved, while creating new communities that are attractive, vital, and enduring."
--Michael Leavitt, EPA Administrator

Infill First

Ventura today is the product of decades of earlier growth and development. These patterns have largely established our community's character and will continue to do so in the future. The passage of SOAR, the Hillside Voter Protection Area, and other land-use constraints, along with natural boundaries, such as the ocean and the rivers, make it abundantly clear that before we expand outward any further, we must pursue an "Infill First" strategy. Such a strategy will help avoid sacrificing farmland and sensitive areas in our hillsides and along our rivers.

Our “Infill First” strategy for Ventura means avoiding suburban sprawl by directing new development to vacant land in the City and Sphere of Influence (with the exception of SOAR land), and by focusing new public and private investment in carefully selected districts, corridors, and neighborhood centers where concentrated development and adaptive reuse will improve the standard of living and quality of life for the entire community.

Recognizing that the rate of future population growth is not subject to City control, this plan has been analyzed (in the accompanying Environmental Impact Report) on the basis of estimates of what new homes and other development might be expected to take place over the next twenty years (see Table 3-2). Looking at the rate of growth over the past decade and recognizing the challenges to "infill" development compared to "greenfield" expansion, a projection of roughly 8,300 additional housing units and approximately 5 million square feet of non-residential development has been used for the plan's 20 year planning horizon. Table 3-2 provides estimates of the amount of development that could reasonably be expected to occur in the City and Sphere of Influence.

The actual distribution of future growth in the City may vary based on market forces and other factors. The districts, corridors, and neighborhood center areas, shown on Figure 3-1 Infill Areas, could accommodate more development and/or a different mix of development than shown in Table 3-2. To demonstrate this, Table 3-1 shows the potential development based on the overall carrying capacity of the land.

Distribution of growth in the districts and corridors is based on the following general assumptions:

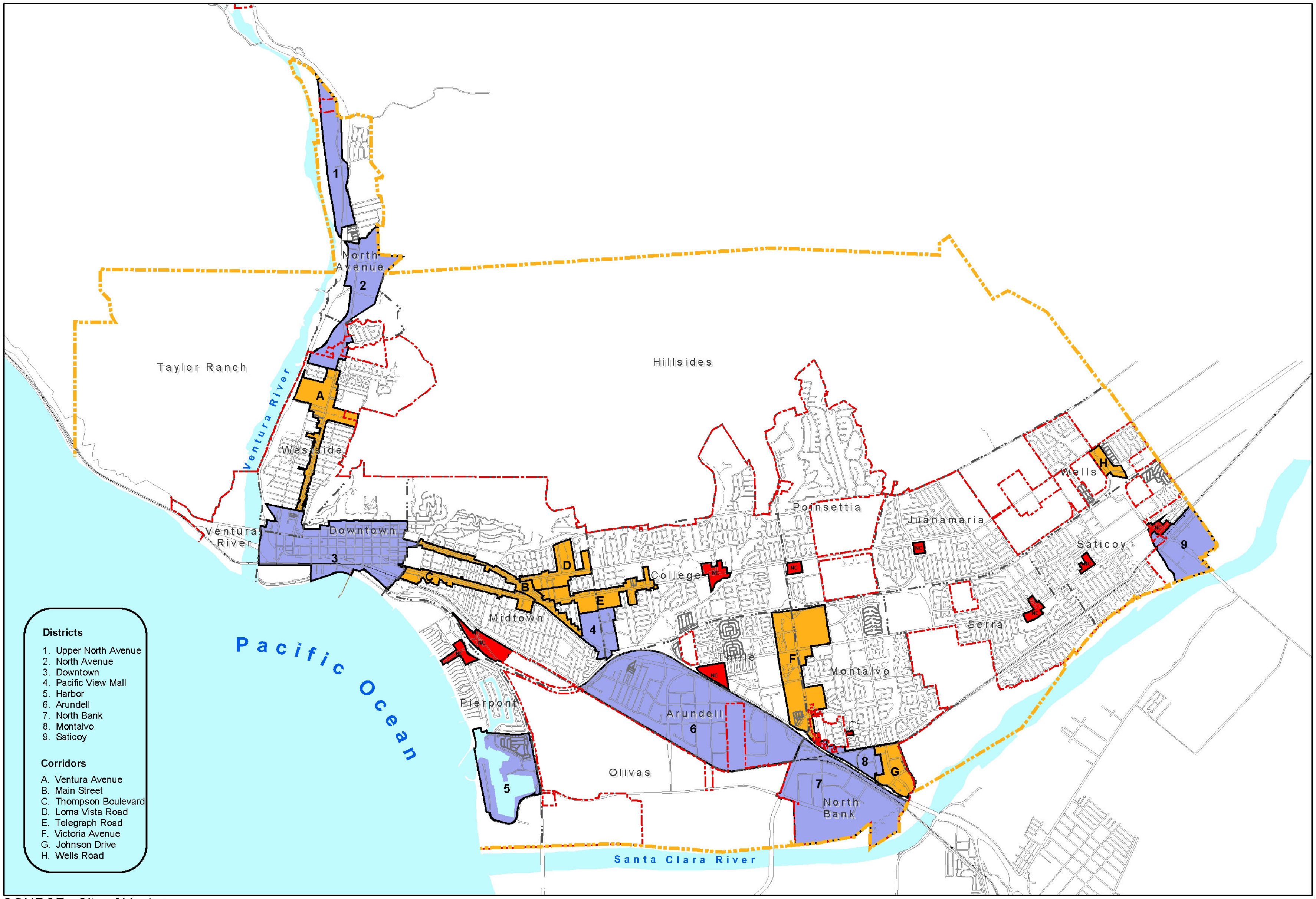
- Development in the Downtown and Harbor Districts will conform to the plans for those areas,
- The Downtown area and, to a lesser extent, the Ventura Avenue corridor will be the focus of future residential and commercial growth, and
- The Arundell, North Avenue, and Upper North Avenue areas will be the focus of future economic growth, potential expansion of the Brooks Institute, with some residential uses.

Table 3-1. Potential Development Based on Carrying Capacity of Land Area

Planning Designation	Allowed Density (du/acre)	Existing Development 2004					General Plan Capacity			
		Single Family Units	Multi Family Units	Comm./Ind. Sq. Ft.	Parcels	Acres	Vacant		Additional Potential[3]	
							Parcels	Acres	Units	Sq. Ft.
Neighborhood Low	0-8	19,425	3,335	49,386	22,511	4,629	108	426	1,221	
Neighborhood Medium	9-20	1,163	8,965	149,513	4,414	1,061	32	116	4,859	
Neighborhood High	21-54	814	2,468	194,143	1,634	303	8	16	8,477	
Commerce[1]		257	490	4,995,248	1,366	808	95	108	7,892	22,328,276
Industry[2]		29	31	8,299,840	1,037	1,401	89	392	4,724	34,215,483
Public & Institutional		4	0	54,422	66	571				
Park & Open Space		6	0	15,491	264	11,693				
Agriculture		4	0	19,550	154	6,857				
Downtown Specific Plan	21-54	332	1,543	1,795,401	1,174	307	45	20	2,500	450,000
Harbor District		0	310	350,160	10	254	1	21	300	876,100
Total		**22,034**	**17,142**	**15,923,154**	**32,630**	**27,884**	**378**	**1099**	**29,910**	**57,869,859**

1. Commerce residential unit capacity is for property within a Corridor, District, or Neighborhood Center and assumes buildout to the maximum FAR and that 25% of floor area would be commercial (with the remainder residential).
2. Industry residential unit capacity is for property within a Corridor, District, or Neighborhood Center and assumes buildout to the maximum FAR and that 75% of floor area would be industrial (with the remainder residential).
3. "Additional Potential" assumes a historic buildout rate of 70% for both residential and non-residential.

Table 3-2. Predicted Development Intensity & Pattern	Residential Development (units)	Non-Residential Development (square feet)				
		Retail	Office	Industrial	Hotel	Total
DISTRICTS						
Upper North Avenue	100	10,000	50,000	150,000	-	210,000
North Avenue	50	10,000	50,000	250,000	-	310,000
Downtown Specific Plan	1,600	100,000	200,000	-	150,000	450,000
Pacific View Mall	25	25,000	-	-	-	25,000
Harbor	300	315,000	-	-	230,000	545,000
Arundell	200	25,000	300,000	1,000,000	-	1,325,000
North Bank	50	300,000	50,000	300,000	-	650,000
Montalvo	50	-	50,000	25,000	-	75,000
Saticoy	50	-	-	25,000	-	25,000
Subtotals (Districts)	**2,425**	**785,000**	**700,000**	**1,750,000**	**380,000**	**3,615,000**
CORRIDORS						
Ventura Avenue	800	40,000	100,000	50,000	-	190,000
Main Street	100	15,000	40,000	-	-	55,000
Thompson Boulevard	300	15,000	40,000	-	-	55,000
Loma Vista Road	25	15,000	40,000	-	-	55,000
Telegraph Road	250	15,000	40,000	-	-	55,000
Victoria Avenue	50	15,000	40,000	-	-	55,000
Johnson Drive	150	50,000	20,000	-	-	70,000
Wells Road	50	15,000	20,000	-	-	35,000
Subtotals (Corridors)	**1,725**	**180,000**	**340,000**	**50,000**	**0**	**570,000**
SPHERE OF INFLUENCE (SOI)/OTHER INFILL/NEIGHBORHOOD CENTERS						
101/126 Agriculture	200	-	-	-	-	-
Wells/Saticoy	1,050	-	-	-	-	-
Pierpont	100	30,000	-	-	-	30,000
Other Neighborhood Centers	100	-	-	-	-	-
Second Units	300	-	-	-	-	-
Underutilized	250	-	-	-	-	-
Vacant	450	165,000	50,000	-	-	215,000
Subtotals (Other Infill)	**2,450**	**195,000**	**50,000**	**0**	**0**	**245,000**
TOTAL INFILL	***6,600***	***1,160,000***	***1,090,000***	***1,800,000***	***380,000***	***4,430,000***
PLANNED AND PENDING DEVELOPMENTS						
Downtown	50	1,072	-	-	150,000	151,072
Ventura Avenue/Westside	238	7,086	-	27,000	-	34,086
Midtown	34	13,751	-	-	-	13,751
College (Telegraph/Loma Vista)	4	2,718	8,843	-	-	11,567
Telephone Road Corridor	256	-	54,785	-	-	54,785
Montalvo/Victoria	296	-	4,300	-	-	4,300
Saticoy/East End	840	7,950	5,600	-	-	13,550
Arundell	-	41,640	42,614	18,080	-	102,334
Olivas	-	7,160	7,066	390,053	-	404,279
Subtotals (Planned/Pending)	**1,718**	**81,377**	**123,214**	**435,133**	**150,000**	**789,724**
TOTAL (Infill+SOI/Other+Pending)	**8,318**	**1,241,377**	**1,213,214**	**2,235,133**	**530,000**	**5,219,724**



SOURCE: City of Ventura

Infill Sites

- Corridor
- Neigborhood Center (NC)
- District
- City Limits
- Planning Boundary
- Planning Neighborhoods

This map is a product of the City of San Buenaventura, California. Although reasonable efforts have been made to ensure the accuracy of this map, the City of San Buenaventura cannot guarantee its accuracy.

Figure 3-1
Infill Areas

Footnotes for Table 3-2:
Growth estimates for the Arundell community consider the likely development of the 75-acre McGrath property with a mix of uses and development of other vacant lands. Growth estimates for the North Bank area consider the possibility of a large retailer in that area. Estimates of growth in the SOI/Other Infill sites are based on the following general assumptions: (a) 101/126 Orchard site will develop similarly to a project recently proposed for that site; (b) Wells/Saticoy sites will develop in accordance with ongoing planning efforts for those areas; (c) the Pierpont area will develop generally in accordance with a conceptual project recently considered by the City; (d) Second Units will be added at a rate of 15/year; (e) roughly half of underutilized lands identified in the Housing Element will be re-developed over the next 20 years; (f) all vacant lands outside the districts and corridors will be developed in accordance with the proposed planning designations. Planned and Pending Developments based upon the City's 2004 Pending Projects list. Building areas do not include self storage facilities.
The following potential projects not included in the 2004 Planned and Pending Developments list have been included in the future development totals: (1) 150,000 square feet of industrial development in the North Bank area; (2) 165,000 square feet of retail development along Wells Road in the Saticoy area; (3) 50,000 square feet of office development on a 3.5-acre site along Ralston Drive. The Auto Center industrial project is included in the North Bank district; the other two projects are included in the "vacant" category. The square footage associated with these projects has been added to the projections of future growth to provide a conservative analysis of possible future impacts.

Together Table 3-2 and Figure 3-1, Infill Areas, offer a sense of how much growth Ventura might experience by 2025, and a picture of where such change is likely to occur. Precisely how and when development happens and what resources are conserved will be determined by the actions presented in the ten chapters of the *General Plan*, and by the specific land development standards. This plan is one of many tools the City will use to control where and how any future development takes place.

21st Century Tool Kit

The City has a wide array of tools at its disposal to achieve our "Infill First" strategy in ways that respect Ventura's heritage and result in beautiful buildings, blocks, streetscapes, and public places that enhance and enrich quality of life for the entire community. Shaping the City's physical form in the 21st Century will be achieved most effectively and aesthetically by combining Planning Designations with a transect-based approach, and with a new form-based Development Code. Together these can strongly influence the design and functioning of Ventura's distinct and unique neighborhoods, districts, and corridors.

The policies and actions in this chapter seek to enrich Ventura's urban fabric through appropriate design that showcases the attractive features of neighborhoods, districts, and corridors. To promote high-quality infill, the policies and actions encourage neighborhood centers, pedestrian access, established and desirable building types, and dynamic, neighborhood-serving nodes of mixed-use development along primary streets and corridors. This chapter specifically calls for detailed attention to community design through a form-based approach.

Neighborhoods: The Basic Building Blocks of Community

Like any great city, Ventura has grown around the basic unit of the neighborhood. A true neighborhood is not a subdivision of similar houses disconnected from surrounding places. Instead it is an identifiable area containing a neighborhood center with a pedestrian-friendly mix of uses and a palette of housing types for people in all stages of their lives. Neighborhoods are often defined by a quarter-mile "pedestrian shed" (see Figure 3-2), in which most residents' daily needs can be met within a five-minute walk. The organic nature of neighborhoods and their interdependency is what makes them viable for generations. Neighborhoods are not static places that resist change, but rather evolve naturally through periods of transformation to accommodate new residents' needs and desires.

> "In a neighborhood, everything that is needed is there and everything that is there is needed."
> - Anonymous

SOURCE: City of Ventura, Created for the Midtown Ventura Design Charette, March 2005

Figure 3-2
Pedestrian Shed, Theoretical versus Actual

Northeast corner of Five Points

Theoretical 5 minute walk (1/4 mile)

Theoretical 10 minute walk (1/2 mile)

Actual 5 minute walk (1/4 mile)

Actual 10 minute walk (1/2 mile)

The City is rich in a variety of neighborhoods, most of which are within one of Ventura's distinct communities. A total of 17 communities were identified in the 1989 Comprehensive Plan and have been carried forward, with some modifications to allow for a more detailed approach to describe Ventura's geography. Figure 3-3 illustrates 19 distinct communities, some of which are composed of a group of neighborhoods, each boasting their own unique attractions and potential. The oldest settled area is nearest the ocean, with newer areas found eastward, with the exception of Saticoy. Some of Ventura's communities have neighborhood centers established around parks, community gathering places, or civic buildings, and contain or are near services they share with surrounding areas, such as schools, libraries, post offices, and specialty shopping.

Ventura also has residential subdivisions and commercial and industrial districts that could evolve into true neighborhoods. A long-term strategy should be developed to gradually transform these areas that do not yet follow the neighborhood pattern. Existing subdivisions could be linked by pedestrian routes to new small-scale retail and service centers. Congested commercial areas could be redesigned as mixed-use centers on a grid of streets with walkable blocks that connect with surrounding neighborhoods and central plazas. These streets could be lined with buildings containing upper level housing and lower level commercial, office, and civic spaces that hide internal parking structures. Industrial sites that are fast converting to light industry, high tech manufacturing, and assembly could become factory villages with green space, multiple types of housing, small-scale retail to serve workers, and spin-off businesses.

Ventura's 19 communities (Figure 3-3) can each be enriched by using the *transect* (see discussion page 3-10) as a lens to understanding the ways in which it functions and by applying form-based development controls to respect and enhance its character to ensure that, where appropriate, each community provides one, if not more, walkable neighborhoods.

SOURCE: City of Ventura

City Limits

Planning Communities

Figure 3-3
Planning Communities

This map is a product of the City of San Buenaventura, California. Although reasonable efforts have been made to ensure the accuracy of this map, the City of San Buenaventura cannot guarantee its accuracy.

Taylor Ranch
This area is essentially undeveloped, with agriculture as the primary activity. Taylor Ranch is within the City's Planning Area, including a portion within the Coastal Zone Boundary.

Ventura River
This area includes the Ventura River Basin, is within the Coastal Zone Boundary, and with Emma Wood State Beach Park, its major activity is recreation offering day use and overnight camping. Opportunities exist for passive recreation and nature study.

Hillside Open Space
Within the City's Planning Area, is undeveloped, and designated Open Space. Plant communities include chaparral, riparian willow forest, and oak woodland. This area has tremendous potential for passive recreation including scenic trails with panoramic views. This area is coterminous with the Hillside Voter Participation Area or "HVPA" (see Chapter 1 and Appendix C).

North Avenue
Within the City's Planning Area. Historically, largely oilfield industrial. Includes both the Upper North Avenue and North Avenue districts, and is home to the Brooks Institute, which is world renown for its professional photographic and motion picture education. Opportunities exist to strengthen the economy of this area and provide for the expansion of the Brooks Institute into a campus-village including spin-off businesses with a mix of housing types and transit options for all ages.

Westside
Includes the Ventura Avenue corridor and is home to several neighborhood centers that are surrounded by well-connected neighborhood blocks. Opportunities exist to realize the potential of neighborhood improvements initiated in ongoing and past grassroots efforts, such as the Westside Revitalization Plan. This community includes "Hillside Areas" (see definition in Attachment A), which are subject to the Hillside Management Program that provides necessary development criteria in order to retain the natural qualities and minimize potential hazards.

Downtown
The area is regulated by the Downtown Specific Plan. This community is both an urban core with opportunity to grow economically stronger, and the historic center of the City. Civic uses include City Hall, Seaside Park, Grant Park, the Ventura County Museum, San Buenaventura Mission, and is home to a number of historic sites and landmarks. Additional opportunity to enhance the area's already strong cultural climate, including art, cookery, music, performance, and entertainment. Tremendous potential to create "around-the-clock activity" leading to increased vitality. This community includes "Hillside Areas".

Midtown
Includes the Main, Thompson, and Loma Vista corridors, a portion of the Telegraph corridor, as well as the Seaward/Alessandro neighborhood center. Home to the Pacific View Mall, the City's Bus Transfer Center, Ventura High School. Blanche Reynolds Park, Ocean Avenue Park,

and Memorial Park. Includes a small amount of agriculture. Opportunities exist to realize potential improvements initiated in ongoing and past grassroots efforts, such as Midtown by Design, and more recently the Midtown Urban Design Charrette. This community includes "Hillside Areas".

Pierpont

Within the Coastal Zone Boundary, a unique-beach oriented predominantly residential community, with high-quality beachfront homes. Includes the Harbor district and the Pierpont neighborhood center. Home to the Ventura Harbor, Seaward Elementary School, a mobile home park, and Marina Park. Currently offers highway retail such as motels, hotels, and fast food, but opportunity exists to offer residents and visitors with more attractive and improved neighborhood and coastal oriented services and to develop a specific plan for the Harbor district.

College

Includes a portion of the Telegraph corridor, and the College/Day neighborhood center. Major civic uses are Arroyo Verde and Camino Real Park, Ventura Community College and Buena High School. This community includes "Hillside Areas".

Thille

Includes the Gateway neighborhood center and shares the Victoria corridor with Montalvo to the east. Contains mix of housing types built mostly between 1960 and 1980, with some newer development in the 1990's and early 2000's. Its primary civic use is the County Square Linear Park

Arundell

This community contains the main industrial and warehouse district of Ventura, but also has mixed-use areas with retail, restaurants, and offices within walking distance of many workers. Callens Road, the historic center of this community, has great potential to expand and increase the mix of uses it contains, including residential. A significant vacant parcel, the 75-acre McGrath property, offers great economic opportunity to attract new industry that provides high value, high wage jobs to the City.

Olivas

Predominantly agricultural. Its major civic use is the Olivas Park Golf Course and is home to the Olivas Adobe. Contains some commercial and industrial.

North Bank

This community contains a portion regulated by the Auto Center Specific Plan. Its major civic use the Buenaventura Golf Course. Predominantly industrial, with some agriculture. Opportunity to enhance the area as a regional retail destination, while providing workforce serving retail uses.

Poinsettia

Includes the Victoria Plaza neighborhood center. Its primary civic uses include elementary and middle schools. Predominantly residential, with some housing in the Hillside Area, and a significant amount of agricultural operations.

Montalvo
Includes the Johnson Drive corridor, Bristol neighborhood center, and shares the Victoria corridor with Thille to the west. Its major civic use is the County Government Center (equal size to 12 downtown blocks), but also the Rancho Ventura Linear Park and the Barranca Vista Park. Contains mix of housing types and is home to the Metrolink Station.

Serra
Includes the Telephone/Petit neighborhood center, and is home to the City's newest civic use – the Community Park, set to open Fall 2005. Also includes the Chumash Park, Junipero Serra Park, North Bank Linear Park, and Bristol Bay Linear Park. Contains a significant amount of agricultural land.

Juanamaria
Includes the Kimball/Telegraph neighborhood center. Primary civic use is Hobert Park; this community contains some agricultural land.

Wells
Includes the Wells corridor. The Brown Barranca runs through the northerly portion of this area. Contains agricultural land.

Saticoy
Includes the Telephone/Cachuma and Saticoy neighborhood centers and the Saticoy district. Developed originally as a rural town in the late 1800s, Saticoy has the full range of transect characteristics: from the Santa Clara river and the rural eastern edge, to its neighborhood centers, and a mix of housing types at various intensities. Its major civic uses are the Fritz Huntsinger Youth Sports Complex, Saticoy Regional Golf Course and the Saticoy neighborhood park.

Planning Designations and Transect Zones

Land in the City's Planning Area is divided into eight basic Planning Designations on the General Plan Diagram (page 3-22). Each acknowledges a particular predominant development pattern that exhibits certain desirable characteristics, such as building types and functions that can be measured and described.

The wide range of building forms in Ventura offers great potential for compatible infill and viable mixed-use projects in existing neighborhoods, districts, corridors, and neighborhood centers. The wealth of building types includes attached and detached housing, duplexes, courtyard bungalows, second units (often over garages), lofts (some live-work), urban villas, neighborhood shopfronts, concentrated retail developments, and civic buildings. Public buildings retain special importance by serving as prominent landmarks that shape the visual character of the city.

Streetscapes set the tone for quality of life in Ventura by providing the shared outdoor living space of the community. Although the city's distinct neighborhoods, commercial and industrial districts, and agricultural areas are linked by corridors that have evolved primarily to accommodate motor vehicles, opportunities abound to make those streets more livable and to focus activities in neighborhood centers that emphasize walking, biking, and public gathering, and thereby ease traffic and reinforce community vitality. Accordingly, new development needs to be high quality, compact, and walkable, and it should incorporate design diversity that increases lifestyle choices and bolsters commerce and industry.

Determining which building types are most appropriate in specific locations requires shifting away from conventional zoning that emphasizes use toward a form-based approach that prioritizes function, appearance, and compatibility with surrounding context. A powerful tool for understanding this context is the *Transect*, which depicts the continuum from rural to urban conditions (see Figure 3-4).

The transect is a tool that can be used by the community to understand and describe the full range of unique environmental and built characteristics within each of Ventura's neighborhoods. Using the six parenthetical transect zones to better understand the broad Planning Designations of the General Plan Diagram, a finer-grained (site specific) set of development standards can be created to ensure that new development is in keeping with local preferences for building.

This new Development Code will better accommodate the diversity of lifestyles Ventura desires – from the *rural* farm to the *sub-urban* house and yard to the *urban core* with apartments above shops – and will contribute to the identity and character desired by the community. Common elements that the transect will help measure and describe, and that the Development Code will prescribe, include the types and arrangements of buildings, their “intensity” of lot coverage, height and mass, the details of streets, public and private frontages and the requirements for and character of open spaces. In general it will prescribe individual neighborhood preferences for urban design and building characteristics, including standards.

In many cases, area specific codes, applying the Planning Designations including districts, corridors, and neighborhood centers, will be developed as part of community or specific plans that establish a detailed strategy for public and private investment and policies to promote the appropriate preservation and development of community desired character.

The following descriptions of the Planning Designations include a parenthetical reference to the transect zones they encompass that will be used as guidance in interpreting the planning designations while drafting detailed plans and codes:

"A **transect** is a geographical cross-section of a region used to reveal a sequence of environments. For human environments, this cross-section can be used to identify a set of habitats that vary by their level and intensity of urban character, a continuum that ranges from rural to urban. In transect planning, this range of environments is the basis for organizing the components of the built world: building, lot, land use, street, and all of the other physical elements of the human habitat."
--SmartCode, Volume 6.5, 2005

"All architecture should be beautiful. All towns should be beautiful. Beauty nurtures the soul and the spirit. It makes life worth living."
-Camillo Sitte

- Neighborhood Low – *(T3 Sub-Urban and T4 General Urban)*
  emphasizes detached houses with some attached units in a small mix of building types from 0 up to 8 dwelling units per acre. Predominantly residential, with opportunity for limited home occupation and neighborhood services sensitively located along corridors and at intersections.

- Neighborhood Medium – *(T3 Sub-Urban, T4 General Urban and T5 Urban Center)*
  anticipates a mixture of detached and attached dwellings and higher building types at approximately 9 to 20 dwelling units per acre. Predominantly residential with small scale commercial at key locations, primarily at intersections and adjacent to corridors.

- Neighborhood High – *(T3 Sub-Urban through T6 Urban Core)*
  accommodates a broader mix of building types, primarily attached, from 21 to 54 dwelling units per acre; A mix of residential, commercial, office, and entertainment that includes mixed-use buildings.

- Commerce – *(T4 General Urban through T6 Urban Core, neighborhood center downtown, regional center, town center or village center)*
  encourages a wide range of building types of anywhere from two to six stories (depending on neighborhood characteristics) that house a mix of functions, including commercial, entertainment, office and housing.

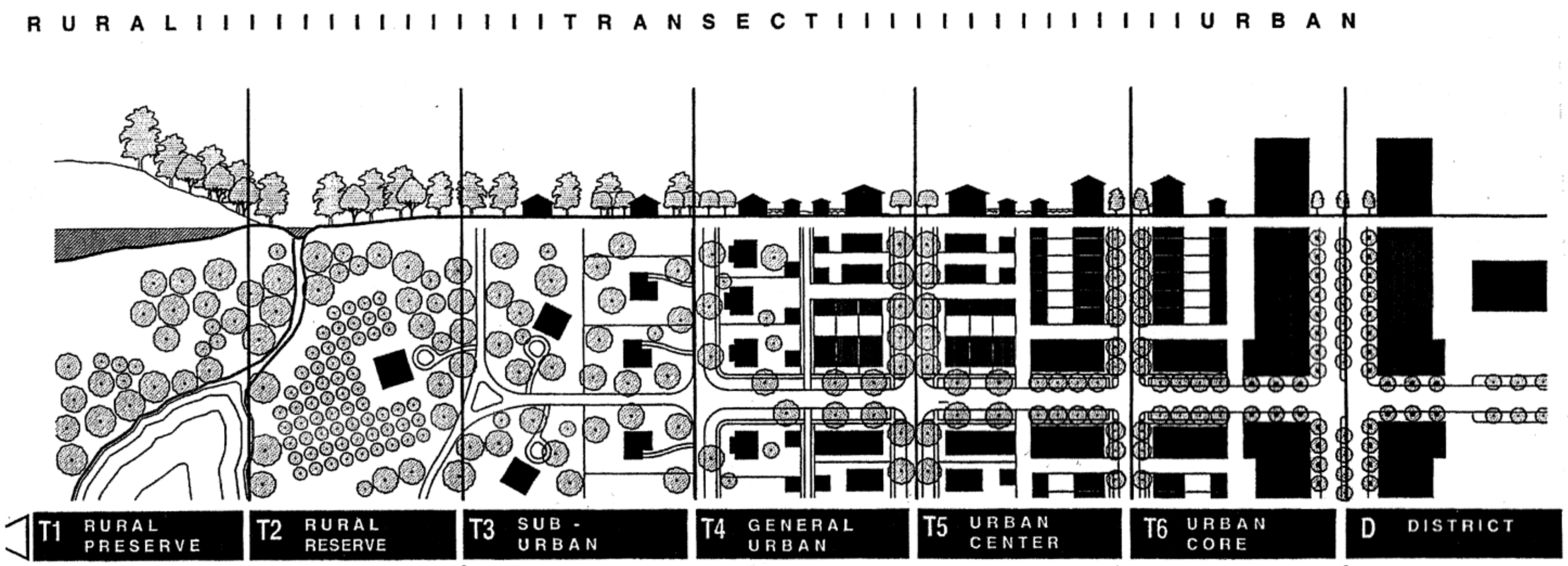
- Industry – *(T2 Rural through T6 Urban Core)*
  encourages intensive manufacturing, processing, warehousing and similar uses, as well as light, clean industries and support offices; also encourages workplace-serving retail functions and work-live residences where such secondary functions would complement and be compatible with industrial uses. Primarily large-scale buildings. Also can be developed as Transit Oriented Development, employment center or working village with a mix of uses.

- Public and Institutional – *(T1 Preserve through T6 Urban Core)*
  accommodates civic functions such as government offices, hospitals, libraries, schools and public green space.

- Agriculture – *(T2 Rural)*
  predominantly commercial cultivation of food and plants and raising of animals.
  Pursuant to SOAR: The Agricultural use (not to be considered until after the Year 2030) category identifies those lands that are designated for agricultural use on the General Plan Diagram. The target date of 2030 associated with the Agricultural Use designation indicates a review date after which agriculturally designated lands may be reconsidered for urban uses. However, during the life of this Plan as amended by initiative, it is intended that only agricultural uses are permitted on these lands, except as such lands may be appropriate to public open space and recreational usage. Furthermore, any updates to this Plan are not intended to imply that development would necessarily be appropriate at that time.

- Parks and Open Space – *(T1 Preserve through T6 Urban Core)*
  designate lands to public recreation and leisure and visual resources, and can range from neighborhood tot lots and pocket parks to urban squares and plazas and playgrounds to large regional parks and natural preserves.

Figure 3-4. The Transect



Transect: a system of ordering human habitats in a range from the most natural to the most urban. For convenience, the Transect is divided into six zones which describe the physical character of place at any scale, according to the intensity of land use and urbanism. The T-Zones are T1 Natural, T2 Rural, T3 Sub-Urban, T4 General Urban, T5 Urban Center, and T6 Urban Core.

Natural Zone (T1): consists of lands approximating or reverting to a wilderness condition, includes lands unsuitable for settlement due to topography, hydrology, or vegetation.

Rural Zone (T2): consists of lands in open or cultivated state or sparsely settled. These may include woodlands, agricultural lands, grasslands and irrigable deserts.

Sub-Urban Zone (T3): though similar in density to conventional suburban residential areas, differs by its superior connectivity and by allowing home occupations. It is typically adjacent to other urban T-zones. This zone is naturalistic in its planting. Blocks may be large and the roads irregular to accommodate site conditions.

General Urban (T4): has a denser and primary residential urban fabric. Mixed-use is usually confined to certain corner locations. This zone has a wide range of building types: singles, side yard and rowhouses. Setbacks and street tree settings are variable.

Urban Center (T5): is the equivalent of the main street area. This zone includes mixed-use building types that accommodate retail, offices and dwellings, including rowhouses and apartments. This zone is a tight network of streets and blocks with wide sidewalks, steady street tree planting and buildings set close to the frontages.

Urban Core (T6): is the equivalent of a downtown. It contains the densest urbanism – the tallest buildings and the greatest variety of uses, particularly unique ones such as financial districts and important civic buildings. This zone is the least naturalistic of all the zones; street trees are formally arranged or non-existent.

Source: Duany, Plater Zyberk & Company's SmartCode, Volume 6.5, Spring 2005

The General Plan Diagram (page 3-22) also depicts the Downtown, Auto Center, and Saticoy Village Specific Plan areas, which are subject to detailed standards for form and use. In addition, the Diagram identifies Districts, Corridors, and Neighborhood Centers – where the development of housing alongside commercial uses is specifically encouraged. These Districts, Corridors, and Neighborhood Centers make up the growth priority areas as the City's "Infill First" strategy (See Figure 3-1 Infill Areas).

Districts, Corridors, and Neighborhood Centers

One of the primary objectives for infill in Ventura is to produce mixed-use development that places most people's daily needs within walking distance of their dwellings. This may include encouraging "flex space" where a single building functions as both living and working area for the owner, combining housing and commercial uses in the same structures, or sensitively integrating small-scale retail, service, and entertainment within convenient distance of residential areas. Mixed-use places inherently reduce automobile trips and improve the pedestrian experience, resulting in safer neighborhoods, healthier citizens, and better access to everyday needs. The City's corridors and districts already encompass significant mixed-use development. Opportunities exist to augment those areas in ways that complement and enhance existing urban form and streetscapes to better serve Ventura's residents.

Districts

Districts consist of streets or areas emphasizing specific types of activities and exhibiting distinct characteristics. A neighborhood or parts of neighborhoods can form a district. A thoroughfare may also be a district, such as when a major shopping avenue runs between adjoining neighborhoods. The following nine districts are depicted on the General Plan Diagram:

1. Upper North Avenue – home to a mix of industrial uses, including an abandoned oil refinery and Brooks Institute. Tremendous opportunities exist for the remediation and reuse of the former USA Petroleum site, as well as for the expansion of the Brooks Institute as a campus village, surrounded by a green edge to define the upper limits of Ventura.

2. North Avenue – an area with oilfield, industrial, and residential development, which has potential to fully develop into a more balanced mix of building types and uses with unique character, to serve as a major neighborhood anchor for northwest Ventura.

3. Downtown – the most intensely developed area of the city and its urban core. The Downtown Specific Plan regulates this area. Proposed initiatives include well-defined design standards via the Downtown Specific Plan update; enhanced efforts to market the Downtown Cultural District; formation of a

downtown management entity; and attracting uses that create “around–the-clock” activity.

4. Pacific View Mall – an enclosed shopping center and adjacent commercial uses. Large expanses of surface parking paired with significant building mass offer opportunity for the reintroduction of the block pattern and a reinvention of single-use retail into a much more sustainable mix of high intensity uses.

5. Harbor – an area with visitor serving uses, marine facilities, boating and commercial and recreational fishing activities, as well mixed-use places. A specific plan (based on the draft Harbor Master Plan) is being prepared for the Harbor District that will ensure a mix of uses, including residential, and highly defined public frontages and shared civic space for increased accessibility to ocean-front amenities.

6. Arundell – is currently an industrial center with a mix of small-scale industrial uses, business park development, and limited retail services. The McGrath Property – is a 76-acre site of undeveloped land that could provide the catalyst for Ventura’s redefinition of 21st Century light industry, manufacturing, research and development, and technological innovation. It is centrally located in the Arundell area, which is ripe for redevelopment into a new form of community plan and building that incorporates large-scale employment, workforce housing and neighborhood commercial in an economically diverse setting.

7. North Bank – a combination of automobile retail, regulated by the Auto Center Specific Plan, and industrial/business park uses. Auto Center – efforts over the short tem will focus on making the area a regional retail destination. The City will strengthen its partnership with Auto Center dealers to realize beautification projects and facilitate land use entitlements for additional dealerships, as well as nurture creative partnerships to discover potential for unique attractions of regional interest.

8. Montalvo – an area of industrial and heavier commercial uses, and currently home to the Metrolink Station. Because of the strategic location of this area between east and west Ventura and it’s transportation-rich infrastructure, it needs a strong plan for connectivity and a strategic mix of uses for evolution that is economically sustainable.

9. Saticoy – a mix of homes, older industrial and agricultural operations, and the planned site for the County maintenance yard. The Saticoy Village Specific Plan governs a small portion of this area. A larger effort should ensure Saticoy’s seamless connection with adjacent areas, including a greenspace and circulation plan.

Corridors

Corridors, which can be natural or urban, often form boundaries, as well as connections, between neighborhoods and/or districts. Natural corridors can be those such as streams, barrancas, canyons, or green parkways. Urban corridors can be transportation thoroughfares that frequently encompass major access routes, especially ones with commercial destinations, including transit routes and rail lines. The following eight urban corridors are depicted on the General Plan Diagram. Each has the potential to evolve into a vibrant mixed-use City street with a distinct character borrowed from the neighborhoods that share it:

A. Ventura Avenue – a mix of older, small-scale commercial, industrial, and residential uses, with potential to grow even more vibrant by building on existing strengths, including its historic role as a major "working center." Using the warehouse model and diversity of building materials as a cue, "The Avenue" could harness cultural expression and become an eclectic center for the emerging arts and manufacturing crafts.

B. Main Street – currently a commerce-oriented area with a limited amount of mixed use development, this corridor displays the broadest range of architectural types and styles in the city, as well as the widest spectrum of transect characteristics. It has the most potential for increased mixed use and housing with improved streetscape and pedestrian enhancement to slow traffic.

C. Thompson Boulevard – a commercial thoroughfare in need of streetscape improvements and pedestrian amenities, this corridor is much like Main Street in that it boasts tremendous history as a "gateway to Ventura" and epitomizes a beach town character. It is a natural for a major transit or streetcar corridor, where nodes of mixed-use development and pedestrian and bike enhancement could support parallel neighborhoods and increase access to the ocean.

D. Loma Vista Road – a mix of commercial and residential development at varying scales, with a high concentration of medical facilities, this is the ideal place for Ventura to focus on creating a concentration of medical and research-centered business, with a high intensity of workforce housing and services housed in large-scale mixed-use buildings of high-tech character and serviced by increased transit.

E. Telegraph Road – a sub-urban-scale commercial area with some detached homes and multifamily buildings. The City's bus transfer station is located along this corridor, creating the perfect opportunity for a multi-modal connection with an intense node of housing and employment. The streetscape could change character along its length, with a mixture of intensities of development.

F. Victoria Avenue – currently a wide artery with high traffic volumes and shopping centers, Victoria needs effective traffic management and pedestrian and streetscape improvements with strong attention to additional mobility options. Actions in this General Plan, along with the new Development Code, will call for revitalizing this corridor by redesigning the current array of single-use shopping centers and retail parcels with a mix of building types, uses, and public and private frontages. By eliminating "big box", mega-block, auto-oriented strip development, and the traffic patterns it generates, Victoria Avenue could create tremendous opportunity for healthy economic investment in walkable blocks, connected to better serve surrounding neighborhoods. Creative solutions, including dedicating transit or streetcar lanes, wider sidewalks, and bike lanes could transform Victoria's image into a regional thoroughfare of great and sophisticated diversity. All new commercial development within the Victoria Avenue corridor must follow this approach.

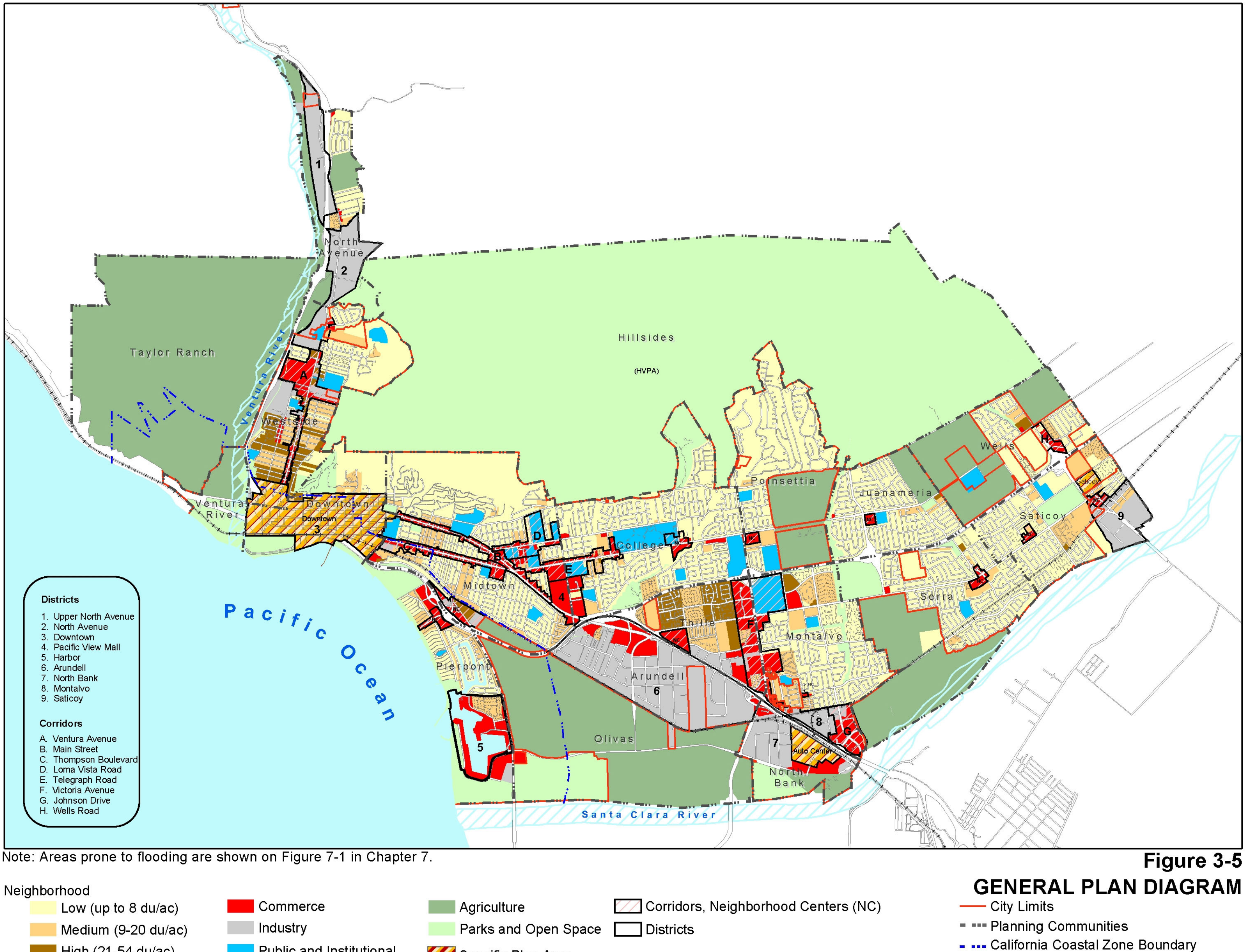
G. Johnson Drive – a connector between eastern Ventura and Highway 101 with sub-urban scale retail. Opportunities exist for high-quality, mixed-uses (such as child-care, restaurants, offices, light industrial, and housing) with ground floor commercial space to strengthen its economic presence and provide a visual gateway.

H. Wells Road – a mix of older industrial uses and newer sub-urban commercial and residential development. Well's Road should be returned to the neighborhoods it serves, so that new development can emulate the country charm that existed prior to its widening. Traffic calming in appropriate locations would encourage neighborhood connectivity, and end the current trend toward walls and buildings that turn their back to the street. This would also encourage redevelopment of the old neighborhood centers.

Neighborhood Centers

Community evolves from individual conversations and the best places to grow community are in individual neighborhoods. Every neighborhood should have at least one center where people can meet by chance at a local coffee shop, market, bookstore, diner, or even hardware store. *Our Involved Community* needs places to gather to have meaningful conversations and share civic information. Ventura's existing neighborhood centers have the opportunity to become such places. The General Plan Diagram identifies 10 neighborhood centers – where the development of housing alongside commercial uses is specifically encouraged. These centers include:

(1) Pierpont, (2) Seaward/Alessandro, (3) College/Day, (4) Gateway Plaza, (5) Victoria Plaza, (6) Bristol, (7) Kimball/Telegraph, (8) Petit/Telephone, (9) Telephone/Cachuma, and (10) Saticoy.



Note: Areas prone to flooding are shown on Figure 7-1 in Chapter 7.

Figure 3-5
GENERAL PLAN DIAGRAM

Special Topics

Agricultural Lands

During the 20th Century, the value of agricultural land in Ventura became secondary to that for development. However, this pattern is not irreversible, and protecting green land to save the aesthetic beauty of open space, preserve the cultural landscape of the community's heritage, and conserve land for environmental quality are high priorities in Ventura. In fact, the land's historic role for food production may soon be more highly valued once again, as prime agricultural areas continue to disappear to development at an astounding rate.

Ventura is fortunate to retain much of its rural landscape. Agriculture still plays an important role in the economy of the City and County of Ventura. Significant yields are made possible by the presence of high quality soils, adequate water supply, favorable climate, long growing season, and level topography. Mechanisms such as the California Land Conservation Act (more popularly known as the Williamson Act), the Save Our Agricultural Resources (SOAR) initiative (see Appendix B), and greenbelt agreements with neighboring jurisdictions continue to help maintain a balance between urban growth and agricultural preservation. The SOAR initiative that was adopted by the voters in 1995, and that, by its own terms, remains in full legal effect until 2030, refers to specific policies from the 1989 Comprehensive Plan that are still in effect and, as such, have been carried forward into this Plan under Policy 3D and Action 3.20 in addition to being incorporated in this General Plan as set forth in Appendix B.

A primary agricultural concern is the potential conflict with adjacent urban uses over pesticides, dust, odors, noise, and the visual impact of large greenhouses. Other issues of importance to agricultural producers include restrictions on farm-related activities, access to water, and provision of farmworker housing. Paralleling these concerns is a community interest in sustainability, the ability to provide for the needs of future generations. The policies and actions in this chapter intend to sustain viable farm operations in areas designated for agricultural use.

Growth Management

Growth management seeks to preserve public good, improve social equity, and minimize adverse impacts of development while still accommodating new housing and business attraction. The effects of growth management policies on housing prices are complex due to the idiosyncrasies of local real estate markets. Properly designed, growth management programs can plan for all development needs, such as open space, access to public transportation, and walkable neighborhoods.

The City's Residential Growth Management Program (originally established in 1979 to ensure that housing development would not outpace needed infrastructure) has not always contributed to housing affordability or quality design. This General Plan calls for revising the Residential

Subsequent to the adoption of the **SOAR** initiative, there have been two general plan amendments, which redesignated individual agricultural properties through a vote of the electorate as required by SOAR. These remain in full legal effect and have been carried forward into this Plan. These include the new Community Park at Kimball Road and the southeast corner of Montgomery and Bristol (see Appendix E and F).

Growth Management Program with an integrated set of growth management tools. Such tools not only include the adoption of a new form-based Development Code, but also community or specific plans based on availability of infrastructure and resources.

Long Term Potential Expansion Strategy

Indeed, the community has indicated that before the City expands any further, the first priority for achieving planning goals should be in the vacant and underutilized areas of the City. Yet, even the most successful effort to achieve community planning goals through infill may need to be supplemented at some point by expanding into areas outside the city limits. Such expansion may not only be necessary to fulfill development objectives; it also may be needed to provide open space, parklands, and natural areas to be preserved and restored. To address this, citizens discussed during the preparation of this General Plan which areas, if any, should be possible expansion areas. These areas were identified because they embody opportunities for achieving a variety of community vision objectives that may not be feasible within existing city limits. The community further went on to agree upon a set of rules about how these areas should be planned. These areas were analyzed in the environmental impact report prepared for this General Plan, and a “long term potential expansion strategy” will be formulated to guide the process of prioritizing any potential future expansion areas to fulfill General Plan objectives that may not be able to be achieved by our “Infill First” approach. Should any areas be selected for future planning, a specific plan, a public vote (if required pursuant to SOAR), and an amendment with the regulatory planning framework would have to occur.

The policies and actions in this chapter call for measured and appropriate growth in Ventura by prioritizing areas appropriate for additional development based on community values and infrastructure potential.

Policy 3A: Sustain and complement cherished community characteristics.

Action 3.1: Preserve the stock of existing homes by carrying out Housing Element programs.

Action 3.2: Enhance the appearance of districts, corridors, and gateways (including views from highways) through controls on building placement, design elements, and signage.

Action 3.3: Require preservation of public view sheds and solar access.

Action: 3.4 Require all shoreline development (including anti-erosion or other protective structures) to provide public access to and along the coast, unless it would duplicate adequate access existing nearby, adversely affect agriculture, or be inconsistent with public safety, military security, or protection of fragile coastal resources.

Action 3.5: Establish land development incentives to upgrade the appearance of poorly maintained or otherwise unattractive sites, and enforce existing land maintenance regulations.

Action 3.6: Expand and maintain the City's urban forest and thoroughfare landscaping, using native species, in accordance with the City's Park and Development Guidelines and Irrigation and Landscape Guidelines.

Action 3.7: Evaluate whether lot coverage standards should be changed based on neighborhood characteristics.

Policy 3B: Integrate uses in building forms that increase choice and encourage community vitality.

Action 3.8: Adopt new development code provisions that designate neighborhood centers, as depicted on the General Plan Diagram, for a mixture of residences and small-scale, local-serving businesses.

Action 3.9: Adopt new development code provisions that designate areas within districts and corridors for mixed-use development that combines businesses with housing, and focuses on the redesign of single-use shopping centers and retails parcels into walkable, well connected blocks, with a mix of building types, uses, and public and private frontages.

Action 3.10: Allow intensification of commercial areas through conversion of surface parking to building area under a district-wide parking management strategy in the Downtown Specific Plan.

Action 3.11: Expand the downtown redevelopment area to include parcels around future transit areas and along freeway frontage.

Action 3.12: The City will work with the hospitals on the new Development Code treatment for the Loma Vista corridor, which includes both hospitals.

Action 3.13: Assess whether the City's Affordable Housing Programs respond to current needs, and modify them as necessary within State mandated Housing Element updates.

Specific Plan Requirements

Specific Plans must include a statement of its relationship to the General Plan and specify all of the following:

1. distribution, location, and extent of uses
2. distribution, location, extent, and intensity of public and private transportation, sewage, water, drainage, solid waste disposal, energy
3. standards and criteria by which development will proceed and standards for conservation, development, and utilization of natural resources
4. program of implementation measures, including regulations, programs, public works projects, and financing
5. any other subjects that are necessary

(§65450-65452)

Policy 3C: Maximize use of land in the city before considering expansion.

Action 3.14: Utilize infill, to the extent possible, development to accommodate the targeted number and type of housing units described in the Housing Element.

Action 3.15: Adopt new development code provisions that ensure compliance with Housing Element objectives.

Action 3.16: Renew and modify greenbelt agreements as necessary to direct development to already urbanized areas.

Action 3.17: Continue to support the Guidelines for Orderly Development as a means of implementing the General Plan, and encourage adherence to these Guidelines by all the cities, the County of Ventura, and the Local Agency Formation Commission (LAFCO); and work with other nearby cities and agencies to avoid urban sprawl and preserve the rural character in areas outside the urban edge.

Action 3.18: Complete community or specific plans, subject to funding, for areas such as Westside, Midtown, Downtown, Wells, Saticoy, Pierpont, Harbor, Loma Vista/Medical District, Victoria Corridor, and others as appropriate. These plans will set clear development standards for public and private investments, foster neighborhood partnerships, and be updated as needed.

Action 3.19: Preparation of the new Development Code will take into account existing or proposed community or specific plans to ensure efficient use of City resources and ample citizen input.

Policy 3D: Continue to preserve agricultural and other open space lands within the City's Planning Area.

Action 3.20: Pursuant to SOAR, adopt development code provisions to "preserve agricultural and open space lands as a desirable means of shaping the City's internal and external form and size, and of serving the needs of the residents.

Action 3.21: Adopt performance standards for non-farm activities in agricultural areas that protect and support farm operations, including requiring non-farm uses to provide all appropriate buffers as determined by the Agriculture Commissioner's Office.

Action 3.22: Offer incentives for agricultural production operations to develop systems of raw product and product processing locally.

Policy 3E: Ensure the appropriateness of urban form through modified development review.

Action 3.23: Develop and adopt a form-based Development Code that emphasizes pedestrian orientation, integration of land uses, treatment of streetscapes as community living space, and environmentally sensitive building design and operation.

Action 3.24: Revise the Residential Growth Management Program (RGMP) with an integrated set of growth management tools including:

- community or specific plans and development codes based on availability of infrastructure and transit that regulate community form and character by directing new residential development to appropriate locations and in ways that integrate with and enhance existing neighborhoods, districts and corridors;
- appropriate mechanisms to ensure that new residential development produces high-quality designs and a range of housing types across all income levels; and,
- numeric limitations linked to the implementation of community or specific plans and development codes and the availability of appropriate infrastructure and resources; within those limitations, the RGMP should provide greater flexibility for timing new residential development.

Action 3.25: Establish first priority growth areas to include the districts, corridors, and neighborhood centers as identified on the General Plan Diagram; and second priority areas to include vacant undeveloped land when a community plan has been prepared for such (within the City limits).

Action 3.26: Establish and administer a system for the gradual growth of the City through identification of areas set aside for long-term preservation, for controlled growth, and for encouraged growth.

Action 3.27: Require the use of techniques such as digital simulation and modeling to assist in project review.

Action 3.28: Revise the planning processes to be more user-friendly to both applicants and neighborhood residents in order to implement City policies more efficiently.

Policies and actions related to the preservation of **historic architecture and resources** are contained in Chapter 9.

2000-2006 HOUSING ELEMENT GOALS AND POLICIES, City Council Adopted Resolution 2004-014. Adopted April 12, 2004

Goal 1

Maintain and improve the quality of existing housing and residential neighborhoods in Ventura.

Policy 1.1 Encourage citizen involvement in addressing the maintenance and improvement of the housing stock and neighborhood quality.

Policy 1.2 Continue to preserve and maintain the City's historical and architecturally significant buildings and neighborhoods.

Policy 1.3 Encourage homeowners and landlords to maintain properties in sound condition through the City's residential rehabilitation assistance programs and code enforcement efforts.

Policy 1.4 Cooperate with housing providers in the acquisition, rehabilitation, and maintenance of older residential properties as long-term affordable housing.

Policy 1.5 Permit the conversion of apartments to condominiums only when such conversion would not adversely affect the overall supply and availability of rental units, particularly units occupied by lower- and moderate-income households.

Policy 1.6 Continue to support the provision of rental assistance to lower-income households, and encourage property owners to list units with the Housing Authority.

Policy 1.7 Continue to preserve the affordability of mobile homes through the Rent Stabilization Ordinance. Support the acquisition and ownership of mobile home parks by non-profit housing providers and resident organizations.

Policy 1.8 Preserve the existing stock of affordable housing, including mobilehomes, through City regulations, as well as financial and other forms of assistance.

Goal 2

Facilitate the provision of a range of housing types to meet the diverse needs of the community.

Policy 2.1 Provide high quality housing for current and future residents with a diverse range of income levels.

Promote housing that is developed under modern sustainable community standards.

Policy 2.2 Provide expanded housing opportunities for the City's workforce. Promote the City's affordable housing programs with employers in Ventura.

Policy 2.3 Continue to offer and promote homeownership assistance programs to lower- and moderate-income households to purchase both new and existing housing. Pursue participation in other homeownership programs available in the private market.

Policy 2.4 Continue to provide financial and regulatory incentives to non-profits, private housing developers, and public agencies for the construction of the types of housing required to meet identified needs.

Policy 2.5 Support the provision of quality rental housing with three or more bedrooms to accommodate large families, and encourage room additions in the existing housing stock to address household overcrowding.

Policy 2.6 Support a variety of housing types to address the needs of agricultural workers, including affordable rentals, mobilehome parks, single room occupancy hotels (SROs), and group housing for migrant laborers.

Policy 2.7 Facilitate the provision of housing to address Ventura's growing senior population, including senior housing with supportive services, assisted living facilities, and second units.

Policy 2.8 Encourage the provision of housing adaptable to the physically disabled through integration of universal design features in new development, and compliance with Title 24 of the California Health and Safety Code.

Policy 2.9 Encourage the provision of supportive housing for persons with mental illness to address the severe shortage of housing for this special needs population.

Policy 2.10 Support efforts by non-profits to expand transitional and emergency housing in Ventura, including support of grant applications and assistance in identification of suitable sites.

Policy 2.11 Evaluate adoption of an inclusionary housing ordinance as a means of integrating affordable units within new residential development: 1) Require affordable units to be provided on or off-site, with allowance for payment of an in-lieu fee at the discretion of the City; 2) Evaluate the financial impact of inclusionary requirements on development, and assess incentive-based alternative strategies for provision of affordable housing.

Policy 2.12 Facilitate the provision of second units as a means of providing affordable rental housing in existing neighborhoods. Ensure compatibility with the primary unit and surrounding neighborhood.

Policy 2.13 Encourage the production of housing that meets the needs of all economic segments, including lower, moderate, and above moderate-income households, to achieve a balanced community.

Policy 2.14 Promote and facilitate non-traditional housing types and options, including co-housing, assisted living facilities, live-work spaces, and artist lofts.

Policy 2.15 Direct City-controlled housing funds towards programs that address the needs of very low- and low-income households.

Policy 2.16 Prioritize affordable housing opportunities and assistance for public service employees.

Policy 2.17 Annually monitor the City's progress in meeting its housing needs for all income levels.

Goal 3

Provide adequate housing sites through appropriate land use and zoning designations to accommodate the City's share of the regional housing needs.

Policy 3.1 Maintain an up-to-date inventory of vacant and underutilized parcels and provide to interested developers in conjunction with information on available development incentives. Within redevelopment project areas, provide assistance in land assembly in support of affordable housing.

Policy 3.2 Implement smart growth principles by rewarding quality infill projects that utilize existing infrastructure.

Policy 3.3 Encourage efficient utilization of the City's limited land resources by encouraging development at the upper end of the permitted Zoning Code/Comprehensive Plan density.

Policy 3.4 Utilize the Urban Infill Overlay Zone and Downtown Specific Plan as a tool to facilitate higher density residential and mixed-use development.

Policy 3.5 Explore residential reuse opportunities on obsolete commercial properties, such as older motels and underutilized historic structures.

Policy 3.6 Pursue use of publicly owned land, such as public parking lots, for development of affordable housing.

Policy 3.7 Identify opportunities for housing development that achieves other community goals such as neighborhood improvement, recreation opportunities, and the preservation of sensitive lands and neighborhood character.

Policy 3.8 Facilitate the development of mixed-use projects in appropriate commercial areas, including stand-alone residential developments (horizontal mixed-use) and housing above ground floor commercial uses (vertical mixed-use).

Policy 3.9 Promote higher density housing as part of mixed-use developments along parts of Thompson Boulevard and Main Street in Midtown Ventura, as well as other areas such as Westside, Downtown and East Ventura.

Policy 3.10 Promote mixed-use developments on the Westside of Ventura.

Policy 3.11 Ensure that the updated Land Use Element designates adequate sites for housing for executives to enhance the City's ability to attract businesses with higher paying jobs.

Goal 4

Mitigate or remove any potential governmental constraints to housing production and affordability.

Policy 4.1 Provide regulatory and/or financial incentives, where appropriate, to offset or reduce the costs of affordable housing development, including density bonuses and flexibility in site development standards.

Policy 4.2 Utilize the Affordable Housing Program to provide incentives for production of affordable units, including streamlined permit processing, reduced fees and exemption from the required competition for RGMP allocations.

Policy 4.3 Amend the City's Residential Growth Management Plan (RGMP) to better facilitate housing production, while discouraging sprawl and maintaining quality of life goals.

Policy 4.4 Undertake a comprehensive review of the City's residential development project review procedures and establish modified procedures as appropriate to streamline processing times, while maintaining adequate levels of public review.

Policy 4.5 Provide flexibility in development standards to accommodate new models and approaches to providing affordable housing, such as co-housing, live/work units and assisted living facilities.

Goal 5

Promote equal opportunity for all residents to reside in the housing of their choice.

Policy 5.1 Continue to enforce fair housing laws prohibiting arbitrary discrimination in the building, financing, selling or renting of housing on the basis of race, religion, family status, national origin, physical or mental disability, or other such factors.

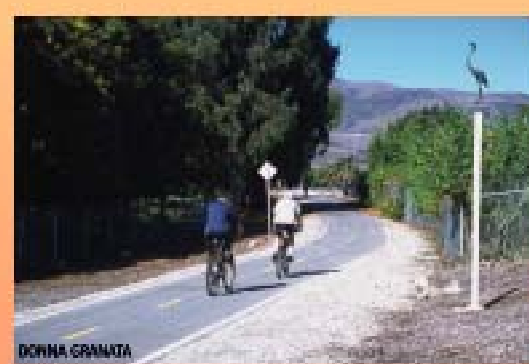
Policy 5.2 Continue to support organizations that offer fair housing and mediation services to Ventura residents.

Policy 5.3 Promote housing that meets the special needs of large families, elderly persons, agricultural workers, and the disabled.

Policy 5.4 Continue to enforce notification and provide relocation assistance for lower-income persons displaced due to demolition, reuse, condominium conversion, or rehabilitation as a result of code enforcement.

ventura's general plan

OUR ACCESSIBLE COMMUNITY



"Restore human legs as a means of travel. Pedestrians rely on food for fuel and need no special parking facilities."

— Lewis Mumford
Author of *The City in History*, 1961

CITY OF
VENTURA

4. OUR ACCESSIBLE COMMUNITY

Our goal is to provide residents with more transportation choices by strengthening and balancing bicycle, pedestrian and transit opportunities in the City and surrounding region.

An Integrated Mobility System

Central to the well-being of Ventura's citizens and visitors is *mobility*, the ability to get from one place to another. Mobility depends on the range, efficiency, and connectivity of the various components that comprise the transportation network – sidewalks, bicycle routes, and thoroughfares, as well as transit services – and that enable people to access the things they need, from the most basic to the extraordinary (See Figures 4-1 Bicycle Facilities, 4-2 Bus and Rail Routes, and 4-3 Roadway Classification Plan). Ventura is a community that recognizes that thoroughfares serve a variety of functions and are not simply conduits for automobile traffic.

Balancing automobile use with other means of travel is essential to maintaining social and physical health. Safe and enjoyable routes for pedestrians and bicyclists should connect every part of the city, and neighborhoods need to be linked by ample and convenient transit service along corridors. Ventura also must be connected to the larger region by a variety of transportation modes.

Thoroughfares have a tremendous effect on neighborhood character and therefore quality of life for both residents and visitors.

Thoroughfares are essentially the stage of public life where a diversity of citizens interact. They can create places of remembrance, chance encounters, and discovery. Ensuring that Ventura thoroughfares are *great places* requires improving design and quality as well as connectivity. In some cases, city thoroughfares are over-engineered to accommodate the worst-case scenario.

Slowing down automobiles, especially in residential neighborhoods, is a desire shared by many residents. Vehicle travel should be directed toward routes that minimize congestion, avoid conflicts with walkers and bicyclists, and keep residential neighborhoods free of excessive cut-through traffic. Additionally, in some areas of the city, suburban patterns have resulted in less connectivity than is desired by the community. Transportation modes and land uses in the city need to be distributed so that residents have close and easy access to meet their basic needs and travel destinations.

Traffic congestion is a major concern among Ventura residents. Although traffic on local roads is generally free-flowing, a few key intersections and road segments experience congestion during peak traffic hours. Simply widening roads to add lanes will not solve traffic congestion. Instead, the system needs integrated solutions that improve mobility for all

The essential qualities of a properly functioning mobility system are:

1. Well connected, interesting components
2. Convenient accessibility
3. Integrated linkage of all modes
4. Comfort and safety
5. Design reflecting natural and urban context

means of travel. While walking, biking, and transit use are already popular, these alternative modes need to be enhanced and better linked. For example, bus and rail systems serve Ventura, but not thoroughly enough to provide a reasonable alternative to auto use for most travelers. And while pedestrian access exists in most areas of Ventura, the network lacks continuous routes in some key locations.

As expressed in the *Ventura Vision,* a top community priority is to minimize automobile use through a fully integrated multi-modal transportation system. The policies and actions in this chapter aim to achieve this objective.

Travel Modes

Walking

Sidewalks are arguably the most important component of the city's mobility system. As with circulation in general, the utility of pedestrian systems is inextricably linked to land use patterns. Combined with urban design elements, land use patterns influence how much walking can safely and effectively occur in the community. Circulation systems that are designed with pedestrians in mind tend to increase outdoor activity and community interaction, while those oriented toward motor vehicles tend to create disincentives to walking.

Ventura's pedestrian system consists of sidewalks, access ramps, crosswalks, linear park paths, and overpasses and tunnels. Special corridors such as the Beachfront Promenade, California Plaza, and Figueroa Plaza have been designated especially for pedestrians. The pedestrian system also includes neighborhood and park path systems, and dedicated trail facilities that are shared with bicyclists and other users.

Pedestrian paths need to be interesting, enjoyable, and lead to a destination, from the most simple – such as a pocket park – to more grand points of arrival, such as major civic spaces. Creating a network of paths that connect key features such as parks, schools, civic facilities, shops, and services is vital to the success of reducing dependence on the automobile. Those most in need of pedestrian access include children, teenagers, and the elderly, as well as those who cannot afford a car or choose not to drive.

The main deficiency of Ventura's pedestrian system is its discontinuity. Some sections of thoroughfares lack sidewalks, and pedestrian connections between some key use areas are in need of repair. Crosswalks are prohibited along some corridors, and pedestrian signal phases are not always long enough for all walkers. Traffic-calming measures also are needed to improve walkability in many neighborhoods. Citizens have placed a high emphasis on improving the pedestrian network, recommending specific improvements such as:

- narrowing selected thoroughfare segments,
- improving sidewalks and road crossings,
- lengthening pedestrian signal phases,
- adding marked crossings at key intersections,
- developing safe and attractive walkways from Downtown and Midtown to the beach,
- ensuring that new development provides ample pedestrian access,
- creating trails along watercourses and through the hillsides, and
- improving pedestrian facilities near schools.

Policies and actions in this chapter intend to improve pedestrian access through this range of methods.

Figure 4-1 illustrates the three State defined classes of bikeway facilities:

- Bike Path (Class I) – Class I bike paths are separated from roads by distance or barriers, and cross-traffic by motor vehicles is minimized.
- Bike Lane (Class II) – Class II bikeways are roadway lanes reserved for bicycles. These lanes are painted with pavement lines and markings and are signed.
- Bike Route (Class III) – Class III bike routes share existing roads and provide continuity to other bikeways or designated preferred routes through high traffic areas. There are no separate lanes, and bike routes are established by placing signs that direct cyclists and warn drivers of the presence of bicyclists.

Biking

Because bicycles are an integral component of the city's mobility system, they are allowed on *all* city thoroughfares. The City has adopted a General Bikeway Plan intended to create a safe, accessible, and interconnected network of bike paths, lanes, and routes that will ensure Ventura becomes and remains a truly bicycle-friendly community. The General Bikeway Plan is a flexible, comprehensive, and long-range guide for bicycle transportation and recreation planning, design, and budget decision-making. Accordingly, it is designed to:

- refine and implement City bicycle-related policies,
- establish bikeway design standards,
- enhance bicycle safety and education programs,
- set priorities and phasing for improvements and amenities depicted on the Select System of Bikeways map, and
- identify funding means and opportunities for interagency cooperation.

The City places high emphasis on improving the local bicycle network by following the recommendations of the General Bikeway Plan, which include:

- connecting schools, parks, activity areas, housing areas, and employment centers with bike paths and lanes, particularly in areas without thoroughfares,
- constructing additional Class I or Class II bikeways in a number of locations, including along the Santa Clara River and the coast to connect to the Ventura River Trail,
- installing bicycle racks,
- updating bicycle facility standards to ensure proper design and maintenance,
- constructing improvements to resolve bicycle/automobile conflicts,
- establishing a highly visible route identification and signage program that fits the character of the community, and
- mitigating impacts on bicyclists from new development and during and following construction of roadway projects.

Policies and actions in this chapter seek to improve bicycle access and safety by carrying out these recommendations.

Public Transit – Bus & Rail

Transit service in Ventura includes bus and rail operations (see Figure 4-2). South Coast Area Transit (SCAT) provides local bus service, Ventura Intercity Transit Authority (VISTA) runs regional routes, and Greyhound offers statewide and national connections. Metrolink provides rail service to and from Los Angeles – although on a very limited schedule, while Amtrak trains that stop in Ventura run between San Luis Obispo and San Diego.

Although local bus routes connect most activity centers, the East End is not well served, and more frequent service is needed to key destinations such as the beach and downtown. Metrolink and Amtrak need to be linked to each other and accessed by local bus routes. An agreement between the City and the Ventura County Transportation Commission calls for identifying a permanent Metrolink site, and the best way to integrate all of these services is with a major multi-modal transit center that also accommodates potential additional future alternative transportation modes.

SCAT buses are equipped with wheelchair lifts and adjustable steps to ensure access for all riders. SCAT also offers discounted fares for seniors and disabled riders, as well as dial-a-ride service. However, seniors and mobility-impaired persons also desire frequent fixed-route service in smaller vehicles, and all riders need upgraded amenities at a number of stops. Bus routes also need increased frequency and stops to make transit a viable alternative to driving.

Other transit system needs include:

- reduced-emission vehicles,
- continued use of schedule synchronization to accommodate route transfers, and
- service to regional destinations such as California State University Channel Islands and airports.

Policies and actions in this Chapter aim to improve transit efficiency, encourage ridesharing, and preserve long-term transit options.

The Automobile and Types of Roadways

The most basic component of the mobility system is the *thoroughfare*, used not only by people who drive, but also by people who ride the bus, bike and walk. Thoroughfares encompass sidewalks, bicycle lanes, travel lanes, and are the most utilized means of travel in Ventura. This system is organized into the following classifications: local thoroughfares, collectors, and arterials (see Figure 4-3, Roadway Classification Plan – also known as "Circulation Plan").

Local Thoroughfares
Local thoroughfares provide mobility within neighborhoods and are generally not shown on the Roadway Classification Plan. Local thoroughfares include *alleys, lanes,* and *"yield" streets*.

Collectors
Collectors serve as links between local thoroughfares. Collectors may front residential and neighborhood-serving commercial uses. Collectors can be configured as *boulevards, avenues, streets,* and *main streets*.

Arterials
Arterials are the primary mechanism for cross-town travel and serve the major centers of activity. These roads typically carry a high proportion of the total urban area travel. Arterials can be configured as *boulevards, avenues,* and *streets*.

Collector and arterial thoroughfare segments in the City are characterized in two ways that describe their physical features: *design* classification and *functional* classification. Design Classification defines the number of travel *lanes* using the following categories: Primary Arterial (6 lanes or more), Secondary Arterial (4 lanes), and Collector (2 lanes), as shown on the Roadway Classification Plan, Figure 4-3. Functional Classification describes how a thoroughfare is used: essentially as a *boulevard*, *avenue*, *street*, or *main street*.

Functional Classification also identifies whether roadways have medians, parking, bike lanes, and other streetscape attributes needed to achieve objectives other than just moving traffic, such as accommodating pedestrians, bicycles, and adjoining land uses and public spaces. Table 4-1 shows the design and functional classifications for thoroughfares in the City.

Ventura is mainly connected by 2-lane and 4-lane thoroughfares. The classification for each type of road segment represents a balance between vehicle capacity, pedestrian and bicycle access, parking requirements, streetscape character, and right-of-way limitations.

<u>Boulevard</u>
A multi-lane and generally urban corridor with a central, planted median.

<u>Avenue</u>
Avenues are typically multi-lane, short distance connectors, with a painted median, used in both residential and commercial areas, and often terminate at prominent buildings or plazas.

Table 4-1 Thoroughfare Sizes and Types

	Street Sizes (Engineering Design Classification)		
	Primary Arterial (6 or more lane roadway)	Secondary Arterial (4 lane roadway)	Collector (2 lane roadway)
Existing			
Future Widening			
Future Extension			
	Thoroughfare Types (Functional Classification)		
	Boulevard	Boulevard	Boulevard
	Avenue	Avenue	Avenue
		Street	Street
			Main Street

Source: Definitions for Design Classifications are the City's modifications to the American Association of State Highway and Transportation Officials (AASHTO) standards. Definitions for Functional Classifications are the City's modifications to the Traditional Neighborhood Development Street Design Guidelines.

<u>Street</u>
Street typically allows two way travel and may be multi-lane and does not have a central median and generally provides access to predominantly residential areas.

Main Street
Main streets have 2 vehicle lanes. Their main purpose is to provide low-speed access to commercial, mixed-uses, and higher density neighborhoods.

Consistency between the design and functional classifications is determined based on the number of through lanes. Temporary improvements, such as restriping to change the number of lanes are allowed, however a permanent improvement that moves the curbs and changes the number of lanes would require an amendment to this plan.

The *Ventura Vision* offers several key recommendations to improve the city thoroughfare system:

- add or enhance north-south arterials;
- consider an additional Santa Clara River bridge, Portola Avenue overcrossing of U.S. 101, and Johnson Drive overcrossing of Route 126; and
- soften the barrier impact of U.S. 101 by working with Caltrans to improve signage, aesthetics, undercrossings, and overcrossings.

Policies, actions, and the Roadway Classification Plan work together to address these recommendations. To improve the safety and functioning of the thoroughfare network and to maintain its compatibility with the character of the community, the policies and actions in this chapter also call for upgrading problem thoroughfares and intersections, improving and constructing freeway ramps, and connecting unfinished roadways. Additional actions intend to protect views from scenic routes, including State-designated scenic highways.

Policy 4A: Ensure that the transportation system is safe and easily accessible to all travelers.

Action 4.1: Direct city transportation investment to efforts that improve user safety and keep the circulation system structurally sound and adequately maintained. First priority for capital funding will go to our pavement management program to return Ventura streets to excellent condition.

Action 4.2: Develop a prioritized list of projects needed to improve safety for all travel modes and provide needed connections and multiple route options.

Action 4.3: Provide transportation services that meet the special mobility needs of the community including youth, elderly, and disabled persons.

Action 4.4: Combine education with enforcement to instill safe and courteous use of the shared public roadway.

Action 4.5: Utilize existing roadways to meet mobility needs, and only consider additional travel lanes when other alternatives are not feasible.

Action 4.6: Require new development to be designed with interconnected transportation modes and routes to complete a grid network.

Action 4.7: Update the traffic mitigation fee program to fund necessary citywide circulation system and mobility improvements needed in conjunction with new development.

Action 4.8: Implement the City's Neighborhood Traffic Management Program and update as necessary to improve livability in residential areas.

Action 4.9: Identify, designate, and enforce truck routes to minimize the impact of truck traffic on residential neighborhoods.

Action 4.10: Modify traffic signal timing to ensure safety and minimize delay for all users.

Action 4.11: Refine level of service standards to encourage use of alternative modes of transportation while meeting state and regional mandates.

Action 4.12: Design roadway improvements and facility modifications to minimize the potential for conflict between pedestrians, bicycles, and automobiles.

Action 4.13: Require project proponents to analyze traffic impacts and provide adequate mitigation in the form of needed improvements, in-lieu fee, or a combination thereof.

Policy 4B: Help reduce dependence on the automobile.

Action 4.14: Provide development incentives to encourage projects that reduce automobile trips.

Action 4.15: Encourage the placement of facilities that house or serve elderly, disabled, or socioeconomically disadvantaged persons in areas with existing public transportation services and pedestrian and bicycle amenities.

Action 4.16: Install roadway, transit, and alternative transportation improvements along existing or planned multi-modal corridors, including primary bike and transit routes, and at land use intensity nodes.

Action 4.17: Prepare and periodically update a Mobility Plan that integrates a variety of travel alternatives to minimize reliance on any single mode.

Action 4.18: Promote the development and use of recreational trails as transportation routes to connect housing with services, entertainment, and employment.

Action 4.19: Adopt new development code provisions that establish vehicle trip reduction requirements for all development.

Action 4.20: Develop a transportation demand management program to shift travel behavior toward alternative modes and services.

Action 4.21: Require new development to provide pedestrian and bicycle access and facilities as appropriate, including connected paths along the shoreline and watercourses.

Action 4.22: Update the General Bikeway Plan as needed to encourage bicycle use as a viable transportation alternative to the automobile and include the bikeway plan as part of a new Mobility Plan.

Action 4.23: Upgrade and add bicycle lanes when conducting roadway maintenance as feasible.

Action 4.24: Require sidewalks wide enough to encourage walking that include ramps and other features needed to ensure access for mobility-impaired persons.

Action 4:25: Adopt new development code provisions that require the construction of sidewalks in all future projects.

Action 4.26: Establish a parking management program to protect the livability of residential neighborhoods, as needed.

Action 4.27: Extend stubbed-end streets through future developments, where appropriate, to provide necessary circulation within a developing area and for adequate internal circulation within and between neighborhoods. Require new developments in the North Avenue area, where applicable, to extend Norway Drive and Floral Drive to connect to Canada Larga Road; and connect the existing segments of Floral Drive. Designate the extension of Cedar Street between Warner Street and south of Franklin Lane and the linking of the Cameron Street segments in the Westside community as high priority projects.

Policy 4C: Increase transit efficiency and options.

Action 4.28: Require all new development to provide for citywide improvements to transit stops that have sufficient quality and amenities, including shelters and benches, to encourage ridership.

Action 4.29: Develop incentives to encourage City employees and local employers to use transit, rideshare, walk, or bike.

Action 4.30: Work with public transit agencies to provide information to riders at transit stops, libraries, lodging, and event facilities.

Action 4.31: Work with public and private transit providers to enhance public transit service.

Action 4.32: Coordinate with public transit systems for the provision of additional routes as demand and funding allow.

Action 4.33: Work with Amtrak, Metrolink, and Union Pacific to maximize efficiency of passenger and freight rail service to the City and to integrate and coordinate passenger rail service with other transportation modes.

Action 4.34: Lobby for additional transportation funding and changes to Federal, State, and regional transportation policy that support local decision-making.

Action 4.35: The City shall pursue funding and site location for a multi-modal transit facility in coordination with VCTC, SCAT, U.P.R.R., Metrolink, Greyhound Bus Lines, and other forms of transportation.

Policy 4D: Protect views along scenic routes.

Action 4.36: Require development along the following roadways – including noise mitigation, landscaping, and advertising – to respect and preserve views of the community and its natural context.

- State Route 33
- U.S. HWY 101
- Anchors Way
- Brakey Road
- Fairgrounds Loop
- Ferro Drive
- Figueroa Street
- Harbor Boulevard
- Main Street
- Navigator Drive
- North Bank Drive
- Poli Street/Foothill Road
- Olivas Park Drive
- Schooner Drive
- Spinnaker Drive
- Summit Drive

- Telegraph Road – east of Victoria Avenue
- Victoria Avenue – south of U.S. 101
- Wells Road

Action 4.37: Request that State Route 126 and 33, and U.S. HWY 101 be designated as State Scenic Highways.

Action 4.38: Continue to work with Caltrans to soften the barrier impact of U.S. HWY 101 by improving signage, aesthetics and undercrossings and overcrossings.

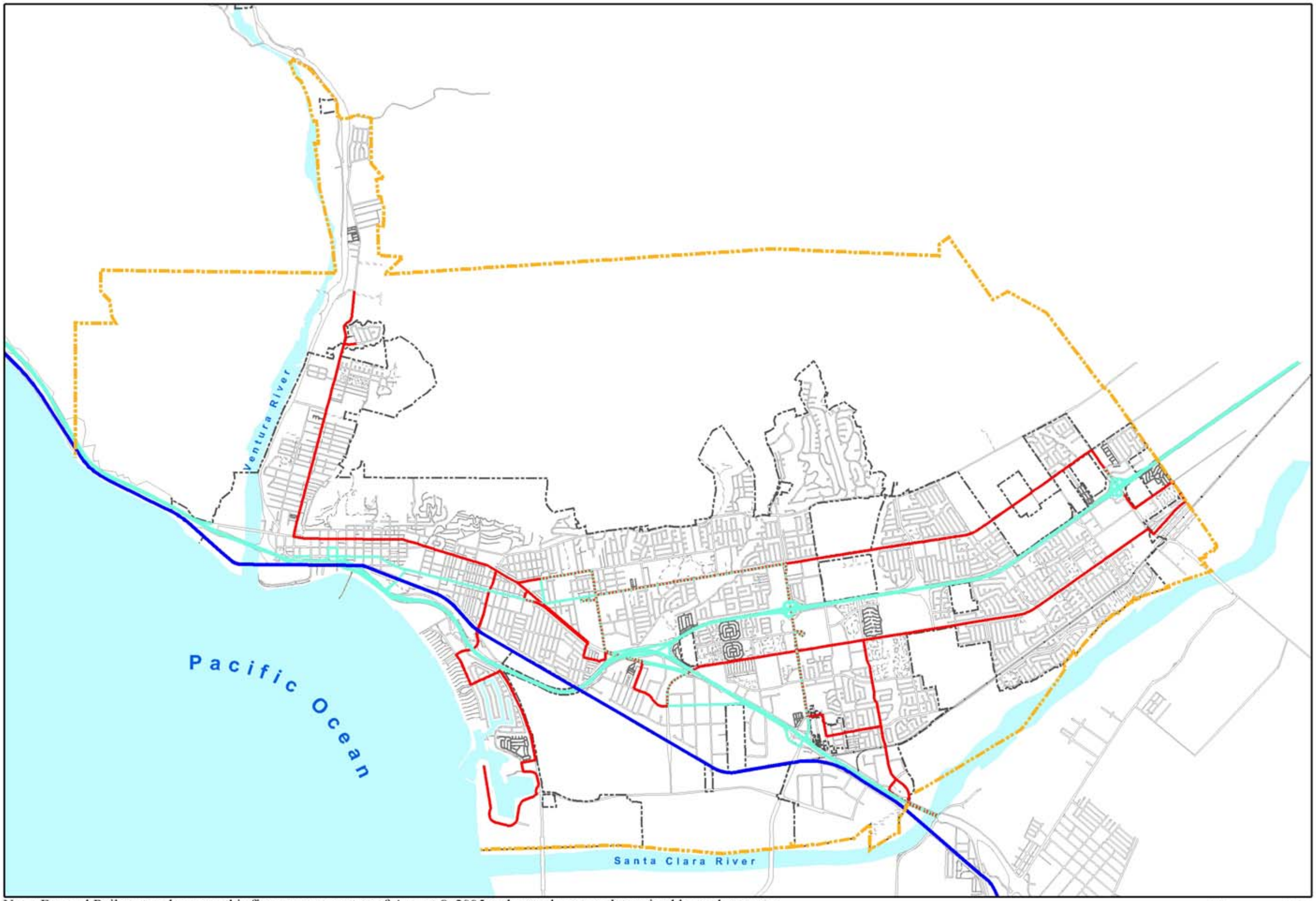
Action 4.39: Maintain street trees along scenic thoroughfares, and replace unhealthy or missing trees along arterials and collectors throughout the City.

Note: Bike facilities shown on this figure are taken from the 1999 General Bikeway Plan and may change as updates to the General Bikeway Plan are completed.

	Class 1	Class 2	Class 3	Shoulder
Existing				
Future				
Existing Sidewalk				

Other
City Limits
Planning Boundary

Figure 4-1
Bicycle Facilities

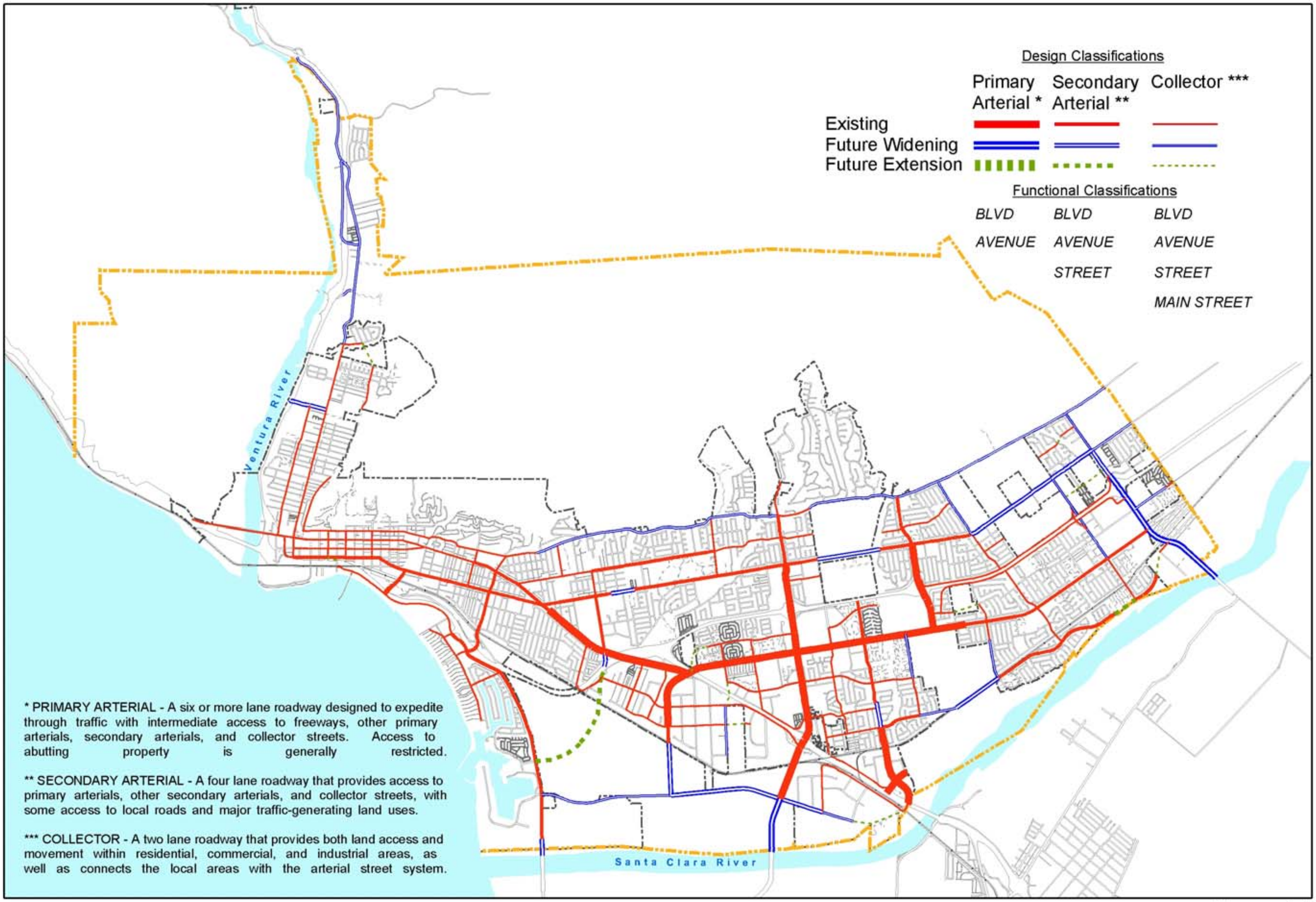


Note: Bus and Rail routes shown on this figure are current as of August 8, 2005 and may change as determined by each operator.

Figure 4-2
Bus and Rail Routes

Routes
- SCAT
- VISTA
- SCAT & VISTA
- RAIL

Other
- City Limits
- Planning Boundary



City Limits

Planning Boundary

Note: Future extensions shown are conceptual in nature, unless a specific alignment has been approved by the City Council.

Figure 4-3
Roadway Classification Plan

"Now, I truly believe, that we in this generation, must come to terms with nature, and I think we're challenged as mankind has never been challenged before to prove our maturity and our mastery, not of nature, but of ourselves."

— Rachel Carson
Biologist, Writer; Ecologist 1907-1964

CITY OF
VENTURA

5. OUR SUSTAINABLE INFRASTRUCTURE

Our goal is to safeguard public health, well-being and prosperity by providing and maintaining facilities that enable the community to live in balance with natural systems.

Essential Support Systems

Infrastructure is an extremely important though largely unnoticed foundation of quality of life in Ventura. Efficient water supply, wastewater treatment, and drainage systems are vital to most daily activities. These facilities on which the community depends need regular maintenance, and they frequently require upgrading both to meet the demands of a growing population and to be sensitive to environmental resources.

To ensure that citizens get high-quality drinking water, the City owns and operates a State-certified laboratory where water quality is tested continuously. Each City treatment plant is also run by State-certified operators who monitor water quality. As a result, City water exceeds State and federal water quality requirements.

The City employs conservation measures and emerging technology in its effort to achieve a high standard for wastewater treatment while protecting natural systems. As a result, treatment capability historically has outpaced community needs, with even peak flows typically reaching only 75 percent of plant capacity. Even so, further expanding the use of reclaimed water and reducing water consumption will be vital to maintaining long-term water supplies.

Much of the storm drain system is aging and in need of repair or replacement, especially corrugated metal pipes in some of the older areas of Ventura. Collecting adequate fees that truly reflect the cost of serving development can help support City efforts to preclude additional deficiencies, and relying on and complementing natural drainage features can both help avoid the need for expensive and environmentally damaging channelization and improve the functioning of the overall drainage system.

Water Supply

The City provides drinking water, and water for fire protection, to households and businesses in Ventura through a complex system with more than 500 miles of distribution mains, 3 water treatment plants, 22 booster pump stations, 25 treated water reservoirs, and 13 wells. Five distinct sources provide surface and ground water to the City supply system:

- Casitas Municipal Water District
- Ventura River surface water intake, subsurface water and wells (Foster Park)
- Mound groundwater basin
- Oxnard Plain groundwater basin (Fox Canyon Aquifer)
- Santa Paula groundwater basin

The City also holds a State Water Project entitlement of 10,000 acre-feet per year;

however, new facilities would need to be constructed to transport this water to the City. The City updates its Urban Water Management Plan every two years (instead of every five years as required by State law) as part of its ongoing effort to ensure that City-managed water supplies will continue to accommodate demand in Ventura.

Meeting future water demands requires saving and reusing every drop possible. The City utilizes recycled water from its reclamation facility (a tertiary wastewater treatment plant) near the Harbor to augment the municipal water supply. Recycled water is used to irrigate City and private landscaping in the area and the Buenaventura and Olivas Park municipal golf courses. The remaining effluent is discharged to the Santa Clara River Estuary.

Largely as a result of conservation efforts, water consumption per city resident has generally declined (see Table 5-1). Projections anticipate that the City will continue to be able to meet consumer needs. Policies and actions in this chapter seek to refine demand management practices and conservation programs to further reduce per capita water use so that Ventura can sustain water resources for many more generations.

Table 5-1
Historic and Projected Water Production (Acre Feet)

Year	Estimated Population Served	Per Capita Use[1]	Treated Water Production	Raw Water Production	Total Water Production
Historic					
1980	73,774	0.236	17,381	4,766	22,147
1990	94,856	0.177	16,831	2,317	19,148
1995	99,668	0.165	16,428	1,602	18,030
1996	100,482	0.180	18,038	1,500	19,538
1997	101,096	0.178	18,002	1,829	19,831
1998	101,610	0.165	16,775	1,769	18,544
1999	102,224	0.192	19,658	1,067	20,725
2000	103,238	0.198	20,437	1,129	21,566
2001	104,153	0.173	18,071	889	18,960
2002	105,267	0.180	18,965	968	19,933
2003	106,782	0.183	19,510	846	20,356
Projected					
2005	109,465	0.179	19,594	1,000	20,594
2010	115,774	0.179	20,724	1,000	21,724
2015	122,447	0.179	21,918	1,000	22,918
2020	129,504	0.179	23,181	1,000	24,181

Sources: City of Ventura Urban Water Management Plan, Dec. 2000, City of Ventura 2004 Biennial Water Supply Report, as amended, September 2004.

[1] Per Capita use excludes raw water.

Wastewater Treatment

Ventura residents generate millions of gallons of wastewater each day, which is carried by more than 450 miles of sewer mains and 12 lift stations to the water reclamation facility in the Harbor area near the mouth of the Santa Clara River. While most residents receive sewer service directly from the City, three other sanitary sewer agencies with their own treatment facilities provide service to some citizens in the Montalvo, Saticoy, and North Ventura Avenue areas. As shown in Table 5-2, all local treatment facilities operate well below capacity.

Table 5-2 Treatment Facilities

Treatment Facilities	Treatment Type	Capacity	Average Daily Flow
Ventura Water Reclamation Facility	Tertiary	14 MGD	9.0 MGD (68% capacity)
Montalvo Municipal Improvement District Treatment Plant	Secondary	0.36 MGD	0.242 MGD (67% capacity)
Saticoy Sanitary District Treatment Plant	Secondary[2]	0.25 MGD	0.16 MGD (64% capacity)
Ojai Valley Sanitary District Treatment Plant	Tertiary	3 MGD	2.0 MGD (71% capacity)

[2] Includes nutrient removal prior to percolation.
Source: Individual agencies listed

About two-thirds of the wastewater treated locally is discharged to the Santa Clara River Estuary, as allowed by the Regional Water Quality Control Board. The remaining effluent is either transferred to recycling ponds, where some is delivered as reclaimed water, or it percolates to underground aquifers or evaporates. The policies and actions in this chapter call for improving treatment system efficiency to reclaim and reuse as much water as possible.

Storm Drainage

Storm runoff travels from the hills above Ventura through the City until it is absorbed into the ground or reaches the Ventura River, the Santa Clara River, or the Pacific Ocean. To convey the occasional high flows associated with storms, the Ventura County Flood Control District oversees about 20 natural or concrete lined barrancas that serve as the major drainage courses for local watersheds. The City has about 20 miles of off-street drain system designed to convey runoff from all but the most severe of storms, in which case water also runs off via city streets.

Maintaining the barrancas and other watercourses that are not already lined with concrete as natural flood channels can help reduce peak flows by limiting water velocity. Incorporating natural features into drainage systems rather than hard treatment devices also can improve water quality and reduce maintenance costs. The policies and actions in this chapter seek to prevent increases in future storm water impacts by incorporating natural drainage and flood control features such as wildlife ponds and wetlands – instead of cement retention basins – into the storm drain system where possible. Such less intensive approaches not only cost less, but they also preserve environmental resources and protect water quality.

Policy 5A: Follow an approach that contributes to resource conservation.

Action 5.1: Require low flow fixtures, leak repair, and drought tolerant landscaping (native species if possible), plus emerging water conservation techniques, such as reclamation, as they become available.

Action 5.2: Use natural features such as bioswales, wildlife ponds, and wetlands for flood control and water quality treatment when feasible.

Action 5.3: Demonstrate low water use techniques at community gardens and city-owned facilities.

Action 5.4: Update the Urban Water Management plan as necessary in compliance with the State 1983 Urban Water Management Planning Act.

Action 5.5: Provide incentives for new residences and businesses to incorporate recycling and waste diversion practices, pursuant to guidelines provided by the Environmental Services Office.

Policy 5B: Improve services in ways that respect and even benefit the environment.

Action 5.6: Require project proponents to conduct sewer collection system analyses to determine if downstream facilities are adequate to handle the proposed development.

Action 5.7: Require project proponents to conduct evaluations of the existing water distribution system, pump station, and storage requirements in order to determine if there are any system deficiencies or needed improvements for the proposed development.

Action 5.8: Locate new development in or close to developed areas with adequate public services, where it will not have significant adverse effects, either individually or cumulatively, on coastal resources.

Action 5.9: Update development fee and assessment district requirements as appropriate to cover the true costs associated with development.

Action 5.10: Utilize existing waste source reduction requirements, and continue to expand and improve composting and recycling options.

Action 5.11: Increase emergency water supply capacity through cooperative tie-ins with neighboring suppliers.

Action 5.12: Apply new technologies to increase the efficiency of the wastewater treatment system.

Action 5.13: Increase frequency of city street sweeping, and post schedules at key points within each neighborhood.

Action 5.14: Develop a financing program for the replacement of failing corrugated metal storm drain pipes in the City.

Action 5.15: Establish assessment districts or other financing mechanisms to address storm drain system deficiencies in areas where new development is anticipated and deficiencies exist.

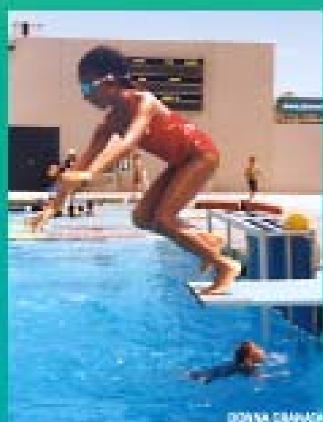
Action 5.16: Require new developments to incorporate stormwater treatment practices that allow percolation to the underlying aquifer and minimize offsite surface runoff utilizing methods such as pervious paving material for parking and other paved areas to facilitate rainwater percolation and retention/detention basins that limit runoff to pre-development levels.

Action 5.17: Require stormwater treatment measures within new development to reduce the amount of urban pollutant runoff in the Ventura and Santa Clara Rivers and other watercourses.

Action 5.18: Work with the Ventura Regional Sanitation District and the County to expand the capacity of existing landfills, site new landfills, and/or develop alternative means of disposal that will provide sufficient capacity for solid waste generated in the City.

ventura's general plan

OUR ACTIVE COMMUNITY



"Leave all the afternoon for exercise and recreation, which are as necessary as reading. I will rather say more necessary because health is worth more than learning."

— Thomas Jefferson
3rd President of the United States
1801-1809

CITY OF
VENTURA

6. OUR ACTIVE COMMUNITY

Our goal is to add to and enhance our parks and open spaces to provide enriching recreation options for the entire community.

Higher Standards

For many people, spending time outdoors and participating in recreational activities represent some of life's most cherished rewards. Ventura's superb public park, open space, and recreation system offers a myriad of ways to partake in these privileges. The city offers 34 developed parks, 45 miles of linear park and trail network, stellar beaches, specialized play and sports facilities and programs, communitywide events, senior and youth activities, and two 18-hole tournament class public golf courses. Figure 6-1 at the end of this chapter shows the locations of various public facilities in the city.

The City is committed to ensuring that its citizens have ample access to high quality spaces for leisure and active recreation. The City's adopted standard of 10 acres per 1,000 residents has created far more park area than would be possible under the basic State level of 3 acres per 1,000, and also tops the more ambitious National Park and Recreation Association benchmarks for specific park types (see Table 6-1). The City continues to create customized facilities like the Community Park (approved by the voters pursuant to SOAR) to expand opportunities for local residents to enjoy healthy, active lifestyles.

Table 6-1 Park Acreage per 1,000 Population

Park Type	Standards	
	City of Ventura	National Park & Recreation Association
Neighborhood	2 acres	1.5 acres
Community	3 acres	2.5 acres
Citywide	5 acres	5 acres
Total	10 acres	9 acres

Sources: City of Ventura, www.nrpa.org.

City Parks and Open Space

The public park and open space system in Ventura includes neighborhood, community, citywide, and linear parks. As shown in Table 6-2, the City oversees nearly 600 acres of developed park facilities, plus the linear park network, which provides important connections among watersheds for both people and wildlife.

As the City continually strives to improve the quality of leisure and recreation opportunities for everyone in the community, it must address a number of challenges such as:

- modernizing existing facilities,
- finding appropriate land for new facilities,
- developing useful and enjoyable public spaces, such as plazas and mini-parks in urban settings,
- formalizing shared use arrangements for non-City facilities like school playfields,
- meeting increasing demand for athletic courts, fields and pools,
- provide opportunities for passive recreation, and
- providing services needed by youth, seniors, and residents with special needs.

Neighborhood Parks
Typically less than 8 acres each, these smaller parks primarily serve specific residential areas in the community. The 18 neighborhood parks in Ventura cover about 73 total acres. Any future development outside the current city limits will have to provide new neighborhood parks to serve the added population.

Community Parks
These parks are designed to offer specialized opportunities and facilities to residents of more than one neighborhood. Amenities in community parks may include formal athletic fields, courts, recreation buildings, preschool and youth play structures, group and individual picnic areas, and landscaped areas for informal activity or leisure.

Citywide Parks
These parks feature recreational opportunities that draw a wide range of age and interest groups from throughout the city. They offer a variety of attractive amenities, such as large open spaces, unique natural resources, interpretive centers, cultural amenities, group picnic areas, sports facilities, and equestrian, bicycling, and hiking trails. The Ventura Community Park also serves some citywide park functions and attracts visitors from outside the city with its high-quality playing fields and aquatic center.

Linear Parks
Ventura's unique linear park network intersperses trails and picnic areas among a mostly undeveloped web of barranca and riverbanks that provide valuable wildlife habitat and migration corridors. The linear parks also merge with a number of neighborhood and community parks, complementing developed recreation areas with natural riparian qualities. Extending trails through the linear park network can create additional opportunities for low-impact contact with nature, and in some cases even provide pleasant non-automobile commuting options.

Table 6-2 City Park Facilities

Park	Park Size (in acres)				
	Neighborhood Parks	Community Parks	Citywide Parks	Special Use Facilities	Total
Albinger Archaeological Museum				0.9	**0.9**
Arroyo Verde Park	2.0	23.0	104.3		**129.3**
Barranca Vista Park	8.7				**8.7**
Blanche Reynolds Park	3.4				**3.4**
Camino Real Park			38.2		**38.2**
Cemetery Memorial Park	7.1				**7.1**
Chumash Park	6.1				**6.1**
Downtown Mini-Park	0.4				**0.4**
Eastwood Park				0.7	**0.7**
Fritz Huntsinger Youth Sports Complex	4.3	14.0			**18.3**
Grant Park			107.3		**107.3**
Harry A. Lyon Park			10.7		**10.7**
Hobert Park	7.1				**7.1**
Juanamaria Park	5.0				**5.0**
Junipero Serra Park	2.7				**2.7**
Linear Park Network				46.0	**46.0**
Marina Park			15.3		**15.3**
Marion Cannon Park	5.0				**5.0**
Mission Park	1.5				**1.5**
Ocean Avenue Park	1.3				**1.3**
Olivas Adobe Historical Park				22.5	**22.5**
Ortega Adobe Historic Residence				0.3	**0.3**
Plaza Park	3.7				**3.7**
Promenade Park	1.0				**1.0**
Seaside Wilderness Park[1, 2]				24.0	**24.0**
Surfers Point at Seaside Park[1]				3.4	**3.4**
Ventura Community Park		100.0			**100.0**
Westpark	1.5	5.8			**7.3**
Total	**60.8**	**142.7**	**275.8**	**97.8**	**577.1**

Sources: City of Ventura, 2004. Note: several parks serve functions in more than one category.
[1] Acreage varies with ocean high levels.
[2] Acreage varies with fluctuations in Ventura River level.

As with most parks in the city, resources for linear park system improvements typically come through conditions placed on adjacent development. City regulations establish standards for park width, landscaping, fencing, lighting, and tree rows that apply specifically along barrancas, freeways, rivers, the shoreline, harbor, hillsides, and utility rights-of-way.

Recreation Programs

The City operates four neighborhood centers where recreation programs and senior services are available: the Ventura Avenue Adult Center, Senior Recreation Center, Barranca Vista Center, and Westpark Community Center. The City also offers a wide range of sports programs, including youth and adult sports programs, classes, aquatics, and corporate games. Other City-sponsored recreational activities include arts and environmental education, community gardening, recreation programs for special needs residents, and after-school activities and summer camps.

A variety of other recreation opportunities are available in Ventura in addition to City programs. Foremost among these are all of the activities possible at State beaches and developed waterfront areas. Other local non-City facilities include the County Fairgrounds and local golf courses. In addition, joint-use agreements allow city residents to use sports fields, pools, and gymnasiums during certain times at public schools and Ventura College.

The policies and actions in this chapter seek to further expand local park and recreation choices by:

- identifying sites for new parks,
- increasing public access to open space, including via linear park trails,
- collaborating with schools and other local agencies and organizations,
- ensuring universal and equal access to parks and recreation facilities, and
- allowing appropriate revenue-generating activities at City parks.

Policy 6A: Expand the park and trail network to link shoreline, hillside, and watershed areas.

Action 6.1: Develop new neighborhood parks, pocket parks, and community gardens as feasible and appropriate to meet citizen needs, and require them in new development.

Action 6.2: Require higher density development to provide pocket parks, tot lots, seating plazas, and other aesthetic green spaces.

Action 6.3: Work with the County to plan and develop trails that link the City with surrounding open space and natural areas, and require development projects to include trails when appropriate.

Action 6.4: Request Flood Control District approval of public access along unchannelized watercourses for hiking.

Action 6.5: Seek landowner permission to allow public access on properties adjacent to open space where needed to connect trails.

Action 6.6: Update plans for and complete the linear park system as resources allow.

Action 6.7: Work with the County of Ventura to initiate efforts to create public trails in the hillsides.

Action 6.8: Update and require periodic reviews of the Park and Recreation Workbook as necessary to reflect City objectives and community needs.

Action 6.9: Require dedication of land identified as part of the City's Linear Park System in conjunction with new development.

Action 6.10: Evaluate and incorporate, as feasible, linear park segments in the General Bikeway Plan.

Action 6.11: Update standards for citywide public parks and open space to include an expanded menu of shared park types, and identify locations and potential funding sources for acquiring new facilities in existing neighborhoods.

Action 6.12: Update and carry out the Grant Park Master Plan.

Action 6.13: Foster the partnership between the City and Fair Board to improve Seaside Park.

Policy 6B: Ensure equal access to facilities and programs.

Action 6.14: Improve facilities at City parks to respond to the requirements of special needs groups.

Action 6.15: Adjust and subsidize fees to ensure that all residents have the opportunity to participate in recreation programs.

Action 6.16: Update the project fee schedule as necessary to ensure that development provides its fair share of park and recreation facilities.

Policy 6C: Provide additional gathering spaces and recreation opportunities.

Action 6.17: Update and create new agreements for joint use of school and City recreational and park facilities.

Action 6.18: Offer programs that highlight natural assets, such as surfing, sailing, kayaking, climbing, gardening, and bird watching.

Action 6.19: Provide additional boating and swimming access as feasible.

Action 6.20: Earmark funds for adequate maintenance and rehabilitation of existing skatepark facilities, and identify locations and funding for new development of advanced level skatepark facilities.

Policy 6D: Increase funding and support for park and recreation programs.

Action 6.21: Promote the use of City facilities for special events, such as festivals, tournaments, and races.

Action 6.22: Enter into concession or service agreements where appropriate to supplement City services.

Police Station
Fire Stations
Hospitals
Government Center
Elementary School
Middle School
High School
Community College
Library
Recreational Facilities
Linear Park
Parks
Golf Courses
City Limits
Planning Area

Figure 6-1
Public Faciities

This map is a product of the City of San Buenaventura, California. Although reasonable efforts have been made to ensure the accuracy of this map, the City of San Buenaventura cannot guarantee its accuracy.

"A city, like a living thing, is a united and continuous whole."

— Plutarch
ca. 50-120 AD, author of *Moralia*

CITY OF
VENTURA

OUR HEALTHY & SAFE COMMUNITY

ventura's general plan

7. OUR HEALTHY AND SAFE COMMUNITY

Our goal is to build effective community partnerships that protect and improve the social well-being and security of all our citizens.

Community Wellness

Keeping the small town feel of Ventura depends on working together as a community to look out for the well being of all residents, especially those most at risk. Community wellness requires comprehensive preventative care, as well as careful preparation for and response to dangers within the built environment and to risks posed by natural processes (see Figure 7-1).

Adequate shelter, sufficient medical services, walkable neighborhoods, and proper nutrition create an essential foundation for a healthy community. Reducing as much as possible the threat to people and property from earthquakes, landslides, floods, and fires further enhance the collective wellness of the city. In addition, a healthy Ventura community requires thorough protection from crime, and freedom from pollution, unwanted noise, and the threat of hazardous materials.

> ***Alquist-Priolo*** *designation requires a geologic investigation prior to the approval of a development permit to determine if a specific site within the zone is threatened by surface displacement from future fault movement.*

Geologic and Flood Hazards

Ventura lies in an active geologic region and is therefore subject to a variety of seismic hazards, including ground shaking, liquefaction, and slope failure. State law requires the City to regulate development in mapped seismic hazard zones. Major faults in the city include the Ventura-Foothill (a State-designated Alquist-Priolo Earthquake Fault Zone), Oak Ridge, McGrath, Red Mountain and Country Club Faults. Areas closest to these faults are most likely to experience ground shaking or rupture in the event of an earthquake. Liquefaction during an earthquake is most likely to occur in areas with loose, granular soils where the water table lies within 50 feet of the surface. As the soil liquefies, buildings and other objects may tilt or sink.

Hillside stability varies based on slope, soil, rock type and groundwater depth. The hills north of Poli Street/Foothill Road have experienced many historic landslides and are prone to future movement. The City Hillside Management Program limits development in the area to minimize dangers from landsliding, erosion, flooding, and fire, and to retain natural and scenic character.

The Federal Emergency Management Agency regulates development along watercourses based on the likelihood of flooding: the basic benchmark – the 100-year flood – has a one percent chance of occurring in any given year. Although the mapped 100-year flood hazard areas for local rivers and barrancas are fairly limited in size, the largest recorded flood events along the Ventura and Santa Clara Rivers, both following heavy rains in 1969, exceeded the 100-year flood zone. The policies and actions in this Chapter intend to limit harm from geologic and flood events by requiring detailed risk analyses and mitigation prior to development of sites in hazard prone areas.

Fire and Emergency Response

The Ventura Fire Department responds to fire, medical, and disaster calls from six stations in the city. The Department's goal is to reach the scene within 4 minutes 90% of the time. The Department has a reciprocal agreement with the County Fire Protection District to ensure that Ventura residents receive the swiftest service possible. The Department also has a responsibility to provide disaster preparedness for the City. Particular fire department concerns in the City include:

- the need for reliable and sustainable source of fire service revenue,
- lengthy response times to areas farthest from existing stations (See Figure 7-2),
- firefighter and support staffing levels that are far below the .98 firefighter per 1,000 population averages of other municipal fire departments with comparable city size, age, and population,
- the threat of wildland fire entering urban area, and
- the lack of fire protection systems in older structures.

The policies and actions in this Chapter aim to optimize firefighting and emergency response capabilities through oversight of new development, improved facilities, and added staff.

Police Protection

Ventura Police response to crimes in progress or alarm soundings averages less than six minutes, and less than sixteen minutes for most other calls. While the local crime rate is slightly higher than State average, the Department hopes to better engage the community in policing efforts to lower crime levels. As part of a Strategic Planning Process, the Department has established the following goals:

- reduce crime and the fear of crime
- improve the quality of life in neighborhoods
- enhance community and police partnerships
- develop personnel
- continued accountability

One-time grant funding has helped add officers dedicated to community crime prevention, gang control, and youth mentoring programs. As these grants end the City must face the challenge of funding these services. Actions in this Chapter seek to improve the full range of police services to maximize community safety by increasing staffing, outreach efforts, and public access to police services.

Noise

Noise is generally defined as unwanted sound. Its effects can range from annoyance to nuisances to health problems. State law requires the City to identify and address noise sources and establish projected noise levels for roadways, railroads, industrial uses, and other significant generators. The Noise Contours map (Figure 7-3) is used to help guide land use in a way that minimizes exposure of residents to excessive noise.

Vehicle traffic is by far the greatest source of noise affecting Ventura residents. Other sources include the Seaside Park raceway, the Grant Park shooting range, and railroad, commercial, and industrial activity. Homes, schools, hotels, and hospitals are considered sensitive receptors where excessive noise can interfere with normal activities.

Noise intensity is customarily measured on the decibel scale, an index of loudness. Sounds as faint as 10 decibels (dB) are barely audible, while noise over 120 dB can be painful or damaging to hearing (Table 7-1 shows some typical noise levels). A sound 10 dB higher than another is perceived as about twice as loud. A 5 dB change is readily noticeable, but a 3 dB difference is barely perceptible.

As shown in Table 7-2, normally acceptable outdoor noise in residential areas may reach 65 decibels. The Ldn label in the table indicates that sound is averaged over time to account for the fact that sources like traffic or aircraft may cause fluctuations of more than 20 dB over a few seconds. CNEL refers to the fact that 5 dB is added to noise after 7 p.m. and 10 dB added from 10 p.m. to 7 a.m., when quieter conditions make sound more noticeable.

The State Building Code requires an acoustical study whenever outdoor noise would exceed 60 decibels at a proposed duplex, multifamily residence, hotel, motel or other attached dwelling. The study must show that the proposed project design would result in interior noise levels of 45 dB or less.

Although future increases in traffic are not expected to produce a significant change in perceived noise levels, other specific sound generators have been identified as problems in the community. The policies and actions in this chapter look to reduce the exposure of people in Ventura to these noise sources.

Table 7-1. Typical Noise Levels

Type of Noise or Environment	Decibels
Recording Studio	20
Soft Whisper; Quiet Bedroom	30
Busy Open-plan Office	55
Normal Conversation	60-65
Automobile *at 20 mph 25 ft. away*	65
Vacuum Cleaner *10 ft. away*	70
Dump Truck *at 50 mph 50 ft. away*	90
Train Horn *100 ft. away*	105
Claw Hammer; Jet Takeoff *200 ft. away*	120
Shotgun *at shooter's ear*	140

Table 7-2
Acceptable Noise Levels

NORMALLY ACCEPTABLE
Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

CONDITIONALLY ACCEPTABLE
New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

NORMALLY UNACCEPTABLE
New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design

CLEARLY UNACCEPTABLE
New construction or development should generally not be undertaken.

Source: General Plan Guidelines, California Office of Planning and Research

Hazardous Materials

Hazardous materials include medical and industrial wastes, pesticides, herbicides, radioactive materials, and combustible fuels. Improper use, storage, transport, or disposal of these materials may result in harm to humans, surface or ground water degradation, air pollution, fire, or explosion. Most of the several hundred facilities in Ventura that use or store hazardous materials lie along Ventura Avenue or in the Arundell industrial district.

The Fire Department maintains a team specially trained and equipped to respond to hazardous materials emergencies. Additional equipment and personnel for large-scale hazardous materials incidents is available from the County Fire Protection District, the City of Oxnard, and the U.S. Naval Construction Battalion Center in Port Hueneme.

The Westside and North Avenue neighborhoods include about 30 brownfields: sites that may possess contaminated soils but also have potential for reuse. Cleanup of these sites will make them more attractive for redevelopment that can improve the neighborhoods and generate employment and tax revenue. The City has established a Brownfield Assessment Demonstration Pilot Program to fund site assessments and initiate remediation. The policies and actions in this chapter intend to minimize the risk of adverse health effects of hazardous materials by regulating their location and seeking funding for cleanup of brownfield sites to encourage their reuse.

Policy 7A: Encourage wellness through care and prevention.

Action 7.1: Work with interested parties to identify appropriate locations for assisted-living, hospice, and other care-provision facilities.

Action 7.2: Provide technical assistance to local organizations that deliver health and social services to seniors, homeless persons, low-income citizens, and other groups with special needs.

Action 7.3: Participate in school and agency programs to:

- provide healthy meals,
- combat tobacco, alcohol, and drug dependency,
- distribute city park and recreation materials through the schools, and
- distribute information about the benefits of proper nutrition and exercise.

Action 7.4: Enhance or create ordinances which increase control over ABC licensed premises.

Action 7.5: Investigate the creation of new land use fees to enhance funding of alcohol related enforcement, prevention and training efforts.

Policy 7B: Minimize risks from geologic and flood hazards.

Action 7.6: Adopt updated editions of the California Construction Codes and International Codes as published by the State of California and the International Code Council respectively.

Action 7.7: Require project proponents to perform geotechnical evaluations and implement mitigation prior to development of any site:

- with slopes greater than 10 percent or that otherwise have potential for landsliding,
- along bluffs, dunes, beaches, or other coastal features
- in an Alquist-Priolo earthquake fault zone or within 100 feet of an identified active or potentially active fault,
- in areas mapped as having moderate or high risk of liquefaction, subsidence, or expansive soils,
- in areas within 100-year flood zones, in conformance with all Federal Emergency Management Agency regulations.

Action 7.8: To the extent feasible, require new critical facilities (hospital, police, fire, and emergency service facilities, and utility “lifeline” facilities) to be located outside of fault and tsunami hazard zones, and require critical facilities within hazard zones to incorporate construction principles that resist damage and facilitate evacuation on short notice.

Action 7.9: Maintain and implement the Standardized Emergency Management System (SEMS) Multihazard Functional Response Plan.

Action 7.10: Require proponents of any new developments within the 100-year floodplain to implement measures, as identified in the Flood Plain Ordinance, to protect structures from 100-year flood hazards (e.g., by raising the finished floor elevation outside the floodplain).

Action 7.11: Prohibit grading for vehicle access and parking or operation of vehicles within any floodway.

Policy 7C: Optimize firefighting and emergency response capabilities.

Action 7.12: Refer development plans to the Fire Department to assure adequacy of structural fire protection, access for firefighting, water supply, and vegetation clearance.

Action 7.13: Resolve extended response time problems by:

- adding a fire station at the Pierpont/Harbor area,
- relocating Fire Station #4 to the Community Park site,
- increasing firefighting and support staff resources,
- reviewing and conditioning annexations and development applications, and
- require the funding of new services from fees, assessments, or taxes as new subdivisions are developed.

Action 7.14: Educate and reinforce City staff understanding of the Standardized Emergency Management System for the State of California.

Policy 7D: Improve community safety through enhanced police service.

Action 7.15: Increase public access to police services by:

- increasing police staffing to coincide with increasing population, development, and calls for service,
- increasing community participation by creating a Volunteers in Policing Program, and,
- require the funding of new services from fees, assessments, or taxes as new subdivisions are developed.

Action 7.16: Provide education about specific safety concerns such as gang activity, senior-targeted fraud, and property crimes.

Action: 7.17: Establish a nexus between police department resources and increased demands associated with new development.

Action 7.18: Continue to operate the Downtown police storefront.

Action 7.19: Expand Police Department headquarters as necessary to accommodate staff growth.

Policy 7D: Minimize exposure to air pollution and hazardous substances.

Action 7.20: Require air pollution point sources to be located at safe distances from sensitive sites such as homes and schools.

Action 7.21: Require analysis of individual development projects in accordance with the most current version of the Ventura County Air Pollution Control District Air Quality Assessment Guidelines and, when significant impacts are identified, require implementation of air pollutant mitigation measures determined to be feasible at the time of project approval.

Action 7.22: In accordance with Ordinance 93-37, require payment of fees to fund regional transportation demand management (TDM) programs for all projects generating emissions in excess of Ventura County Air Pollution Control District adopted levels.

Action 7.23: Require individual contractors to implement the construction mitigation measures included in the most recent version of the Ventura County Air Pollution Control District Air Quality Assessment Guidelines.

Action 7.24: Only approve projects involving sensitive land uses (such as residences, schools, daycare centers, playgrounds, medical facilities) within or adjacent to industrially designated areas if an analysis provided by the proponent demonstrates that the health risk will not be significant.

Action 7.25: Adopt new development code provisions that ensure uses in mixed-use projects do not pose significant health effects.

Action 7.26: Seek funding for cleanup of sites within the Brownfield Assessment Demonstration Pilot Program and other contaminated areas in West Ventura.

Action 7.27: Require proponents of projects on or immediately adjacent to lands in industrial, commercial, or agricultural use to perform soil and groundwater contamination assessments in accordance with American Society for Testing and Materials standards, and if contamination exceeds regulatory action levels, require the proponent to undertake remediation procedures prior to grading and development under the supervision of the County Environmental Health Division, County Department of Toxic Substances Control, or Regional Water Quality Control Board (depending upon the nature of any identified contamination).

Action 7.28: Educate residents and businesses about how to reduce or eliminate the use of hazardous materials, including by using safer non-toxic equivalents.

Action 7.29: Require non-agricultural development to provide all necessary buffers, as determined by the Agriculture Commissioner's Office, from agricultural operations to minimize the potential for pesticide drift.

Action 7.30: Require all users, producers, and transporters of hazardous materials and wastes to clearly identify the materials that they store, use, or transport, and to notify the appropriate City, County, State and Federal agencies in the event of a violation.

Action 7.31: Work toward voluntary reduction or elimination of aerial and synthetic chemical application in cooperation with local agricultural interests and the Ventura County agricultural commissioner.

Policy 7E: Minimize the harmful effects of noise.

Action 7.32: Require acoustical analyses for new residential developments within the mapped 60 decibel (dBA) CNEL contour, or within any area designated for commercial or industrial use, and require mitigation necessary to ensure that:

- Exterior noise in exterior spaces of new residences and other noise sensitive uses that are used for recreation (such as patios and gardens) does not exceed 65 dBA CNEL, and
- Interior noise in habitable rooms of new residences does not exceed 45 dBA CNEL with all windows closed.

Action 7.33: As funding becomes available, construct sound walls along U.S. 101, SR 126, and SR 33 in areas where existing residences are exposed to exterior noise exceeding 65 dBA CNEL.

Action 7.34: Request that sound levels associated with concerts at the County Fairgrounds be limited to 70 dBA at the eastern edge of that property.

Action 7.35: Request the termination of auto racing at the County fairgrounds.

Action 7.36: Amend the noise ordinance to restrict leaf blowing, amplified music, trash collection, and other activities that generate complaints.

Action 7.37: Use rubberized asphalt or other sound reducing material for paving and re-paving of City streets.

Action 7.38: Update the Noise Ordinance to provide standards for residential projects and residential components of mixed-use projects within commercial and industrial districts.

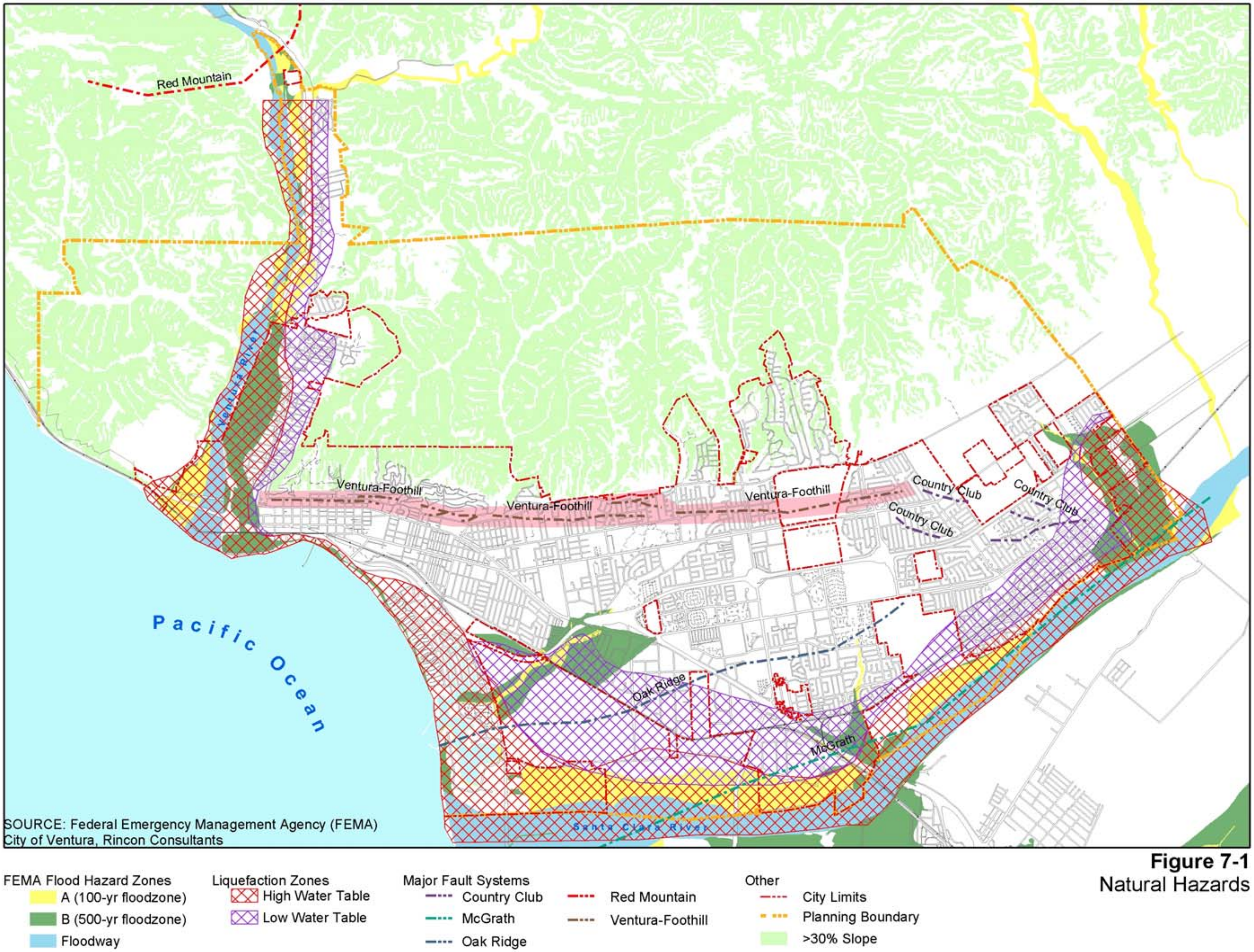
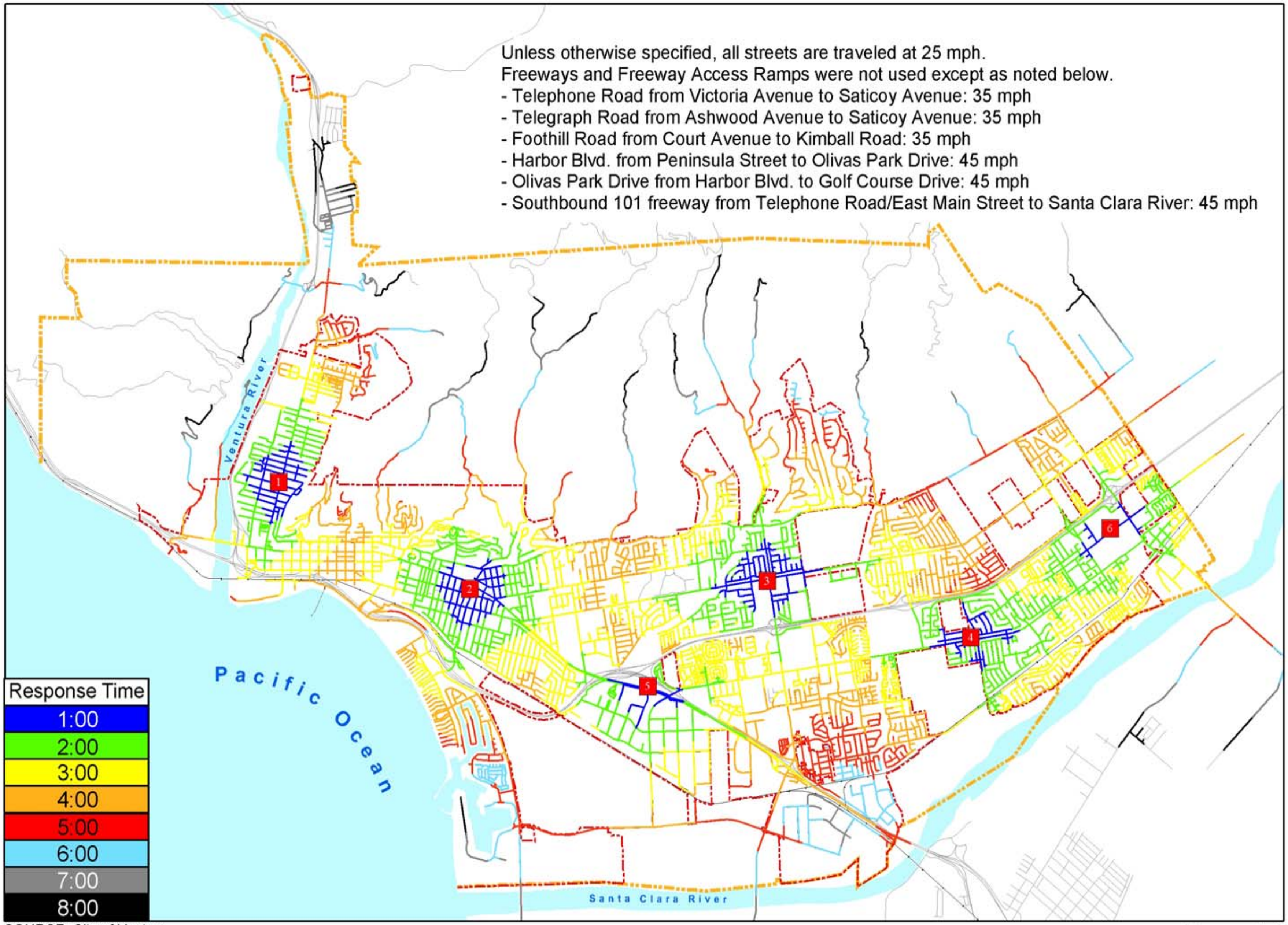


Figure 7-1
Natural Hazards

This map is a product of the City of San Buenaventura, California. Although reasonable efforts have been made to ensure the accuracy of this map, the City of San Buenaventura cannot guarantee its accuracy.



SOURCE: City of Ventura

City Limits

Planning Boundary

Existing Fire Stations 1-6

Figure 7-2
Fire Response Time

This map is a product of the City of San Buenaventura, California. Although reasonable efforts have been made to ensure the accuracy of this map, the City of San Buenaventura cannot guarantee its accuracy.

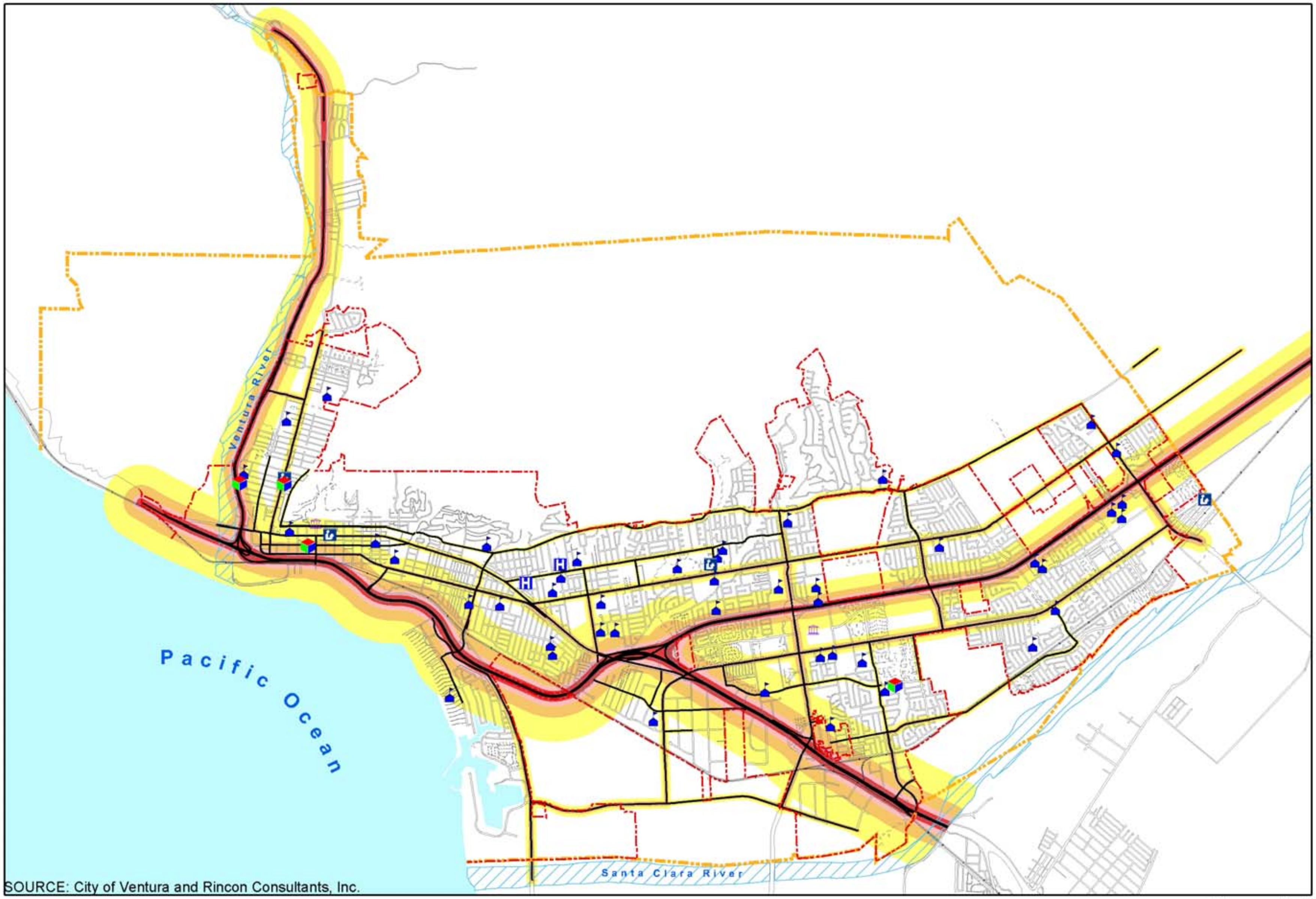


Figure 7-3
Noise Contours

Noise Contours

- 60dBA
- 65dBA
- 70dBA
- 75dBA
- Countoured Streets (Over 5000 ADT)
- Recreation Centers
- Hospitals
- Schools
- Library
- Government Centers
- City Limits
- Planning Boundary

This map is a product of the City of San Buenaventura, California. Although reasonable efforts have been made to ensure the accuracy of this map, the City of San Buenaventura cannot guarantee its accuracy.

"A vigorous culture capable of making corrective, stabilizing changes depends heavily on its educated people, and especially upon their critical capacities and depth of understanding."

— Jane Jacobs
Dark Age Ahead

CITY OF
VENTURA

8. OUR EDUCATED COMMUNITY

Our goal is to encourage academic excellence and life-long learning resources to promote a highly-educated citizenry.

Lifelong Learning

Education is more important than ever before as the foundation for the vitality of informed community participation in Ventura. The *Ventura Vision* calls for the city to be "a community dedicated to educational excellence and an emphasis on lifelong learning." A truly educated community is key to achieving most of the goals in this General Plan because:

- In the 21st Century information economy a highly educated and skilled workforce is vital to community prosperity,
- Education and the institutions that provide it are critical to achieving environmental and cultural leadership, and
- An educated and informed citizenry is essential to sound planning and decision-making.

While Ventura has a comparatively well-educated population (see Table 8-1), the high costs of doing business and finding housing in the city will force even greater emphasis on businesses and jobs that require ever-higher levels of skill. The need and desire for lifelong learning will require relentlessly expanding educational resources and access to them in the years ahead. Plus, the assets that strong educational institutions provide are necessary to bring a rich cultural life to the community as well.

Ventura can build on an impressive base of well-regarded public schools, array of private alternatives, major community college, satellite university campuses, expanding media-training institute, law school, and three branch libraries, among other educational resources. The key to becoming renowned as a local "learning community" lies in creating stronger linkages between these existing resources and integrating them into the physical and social landscape of our community.

Leveraging our Assets

Excellence in public education is the top priority for the Ventura Unified School District (whose boundaries extend beyond the city). In Ventura, the District manages 16 elementary schools, four middle schools, three high schools, and one continuation high school, plus independent study and adult education programs.

In addition to District schools, the city also is home to more than a dozen private schools (see Table 8-2), serving 13 percent of elementary and high school students living in Ventura, according to the 2000 Census. Figure 6-1 shows school locations in the city.

Table 8-1
Education Level

Schooling Completed	Percent of Population
High School	21.7
Some College	28.2
Associate Degree only	9.6
Bachelors Degree only	15.4
Graduate Degree	9.3
High School Diploma & Above	***84.1***
Associate Degree & Above	***34.2***

Source: 2001 Ventura County Economic Outlook

Table 8-2
Private Schools

School	Grades
First Baptist Day	K-5
St. Augustine Academy	4-12
Sacred Heart	K-8
Ventura Missionary Christian Day	K-8
College Heights Christian	K-8
St. Bonaventure High School	9-12
Holy Cross	K-8
Our Lady of The Assumption	K-8
St. Paul's Parish Day	K-8
Grace Lutheran Christian Day	K-6
Jameson	K-12
Ventura County Christian	K-12
Hill Road Montessori Preschool	K-3
Wells Road Baptist Academy	K-12

Most public schools operate at or near capacity (see Table 8-3), and continuing growth in Ventura requires the District to search for sites for new schools (see Table 8-4). Developers of new projects are required to dedicate land or pay fees for school purposes, and any major annexation of land outside the city is likely to have to provide a school site to serve new resident children. Still, the scarcity and cost of suitable sites means that greater thought will need to be given to shared facility use and other non-traditional approaches to expanding capacity.

Table 8-3. Ventura Unified School District Enrollment

Schools – No.	Students	Capacity
Elementary – 17	8,093	95%
Middle – 4	4,304	93%
High - 3	4,820	85%
TOTAL	**17,217**	**92%**

Source: Ventura Unified School District, 2003

Table 8-4. Public School Demand

School Type	Students/ School	School Needs	Acres Needed[1]
Elementary	600	4	40
Middle	1,000	1	20
High	2,000	1	40
TOTAL		**6**	**100**

1. Assumes 10 acres for elementary schools, 20 acres for middle schools, and 40 acres for high schools.
Source: Ventura Unified School District, 2003

Ventura is increasingly becoming recognized as a center for higher education. Ventura College is a highly respected two-year school with more than 12,000 students, providing everything from a distinguished transfer opportunity for the University of California to certificates and associates degrees in important fields such as manufacturing and nursing. Students also can obtain four-year degrees in certain fields at the UCSB Ventura Center. Brooks Institute of Photography provides education in photojournalism, filmmaking, and related fields, providing the city with a significant cultural asset. Residents can earn graduate degrees in law, public policy, and education at the Ventura campuses of California Lutheran University, Azusa Pacific University, the Ventura College of Law, and the Southern California Institute of Law. The opening of the nearby California State University Channel Islands has drawn many students and faculty to live in Ventura, especially those in creative fields.

Combined, these institutions of higher learning provide Ventura with tremendous educational assets. Through the policies and actions in this chapter, the City is committed to nurturing these institutions, creating synergy among them, and instilling both cultural and economic opportunities.

Libraries of the Future

The County public library system in Ventura currently operates three branch libraries that serve about 200,000 visits annually (see Table 8-5). But in a digital age where more and more content is available online, the traditional book borrowing function is becoming outmoded. Library administrators and staff, the City's Library Advisory Commission, and patrons have all pointed to needs for adding library space, extending operating hours, and updating and expanding learning resources.

At a more fundamental level, the ideas of what constitutes a library and how it fits the patterns of a learning community need to be reexamined. Integration with school libraries, including the Ventura College Learning Center, is a top priority for this reevaluation, as embodied in the policies and actions in this chapter.

City and Community Programs

Traditional classroom settings alone cannot provide the complete set of educational skills and experience needed by people of all ages. The City provides a variety of learning opportunities, including youth and adult art programs, environmental education, adaptive recreation programs, youth after-school activities, and summer camps. Community organizations also provide a range of classes and experiences, including tours, museums, lectures, and hands-on activities. Expanding venues for such activities and promoting participation in them are key challenges.

Policies and actions in this chapter seek to expand lifelong learning opportunities for everyone in the community.

Table 8-5. Local Libraries

Library	Card-Holders	2003-2004 Patronage	Hours Open Weekly	Facility Size (sq. ft.)
E. P. Foster	48,195	366,134	54	31,000
H. P. Wright			39	12,000
Avenue			25	3,000

Source: Ventura County Library Administration, 2005

Policy 8A: Reach out to institutions and educators to advance lifelong learning.

Action 8.1: Work closely with schools, colleges, and libraries to provide input into site and facility planning.

Action 8.2: Organize a regional education summit to generate interest in and ideas about learning opportunities.

Action 8.3: Adopt joint-use agreements with libraries, schools, and other institutions to maximize use of educational facilities.

Action 8.4: Distribute information about local educational programs.

Policy 8B: Increase the availability and diversity of learning resources.

Action 8.5: Install infrastructure for wireless technology and computer networking in City facilities.

Action 8.6: Establish educational centers at City parks.

Action 8.7: Work with the State Parks Department to establish a marine learning center at the Harbor.

Action 8.8: Work with the Ventura Unified School District to ensure that school facilities can be provided to serve new development.

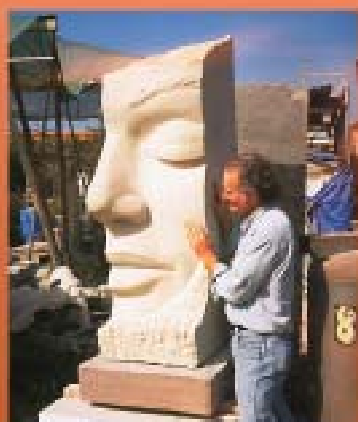
Policy 8C: Reshape public libraries as 21st Century learning centers.

Action 8.9: Complete a new analysis of community needs, rethinking the role of public libraries in light of the ongoing advances in information technology and the changing ways that individuals and families seek out information and life-long learning opportunities.

Action 8.10: Reassess the formal and informal relationships between our current three branch public libraries and school libraries – including the new Ventura College Learning Resource Center – as well as joint use of facilities for a broader range or compatible public, cultural, and educational uses.

Action 8.11: Develop a Master Plan for Facilities, Programs, and Partnerships to create an accessible, robust, and vibrant library for the 21st Century system, taking into consideration that circulation of books is no longer the dominant function but will continue to be an important part of a linked network of learning centers.

Action 8.12: Develop formal partnerships, funding, capital strategies, and joint use agreements to implement the new libraries Master Plan.



"Whatever you can do, or dream you can, begin it. Boldness has genius, power and magic in it."

— Johann Wolfgang von Goethe

CITY OF VENTURA

OUR CREATIVE COMMUNITY

ventura's general plan

9. OUR CREATIVE COMMUNITY

Our goal is to become a vibrant cultural center by weaving the arts and local heritage into everyday life.

A Rich Foundation

Local history, artistic expression, and cultural diversity play vital roles in making Ventura a vibrant and interesting place. The heritage of Chumash civilization, which developed over the course of about 9,000 years, and influences of Mexican settlement establish a rich tableau for the modern development of the city. Art in museums, galleries, and public places, as well as space and energy devoted to the creation of artwork and crafts connect the community in complex and fundamental ways. Cultural expression in the form of festivals and informal gatherings provide additional and essential bonds that strengthen the community.

Historic Context

Abundant food and water, temperate climate, and ample material for tool manufacturing attracted early local inhabitants. Chumash peoples were living in a string of coastal villages when Spanish explorers arrived in 1542. Shisholop village (at the south end of present-day Figueroa Street) was a thriving Chumash provincial capital at the time of the Spanish arrival. Other Chumash villages and burial sites have been found in what are now the North Avenue and Saticoy neighborhoods, as well as north of the Ventura River. Mexican settlers began to arrive in earnest after the founding of Mission San Buenaventura in 1782.

Table 9-1
Key Historical and Cultural Sites

Site	Description
Albinger Museum	Artifacts spanning 3,500 years excavated from a site next to the Mission are on display in this former adobe at 113 East Main Street.
Downtown	Downtown Ventura is home to a variety of 19th Century buildings that house restaurants and retail establishments in a small-town setting with a variety of cultural amenities.
Olivas Adobe Park	Completed in 1849 for the Raymundo ranching family, the well-preserved hacienda at 4200 Olivas Park Road is utilized as concert and banquet facility.
Ortega Adobe	Built in 1857, the adobe is only remaining example of the middle class homes that once lined West Main Street. The building has since been used as a police station and restaurant.
San Buenaventura Mission	Built in 1782, the Mission anchors the western part of the downtown area and is still used for regular Catholic services.
Santa Gertrudis Chapel	The Chapel was originally completed around 1809. The site is located along Highway 33 near Foster Park.
San Miguel Chapel	The site is located at Thompson Boulevard and Palm Street. The original chapel dated back to the early 1800s.
Ventura County Museum of History and Art	The museum at 100 East Main Street houses exhibits featuring local artists and historical artifacts. Expansion plans include a 200-seat auditorium and a gallery with touring exhibits.

Source: City of Ventura

More than 90 historic sites have been identified in the planning area (which includes areas outside the city). Notable ones include the Mission, the Ortega and Olivas Adobes, and the locations of the Santa Gertrudis and San Miguel Chapels (See Table 9-1 and Figure 9-1). Many of the existing buildings in Ventura were constructed between 1880 and 1940, a period that coincided with development of the railroads and harbor. City

Hall (formerly the County Courthouse) and the Mission aqueduct are listed as landmarks on the National Register of Historic Places, and structures in the following historic districts are protected by City architectural controls:

- the grounds within the Mission District,
- the Mitchell block (south of Thompson Boulevard between Chestnut and Fir Streets),
- the Selwyn Shaw block (north of Poli Street between Ann and Hemlock Streets), and
- the Simpson Tract (west of Ventura Avenue between Simpson and Prospect Streets).

Arts and Culture

When the City first adopted a Community Cultural Plan in 1992, Ventura's creative community was in its fledgling stage. Few of the now-thriving professional art and cultural organizations existed (see Table 9-2). A burgeoning visual artist community had made the city its home, but was fairly invisible except to the more intrepid arts supporters and collectors.

Since completion of that plan, the City has either implemented or initiated all of its recommendations, which were developed through extensive public involvement. As a result, the growth of the cultural community has been extraordinary. Now Ventura is home to a wealth of active artists and arts organizations. From 1994-2004, the budgets of arts organizations in Downtown Ventura alone increased from $500,000 to more than $4 million.

Ventura also now has a complement of major cultural institutions unique for a city of its size, including the Ventura Music Festival, the Rubicon Theatre Company, the Ventura County Museum of History and Art, and Focus on the Masters. The individual artists who live and work in the city continue to comprise a major part of its cultural fabric, and are highlighted in popular cultural events like the Downtown ArtWalks.

A strong focus of the City's general is to build the arts infrastructure of Ventura. A strong cultural infrastructure is the foundation of a healthy arts ecosystem: this includes *places* (for arts creation, sales, exhibition, performance, rehearsal, living), *people* (artists, audiences, patrons), and *organizations* (production, support, and presentation).

In keeping with the community's respect for its roots, the Ventura arts scene remains authentic, no small feat in today's competitive environment. While many communities focus on importing Broadway shows or big-name art exhibits to increase their profile, Ventura successfully continues to highlight local artists, architecture, culture, history, and the environment – the unique threads that together comprise the rich tapestry of the Ventura community. Policies and actions in this chapter call for continuing to build the cultural foundations of the community by involving everyone in the production, support, and presentation of art and cultural programs, installing art in public places, providing working and display space for local artists, and identifying a site for an arts and cultural center.

Table 9-2
Art and Cultural Institutions

Name	Description	Years in Operation	Annual Patronage
Buenaventura Arts Association	Fine art gallery in downtown Ventura.	50	5,000
Channelaire Chorus	Women's chorus	42	2,500
City of Ventura Cultural Affairs Division	Supports local arts organizations; produces cultural programs (ArtWalks, Street Fairs, Music Under the Stars, Arts Education classes, grants, public art, etc.)	13	132,000
Focus on the Masters	Documentation of extraordinary artists (photographs, audio and video interviews)	10	15,000
Kids' Art	Ongoing, free kids' creative arts programs	12	350
Music 4 Kids	After school music instruction at Boys & Girls Clubs	4	800
Plexus Dance Theater	Professional modern dance performances	20	1,400
Rubicon Theater	Regional theater – classic and contemporary	6	37,000
San Buenaventura Foundation for the Arts	Arts umbrella organization - supports development of the Cultural Center and produces Arts Explosion	5	5,900
Ventura Area Theater Sports	Live improvisational theater in downtown Ventura	15	5,000
Ventura Artists' Union	Art gallery and weekly arts shows on California Plaza	15	17,000
Ventura College Opera Workshop	Opera and theater company at Ventura College	21	4,500
Ventura County Ballet	Ballet school with twice annual performances	6	11,000
Ventura County Master Chorale	Professional vocal music ensemble	23	6,000
Ventura County Museum of History and Art	Museum featuring exhibits on the history and art of Ventura County	26	55,000
Ventura Music Festival	Annual concert festival presenting international and local performers	11	9,000

Policy 9A: Increase public art and cultural expression throughout the community.

Action 9.1: Require works of art in public spaces per the City's Public Art Program Ordinance.

Action 9.2: Sponsor and organize local art exhibits, performances, festivals, cultural events, and forums for local arts organizations and artists.

Action 9.3: Expand outreach and publicity by:

- promoting locally produced art and local cultural programs
- publishing a monthly calendar of local art and cultural features,
- distributing the *State of the Arts* quarterly report, and
- offering free or subsidized tickets to events.

Action 9.4: Support the creative sector through training and other professional development opportunities.

Action 9.5: Work with the schools to integrate arts education into the core curriculum.

Action 9.6: Promote the cultural and artistic expressions of Ventura's underrepresented cultural groups.

Action 9.7: Offer ticket subsidy and distribution programs and facilitate transportation to cultural offerings.

Policy 9B: Meet diverse needs for performance, exhibition, and workspace.

Action 9.8: Increase the amount of live-work development, and allow its use for production, display, and sale of art.

Action 9.9: Work with community groups to locate sites for venues for theater, dance, music, and children's programming.

Policy 9C: Integrate local history and heritage into urban form and daily life.

Action 9.10: Provide incentives for preserving structures and sites that are representative of the various periods of the city's social and physical development.

Action 9.11: Organize and promote multi-cultural programs and events that celebrate local history and diversity.

Action 9.12: Allow adaptive reuse of historic buildings.

Action 9.13: Work with community groups to identify locations for facilities that celebrate local cultural heritage, such as a living history Chumash village and an agricultural history museum.

Policy 9D: Ensure proper treatment of archeological and historic resources.

Action 9.14: Require archaeological assessments for projects proposed in the Coastal Zone and other areas where cultural resources are likely to be located.

Action 9.15: Suspend development activity when archaeological resources are discovered, and require the developer to retain a qualified archaeologist to oversee handling of the resources in coordination with the Ventura County Archaeological Society and local Native American organizations as appropriate.

Action 9.16: Pursue funding to preserve historic resources.

Action 9.17: Provide incentives to owners of eligible structures to seek historic landmark status and invest in restoration efforts.

Action 9.18: Require that modifications to historically-designated buildings maintain their character.

Action 9.19: For any project in a historic district or that would affect any potential historic resource or structure more than 40 years old, require an assessment of eligibility for State and federal register and landmark status and appropriate mitigation to protect the resource.

Action 9.20: Seek input from the City's Historic Preservation Commission on any proposed development that may affect any designated or potential landmark.

Action 9.21: Update the inventory of historic properties.

Action 9.22: Create a set of guidelines and/or policies directing staff, private property owners, developers, and the public regarding treatment of historic resources that will be readily available at the counter.

Action 9.23: Complete and maintain historic resource surveys containing all the present and future components of the historic fabric within the built, natural, and cultural environments.

Action 9.24: Create a historic preservation element.

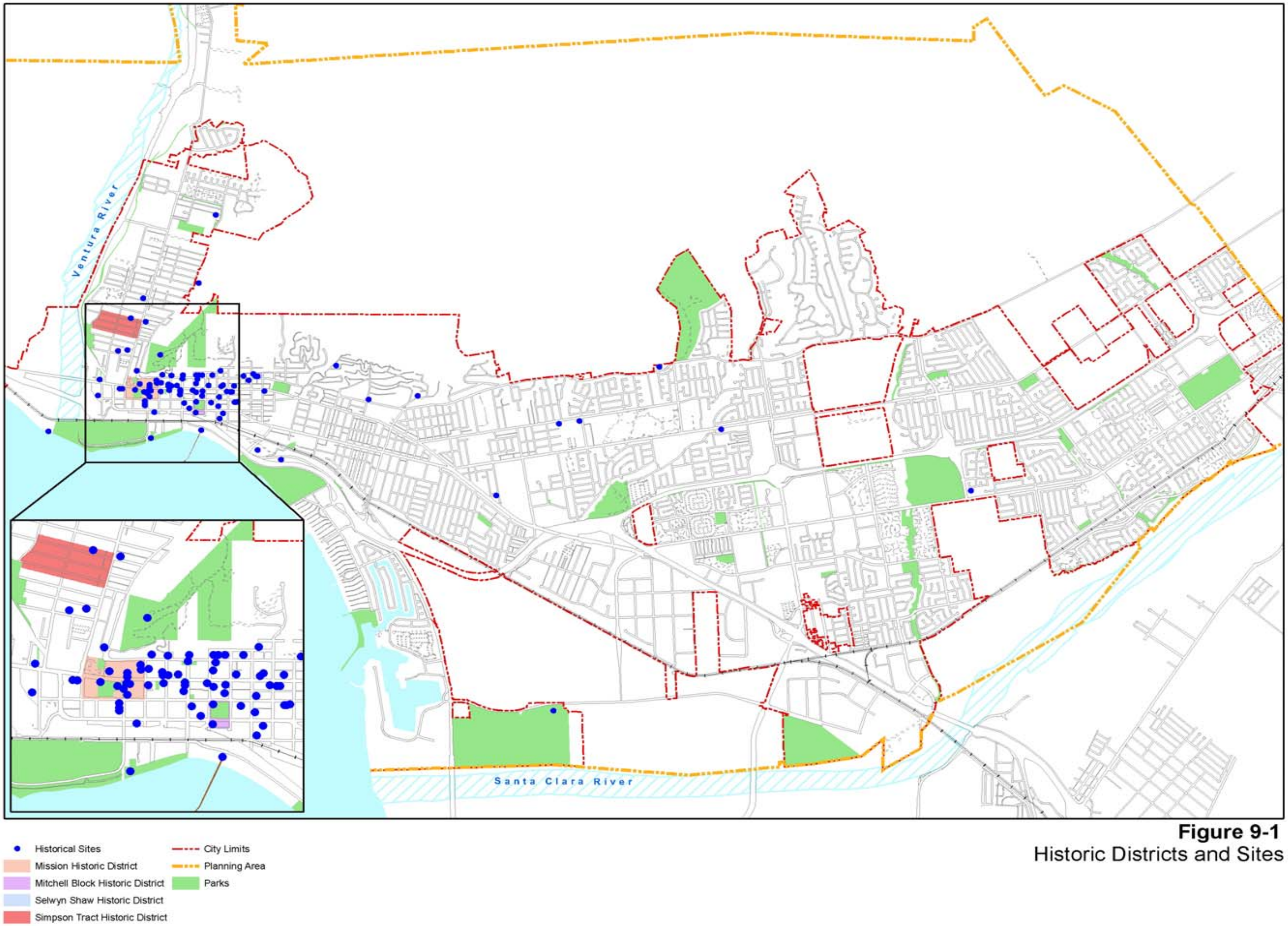
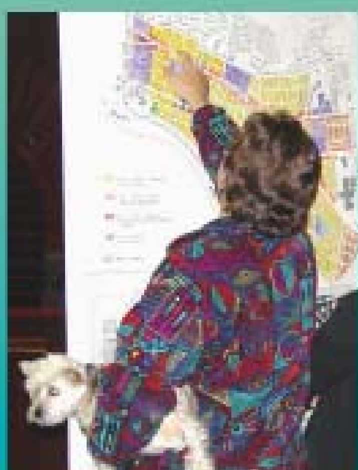


Figure 9-1
Historic Districts and Sites

This map is a product of the City of San Buenaventura, California. Although reasonable efforts have been made to ensure the accuracy of this map, the City of San Buenaventura cannot guarantee its accuracy.



"Never believe that a few caring people can't change the world. For indeed, that's all who ever have."

— Margaret Mead
Renowned Anthropologist

CITY OF
VENTURA

10. OUR INVOLVED COMMUNITY

Our goal is to strive to work together as a community to achieve the Ventura Vision through civic engagement, partnerships, and volunteer service.

Civic Engagement

It is not enough to have a vision of smart growth for Ventura. Achieving that vision requires the active and ongoing participation of an engaged and active community. Fortunately, Ventura builds on a strong foundation: thousands of Ventura citizens are involved in their schools and places of worship and give their time to civic, cultural, and charitable organizations. City Commissions, the Community Councils, the Chamber of Commerce and other well-established avenues provide opportunities for community leadership.

This is what Alexis De Toqueville celebrated in his famous book, *Democracy in America*, calling our nation, "the one country in the world, day in and day out, that makes use of an unlimited freedom of association." Yet today in Ventura, as all across America, there is concern about the health of our democracy. Sociologist Robert Putnam gained national attention with his research showing that "by almost every measure, Americans' direct engagement in politics and government has fallen steadily and sharply over the last generation."

Among the symptoms in Ventura have been a decline in voter turnout in recent local elections – (a 36% drop from 1995 through 2003.) Over those years, the ability to build consensus about future development has been undermined by sharply polarized divisions, showdowns at the ballot box, and often rancorous public hearings. The complaint often recurs that planning decisions are made without adequate notice or consideration of the views of those affected. Many citizens criticize the City decision-making process as convoluted and counterproductive.

Moreover, ongoing participation of an engaged community requires civic places where citizens can come together. It is not insignificant that a decline in public participation and the quality of civic discourse has paralleled the loss of civic places in our cities. Historically, governments provided open spaces and buildings that were at the center of a community, physically and symbolically. Town squares and plazas, often faced by a hall for formal gathering and civic engagement, have all but disappeared. The poverty of American public places was apparent after the Columbine High School shooting in Colorado, when citizens gathered to mourn, not in a shared place for people, but in a parking lot.

Nearly everyone agrees we can and should do better. The best model for doing this was the citywide effort to craft the *Ventura Vision*. Thousands participated in a year-long partnership encompassing City government, non-profit organizations, community groups, business, schools and individual residents to chart the community's future.

The vision of an "involved community" was described in the *Ventura Vision* report as: seeking "broad community collaboration; more widely publicizing city government services, planning processes and policies; better involvement of typically under-represented groups such as youth, seniors and ethnic minorities in community planning; and developing public parks, plazas, neighborhood greenways and other spaces that promote civic interaction and events."

Since that vision was adopted by the City Council in 2000, the City has worked to implement it, building on existing community assets and strengthening the linkages and interconnections that already exist among people, organizations, and shared community goals. A remarkable example of broad community collaboration earned attention throughout Southern California in late 2004. Facing the prospect of winter flooding, the City undertook to evacuate homeless people living in the channel of the Ventura River. This was accomplished by a partnership involving non-profit social service agencies, faith-based organizations, City staff, business leaders, community volunteers and the affected homeless population.

There are many more models of successful community collaboration in Ventura, including: the restoration of the pier, the community's rich array of after-school programs, the implementation of the 1992 Cultural Plan, the 2004 Downtown Charrette, the 2005 Midtown Design Charrette and the establishment of conservancies to preserve the Grant Park cross and Ventura's cherished hillsides.

City government has learned from these efforts to reach broadly and deeply into the community. Civic engagement and trust are built when City representatives actively seek to involve everyone in positive and transparent partnerships. That goal requires a continually evolving effort to promote participation:

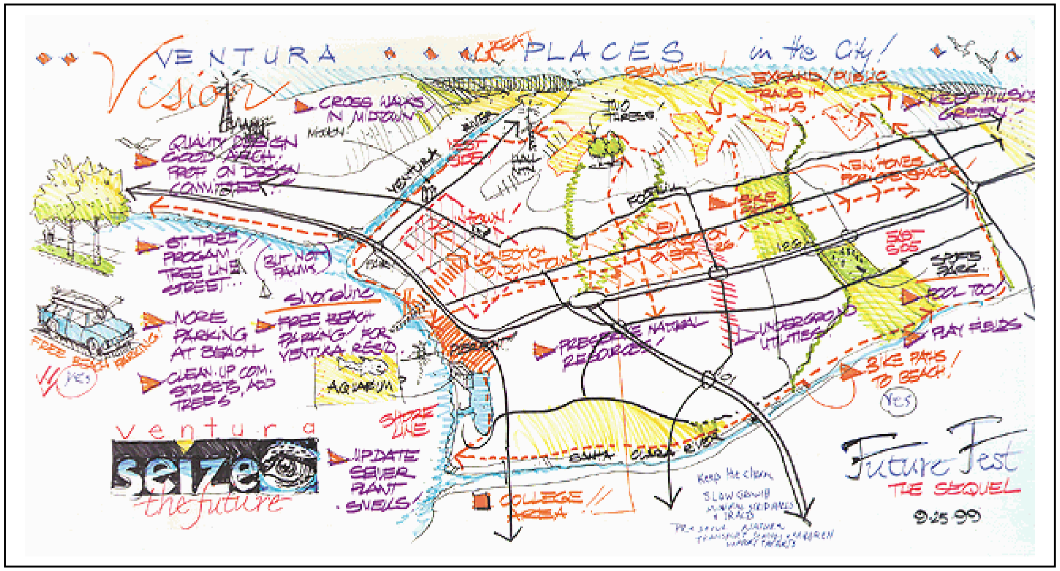
- through proactive and interactive media outreach in the press, on the web, on radio and television,
- by striving to include everyone in decision making and making it convenient for them to participate by seeking them out in their neighborhoods and gathering places like schools, houses of worship and public spaces, and
- through community dialogues, workshops, charrettes, town hall forums, and community councils, in addition to formal public hearings.

More effort needs to be put into building consensus about future growth and change upfront through community planning, rather than waiting until specific development projects are proposed. That effort will continue with the work to craft a citywide "form-based code" and concentrated planning efforts for specific neighborhoods and districts.

Focused attention should be paid to making our public decision-making processes easier to understand and participate in. Citizens have little time or patience for complicated planning and entitlement processes that drag on for years. By establishing clearer rules and public processes for applying them, the policies and actions in this chapter will enable more citizens to feel that they will be heard and their contributions valued. By involving a wider range of the community in clearly setting Ventura's planning goals and standards of quality, we can devote more time to achieving those goals and less time wrangling over specific proposals.

Ventura also needs to reestablish places for civic discourse. While the City will continue to encourage the use of our beautiful City Hall for its historic role of government by and for the people, we also need a hierarchy of civic spaces citywide that are strategically located in neighborhood centers and accessible by pedestrians (see Chapter Three, Action 3.8). Every neighborhood should have access to a physical location designated for public gathering and civic purposes.

Our long-range vision is to build an ethic and a fabric of robust civic engagement – what De Toqueville called "the habits of the heart." His phrase evokes what the Ventura Vision called "direct engagement in public affairs" through "participation, hard work and collaboration . . . sustaining Ventura as an exceptional place." The policies and actions in this chapter aim to do just that.



Policy 10A: Work collaboratively to increase citizen participation in public affairs.

Action 10.1: Conduct focused outreach efforts to encourage all members of the community – including youth, seniors, special needs groups, and non-English speakers – to participate in City activities.

Action 10.2: Obtain public participation by seeking out citizens in their neighborhoods and gathering places such as schools, houses of worship and public spaces.

Action 10.3: Invite civic, neighborhood, and non-profit groups to assist with City project and program planning and implementation.

Action 10.4: Provide incentives for City staff to participate in community and volunteer activities.

Action 10.5: Invite seniors to mentor youth and serve as guides at historical sites.

Action 10.6: Offer internships in City governance, and include youth representatives on public bodies.

Action 10.7: Continue to offer the Ambassadors program to obtain citizens assistance with City projects.

Policy 10B: Raise awareness of City operations and be clear about City objectives.

Action 10.8: Utilize the City website as a key source of information and expand it to serve as a tool for civic engagement.

Action 10.9: Publish an annual report that evaluates City performance in such areas as conservation, housing, and economic development.

Action 10.10: Continue to improve the user-friendliness of the media that communicate information about the City, including the website, cable channels, newsletters, kiosks, and water billing statements.

Policy 10 C: Work at the neighborhood level to promote citizen engagement.

Action 10.11: Establish a clear policy toward the scope, role, boundaries, and jurisdiction of neighborhood Community Councils citywide, with the objectives of strengthening their roles in decision-making.

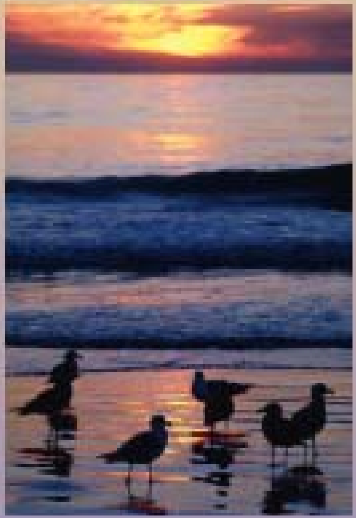
Action 10.12: Establish stronger partnerships with neighborhood Community Councils to set area priorities for capital investment, community policing, City services, commercial investment, physical planning, education, and other concerns, to guide both City policies and day-to-day cooperation and problem-solving.

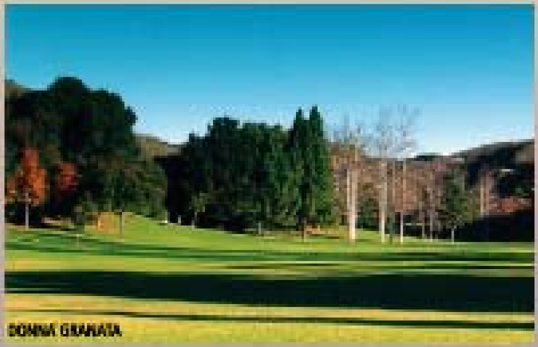
Action 10.13: Recognizing that neighborhood empowerment must be balanced and sustained by overall City policies and citywide vision and resources – establish a citywide Neighborhood Community Congress where local neighborhood Community Councils can collaborate and learn from each other.

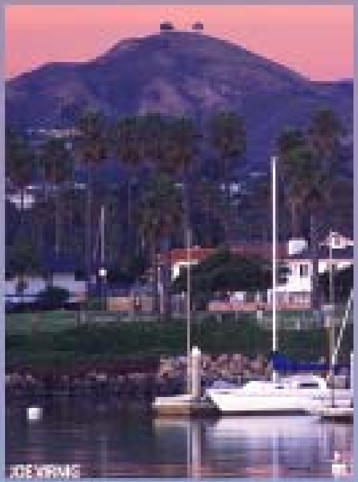
Action 10.14: Establish clear liaison relationships to foster communication, training, and involvement efforts between the City, neighborhood Community Councils and other community partners, including the Ventura Unified School District and business, civic, cultural and religious groups.

APPENDICES

ventura's general plan







"Individual commitment to a group effort, that is what makes a team work, a company work, a society work, a civilization work."

— Vince Lombardi
Author of *What it Takes To Be #1*, 2001

CITY OF
VENTURA

KEY TO ABBREVIATIONS

AS = Administrative Services Department
AS [P] = Purchasing
CA = City Attorney
CD = Community Development Department
CD [A] = Administration
CD [CP] = Current Planning
CD [LRP] = Long Range Planning
CD [ED] = Economic Development
CD [LD] = Land Development
CD [RDA] = Redevelopment Agency
CC = City Council
CM = City Manager's Department
CM [CE] = Civic Engagement
CS = Community Services Department
CS [CR] = Community Recreation
CS [CA] = Cultural Affairs
CS [GS/AS] = Golf Services/Adult Sports
CS [SS] = Social Services
FD = Fire Department
FD [IS] = Inspection Services
HR = Human Resources Department
PD = Police Department
PW = Public Works Department
PW [E] = Engineering
PW [P] = Parks
PW [MS] = Maintenance Services
PW [U] = Utilities

Short-term = 0-5 years
Mid-term = 5-10 years
Long-term = 10-20 years
Ongoing = May require short-, mid-, and long-term action

= Action included in the Land Use Plan of the City's Local Coastal Program

Number	Action	Lead Entity	Timeframe
1.1	Adhere to the policies and directives of the California Coastal Act in reviewing and permitting any proposed development in the Coastal Zone.	CD [CP]	Ongoing
1.2	Prohibit non-coastal-dependent energy facilities within the Coastal Zone, and require any coastal-dependent facilities including pipelines and public utility structures to avoid coastal resources (including recreation, habitat, and archaeological areas) to the extent feasible, or to minimize any impacts if development in such areas is unavoidable.	CD [CP]	Ongoing
1.3	Work with the State Department of Parks and Recreation, Ventura County Watershed Protection Agency, and the Ventura Port District to determine and carry out appropriate methods for protecting and restoring coastal resources, including by supplying sand at beaches under the Beach Erosion Authority for Control Operations and Nourishment (BEACON) South Central Coast Beach Enhancement program.	PW [E]	Ongoing
1.4	Require new coastal development to provide non-structural shoreline protection that avoids adverse impacts to coastal processes and nearby beaches.	CD [CP]	Ongoing
1.5	Collect suitable material from dredging and development, and add it to beaches as needed and feasible.	PW [E]	Ongoing
1.6	Support continued efforts to decommission Matilija Dam to improve the sand supply to local beaches.	PW [U]	Long-term
1.7	Update the Hillside Management Program to address and be consistent with the Planning Designations as defined and depicted on the General Plan Diagram.	CD [LRP]	Short-term

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= Action included in the Land Use Plan of the City's Local Coastal Program	

Number	Action	Lead Entity	Timeframe
1.8	Buffer barrancas and creeks that retain natural soil slopes from development according to state and Federal guidelines.	CD [LD]	Ongoing
1.9	Prohibit placement of material in watercourses other than native plants and required flood control structures, and remove debris periodically.	PW [MS/P]	Ongoing
1.10	Remove concrete channel structures as funding allows, and where doing so will fit the context of the surrounding area and not create unacceptable flood or erosion potential.	PW [MS/P]	Long-term
1.11	Require that sensitive wetland and coastal areas be preserved as undeveloped open space wherever feasible and that future developments result in no net loss of wetlands or "natural" areas.	CD [LRP]	Short-term
1.12	Update the provisions of the Hillside Management Program as necessary to ensure protection of open space lands.	CD [LRP]	Mid-term
1.13	Recommend that the City's Sphere of Influence be coterminous with existing City limits in the hillsides in order to preserve the hillsides as open space.	CD [LRP]	Short-term
1.14	Work with established land conservation organizations toward establishing a Ventura hillsides preserve.	PW [P]	Long-term
1.15	Actively seek local, state, and Federal funding sources to achieve preservation of the hillsides.	PW [P]	Mid-term
1.16	Comply with directives from regulatory authorities to update and enforce stormwater quality and watershed protection measures that limit impacts to aquatic ecosystems and that preserve and restore the beneficial uses of natural watercourses and wetlands in the city.	PW	Ongoing

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Number	Action	Lead Entity	Timeframe
1.17	Require development to mitigate its impacts on wildlife through the development review process.	CD [CP]	Ongoing
1.18	Require new development adjacent to rivers, creeks, and barrancas to use native or non-invasive plant species, preferably drought tolerant, for landscaping.	CD [CP] PW [P]	Ongoing
1.19	Require projects near watercourses, shoreline areas, and other sensitive habitat areas to include surveys for State and/or federally listed sensitive species and to provide appropriate buffers and other mitigation necessary to protect habitat for listed species.	CD [LRP]	Long-term
1.20	Conduct coastal dredging in accordance with the U.S. Army Corps of Engineers and California Department of Fish and Game requirements in order to avoid impacts to sensitive fish and bird species.	PW [E]	Ongoing
1.21	Work with State Parks on restoring the Alessandro Lagoon and pursue funding cooperatively.	PW [P]	Long-term
1.22	Adopt development code provisions to protect mature trees as defined by minimum height, canopy, and/or tree trunk diameter.	CD [LRP]	Short-term
1.23	Require, where appropriate, the preservation of healthy tree windrows associated with current and former agricultural uses, and incorporate trees into the design of new developments.	CD [CP]	Short-term
1.24	Require new development to maintain all indigenous tree species or provide adequately sized replacement native trees on a 3:1 basis.	CD [CP]	Ongoing
1.25	Purchase and use recycled materials and alternative and renewable energy sources as feasible in	AS [P]	Ongoing

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Number	Action	Lead Entity	Timeframe
	City operations.		
1.26	Reduce pesticide use in City operations.	PW [P]	Mid-term
1.27	Utilize green waste as biomass/compost in City operations.	PW [P]	Mid-term
1.28	Purchase low-emission City vehicles, and convert existing gasoline-powered fleet vehicles to cleaner fuels as technology becomes available.	PW [MS]	Mid-term
1.29	Require all City funded projects that enter design and construction after January 1, 2006 to meet a design construction standard equivalent to the minimum U.S. Green Building Council LEED™ Certified rating in accordance with the City's Green Building Standards for Private and Municipal Construction Projects.	FD [IS]	Short-term
1.30	Provide information to businesses about how to reduce waste and pollution and conserve resources.	PW [MS]	Short-term
1.31	Provide incentives for green building projects in both the public and private sectors to comply with either the LEED™ Rating System, California Green Builder, or the Residential Built Green program and to pursue registration and certification; incentives include "Head-of-the-Line" discretionary processing and "Head-of-the-Line" building permit processing.	FD [IS]	Short-term
1.32	Apply for grants, rebates, and other funding to install solar panels on all City-owned structures to provide at least half of their electric energy requirements.	PW	Ongoing

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Number	Action	Lead Entity	Timeframe
1.33	Publicly acknowledge individuals and businesses that implement green construction and building practices.	FD [IS]	Ongoing
2.1	Track economic indicators for changes that may affect City land resources, tax base, or employment base, such as terms and conditions of sale or lease of available office, retail, and manufacturing space.	CD [ED]	Ongoing
2.2	Prepare an economic base analysis that identifies opportunities to capture retail sales in sectors where resident purchasing has leaked to other jurisdictions.	CD [ED]	Short-term
2.3	Maintain and update an Economic Development Strategy to implement City economic goals and objectives.	CD [ED]	Ongoing
2.4	Map priority locations for commercial and industrial development and revitalization, including a range of parcel sizes targeted for high-technology, non-durables manufacturing, finance, business services, tourism, and retail uses.	CD	Short-term
2.5	Share economic and demographic information with organizations that may refer businesses to Ventura.	CD [ED]	Ongoing
2.6	Encourage intensification and diversification of uses and properties in districts, corridors, and neighborhood centers, including through assembly of vacant and underutilized parcels.	CD [ED]	Ongoing

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Number	Action	Lead Entity	Timeframe
2.7	Partner with local commerce groups to recruit companies and pursue funding for business development and land re-utilization.	CD [ED]	Ongoing
2.8	Carry out Housing Element programs that provide housing to all segments of the local workforce.	CD	Ongoing
2.9	Expedite review for childcare facilities that will provide support to local employees.	CD [CP]	Short-term
2.10	Expedite review of the entitlement process for installation of infrastructure necessary to support high technology and multimedia companies.	CA	Mid-term
2.11	Allow mixed-use development in commercial and industrial districts as appropriate.	CD [LRP]	Short-term
2.12	Allow uses such as conference centers with resort amenities on appropriately sized and located parcels.	CD [LRP]	Short-term
2.13	Market the city to businesses that link agriculture with high technology, such as biotechnology enterprises.	CD [ED]	Ongoing
2.14	Partner with local farms to promote farmers markets and high quality locally grown food.	CS	Ongoing
2.15	Provide incentives for use of waterfront parcels for recreation, visitor-serving commerce, restaurant, marina, and fishing uses.	CD [ED]	Short-term
2.16	Work with the State to create year-round commercial opportunities at the fairgrounds.	CD [ED]	Long-term

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Number	Action	Lead Entity	Timeframe
2.17	Partner with the Harbor District and National Park Service to promote Channel Islands tours and develop a marine learning center.	CS	Long-term
2.18	Prioritize uses within the Harbor Specific Plan area as follows: (1) coastal dependent, (2) commercial fishing, (3) coastal access, and (4) visitor serving commercial and recreational uses.	CD	Short-term
2.19	Partner with hotels and the Chamber of Commerce to promote city golf courses.	CS [GS/AS]	Long-term
2.20	Promote outdoor recreation as part of an enhanced visitor opportunity strategy.	CS	Mid-term
3.1	Preserve the stock of existing homes by carrying out Housing Element programs.	CD	Ongoing
3.2	Enhance the appearance of districts, corridors, and gateways (including views from highways) through controls on building placement, design elements, and signage.	CD [LRP]	Short-term
3.3	Require preservation of public view sheds and solar access.	CD [CP]	Short-term
3.4	Require all shoreline development (including anti-erosion or other protective structures) to provide public access to and along the coast, unless it would duplicate adequate access existing nearby, adversely affect agriculture, or be inconsistent with public safety, military security, or protection of fragile coastal resources.	CD [CP]	Ongoing
3.5	Establish land development incentives to upgrade the appearance of poorly maintained or	FD [IS]	Mid-term

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Number		Action	Lead Entity	Timeframe
		otherwise unattractive sites, and enforce existing land maintenance regulations.		
3.6		Expand and maintain the City's urban forest and thoroughfare landscaping, using native species, in accordance with the City's Park and Development Guidelines and Irrigation and Landscape Guidelines.	PW [P]	Ongoing
3.7		Evaluate whether lot coverage standards should be changed based on neighborhood character.	CD [LRP]	Short-term
3.8		Adopt new development code provisions that designate neighborhood centers, as depicted on the General Plan Diagram, for a mixture of residences and small-scale, local-serving businesses.	CD [LRP]	Short-term
3.9		Adopt new development code provisions that designate areas within districts and corridors for mixed-use development that combines businesses with housing and focuses on the redesign of single-use shopping centers and retail parcels into walkable, well connected blocks, with a mix of building types, uses, and public and private frontages.	CD [LRP]	Short-term
3.10		Allow intensification of commercial areas through conversion of surface parking to building area under a districtwide parking management strategy in the Downtown Specific Plan.	CD [LRP]	Short-term
3.11		Expand the downtown redevelopment area to include parcels around future transit areas and along freeway frontage.	CD [RDA]	Mid-term
3.12		The City will work with the hospitals on the new Development Code treatment for the Loma Vista corridor, which includes both hospitals.	CD [LRP]	Short-term

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Number	Action	Lead Entity	Timeframe
3.13	Assess whether the City's Affordable Housing Programs respond to current needs, and modify them as necessary within State mandated Housing Element updates	CD	Ongoing
3.14	Utilize infill development, to the extent possible, to accommodate the targeted number and type of housing units described in the Housing Element	CD [LRP]	Ongoing
3.15	Adopt new development code provisions that ensure compliance with Housing Element objectives.	CD [LRP]	Short-term
3.16	Renew and modify greenbelt agreements as necessary to direct development to already urbanized areas.	CD [LRP]	Long-term
3.17	Continue to support the Guidelines for Orderly Development as a means of implementing the General Plan, and encourage adherence to these Guidelines by all the cities, the County of Ventura, and the Local Agency Formation Commission (LAFCO); and work with other nearby cities and agencies to avoid sprawl and preserve the rural character in areas outside the urban edge.	CD [LRP]	Ongoing
3.18	Complete community or specific plans, subject to funding, for areas such as Westside, Midtown, Downtown, Wells, Saticoy, Pierpont, Harbor, Loma Vista/Medical District, Victoria Corridor, and others as appropriate. These plans will set clear development standards for public and private investments, foster neighborhood partnerships, and be updated as needed.	CD [LRP]	Ongoing
3.19	Preparation of the new Development Code will take into account existing or proposed community or specific plans to ensure efficient use of City resources and ample citizen input.	CD [LRP]	Short-term

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Number	Action	Lead Entity	Timeframe
3.20	Pursuant to SOAR, adopt development code provisions to "preserve agricultural and open space lands as a desirable means of shaping the City's internal and external form and size, and of serving the needs of the residents."	CD [LRP]	Short-term
3.21	Adopt performance standards for non-farm activities in agricultural areas that protect and support farm operations, including requiring non-farm uses to provide all necessary buffers as determined by the Agriculture Commissioner's Office.	CD [LRP]	Short-term
3.22	Offer incentives for agricultural production operations to develop systems of raw product and product processing locally.	CD [ED]	Mid-term
3.23	Develop and adopt a form-based Development Code that emphasizes pedestrian orientation, integration of land uses, treatment of streetscapes as community living space, and environmentally sensitive building design and operation.	CD [LRP]	Short-term
3.24	Revise the Residential Growth Management Program (RGMP) with an integrated set of growth management tools including: • Community or specific plans and development codes based on availability of infrastructure and transit that regulate community form and character by directing new residential development to appropriate locations and in ways that integrate with and enhance existing neighborhoods, districts and corridors; • appropriate mechanisms to ensure that new residential development produces high-quality	CD [LRP]	Short-term

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Number	Action	Lead Entity	Timeframe
	designs and a range of housing types across all income levels; and, • numeric limitations linked to the implementation of community or specific plans and development codes and the availability of appropriate infrastructure and resources; within those limitations, the RGMP should provide greater flexibility for timing new residential development.		
3.25	Establish first priority growth areas to include the districts, corridors, and neighborhood centers as identified on the General Plan Diagram; and second priority areas to include vacant undeveloped land when a community plan has been prepared for such (within the City limits).	CD [LRP]	Short-term
3.26	Establish and administer a system for the gradual growth of the City through identification of areas set aside for long-term preservation, for controlled growth, and for encouraged growth.	CD [LRP]	Mid-term
3.27	Require the use of techniques such as digital simulation and modeling to assist in project review.	CD [CP]	Short-term
3.28	Revise the planning processes to be more user-friendly to both applicants and neighborhood residents in order to implement City policies more efficiently.	CD [CP]	Short-term
4. OUR ACCESSIBLE COMMUNITY			
4.1	Direct city transportation investment to efforts that improve user safety and keep the circulation system structurally sound and adequately maintained. First priority for capital funding will go to our pavement management program to return Ventura streets to excellent conditions.	PW [E]	Ongoing

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Number		Action	Lead Entity	Timeframe
4.2		Develop a prioritized list of projects needed to improve safety for all travel modes and provide needed connections and multiple route options.	PW [E]	Short-term
4.3		Provide transportation services that meet the special mobility needs of the community including youth, elderly, and disabled persons.	PW [E]	Ongoing
4.4		Combine education with enforcement to instill safe and courteous use of the shared public roadway.	CS	Ongoing
4.5		Utilize existing roadways to meet mobility needs, and only consider additional travel lanes when other alternatives are not feasible.	CD [LRP]	Ongoing
4.6		Require new development to be designed with interconnected transportation modes and routes to complete a grid network.	CD [CP]	Short-term
4.7		Update the traffic mitigation fee program to fund necessary citywide circulation system and mobility improvements needed in conjunction with new development.	CD [LD]	Short-term
4.8		Implement the City's Neighborhood Traffic Management Program and update as necessary to improve livability in residential areas.	PW [E]	Ongoing
4.9		Identify, designate, and enforce truck routes to minimize the impact of truck traffic on residential neighborhoods.	PW [E]	Ongoing
4.10		Modify traffic signal timing to ensure safety and minimize delay for all users.	PW [E]	Short-term

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Number	Action	Lead Entity	Timeframe
4.11	Refine level of service standards to encourage use of alternative modes of transportation while meeting state and regional mandates.	PW [E]	Short-term
4.12	Design roadway improvements and facility modifications to minimize the potential for conflict between pedestrians, bicycles, and automobiles.	PW [E]	Ongoing
4.13	Require project proponents to analyze traffic impacts and provide adequate mitigation in the form of needed improvements, in-lieu fee, or a combination thereof.	CD [LD]	Ongoing
4.14	Provide development incentives to encourage projects that reduce automobile trips.	CD [CP]	Short-term
4.15	Encourage the placement of facilities that house or serve elderly, disabled, or socioeconomically disadvantaged persons in areas with existing public transportation services and pedestrian and bicycle amenities.	CD [CP]	Ongoing
4.16	Install roadway, transit, and alternative transportation improvements along existing or planned multi-modal corridors, including primary bike and transit routes, and at land use intensity nodes.	PW [E]	Ongoing
4.17	Prepare and periodically update a Mobility Plan that integrates a variety of travel alternatives to minimize reliance on any single mode.	CD [LRP]	Short-term
4.18	Promote the development and use of recreational trails as transportation routes to connect housing with services, entertainment, and employment.	PW [P]	Ongoing
4.19	Adopt new development code provisions that establish vehicle trip reduction requirements for all development.	CD [LRP]	Short-term

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4.20	Develop a transportation demand management program to shift travel behavior toward alternative modes and services.	PW [E]	Mid-term
4.21	Require new development to provide pedestrian and bicycle access and facilities as appropriate, including connected paths along the shoreline and watercourses.	PW [E/P]	Short-term
4.22	Update the General Bikeway Plan as needed to encourage bicycle use as a viable transportation alternative to the automobile and include the bikeway plan as part of a new Mobility Plan.	PW [E]	Mid-term
4.23	Upgrade and add bicycle lanes when conducting roadway maintenance as feasible.	PW [E]	Ongoing
4.24	Require sidewalks wide enough to encourage walking that include ramps and other features needed to ensure access for mobility-impaired persons.	PW [E]	Short-term
4.25	Adopt new development code provisions that require the construction of sidewalks in all future projects, where appropriate.	CD [LRP]	Short-term
4.26	Establish a parking management program to protect the livability of residential neighborhoods, as needed.	CD [LRP]	Short-term
4.27	Extend stubbed-end streets through future developments, where appropriate, to provide necessary circulation within a developing area and for adequate internal circulation within and between neighborhoods. Require new developments in the North Avenue area, where applicable, to extend Norway Drive and Floral Drive to connect to Canada Larga Road; and connect the existing segments of Floral Drive. Designate the extension of Cedar Street between Warner Street and	PW [E]	Mid-term

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Number		Action	Lead Entity	Timeframe
		south of Franklin Lane and the linking of the Cameron Street segments in the Westside community as high priority projects.		
4.28		Require all new development to provide for citywide improvements to transit stops that have sufficient quality and amenities, including shelters and benches, to encourage ridership.	PW [E]	Short-term
4.29		Develop incentives to encourage City employees and local employers to use transit, rideshare, walk, or bike.	HR	Mid-term
4.30		Work with public transit agencies to provide information to riders at transit stops, libraries, lodging, and event facilities.	PW [E]	Ongoing
4.31		Work with public and private transit providers to enhance public transit service.	PW [E]	Mid-term
4.32		Coordinate with public transit systems for the provision of additional routes as demand and funding allow.	PW [E]	Long-term
4.33		Work with Amtrak, Metrolink, and Union Pacific to maximize efficiency of passenger and freight rail service to the City and to integrate and coordinate passenger rail service with other transportation modes.	PW [E]	Mid-term
4.34		Lobby for additional transportation funding and changes to Federal, State, and regional transportation policy that support local decision-making.	PW [E]	Ongoing
4.35		The City shall pursue funding and site location for a multi-modal transit facility in coordination with VCTC, SCAT, U.P.R.R., Metrolink, Greyhound Bus Lines, and other forms of	PW [E]	Mid-term

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	transportation.		
4.36	Require development along the following roadways – including noise mitigation, landscaping, and advertising – to respect and preserve views of the community and its natural context. • State Route 33 • U.S. HWY 101 • Anchors Way • Brakey Road • Fairgrounds Loop • Ferro Drive • Figueroa Street • Harbor Boulevard • Main Street • Navigator Drive • North Bank Drive • Poli Street/Foothill Road • Olivas Park Drive • Schooner Drive	CD [CP]	Ongoing

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	• Spinnaker Drive • Summit Drive • Telegraph Road – east of Victoria Avenue • Victoria Avenue – south of U.S. 101 • Wells Road		
4.37	Request that State Route 126 and 33, and U.S. HWY 101 be designated as State Scenic Highways.	CD [LRP]	Short-term
4.38	Continue to work with Caltrans to soften the barrier impact of U.S. HWY 101 by improving signage, aesthetics and undercrossings and overcrossings.	PW [E/P]	Ongoing
4.39	Maintain street trees along scenic thoroughfares, and replace unhealthy or missing trees along arterials and collectors throughout the City.	PW [P]	Ongoing
5. OUR SUSTAINABLE INFRASTRUCTURE			
5.1	Require low flow fixtures, leak repair, and drought tolerant landscaping (native species if possible), plus emerging water conservation techniques, such as reclamation, as they become available.	CD [CP]	Ongoing
5.2	Use natural features such as bioswales, wildlife ponds, and wetlands for flood control and water quality treatment when feasible.	PW [MS/P]	Ongoing
5.3	Demonstrate low water use techniques at community gardens and city-owned facilities.	PW [U/P]	Mid-term

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Number	Action	Lead Entity	Timeframe
5.4	Update the Urban Water Management plan as necessary in compliance with the State 1983 Urban Water Management Planning Act.	PW [U]	Ongoing
5.5	Provide incentives for new residences and businesses to incorporate recycling and waste diversion practices, pursuant to guidelines provided by the Environmental Services Office.	PW [MS]	Ongoing
5.6	Require project proponents to conduct sewer collection system analyses to determine if downstream facilities are adequate to handle the proposed development.	PW [U]	Ongoing
5.7	Require project proponents to conduct evaluations of the existing water distribution system, pump station, and storage requirements in order to determine if there are any system deficiencies or needed improvements for the proposed development.	PW [U]	Ongoing
5.8	Locate new development in or close to developed areas with adequate public services, where it will not have significant adverse effects, either individually or cumulatively, on coastal resources.	CD [LRP]	Ongoing
5.9	Update development fee and assessment district requirements as appropriate to cover the true costs associated with development.	AS	Mid-term
5.10	Utilize existing waste source reduction requirements, and continue to expand and improve composting and recycling options.	PW [MS]	Mid-term
5.11	Increase emergency water supply capacity through cooperative tie-ins with neighboring suppliers.	PW [U]	Mid-term
5.12	Apply new technologies to increase the efficiency of the wastewater treatment system.	PW [U]	Mid-term

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Number	Action	Lead Entity	Timeframe
5.13	Increase frequency of city street sweeping, and post schedules at key points within each neighborhood.	PW [MS]	Mid-term
5.14	Develop a financing program for the replacement of failing corrugated metal storm drain pipes in the City.	PW [MS]	Short-term
5.15	Establish assessment districts or other financing mechanisms to address storm drain system deficiencies in areas where new development is anticipated and deficiencies exist.	PW [MS]	Mid-term
5.16	Require new developments to incorporate stormwater treatment practices that allow percolation to the underlying aquifer and minimize offsite surface runoff utilizing methods such as pervious paving material for parking and other paved areas to facilitate rainwater percolation and retention/detention basins that limit runoff to pre-development levels.	CD [LD]	Ongoing
5.17	Require stormwater treatment measures within new development to reduce the amount of urban pollutant runoff in the Ventura and Santa Clara Rivers and other watercourses.	CD [LD]	Ongoing
5.18	Work with the Ventura Regional Sanitation District and the County to expand the capacity of existing landfills, site new landfills, and/or develop alternative means of disposal that will provide sufficient capacity for solid waste generated in the City.	PW [MS]	Long-term

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Number	Action	Lead Entity	Timeframe
6. OUR ACTIVE COMMUNITY			
6.1	Develop new neighborhood parks, pocket parks, and community gardens as feasible and appropriate to meet citizen needs, and require them in new development.	PW [P]	Long-term
6.2	Require higher density development to provide pocket parks, tot lots, seating plazas, and other aesthetic green spaces.	CD [CP]	Short-term
6.3	Work with the County to plan and develop trails that link the City with surrounding open space and natural areas, and require development projects to include trails when appropriate.	PW [P]	Ongoing
6.4	Request Flood Control District approval of public access to unchannelized watercourses for hiking.	PW [P]	Mid-term
6.5	Seek landowner permission to allow public access on properties adjacent to open space where needed to connect trails.	PW [P]	Ongoing
6.6	Update plans for and complete the linear park system as resources allow.	PW [P]	Long-term
6.7	Work with the County of Ventura to initiate efforts to create public trails in the hillside area.	PW [P]	Mid-term
6.8	Update and require periodic reviews of the Park and Recreation Workbook as necessary to reflect City objectives and community needs.	PW [P]	Mid-term
6.9	Require dedication of land identified as part of the City's Linear Park System in conjunction with new development.	PW [P]	Ongoing

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Number		Action	Lead Entity	Timeframe
6.10		Evaluate and incorporate, as feasible, linear park segments in the General Bikeway Plan.	PW [E]	Ongoing
6.11		Update standards for citywide public parks and open space to include an expanded menu of shared park types, and identify locations and potential funding sources for acquiring new facilities in existing neighborhoods.	PW [P]	Short-term
6.12		Update and carry out the Grant Park Master Plan.	PW [P]	Mid-term
6.13	(coastal)	Foster the partnership between the City and Fair Board to improve Seaside Park.	CD [ED]	Ongoing
6.14		Improve facilities at City parks to respond to the requirements of special needs groups.	PW [P]	Mid-term
6.15		Adjust and subsidize fees to ensure that all residents have the opportunity to participate in recreation programs.	CS [CR]	Short-term
6.16		Update the project fee schedule as necessary to ensure that development provides its fair share of park and recreation facilities.	PW [P]	Short-term
6.17		Update and create new agreements for joint use of school and City recreational and park facilities.	CS [CR] PW [P]	Mid-term
6.18	(coastal)	Offer programs that highlight natural assets, such as surfing, sailing, kayaking, climbing, gardening, and bird watching.	CS [CR]	Ongoing
6.19	(coastal)	Provide additional boating and swimming access as feasible.	PW	Long-term

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Number	Action	Lead Entity	Timeframe
6.20	Earmark funds for adequate maintenance and rehabilitation of existing skatepark facilities, and identify locations and funding for new development of advanced level skatepark facilities.	PW [P]	Mid-term
6.21	Promote the use of City facilities for special events, such as festivals, tournaments, and races.	CS [CA]	Ongoing
6.22	Enter into concession or service agreements where appropriate to supplement City services.	PW	Ongoing
7. OUR HEALTHY AND SAFE COMMUNITY			
7.1	Work with interested parties to identify appropriate locations for assisted-living, hospice, and other care-provision facilities.	CS [SS]	Short-term
7.2	Provide technical assistance to local organizations that deliver health and social services to seniors, homeless persons, low-income citizens, and other groups with special needs.	CS [SS]	Ongoing
7.3	Participate in school and agency programs to: ♦ provide healthy meals, ♦ combat tobacco, alcohol, and drug dependency, ♦ distribute city park and recreation materials through schools, and ♦ distribute information about the benefits of proper nutrition and exercise.	CS [SS]	Ongoing
7.4	Enhance or create ordinances which increase control over ABC licensed premises.	PD	Mid-term
7.5	Investigate the creation of new land use fees to enhance funding of alcohol related enforcement, prevention and training efforts.	PD	Mid-term

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Number		Action	Lead Entity	Timeframe
7.6		Adopt updated editions of the California Construction Codes and International Codes as published by the State of California and the International Code Council respectively.	FD [IS]	Ongoing
7.7		Require project proponents to perform geotechnical evaluations and implement mitigation prior to development of any site: • with slopes greater than 10 percent or that otherwise have potential for landsliding, • along bluffs, dunes, beaches, or other coastal features • in an Alquist-Priolo earthquake fault zone or within 100 feet of an identified active or potentially active fault, • in areas mapped as having moderate or high risk of liquefaction, subsidence, or expansive soils, • in areas within 100-year flood zones, in conformance with all Federal Emergency Management Agency regulations.	CD [CP/LD]	Ongoing
7.8		To the extent feasible, require new critical facilities (hospital, police, fire, and emergency service facilities, and utility "lifeline" facilities) to be located outside of fault and tsunami hazard zones, and require critical facilities within hazard zones to incorporate construction principles that resist damage and facilitate evacuation on short notice.	FD	Ongoing
7.9		Maintain and implement the Standardized Emergency Management System (SEMS) Multihazard Functional Response Plan.	FD	Ongoing

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Number	Action	Lead Entity	Timeframe
7.10	Require proponents of any new developments within the 100-year floodplain to implement measures, as identified in the Floodplain Ordinance, to protect structures from 100-year flood hazards (e.g., by raising the finished floor elevation outside the floodplain).	FD [IS]	Ongoing
7.11	Prohibit grading for vehicle access and parking or operation of vehicles within any floodway.	FD [IS]	Ongoing
7.12	Refer development plans to the Fire Department to assure adequacy of structural fire protection, access for firefighting, water supply, and vegetation clearance.	CD [CP]	Ongoing
7.13	Resolve extended response time problems by: • adding a fire station at the Pierpont/Harbor area, • relocating Fire Station #4 to the Community Park site, • increasing firefighting and support staff resources, • reviewing and conditioning annexations and development applications, and • require the funding of new services from fees, assessments, or taxes as new subdivisions are developed.	FD	Long-term
7.14	Educate and reinforce City staff understanding of the Standardized Emergency Management System for the State of California.	FD	Ongoing
7.15	Increase public access to police services by: • increasing police staffing to coincide with increasing population, development, and calls for	PD	Ongoing

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Number	Action	Lead Entity	Timeframe
	service, • increasing community participation by creating a Volunteers in Policing Program, and • require the funding of new services from fees, assessments, or taxes as new subdivisions are developed.		
7.16	Provide education about specific safety concerns such as gang activity, senior-targeted fraud, and property crimes.	PD	Ongoing
7.17	Establish a nexus between police department resources and increased service demands associated with new development.	PD	Mid-term
7.18	Continue to operate the Downtown police storefront.	PD	Ongoing
7.19	Expand Police Department headquarters as necessary to accommodate staff growth	PD	Mid-term
7.20	Require air pollution point sources to be located at safe distances from sensitive sites such as homes and schools.	FD [IS]	Short-term
7.21	Require analysis of individual development projects in accordance with the most current version of the Ventura County Air Pollution Control District Air Quality Assessment Guidelines and, when significant impacts are identified, require implementation of air pollutant mitigation measures determined to be feasible at the time of project approval.	FD [IS]	Ongoing
7.22	In accordance with Ordinance 93-37, require payment of fees to fund regional transportation demand	CD [LD]	Ongoing

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Number	Action	Lead Entity	Timeframe
	management (TDM) programs for all projects generating emissions in excess of Ventura County Air Pollution Control District adopted levels.		
7.23	Require individual contractors to implement the construction mitigation measures included in the most recent version of the Ventura County Air Pollution Control District Air Quality Assessment Guidelines.	PW [E]	Ongoing
7.24	Only approve projects involving sensitive land uses (such as residences, schools, daycare centers, playgrounds, medical facilities) within or adjacent to industrially designated areas if an analysis provided by the proponent demonstrates that the health risk will not be significant.	CD [CP]	Ongoing
7.25	Adopt new development code provisions that ensure uses in mixed-use projects do not pose significant health effects.	CD [LRP]	Short-term
7.26	Seek funding for cleanup of sites within the Brownfield Assessment Demonstration Pilot Program and other contaminated areas in West Ventura.	CD [ED]	Mid-term
7.27	Require proponents of projects on or immediately adjacent to lands in industrial, commercial, or agricultural use to perform soil and groundwater contamination assessments in accordance with American Society for Testing and Materials standards, and if contamination exceeds regulatory action levels, require the proponent to undertake remediation procedures prior to grading and development under the supervision of the County Environmental Health Division, County Department of Toxic Substances Control, or Regional Water Quality Control Board (depending	FD [IS]	Ongoing

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		upon the nature of any identified contamination).		
7.28		Educate residents and businesses about how to reduce or eliminate the use of hazardous materials, including by using safer non-toxic equivalents.	PW [MS]	Ongoing
7.29		Require non-agricultural development to provide buffers, as determined by the Agriculture Commissioner's Office, from agricultural operations to minimize the potential for pesticide drift.	CD [CP]	Short-term
7.30		Require all users, producers, and transporters of hazardous materials and wastes to clearly identify the materials that they store, use, or transport, and to notify the appropriate City, County, State and Federal agencies in the event of a violation.	FD [IS]	Ongoing
7.31		Work toward voluntary reduction or elimination of aerial and synthetic chemical application in cooperation with local agricultural interests and the Ventura County agricultural commissioner.	FD [IS]	Mid-term
7.32		Require acoustical analyses for new residential developments within the mapped 60 decibel (dBA) CNEL contour, or within any area designated for commercial or industrial use, and require mitigation necessary to ensure that: • Exterior noise in exterior spaces of new residences and other noise sensitive uses that are used for recreation (such as patios and gardens) does not exceed 65 dBA CNEL, and • Interior noise in habitable rooms of new residences does not exceed 45 dBA CNEL with all windows closed.	FD [IS]	Ongoing

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7.33		As funding becomes available, construct sound walls along U.S. 101, SR 126, and SR 33 in areas where existing residences are exposed to exterior noise exceeding 65 dBA CNEL.	PW [E]	Long-term
7.34		Request that sound levels associated with concerts at the County Fairgrounds be limited to 70 dBA at the eastern edge of that property.	CS	Short-term
7.35		Request the termination of auto racing at the County fairgrounds	CS	Short-term
7.36		Amend the noise ordinance to restrict leaf blowing, amplified music, trash collection, and other activities that generate complaints.	FD [IS]	Short-term
7.37		Use rubberized asphalt or other sound reducing material for paving and re-paving of City streets.	PW [E]	Ongoing
7.38		Update the Noise Ordinance to provide standards for residential projects and residential components of mixed-use projects within commercial and industrial districts.	CD [LRP]	Short-term
8.1		Work closely with schools, colleges, and libraries to provide input into site and facility planning.	CS	Ongoing
8.2		Organize a regional education summit to generate interest in and ideas about learning opportunities.	CS	Mid-term
8.3		Adopt joint-use agreements with libraries, schools, and other institutions to maximize use of educational facilities.	CS	Mid-term
8.4		Distribute information about local educational programs.	CS	Mid-term

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8.5	Install infrastructure for wireless technology and computer networking in City facilities.	AS	Short-term
8.6	Establish educational centers at City parks.	PW [P] CS	Mid-term
8.7	Work with the State Parks Department to establish a marine learning center at the Harbor.	PW [P]	Long-term
8.8	Work with the Ventura Unified School District to ensure that school facilities can be provided to serve new development.	CD [LRP]	Ongoing
8.9	Complete a new analysis of community needs, rethinking the role of public libraries in light of the ongoing advances in information technology and the changing ways that individuals and families seek out information and life-long learning opportunities.	CS	Mid-term
8.10	Reassess the formal and informal relationships between our current three branch public libraries and school libraries – including the new Ventura College Learning Resource Center – as well as joint use of facilities for a broader range or compatible public, cultural, and educational uses.	CS	Mid-term
8.11	Develop a Master Plan for Facilities, Programs, and Partnerships to create an accessible, robust, and vibrant library for the 21st Century system, taking into consideration that circulation of books is no longer the dominant function but will continue to be an important part of a linked network of learning centers.	CS	Mid-term
8.12	Develop formal partnerships, funding, capital strategies, and joint use agreements to implement the	CS	Ongoing

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		new libraries Master Plan.		
9. OUR CREATIVE COMMUNITY				
9.1		Require works of art in public spaces per the City's Public Art Program Ordinance.	CD [CP]	Mid-term
9.2		Sponsor and organize local art exhibits, performances, festivals, cultural events, and forums for local arts organizations and artists.	CS	Ongoing
9.3		Expand outreach and publicity by: ♦ promoting locally produced art and local cultural programs, ♦ publishing a monthly calendar of local art and cultural features, ♦ distributing the *State of the Arts* quarterly report, and ♦ offering free or subsidized tickets to events.	CS	Ongoing
9.4		Support the creative sector through training and other professional development opportunities.	CS	Short-term
9.5		Work with the schools to integrate arts education into the core curriculum	CS	Short-term
9.6		Promote the cultural and artistic expressions of Ventura's underrepresented cultural groups.	CS	Mid-term
9.7		Offer ticket subsidy and distribution programs and facilitate transportation to cultural offerings.	CS	Ongoing
9.8		Increase the amount of live-work development, and allow its use for production, display, and sale of	CD [LRP]	Ongoing

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AS = Administrative Services Department AS [P] = Purchasing CA = City Attorney CD = Community Development Department CD [A] = Administration CD [CP] = Current Planning CD [LRP] = Long Range Planning CD [ED] = Economic Development CD [LD] = Land Development CD [RDA] = Redevelopment Agency CC = City Council CM = City Manager's Department CM [CE] = Civic Engagement CS = Community Services Department CS [CR] = Community Recreation	CS [CA] = Cultural Affairs CS [GS/AS] = Golf Services/Adult Sports CS [SS] = Social Services FD = Fire Department FD [IS] = Inspection Services HR = Human Resources Department PD = Police Department PW = Public Works Department PW [E] = Engineering PW [P] = Parks PW [MS] = Maintenance Services PW [U] = Utilities Short-term = 0-5 years Mid-term = 5-10 years Long-term = 10-20 years Ongoing = May require short-, mid-, and long-term action

= Action included in the Land Use Plan of the City's Local Coastal Program

Number		Action	Lead Entity	Timeframe
		art.		
9.9		Work with community groups to locate sites for venues for theater, dance, music, and children's programming.	CS [CR]	Mid-term
9.10		Provide incentives for preserving structures and sites that are representative of the various periods of the city's social and physical development.	CD [LRP]	Mid-term
9.11		Organize and promote multi-cultural programs and events that celebrate local history and diversity.	CS [CA]	Ongoing
9.12		Allow adaptive reuse of historic buildings.	CD [LRP]	Short-term
9.13		Work with community groups to identify locations for facilities that celebrate local cultural heritage, such as a living history Chumash village and an agricultural history museum.	CS [CA]	Long-term
9.14		Require archaeological assessments for projects proposed in the Coastal Zone and other areas where cultural resources are likely to be located.	CD [CP]	Ongoing
9.15		Suspend development activity when archaeological resources are discovered, and require the developer to retain a qualified archaeologist to oversee handling of the resources in coordination with the Ventura County Archaeological Society and local Native American organizations as appropriate.	CD [CP]	Ongoing
9.16		Pursue funding to preserve historic resources.	CS	Ongoing

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Number	Action	Lead Entity	Timeframe
9.17	Provide incentives to owners of eligible structures to seek historic landmark status and invest in restoration efforts.	CD [LRP]	Short-term
9.18	Require that modifications to historically-designated buildings maintain their character.	CD [CP]	Ongoing
9.19	For any project in a historic district or that would affect any potential historic resource or structure more than 40 years old, require an assessment of eligibility for State and federal register and landmark status and appropriate mitigation to protect the resource.	CD [CP]	Ongoing
9.20	Seek input from the City's Historic Preservation Commission on any proposed development that may affect any designated or potential landmark.	CD [CP]	Ongoing
9.21	Update the inventory of historic properties.	CD [LRP]	Ongoing
9.22	Create a set of guidelines and/or policies directing staff, private property owners, developers, and the public regarding treatment of historic resources that will be readily available at the counter.	CD [LRP]	Short-term
9.23	Complete and maintain historic resource surveys containing all the present and future components of the historic fabric within the built, natural, and cultural environments.	CD [LRP]	Ongoing
9.24	Create a historic preservation element.	CD [LRP]	Long-term
10. OUR INVOLVED COMMUNITY			
10.1	Conduct focused outreach efforts to encourage all members of the community – including youth, seniors, special needs groups, and non-English speakers – to participate in City activities.	CM [CE]	Short-term

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Number	Action	Lead Entity	Timeframe
10.2	Obtain public participation by seeking out citizens in their neighborhoods and gathering places such as schools, houses of worship and public spaces.	CM [CE]	Ongoing
10.3	Invite civic, neighborhood, and non-profit groups to assist with City project and program planning and implementation.	CD	Ongoing
10.4	Provide incentives for City staff to participate in community and volunteer activities.	HR	Short-term
10.5	Invite seniors to mentor youth and serve as guides at historical sites.	CS	Short-term
10.6	Offer internships in City governance, and include youth representatives on public bodies.	CS	Mid-term
10.7	Continue to offer the Ambassadors program to obtain citizens assistance with City projects.	PW	Ongoing
10.8	Utilize the City website as a key source of information and expand it to serve as a tool for civic engagement.	CM [CE]	Short-term
10.9	Publish an annual report that evaluates City performance in such areas as conservation, housing, and economic development.	CD	Mid-term
10.10	Continue to improve the user-friendliness of the media that communicate information about the City, including the website, cable channels, newsletters, kiosks, and water billing statements.	CM [CE]	Short-term
10.11	Establish a clear policy toward the scope, role, boundaries, and jurisdiction of neighborhood Community Councils citywide, with the objectives of strengthening their roles in decision-making.	CD [LRP]	Mid-term

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Number	Action	Lead Entity	Timeframe
10.12	Establish stronger partnerships with neighborhood Community Councils to set area priorities for capital investment, community policing, City services, commercial investment, physical planning, education, and other concerns, to guide both City policies and day-to-day cooperation and problem-solving.	CD [LRP]	Ongoing
10.13	Recognizing that neighborhood empowerment must be balanced and sustained by overall City policies and citywide vision and resources – establish a citywide Neighborhood Community Congress where local neighborhood Community Councils can collaborate and learn from each other.	CM[CE]	Mid-term
10.14	Establish clear liaison relationships to foster communication, training, and involvement efforts between the City, neighborhood Community Councils and other community partners, including the Ventura Unified School District and business, civic, cultural and religious groups.	CM [CE]	Short-term

ORDINANCE NO. 95-33

AN ORDINANCE OF THE PEOPLE OF THE CITY OF SAN BUENAVENTURA ADOPTING AN ORDINANCE AMENDING THE COMPREHENSIVE PLAN WITH RESPECT TO THE PRESERVATION OF AGRICULTURAL LANDS.

The people of the City of San Buenaventura do hereby ordain as follows:

<u>Section 1. Findings and Purpose.</u>

A. The protection of existing agricultural and watershed lands is of critical importance to present and future residents of the City of San Buenaventura (City of Ventura). Agriculture has been and remains the major contributor to the economy of the City and County of Ventura, creating employment for many people, directly and indirectly, and generating substantial tax revenues for the City.

B. In particular, the City of Ventura and surrounding area, with its unique combination of soils, micro-climate and hydrology, has become one of the finest growing regions in the world. Vegetable and fruit production from the County of Ventura and in particular production from the soils and silt from the Santa Clara and Ventura rivers have achieved international acclaim, enhancing the City's economy and reputation.

C. Uncontrolled urban encroachment into agricultural and watershed areas will impair agriculture and threaten the public health, safety and welfare by causing increased traffic congestion, associated air pollution, and potentially serious water problems, such as pollution, depletion, and sedimentation of available water resources. Such urban encroachment would eventually result in both the unnecessary, expensive extension of public services and facilities and inevitable conflicts between urban and agricultural uses.

D. The unique character of the City of Ventura and quality of life of City residents depend on the protection of a substantial amount of open space lands. The protection of such lands not only ensures the continued viability of agriculture, but also protects the available water supply and contributes to flood control and the protection of wildlife, environmentally sensitive areas, and irreplaceable natural resources.

E. The Resolution by which the City of Ventura adopted its Comprehensive Plan on August 28, 1989, Resolution No. 89-103, at page 4, contains in part the following “mitigation measures” in recognition of the importance of preserving agriculture resources:

> “Any potential significant adverse impacts are mitigated by substantially limiting the amount of agricultural land converted from an agricultural land use designation limiting the amount of prime farmland converted, and by making the various agricultural land areas designated for potential development subject to conditions which narrowly limit the possible land use.”

F. The Comprehensive Plan sets out as Objective 4 (at II-9) the desire to:

> “Continue to preserve agricultural and other open space lands within the City’s Planning Area.”

And, the Comprehensive Plan describes as the first Goal of its Resource Element (at II-3) the objective to:

> “Preserve agricultural and open space lands as a desirable means of shaping the City’s internal and external form and size, and of serving the needs of residents.”

G. The purpose of this initiative is to ensure that the Goals and Objectives of the Comprehensive Plan are inviolable by transitory short-term political decisions and that agricultural, watershed and open space lands are not prematurely or unnecessarily converted to other non-agricultural or non-open space uses without public debate and a vote of the people. Accordingly, the initiative ensures that until December 31, 2030, the general plan provisions governing agricultural land use designation and intent may not be change except by vote of the people. In addition, the initiative provides that any lands designated as “Agriculture Use”, referring to both “Agricultural Use (not to be reconsidered until after the Year 2010” and Agricultural/Institutional” on the City of Ventura’s General Plan “Land Use Plan Map” adopted by the City Council by Resolution 89-103 on August 28, 1989, as amended through February 1, 1995, will remain designated as Agricultural Use until December 31, 2030, unless the land is redesignated to another land use category by vote of the people, or redesignated by the City Council for the City of San Buenaventura pursuant to the procedures set forth in this initiative.

H. This initiative allows the City Council to redesignate agriculture lands only if certain if certain findings can be made, including (among other things) that the land is proven to be unsuitable for any form of agriculture and redesignation is necessary to avoid an unconstitutional taking of property without just compensation.

Section 2. General Plan Amendment.

The Agricultural Lands Preservation Initiative hereby reaffirms and readopts until December 31, 2030, The “Agricultural Use” designations as defined in the City of San Buenaventura Comprehensive Plan adopted August 28, 1989, as amended through February 1, 1995, at pages III-25 and III-26, with the modification that the “target date” is extended from 2010 until after December 31, 2030.

The following terminology shall replace the current “Agricultural Use” designation defined at page III-25 of The Plan:

Agricultural Use

The Agricultural Use (not to be reconsidered until after the Year 2030) category identifies those lands that are designated for agricultural use on the Land Use Plan Map.

The target date of 2030 associated with the Agricultural Use designation indicates a review date after which agriculturally designated lands may be reconsidered for urban uses. However, during the life of this plan as amended by initiative, it is intended that only agricultural uses are permitted on these lands, except as such lands may be appropriate to public open space and recreational usage. Furthermore, any updates to this Plan are not intended to imply that development would necessarily be appropriate at hat time.

In addition, the initiative hereby reaffirms and readopts until December 31, 2030, the “Agricultural” designations set forth on the of the City of Ventura Comprehensive Plan “Land Use Plan Map” adopted by the City Council on August 28, 1989, as amended through February 1, 1995, which map is incorporated herein by reference, modified, as appropriate, to delete the reference year 2010 and replace it with the reference year 2030.

Finally, the text of the Amendment Procedures of the City of Ventura Comprehensive Plan adopted August 28, 1989, as amended through February 1, 1995, (at XI-I) shall be amended to add a new subsection which provides:

Limitation on General Plan Amendments Relating to “Agricultural Use”

a) Until December 31, 2030, the provisions and designations governing the intent for lands designated “Agricultural Use” of the Land Use Element and Resource Element adopted on August 28, 1989, as amended through February 1, 1995, shall not be amended unless such amendment is approved by vote of the people.

b) All those lands designated as “Agricultural Use” in the City of Ventura Comprehensive Plan “Land Use Plan Map” adopted by the City Council on August 28, 1989 as amended through February 1, 1995, shall remain so designated until December 31, 2030 unless redesignated to another general plan land use category by vote of the people, or redesignated by the City Council pursuant to the procedures set forth in subsections c) or d), below.

c) Except as provided in subsection d), below, land designated as “Agricultural Use” may be redesignated by the City Council to a land use other than “Agricultural Use” as defined by the Comprehensive Plan adopted by the City Council on August 28, 1989, as amended through February 1, 1995, only if the City Council makes all of the following findings supported by the evidence:

    i) The land is immediately adjacent to areas developed in a manner comparable to the proposed use;

    ii) Adequate public services and facilities are available and have the capacity and capability to accommodate the proposed use;

    iii) The proposed use is compatible with agricultural uses, does not interfere with accepted agricultural practices, and does not adversely affect the stability of land use patterns in the area;

    iv) The land proposed for redesignation has not been used for agricultural purposes in the past 2 years and is unusable for agriculture due to its topography, drainage, flooding, adverse soil conditions or other physical reasons; and

v) The land proposed for redesignation pursuant to this subsection (c) does not exceed 40 acres for any one landowner in any calendar year, and one landowner may not obtain redesignation in the Comprehensive Plan of "Agricultural Use" land pursuant to this subsection (c) more often than every other year. Landowners with any unity of interest are considered one landowner for purposes of this limitation.

d) Land designated as "Agricultural Use" on the Land Use Plan Map may be redesignated to another land use category by the City Council if each of the following conditions are satisfied:

i) The City Council makes a finding that the application of the provisions of Section 2 (a) would constitute an unconstitutional taking of the landowners' property; and

ii) In permitting the redesignation, the City Council allows additional land uses only to the extent necessary to avoid said unconstitutional taking of the landowner's property.

e) Approval by a vote of the people is accomplished when a Comprehensive Plan amendment is placed on the ballot through any procedure provided for in the Election Code, and a majority of the voters vote in favor of it. Whenever the City Council adopts an amendment requiring approval by a vote of the people pursuant to the provisions of this subsection, the City Council's action shall have no effect until after such a vote is held and a majority of the voters vote in favor of it. The City Council shall follow the provisions of the Election Code in all matters pertaining to such an election.

<u>Section 3. Implementation.</u>

A. Upon the effective date of this initiative, the initiative shall be deemed inserted in the City of Ventura's Comprehensive Plan as an amendment thereof; except, that if the four amendments of the mandatory elements of the general plan permitted by state law for any given calendar year have already been utilized in 1995, prior to the effective date of this initiative, this Comprehensive Plan amendment shall be deemed inserted in the City's General Plan on January 1, 1996. At such time as this Comprehensive Plan amendment is deemed inserted in the City's Comprehensive Plan (hereinafter, the "insertion date") any provisions of the City's Zoning Ordinance inconsistent with that amendment shall not be enforced to the extent of the inconsistency. Within 180 days of the insertion date, the City shall complete such revisions of its Comprehensive Plan, including, but not limited to, the Comprehensive Plan Land Use Plan Map adopted by the City Council on August 28, 1989, (as amended through February 1, 1995) and accompanying test, as are necessary to achieve consistency with all provisions of this initiative. Also, within 180 days of the insertion date, the City Council shall complete such revisions of its Zoning Ordinance and other land use regulations as are necessary to conform to and be consistent with all provisions of this initiative.

B. The provisions of this initiative shall prevail over any revisions to the City of Ventura's Comprehensive Plan as amended through February 1, 1995, or to the City of Ventura's Land Use Plan Map as amended through February 1, 1995 which conflict with the initiative. Except as provided in Section 4 below, upon the specific plans, tentative or final subdivision maps, parcel maps, conditional use permits, building permits or other ministerial or discretionary entitlements for use not yet approved or issued shall not be approved or issued unless consistent with the policies and provisions of this initiative.

<u>Section 4. Exemptions for Certain Projects.</u>

This initiative shall not apply to or affect any property owner whose property has acquired any of the following prior to its effective date:

A. A vested right pursuant to state law;

B. A validly approved and fully executed development agreement with the City; or

C. Approval of a vesting tentative map.

<u>Section 5. Severability.</u>

If any portion of this initiative is declared invalid by a court, the remaining portions are to be considered valid.

<u>Section 6. Amendment or Repeal.</u>

This initiative may be amended or repealed only by the voters at a general election.

STATE OF CALIFORNIA)
COUNTY OF VENTURA) ss
CITY OF SAN BUENAVENTURA)

I, BARBARA J. KAM, City Clerk of the City of San Buenaventura, California, do hereby certify that the foregoing Ordinance was adopted by the voters of the City of San Buenaventura at the General Municipal Election held on November 7, 1995 and subsequently declared adopted by the City Council of the City of San Buenaventura on November 27, 1995. The Ordinance shall take effect December 7, 1995. This ordinance shall not be repealed or amended except by a vote of the people, unless provision is otherwise made in the original ordinance.

Dated this 30th day of November, 1995.

Barbara J. Kam, CMC
City Clerk

Ventura Hillside Voter Participation Measure

The people of the City of San Buenaventura do ordain as follows:

Section 1. Title

This measure shall be known as the Ventura Hillside Voter Participation Measure.

Section 2. Purpose

The overall purpose of this measure is to allow City voters to participate in the review process relating to non-exempt development projects that may be proposed in a certain portion of the "Hillside Area" of the City as defined in the City's Comprehensive Plan Update to the Year 2010 (hereafter the "Comprehensive Plan"). The portion of the Hillside Area under consideration lies generally north of the City, constitutes an area approximately 9108 acres in size, and is further depicted as the "Hillside Voter Participation Area" indicated in Exhibit "A" attached hereto and made a part hereof. The proposed Hillside Voter Participation Area (also referred to from time to time hereafter as "HVP Area" or "HVPA") is outside the Ventura City limits, but it is within the "Planning Area" of the City of San Buenaventura as further indicated on Exhibit "A." The Comprehensive Plan Land Use Map currently designates the properties within the proposed Hillside Voter Participation Area as "Hillside Planned Residential" or "HPR" rather than "Agricultural" and, therefore, these properties are not subject to the Save Our Agricultural Resources ("SOAR") Initiative adopted by the voters in 1995.

In the recent past, some property owners within the proposed Hillside Voter Participation Area have publicly presented initial proposals to develop those properties with a combination of residential uses and open space and recreational areas proposed to include, among other things, hiking and equestrian trails for use by the public. In the course of public meetings and informational workshops discussing these proposals, it has become apparent that there is a high level of public concern over potential issues of scenic resource protection, open space and recreational opportunities, infrastructure needs, traffic circulation, and other development-related issues arising from any proposed changes in the use of this important part of the City's Planning Area. This measure, in recognition of this heightened public concern, is intended to provide the electorate of the City of San Buenaventura with an opportunity to vote on the approval of any such development proposals or any similar proposals to extend urban services to the Hillside Voter Participation Area or develop property in the Hillside Voter Participation Area with urbanized land uses.

More particularly, this measure proposes to amend the Comprehensive Plan of the City of San Buenaventura by adding a requirement that approvals for extensions of “urban services” (defined in the City’s Hillside Management Program as the provision of domestic water and sewers) or any proposed “urbanized uses of land” (as defined herein) in the Hillside Voter Participation Area cannot be granted without prior approval by a majority vote of the electorate.

Section 3. Comprehensive Plan Amendment

The following text shall be inserted into the Land Use Element of the Comprehensive Plan at page 111-8 thereof:

Hillside Voter Participation Area

The electorate of the City of Ventura has adopted a Hillside Voter Participation Area (Ventura HVP Area). Its purpose, principles, implementation procedures, and methodologies for amendment are set forth in this Comprehensive Plan amendment.

A. PURPOSE

The City of Ventura Hillside Area, with its unique topography, viewsheds, watershed lands; its unique microclimate and hydrology, and its diversity of plant and wildlife resources, is one of the finest scenic resources in the Southern California region. The Comprehensive Plan recognizes the unique and important qualities and potential of the Hillside Area in, among other provisions, the declaration of specialized Objectives and Policies for the Hillside Area in the Resources Element of the Plan and the Plan’s requirements for continuing operation of, and compliance with, the City’s Hillside Management Program.

This Comprehensive Plan amendment is intended to provide for an increased level of public awareness and participation in the development review process applicable to that portion of the Hillside Area described and depicted in Exhibit “A” as the “Hillside Voter Participation Area.” It is further intended to provide assurance to the public that any proposed development in the Hillside Voter Participation Area appropriately takes into account the Area’s unique combination of viewshed, watershed, open space, scenic area, and environmentally sensitive habitat, and that agricultural, viewshed, watershed, and open space lands in the Hillside Voter Participation Area are not converted to urban or other non-open space uses without public discussion and a vote of the people. Increasing citizen participation in the development review process through the establishment of a Hillside Voter Participation Area enhances the City’s sense of community, allows for development unique to the City of Ventura, and promotes the efficient use of the City’s infrastructure.

More specifically, this Comprehensive Plan amendment is intended to provide an opportunity for the public to be involved in insuring that any development projects proposed in the Hillside Voter Participation Area, shall, at a minimum:

1. Maintain the scenic character of the hillsides in areas of future development, by preserving significant natural landmarks and scenic ridgelines and slopes.

2. Provide increased recreational opportunities for existing and future hillside and other City residents, by improving access to existing parks and establishing additional parks or open, non-developed areas in conjunction with future hillside development.

3. Maximize public access to hillside open space and recreation areas, by establishing a system of linear parks and hiking trails along scenic ridges and barrancas.

4. Minimize the impact of hillside development on sensitive natural habitats and historical or archaeological resources.

B. PRINCIPLES

Inappropriate urban encroachment into Hillside open space, viewshed, watershed, scenic areas, and biological resource areas would have the potential to impact sensitive environmental areas, unwarrantedly intrude on open space, diminish the quality of life and threaten the public health, safety and welfare by leading to increased traffic congestion, associated air pollution, erosion, alteration of sensitive lands in watershed areas and causing potentially serious water problems, such as pollution, depletion and sedimentation of available water resources not only for the City of Ventura, but for its jurisdictional neighbors. Inappropriate urban encroachment could further result in the unwarranted extension of public services and facilities into sensitive areas.

The unique character of the City of Ventura and quality of life of City residents depends on the appropriate protection of the Hillside Area's substantial amount of open space, viewshed, watershed, scenic resources, and biological resources. The increased public awareness and involvement in the fate of such lands through the implementation of this Comprehensive Plan amendment will provide the public a special opportunity to assure that future generations of Ventura citizens will not be deprived of the benefits of access to a viable water supply, flood and erosion control, protection of viewsheds, wildlife, environmentally sensitive areas, open space and recreational areas, and irreplaceable natural resources.

C. IMPLEMENTATION

(1) There is hereby established a Ventura Hillside Voter Participation Area (Ventura HVP Area). The Ventura HVP Area is that portion of the Hillside Area delineated and depicted in Exhibit “A” of this Comprehensive Plan amendment (hereafter, the “HVP Area Map”). As shown on the HVP Area Map, the southern boundary of the HVP Area generally follows the northern segment of the City’s incorporated limit as established by the Local Agency Formation Commission for the City of Ventura, except as the HVP boundary line runs northerly of some small residential lots on or near Foothill Road west of Arroyo Verde Park as further depicted on Exhibit “A.” East of Harmon Barranca, the HVP Area boundary generally follows the alignment of Foothill Road eastward to the boundary of the City’s Planning Area. The northerly boundary of the HVP Area continues, generally, as the northern boundary of the City’s Planning Area. The westerly boundary of the HVP Area alternately follows the City limit boundary or Sphere of Influence boundary easterly of the North Avenue area. The foregoing narrative description is intended to be general in nature and all of the foregoing is more particularly depicted and described in Exhibit “A’

Insofar as the HVP Area boundary described and depicted in this Comprehensive Plan amendment, including Exhibit “A” hereto, is said or shown to be coterminous with either the City’s incorporated limit or the City’s Sphere of Influence boundary, or with the boundary of the City’s Planning Area, such references are intended to be, and shall be construed to be, the location of the City limit boundary or Sphere of Influence boundary or boundary of the City’s Planning Area. as applicable, as each of those boundaries are established for the City of Ventura as of January 1, 2001. Although the HVP Area boundary is established, in part, in generally the same location as the City limit boundary, or in some instances, the Sphere of Influence boundary, the establishment of the HVP Area boundary is not intended to and shall in no way inhibit the Local Agency Formation Commission from changing or altering the City limit boundary or Sphere of Influence boundary in accordance with State law. The boundary of the HVP Area, although incidentally coterminous as of one point in time with the City limit boundary or Sphere of Influence boundary or boundary of the City’s Planning Area, is independent from these boundaries in legal significance and purpose. While the City limit boundary or Sphere of Influence boundary may be, from time to time, altered by the Local Agency Formation Commission, or the boundary of the City’s Planning Area may be changed, the HVP Area boundary shall not be changed except as provided herein.

(2) Until December 31, 2030, the City of Ventura shall not extend urban services into, and shall not authorize urbanized uses of land within, the Ventura Hillside Voter Participation Area unless otherwise authorized by a vote of the people, except for the purpose of construction of public potable water facilities, public parks or other city government facilities or as otherwise provided or excepted herein. Upon the effective date of this Hillside Voter Participation Area Comprehensive

Plan amendment, the City and its departments, boards, commissions, officers and employees shall not grant, or by inaction allow to be approved by operation of law, any Comprehensive Plan amendment, rezoning, specific plan, subdivision map, conditional use permit, building permit or any other ministerial or discretionary entitlement, which is inconsistent with the purposes of this Comprehensive Plan amendment, unless in accordance with the amendment procedures of Section 4 of this Comprehensive Plan amendment.

(3) “Urbanized uses of land” shall mean any development that would require the establishment of new community sewer systems or the significant expansion of existing community sewer systems; or, would result in the creation of residential densities greater than one primary residential unit per 40 acres in area; or, would result in the establishment of commercial or industrial uses that are neither agriculturally-related nor related to the production of mineral resources.

(4) The Land Use Map is amended to reflect the existence of the Ventura Hillside Voter Participation Area as generally described in paragraph (1) above and as depicted in Exhibit “A,” attached hereto.

(5) The Hillside Voter Participation Area, as defined herein, may not be amended, altered, revoked or otherwise changed prior to December 31, 2030, except by vote of the people or by the City Council pursuant to the procedures set forth in Section 4 of this Comprehensive Plan amendment. For purposes of this Ordinance, approval by a vote of the people is accomplished when a Comprehensive Plan amendment is placed on the ballot through any procedure provided for in the Election Code, and a majority of the voters vote in favor of it. Whenever the City Council adopts an amendment requiring approval by a vote of the people pursuant to the provisions of this subsection, the City Council’s action shall have no effect until after such a vote is held and a majority of the voters vote in favor of it. The City Council shall follow the provisions of the Election Code in all matters pertaining to such an election.

Section 4. Changes to Area: Procedures.

Until December 31, 2030, the foregoing Purposes, Principles and Implementation provisions of this Comprehensive Plan amendment, and the Hillside Voter Participation Area may be amended only by a vote of the people commenced pursuant to the initiative process by the public, or pursuant to the procedures set forth below:

A. The City Council may amend the boundary of the Hillside Voter Participation Area depicted on Exhibit “A” if it finds such amendment to be in the public interest, provided that the amended boundary enlarges said Hillside Voter Participation Area established by this Comprehensive Plan amendment.

B. The City Council, following at least one public hearing for presentation by an applicant and the public, and after compliance with the California Environmental Quality Act, may amend the Hillside Voter Participation Area described herein, based on substantial evidence in the record, if the City Council makes each of the following findings:

(1) Application of the provisions of subsections (A) or (B) of the amendment procedures set forth in this Section 4 are unworkable and failure to amend the Hillside Voter Participation Area would constitute an unconstitutional taking of a landowner's property for which compensation would be required or would deprive the landowner of a vested right; and

(2) The amendment and associated land use designations will allow additional land uses only to the minimum extent necessary to avoid said unconstitutional taking of the landowner's property or to give effect to the vested right.

C. The City Council, following at least one public hearing for presentations by an applicant and the public, and after compliance with the California Environmental Quality Act, may place any amendment to the Hillside Voter Participation Area or the provisions of this Comprehensive Plan amendment on the ballot pursuant to the mechanisms provided by state law.

D. The Comprehensive Plan may be reorganized and individual provisions, including the provisions of this ordinance, maybe renumbered or reordered in the course of ongoing updates of the Comprehensive Plan in accordance with the requirements of state law.

Section 5. No Changes to Save Our Agricultural Resources Initiative

Any restrictions imposed upon the City of San Buenaventura limiting the City's ability to redesignate, or allow development of, property designated "Agricultural" that are in effect as a result of the "SOAR" initiative approved by the voters in 1995 and adopted by the City Council as Ordinance No. 95-33 shall remain in full force and effect and shall not be amended, modified, altered, or abridged by the adoption of this ordinance.

Section 6. Exemptions:

The provisions of this ordinance do not apply to:

A. Construction or reconstruction of, or related to, public potable water facilities, public: parks or other city government facilities; or

B. Construction or reconstruction of no more than one residential dwelling unit, and incidental uses or structures related thereto, on an individual parcel of land that is lawfully established of record as of the effective date of this Comprehensive Plan amendment and that is contiguous to the City's incorporation boundary but only to the extent that such a legally established parcel is developed with, or proposed to be developed with, no more than one residential dwelling unit; or

C. Any development that would result in the creation of residential densities equal to or less than one primary residential unit per 40 acres in area; or, would result in the establishment of commercial or industrial uses that are agriculturally-related or related to the production of mineral resources; or

D. Any development project that has obtained, as of the effective date of this Comprehensive Plan amendment, a vested right pursuant to state or local law; or

E. Uses that are "incidental' (as the City's Zoning Ordinance defines "incidental uses") to uses lawfully established as of the effective date of this Comprehensive Plan
amendment.

Section 7. Interpretation

This ordinance shall be broadly construed in order to achieve the purposes stated in this ordinance. It is the intent of the voters that the provisions of this measure shall be interpreted by the City and others in a manner that promotes public participation in decision-making relating to future development proposals within in the Hillside Voter Participation Area.

Section 8. Insertion Date

A. Upon the effective date of this ordinance, Sections 3, 4, 5, 6, and 7 of this ordinance shall be deemed inserted in the Comprehensive Plan and the Land Use Map referred to in Part C of Section 3 shall be deemed amended even though the reprinting may not occur until it can be carried out by the staff of the City of San Buenaventura.

B. The Comprehensive Plan in effect at the time the City Council decided to place this measure on the ballot, and the Comprehensive Plan as amended by this ordinance, comprise an integrated, internally consistent and compatible statement of policies for the City of San Buenaventura. In order to ensure that the Comprehensive Plan remains an integrated, internally consistent and compatible statement of policies and to ensure that the actions of the voters in enacting this ordinance are given effect, any provision of the Comprehensive Plan that is adopted between July 23, 2001 and the effective date of this ordinance, to the extent that such provision is inconsistent with this ordinance, shall be amended as soon as possible and in the manner and time required by state law to ensure consistency between such provision and Section 3 of this ordinance. In the alternative, such interim-enacted inconsistent provisions shall be repealed.

Section 9. Amendment or Repeal

This ordinance may be amended or repealed only by the voters of the City of San Buenaventura at an election held in accordance with state law, except as expressly provided by Section 4 herein.

The people of the City of San Buenaventura do ordain as follows:

Section 1. Title

This measure shall be known as the Ventura Community Park SOAR Amendment.

Section 2. Purpose

The purpose of this measure is to allow the City to develop a Community Park on a parcel of property located at the northwest corner of the intersection of Kimball Road and Telephone Road. The subject property, which is approximately 100 acres in size, is further described in Exhibit “A,” attached hereto and made a part hereof, and is hereafter referred to as the “Property.” Most of the Property is outside the Ventura City limits but within the “Planning Area” of the City of San Buenaventura and therefore covered by the City’s Comprehensive Plan Update to the Year 2010 (hereafter the “Comprehensive Plan”). The Property is currently designated “Agricultural” under the Comprehensive Plan and, therefore, also subject to the 1995 Save Our Agricultural Resources (“SOAR”) Initiative.

The City is proposing to develop the Property with community-oriented public park facilities that may include, among other things, athletic fields, an aquatic facility, a community center and other related buildings and structures for use by the public. If this measure is approved, the City may also construct and operate a fire station on a portion of the Property.

This initiative proposes to amend the Comprehensive Plan of the City of San Buenaventura, by changing the designation of the Property in the Comprehensive Plan Land Use Plan Map from “Agricultural” (or “A”) to “Parks” (or “P”). This will allow the City of San Buenaventura to potentially develop the Property with a Community Park without being restricted by the SOAR Initiative.

Section 3. Comprehensive Plan Amendment

Part A.

The following paragraph titled “Parks Uses” is hereby added to the Land Use Element of the Comprehensive Plan, more particularly, to the provisions of the Serra Community Intent and Rationale Statement on page III-96, to read as follows:

“Parks Uses: The Parks Land Use Plan designation is applied to an approximately 100-acre site at the northwest corner of Kimball Road and Telephone Road for the purpose of developing a multi-purpose community-oriented public park on this site. It is further intended that this site should be zoned to the “P” (Parks) zone if and when it is annexed to the City. Design Review should be carried out by the City's Planning Commission prior to the development of any Recreation Services use types on the site to assure that the range of community park uses potentially permitted on the site by the "P" zone are well integrated on the site and compatible with adjacent land uses.”

Part B.

The Property is deleted from the discussion of “Agricultural Uses” in the Serra Community provisions of the Land Use Element of the Comprehensive Plan. To that end, the final paragraph with the heading “Agricultural Use” beginning at the bottom of page III-95 and ending at the top of page III-96 is hereby revised to read as follows:

“Agricultural Use: A 297-acre area between Telephone Road and the Southern Pacific Railroad and a 172-acre area between Bristol Road and the Santa Clara River are designated Agricultural Use, not to be reconsidered until after the Year 2010, to preserve their existing agricultural character.”

Part C.

The Land Use Plan Map incorporated in the Comprehensive Plan is hereby amended, and official copies thereof shall be revised by City staff, to reflect the foregoing amendments to the text of the Land Use Element.

Section 4. Zoning

Upon annexation to the City of San Buenaventura, the zoning classification for the Property shall be "P" (Parks) and the Official Zoning District Map incorporated in the Zoning Ordinance shall, by this Measure, be amended, and official copies thereof shall be revised by City staff, to reflect the foregoing zone change to the Property.

Section 5. Save Open-Space and Agricultural Resources

Any restrictions imposed upon the City of San Buenaventura limiting the City's ability to redesignate, or allow development of, property designated "Agricultural" that are in effect on the day that this Initiative is approved by the voters shall remain in full force and effect except as to the Property. The City of San Buenaventura may allow development of a community park on the Property in accordance with this ordinance.

Section 6. Interpretation

This ordinance shall be broadly construed in order to achieve the purposes stated in this ordinance. It is the intent of the voters that the provisions of this ordinance shall be interpreted by the City of San Buenaventura and others in a manner that facilitates the development of a community park on the Property in accordance with the purposes of this ordinance.

Section 7. Insertion Date

Part A. Upon the effective date of this ordinance, Part A and Part B of Section 3 of this ordinance shall be deemed inserted in the Comprehensive Plan and the Land Use Map referred to in Part C of Section 3 shall be deemed amended even though the reprinting may not occur until it can be carried out by the staff of the City of San Buenaventura.

Part B. The Comprehensive Plan in effect at the time the City Council decided to place this measure on the ballot, and the Comprehensive Plan as amended by this ordinance, comprise an integrated, internally consistent and compatible statement of policies for the City of San Buenaventura.

In order to ensure that the Comprehensive Plan remains an integrated, internally consistent and compatible statement of policies and to ensure that the actions of the voters in enacting this ordinance are given effect, any provision of the Comprehensive Plan that is adopted between [the date the City Council decided to place this measure on the ballot] and the effective date of this ordinance, to the extent that such provision is inconsistent with this ordinance, shall be amended as soon as possible and in the manner and time required by state law to ensure consistency between such provision and Section 3 of this ordinance. In the alternative, such interim-enacted inconsistent provisions shall be repealed.

Section 8. Amendment or Repeal

Section 3 and Section 4 of this ordinance may be amended or repealed only by the voters of the City of San Buenaventura at an election held in accordance with state law.

The people of the City of San Buenaventura do ordain as follows:

Section 1. Title

This ordinance shall be known as the First Assembly of God Land Initiative.

Section 2. Purpose

The purpose of this ordinance is to allow the First Assembly of God (hereafter "Church") to develop a property located at the northwest corner of the intersection of Montgomery Avenue and Northbank Drive. Such property is 25.59 acres and is further described in Exhibit A, attached hereto and made a part hereof, and is hereafter referred to as "Property". The Church wishes to develop the Property in accordance with City of San Buenaventura Ordinance No 95-33 (commonly known as "SOAR") guidelines for a sanctuary, related Church buildings, and athletic fields for use by the community of San Buenaventura.

Since the Property is within the sphere of influence of the City of San Buenaventura, this ordinance (1) amends the Comprehensive Plan Update to the Year 2010 (hereafter the "General Plan") of the City of San Buenaventura, and (2) prezones the Property to the R-1 Single Family zone with a subzone of R-1-1AC. This will allow the City of San Buenaventura to annex the Property with a restricted land use that is compatible with the Church's development of the Property.

Section 3. General Plan Amendment

Part A.

The second paragraph under the heading "Residential Uses" appearing on page III-94 of the General Plan describes the areas that may be used for low-density, single family homes in the Serra Community area of the City of San Buenaventura. The single family use (designated as SF in the General Plan) is the most restrictive land use that will allow the Church to build a sanctuary, related church buildings, and athletic fields. Section 4 of this initiative will further restrict the Property by pre-zoning the Property and requiring a minimum of one acre for each parcel. This will make the Property unattractive for single family development but still acceptable for the Church sanctuary, related Church buildings, and athletic fields. This ordinance adds the Church's 25.59 acre parcel to the SF land use.

The second paragraph under the heading “Residential Uses” appearing on page III-94 of the General Plan is hereby amended to read as follows:

“The SF category is applied to an approximately 3-acre site at the southeast corner of Henderson and Petit Avenue, a 1.7-acre site southerly of Darling Road extended, and a 25.59-acre site located at the northwest corner of Montgomery Avenue and Northbank Drive.”

Part B.

The final paragraph with the heading “Agricultural Use” beginning at the bottom of page III-95 and ending at the top of page III-96 of the General Plan describes that portion of the Serra Community area of the City of San Buenaventura which may only be used for agricultural uses. This ordinance deletes the Church’s 25.59 acre parcel from the agricultural use category.

The final paragraph with the heading “Agricultural Use” beginning at the bottom of page III-95 and ending at the top of page III-96 of the General Plan is hereby amended to read as follows:

“Agricultural Use: A 100-acre site at the northwest corner of Kimball Road and Telephone, a 297-acre area between Telephone Road and the Southern Pacific Railroad except for the 25.59-acre site located at the northwest corner of Montgomery Avenue and Northbank Drive, and a 172-acre area between Bristol Road and the Santa Clara River are designated Agricultural Use, not to be reconsidered until after the Year 2010, to preserve their existing agricultural character.”

Part C.

The map of the Land Use Plan contained in the General Plan shall be redrafted to reflect the foregoing amendments.

Section 4. Zoning

The most restrictive zoning in the City of San Buenaventura which will allow the Church to build a sanctuary, related Church buildings, and athletic fields on the Property is an R-1 Single Family zone with a subzone of R-1-1AC. The R-1-1AC subzone restricts the Property by requiring a minimum of one acre for each parcel. This will make the Property unattractive for single family development but still acceptable for the Church's sanctuary, related Church buildings, and athletic fields.

Therefore, upon annexation of the Property to the City of San Buenaventura the zoning designation for the Property shall be the R-1 Single Family zone with a subzone of R-1-1AC.

Section 5. Save Open-Space and Agricultural Resources

Any restrictions imposed upon he City of San Buenaventura limiting the City's ability to annex property and allow development of such property shall remain in full force and effect except as to the 25.59-acres of the Property.

Section 6. Construction

This ordinance shall be broadly construed in order to achieve the purposes stated in this ordinance. It is the intent of the voters that the provisions of this ordinance shall be interpreted by the City of San Buenaventura and others in a manner that facilitates the development of the Property in accordance with the purposes of this ordinance.

Section 7. Insertion Date

Part A. Upon the effective date of this ordinance, Part A and Part B of Section 3 of this ordinance shall be deemed inserted in the General Plan and the Land Use Map referred to in Part C of Section 3 shall be deemed amended even though the reprinting may not occur until deemed convenient by the City of San Buenaventura.

Part B. The General Plan in effect at the time the Notice of Intention to circulate this initiative was submitted to the City Clerk of the City of San Buenaventura, and the General Plan as amended by this ordinance, comprise an integrated, internally consistent and compatible statement of policies for the City of San Buenaventura. In order to ensure that the General Plan remains an integrated, internally consistent and compatible statement of policies and to ensure that the actions of the voters in enacting this ordinance are given effect, any provision of the General Plan that is adopted between the Notice of Intention and the effective date of this ordinance, to the extent that such provision is inconsistent with this ordinance, shall be amended as soon as possible and in the manner and time required by state law to ensure consistency between such provision and Section 3 of this ordinance. In the alternative, such interim-enacted inconsistent provisions shall be repealed.

Section 8. Amendment or Repeal

Section 3 and Section 4 of this ordinance may be amended or repealed only by the voters of the City of San Buenaventura at an election held in accordance with state law.

EXHIBIT "A"

PARCEL 1:

That portion of Subdivision 98 of Rancho Santa Paula y Saticoy, in the county of Ventura, state of California, as per map recorded in book "A" pag3 290 of Miscellaneous Records (Transcribed Records from Santa Barbara County), in the office of the county recorder of said county, described as follows:

Beginning at the point of intersection of the centerline of the right of way of the Southern Pacific Railroad and the boundary line between Subdivisions 98 and 99 of said Rancho Santa Paula y Saticoy; thence from said point of beginning,

1st: - North 10° 30' West 9.482 chains, more or less, to the southeast corner of that certain Parcel of land conveyed to Charles H. Fowler, by deed dated March 18, 1892, recorded in book 36 page 86 of Deeds; thence,

2nd: - South 79º 30' West 19.25 chains, along the south line of said lands of Charles H. Fowler, to the northeast corner of that certain Parcel of land as conveyed to Emma J. Tyler, by deed dated June 20, 1894, recorded in book 43 page 90 of Deeds; thence,

3rd: - South 10º 30' East 18.982 chains, more or less, along the east line of said lands of Emma J. Tyler, to a point in the centerline of the right of way of the Southern Pacific Railroad; thence along same,

4th: - North 53º 15' East 22.57 chains, more or less, to the point of beginning.

EXCEPT a strip of parcel of land 50 feet wide lying adjoining and immediately west of the east line of the above described land, conveyed to the County of Ventura, as a public highway, by deed recorded July 12, 1889, in book 28 page 338 of Deeds.

ALSO EXCEPT that portion thereof conveyed to the Southern Pacific Railroad Company by deed recorded January 27, 1887 in book 18 page 146 of Deeds.

RESERVING unto the grantor herein, all oil, gas and mineral rights in and to said land, without however, any right of surface entry in and to a depth of 500 feet.

PARCEL 3:

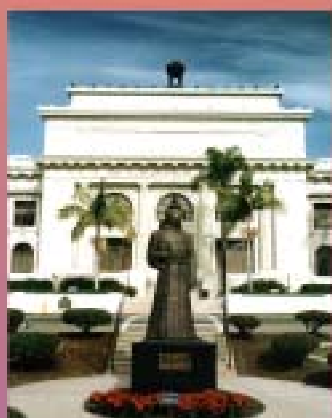
That certain parcel in Lot 99 of the Rancho Santa Paula y Saticoy, marked “not a part of this subdivision” on the map of Tract No. 1333-1, in the City of San Buenaventura, county of Ventura, state of California, as per map recorded in book 30 page 51 of Maps, in the office of the county recorder of said county, and lying northwesterly of the Southern Pacific Railroad right of way, easterly of Bristol Road and southwesterly of Montgomery Avenue, as shown on said map.

RESERVING unto the grantor herein, all oil, gas and mineral rights in and to said land, without however, any right of surface entry in and to a depth of 500 feet from the surface thereof.

ATTACHMENTS

ventura's general plan

DONNA GRANATA



"The desire for community is a constant of human nature."

— Steven Price
Urban Advantage
Berkeley, California

CITY OF VENTURA

21ST CENTURY TOOL KIT

Prelude

The 2005 Ventura General Plan envisions a new direction to protect and preserve its citizens' quality of life. This direction is based on the recognition that zoning and land development, as practiced for the past several decades, has not served our citizens, our city, or our environment as well as it should.

Currently, the two most successful movements created to alleviate this situation are "Smart Growth" and "New Urbanism." Smart Growth is a government initiated approach against sprawl that addresses underlying policy from the top-down, and is primarily marketed by government and similar agencies. New Urbanism is a grass roots, market response to outdated zoning and land use policy as it impacts development and the physical properties of the public realm. Its chief advocates are architects and town designers.

Smart Growth grew out of early New Urbanist work, and both are concerned with the real outcomes of the built environment and how it affects communities environmentally, economically, culturally, and socially.

The Ahwahnee Principles and the Charter for the New Urbanism, listed below, were created early on as "constitutions" that governed these movements. Both are valuable tools that Ventura would be wise to include in it's 21st Century Tool Kit to understand and solve long-standing problems associated with growth and change.

AHWAHNEE PRINCIPLES

Preamble:

Existing patterns of urban and suburban development seriously impair our quality of life. The symptoms are: more congestion and air pollution resulting from our increased dependence on automobiles, the loss of precious open space, the need for costly improvements to roads and public services, the inequitable distribution of economic resources, and the loss of a sense of community. By drawing upon the best from the past and the present, we can plan communities that will more successfully serve the needs of those who live and work within them. Such planning should adhere to certain fundamental principles.

Community Principles

1. All planning should be in the form of complete and integrated communities containing housing, shops, work places, schools, parks and civic facilities essential to the daily life of the residents.

2. Community size should be designed so that housing, jobs, daily needs and other activities are within easy walking distance of each other.
3. As many activities as possible should be located within easy walking distance of transit stops.
4. A community should contain a diversity of housing types to enable citizens from a wide range of economic levels and age groups to live within its boundaries.
5. Businesses within the community should provide a range of job types for the community's residents.
6. The location and character of the community should be consistent with a larger transit network.
7. The community should have a center focus that combines commercial, civic, cultural and recreational uses.
8. The community should contain an ample supply of specialized open space in the form of squares, greens and parks whose frequent use is encouraged through placement and design.
9. Public spaces should be designed to encourage the attention and presence of people at all hours of the day and night.
10. Each community or cluster of communities should have a well-defined edge, such as agricultural greenbelts or wildlife corridors, permanently protected from development.
11. Streets, pedestrian paths and bike paths should contribute to a system of fully-connected and interesting routes to all destinations. Their design should encourage pedestrian and bicycle use by being small and spatially defined by buildings, trees and lighting; and by discouraging high speed traffic.
12. Wherever possible, the natural terrain, drainage and vegetation of the community should be preserved with superior examples contained within parks or greenbelts.
13. The community design should help conserve resources and minimize waste.
14. Communities should provide for the efficient use of water through the use of natural drainage, drought tolerant landscaping and recycling.
15. The street orientation, the placement of buildings and the use of shading should contribute to the energy efficiency of the community.

Regional Principles

1. The regional land-use planning structure should be integrated within a larger transportation network built around transit rather than freeways.
2. Regions should be bounded by and provide a continuous system of greenbelt/wildlife corridors to be determined by natural conditions.
3. Regional institutions and services (government, stadiums, museums, etc.) should be located in the urban core.
4. Materials and methods of construction should be specific to the region, exhibiting a continuity of history and culture and compatibility with the climate to encourage the development of local character and community identity.

Implementation Principles

1. The general plan should be updated to incorporate the above principles.
2. Rather than allowing developer-initiated, piecemeal development, local governments should take charge of the planning process. General plans should designate where new growth, infill or redevelopment will be allowed to occur.

3. Prior to any development, a specific plan should be prepared based on these planning principles.
4. Plans should be developed through an open process and participants in the process should be provided visual models of all planning proposals.

CONGRESS FOR THE NEW URBANISM

THE CONGRESS FOR THE NEW URBANISM views disinvestment in central cities, the spread of placeless sprawl, increasing separation by race and income, environmental deterioration, loss of agricultural lands and wilderness, and the erosion of society's built heritage as one interrelated community building challenge.

WE STAND for the restoration of existing urban centers and towns within coherent metropolitan regions, the reconfiguration of sprawling suburbs into communities of real neighborhoods and diverse districts, the conservation of natural environments, and the preservation of our built legacy.

WE RECOGNIZE that physical solutions by themselves will not solve social and economic problems, but neither can economic vitality, community stability, and environmental health be sustained without a coherent supportive physical framework.

WE ADVOCATE the restructuring of public policy and development practices to support the following principles: neighborhoods should be diverse in use and population; communities should be designed for the pedestrian and transit as well as the car; cities and towns should be shaped by physically defined and universally accessible public spaces and community institutions; urban places should be framed by architecture and landscape design that celebrate local history, climate, ecology, and building practice.

WE REPRESENT a broad-based citizenry, composed of public and private sector leaders, community activists, and multidisciplinary professionals. We are committed to reestablishing the relationship between the art of building and the making of community, through citizen-based participatory planning and design.

WE DEDICATE ourselves to reclaiming our homes, blocks, streets, parks, neighborhoods, districts, towns, cities, regions, and environment.

We assert the following principles to guide public policy, development practice, urban planning, and design:

The region: Metropolis, city, and town

1. Metropolitan regions are finite places with geographic boundaries derived from topography, watersheds, coastlines, farmlands, regional parks, and river basins. The metropolis is made of multiple centers that are cities, towns, and villages, each with its own identifiable center and edges.

2. The metropolitan region is a fundamental economic unit of the contemporary world. Governmental cooperation, public policy, physical planning, and economic strategies must reflect this new reality.

3. The metropolis has a necessary and fragile relationship to its agrarian hinterland and natural landscapes. The relationship is environmental, economic, and cultural. Farmland and nature are as important to the metropolis as the garden is to the house.

4. Development patterns should not blur or eradicate the edges of the metropolis. Infill development within existing urban areas conserves environmental resources, economic investment, and social fabric, while reclaiming marginal and abandoned areas. Metropolitan regions should develop strategies to encourage such infill development over peripheral expansion.

5. Where appropriate, new development contiguous to urban boundaries should be organized as neighborhoods and districts, and be integrated with the existing urban pattern. Noncontiguous development should be organized as towns and villages with their own urban edges, and planned for a jobs/housing balance, not as bedroom suburbs.

6. The development and redevelopment of towns and cities should respect historical patterns, precedents, and boundaries.

7. Cities and towns should bring into proximity a broad spectrum of public and private uses to support a regional economy that benefits people of all incomes. Affordable housing should be distributed throughout the region to match job opportunities and to avoid concentrations of poverty.

8. The physical organization of the region should be supported by a framework of transportation alternatives. Transit, pedestrian, and bicycle systems should maximize access and mobility throughout the region while reducing dependence upon the automobile.

9. Revenues and resources can be shared more cooperatively among the municipalities and centers within regions to avoid destructive competition for tax base and to promote rational coordination of transportation, recreation, public services, housing, and community institutions.

The neighborhood, the district, and the corridor

1. The neighborhood, the district, and the corridor are the essential elements of development and redevelopment in the metropolis. They form identifiable areas that encourage citizens to take responsibility for their maintenance and evolution.

2. Neighborhoods should be compact, pedestrian-friendly, and mixed-use. Districts generally emphasize a special single use, and should follow the principles of neighborhood design when possible. Corridors are regional connectors of neighborhoods and districts; they range from boulevards and rail lines to rivers and parkways.

3. Many activities of daily living should occur within walking distance, allowing independence to those who do not drive, especially the elderly and the young. Interconnected networks of streets should be designed to encourage walking, reduce the number and length of automobile trips, and conserve energy.

4. Within neighborhoods, a broad range of housing types and price levels can bring people of diverse ages, races, and incomes into daily interaction, strengthening the personal and civic bonds essential to an authentic community.

5. Transit corridors, when properly planned and coordinated, can help organize metropolitan structure and revitalize urban centers. In contrast, highway corridors should not displace investment from existing centers.

6. Appropriate building densities and land uses should be within walking distance of transit stops, permitting public transit to become a viable alternative to the automobile.

7. Concentrations of civic, institutional, and commercial activity should be embedded in neighborhoods, and districts, not isolated in remote, single-use complexes. Schools should be sized and located to enable children to walk or bicycle to them.

8. The economic health and harmonious evolution of neighborhoods, districts, and corridors can be improved through graphic urban design codes that serve as predictable guides for change.

9. A range of parks, from tot-lots and village greens to ball fields and community gardens, should be distributed within neighborhoods. Conservation areas and open lands should be used to define and connect different neighborhoods and districts.

The block, the street, and the building

1. A primary task of all urban architecture and landscape design is the physical definition of streets and public spaces as places of shared use.

2. Individual architectural projects should be seamlessly linked to their surroundings. This issue transcends style.

3. The revitalization of urban places depends on safety and security. The design of streets and buildings should reinforce safe environments, but not at the expense of accessibility and openness.

4. In the contemporary metropolis, development must adequately accommodate automobiles. It should do so in ways that respect the pedestrian and the form of public space.

5. Streets and squares should be safe, comfortable, and interesting to the pedestrian. Properly configured, they encourage walking and enable neighbors to know each other and protect their communities.

6. Architecture and landscape design should grow from local climate, topography, history, and building practice.

7. Civic buildings and public gathering places require important sites to reinforce community identity and the culture of democracy. They deserve distinctive form, because their role is different from that of other buildings and places that constitute the fabric of the city.

8. All buildings should provide their inhabitants with a clear sense of location, weather and time. Natural methods of heating and cooling can be more resource-efficient than mechanical systems.

9. Preservation and renewal of historic buildings, districts, and landscapes affirm the continuity and evolution of urban society.

Congress of the New Urbanism, 140 S. Dearborn St., Suite 310, Chicago, IL, 60603, (312) 551-7300
For information, visit www.cnu.org

GLOSSARY OF TERMS IN THE 2005 VENTURA GENERAL PLAN

Abbreviations

ADT: Average number of vehicle trips per day
CEQA: California Environmental Quality Act
CIP: Capital Improvements Program
CNEL: Community Noise Equivalent Level
dB: Decibel
DOF: California Department of Finance
EIR: Environmental Impact Report
FAR: Floor Area Ratio
FEMA: Federal Emergency Management Agency
LAFCo: Local Agency Formation Commission
Ldn: Day and Night Average Sound Level
Leq: Sound Energy Equivalent Level
LOS: Traffic Intersection Level of Service
RDA: City of Ventura Redevelopment Agency
SCAG: Southern California Association of Governments
SOI: Sphere of Influence
TDM: Transportation Demand Management
TOD: Transit-Oriented Development
VCOG: Ventura County Council of Governments

Definitions

Acre: Approximately 43,560 square feet.

Acres, Gross: The entire acreage of a site calculated to the centerline of proposed bounding streets and to the edge of the right-of-way of existing or dedicated streets.

Acres, Net: The portion of a site that can actually be built upon. The following generally are not included in the net acreage of a site: public or private road rights-of-way, public open space, and flood ways.

Action: A strategy carried out in response to adopted policy to achieve a specific goal or objective. Policies and action statements establish the "who," "how" and "when" for carrying out the "what" and "where" of goals and objectives.

Adaptive Reuse: The conversion of obsolescent or historic buildings from their original or most recent use to a new use; for example, the conversion of former hospital or school buildings to residential use, or the conversion of a historic single-family home to office use.

Affordable Housing: Housing capable of being purchased or rented by a household with very low, low, or moderate income, based on a household's ability to make monthly payments necessary to obtain housing. Housing is considered affordable when a household pays less than 30 percent of its gross monthly income (GMI) for housing including utilities.

Alley: A narrow service way, either public or private, which provides a permanently reserved but secondary means of public access not intended for general traffic circulation. Alleys typically are located along rear property lines.

Ambient: Surrounding on all sides; used to describe measurements of existing conditions with respect to traffic, noise, air and other environments.

Annex, *v*: To incorporate a land area into an existing district or municipality, with a resulting change in the boundaries of the annexing jurisdiction.

Aquifer: An underground, water-bearing layer of earth, porous rock, sand, or gravel, through which water can seep or be held in natural storage. Aquifers generally hold sufficient water to be used as a water supply.

Arterial: Medium-speed (30-40 mph), medium-capacity (10,000-35,000 average daily trips) roadway that provides intra-community travel and access to the county-wide highway system. Access to community arterials should be provided at collector roads and local streets, but direct access from parcels to existing arterials is common.

Bicycle Lane (Class II): A corridor expressly reserved for bicycles, existing on a street or roadway in addition to any lanes for use by motorized vehicles.

Bicycle Path (Class I): A paved route not on a street or roadway and expressly reserved for bicycles traversing an otherwise unpaved area. Bicycle paths may parallel roads but typically are separated from them by landscaping.

Bicycle Route (Class III): A facility shared with motorists and identified only by signs, a bicycle route has no pavement markings or lane stripes.

Buffer: An area of land separating two distinct land uses that acts to soften or mitigate the effects of one land use on the other.

Building: Any structure used or intended for supporting or sheltering any use or occupancy.

Building Type: a structure category determined by function, disposition on the lot, and configuration, including frontage and height. For example, a rowhouse is a type, not a style.

Buildout: Development of land to its full potential or theoretical capacity as permitted under current or proposed planning or zoning designations.

California Environmental Quality Act (CEQA): Law requiring State and local agencies to regulate activities with consideration for environmental protection. If a proposed activity has the potential for a significant adverse environmental impact, an Environmental Impact Report (EIR) must be prepared and certified before taking action on the proposed project.

Capital Improvements Program (CIP): A program that schedules permanent City improvements at least five years ahead to fit projected fiscal capability. The CIP is reviewed annually.

Channelization: The straightening and/or deepening of a watercourse for purposes of runoff control or ease of navigation; often includes lining banks with retaining material such as concrete.

Character: Special physical characteristics of a structure or area that set it apart from its surroundings and contribute to its individuality.

Charrette: An interactive, multi-day public process in which the community works together with planning and design professionals and City staff and officials to create and support a feasible plan for a specific area of the City that will produce positive and transformative community change.

City: When capitalized, refers to the governmental entity; "city" refers to the geographic area.

Civic: the term defining not-for-profit organizations dedicated to the arts, culture, education, recreation, government, transit, and municipal parking.

Clustered Development: Buildings placed close together with the purpose of retaining open space area.

Co-housing: A residential development with dwelling units for grouped around a common kitchen, gathering room, and child-care facilities. Co-housing developments normally are organized as condominiums.

Collector: Relatively-low-speed (25-30 mph), relatively low-volume (5,000-10,000 average daily trips) street that provides circulation within and between neighborhoods. Collectors usually serve short trips and are intended for collecting trips from local streets and distributing them to the arterial network.

Commerce; Commercial: The buying and selling of commodities and services.

Community Noise Equivalent Level (CNEL): A 24-hour energy equivalent level derived from a variety of single-noise events, with weighting factors of 5 and 10 dBA applied to the evening (7 PM to 10 PM) and nighttime (10 PM to 7 AM) periods, respectively, to allow for the greater sensitivity to noise during these hours.

Community Park: Land with full public access intended to provide recreation opportunities beyond those supplied by neighborhood parks. Community parks are larger in scale than neighborhood parks but smaller than regional parks.

Corridor: Linear features that may form boundaries, as well as connections, between neighborhoods. Corridors frequently encompass major access routes, especially ones with commercial destinations. Corridors also can incorporate parks or natural features such as streams or canyons.

dB: Decibel; a unit used to express the relative intensity of a sound as it is heard by the human ear.

dBA: The "A-weighted" scale for measuring sound in decibels; weighs or reduces the effects of low and high frequencies in order to simulate human hearing. Every increase of 10 dBA doubles the perceived loudness though the noise is actually ten times more intense.

Dedication: The turning over by an owner or developer of private land for public use, and the acceptance of land for such use by the governmental agency having jurisdiction over the public function for which it will be used. Dedications for roads, parks, school sites, or other public uses often are made conditions for approval of a development by a city or county.

Density, Residential: The number of permanent residential dwelling units per gross acres of land.

Density Bonus: The allocation of development rights that allow a parcel to accommodate additional square footage or additional residential units beyond the maximum for which the parcel is zoned, usually in exchange for the provision or preservation of an amenity at the same site or at another location. Under California law, a housing development that provides 20 percent of its units for lower income households, or 10 percent of its units for very low-income households, or 50 percent of its units for seniors, is entitled to a density bonus.

Design Review: The comprehensive evaluation of a development and its impact on neighboring properties and the community as a whole, from the standpoint of site and landscape design, architecture, materials, colors, lighting, and signs, in accordance with a set of adopted criteria and standards.

Detention Basin: A structure constructed to retard flood runoff and minimize the effect of sudden floods. Water is temporarily stored and released through an outlet structure at a rate that will not exceed the carrying capacity of the channel downstream. Basins often are planted with grass and used for open space or recreation in periods of dry weather.

Developer: An individual or business that prepares raw land for the construction of buildings or causes to be built physical space for use primarily by others, and in which the preparation of the land or the creation of the building space is in itself a business and is not incidental to another business or activity.

Development: The physical extension and/or construction of urban land uses, including: subdivision of land; construction or alteration of structures, roads, utilities, and other facilities; installation of septic systems; grading; deposit of refuse, debris, or fill materials; and clearing of natural vegetative cover (with the exception of agricultural activities). Routine repair and maintenance activities are exempted.

Development Fee: (See "Impact Fee.")

District: An area of the city that has a unique character identifiable as different from surrounding areas because of distinctive architecture, streets, geographic features, culture, landmarks, activities, and/or land uses. A neighborhood or parts of neighborhoods can form a district. Districts consist of streets or areas emphasizing specific types of activities. A corridor may also be a district, as when a major shopping avenue runs between adjoining neighborhoods.

Dwelling Unit: A room or group of rooms (including sleeping, eating, cooking, and sanitation facilities, but not more than one kitchen), which constitutes an independent housekeeping unit, occupied or intended for occupancy by one household on a long-term basis.

Encourage, *v*: To stimulate or foster a particular condition through direct or indirect action by the private sector or government agencies.

Enhance, *v*: To improve existing conditions by increasing the quantity or quality of beneficial uses or features.

Environment: The existing physical conditions in an area that will be affected by a proposed project, including land, air, water, mineral, flora, fauna, noise, and objects of historic or aesthetic significance.

Environmental Impact Report (EIR): A report required by CEQA that assesses all the environmental characteristics of an area and determines what effects or impacts will result if the area is altered or disturbed by a proposed action.

Fault: A fracture in the earth's crust forming a boundary between rock masses that have shifted.

Flood, 100-Year: The magnitude of a flood expected to occur on the average every 100 years, based on historical data. The 100-year flood has a one percent chance of occurring in any given year.

Floodplain: The relatively level land area on either side of the banks of a stream regularly subject to flooding. That part of the flood plain subject to a one percent chance of flooding in any given year is designated as an "area of special flood hazard" by the Federal Insurance Administration.

Floodway: The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the "base flood" without cumulatively increasing the water surface elevation more than one foot. No development is allowed in floodways.

General Plan: A compendium of city or county policies regarding its long-term development, in the form of maps and accompanying text. The General Plan is a legal document required by the State of California Government Code Section 65301 and adopted by the City Council.

Gateway: A point along the edge of a city at which a person gains a sense of having left the environs and entered the city.

Goal: A general, overall, and ultimate purpose, aim, or end toward which the City will direct effort.

Green: A whole-building and systems approach to siting, design, construction, and operation that employs techniques that minimize environmental impacts and reduce the energy consumption of buildings while contributing to the health and productivity of occupants.

Hazardous Material: Any substance that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment if released into the workplace or the environment. The term includes, but is not limited to, hazardous substances and hazardous wastes.

Hillside Area: All that area north of Foothill and Poli Street, and east of Cedar Street and within City limits. This area is subject to the Hillside Management Program.

Hillside Open Space: One of the 19 distinct communities within the City's Planning Area; coterminous with the Hillside Voter Participation Area; generally referred to as "hillsides".

Hillside Voter Participation Area or HVPA: The area subject to the "Hillside Voter Participation Act" (also known as Measure "P") as set forth in Appendix X and coterminous with the "Hillside Open Space" area depicted on the Land Use Diagram.

Hillsides: Synonymous and coterminous with HVPA and "Hillside Open Space".

Historic: Noteworthy for significance in local, state, or national history or culture, architecture or design, or housing works of art, memorabilia, or artifacts.

Household: Persons who occupy a housing unit.

Housing Element: A separately published State-mandated general plan element that assesses existing and projected housing needs of all economic segments of the community, identifies potential sites adequate to provide the amount and kind of housing needed, and contains adopted goals, policies, and implementation programs for the preservation, improvement, and development of housing. The Housing Elements is updated every five years.

Housing Unit: A rooms or a rooms intended for occupancy, separate from any other living space, with direct access from outside or through a common area.

Impact: The direct or indirect effect of human action on existing physical, social, or economic conditions.

Impact or Development Fee: A fee levied on the developer of a project as compensation for otherwise-unmitigated impacts the project will produce, not to exceed the estimated reasonable cost of providing the service for which the fee is charged.

Industry/Industrial: The manufacture, production, and processing of consumer goods. Industrial is often divided into "heavy industrial" uses, such as construction yards, quarrying, and factories; and "light industrial" uses, such as research and development and less intensive warehousing and manufacturing.

Infill: Development of vacant and/or underutilized land within areas already largely developed with urban uses.

Infrastructure: Public services and facilities, such as sewage-disposal systems, water-supply systems, and other utilities.

In-lieu Fee: Payment that substitutes for required dedication of land or provision of structures or amenities.

Institutional: Uses such as hospitals, museums, schools, places of worship, and nonprofit activities of a welfare, educational, or philanthropic nature that cannot be considered residential, commercial, or industrial activities.

Landmark: (1) A building, site, object, structure, or significant tree, having historical, architectural, social, or cultural significance and marked for preservation by the local, state, or federal government. (2) A visually prominent or outstanding structure or natural feature that functions as a point of orientation or identification.

Ldn: Day-Night Average Sound Level. The A-weighted average sound level for a given area (measured in decibels) during a 24-hour period with a 10 dB weighting applied to night-time sound levels. The Ldn is approximately numerically equal to the CNEL for most environmental settings.

Leq: The energy equivalent level, defined as the average sound level on the basis of sound energy (or sound pressure squared). The Leq is a "dosage" type measure and is the basis for the descriptors used in current standards, such as the 24-hour CNEL used by the State of California.

Lease: A contractual agreement by which an owner of real property (the lessor) gives the right of possession to another (a lessee) for a specified period of time (term) and for a specified consideration (rent).

Level of Service, Intersection (LOS): A scale that measures the amount of traffic an intersection is capable of handling. Levels range from A, representing free-flow, to F corresponding to significant stoppage.

Liquefaction: The transformation of loose water-saturated granular materials (such as sand or silt) from a solid into a liquid state, which can lead to ground failure during an earthquake.

Live-Work: A dwelling unit that contains, to a limited extent, a commercial component. A live-work unit is a fee-simple unit on its own lot with the commercial component limited to the ground level. (see Work-Live)

Local Agency Formation Commission (LAFCo): A commission in each county that reviews and evaluates proposals for formation of special districts, incorporation of cities, annexation to special districts or cities, consolidation of districts, and merger of districts with cities. LAFCo members include two county supervisors, two city council members, and one member representing the general public.

Local Coastal Program (LCP): A combination of City land use plans, zoning regulations, and zoning district maps that control land use in the Coastal Zone established under the California Coastal Act of 1976.

Local Street: Relatively low-volume, low-speed streets (not shown on the Roadway Classifications map), whose primary purpose is to provide access to fronting properties.

Lot: A legally-recognized parcel with frontage on a public or City-approved private street.

Low Income: Households with annual income 80 percent of the County median or less.

Maintain: Keep in an existing state. (See “Preserve.”)

Median: The dividing area between opposing lanes of traffic.

Mitigate: Alleviate or avoid to the extent feasible.

Mixed Use: Properties on which various uses, such as office, commercial, and institutional, are combined with residences in a single building or site in an integrated development project with significant functional interrelationships and a coherent physical design. A single site may include contiguous properties.

Neighborhood: The basic building blocks of a community that together comprise the city. Each neighborhood is limited in physical area, with a defined edge and a center. The size of a neighborhood is usually based on the distance that a person can walk in five minutes from the center to the edge – a quarter-mile. Neighborhoods have a fine-grained mix of land uses, providing places to live, work, shop, and be entertained.

Neighborhood Center: The focal point of a neighborhood, commonly featuring places for work, shopping, services, entertainment, leisure, recreation, and social and civic interaction.

Neighborhood Park: A facility intended to serve the recreation needs of people living or working within a one-half mile radius of the park.

Noise: Sound that is undesirable because it interferes with speech and hearing, is intense enough to damage hearing, or is otherwise annoying.

Noise Contour: A line connecting points of equal noise level as measured on the same scale. Noise levels greater than the 60 Ldn contour (measured in dBA) require mitigation in residential development.

Office: Professional or consulting services in fields such as accounting, architecture, design, engineering, finance, law, insurance, medicine, real estate, and similar types of work.

Open Space: An area of land or water that is essentially unimproved and devoted to outdoor recreation and/or the preservation of natural resources.

Outdoor Recreation: Recreation in an urbanized outdoor setting (active recreation) or open-space outdoor setting (passive recreation).

(a) *Active outdoor recreation* includes participant sports or other activities conducted in open or partially enclosed or screened recreational activities facilities. Typical uses include driving ranges, miniature golf courses, golf courses, amusement parks, swimming pools, and tennis courts and usually rely on permanent above-ground improvements, including, but not limited to, playing fields or courts, restrooms, and tables.

(b) *Passive outdoor recreation* includes recreational activities, usually of an individual or small group nature, such as sunbathing, walking, hiking, bird watching, or nature study, conducted in an open-space setting and which, generally, do not rely on the use of permanent aboveground improvements or involve motorized vehicle use.

Parcel: A lot, or contiguous group of lots, in single ownership or under single control, usually considered a unit for purposes of development.

Parks: Open space lands whose primary purpose is recreation.

Parkway: The area between curb and sidewalk, usually planted with ground cover and/or trees.

Pedestrian Shed: an area defined by the average distance that may be traversed at and easy walking pace from its edge to its center. This distance is applied to determine the size of a neighborhood or extent of a community. A standard Pedestrian Shed is one quarter of a mile radius or 1,320 feet. With transit available or proposed, a long Pedestrian Shed has an average walking distance of ½-mile or 2,640 feet. Pedestrian Sheds should be conceived as oriented toward a central destination containing one or more important intersections, meeting places, civic spaces, civic buildings, and the capacity to accommodate a T5 Transect Zone in the future. Sometimes called a Walkshed.

Planning Area: The land area addressed by the General Plan, which includes the City Limits, potentially annexable land in the Sphere of Influence, and neighboring open space and agricultural areas of Ventura County that the City desires to remain in rural condition.

Policy: A statement of principle that anticipates specific actions to be undertaken to meet City goals.

Pollution: The presence of matter or energy whose nature, location, or quantity produces undesired environmental effects.

Preserve: Keep intact and safe from destruction or decay.

Protect: Maintain and preserve beneficial uses in their present condition.

Public and Quasi-public Facilities: Institutional, academic, governmental and community service uses, either publicly owned or operated by non-profit organizations.

Public Art: Signs, other monuments, sculptures, murals, statues, fountains, and other artistic installations in spaces accessible to the general public that accentuate or draw attention to a particular place or feature of the city, provide a focal point for public gathering, and/or serve a specific function, such as to provide seating.

Recreation, Active: A type of recreation that requires organized play areas, such as softball, baseball, football and soccer fields, tennis and basketball courts and various forms of children's play equipment.

Recreation, Passive: Recreation that does not require organized play areas.

Recycling: The process of extracting and reusing materials from waste products.

Redevelop: To demolish existing buildings, or increase the overall floor area existing on a property, or both, irrespective of whether a change occurs in land use.

Redevelopment Agency: The City division created under California Redevelopment Law for the purpose of planning, developing, re-planning, redesigning, clearing, reconstructing, and/or rehabilitating all or part of a specified area with residential, commercial, industrial, and/or public (including recreational) structures and facilities.

Regional: Pertaining to activities or economies at a scale greater than that of a single jurisdiction and affecting a broad geographic area.

Regional Park: A park typically 150-500 acres in size focusing on activities and natural features not included in most other types of parks and often based on a specific scenic or recreational opportunity.

Restore: Renew, rebuild, or reconstruct to a former state.

Ridesharing: Vehicle travel other than driving alone.

Ridgeline: A line connecting the highest points along a ridge and separating drainage basins or small-scale drainage systems from one another.

Right-of-way: Land intended to be occupied by transportation and public use facilities such as roadways, railroads, and utility lines.

Riparian: Areas adjacent to perennial and intermittent streams delineated by the existence of plant species normally found near fresh water.

Runoff: The portion of precipitation that does not percolate into the ground.

Seismic: Caused by or subject to earthquakes or earth vibrations.

Sidewalk: the paved layer of the public frontage dedicated exclusively to pedestrian activity.

Specific Plan: A legal tool allowed by State Government Code Section 65450 et seq. that prescribes detailed regulations, conditions, programs, and/or proposed legislation for a defined area of the city.

Sphere of Influence: The probable ultimate physical boundaries and service area of the city, as determined by LAFCo.

Streetscape: the urban element that establishes the major part of the public realm. The streetscape is composed of thoroughfares (travel lanes for vehicles and bicycles, parking lanes for cars, and sidewalks or paths for pedestrians) as well as the visible private frontages (building facades and elevations, porches, yards, fences, awnings, etc.), and the amenities of the public frontages (street trees and plantings, benches, and streetlights, etc.).

Structure: Anything constructed or erected that requires location on the ground (excluding swimming pools, fences, and walls used as fences).

Subdivision: The division of a land into defined lots or condominiums that can be separately conveyed by sale or lease.

Sustainable: Meeting the needs of the present without compromising the ability of future generations to meet their needs, and successfully balancing economic, environmental, and social equity concerns.

Tourism: The business of providing services for persons traveling for pleasure.

Transect: a system of ordering human habitats in a range from the most natural to the most urban. Based upon six Transect Zones that describe the physical character of place at any scale, according to the density and intensity of land use and urbanism.

Transit-Oriented Development (TOD): Relatively high-density development located within an easy walk of a major transit stop, generally with a mix of residential, employment, and shopping designed primarily for pedestrians.

Transit, Public: A system of regularly-scheduled buses and/or trains available to the public on a fee-per-ride basis.

Transportation Demand Management (TDM): Strategies for reducing the number of vehicle trips by increasing ridesharing, transit use, walking, and biking.

Trip: A one-way journey that proceeds from an origin to a destination via a single mode of transportation.

Truck Route: A route required for all vehicles exceeding set weight or axle limits, which follows major arterials through commercial or industrial areas and avoids sensitive areas.

Underutilized: Non-vacant properties that have not been fully developed with improvements that reach the allowed density and/or floor area.

Urban Design: The attempt to give form, in terms of both beauty and function, to selected urban areas or to whole cities. Urban design is concerned with the location, mass, and design of various urban components and combines elements of urban planning, architecture, and landscape architecture.

Use Permit: The discretionary and conditional review of an activity or function or operation on a site or in a building or facility.

Very Low Income: Households with annual income 50 percent of the County median or less.

View Corridor: The line of sight of an observer looking toward an object of significance (e.g., ridgeline, river, historic building, etc.).

Viewshed: The area within view from a defined point.

Watercourse: Presently or once naturally perennially or intermittently flowing water, including rivers, streams, barrancas, and creeks. Includes waterways that have been channelized, but not ditches or underground drainage and sewage systems.

Watershed: The total area above a given point on a watercourse that contributes water to its flow; also, the entire region drained by a watercourse.

Wetlands: Transitional areas between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is covered by shallow water. Federal agencies establish hydrology, vegetation, and soil criteria to define wetlands.

Work-Live: A dwelling unit that contains a commercial component. A Work-Live unit is a fee-simple unit on a lot with the commercial component anywhere within the unit. (see Live-Work)

Yield Street: A street whereby by two vehicles, going in opposite directions, one car will often have to pull over slightly and yield to the other vehicle, depending on how many cars are parked on the street. A standard residential street.

Zoning: The regulation of building forms and land uses throughout the city.

Guidelines for Energy Project Applications Requiring CEQA Compliance:

Pre-filing and Proponent's Environmental Assessments

November 2019

Version 1.0

Energy Division

Infrastructure Permitting and CEQA Unit

California Public Utilities Commission

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Pre-filing and Proponent's Environmental Assessments

Contents

PEA CHECKLIST ATTACHMENTS

Foreword

November 12, 2019

To: Applicants Filing Proponent's Environmental Assessments for Energy Infrastructure Projects at the California Public Utilities Commission (CPUC or Commission)

From: Merideth Sterkel (Program Manager, Infrastructure Planning and Permitting) and Mary Jo Borak and Lonn Maier, Supervisors, Infrastructure Permitting and California Environmental Quality Act, Energy Division, CPUC

Subject: Introducing revisions to the Pre-filing Guidelines for Energy Infrastructure Projects and a Unified and Updated Electric and Gas PEA Checklist

We are pleased to release a 2019 revision to the California Environmental Quality Act (CEQA) Proponent's Environmental Assessments (PEA) Checklist. This substantially revised document is now entitled "Guidelines for Energy Project Applications Requiring CEQA Compliance: Pre-filing and Proponent's Environmental Assessments" (Guidelines). Future updates to this document will be made as determined necessary. The CPUC's Rules of Practice and Procedure Sections 2.4 provide that all applications to the CPUC for authority to undertake projects that are not statutorily or categorically exempt from CEQA requirements shall include an Applicant-prepared PEA.

Updates Overview

Prior versions of the Working Draft PEA Checklist were published in 2008 and 2012. For this 2019 update, extensive revisions were made to all sections based on our experience with the prior checklist versions. All electric and natural gas projects are now addressed in a single PEA Checklist, and the following updates were made:

- **CEQA Statute and Guidelines 2019 Updates:** The PEA Checklist is updated pursuant to the 2019 CEQA Statues and Guidelines, including new energy and wildfire resource areas.
- **Pre-filing Consultation Guidelines:** Pre-filing guidelines are now provided since the pre-filing and PEA development processes are intertwined.
- **Unified PEA Checklist for Energy Projects:** All electric and natural gas projects are now addressed in a single PEA Checklist.
- **Additional CEQA Impact Questions:** Questions are included for the following PEA Checklist sections: 5.4, Biological Resources; 5.6, Energy; 5.9, Hazards, Hazardous Materials, and Public Safety; 5.16, Recreation; 5.17, Transportation; and 5.19, Utilities and Service Systems.
- **CPUC Draft Environmental Measures:** Draft measures are provided in PEA Checklist Attachment 4 for Aesthetics, Air Quality, Cultural Resources, Greenhouse Gas Emissions, Utilities and Service Systems and Wildfire.

Purpose of the Guidelines Document

The purpose and objective of the PEA Checklist included within this Guidelines document has not changed, which is to provide project Proponents (Applicants) with detailed guidance about information our CEQA Unit Staff expect in sufficient PEAs. The document details the information Applicants must provide the CPUC to complete environmental reviews that satisfy CEQA requirements. Specifically, the Pre-filing Consultation Guidelines and PEA Checklist, together, are intended to achieve the following objectives:

1. Provide useful guidance to Applicants, CPUC staff, and outside consultants regarding the type and detail of information needed to quickly and efficiently deem an application complete;

2. Ensure PEAs provide reviewers with a detailed project description and associated information sufficient to deem an application complete, avoid lengthy review periods and numerous data requests for the purpose of augmenting a PEA, and avoid unnecessary PEA production costs;
3. Increase the level of consistency between PEAs submitted and provide for more consistent review by CPUC CEQA Unit Staff and outside consultants; and
4. Promote transparency and reduce the potential for conflicts between utility and CPUC Staff about the types, scope, and thoroughness of data expected for data adequacy purposes.

The Guidelines document provides detailed instructions to Applicants for use during the Pre-filing process and PEA development. The document is intended to fully inform Applicants and focus the role of outside consultants, thus, enabling Applicants to submit more complete, useful, and immediately data-adequate PEAs.

Benefits of High Quality and Complete PEAs

CPUC CEQA Unit Staff seek to complete the environmental review process required under CEQA as quickly and efficiently as possible. Table 1 shows the average duration in months of CPUC applications that require CEQA documents. While there are tensions between speed and quality in all project management, the achievement of expeditious environmental reviews can result in lower project costs to ratepayers. Our staff have reviewed the timelines for 108 past CPUC applications that required review pursuant to CEQA and determined that the average length of time from application filing to PEA deemed complete is four months, regardless of the type of CEQA document. The goal for our agency is to deem PEAs complete within 30 days. The faster PEAs are deemed complete, the sooner staff can prepare the CEQA document. With each delay to PEA completeness, the fundamental project purpose and need and baseline circumstances may shift, requiring refreshing of the data. The Guidelines document will improve the initial accuracy of PEAs and reduce the time required to deem PEAs complete. Once an application is formally filed, the Applicant will receive a notification letter from CPUC CEQA Unit Staff when the PEA is deemed complete.

Table 1. Average Duration in Months of CPUC Applications that Require CEQA Documents (1996–2019)

	I: Application Filed to PEA Deemed Complete	II: PEA Deemed Complete to Draft Environmental Document Circulated	III: Draft Environmental Document to Final Released	IV: Final Released to Proposed Decision	V: Proposed Decision to Final Decision (with Certification of CEQA Document)	I-V: Overall Duration (1)
Environmental Impact Report (EIR; n=49)	5	13	7	5	2	**29**
Initial Study/ Mitigated Negative Declaration (IS/MND; n=56)	4	8	3	4	1	**19**
All Document Types (n=108)	4	8	4	5	2	**23**
Range: All Document Types	*1-9*	*5-18*	*2-10*	*1-7*	*1-2*	***12-38***

Note:
(1) The overall duration is not a sum of the average durations for each step. The overall duration was calculated using "n," the number of applications with data available for the date of application filing and final decision date. Not all projects had data available for each step. The data include several instances where the CEQA document was developed in conjunction with a NEPA document, e.g., an EIR/Environmental Impact Statement or IS/MND/Environmental Assessment/Finding of No Significant Impact was prepared instead of an EIR or MND, respectively. The above data is not inclusive of projects that had averages and ranges that are statistically abnormal.

Lessons Learned about the PEA Process

In the past, Applicants have filed PEAs using the checklist to ensure the correct information was provided but have not followed the format and organization of the PEA checklist and sometimes chose not to engage in Pre-filing activities with our staff. To achieve the objectives and benefits listed above, Applicants will file all future PEAs in the same organizational format as the updated checklist and adhere to the Pre-filing Consultation Guidelines in coordination with CPUC CEQA Unit Staff.

The Guidelines document describes the level effort required for the assessments necessary to not only finalize a CEQA document but ensure its legal defensibility. While final design and survey information is preferred, the PEA may incorporate preliminary design and survey data as appropriate and in consultation with CEQA Unit Staff during Pre-filing. We recognize that projects are fact specific, and deviations from the Pre-filing Consultation Guidelines and PEA Checklist are inevitable but providing concise and accurate information as soon as possible is paramount. Any deviations from these Guidelines must include clear justification and should be discussed and submitted during the Pre-filing Consultation process to avoid subsequent delays.

The PEA Checklist is written with the assumption that an Environmental Impact Report will be prepared, however, a Mitigated Negative Declaration or other form of CEQA document (e.g., exemption) may be appropriate. This determination, however, must be made in consultation with CPUC CEQA Unit Staff during Pre-filing and prior to submittal of the Draft PEA.

Future Modifications and Improvements

Like the predecessor PEA checklists, this is a working document that will be modified over time based on experience and changes to the CEQA Statute and Guidelines. To meet the above stated objectives and maintain consistency with CEQA. We expect Applicants, their consultants, CPUC consultants, and the CPUC to engage in a regular and ongoing dialogue about specific improvements to the CEQA process overall, and these Guidelines in particular.

We look forward to working with Applicants during the Pre-filing Consultation process to ensure that the level of effort that goes into preparing PEAs can be effectively and efficiently transferred into the CEQA document prepared by CPUC Staff and consultants. Applicants are invited to debrief with our staff about the efficacy of these Guidelines.

Merideth Sterkel
/s/
Program Manager, Infrastructure Planning and Permitting
California Public Utilities Commission

Mary Jo Borak
/s/
Supervisor, Infrastructure Permitting and CEQA Unit
California Public Utilities Commission

Lonn Maier
/s/
Supervisor, Infrastructure Permitting and CEQA Unit
California Public Utilities Commission

Pre-Filing Consultation Guidelines

The following Pre-filing Consultation Guidelines apply to all PEAs filed with applications to the CPUC and outline a process for Applicants to engage with CPUC CEQA Unit Staff about upcoming projects that will require environmental review pursuant to CEQA. The CPUC is typically the Lead Agency for large projects by investor-owned gas and electric utilities. The CPUC's CEQA Unit Staff are experienced with developing robust CEQA documents for long, linear energy projects. The PEA Checklist, starting in the next section, is based upon that experience.

Pre-filing Consultation Process

During Pre-filing Consultation, Applicants and CPUC Staff meet to discuss the upcoming application. Successful projects will commence Pre-filing Consultation no less than six months prior to application filing at the CPUC. When the application is formally filed at the CPUC, the Application and the PEA are submitted to the CPUC Docket Office.

1. Meetings with CPUC Staff

To initiate Pre-filing Consultation, Applicants will request and attend a meeting with CPUC CEQA Unit Staff at least six months prior to application filing.

   a. Applicants can request a Pre-Filing Consultation meeting via email or letter. Initial contact via telephone may occur, but staff request written documentation of Pre-filing Consultation commencement.
   b. For the initial meeting, Applicants will provide staff with a summary of the proposed project including maps and basic GIS data at least one week prior to the meeting.
   c. Applicants will receive initial feedback on the scope of the proposed project and PEA. Staff will work with Applicants to establish a schedule for subsequent Pre-filing meetings and milestones.

2. Consultant Resources

CPUC CEQA Unit Staff will initiate the consultant contract immediately following the initial Pre-filing Consultation meeting. CPUC's consultant contract resources will be executed prior to Applicant filing of the Draft PEA. The consultant contract is critical to the Pre-filing Consultation process. Applicants are encouraged to request updates about the status of the contract. The CPUC may use its on-call consulting resources contract for these purposes. If CEQA Unit Staff determine that their on-call consulting resources are not appropriate due to the anticipated project scope, staff may initiate a request for proposals process to engage consulting resources, and the resulting contracting process will be completed and consultant contract in place prior to Draft PEA filing.

3. Draft PEA Provided Prior to PEA Filing

A complete Draft PEA will be filed at least three months prior to application filing. CPUC CEQA Unit Staff and the CPUC consultant team will review and provide comments on the Draft PEA to the Applicant early in the three-month period to allow time for Applicant revisions to the PEA.

4. Project Site Visits

One or more site visits will be scheduled with CPUC CEQA Unit Staff and their consultant at the time of Draft PEA filing (or prior). Appropriate federal, state, and local agencies will also be engaged at this time.

5. Consultation with Public Agencies

The Applicant and CPUC CEQA Unit Staff will jointly reach out and conduct consultation meetings with public agencies and other interested parties in the project area. CPUC CEQA Unit Staff may also choose to conduct separate consultation meetings if needed.

If a federal agency will be a co-lead pursuant to the National Environmental Policy Act and coordinating with the CPUC during the environmental review process, the Applicant and CPUC CEQA Unit Staff will ensure that the agency has the opportunity to comment on the Draft PEA and participate jointly with the CPUC throughout the application review process. Applicant and Commission CEQA Unit Staff coordination with the federal agency (if applicable) will likely need to occur more than six months in advance of application filing.

6. Alternatives Development

PEAs will be drafted with the assumption that an Environmental Impact Report (EIR) will be prepared. Applicants will include a reasonable range of alternatives in the PEA (even though a Mitigated Negative Declaration [MND] may ultimately be prepared), including sufficient information about each alternative. In some situations, CPUC CEQA Unit Staff and project Applicants may agree during Pre-filing Consultation that an MND is likely and a reasonable range of alternatives is not required for the PEA. This determination, however, must be made in consultation with CEQA Unit Staff during Pre-filing and is not final. The type of document to be prepared may change based on public scoping results and other findings during the environmental review process.

CEQA Unit Staff will provide feedback on the range of alternatives prior to Draft PEA filing (if possible) based on their review of the Draft PEA. It is critical that Applicants receive feedback from CEQA Unit Staff about the range of alternatives prior to filing the PEA. Applicants will ensure that each alternative is described and evaluated in the PEA with an equal level of detail as the proposed project unless otherwise instructed in writing by CEQA Unit Staff.

7. Format of PEA Submittal

Each PEA submittal will include the completed PEA Checklist tables. Each PEA submittal will be formatted and organized as shown in the Example PEA Table of Contents provided in the PEA Checklist unless otherwise directed by CPUC CEQA Unit Staff in writing prior to application filing. The example PEA Table of Contents is modeled after typical CPUC EIRs.

8. Transmission and Distribution System Information

A key component of CEQA projects analyzed during CPUC environmental reviews is the context of the project within the larger transmission and distribution system. Detailed descriptions of the regional transmission system, including GIS data, to which the proposed project would interconnect are required. The required level of detail about interconnecting systems is project specific and will be specified by CEQA Unit Staff in writing during Pre-filing Consultation. Detailed distribution system information may also be required.

9. Data and Technical Adequacy

Applicants will focus PEA development efforts on providing thorough, up-to-date data and technical reports required for CPUC CEQA Unit Staff to complete the environmental document and alternatives analysis.

The Applicant-drafted PEA Executive Summary, Introduction, Project Description, Description of Alternatives, and other chapters typically found in past CPUC EIRs and Initial Study/MNDs will be *thorough*—emulate the level of detail provided in typical CPUC EIRs. The setting sections provided for

PEA Chapter 5, Environmental Analysis, will also be thorough. Applicants will ensure that the PEA text, graphics, and file formats can be efficiently converted into CPUC's CEQA document with minimal revision, reformatting, and redevelopment by CPUC Staff and consultants.

The impact analyses and determinations provided for Chapter 5, Environmental Analysis, and Chapter 6, Comparison of Alternatives, need not be as thorough as those to be prepared by the CPUC for its CEQA document. These two sections are expected to be revised and redeveloped by CPUC Staff and consultants. Other sections of the CEQA document will only be revised and redeveloped by CPUC Staff and consultants if determined to be necessary after PEA filing.

10. Applicant Proposed Measures

The Pre-filing Consultation process can support the development Applicant Proposed Measures (APMs); measures that Applicants incorporate into the PEA project description to avoid or reduce what otherwise may be considered significant impacts. APMs that use phrases, such as, "as practicable," "as needed," or other conditional language will be superseded by Mitigation Measures if required to avoid or reduce a potentially significant impact. CPUC CEQA Unit Staff and their consultant team may review and provide comments on the Draft PEA APMs during Pre-filing Consultation.

Applicants will carefully consider each CPUC Draft Environmental Measure identified in Chapter 5 of this PEA Checklist. The measures may be applied to the proposed project if appropriate and may be subject to modification by the CPUC during its environmental review.[1]

11. PEA Checklist Deviations

CPUC CEQA Unit Staff understand that the PEA Checklist requires Applicants to develop a significant quantity of information. There are times when it is appropriate to deviate from the PEA Checklist. Deviations to the Pre-Filing Consultation Guidelines or the PEA Checklist contents may be approved by the CPUC's CEQA Unit Staff. Staff approval will be in writing and will occur prior to Applicant filing of the Draft PEA. Note that any deviations approved in writing by staff during the Pre-filing period may be reversed or modified after application and PEA filing and at any time throughout the environmental review period at the discretion of CPUC CEQA Unit Staff.

12. Submittal of Confidential Information

CPUC Staff are available during Pre-filing Consultation to discuss concerns that Applicants may have about confidentiality. However, the CEQA process requires public disclosure about projects, and such disclosure can often appear to conflict with Applicant requests for confidentiality. CPUC CEQA Unit Staff will rely on CPUC adopted confidentiality procedures to resolve confidentiality concerns. Applicants that expect aspects of a PEA filing to be confidential must follow CPUC confidentiality procedures. Applicants may mark information as confidential if allowed pursuant to General Order 66 or latest applicable Commission rule (e.g., see Public Records Act Proceeding Rulemaking (R.14-11-001).

13. Additional CEQA Impact Questions

Additional CEQA Impact Questions that are specific to the types of projects evaluated by the Commission's CEQA Unit are identified in the PEA Checklist to be considered in addition to the checklist items in CEQA Guidelines Appendix G.

The next section of this Guidelines document provides the PEA Checklist for all energy project applications that require CEQA compliance.

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[1] At this time, the CPUC environmental measures are in draft format, see PEA Checklist Attachment 4. They may be formally incorporated into Chapter 5 of future versions of the PEA Checklist.

Proponent's Environmental Assessment (PEA) Checklist

The PEA Checklist provides project Applicants (e.g., projects involving electric transmission lines, electric substations or switching stations, natural gas transmission pipelines, and underground natural gas storage facilities) with detailed guidance regarding the level of detail CPUC CEQA Unit Staff expect to deem PEAs complete. Applicants will prepare their PEAs using the same section headers and numbering as provided in the PEA Checklist. Applicants will also provide supporting data that is specific to each item within the PEA Checklist. As noted in the Pre-Filing Consultation Guidelines, the PEA Checklist is written with the assumption that an EIR will be prepared. PEA contents may not need to support the development of an EIR, but this determination can only be made in consultation with CPUC CEQA Unit Staff as described in the Pre-Filing Consultation Guidelines.

Formatting and Basic PEA Data Needs, Including GIS Data

1. Provide **editable and fully functional source files** in electronic format for all PDF files, hardcopies, maps, images, and diagrams. Files will be provided in their original file format as well as the output file format. All Excel and other spreadsheet files or modeling files will include all underlying formulas/modeling details. All modeling files must be fully functional.
2. Details about the types of **GIS data and maps** to be submitted are provided in Attachment 1. GIS data not specified in this checklist may also be requested depending on the Proposed Project and alternatives.
3. The Applicant is responsible for ensuring that all project features, including project components and temporary and permanent work areas, are included within all **survey boundaries** (e.g., biological and cultural resources).
4. Excel spreadsheets with **emissions calculations** will be provided that are complete with all project assumptions, values, and formulas used to prepare emissions calculations in the PEA. Accompanying PDF files with the same information will be provided as Appendix B to the PEA (see List of Appendices below).
5. Applicants will provide in an Excel spreadsheet a comprehensive **mailing list** that includes the names and addresses of all affected landowners and residents, including unit numbers for multi-unit properties for both the proposed project <u>and alternatives</u>.
   a. An affected resident or landowner is defined as one whose place of residence or property is:
      i. Crossed by or abuts any component of the proposed project or an alternative including any permanent or temporary disturbance area (either above or below ground) and any extra work area (e.g., staging or parking area); or
      ii. Located within approximately 1,000 feet[2] of the edge of any construction work area.
   b. Include in the following information for each resident in a spreadsheet, at minimum: parcel APN number, owner name and mailing address, and parcel physical address. If individual occupant names, facility names, or business names are available, also provide these names and addresses in the spreadsheet. A sample mailing list format is provided in Table 2.

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[2] Notice to all property owners within 300 feet of a Proposed Project is required at the time of application filing under GO 131-D. Commission notices of CEQA document preparation may be mailed to residents and property owners greater than 300 feet from a Proposed Project to ensure adequate notification (e.g., 1,000 feet) and the extent of notification will be determined on a project specific basis. Appropriate notice expectations will be discussed during Pre-filing (e.g., with respect to visual impact areas and other types of impacts specific to the Proposed Project and its study area).

Table 2. Sample Project Mailing List

Category	Company/ Agency	Name	Mailing Address	Phone Number	Email	APN	Source
State Agency	California Resources Agency	John Doe	1234 California Street City, CA 98765	(333) 456-7899	johndoe@email.com	123-456-789	County Assessor
Individual	n/a	Jane Doe	222 Main Street City, CA 97531	(909) 876-5432	janedoe@email.com	101-202-303	Public meeting on Month, Day 2019

6. **PEA Organization:** This PEA Checklist is organized to include each of the chapters and sections found in typical CPUC EIRs. The following sections will serve as the outline for all Draft PEAs submitted during Pre-filing and all PEAs filed with the CPUC Docket Office. PEAs will include each chapter and section identified (in matching numerical order) unless otherwise directed by CPUC CEQA Unit Staff in writing prior to filing.

Cover

A single sheet with the following information:	Applicant Notes, Comments
Title "Proponent's Environmental Assessment" and filing date	
Proponent Name (the Applicant)	
Name of the proposed project[3]	
Technical subheading summarizing the type of project and its major components, in one sentence or about 40 words, for example: A new 1,120 MVA, 500/115kV substation, 10 miles of new singled-circuit 500kV transmission lines, 25 miles of new and replaced double-circuit 115kV power lines, and upgrades at three existing substations are proposed.	
Location of the proposed project (all counties and municipalities or map figure for the cover that shows the areas crossed)	
Proceeding for which the PEA was prepared and CPUC Docket number (if known) or simply leave a blank where the Docket number would go	
Primary Contact's name, address, telephone number, and email address for both the project Applicant(s) and entities that prepared the PEA	
See example PEA cover in Figure 1.	

[3] If approved by the California Independent System Operator (CAISO), the project name listed will match the name specified in the CAISO approval. If multiple names apply, list all versions.

Figure 1. Example PEA Cover

Proponent's Environmental Assessment for California Utility Company's Evergreen Electric Substation and Transmission Line Project

May 1, 2019 (PEA filing date)

A new 230 kV substation, 10 miles of new single-circuit 230kV transmission lines, and upgrades at two existing substations are proposed.

The Proposed Project would be located primarily in __ County but would also cross __ and __ counties and areas within the City of __.

Application A.19-05-01 to the California Public Utilities Commission

Prepared by California Environmental Consulting
1234 Avenue
City, CA Zip Code
Primary Contact's Name
Position
Phone Number
Email

Prepared for California Utility Company
1234 Avenue
City, CA Zip Code
Primary Contact's Name
Position
Phone Number
Email

Table of Contents

Sections

Order	The format of the PEA will be organized as follows:	Applicant Notes, Comments
--	Cover	
--	Table of Contents, List of Tables, List of Figures, List of Appendices	
1	Executive Summary	
2	Introduction	
3	Proposed Project Description	
4	Description of Alternatives	
5	Environmental Analysis	
5.1	Aesthetics	
5.2	Agriculture and Forestry	
5.3	Air Quality	
5.4	Biological Resources	
5.5	Cultural Resources	
5.6	Energy	
5.7	Geology, Soils, and Paleontological Resources	
5.8	Greenhouse Gas Emissions	
5.9	Hazards, Hazardous Materials, and Public Safety	
5.10	Hydrology and Water Quality	
5.11	Land Use and Planning	
5.12	Mineral Resources	
5.13	Noise	
5.14	Population and Housing	
5.15	Public Services	
5.16	Recreation	
5.17	Transportation	
5.18	Tribal Cultural Resources	
5.19	Utilities and Service Systems	
5.20	Wildfire	
5.21	Mandatory Findings of Significance	
6	Comparison of Alternatives	

7	Cumulative Impacts and Other CEQA Considerations	
8	List of Preparers	
9	References[4]	
--	Appendices	

Required PEA Appendices and Supporting Materials

Order	Title	Applicant Notes, Comments
Appendix A	Detailed Maps and Design Drawings	
Appendix B	Emissions Calculations	
Appendix C	Biological Resources Technical Reports (see Attachment 2)	
Appendix D	Cultural Resources Studies (see Attachment 3)	
Appendix E	Detailed Tribal Consultation Report[5]	
Appendix F	Environmental Data Resources Report, Phase I Environmental Site Assessment, or similar hazardous materials report	
Appendix G	Agency Consultation and Public Outreach Report and Records of Correspondence	
Appendix H	Construction Fire Prevention Plan[6]	

Potentially Required[7] Appendices and Supporting Materials

Order	Title	Applicant Notes, Comments
Appendix I	Noise Technical Studies	
Appendix J	Traffic Studies	
Appendix K	Geotechnical Investigations (may preliminary at time of PEA filing)	
Appendix L	Hazardous Substance Control and Emergency Response Plan / Hazardous Waste and Spill Prevention Plan	

4 References will be organized by section but contained in a single chapter called, "References."
5 Include summary and timing of all correspondence to and from any Tribes and the State Historic Preservation Office/Native American Heritage Commission, including Sacred Lands File search results, and full description of any issues identified by Tribes in their interactions with the Applicant.
6 The Construction Fire Prevention Plan will be provided to federal, state, and local fire agencies for review and comment as applicable to where components of the proposed project would be located. CPUC will approve the final Construction Fire Prevention Plan. Record of the request for review and comment and any comments received from these agencies will be provided to CPUC CEQA Unit Staff.
7 Anticipated Appendix and study requirements should be discussed with CPUC CEQA Unit Staff during Pre-filing.

Appendix M	Erosion and Sedimentation Control Best Management Practice Plan / Draft Storm Water Pollution Prevention Plan (may be preliminary at time of PEA filing)	
Appendix N	FAA Notice and Criteria Tool Results	
Appendix O	Revegetation or Site Restoration Plan	
Appendix P	Health and Safety Plan	
Appendix Q	Existing Easements[8]	
Appendix R	Blasting Plan (may be preliminary at time of PEA filing)	
Appendix S	Traffic Control/Management Plan (may be preliminary at time of PEA filing)	
Appendix T	Worker Environmental Awareness Program (may preliminary at time of PEA filing)	
Appendix U	Helicopter Use and Safety Plan (may be preliminary at time of PEA filing)	
Appendix V	Electric and Magnetic Fields Management Plan (may be part of the Application rather than the PEA)	

[8] Easements should be provided military lands, conservation easements, or other lands where the real estate agreement specifies the range of activities that can be conducted

1 Executive Summary

This section will include, but is not limited to, the following:	PEA Section and Page Number[9]	Applicant Notes, Comments
1.1: Proposed Project Summary. Provide a summary of the proposed project and its underlying purpose and basic objectives.		
1.2: Land Ownership and Right-of-Way Requirements. Provide a summary of the existing and proposed land ownership and rights-of-way for the proposed project.		
1.3: Areas of Controversy. Identify areas of anticipated controversy and public concern regarding the project.		
1.4: Summary of Impacts a) Identify all impacts expected by the Applicant to be potentially significant. Identify and discuss Applicant Proposed Measures here and provide a reference to the full listing of Applicant Proposed Measures provided in the table described in Section 3.11 of this PEA Checklist. b) Identify any significant and unavoidable impacts that may occur.		
1.5: Summary of Alternatives. Summarize alternatives that were considered by the Applicant and the process and criteria that were used to select the proposed project.		
1.6: Pre-filing Consultation and Public Outreach Summary. Briefly summarize Pre-filing consultation and public outreach efforts that occurred and identify any significant outcomes that were incorporated into the proposed project.		
1.7: Conclusions. Provide a summary of the major PEA conclusions.		
1.8: Remaining Issues. Describe any major issues that must still be resolved.		

[9] The *PEA Section and Page Number* column and *Applicant Notes, Comments* column are intended to be filled out and provided with PEA submittals. The PEA Checklist is provided in Word to all Applicants to allow column resizing as appropriate to reduce PEA checklist length when completed for submittal. Landscape formatting may also be appropriate for completed PEA Checklist tables.

2 Introduction

2.1 Project Background

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
2.1.1: Purpose and Need a) Explain why the proposed project is needed. b) Describe localities the proposed project would serve and how the project would fit into the local and regional utility system. c) If the proposed project was identified by the California Independent System Operator (CAISO), thoroughly describe the CAISO's consideration of the proposed project and provide the following information: i. Include references to all CAISO Transmission Planning Processes that considered the proposed project. ii. Explain if the proposed project is considered an economic, reliability, or policy-driven project or a combination thereof. iii. Identify whether and how the Participating Transmission Owner recommended the project in response to a CAISO identified need, if applicable. iv. Identify if the CAISO approved the original scope of the project or an alternative and the rationale for their approval either for the original scope or an alternative. v. Identify how and whether the proposed project would exceed, combine, or modify in any way the CAISO identified project need. vi. If the Applicant was selected as part of a competitive bid process, identify the factors that contributed to the selection and CAISO's requirements for in-service date. d) If the project was not considered by the CAISO, explain why.		
(Natural Gas Storage Only) e) Provide storage capacity or storage capacity increase in billion cubic feet. If the project does not increase capacity, make this statement. f) Describe how existing storage facilities will work in conjunction with the proposed project. Describe the purchasing process (injection, etc.) and transportation arrangements this facility will have with its customers.		
2.1.2: Project Objectives a) Identify and describe the basic project objectives.[10] The objectives will include reasons for constructing the project based on its		

[10] Tangential project goals should not be included as basic project objectives, such as, minimizing environmental impacts, using existing ROWs and disturbed land to the maximum extent feasible, ensuring safety during construction and operation, building on property already controlled by the Applicant/existing site control. Goals of this type do not describe the underlying purpose or basic objectives but, rather, are good general practices for all projects.

purpose and need (i.e., address a specific reliability issue). The description of the project objectives will be sufficiently detailed to permit CPUC to independently evaluate the project need and benefits to accurately consider them in light of the potential environmental impacts. The basic project objectives will be used to guide the alternatives screening process, when applicable. b) Explain how implementing the project will achieve the basic project objectives and underlying purpose and need. c) Discuss the reasons why attainment of each basic objective is necessary or desirable.		
2.1.3: Project Applicant(s). Identify the project Applicant(s) and ownership of each component of the proposed project. Describe each Applicant's utility services and their local and regional service territories.		

2.2 Pre-filing Consultation and Public Outreach[11]

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
2.2.1: Pre-filing Consultation and Public Outreach a) Describe all Pre-filing consultation and public outreach that occurred, such as, but not limited to: i. CAISO ii. Public agencies with jurisdiction over project areas or resources that may occur in the project area iii. Native American tribes affiliated with the project area iv. Private landowners and homeowner associations v. Developers for large housing or commercial projects near the project area vi. Other utility owners and operators vii. Federal, state, and local fire management agencies b) Provide meeting dates, attendees, and discussion summaries, including any preliminary concerns and how they were addressed and any project alternatives that were suggested. c) Clearly identify any significant outcomes of consultation that were incorporated into the proposed project. d) Clearly identify any developments that could coincide or conflict with project activities (i.e., developments within or adjacent to a proposed ROW).		
2.2.2: Records of Consultation and Public Outreach. Provide contact information, notification materials, meeting dates and materials, meeting notes, and records of communication organized by entity as an Appendix to the PEA (Appendix G).		

[11] CPUC CEQA Unit Staff request that consultation and public outreach that occurs during the Pre-filing period and throughout environmental review include the assigned CPUC Staff person and CPUC consultant.

2.3 Environmental Review Process

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
2.3.1: Environmental Review Process. Provide a summary of the anticipated environmental review process and schedule.		
2.3.2: CEQA Review a) Explain why CPUC is the appropriate CEQA Lead agency. b) Identify other state agencies and any federal agencies that may have discretionary permitting authority over any aspect of the proposed project. c) Identify all potential involvement by federal, state, and local agencies not expected to have discretionary permitting authority (i.e., ministerial actions). d) Summarize the results of any preliminary outreach with these agencies as well as future plans for outreach.		
2.3.3: NEPA Review (if applicable). If review according to the National Environmental Policy Act (NEPA) is expected, explain the portions of the project that will require the NEPA review process. Discuss which agency is anticipated to be the NEPA Lead agency if discretionary approval by more than one federal agency is required.		
2.3.4: Pre-filing CEQA and NEPA Coordination. Describe the results of Pre-filing coordination with CEQA and NEPA review agencies (refer to CPUC's Pre-Filing Consultation Guidelines). Identify major outcomes of the Pre-filing coordination process and how the information was incorporated into the PEA, including suggestions on the type of environmental documents and joint or separate processes based on discussions with agency staff.		

2.4 Document Organization

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
2.4: PEA Organization. Summarize the contents of the PEA and provide an annotated list of its sections.		

3 Proposed Project Description[12]

3.1 Project Overview

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
3.1: Project Overview a) Provide a concise summary of the proposed project and components in a few paragraphs. b) Described the geographical location of the proposed project (i.e., county, city, etc.). c) Provide an overview map of the proposed project location.		

3.2 Existing and Proposed System

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
3.2.1: Existing System a) Identify and describe the existing utility system that would be modified by the proposed project, including connected facilities to provide context. Include detailed information about substations, transmission lines, distribution lines, compressor stations, metering stations, valve stations, nearby renewable generation and energy storage facilities, telecommunications facilities, control systems, SCADA systems, etc. b) Provide information on users and the area served by the existing system features. c) Explain how the proposed project would fit into the existing local and regional systems. d) Provide a schematic diagram of the existing system features. e) Provide detailed maps and associated GIS data for existing facilities that would be modified by the proposed project.		
3.2.2: Proposed Project System a) Describe the whole of the proposed project by component, including all new facilities and any modifications, upgrades, or expansions to existing facilities and any interrelated activities that are part of the whole of the action. b) Clearly identify system features that would be added, modified, removed, disconnected and left in place, etc. c) Identify the expected capacities of the proposed facilities, highlighting any changes from the existing system. If the project would not change existing capacities, make this statement. For electrical projects, provide the anticipated capacity increase in amps or megawatts or in the typical units for the types of facilities proposed. For gas projects, provide the total volume of gas to be		

[12] Applicant review of the Administrative Draft Project Description or sections of the Administrative Draft Project Description prepared for the CEQA document may be requested by CPUC CEQA Unit Staff to ensure technical accuracy.

delivered by the proposed facilities, anticipated system capacity increase (typically in million cubic feet per day), expected customers, delivery points and corresponding volumes, and the anticipated maximum allowable operating pressure(s). d) Describe the initial buildout and eventual full buildout of the proposed project facilities. For example, if an electrical substation or gas compressor station would be installed to accommodate additional demand in the future, then include the designs for both the initial construction based on current demand and the design for all infrastructure that could ultimately be installed within the planned footprint of an electric substation or compressor station. e) Explain whether the electric line or gas pipeline will create a second system tie or loop for reliability. f) Provide information on users and the area served by the proposed system features, highlighting any differences from the existing system. g) Provide a schematic diagram of the proposed system features. h) Provide detailed maps and associated GIS data for proposed facilities that would be installed, modified, or relocated by the proposed project.		
3.2.3: System Reliability. Explain whether the electric line or gas pipeline will create a second system tie or loop for reliability. Clearly explain and show how the proposed project relates to and supports the existing utility systems.		
3.2.4: Planning Area. Describe the system planning area served or to be served by the project. Clearly define the Applicant's term for the planning area (e.g., Electrical Needs Area or Distribution Planning Area).		

3.3 Project Components

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
Required for all Project Types		
3.3.1: Preliminary Design and Engineering a) Provide preliminary design and engineering information for all above-ground and below-ground facilities for the proposed project. The approximately locations, maximum dimensions of facilities, and limits of areas that would be needed to construction and operate the facilities should be clearly defined.[13] b) Provide preliminary design drawings for project features and explain the level of completeness (i.e., percentage). c) Provide detailed project maps (approximately 1:3,000 scale) and associated GIS data of all facility locations and boundaries with attributes and spatial geometry that corresponds to information in the Project Description.		

[13] Refer to Attachment 1 for mapping and GIS data requirements for the project layout and design.

3.3.2: Segments, Components, and Phases a) Define all project segments, components, and phases for the proposed project. b) Provide the length/area of each segment or component, and the timing of each development phase. c) Provide an overview map showing each segment and provide associated GIS data (may be combined with other mapping efforts).		
3.3.3: Existing Facilities a) Identify the types of existing facilities that would be removed or modified by the proposed project (i.e., conductor/cable, poles/towers, substations, switching stations, gas storage facilities, gas pipelines, service buildings, communication systems, etc.). b) Describe the existing facilities by project segment and/or component, and provide information regarding existing dimensions, areas/footprints, quantities, locations, spans, etc. c) Distinguish between above-ground and below-ground facilities and provide both depth and height ranges for each type of facility. For poles/towers, provide the installation method (i.e., foundation type or direct bury), and maximum above-ground heights and below-ground depths. d) Explain what would happen to the existing facilities. Would they be replaced, completely removed, modified, or abandoned? Explain why. e) Identify the names, types, materials, and capacity/volumes ranges (i.e., minimum and maximum) of existing facilities that would be installed or modified by the proposed project. f) Provide diagrams with dimensions representing existing facilities to provide context on how the proposed facilities would be different. g) Briefly describe the surface colors, textures, light reflectivity, and any lighting of existing facilities.		
3.3.4: Proposed Facilities a) Identify the types of proposed facilities to be installed or modified by the proposed project (e.g., conductor/cable, poles/towers, substations, switching stations, gas storage facilities, gas pipelines, service buildings, communication systems). b) Describe the proposed facilities by project segment and/or component, and provide information regarding maximum dimensions, areas/footprints, quantities, locations, spans, etc. c) Distinguish between above-ground and below-ground facilities and provide both depth and height ranges for each type of facility. For poles/towers, provide the installation method (i.e., foundation type or direct bury), and maximum above-ground heights and below-ground depths.		

d) Identify where facilities would be different (e.g., where unique or larger poles would be located, large guy supports or snub poles). e) Provide details about civil engineering requirements (i.e., permanent roads, foundations, pads, drainage systems, detention basins, spill containment, etc.). f) Distinguish between permanent facilities and any temporary facilities (i.e., poles, shoo-fly lines, mobile substations, mobile compressors, transformers, capacitors, switch racks, compressors, valves, driveways, and lighting). g) Identify the names, types, materials, and capacity/volumes ranges (i.e., minimum and maximum) of proposed facilities that would be installed or modified by the proposed project. h) Provide diagrams with dimensions representing existing facilities. i) Briefly describe the surface colors, textures, light reflectivity, and any lighting of proposed facilities.		
3.3.5: Other Potentially Required Facilities a) Identify and describe in detail any other actions or facilities that may be required to complete the project. For example, consider the following questions: i. Could the project require the relocation (temporary or permanent), modification, or replacement of unconnected utilities or other types of infrastructure by the Applicant or any other entity? ii. Could the project require aviation lighting and/or marking? iii. Could the project require additional civil engineering requirements to address site conditions or slope stabilization issues, such as pads and retaining walls, etc.? b) Provide the location of each facility and a description of the facility.		
3.3.6: Future Expansions and Equipment Lifespans a) Provide detailed information about the current and reasonably foreseeable plans for expansion and future phases of development. b) Provide the expected usable life of all facilities. c) Describe all reasonably foreseeable consequences of the proposed project (e.g., future ability to upgrade gas compressor station to match added pipeline capacity).		
Required for Certain Project Types		
3.3.7: Below-ground Conductor/Cable Installations (as Applicable) a) Describe the type of line to be installed (e.g., single circuit cross-linked polyethylene-insulated solid-dielectric, copper-conductor cables). b) Describe the type of casing the cable would be installed in (e.g., concrete-encased duct bank system) and provide the dimensions of the casing.		

c) Describe the types of infrastructure would likely be installed within the duct bank (e.g., transmission, fiber optics, etc.).		
3.3.8: Electric Substations and Switching Stations (as Applicable) a) Provide the number of transformer banks that will be added at initial and full buildout of the substation. Identify the transformer voltage and number of each transformer type. b) Identify any gas insulated switchgear that will be installed within the substation. c) Describe any operation and maintenance facilities, telecommunications equipment, and SCADA equipment that would be installed within the substation.		
3.3.9: Gas Pipelines (as Applicable). For each segment: a) Identify pipe diameter, number and length of exposed sections, classes and types of pipe to be installed, pressure of pipe, and cathodic protection for each linear segment. b) Describe new and existing inspection facilities (e.g., pig launcher sites). c) Describe system cross ties and laterals/taps. d) Identify the spacing between each valve station. e) Describe the compressor station, if needed, for any new or existing pipeline. f) Describe all pipelines and interconnections with existing and proposed facilities: i. Number of interconnections and locations and sizes; ii. All below-ground and above-ground installations; and iii. All remote facility locations for metering, telemetry, control.		
3.3.10: Gas Storage Facilities – Background and Resource Information (as Applicable) a) Provide detailed background information on the natural gas formation contributing to the existing or proposed natural gas facility, including the following: i. Description of overlying stratigraphy, especially caps ii. Description of production, injection, and intervening strata iii. Types of rock iv. Description of types of rocks in formation, including permeability or fractures v. Thickness of strata b) Provide a graphic and/or table showing formation thicknesses. c) Identify and describe any potential gas migration pathways, such as faults, permeable contacts, abandoned wells, underground water or other pipelines. d) Provide a summary and detailed cross-section diagrams of the geologic formations and structures of the oil/gas field or area. e) Provide the first well drilling and production history, abandonment procedures, inspections, etc. f) Describe production zones, including depth, types of formations, and characteristics of field/area.		

g) Describe the existing and proposed storage capacity and limiting factors, such as injection or withdrawal capacities. h) Describe existing simulation studies that were used to predict the reservoir pressure response under gas injection and withdrawal operations, and simulation studies for how the system would change as proposed. Provide the studies as a PEA Appendix. i) Provide the history of the oil/gas field or area.		
3.3.11: Gas Storage Facilities – Well-Head Sites (as Applicable). Describe the location, depth, size and completion information for all existing, abandoned, proposed production and injection, monitoring, and test wells.		
3.3.12: Gas Storage Facilities – Production and Injection (as Applicable) a) Provide the proposed storage capacity of production and injection wells. b) Provide production and injection pressures, depths, and rates. c) Provide production and injection cycles by day, week, and year. d) Describe existing and proposed withdrawal/production wells (i.e., size, depth, formations, etc.). e) Describe existing and proposed cushion gas requirements. f) Describe any cushion gas injection—formation the well is completed in (cushion gas formation), and injection information.		
3.3.13: Gas Storage Facilities – Electrical Energy (as Applicable). Describe all existing and proposed electric lines, telecommunications facilities, and other utilities/facilities (e.g., administrative offices, service buildings, and non-hazardous storage), and chemical storage associated with the proposed project.		
3.3.14: Telecommunication Lines (as Applicable) a) Identify the type of cable that is proposed and length in linear miles by segment. b) Identify any antenna and node facilities that are part of the project. c) For below-ground telecommunication lines, provide the depth of cable and type of conduit. d) For above-ground telecommunication lines, provide: i. Types of poles that will be installed (if new poles are required) ii. Where existing poles will be used iii. Any additional infrastructure (e.g., guy wires) or pole changes required to support the additional cable on existing poles		

3.4 Land Ownership, Rights-of-Way, and Easements

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
3.4.1: Land Ownership. Describe existing land ownership where each project component would be located. State whether the proposed		

project would be located on property(ies) owned by the Applicant or if additional property would be required.		
3.4.2: Existing Rights-of-Way or Easements a) Identify and describe existing rights-of-way (ROWs) or easements where project components would be located. Provide the approximately lengths and widths in each project area. b) Clearly state if project facilities would be replaced, modified, or relocated within existing ROWs or easements.		
3.4.3: New or Modified Rights-of-Way or Easements a) Describe new permanent or modified ROWs or easements that would be required. Provide the approximately lengths and widths in each project area. b) Describe how any new permanent or modified ROWs or easements would be acquired. c) Provide site plans identifying all properties/parcels and partial properties/parcels that may require acquisition and the anticipated ROWs or easements. Provide associated GIS data. d) Describe any development restrictions within new ROWs or easements, e.g., building clearances and height restrictions, etc. e) Describe any relocation or demolition of commercial or residential property/structures that may be necessary.		
3.4.4: Temporary Rights-of-Way or Easements f) Describe temporary ROWs or easements that would be required to access project areas, including ROWs or easements for temporary construction areas (i.e., staging areas or landing zones). g) Explain where temporary construction areas would be located with existing ROWs or easements for the project or otherwise available to the Applicant without a temporary ROW or easement. h) Describe how any temporary ROWs or easements would be acquired.		

3.5 Construction

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
3.5.1 Construction Access (All Projects)		
3.5.1.1: Existing Access Roads a) Provide the lengths, widths, ownership details (both public and private roads), and surface characteristics (i.e., paved, graveled, bare soil) of existing access roads that would be used during construction. Provide the area of existing roads that would be used (see example in Table 3 below). b) Describe any road modifications or stabilization that would be required prior to construction, including on the adjacent road		

shoulders or slopes. Identify any roads that would be expanded and provide the proposed width increases. c) Describe any procedures to address incidental road damage cause by project activities following construction. d) Provide detailed maps and associated GIS data for all existing access roads.		

Table 3. Access Roads

Type of Road	Description	Area Proposed Project
Existing Dirt Road	Typically double track. May have been graded previously. No other preparation required, although a few sections may need to be re-graded and crushed rock applied in very limited areas for traction.	_____ acres
New Permanent	Would be xx feet wide, bladed. No other preparation required although crushed rock may need to be applied in very limited areas for traction.	_____ acres
Overland Access	No preparation required. Typically grassy areas that are relatively flat. No restoration would be necessary.	_____ acres

3.5.1.2: New Access Roads a) Identify any new access roads that would be developed for project construction purposes, such as where any blading, grading, or gravel placement could occur to provide equipment access outside of a designated workspace.[14] b) Provide lengths, widths, and development methods for new access roads. c) Identify any temporary or permanent gates that would be installed. d) Clearly identify any roads that would be temporary and fully restored following construction. Otherwise it will be assumed the new access road is a permanent feature. e) Provide detailed maps and associated GIS data for all new access roads.		
3.5.1.3: Overland Access Routes a) Identify any overland access routes that would be used during construction, such as where vehicles and equipment would travel over existing vegetation and where blading, grading, or gravel placement would occur. b) Provide lengths and widths for new access roads. c) Provide detailed maps and associated GIS data for all overland access routes.		
3.5.1.4: Watercourse Crossings a) Identify all temporary watercourse crossings that would be required during construction. Provide specific methods and procedures for temporary watercourse crossings.		

[14] Temporary roads that would not require these activities should be considered an overland route.

b) Describe any bridges or culverts that replacement or installation of would be required for construction access. c) Provide details about the location, design and construction methods.		
3.5.1.5: Helicopter Access. If helicopters would be used during construction: a) Describe the types and quantities of helicopters that would be used during construction (e.g., light, medium, heavy, or sky crane), and a description of the activities that each helicopter would be used for. b) Identify areas for helicopter takeoff and landing. c) Describe helicopter refueling procedures and locations. d) Describe flight paths, payloads, and expected hours and durations of helicopter operation. e) Describe any safety procedures or requirements unique to helicopter operations, such as but not limited to obtaining a Congested Area Plan from the Federal Aviation Administration (FAA).		
3.5.2 Staging Areas (All Projects)		
3.5.2.1: Staging Area Locations a) Identify the locations of all staging area(s). Provide a map and GIS data for each.[15] b) Provide the size (in acres) for each staging area and the total staging area requirements for the project.		
3.5.2.2: Staging Area Preparation a) Describe any site preparation required, if known, or generally describe what might be required (i.e., vegetation removal, new access road, installation of rock base, etc.). b) Describe what the staging area would be used for (i.e., material and equipment storage, field office, reporting location for workers, parking area for vehicles and equipment, etc.). c) Describe how the staging area would be secured. Would a fence be installed? If so, describe the type and extent of the fencing. d) Describe how power to the site would be provided if required (i.e., tap into existing distribution, use of diesel generators, etc.). e) Describe any temporary lightning facilities for the site. f) Describe any grading activities and/or slope stabilization issues.		

[15] While not all potential local site staging areas will be known prior to selection of a contractor, it is expected that approximate area and likely locations of staging areas be disclosed. The identification of extra or optional staging areas should be considered to reduce the risk of changes after project approval that could necessitate further CEQA review.

3.5.3 Construction Work Areas (All Projects)		
3.5.3.1: Construction Work Areas a) Describe known work areas that may be required for specific construction activities (e.g., pole assembly, hillside construction)[16] b) Describe the types of activities that would be performed at each work area. Work areas may include but are not necessarily limited to: i. Helicopter landing zones and touchdown areas ii. Vehicle and equipment parking, passing, or turnaround areas iii. Railroad, bridge, or watercourse crossings iv. Temporary work pads for facility installation, modification, or removal v. Excavations and associated equipment work areas vi. Temporary guard structures vii. Pull-and-tension/stringing sites viii. Jack and bore pits, drilling areas and pull-back areas for horizontal directional drills ix. Retaining walls		
3.5.3.2 Work Area Disturbance a) Provide the dimensions of each work area including the maximum area that would be disturbed during construction (e.g., 100 feet by 200 feet) (see example in Table 4 below). b) Provide a table with temporary and permanent disturbance at each work area (in square feet or acres), and the total area of temporary and permanent disturbance for the entire project (in acres).		
3.5.3.3: Temporary Power. Identify how power would be provided at work area (i.e., tap into existing distribution, use of diesel generators, etc.). Provide the disturbance area for any temporary power lines.		
3.5.4 Site Preparation (All Projects)		
3.5.4.1: Surveying and Staking. Describe initial surveying and staking procedures for site preparation and access.		
3.5.4.2: Utilities a) Describe the process for identifying any underground utilities prior to construction (i.e., underground service alerts, etc.). b) Describe the process for relocating any existing overhead or underground utilities that aren't directly connected to the project system. c) Describe the process for installing any temporary power or other utility lines for construction.		

[16] Understanding that each specific work area may not be determined until the final work plan is submitted by the construction contractor, estimate total area likely to be disturbed.

Table 4. Work Areas

	Proposed Project (approximate metrics)
Pole Diameter: • Wood • Self-Supporting Steel	 _____ inches _____inches
Lattice Tower Base Dimension: • Self-Supporting Lattice Structure	_____feet
Auger Hole Depth: • Wood • Self-Supporting Steel	 _____ to _____ feet _____ to _____ feet
Permanent Footprint per Pole/Tower: • Wood • Self-Supporting Steel • Self-Supporting Steel Tower	 _____ sq. feet _____ sq. feet _____ sq. feet
Number of Poles/Towers: • Wood • Self-Supporting Steel • Self-Supporting Steel Tower	 _____ _____ _____
Average Work Area around Pole/Towers (e.g., for old pole removal and new pole installation): • Tangent structure work areas • Dead End / Angle structure work areas	 _____ sq. feet _____ sq. feet
Total Permanent Footprint for Poles/Towers	Approximately _____ acres

3.5.4.3: Vegetation Clearing a) Describe what types of vegetation clearing may be required (e.g., tree removal, brush removal, flammable fuels removal) and why (e.g., to provide access, etc.). b) Provide calculations of temporary and permanent disturbance of each vegetation community and include all areas of vegetation removal in the GIS database. Distinguish between disturbance that would occur in previously developed areas (i.e., paved, graveled, or otherwise urbanized), and naturally vegetated areas. c) Describe how each type of vegetation removal would be accomplished. d) Describe the types of equipment that would be used for vegetation removal.		
3.5.4.4: Tree Trimming Removal a) For electrical projects, distinguish between tree trimming as required under CPUC General Order 95-D and tree removal. b) Identify the types, locations, approximate numbers, and sizes of trees that may need to be removed or trimmed substantially. c) Identify potentially protected trees that may be removed or substantially trimmed, such as but not limited to riparian trees, oaks trees, Joshua trees, or palm trees.		

d) Describe the types of equipment that would typically be used for tree removal.		
3.5.4.5: Work Area Stabilization. Describe the processes to stabilize temporary work areas and access roads including the materials that would be used (e.g., gravel).		
3.5.4.6: Grading a) Describe any earth moving or substantial grading activities (i.e., grading below a 6-inch depth) that would be required and identify locations where it would occur. b) Provide estimated volumes of grading (in cubic yards) including total cut, total fill, cut that would be reused, cut that would be hauled away, and clean fill that would be hauled to the site.		
3.5.5 Transmission Line Construction (Above Ground)		
3.5.5.1: Poles/Towers a) Describe the process and equipment for removing poles, towers, and associated foundations for the proposed project (where applicable). Describe how they would be disconnected, demolished, and removed from the site. Describe backfilling procedures and where the material would be obtained. b) Describe the process and equipment for installing or otherwise modifying poles and towers for the proposed project. Describe how they would be put into place and connected to the system. Identify any special construction methods (e.g., helicopter installation) at specific locations or specific types of poles/towers. c) Describe how foundations, if any, would be installed. Provide a description of the construction method(s), approximate average depth and diameter of excavation, approximate volume of soil to be excavated, approximate volume of concrete or other backfill required, etc. for foundations. Describe what would be done with soil removed from a hole/foundation site. d) Describe how the poles/towers and associated hardware would be delivered to the site and assembled. e) Describe any pole topping procedures that would occur, identify specific locations and reasons, and describe how each facility would be modified. Describe any special methods that would be required to top poles that may be difficult to access.		
3.5.5.2: Aboveground and Underground Conductor/Cable a) Provide a process-based description of how new conductor/cable would be installed and how old conductor/cable would be removed, if applicable. b) Identify where conductor/cable stringing/installation activities would occur. c) Provide a diagram of the general sequencing and equipment that would be used. d) Describe the conductor/cable splicing process.		

e) Provide the general or average distance between pull-and-tension sites. Describe the approximate dimensions and where pull-and-tension sites would generally be required (as indicated by the designated work areas), such as the approximate distance to pole/tower height ratio, at set distances, or at significant direction changes. Describe the equipment that would be required at these sites. f) For underground conductor/cable installations, describe all specialized construction methods that would be used for installing underground conductor or cable. If vaults are required, provide their dimensions and location/spacing along the alignment. Provide a detailed description for how the vaults would be delivered to the site and installed. g) Describe any safety precautions or areas where special methodology would be required (e.g., crossing roadways, stream crossing).		
3.5.5.3: Telecommunications. Identify the procedures for installation of proposed telecommunication cables and associated infrastructure.		
3.5.5.4: Guard Structures. Identify the types of guard structures that would be used at crossings of utility lines, roads, railroads, highways, etc. Describe the different types of guard structures or methods that may be used (i.e., buried poles and netting, poles secured to a weighted object, bucket trucks, etc.). Describe any pole installation and removal procedures associated with guard structures. Describe guard structure installation and removal process and duration that guard structures would remain in place.		
3.5.5.5: Blasting a) Describe any blasting that may be required to construct the project. b) If blasting may be required, provide a Blasting Plan that identifies the blasting locations; types and amounts of blasting agent to be used at each location; estimated impact radii; and, noise estimates. The Blasting Plan should be provided as an Appendix to the PEA. c) Provide a map identifying the locations where blasting may be required with estimated impact radii. Provide associated GIS data.		
3.5.6 Transmission Line Construction (Below Ground)		
3.5.6.1: Trenching a) Describe the approximate dimensions of the trench (e.g., depth, width). b) Provide the total approximate volume of material to be removed from the trench, the amount to be used as backfill, and any amount to subsequently be removed/disposed of offsite in cubic yards. c) Describe the methods used for making the trench (e.g., saw cutter to cut the pavement, backhoe to remove, etc.). d) Provide off-site disposal location, if known, or describe possible option(s). e) Describe if dewatering would be anticipated and if so, how the trench would be dewatered, the anticipated flows of the water,		

whether there would be treatment, and how the water would be disposed of. f) Describe the process for testing excavated soil or groundwater for the presence of pre-existing environmental contaminants that could be exposed from trenching operations. g) If a pre-existing hazardous waste were encountered, describe the process of removal and disposal. h) Describe the state of the ground surface after backfilling the trench. i) Describe standard Best Management Practices to be implemented.		
3.5.6.2: Trenchless Techniques (Microtunnel, Jack and Bore, Horizontal Directional Drilling) a) Identify any locations/features for which the Applicant expects to use a trenchless (i.e., microtunneling, jack and bore, horizontal directional drilling) crossing method and which method is planned for each crossing. b) Describe the methodology of the trenchless technique. c) Provide the approximate location and dimensions of the sending and receiving pits. d) Describe the methodology of excavating and shoring the pits. e) Provide the total volume of material to be removed from the pits, the amount to be used as backfill, and the amount subsequently to be removed/disposed of offsite in cubic yards. f) Describe process for safe handling of drilling mud and bore lubricants. g) Describe the process for detecting and avoiding "fracturing-out" during horizontal directional drilling operations. h) Describe the process for avoiding contact between drilling mud/lubricants and stream beds. i) If engineered fill would be used as backfill, indicate the type of engineered backfill and the amount that would be typically used (e.g., the top 2 feet would be filled with thermal-select backfill). j) Describe if dewatering is anticipated and, if so, how the pits would be dewatered, the anticipated flows of the water, whether there would there be treatment, and how the water would be disposed of. k) Describe the process for testing excavated soil or groundwater for the presence of pre-existing environmental contaminants. Describe the process of disposing of any pre-existing hazardous waste that is encountered during excavation. l) Describe any standard BMPs that would be implemented for trenchless construction.		
3.5.7 Substation, Switching Stations, Gas Compressor Stations		
3.5.7.1: Installation or Facility Modification. Describe the process and equipment for removing, installing, or modifying any substations, switching stations, or compressor stations including: a) Transformers/ electric components b) Gas components c) Control and operation buildings d) Driveways		

e) Fences f) Gates g) Communication systems (SCADA) h) Grounding systems		
3.5.7.2: Civil Works. Describe the process and equipment required to construct any slope stabilization, drainage, retention basins, and spill containment required for the facility.		
3.5.8 Gas Pipelines		
3.5.8.1: Gas Pipeline Construction. Describe the process for proposed pipeline construction including site development, trenching and trenchless techniques, pipe installation, and backfilling.		
3.5.8.2: Water Crossings. Describe water feature crossings that will occur during trenching, the method of trenching through stream crossings, and the process for avoiding impacts to the water features required for pipeline construction. Identify all locations where the pipeline will cross water features. Cite to any associated geotechnical or hydrological investigations completed and provide a full copy of each report as an Appendix to the PEA.[17]		
3.5.8.3: Gas Pipeline Other Requirements a) Describe hydrostatic testing process including pressures, timing, source of flushing water, discharge of water. b) Describe energy dissipation basin, and the size and length of segments to be tested. c) Describe pig launching locations and any inline inspection techniques used during or immediately post construction.		
3.5.9 Gas Storage Facilities		
3.5.9.1: Gas Storage Construction a) Describe the process for constructing the gas storage facility including constructing well pads and drilling wells. b) Describe the specific construction equipment that would be used, such as the type of drill rig (i.e., size, diesel, electric, etc.), depth of drilling, well-drilling schedule and equipment.		
3.5.9.2: Drilling Muds and Fluids. Describe the use of any drilling muds, fluids, and other drilling materials. Provided estimated types and quantities.		
3.5.10 Public Safety and Traffic Control (All Projects)		
3.5.10.1: Public Safety a) Describe specific public safety considerations during construction and best management practices to appropriately manage public safety. Clearly state when and where they each safety measure would be applied.		

[17] If a geotechnical study is not available at the time of PEA filing, provide the best information available.

b) Identify procedures for managing work sites in urban areas, covering open excavations securely, installing barriers, installing guard structures, etc. c) Identify specific project areas where public access may be restricted for safety purposes and provide the approximate durations and timing of restricted access at each location.		
3.5.10.2: Traffic Control a) Describe traffic control procedures that would be implemented during construction. b) Identify the locations, process, and timing for closing any sidewalks, lanes, roads, trails, paths, or driveways to manage public access. c) Identify temporary detour routes and locations. d) Provide a preliminary Traffic Control Plan(s) for the project.		
3.5.10.3: Security. Describe any security measures, such as fencing, lighting, alarms, etc. that may be required. State if security personnel will be stationed at project areas and anticipated duration of security.		
3.5.10.4: Livestock. Describe any livestock fencing or guards that may be necessary to prevent livestock from entering project areas. State if the fencing would be electrified and if so, how it would be powered.		
3.5.11 Dust, Erosion, and Runoff Controls (All Projects)		
3.5.11.1: Dust. Describe specific best management practices that would be implemented to manage fugitive dust.		
3.5.11.2: Erosion. Describe specific best management practices that would be implemented to manage erosion.		
3.5.11.3: Runoff. Describe specific best management practices that would be implemented to manage stormwater runoff and sediment.		
3.5.12 Water Use and Dewatering (All Projects)		
3.5.12.1: Water Use. Describe the estimated volumes of water that would be used by construction activity (e.g., dust control, compaction, etc.). State if recycled or reclaimed water would be used and provide estimated volumes. Identify the anticipated sources where the water would be acquired or purchased. Identify if the source of water is groundwater and the quantity of groundwater that could be used.		
3.5.12.2: Dewatering a) Describe dewatering procedures during construction, including pumping, storing, testing, permitted discharging, and disposal requirements that would be followed. b) Describe the types of equipment and workspace considerations to be used to dewater, store, transport, or discharge extracted water.		
3.5.13 Hazardous Materials and Management (All Projects)		
3.5.13.1: Hazardous Materials a) Describe the types, uses, and volumes of all hazardous materials that would be used during construction. b) State if herbicides or pesticides may be used during construction.		

c) If a pre-existing hazardous waste were encountered, describe the process of removal and disposal.		
3.5.13.2: Hazardous Materials Management a) Identify specific best management practices that would be followed for transporting, storing, and handling hazardous materials. b) Identify specific best management practices that would be followed in the event of an incidental leak or spill of hazardous materials. c) Provide a Hazardous Substance Control and Emergency Response Plan / Hazardous Waste and Spill Prevention Plan as an Appendix to the PEA, if appropriate.		
3.5.14 Waste Generation and Management (All Projects)		
3.5.14.1: Solid Waste a) Describe solid waste streams from existing and proposed facilities during construction. b) Identify procedures to be implemented to manage solid waste, including collection, containment, storage, treatment, and disposal. c) Provide estimated total volumes of solid waste by construction activity or project component. d) Describe the recycling potential of solid waste materials and provide estimated volumes of recyclable materials by construction activity or project component. e) Identify the locations of appropriate disposal and recycling facilities where solid wastes would be transported.		
3.5.14.2: Liquid Waste a) Describe liquid waste streams during construction (i.e., sanitary waste, drilling fluids, contaminated water, etc.) b) Describe procedures to be implemented to manage liquid waste, including collection, containment, storage, treatment, and disposal. c) Provide estimated volumes of liquid waste generated by construction activity or project component. d) Identify the locations of appropriate disposal facilities where liquid wastes would be transported.		
3.5.14.3: Hazardous Waste a) Describe potentially hazardous waste streams during construction and procedures to be implemented to manage hazardous wastes, including collection, containment, storage, treatment, and disposal. b) If large volumes of hazardous waste are anticipated, such as from a pre-existing contaminant in the soil that must be collected and disposed of, provide estimated volumes of hazardous waste that would be generated by construction activity or project component. c) Identify the locations of appropriate disposal facilities where hazardous wastes would be transported.		
3.5.15 Fire Prevention and Response (All Projects)		
3.5.15.1: Fire Prevention and Response Procedures. Describe fire prevention and response procedures that would be implemented during		

construction. Provide a Construction Fire Prevention Plan or specific procedures as an Appendix to the PEA.		
3.5.15.2: Fire Breaks. Identify any fire breaks (i.e., vegetation clearance) requirements around specific project activities (i.e., hot work). Ensure that such clearance buffers are included in the limits of the defined work areas, and the vegetation removal in that area is attributed to Fire Prevention and Response (refer to 3.5.4.3: Vegetation Clearing).		

3.6 Construction Workforce, Equipment, Traffic, and Schedule

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
3.6.1: Construction Workforce a) Provide the estimated number of construction crew members. In the absence of project-specific data, provide estimates based on past projects of a similar size and type. b) Describe the crew deployment. Would crews work concurrently (i.e., multiple crews at different sites); would they be phased? How many crews could be working at the same time and where? c) Describe the different types of activities to be undertaken during construction, the number of crew members for each activity (i.e. trenching, grading, etc.), and number and types of equipment expected to be used for the activity. Include a written description of the activity. See example in Table 5.		
3.6.2: Construction Equipment. Provide a tabular list of the types of equipment expected to be used during construction of the proposed project including the horsepower. Define the equipment that would be used by each phase as shown in the example table below (Table 5).		

Table 5. Construction Equipment and Workforce

Work Activity				Activity Production				
Equipment Description	**Estimated Horse-power**	**Probable Fuel Type**	**Equipment Quantity**	**Estimated Workforce**	**Estimated Start Date**	**Estimated End Date**	**Duration of Use (Hrs./Day)**	**Estimated Production**
Survey				**4**	**January 2020**	**December 2020**		**358 Miles**
1-Ton Truck, 4x4	300	Diesel	2		January 2020	December 2020	10	1 Mile/Day
Staging Yards				**5**	**DOP**			
1-Ton Truck, 4x4	300	Diesel	1		Duration of Project		4	
R/T Forklift	350	Diesel	1				5	
Boom/Crane Truck	350	Diesel	1				5	
Water Truck	300	Diesel	2				10	
Jet A Fuel Truck	300	Diesel	1				4	
Truck, Semi-Tractor	500	Diesel	1				6	
Road Work				**6**	**January 2020**	**March 2020**		**426 Miles**
1-Ton Truck, 4x4	300	Diesel	2		January 2020	March 2020	5	
Backhoe/Front Loader	350	Diesel	1		January 2020	March 2020	7	
Track Type Dozer	350	Diesel	1		January 2020	March 2020	7	
Motor Grader	350	Diesel	1		January 2020	March 2020	5	
Water Truck	300	Diesel	2		January 2020	March 2020	10	
Drum Type Compactor	250	Diesel	1		January 2020	March 2020	5	
Excavator	300	Diesel	1		January 2020	February 2020	7	
Lowboy Truck/Trailer	500	Diesel	1		January 2020	February 2020	4	

3.6.3: Construction Traffic a) Describe how the construction crews and their equipment would be transported to and from the proposed project site. b) Provide vehicle type, number of vehicles, and estimated hours of operation per day, week, and month for each construction activity and phase. c) Provide estimated vehicle trips and vehicles miles traveled (VMT) for each construction activity and phase. Provide separate values for construction crews commuting, haul trips, and other types of construction traffic.		
3.6.4: Construction Schedule a) Provide the proposed construction schedule (e.g., month and year) for each segment or project component, and for each construction activity and phase. b) Provide and explain the sequencing of construction activities, and if they would or would not occur concurrently. c) Provide the total duration of each construction activity and phase in days or weeks. d) Identify seasonal considerations that may affect the construction schedule, such as weather or anticipated wildlife restrictions, etc. The proposed construction should account for such factors.		
3.6.5: Work Schedule a) Describe the anticipated work schedule, including the days of the week and hours of the day when work would occur. Clearly state if work would occur at night or on weekends and identify when and where this could occur. b) Provide the estimated number of days or weeks that construction activities would occur at each type of work area. For example, construction at a stationary facility or staging area may occur for the entire duration of construction, but construction at individual work areas along a linear project would be limited to a few hours, days or weeks, and only a fraction of the total construction period.		

3.7 Post-Construction

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
3.7.1: Configuring and Testing. Describe the process and duration for post-construction configuring and testing of facilities. Describe the number of personnel and types of equipment that would be involved.		
3.7.2: Landscaping. Describe any landscaping that would be installed. Provide a conceptual landscape plan that identifies the locations and types of plantings that will be used. Identify whether plantings will include container plants or seeds. Include any water required for landscaping in the description of water use above.		

3.7.3 Demobilization and Site Restoration		
3.7.3.1: Demobilization. Describe the process for demobilization after construction activities, but prior to leaving the work site. For example, describe final processes for removing stationary equipment and materials, etc.		
3.7.3.2: Site Restoration. Describe how cleanup and post-construction restoration would be performed (i.e., personnel, equipment, and methods) on all project ROWs, sites, and extra work areas. Things to consider include, but are not limited to, restoration of the following: a) Restoring natural drainage patterns b) Recontouring disturbed soil c) Removing construction debris d) Vegetation e) Permanent and semi-permanent erosion control measures f) Restoration of all disturbed areas and access roads, including restoration of any public trails that are used as access, as well as any damaged sidewalks, agricultural infrastructure, or landscaping, etc. g) Road repaving and striping, including proposed timing of road restoration for underground construction within public roadways		

3.8 Operation and Maintenance

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
3.8.1: Regulations and Standards a) Identify and describe all regulations and standards applicable to operation and maintenance of project facilities. b) Provide a copy of any applicable Wildfire Management Plan and describe any special procedures for wildfire management.		
3.8.2: System Controls and Operation Staff a) Describe the systems and methods that the Applicant would use for monitoring and control of project facilities (e.g., on-site control rooms, remote facilities, standard monitoring and protection equipment, pressure sensors, automatic shut-off valves, and site and equipment specific for monitoring and control such as at natural gas well pads). b) If new full-time staff would be required for operation and/or maintenance, provide the number of positions and purpose.		
3.8.3: Inspection Programs a) Describe the existing and proposed inspection programs for each project component, including the type, frequency, and timing of scheduled inspections (i.e., aerial inspection, ground inspection, pipeline inline inspections). b) Describe any enhanced inspections, such as within any High Fire Threat Districts consistent with applicable Wildfire Management Plan requirements.		

c) Describe the inspection processes, such as the methods, number of crew members, and how access would occur (i.e., walk, vehicle, all-terrain vehicle, helicopter, drone, etc.). If new access would be required, describe any restoration that would be provided for the access roads.		
3.8.4: Maintenance Programs a) Describe the existing and proposed maintenance programs for each project component. b) Describe scheduled maintenance or facility replacement after the designated lifespan of the equipment. c) Identify typical parts and materials that require regular maintenance and describe the repair procedures. d) Describe any access road maintenance that would occur. e) Describe maintenance for surface or color treatment. f) Describe cathodic protection maintenance that would occur. g) Describe ongoing landscaping maintenance that would occur.		
3.8.5: Vegetation Management Programs a) Describe vegetation management programs within and surrounding project facilities. Distinguish between any different types of vegetation management. b) Describe any enhanced vegetation management, such as within any High Fire Threat Districts consistent with any applicable Wildfire Management Plan requirements. Identify the areas where enhanced vegetation management would be conducted.		

3.9 Decommissioning

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
3.9.1: Decommissioning. Provide detailed information about the current and reasonably foreseeable plans for the disposal, recycling, or future abandonment of all project facilities.		

3.10 Anticipated Permits and Approvals

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
3.10.1: Anticipated Permits and Approvals. Identify all necessary federal, state, regional, and local permits that may be required for the project. For each permit, list the responsible agency and district/office representative with contact information, type of permit or approval, and status of each permit with date filed or planned to file. For example: a) Federal Permits and Approvals i. U.S. Fish and Wildlife Service ii. U.S. Army Corps of Engineers iii. Federal Aviation Administration iv. U.S. Forest Service		

v. U.S. Department of Transportation – Office of Pipeline Safety vi. U.S. Environmental Protection Agency (Resource Conservation and Recovery Act; Comprehensive Environmental Response, Compensation, and Liability Act) b) State and Regional Permits i. California Department of Fish and Wildlife ii. California Department of Transportation iii. California State Lands Commission iv. California Coastal Commission v. State Historic Preservation Office, Native American Heritage Commission vi. State Water Resources Control Board vii. California Division of Oil, Gas and Geothermal Resources viii. Regional Air Quality Management District ix. Regional Water Quality Control Board (National Pollutant Discharge Elimination System General Industrial Storm Water Discharge Permit) x. Habitat Conservation Plan Authority (if applicable) See also Table 6 of example permitting requirements and processes.		
3.10.2: Rights-of-Way or Easement Applications. Demonstrate that applications for ROWs or other proposed land use have been or soon will be filed with federal, state, or other land-managing agencies that have jurisdiction over land that would be affected by the project (if any). Discuss permitting plans and timeframes and provide the contact information at the federal agency(ies) approached.		

3.11 Applicant Proposed Measures

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
3.11 Applicant Proposed Measures a) Provide a table with the full text of any Applicant Proposed Measure. Where applicable, provide a copy of Applicant procedures, plans, and standards referenced in the Applicant Proposed Measures. b) Within Chapter 5, describe the basis for selecting a particular Applicant Proposed Measure and how the Applicant Proposed Measure would reduce the impacts of the project.[18] c) Carefully consider each CPUC Draft Environmental Measure identified in Chapter 5 of this PEA Checklist. The CPUC Draft Environmental Measures will be applied to the proposed project where applicable.		

[18] Applicant Proposed Measures that use phrases, such as, "as practicable" or other conditional language are not acceptable and will be superseded by Mitigation Measures if required to avoid or reduce a potentially significant impact.

Table 6. Example Permitting Requirements and Processes

Note: In addition to the CPCN or PTC, the applicant may also be required to secure resource agency permits for the project.

Disclaimer: Below is a general list of permits required for transmission projects. Permit requirements for individual projects may vary slightly depending on project conditions.

Agency	Permit	Regulation	Protected Resource	Trigger	Application Process	Timing
				Federal		
Army Corps of Engineers	404 Permit	Clean Water Act	Waters of the United States (including wetlands)	Placement of dredge or fill material into waters of the U.S., including wetlands. If project impacts less than 0.5 acres a **nationwide permit (NWP)** is typically issued	**NWP:** prepare a preconstruction notification (PCN) along with the draft Corps's application (Engineer Form 4345). Information in the PCN includes, but is not limited to: results of wetland delineation including areas of waters of the U.S.; temporary and permanent impacts to waters of the U.S. and discussion of avoidance; construction techniques, timeline, and equipment that would be used; special status species that potentially occur in the project area, and discussion of mitigation (if applicable) to replace wetlands	**NWP:** takes approximately nine months from the date of application submittal (depending on level of impacts and level of consultation required by other agencies). Initial review is 30 days after which application is deemed complete or additional information is requested.
				If project would impact more than 0.5 acres a **regional or individual permit** may be required.	**Regional or Individual Permit:** Same requirements as NWP as well as preparation and submittal of 404(b)(1) Alternatives analysis which identifies the Least Environmentally Damaging Practicable Alternative (LEDPA). Public notice also required	**Regional or Individual Permit:** An additional three to six months may be required on top of the nine months expected for an NWP. A 30 day public notice is also required to inform the public about the project before the Corps issues the permit.
USFWS	Section 7 Consultation	Federal Endangered Species Act	Federally Listed Species	Potential impact to a federally listed threatened or endangered species	Biological Assessment (BA) prepared and submitted to Corps. BA contains information on each species and describes potential for "take" of species and/or habitat.	The timeline for processing and receiving a formal **Biological Opinion (BO)** from USFWS can be six months to a year from when the Corps has initiated consultation and depending on the level of impact to listed species. The typical timeline for issuance of a BO is no less than 135 days after acceptance of the BA as complete.
US Department of Agriculture, Forest Service	Special Use Authorization	National Forest Management Act/NEPA	National Forest lands	Use of federal lands managed by the USDA Forest Service for a transmission line. Typically constitutes a Major Federal Action which in turn triggers NEPA analysis.	**Special Use Authorization Application:** prepare a special use application for consideration by the Forest Service. Prior to submitting a proposal, applicant is required to arrange a preapplicaiton meeting at the local Forest Service office. Application typically includes project plan, operating plans, liability insurance, licenses/registrations and other documents. If it is determined that NEPA is required either an EA or EIS would be prepared. The NEPA document may be prepared jointly with the CEQA document.	Revies of Special Use Authorization applications is often dependent upon what level of NEPA analysis is required. An EA is typically 9-12 months, and EIS is generally 18 months. NEPA process may occur concurrently with CEQA process.
US Department of the Interior, Bureau of Land Management	Right-of-Way Grant	Federal Land Policy and Management Act/NEPA	Federal Lands	Use of federal lands managed by the BLM for a transmission line. Typically constitutes a Major Federal Action which in turn triggers NEPA analysis.	**Right-of-Way Application**: Contact the BLM office with management responsibility. Obtain an application form "Application for Transportation and Utility Systems and Facilities on Federal Lands". Arrange a pre-application meeting with a BLM Realty Specialist or appropriate staff member. Submit completed application to the appropriate BLM office. If it is determined that NEPA is required either an EA or EIS would be prepared. The NEPA document may be prepared jointly with the CEQA document.	BLM attempts to review completed applications within 60 days of submittal. Full timing is often dependent upon what level of NEPA analysis is required. An EA is typically 9-12 months, and EIS is generally 18 months. NEPA process may occur concurrently with CEQA process.

Agency	Permit	Regulation	Protected Resource	Trigger	Application Process	Timing
				State (continued)		
State Historic Preservation Officer (SHPO)	Section 106 National Historic Preservation Act (NHPA)	National Historic Preservation Act	Cultural and/or historical resources	Required if there are potential impacts to cultural and/or historical resources that are listed or eligible for listing on the National Register of Historic Places.	Information on cultural and historical resources gathered during the draft CEQA document preparation is included in a 106 Technical Report and submitted to the Corps along with the Area of Potential Effect (APE) map. The information is then evaluated by the Corps' cultural resources evaluator for potential adverse effects within the APE. Depending upon the level of potential adverse effect, the Corps then forwards its finding to SHPO for concurrence or begins the process for a Memorandum of Agreement (MOA). Native American consultation is also mandatory for the 106 process but can begin during preparation of the environmental document. All letters and correspondence for the Native American consultation must be provided to the Corps.Consultation with federally-recongized tribes may require a more extensive consultation.	Once SHPO has received the Corps' determination, it has approximately 60 days to agree or request additional information. However, SHPO has recently become more involved in projects and this timeframe is only an estimate and if a potential adverse effect to cultural or historical resources could occur, the SHPO process can take up to a year or more. Depending on the level of impacts to cultural resources, the Corps may determine no effect and issue the permit before receiving concurrence from SHPO.
California State Lands Commission (CSLC)	Right of Way Lease Agreement	Division 6 of the California Public Resources Code	California Sovereign Lands	May be triggered if the transmission line crosses state lands under the jurisdiction of the CSLC, which includes the beds of 1) more than 120 rivers, streams and sloughs; 2) nearly 40 non-tidal navigable lakes, such as Lake Tahoe and Clear Lake; 3) the tidal navigable bays and lagoons; and 4) the tide and submerged lands adjacent to the entire coast and offshore islands of the State from the mean high tide line to three nautical miles offshore.	Leases or permits may be issued to qualified applicants and the Commission shall have broad discretion in all aspects of leasing including category of lease or permit and which use, method or amount of rental is most appropriate, whether competitive bidding should be used in awarding a lease, what term should apply, how rental should be adjusted during the term, whether bonding and insurance should be required and in what amounts, whether an applicant is qualified based on what it deems to be in the best interest of the State.	Most coordination should be done concurrently with the CEQA process to ensure that any CSLC-required issues are addressed under CEQA. Once a final route/alternative is selected, the lease process may take two to three months for final Commission approval.
				Local / Other		
Air Quality Management District or Air Pollution Control District	Permit to Construct	Federal Clean Air Act	Air Quality	Depends on the air disctrict involved; may not be required for most transmission projects. Some air districts have a trigger level based on disturbed acreage.	Application forms need to be prepared and submiited to the local AQMD or APCD	Typically 30 to 90 days after submittal of a complete application.

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[19] Permitting is project specific. This table is provided for discussion purposes.

3.12 Project Description Graphics, Mapbook, and GIS Requirements

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
3.12.1: Graphics. Provide diagrams of the following as applicable: a) All pole, tower, pipe, vault, conduit, and retaining wall types b) For poles, provide typical drawings with approximate diameter at the base and tip; for towers, estimate the width at base and top. c) A typical detail for any proposed underground duct banks and vaults d) All substation, switchyard, building, and facility layouts e) Trenching, drilling, pole installation, pipe installation, vault installation, roadway construction, facility removal, helicopter uses, conductor installation, traffic control, and other construction activities where a diagram would assist the reader in visualizing the work area and construction approach f) Typical profile views of proposed aboveground facilities and existing facilities to be modified within the existing and proposed ROW (e.g., typical cross-section of existing and proposed facilities by project segment). g) Photos of representative existing and proposed structures		
3.12.2: Mapbook. Provide a detailed mapbook on an aerial imagery basemap at a scale between 1:3000 and 1:6000 (or as appropriate and legible) that show mileposts, roadways, and all project components and work areas including: a) All proposed above-ground and underground structure/facility locations (e.g., poles, conductor, substations, compressor stations, telecommunication lines, vaults, duct bank, lighting, markers, etc.) b) All existing structures/facilities that would be modified or removed c) Identify by milepost where existing ROW will be used and where new ROW or land acquisition will be required. d) All permanent work areas including permanent facility access e) All access roads including, existing, temporary, and new permanent access f) All temporary work areas including staging, material storage, field offices, material laydown, temporary work areas for above ground (e.g., pole installation) and underground facility construction (e.g., trenching and duct banks), helicopter landing zones, pull and tension sites, guard structures, shoo flys etc. g) Areas where special construction methods (e.g., jack and bore, HDD, blasting, retaining walls etc.) may need to be employed		

h) Areas where vegetation removal may occur i) Areas to be heavily graded and where slope stabilization measures would be employed including any retaining walls		
3.12.3: GIS Data. Provide GIS data for all features and ROW shown on the detailed mapbook.		
3.12.4: GIS Requirements. Provide the following information for each pole/tower that would be installed and for each pole/tower that would be removed: a) Unique ID number and type of pole (e.g., wood, steel, etc.) or tower (e.g., self-supporting lattice) both in a table and in the attributes of the GIS data provided b) Identify pole/tower heights and conductor sizes in the attributes of the GIS data provided.		
3.12.5: Natural Gas Facilities GIS Data. For natural gas facilities, provide GIS data for system cross ties and all laterals/taps, valve stations, and new and existing inspection facilities (e.g., pig launcher sites).		

4 Description of Alternatives

All Applicants will assume that alternatives will be required for the environmental analysis and that an EIR will be prepared unless otherwise instructed by CPUC CEQA Unit Staff in writing prior to application filing. See PEA Requirements at the beginning of this checklist document. The consideration and discussion of alternatives will adhere to CEQA Guidelines Section 15126.6. The description of alternatives will be provided in this chapter of the PEA, and the comparison of each alternative to the proposed project is provided in PEA Chapter 6. The amount of detail required for the description of various alternatives to the proposed project and what may be considered a reasonable range of alternatives will be discussed with CPUC during Pre-filing.

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
4.1 Alternatives Considered. Identify alternatives to the proposed project.[20] Include the following: a) All alternatives to the proposed project that were suggested, considered, or studied by the CAISO or by CAISO stakeholders b) Alternatives suggested by the public or agencies during public outreach efforts conducted by the Applicant c) Reduced footprint alternatives, including, e.g., smaller diameter pipelines and space for fewer electric transformers d) Project phasing options (e.g., evaluate the full build out for environmental clearance but consider an initial, smaller buildout that would only be expanded [in phases] if needed) e) Alternative facility and construction activity sites (e.g., substation, compressor station, drilling sites, well-head sites, staging areas) f) Renewable, energy conservation, energy efficiency, demand response, distributed energy resources, and energy storage alternatives g) Alternatives that would avoid or limit the construction of new transmission-voltage facilities or new gas transmission pipelines h) Other technological alternatives (e.g., conductor type) i) Route alternatives and route variations j) Alternative engineering or technological approaches (e.g., alternative types of facilities, or materials, or configurations) k) Assign an identification label and brief, descriptive title to each alternative described in this PEA chapter (e.g., Alternative A: No Project; Alterative B: Reduced Footprint 500/115-kV Substation; Alternative C: Ringo Hills 16-inch Pipeline Alignment; Alternative D1: Lincoln Street Route Variation; etc.). Each alternative will be easily identifiable by reading the brief title. Provide a description of each alternative. The description of each alternative will discuss to what extent it would be potentially feasible,		

[20] Reduced footprint alternatives; siting alternatives; renewable, energy conservation, energy efficiency, demand response, distributed energy resources, and energy storage alternatives; and non-wires alternatives (electric projects only) are typically required. For linear projects, route alternatives and route variations are typically required as well.

meet the project's underlying purpose, meet most of the basic project objectives, and avoid or reduce one or more potentially significant impacts. If the Applicant believes that an alternative is infeasible or the implementation is remote and speculative (CEQA Guidelines Section 15126.6(f)(3), clearly explain why. If significant environmental effects are possible without mitigation, alternatives will be provided in the PEA that are capable of avoiding or reducing any potentially significant environmental effects, even if the alternative(s) substantially impede the attainment of some project objectives or are costlier.[21]		
4.2 No Project Alternative. Include a thorough description of the No Project Alternative. The No Project Alternative needs to describe the range of actions that are reasonably foreseeable if the proposed project is not approved. The No Project Alternative will be described to meet the requirements of CEQA Guidelines Section15126.6(e).		
4.3 Rejected Alternatives. Provide a detailed discussion of all alternatives considered by the Applicant that were not selected by the Applicant for a full description in the PEA and analysis in PEA Chapter 5. The detailed discussion will include the following: a) Description of the alternative and its components b) Map of any alternative sites or routes c) Discussion about the extent to which the alternative would meet the underlying purpose of the project and its basic objectives d) Discussion about the feasibility of implementing the alternative e) Discussion of whether the alternative would reduce or avoid any significant environmental impacts of the proposed project f) Discussion of any new significant impacts that could occur from implementation of the alternative g) Description of why the alternative was rejected h) Any comments from the public or agencies about the alternative during PEA preparation		
For Natural Gas Storage Projects:		
4.4 Natural Gas Storage Alternatives. In addition to the requirements included above, alternatives to be considered for proposed natural gas storage projects include the following, where applicable: a) Alternative reservoir locations considered for gas storage including other field locations and other potential storage areas b) Alternative pipelines, road, and utility siting c) Alternative suction gas requirements, and injection/withdrawal options		

[21] CPUC CEQA Unit Staff will determine whether an alternative could *substantially* reduce one or more potentially significant impacts of the proposed project (CEQA Guidelines Section 15125.5). Applicants are strongly advised to provide more rather than less alternatives for CPUC's consideration or as determined during Pre-filing.

5 Environmental Analysis

Include a description of the environmental setting, regulatory setting, and impact analysis for each resource area. The resource areas addressed will include each environmental factor (resource area) identified in the most recent adopted version of the CEQA Guidelines Appendix G checklist and any additional relevant resource areas and impact questions that are defined in this PEA checklist.

1. Environmental Setting
    a. For each resource area, the PEA will include a detailed description of the natural and built environment in the vicinity of the proposed project area (e.g., topography, land use patterns, biological environment, etc.) as applicable to the resource area. Both regional and local environmental setting information will be provided.
    b. All setting information provided will relate in some way to the impacts of the proposed project discussed in the PEA's impacts analysis, however CPUC's impacts analysis may be more thorough, which may necessitate additional setting information than the Applicant might otherwise provide.
2. Regulatory Setting
    a. Organized by federal, State, regional, and local sections
    b. Describe the policy or regulation and briefly explain why it is applicable to the proposed project.
        i. Identify in the setting all laws, regulations, and policies that would be applicable for CPUC's exclusive jurisdiction over the siting and design of electric and gas facilities. Public utilities under CPUC's jurisdiction are expected to consult with local agencies regarding land use matters. Local laws, regulations, and policies will be considered for the consideration of potential impacts during CPUC's CEQA review (e.g., encroachment, grading, erosion control, scenic corridors, overhead line undergrounding, tree removal, fire protection, permanent and temporary noise limits, zoning requirements, general plan polices, and all local and regional laws, regulations, and policies).
3. Impact Questions
    a. Includes all impact questions in the current version of CEQA Guidelines, Appendix G.
    b. Additional impact questions that are frequently relevant to utility projects are provided in Attachment 4, CPUC Draft Environmental Measures.
4. Impact Analyses
    a. Discussion organized by CEQA Guidelines, Appendix G impact items and any Additional CEQA Impact Questions in the PEA Checklist. Assess all potential environmental impacts and make determinations, such as, No Impact, Less than Significant, Less than Significant with Mitigation, Significant and Unavoidable, or Beneficial Impact with respect to construction, operations, and maintenance activities.
    b. The impact analyses provided in PEA Chapter 5, Environmental Analysis, need not be as thorough as those to be prepared by CPUC for the CEQA environmental document. A preliminary determination will be provided but with only brief justification unless otherwise directed by CPUC Staff in writing during Pre-filing.
5. CPUC Draft Environmental Measures
    a. CPUC Draft Environmental Measures are provided for some of the resource areas in Attachment 4, CPUC Draft Environmental Measures. The measures may be applied to the proposed project as written or modified by the CPUC during its environmental review if the measure would avoid or reduce a potentially significant impact.

b. The CPUC Draft Environmental Measures should be discussed with the CPUC's CEQA Unit Staff during Pre-filing, especially with respect to the development of Applicant Proposed Measures.
c. In general, impact avoidance is preferred to the reduction of potentially significant impacts.

Additional requirements specific to each resource area are identified in the following sections.

5.1 Aesthetics

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
5.1.1 Environmental Setting		
5.1.1.1: Landscape Setting. Briefly described the regional and local landscape setting.		
5.1.1.2: Scenic Resources. Identify and describe any vistas, scenic highways, national scenic areas, or other scenic resources within and surrounding the project area (approximately 5-mile buffer but may be greater if necessary). Scenic resources may also include but are not limited to historic structures, trees, or other resources that contribute to the scenic values where the project would be located.		
5.1.1.3: Viewshed Analysis a) Conduct a viewshed analysis for the project area (approximately 5-mile buffer but may be greater if necessary). b) Describe the project viewshed, including important visibility characteristics for the project site, such as viewing distance, viewing angle, and intervening topography, vegetation, or structures. c) Provide a supporting map (or maps) showing project area, landscape units, topography (i.e., hillshade), and the results of the viewshed analysis. Provide associated GIS data.		
5.1.1.4: Landscape Units. Identify and describe landscape units (geographic zones) within and surrounding the project area (approximately 5-mile buffer but may be greater if necessary) that categorizes different landscape types and visual characteristics, with consideration to topography, vegetation, and existing land uses. Landscape units should be developed based on the existing landscape characteristics rather than the project's features or segments.		
5.1.1.5: Viewers and Viewer Sensitivity. Identify and described the types of viewers expected within the viewshed and landscape units. Describe visual sensitivity to general visual change based on viewing conditions, use of the area, feedback from the public about the project, and landscape characteristics.		

5.1.1.6: Representative Viewpoints a) Identify representative viewpoints from publicly accessible locations (up to approximately 5-mile buffer but may be greater if appropriate). The number and location of the viewpoints must represent a range of views of the project site from major roads, highways, trails, parks, vistas, landmarks, and other scenic resources near the project site. Multiple viewpoints should be included where the project site would be visible from sensitive scenic resources to provide context on different viewing distances, perspectives, and directions. b) Provide the following information for each viewpoint: i. Number, title, and brief description of the location ii. Types of viewers iii. Viewing direction(s) and distance(s) to the nearest proposed project features iv. Description of the existing visual conditions and visibility of the project site as seen from the viewpoint and shown in the representative photographs c) Provide a supporting map (or maps) showing project features and representative viewpoints with arrows indicating the viewing direction(s). Provide associated GIS data (may be combined with GIS data request below for representative photographs).		
5.1.1.7: Representative Photographs a) Provide high resolution photographs taken from the representative viewpoints in the directions of all proposed project features.[22] Multiple photographs should be provided where project features may be visible in different viewing directions from the same location. b) Provide the following information for each photograph: i. Capture time and date ii. Camera body and lens model iii. Lens focal length and camera height when taken c) Provide GIS data associated with each photograph location that includes coordinates (<1 meter resolution), elevations, and viewing directions, as well as the associated viewpoint.		
5.1.1.8: Visual Resource Management Areas a) Identify any visual resource management areas within and surrounding the project area (approximately 5-mile buffer). b) Describe any project areas within visual resource management areas.		

22 All representative photographs should be taken using a digital single-lens reflex camera with standard 50-millimeter lens equivalent, which represents an approximately 40-degree horizontal view angle. The precise photograph coordinates and elevations should be collected using a high accuracy GPS unit.

c) Provide a supporting map (or maps) showing project features and visual resource management areas. Provide associated GIS data.		
5.1.2 Regulatory Setting		
5.1.2.1: Regulatory Setting. Identify applicable federal, state, and local laws, policies, and standards regarding aesthetics and visual resource management.		
5.1.3 Impact Questions		
5.1.3.1: Impact Questions. The impact questions include all aesthetic impact questions in the current version of CEQA Guidelines, Appendix G. **5.1.3.2:** Additional CEQA Impact Questions: None.		
5.1.4 Impact Analysis		
5.1.4.1: Visual Impact Analysis. Provide an impact analysis for each checklist item identified in CEQA Guidelines Appendix G for this resource area and any additional impact questions listed above.		
The following information will be included in the PEA or a technical Appendix to support the aesthetic impact analysis:		
5.1.4.2: Analysis of Selected Viewpoints. Identify the methodology and assumptions that were applied in selecting key observation points for visual simulation. It is recommended that viewpoints are selected where viewers may be sensitive to visual change (public views) and in areas that are visually sensitive, or heavily trafficked or visited.[23]		
5.1.4.3: Visual Simulation a) Identify methodology and assumptions for completing the visual simulations. The simulations should include photorealistic 3-D models of project features and any land changes within the KOP view. The visual simulations should depict conditions: i. Immediately following construction, and ii. After vegetation establishment in all areas of temporary impact to illustrate the visual impact from vegetation removal. b) Provide high resolution images for the visual simulations.		
5.1.4.4: Analysis of Visual Change a) Identify the methodology and assumptions for completing the visual change analysis.[24] The methodology should be consistent with applicable visual resource management criteria. b) Provide a description of the visual change for each selected viewpoint. Describe any conditions that would change over time, such as vegetation growth.		

[23] The KOP selection process should be discussed with CPUC during Pre-filing
[24] The visual impact assessment methodology should be discussed with CPUC during Pre-filing

c) Describe the effects of visual change that would result in the entire project area, as indicated by the selected viewpoints that were simulated and analyzed.		
5.1.4.5: Lighting and Marking. Identify all new sources of permanent lighting. Identify any proposed structures or lines that could require FAA notification. Identify any structures or line segments that could require lighting and marking based on flight patterns and FAA or military requirements. Provide supporting documentation in an Appendix (e.g., FAA notice and criteria tool results).		
5.1.5 CPUC Draft Environmental Measures		
Refer to Attachment 4, CPUC Draft Environmental Measures.		

5.2 Agriculture and Forestry Resources

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
5.2.1 Environmental Setting		
5.2.1.1: Agricultural Resources and GIS a) Identify all agricultural resources that occur within the project area including: i. Areas designated as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance ii. Areas under Williamson Act contracts and provide information on the status of the Williamson Act contract iii. Any areas zoned for agricultural use in local plans iv. Areas subject to active agricultural use b) Provide GIS data for agricultural resources within the proposed project area.		
5.2.1.2: Forestry Resources and GIS a) Identify all forestry resources within the project area including: i. Forest land as defined in Public Resources Code 12220(g)[25] ii. Timberland as defined in Public Resource Code section 4526 iii. Timberland zoned Timberland Production as defined in Government Code section 51104(g) b) Provide GIS data for all forestry resources within the proposed project area.		
5.2.2 Regulatory Setting		
5.2.2: Agriculture and Forestry Regulations. Identify all federal, state, and local policies for protection of agricultural and forestry resources that apply to the proposed project.		

[25] Forest land is defined in Public Resources Code as, "land that can support 10 percent native tree cover of any species, including hardwoods, under natural conditions, and that allows for management of one or more forest resources, including timber, aesthetics, fish and wildlife, biodiversity, water quality, recreation, and other public benefits."

5.2.3 Impact Questions		
5.2.3.1: Agriculture and Forestry Impact Questions. The impact questions include all agriculture and forestry impact questions in the current version of CEQA Guidelines, Appendix G. **5.2.3.2:** Additional CEQA Impact Questions: None.		
5.2.4 Impact Analyses		
5.2.4.1: Agriculture and Forestry Impacts. Provide an impact analysis for each checklist item identified in CEQA Guidelines Appendix G for this resource area and any additional impact questions listed above.		
Incorporate the following discussions into the analysis of impacts:		
5.2.4.2: Prime Farmland Soil Impacts. Calculate the acreage of Prime Farmland soils that would be affected by construction and operation and maintenance.		
5.2.4.3. Williamson Act Impacts. Describe the approach to resolve potential conflicts with Williamson Act contract (if applicable)		
5.2.5 CPUC Draft Environmental Measures		
Refer to Attachment 4, CPUC Draft Environmental Measures.		

5.3 Air Quality

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
5.3.1 Environmental Setting		
5.3.1.1: Air Quality Plans Identify and describe all applicable air quality plans and attainment areas. Identify the air basin(s) for the project area. If the project is located in more than one attainment area and/or air basin, provide the extent in each attainment area and air basin.		
5.3.1.2: Air Quality. Describe existing air quality in the project area. a) Identify existing air quality exceedance of National Ambient Air Quality Standards and California Ambient Air Quality Standards in the air basin. b) Provide the number of days that air quality in the area exceeds state and federal air standards for each criteria pollutant that where air quality standards are exceeded. c) Provide air quality data from the nearest representative air monitoring station(s).		
5.3.1.3: Sensitive Receptor Locations. Identify the location and types of each sensitive receptor locations[26] within 1,000 feet of the project area. Provide GIS data for sensitive receptor locations.		

[26] Sensitive Receptor locations may include hospitals, schools, and day care centers, and such other locations as the air district board or California Air Resources Board may determine (California Health and Safety Code § 42705.5(a)(5)).

5.3.2 Regulatory Setting		
5.3.2.1: Regulatory Setting. Identify applicable federal, state, and local laws, policies, and standards regarding aesthetics and visual resource management.		
5.3.2.2: Air Permits. Identify and list all necessary air permits.		
5.3.3 Impact Questions		
5.3.3.1: Impact Questions. The impact questions include all air quality impact questions in the current version of CEQA Guidelines, Appendix G. **5.3.3.2:** Additional CEQA Impact Questions: None.		
5.3.4 Impact Analysis		
5.3.4.1: Impact Analysis. Provide an impact analysis for each checklist item identified in CEQA Guidelines Appendix G for this resource area and any additional impact questions listed above.		
The following information will be presented in the PEA or a technical Appendix to support the air quality impact analysis:		
5.3.4.2: Air Quality Emissions Modeling. Model project emissions using the most recent version of CalEEMod and/or a current version of other applicable modeling program. Provide all model input and output data sheets in Microsoft Excel format to allow CPUC to evaluate whether project data was entered into the modeling program accurately. The assumptions used in the air quality modeling must be consistent with all PEA information about the project's schedule, workforce, and equipment. The following information will be addressed in the emissions modeling, Air Quality Appendix, and PEA: a) Quantify the expected emissions of criteria pollutants from all project-related sources. Quantify emissions for both construction and operation (e.g., compressor equipment). b) Identify manufacturer's specifications for all proposed new emission sources. For proposed new, additional, or modified compressor units, include the horsepower, type, and energy source. c) Describe any emission control systems that are included in the air quality analysis (e.g., installation of filters, use of EPA Tier II, III, or IV equipment, use of electric engines, etc.). d) When multiple air basins may be affected by the project, model air emissions within each air basin and provide a narrative (supported by calculations) that clearly describes the assumptions around the project activities considered for each air basin. Provide modeled emissions by attainment area or air basin (supported by calculations).		

5.3.4.3: Air Quality Emissions Summary. Provide a table summarizing the air quality emissions for the project and applicable thresholds for each applicable attainment area. Include a summary of uncontrolled emissions (prior to application of any APMs) and controlled emissions (after application of APMs). Clearly identify the assumptions that were applied in the controlled emissions estimates.		
5.3.4.4: Health Risk Assessment. Complete a Health Risk Assessment when air quality emissions have the potential to lead to human health impacts[27]. If health impacts are not anticipated from project emissions, the analysis should clearly describe why emissions would not lead to health impacts.		
5.3.5 CPUC Draft Environmental Measures		
Refer to Attachment 4, CPUC Draft Environmental Measures.		

5.4 Biological Resources

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
5.4.1 Environmental Setting		
5.4.1.1: Biological Resources Technical Report. Provide a Biological Resources Technical Report as an Appendix to the PEA that includes all information specified in Attachment 2.		
The following biological resources information will be presented in the PEA:		
5.4.1.2: Survey Area (Local Setting). Identify and describe the biological resources survey area as documented in the Biological Resources Technical Report. All temporary and permanent project areas must be within the survey area.		
5.4.1.3: Vegetation Communities and Land Cover a) Identify, describe, and quantify vegetation communities and land cover types within the biological resources survey area. b) Clearly identify any sensitive natural vegetation communities that meet the definition of a biological resource under CEQA (i.e., rare, designated, or otherwise protected), such as, but not limited to, riparian habitat. c) Provide a supporting map (or maps) showing project features and vegetation communities and land cover type.		

27 Refer to Office of Environmental Health Hazard Assessment (OEHHA) most recent guidance for preparation of Health Risk Assessments to determine whether a Health Risk Assessment is required for the project. The need for an HRA should also be discussed with CPUC during Pre-filing.

5.4.1.4: Aquatic Features a) Identify, describe, and quantify aquatic features within the biological resources survey area that may provide potentially suitable aquatic habitat for rare and special-status species. b) Identify and quantify potentially jurisdictional aquatic features and delineated wetlands, according to the Wetland Delineation Report and Biological Resources Technical Report. c) Provide a supporting map (or maps) showing project features and aquatic resources.		
5.4.1.5: Habitat Assessment. Identify rare and special-status species with potential to occur in the project region (approximately a 5-mile buffer but may be larger if necessary). For each species, provide the following information: a) Common and scientific name b) Status and/or rank c) Habitat characteristics (i.e., vegetation communities, elevations, seasonal changes, etc.) d) Blooming characteristics for plants e) Breeding and other dispersal (range) behavior for wildlife f) Potential to occur within the survey area (i.e., Present, High Potential, Moderate Potential, Low Potential, or Not Expected), with justification based on the results of the records search, survey findings, and presence of potentially suitable habitat g) Specific types and locations of potentially suitable habitat that correspond to the vegetation communities and land cover and aquatic features		
5.4.1.6: Critical Habitat a) Identify and describe any critical habitat for rare or special-status species within and surrounding the project area (approximately a 5-mile buffer). b) Provide a supporting map (or maps) showing project features and critical habitat.		
5.4.1.7: Native Wildlife Corridors and Nursery Sites a) Identify and describe regional and local wildlife corridors within and surrounding the project area (approximately a 5-mile buffer), including but not limited to, landscape and aquatic features that connect suitable habitat in regions otherwise fragmented by terrain, changes in vegetation, or human development. b) Identify and describe regional and local native wildlife nursery sites within and surrounding the project area (approximately a 5-mile buffer), as identified through the records search, surveys, and habitat assessment.		

c) Provide a supporting map (or maps) showing project features, native wildlife corridors, and native nursery sites.		
5.4.1.8: Biological Resource Management Areas a) Identify any biological resource management areas (i.e., conservation or mitigation areas, HCP or NCCP boundaries, etc.) within and surrounding the project area (approximately 5-mile buffer). b) Identify and quantify any project areas within biological resource management areas. c) Provide a supporting map (or maps) showing project features and biological resource management areas.		
5.4.2 Regulatory Setting		
5.4.2.1: Regulatory Setting. Identify applicable federal, state, and local laws, policies, and standards regarding biological resources.		
5.4.2.2: Habitat Conservation Plan. Provide a copy of any relevant Habitat Conservation Plan.		
5.4.3 Impact Questions		
5.4.3.1: Impact Questions. The impact questions include all biological resource impact questions in the current version of CEQA Guidelines, Appendix G. **5.4.3.2:** Additional CEQA Impact Question: Would the project create a substantial collision or electrocution risk for birds or bats?		
5.4.4 Impact Analysis		
5.4.4.1: Impact Analysis Provide an impact analysis for each checklist item identified in CEQA Guidelines, Appendix G for Biological Resources and any additional impact questions listed above.		
The following information will be included in the impact analysis:		
5.4.4.2: Quantify Habitat Impacts. Provide the area of impact in acres by each habitat type. Quantify temporary and permanent impacts. For all temporary impacts provide the following: a) Description of the restoration and revegetation approach b) Vegetation species that would be planted within the area of temporary disturbance c) Procedures to reduce invasive weed encroachment within areas of temporary disturbance d) Expected timeframe for restoration of the site		
5.4.4.3: Special-Status Species Impacts. Identify anticipated impacts on special-status species. Identify any take permits that are anticipated for the project. If an existing habitat conservation plan (HCP) or natural communities conservation plan (NCCP) would be used for the project, provide current accounting of take coverage included in the HCP/NCCP		

to demonstrate that there is sufficient habitat coverage remaining under the existing permit.		
5.4.4.4: Wetland Impacts. Quantify the area (in acres) of temporary and permanent impacts on wetlands. Include the following details: a) Provide a table identifying all wetlands, by milepost and length, crossed by the project and the total acreage of each wetland type that would be affected by construction. b) Discuss construction and restoration methods proposed for crossing wetlands. c) If wetlands would be filled or permanently lost, describe proposed measures to compensate for permanent wetland losses. d) If forested wetlands would be affected, describe proposed measures to restore forested wetlands following construction.		
5.4.4.5: Avian Impacts. Describe avian obstructions and risk of electrocution from the project. Describe any standards that will be implemented as part of the project to reduce the risk of collision and electrocution.		
5.4.5 CPUC Draft Environmental Measures		
Refer to Attachment 4, CPUC Draft Environmental Measures.		

5.5 Cultural Resources[28]

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
5.5.1 Environmental Setting		
5.5.1.1: Cultural Resource Reports. Provide a cultural resource inventory and evaluation report that addresses the technical requirement provided in Attachment 3.		
5.5.1.2: Cultural Resources Summary. Summarize cultural resource survey and inventory results and survey methods. Do not provide any confidential cultural resource information within the PEA chapter.		
5.5.1.3: Cultural Resource Survey Boundaries. Provide a map with mileposts showing the boundaries of all survey areas in the report. Provide the GIS data for the survey area. Provide confidential GIS data for the resource locations and boundaries separately under confidential cover.		
5.5.2 Regulatory Setting		
5.5.2.1: Regulatory Setting. Identify applicable federal and state regulations for protection of cultural resources.		

[28] For a description and evaluation of cultural resources specific to Tribes, see Section 5.18, Tribal Cultural Resources.

5.5.3 Impact Questions		
5.5.3.1: Impact Questions. The impact questions include all cultural resource impact questions in the current version of CEQA Guidelines, Appendix G. **5.5.3.2:** Additional CEQA Impact Questions: None.		
5.5.4 Impact Analysis		
5.5.4.1: Impact Analysis. Provide an impact analysis for each checklist item identified in CEQA Guidelines, Appendix G for this resource area and any additional impact questions listed above.		
Include the following information in the impact analysis		
5.5.4.2: Human Remains. Describe the potential for encountering human remains or grave goods during the trenching or any other phase of construction. Describe the procedures that would be used if human remains are encountered.		
5.5.4.3: Resource Avoidance. Describe avoidance procedures that would be implemented to avoid known resources.		
5.5.5 CPUC Draft Environmental Measures		
Refer to Attachment 4, CPUC Draft Environmental Measures.		

5.6 Energy

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
5.6.1 Environmental Setting		
5.6.1.1: Existing Energy Use. Identify energy use of existing infrastructure if the proposed project would replace or upgrade an existing facility.		
5.6.2 Regulatory Setting		
5.6.2.1: Regulatory Setting. Identify applicable federal, state, or local regulations or policies applicable to energy use for the proposed project.		
5.6.3 Impact Questions		
5.6.3.1: Impact Questions: The impact questions include all energy impact questions in the current version of CEQA Guidelines, Appendix G. **5.6.3.2:** Additional CEQA Impact Question: Would the project add capacity for the purpose of serving a non-renewable energy resource?		

5.6.4 Impact Analysis		
5.6.4.1: Impact Analysis. Provide an impact analysis for each checklist item identified in CEQA Guidelines Appendix G for this resource area and any additional impact questions listed above.		
Include the following information in the impact analysis:		
5.6.4.2: Nonrenewable Energy. Identify renewable and non-renewable energy projects that may interconnected to or be supplied by the proposed project.		
5.6.4.3: Fuels and Energy Use a) Provide an estimation of the amount of fuels (gasoline, diesel, helicopter fuel, etc.) that would be used during construction and operation and maintenance of the project. Fuel estimates should be consistent with Air Quality calculations supporting the PEA. b) Provide the following information on energy use: i. Total energy requirements of the project by fuel type and end use ii. Energy conservation equipment and design features iii. Identification of energy supplies that would serve the project		
5.6.5 CPUC Draft Environmental Measures		
Refer to Attachment 4, CPUC Draft Environmental Measures.		

5.7 Geology, Soils, and Paleontological Resources

This section will include, but is not limited to, the following:	**PEA Section and Page Number**	**Applicant Notes, Comments**
5.7.1 Environmental Setting		
5.7.1.1: Regional and Local Geologic Setting. Briefly describe the regional and local physiography, topography, and geologic setting in the project area.		
5.7.1.2: Seismic Hazards a) Provide the following information on potential seismic hazards in the project area: i. Identify and describe regional and local seismic risk including any active faults within and surrounding the project area (will be a 10-mile buffer unless otherwise instructed in writing by CEQA Unit Staff during Pre-filing) ii. Identify any areas that are prone to seismic-induced landslides iii. Provide the liquefaction potential for the project area b) Provide a supporting map (or maps) showing project features and major faults, areas of landslide risk, and areas at high risk of liquefaction. Provide GIS data for all faults, landslides, and areas of high liquefaction potential.		

5.7.1.3: Geologic Units. Identify and describe the types of geologic units in the project area. Include the following information for each geologic unit: a) Summarize the geologic units within the project area. b) Identify any previous landslides in the area and any areas that are at risk of landslide. c) Identify any unstable geologic units. d) Provide a supporting map (or maps) showing project features and geologic units. Clearly identify any areas with potentially hazardous geologic conditions. Provide associated GIS data.		
5.7.1.4: Soils. Identify and describe the types of soils in the project area. a) Summarize the soils within the project area. b) Clearly identify any soils types that could be unstable (e.g., at risk of lateral spreading, subsidence, liquefaction, or collapse). c) Provide information on erosion susceptibility for each soil type that occurs in the project area. d) Provide a supporting map (or maps) showing project features and soils. Provide associated GIS data.		
5.7.1.5: Paleontological Report. Provide a paleontological report that includes the following: a) Information on any documented fossil collection localities within the project area and a 500-foot buffer. b) A paleontological resource sensitivity analysis based on published geological mapping and the resource sensitivity of each rock type. c) Supporting maps and GIS data.		
5.7.2 Regulatory Setting		
5.7.2.1: Regulatory Setting. Identify applicable federal, state, and local laws, policies, and standards regarding geology, soils, and paleontological resources.		
5.7.3 Impact Questions		
5.7.3.1: Impact Questions. The impact questions include all geology, soils, and paleontological resource impact questions in the current version of CEQA Guidelines, Appendix G. **5.7.3.2:** Additional CEQA Impact Questions: None.		
5.7.4 Impact Analysis		
5.7.4.1: Impact Analysis. Provide an impact analysis for each checklist item identified in CEQA Guidelines, Appendix G for this resource area and any additional impact questions listed above.		
Include the following information in the impact analysis:		

5.7.4.2: Geotechnical Requirements. Identify any geotechnical requirements that would be implemented to address effects from unstable geologic units or soils. Describe how the recommendation would be applied (i.e., when and where).		
5.7.4.3: Paleontological Resources. Identify the potential to disturb paleontological resources based on the depth of proposed excavation and paleontological sensitivity of geologic units within the project area.		
5.7.5 CPUC Draft Environmental Measures		
Refer to Attachment 4, CPUC Draft Environmental Measures.		

5.8 Greenhouse Gas Emissions

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
5.8.1 Environmental Setting		
5.8.1.1: GHG Setting. Provide a description of the setting for greenhouse gases (GHGs). The setting should consider any GHG emissions from existing infrastructure that would be upgraded or replaced by the proposed project.		
5.8.2 Regulatory Setting		
5.8.2.1: Regulatory Setting. Identify applicable federal, state, and local laws, policies, and standards for greenhouse gases.		
5.8.3 Impact Questions		
5.8.3.1 Impact Questions. The impact questions include all greenhouse gas impact questions in the current version of CEQA Guidelines, Appendix G. **5.8.3.2:** Additional CEQA Impact Questions: None.		
5.8.4 Impact Analysis		
5.8.4.1: Impact Analysis. Provide an impact analysis for each checklist item identified in CEQA Guidelines, Appendix G for this resource area and any additional impact questions listed above.		
Include the following information in the impact analysis:		
5.8.4.2: GHG Emissions. Provide a quantitative assessment of GHG emissions for construction and operation and maintenance of the proposed project. Provide model results and all model files. Modeling will be conducted using the latest version of the emissions model at the time of application filing (e.g., most recent version of CalEEMod). GHG emissions will be provided for the following conditions: a) Uncontrolled emissions (before APMs are applied) b) Controlled emissions considering application of APMs i. Based on the modeled GHG emissions, quantify the project's contribution to and analyze the project's effect on		

climate change. Identify and provide justification for the timeframe considered in the analysis. ii. Discuss any programs already in place to reduce GHG emissions on a system-wide level. This includes the Applicant's voluntary compliance with the EPA SF6 reduction program, reductions from energy efficiency, demand response, LTPP, etc. iii. For any significant impacts, identify potential strategies that could be employed by the project to reduce GHGs during construction or operation and maintenance consistent with OPR Advisory on CEQA and Climate Change.		
Natural Gas Storage		
5.8.4.3: Natural Gas Storage Accident Conditions. In addition to the requirements above, identify the potential GHG emissions that could result in the event of a gas leak.		
5.8.4.4: Monitoring and Contingency Plan. Provide a comprehensive monitoring plan that would be implemented during project operation to monitor for gas leaks. The plan should identify a monitoring schedule, description of monitoring activities, and actions to be implemented if gas leaks are observed.		
5.8.5 CPUC Draft Environmental Measures		
Refer to Attachment 4, CPUC Draft Environmental Measures.		

5.9 Hazards, Hazardous Materials, and Public Safety[29]

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
5.9.1 Environmental Setting		
5.9.1.1: Hazardous Materials Report. Provide a Phase I Environmental Site Assessment or similar hazards report for the proposed project area. Describe any known hazardous materials locations within the project area and the status of the site.		
5.9.1.2: Airport Land Use Plan. Identify any airport land use plan(s) within the project area.		
5.9.1.3: Fire Hazard. Identify if the project occurs within federal, state, or local fire responsibility areas and identify the fire hazard severity rating for all project areas, including temporary work areas and access roads.		
5.9.1.4: Metallic Objects. For electrical projects, identify any metallic pipelines or cables within 25 feet of the project.		

29 For fire risk specific to state responsibility areas or lands classified as very high fire hazard severity zones, see Section 5.20, Wildfire.

5.9.1.5: Pipeline History (for Natural Gas Projects). Provide a narrative describing the history of the pipeline system(s) to which the project would connect, list of previous owner and operators, and detailed summary of the pipeline systems' safety and inspection history.		
5.9.2 Regulatory Setting		
5.9.2.1: Regulatory Setting. Identify applicable federal, state, and local laws, policies, and standards for hazards, hazardous materials, and public safety.		
5.9.2.2: Touch Thresholds. Identify applicable standards for protection of workers and the public from shock hazards.		
5.9.3 Impact Questions		
5.9.3.1: Impact Questions. The impact questions include all hazards and hazardous materials impact questions in the current version of CEQA Guidelines, Appendix G. **5.9.3.2:** Additional CEQA Impact Questions: a) Would the project create a significant hazard to air traffic from the installation of new power lines and structures? b) Would the project create a significant hazard to the public or environment through the transport of heavy materials using helicopters? c) Would the project expose people to a significant risk of injury or death involving unexploded ordnance? d) Would the project expose workers or the public to excessive shock hazards?		
5.9.4 Impact Analysis		
5.9.4.1: Impact Analysis. Provide an impact analysis for each checklist item identified in CEQA Guidelines Appendix G for this resource area and any additional impact questions listed above.		
Include the following information in the impact analysis:		
5.9.4.2: Hazardous Materials. Identify the hazardous materials (i.e., chemicals, solvents, lubricants, and fuels) that would be used during construction and operation of the project. Estimate the quantity of each hazardous material that would be stored on site during construction and operation.		
5.9.4.3: Air Traffic Hazards. If the project involves construction of above-ground structures (including structure replacement) within the airport land use plan area, provide a discussion of how the project would or would not conflict with height restrictions identified in the airport land use plan and how the project would comply with any FAA or military requirements for the above ground facilities.		
5.9.4.4: Accident or Upset Conditions. Describe how the project facilities would be designed, constructed, operated, and maintained to		

minimize potential hazard to the public from the failure of project components as a result of accidents or natural catastrophes.		
5.9.4.5: Shock Hazard. For electricity projects, identify infrastructure that may be susceptible to induced current from the proposed project. Describe strategies (e.g., cathodic protection) that the project would employ to reduce shock hazards and avoid electrocution of workers or the public.		
For Natural Gas and Gas Storage:		
5.9.4.6: Health and Safety Plan. Include in the Health and Safety Plan, plans for addressing gas leaks, fires, etc. Identify sensitive receptors, methods of evacuation, and protection measures. The Plan will be provided as an Appendix to the PEA.		
5.9.4.7: Health Risk Assessment. Provide a Health Risk Assessment including risk from potential gas leaks, fires, etc. Identify sensitive receptors that would be affected and potential impacts on them if there is a gas release.[30]		
5.9.4.8: Gas Migration. Describe potential for and effects of gas migration through natural and manmade pathways. a) Provide Applicant Proposed Measures for avoiding gas emissions at the surface from gas migration pathways. b) Provide Applicant Proposed Measures for avoiding emissions of mercaptan and/or other odorizing agents.		
5.9.5 CPUC Draft Environmental Measures		
Refer to Attachment 4, CPUC Draft Environmental Measures.		

5.10 Hydrology and Water Quality

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
5.10.1 Environmental Setting		
5.10.1.1: Waterbodies. Identify by milepost all ephemeral, intermittent, and perennial surface waterbodies crossed by the project. For each, list its water quality classification, if applicable.		
5.10.1.2: Water Quality. Identify any downstream waters that are on the state 303(d) list and identify whether a total maximum daily load (TMDL) has been adopted or the date for adoption of a TMDL. Identify existing sources of impairment for downstream waters. Describe any management plans that are in place for downstream waters.		
5.10.1.3: Groundwater Basin. Identify all known EPA and state groundwater basins and aquifers crossed by the project.		

[30] Refer to the requirements for Health Risk Assessments in Section 5.3.4.4.

5.10.1.4: Groundwater Wells and Springs. Identify the locations of all known public and private groundwater supply wells and springs within 150 feet of the project area.		
5.10.1.5: Groundwater Management. Identify the groundwater management status of any groundwater resources in the project area and any groundwater resources that may be used by the project. Describe if groundwater resources in the basin have been adjudicated. Identify any sustainable groundwater management plan that has been adopted for groundwater resources in the project area or describe the status of groundwater management planning in the area.		
5.10.2 Regulatory Setting		
5.10.2.1: Regulatory Setting. Identify applicable federal, state, and local laws, policies, and standards regarding hydrologic and water quality.		
5.10.3 Impact Questions		
5.10.3.1: Impact Questions. The impact questions include all hydrology and water quality impact questions in the current version of CEQA Guidelines, Appendix G. **5.10.3.2:** Additional CEQA Impact Questions: None.		
5.10.4 Impact Analysis		
5.10.4.1: Impact Analysis. Provide an impact analysis for each checklist item identified in the current version of CEQA Guidelines, Appendix G for this resource area and any additional impact questions listed above.		
Include the following information in the impact analysis:		
5.10.4.2: Hydrostatic Testing. Identify all potential sources of hydrostatic test water, quantity of water required, withdrawal methods, treatment of discharge, and any waste products generated.		
5.10.4.3: Water Quality Impacts. Describe impacts to surface water quality, including the potential for accelerated soil erosion, downstream sedimentation, and reduced surface water quality.		
5.10.4.4: Impermeable Surfaces. Describe increased run-off and impacts on groundwater recharge due to construction of impermeable surfaces. Provide the acreage of new impermeable surfaces that will be created as a result of the project.		
5.10.4.5: Waterbody Crossings. Identify by milepost all waterbody crossings. Provide the following information for crossing: a) Identify whether the waterbody has contaminated waters or sediments. b) Describe the waterbody crossing method and any approaches to avoid the waterbody. c) Describe typical additional work area and staging area requirements at waterbody and wetland crossings.		

d) Describe any dewatering or water diversion that will be required during construction near the waterbody. Identify treatment methods for any dewatering. e) Describe any proposed restoration methods for work near or within the waterbody.		
5.10.4.6: Groundwater Impacts. If water would be obtained from groundwater supplies, evaluate the project's consistency with any applicable sustainable groundwater management plan.		
5.10.5 CPUC Draft Environmental Measures		
Refer to Attachment 4, CPUC Draft Environmental Measures.		

5.11 Land Use and Planning

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
5.11.1 Environmental Setting		
5.11.1.1: Land Use. Provide a description of land uses within the area traversed by the project route as designated in the local General Plan (e.g., residential, commercial, agricultural, open space, etc.).		
5.11.1.2: Special Land Uses. Identify by milepost and segment all special land uses within the project area including: a) All land administered by federal, state, or local agencies, or private conservation organizations b) Any designated coastal zone management areas c) Any designated or proposed candidate National or State Wild and Scenic Rivers crossed by the project d) Any national landmarks		
5.11.1.3: Habitat Conservation Plan. Provide a copy of any Habitat Conservation Plan applicable to the project area or proposed project. Also required for Section 5.4, Biological Resources.		
5.11.2 Regulatory Setting		
5.11.2.1: Regulatory Setting. Identify applicable federal, state, and local laws, policies, and standards for land use and planning.		
5.11.3 Impact Questions		
5.11.3.1: Impact Questions. The impact questions include all land use questions in the current version of CEQA Guidelines, Appendix G. **5.11.3.2:** Additional CEQA Impact Questions: None.		
5.11.4 Impact Analysis		
5.11.4.1: Impact Analysis. Provide an impact analysis for each checklist item identified in CEQA Guidelines, Appendix G for this resource area and any additional impact questions listed above.		

5.11.5 CPUC Draft Environmental Measures		
Refer to Attachment 4, CPUC Draft Environmental Measures.		

5.12 Mineral Resources

This section will include, but is not limited to, the following:	**PEA Section and Page Number**	**Applicant Notes, Comments**
5.12.1 Environmental Setting		
5.12.1.1: Mineral Resources. Provide information on the following mineral resources within 0.5 mile of the proposed project area: a) Known mineral resources b) Active mining claims c) Active mines d) Resource recovery sites		
5.12.2 Regulatory Setting		
5.12.2.1: Regulatory Setting. Identify applicable federal, state, and local laws, policies, and standards for minerals.		
5.12.3 Impact Questions		
5.12.3.1: Impact Questions. The impact questions include all mineral resource impact questions in the current version of CEQA Guidelines, Appendix G. **5.12.3.2:** Additional CEQA Impact Questions: None.		
5.12.4 Impact Analysis		
5.12.4.1: Impact Analysis. Provide an impact analysis for each checklist item identified in CEQA Guidelines, Appendix G for this resource area and any additional impact questions listed above.		
5.12.5 CPUC Draft Environmental Measures		
Refer to Attachment 4, CPUC Draft Environmental Measures.		

5.13 Noise

This section will include, but is not limited to, the following:	**PEA Section and Page Number**	**Applicant Notes, Comments**
5.13.1 Environmental Setting		
5.13.1.1: Noise Sensitive Land Uses. Identify all noise sensitive land uses within 1,000 feet of the proposed project. Provide GIS data for sensitive receptors within 1,000 feet of the project.		
5.13.1.2: Noise Setting. Provide the existing noise levels (Lmax, Lmin, Leq, and Ldn sound level and other applicable noise parameters) at noise sensitive areas near the proposed project. All noise measurement data and the methodology for collecting the data will be provided in a noise study as an Appendix to the PEA.		

5.13.2 Regulatory Setting		
5.13.2.1: Regulatory Setting. Identify applicable state, and local laws, policies, and standards for noise.		
5.13.3 Impact Questions		
5.13.3.1 Impact Questions. The impact questions include all noise questions in the current version of CEQA Guidelines, Appendix G. **5.13.3.2:** Additional CEQA Impact Questions: None.		
5.13.4 Impact Analysis		
5.13.4.1: Impact Analysis. Provide an impact analysis for each checklist item identified in CEQA Guidelines, Appendix G for this resource area and any additional impact questions listed above.		
Include the following information in the impact analysis:		
5.13.4.2: Noise Levels a) Identify noise levels for each piece of equipment that could be used during construction. b) Provide a table that identifies each phase of construction, the equipment used in each construction phase, and the length of each phase at any single location (see example in Table 7 below). c) Estimate cumulative equipment noise levels for each phase of construction. d) Include phases of operation if noise levels during operation have the potential to frequently exceed pre-project existing conditions. e) Identify manufacturer's specifications for equipment and describe approaches to reduce impacts from noise.		

Table 7. Construction Noise Levels

Equipment Required	Equipment Noise Levels (Leq; 50 feet)	Phase Noise Level (Leq; 50 feet)	Phase Duration at Each Location	Receptor Nearest to Construction Phase	Noise Level at Nearest Receptor (Leq)	Exceeds Noise Standard at Nearest Receptor?	Distance to Not Exceed Standard
Site Preparation/Grading							
Dozer	78 dBA	82 dBA	5 days	Residence on Main Street; 100 feet from Substation Site	76 dBA	Yes	112 feet
Gradall	79 dBA						
Dump Truck	73 dBA						
Construct Tower Foundation							
Auger Rig	77 dBA	82 dBA	11 days	School on Education Avenue; 130 feet from Tower A12	73 dBA	No	N/A
Dump Truck	73 dBA						
Excavator	77 dBA						
Concrete Truck	75 dBA						

For Natural Gas:		
5.13.4.3: Compressor Station Noise. Provide site plans of compressor stations or other noisy, permanent equipment, showing the location of the nearest noise sensitive areas within 1 mile of the proposed ROW. If new compressor station sites are proposed, measure or estimate the existing ambient sound environment based on current land uses and		

activities. For existing compressor stations (operated at full load), include the results of a sound level survey at the site property line and nearby noise-sensitive areas. Include a plot plan that identifies the locations and duration of noise measurements.		
5.13.5 CPUC Draft Environmental Measures		
Refer to Attachment 4, CPUC Draft Environmental Measures.		

5.14 Population and Housing

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
5.14.1 Environmental Setting		
5.14.1.1: Population Estimates. Identify population trends for the areas (county, city, town, census designated place) where the project would take place.		
5.14.1.2: Housing Estimates. Identify housing estimates and projections in areas where the project would take place.		
5.14.1.3: Approved Housing Developments a) Provide the following information for all housing development projects within 1 mile of the proposed project that have been recently approved or may be approved around the PEA and application filing date: i. Project name ii. Location iii. Number of units and estimated population increase iv. Approval date and construction status v. Contact information for developer (provided in the public outreach Appendix) b) Ensure that the project information provided above is consistent with the PEA analysis of cumulative project impacts.		
5.14.2 Regulatory Setting		
5.14.2.1: Regulatory Setting. Identify any applicable federal, state or local laws or regulations that apply to the project.		
5.14.3 Impact Questions		
5.14.3.1: Impact Questions. The impact questions include all population and housing impact questions in the current version of CEQA Guidelines, Appendix G. **5.14.3.2:** Additional CEQA Impact Questions: None.		
5.14.4 Impact Analysis		
5.14.4.1: Impact Analysis. Provide an impact analysis for each checklist item identified in CEQA Guidelines, Appendix G for this resource area and any additional impact questions listed above.		

Include the following information in the impact analysis:		
5.14.4.2: Impacts to Housing. Identify if any existing or proposed homes occur within the footprint of any proposed project elements or right-of-way. Describe housing impacts (e.g., demolition and relocation of residents) that may occur as a result of the proposed project.		
5.14.4.3: Workforce Impacts. Describe on-site manpower requirements, including the number of construction personnel who currently reside within the impact area, who would commute daily to the site from outside the impact area or would relocate temporarily within the impact area. Chapter 4 of this document can be referenced as applicable. Identify any permanent employment opportunities that would be create by the project and the workforce conditions in the area that the jobs would be created.		
5.14.4.4: Population Growth Inducing. Provide information on the project's growth inducing impacts, if any. The information will include, but is not necessarily limited to, the following: a) Any economic or population growth in the surrounding environment that will directly or indirectly result from the project b) Any obstacles to population growth that the project would remove c) Any other activities directly or indirectly encouraged or facilitated by the project that would cause population growth leading to a significant effect on the environment, either individually or cumulatively		
5.14.5 CPUC Draft Environmental Measures		
Refer to Attachment 4, CPUC Draft Environmental Measures.		

5.15 Public Services

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
5.15.1 Environmental Setting		
5.15.1.1 Service Providers a) Identify the following service providers that serve the project area and provide a map showing the service facilities that could serve the project: i. Police ii. Fire (identify service providers within local and state responsibility areas) iii. Schools iv. Parks v. Hospitals		

b) Provide the documented performance objectives and data on existing emergency response times for service providers in the area (e.g., police or fire department response times).		
5.15.2 Regulatory Setting		
5.15.2.1 Regulatory Setting. Identify any applicable federal, state or local laws or regulations for public services that apply to the project.		
5.15.3 Impact Questions		
5.15.3.1: Impact Questions. The impact questions include all public services impact questions in the current version of CEQA Guidelines, Appendix G. **5.15.3.2:** Additional CEQA Impact Questions: None.		
5.15.4 Impact Analysis		
5.15.4.1 Impact Analysis. Provide an impact analysis for each checklist item identified in CEQA Guidelines, Appendix G for this resource area and any additional impact questions listed above.		
Include the following information in the impact analysis:		
5.15.4.2: Emergency Response Times a) Describe whether the project would impede ingress and egress of emergency vehicles during construction and operation. b) Include an analysis of impacts on emergency response times during project construction and operation, including impacts during any temporary road closures. Describe approaches to address impacts on emergency response times.		
5.15.4.3: Displaced Population. If the project would create permanent employment or displace people, evaluate the impact of the new employment or relocated people on governmental facilities and services and describe plans to reduce the impact on public services.		
5.15.5 CPUC Draft Environmental Measures		
Refer to Attachment 4, CPUC Draft Environmental Measures.		

5.16 Recreation

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
5.16.1 Environmental Setting		
5.16.1.1: Recreational Setting a) Describe the regional and local recreation setting in the project area including: i. Any recreational facilities or areas within and surrounding the project area (approximately 0.5-mile buffer) including the recreational uses of each facility or area		

ii. Any available data on use of the recreational facilities including volume of use b) Provide a map (or maps) showing project features and recreational facilities and provide associated GIS data.		
5.16.2 Regulatory Setting		
5.16.2.1: Regulatory Setting. Identify applicable federal, state, and local laws, policies, and standards regarding recreation.		
5.16.3 Impact Questions		
5.16.3.1: Impact Questions. The impact questions include all recreation impact questions in the current version of CEQA Guidelines, Appendix G. **5.16.3.2:** Additional CEQA Impact Questions: a) Would the project reduce or prevent access to a designated recreation facility or area? b) Would the project substantially change the character of a recreational area by reducing the scenic, biological, cultural, geologic, or other important characteristics that contribute to the value of recreational facilities or areas? c) Would the project damage recreational trails or facilities?		
5.16.4 Impact Analysis		
5.16.4.1: Impact Analysis: Provide an impact analysis for each checklist item identified in CEQA Guidelines, Appendix G for this resource area and any additional impact questions listed above.		
5.16.4.2: Impact Details. Clearly identify the maximum extent of each impact, and when and where the impacts would or would not occur. Organize the impact assessment by project phase, project component, and/or geographic area, as necessary.		
5.16.5 CPUC Draft Environmental Measures		
Refer to Attachment 4, CPUC Draft Environmental Measures.		

5.17 Transportation

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
5.17.1 Environmental Setting		
5.17.1.1: Circulation System. Briefly describe the regional and local circulation system in the project area, including modes of transportation, types of roadways, and other facilities that contribute to the circulation system.		
5.17.1.2: Existing Roadways and Circulation a) Identify and describe existing roadways that may be used to access the project site and transport materials during		

construction or are otherwise adjacent to or crossed by linear project features. Provide the following information for each road: i. Name of the road ii. Jurisdiction or ownership (i.e., State, County, City, private, etc.) iii. Number of lanes in both directions of travel iv. Existing traffic volume (if publicly available data is unavailable or significantly outdated, then it may be necessary to collect existing traffic counts for road segments where large volumes of construction traffic would be routed or where lane or road closures would occur) v. Closest project feature name and distance b) Provide a supporting map (or maps) showing project features and the existing roadway network identifying each road described above. Provide associated GIS data. The GIS data should include all connected road segments within at least 5 miles of the project.		
5.17.1.3: Transit and Rail Services a) Identify and describe transit and rail service providers in the region. b) Identify any rail or transit lines within 1,000 feet of the project area. c) Identify specific transit stops, and stations within 0.5 mile of the project. Provide the frequency of transit service. d) Provide a supporting map (or maps) showing project features and transit and rail services within 0.5 mile of the project area. Provide associated GIS data.		
5.17.1.4: Bicycle Facilities a) Identify and describe any bicycle plans for the region. b) Identify specific bicycle facilities within 1,000 feet of the project area. c) Provide a supporting map (or maps) showing project features and bicycle facilities. Provide associated GIS data.		
5.17.1.5: Pedestrian Facilities a) Identify and describe important pedestrian facilities near the project area that contribute to the circulation system, such as important walkways. b) Identify specific pedestrian facilities that would be near the project, including on the road segments identified per 5.17.1.2. c) Provide a supporting map (or maps) showing project features and important pedestrian facilities. Provide associated GIS data.		

5.17.1.6: Vehicle Miles Traveled (VMT). Provide the average VMT for the county(s) where the project is located.		
5.17.2 Regulatory Setting		
5.17.2.1: Regulatory Setting. Identify applicable federal, state, and local laws, policies, and standards regarding transportation.		
5.17.3 Impact Questions		
5.17.3.1: Impact Questions. All impact questions for this resource area in the current version of CEQA Guidelines, Appendix G. **5.17.3.2:** Additional CEQA Impact Questions: a) Would the project create potentially hazardous conditions for people walking, bicycling, or driving or for public transit operations? b) Would the project interfere with walking or bicycling accessibility? c) Would the project substantially delay public transit?		
5.17.4 Impact Analysis		
5.17.4.1: Impact Analysis. Provide an impact analysis for each significance criteria identified in Appendix G of the CEQA Guidelines for transportation and any additional impact questions listed above[31].		
Include the following information in the impact analysis:		
5.17.4.2: Vehicle Miles Traveled (VMT) a) Identify whether the project is within 0.5 mile of a major transit stop or a high-quality transit corridor. b) Identify the number of vehicle daily trips that would be generated by the project during construction and operation by light duty (e.g., worker vehicles) and heavy-duty vehicles (e.g., trucks). Provide the frequency of trip generation during operation. c) Quantify VMT generation for both project construction and operation. d) Provide an excel file with the VMT assumptions and model calculations, including all formulas and values. e) Evaluate the project VMT relative to the average VMT for the area in which the project is located.		
5.17.4.3: Traffic Impact Analysis. Provide a traffic impact study. The traffic impact study should be prepared in accordance with guidance from the relevant local jurisdiction or Caltrans, where appropriate.		
5.17.4.4: Hazards. Identify any traffic hazards that could result from construction and operation of the project. Identify any lane closures and traffic management that would be required to construct the project.		

[31] Discuss with CPUC during Pre-filing whether a traffic study is needed.

5.17.4.5: Accessibility. Identify any closures of bicycle lanes, pedestrian walkways, or transit stops during construction or operation of the project.		
5.17.4.6: Transit Delay. Identify any transit lines that could be delayed by construction and operation of the project. Provide the maximum extent of the delay in minutes and the duration of the delay.		
5.17.5 CPUC Draft Environmental Measures		
Refer to Attachment 4, CPUC Draft Environmental Measures.		

5.18 Tribal Cultural Resources[32]

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
5.18.1 Environmental Setting		
5.18.1.1: Outreach to Tribes. Provide a list of all tribes that are on the Native American Heritage Commission (NAHC) list of tribes that are affiliated with the project area. Provide a discussion of outreach to Native American tribes, including tribes notified, responses received from tribes, and information of potential tribal cultural resources provided by tribes. Any information of potential locations of tribal cultural resources should be submitted in an Appendix under clearly marked confidential cover. Provide copies of all correspondence with tribes in an Appendix.		
5.18.1.2: Tribal Cultural Resources. Describe tribal cultural resources (TCRs) that are within the project area. a) Summarize the results of attempts to identify possible TCRs using publicly available documentary resources. The identification of TCRs using documentary sources should include review of archaeological site records and should begin during the preparation of the records search report (see Attachment 3). During the inventory phase, a formal site record would be prepared for any resource identified unless tribes object. b) Summarize attempts to identify TCRs by speaking directly with tribal representatives.		
5.18.1.3: Ethnographic Study. The ethnographic study should document the history of Native American use of the area and oral history of the area.		
5.18.2 Regulatory Setting		
5.18.2.1: Regulatory Setting. Identify any applicable federal, state or local laws or regulations for tribal cultural resources that apply to the project.		

[32] For a description of historical resources and requirements for cultural resources that are not tribal cultural resources, refer to Section 5.5 Cultural Resources.

5.18.3 Impact Questions		
5.18.3.1: Impact Questions. The impact questions include all tribal cultural resources impact questions in the current version of CEQA Guidelines, Appendix G. **5.18.3.2:** Additional CEQA Impact Questions: None.		
5.18.4 Impact Analysis		
5.18.4.1: Impact Analysis. Provide an impact analysis for each checklist item identified in CEQA Guidelines, Appendix G for this resource area and any additional impact questions listed above.		
Include the following information in the impact analysis:		
5.18.4.2: Information Provided by Tribes. Include an analysis of any impacts that were identified by the tribes during the Applicant's outreach.		
5.18.5 CPUC Draft Environmental Measures		
Refer to Attachment 4, CPUC Draft Environmental Measures.		

5.19 Utilities and Service Systems

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
5.19.1 Environmental Setting		
5.19.1.1: Utility Providers. Identify existing utility providers and the associated infrastructure that serves the project area.		
5.19.1.2: Utility Lines. Describe existing utility infrastructure (e.g., water, gas, sewer, electrical, stormwater, telecommunications, etc.) that occurs in the project ROW. Provide GIS data and/or as-built engineering drawings to support the description of existing utilities and their locations.		
5.19.1.3: Approved Utility Projects. Identify utility projects that have been approved for construction within the project ROW but that have not yet been constructed.[33]		
5.19.1.4: Water Supplies. Identify water suppliers and the water source (e.g., aqueduct, well, recycled water, etc.). For each potential water supplier, provide data on the existing water capacity, supply, and demand.		
5.19.1.5: Landfills and Recycling. Identify local landfills that can accept construction waste and may service the project. Provide documentation of landfill capacity and estimated closure date. Identify any recycling centers in the area and opportunities for construction and demolition waste recycling.		

[33] Note that this project information should be consistent with the cumulative project description included in Chapter 7.

5.19.2 Regulatory Setting		
5.19.2.1: Regulatory Setting. Identify any applicable federal, state or local laws or regulations for utilities that apply to the project.		
5.19.3 Impact Questions		
5.19.3.1: Impact Questions. All impact questions for this resource area in the current version of CEQA Guidelines, Appendix G. **5.19.3.2:** Additional CEQA Impact Question: Would the project increase the rate of corrosion of adjacent utility lines as a result of alternating current impacts?		
5.19.4 Impact Analysis		
5.19.4.1: Impact Analysis. Provide an impact analysis for each checklist item identified in CEQA Guidelines, Appendix G for this resource area and any additional impact questions listed above.		
Include the following information in the impact analysis:		
5.19.4.2: Utility Relocation. Identify any project conflicts with existing utility lines. If the project may require relocation of existing utilities, identify potential relocation areas and analyze the impacts of relocating the utilities. Provide a map showing the relocated utility lines and GIS data for all relocations.		
5.19.4.3: Waste a) Identify the waste generated by construction, operation, and demolition of the project. b) Describe how treated wood poles would be disposed of after removal, if applicable. c) Provide estimates for the total amount of waste materials to be generated by waste type and how much of it would be disposed of, reused, or recycled.		
5.19.4.4: Water Supply a) Estimate the amount of water required for project construction and operation. Provide the potential water supply source(s). b) Evaluate the ability of the water supplier to meet the project demand under a multiple dry year scenario. c) Provide a discussion as to whether the proposed project meets the criteria for consideration as a project subject to Water Supply Assessment Requirements under Water Code Section 10912. d) If determined to be necessary under Water Code Section 10912, submit a Water Supply Assessment to support conclusions that the proposed water source can meet the project’s anticipated water demand, even in multiple dry year scenarios. Water Supply Assessments should be approved by		

the water supplier and consider normal, single-dry, and multiple-dry year conditions.		
5.19.4.5: Cathodic Protection. Analyze the potential for existing utilities to experience corrosion due to proximity to the proposed project. Identify cathodic protection measures that could be implemented to reduce corrosion issues and where the measures may be applied.		
5.19.5 CPUC Draft Environmental Measures		
Refer to Attachment 4, CPUC Draft Environmental Measures.		

5.20 Wildfire

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
5.20.1 Environmental Setting		
5.20.1.1: High Fire Risk Areas and State Responsibility Areas a) Identify areas of high fire risk or State Responsibility Areas (SRAs) within the project area. Provide GIS data for the Wildland Urban Interface (WUI) and Fire Hazard Severity Zones (FHSZ) mapping along the project alignment. Include areas mapped by CPUC as moderate and high fire threat districts as well as areas mapped by CalFire. b) Identify any areas the utility has independently identified as High FHSZ known to occur within the proposed project vicinity.		
5.20.1.2: Fire Occurrence. Identify all recent (within the last 10 years) large fires that have occurred within the project vicinity. For each fire, identify the following: a) Name of the fire b) Location of fire c) Ignition source and location of ignition d) Amount of land burned e) Boundary of fire area in GIS		
5.20.1.3: Fire Risk. Provide the following information for assessment of baseline fire risk in the area: a) Provide fuel modeling using Scott Burgan fuel models, or other model of similar quality. b) Provide values of wind direction and speed, relative humidity, and temperature for representative weather stations along the alignment for the previous 10 years, gathered hourly. c) Digital elevation models for the topography in the project region showing the relationship between terrain and wind patterns, as well as localized topography to show the effects of terrain on wind flow, and on a more local area to show effect of slope on fire spread.		

d) Describe vegetation fuels within the project vicinity and provide data in map format for the project vicinity. USDA Fire Effects Information System or similar data source should be consulted to determine high-risk vegetation types. Provide the mapped vegetation fuels data in GIS format.		
5.20.1.4: Values at Risk. Identify values at risk along the proposed alignment. Values at risk may include: Structures, improvements, rare habitat, other values at risk, (including utility-owned infrastructure) within 1000 feet of the project. Provide some indication as to its vulnerability (wood structures vs. all steel features). Communities and/or populations near the project should be identified with their proximity to the project defined.		
5.20.1.5: Evacuation Routes. Identify all evacuation routes that are adjacent to or within the project area. Identify any roads that lack a secondary point of access or exit (e.g., cul-de-sacs).		
5.20.2 Regulatory Setting		
5.20.2.1: Regulatory Setting. Identify applicable federal, state, and local laws, policies, and standards for wildfire.		
5.20.2.2: CPUC Standards. Identify any CPUC standards that apply to wildfire management of the new facilities.		
5.20.3 Impact Questions		
5.20.3.1: Impact Questions. All impact questions for this resource area in the current version of CEQA Guidelines, Appendix G. **5.20.3.2:** Additional CEQA Impact Questions: None.		
5.20.4 Impact Analysis		
5.20.4.1: Impact Analysis. Provide an impact analysis for each checklist item identified in CEQA Guidelines, Appendix G for this resource area and any additional impact questions listed above.		
Include the following information in the impact analysis:		
5.20.4.2: Fire Behavior Modeling. For any new electrical lines, provide modeling to support the analysis of wildfire risk.		
5.20.4.3: Wildfire Management. Describe approaches that would be implemented during operation and maintenance to manage wildfire risk in the area. Provide a copy of any Wildfire Management Plan.		
5.20.5 CPUC Draft Environmental Measures		
Refer to Attachment 4, CPUC Draft Environmental Measures.		

5.21 Mandatory Findings of Significance[34]

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
5.21.1: Impact Assessment for Mandatory Findings of Significance. Provide an impact analysis for each of the mandatory findings of significance provided in Appendix G of the CEQA Guidelines. The impact analysis can reference relevant information and conclusion from the biological resources, cultural resources, air quality, hazards, and cumulative sections of the PEA, where applicable.		

6 Comparison of Alternatives

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
6.1: Alternatives Comparison a) Compare the ability of each alternative described in Chapter 4 against the proposed project in terms of its ability to avoid or reduce a potentially significant impact. The alternatives addressed in this section will each be: i. Potentially feasible ii. Meet the underlying purpose of the proposed project iii. Meet most of the basic project objectives, and iv. Avoid or reduce one or more potentially significant impacts. b) The relative effect of the various potentially significant impacts may be compared using the following or similar descriptors and an accompanying analysis: i. Short-term versus long-term impacts ii. Localized versus widespread impacts iii. Ability to fully mitigate impacts c) Impacts that the Applicant believes would be less than significant with mitigation may also be included in the analysis, but only if the steps listed above fail to distinguish among the remaining few alternatives.		
6.2: Alternatives Ranking. Provide a detailed table that summarizes the Applicant's comparison results and ranks the alternatives in order of environmental superiority.[35]		

[34] PEAs need only include a Mandatory Findings of Significance section if CPUC CEQA Unit Staff determine that a Mitigated Negative Declaration may be the appropriate type of document to prepare for the project, as determined through Pre-filing consultation. If no such determination has been made, then a Mandatory Findings of Significance section and the requirements below are not required.

[35] If the proposed project does not rank #1 on the list, the Applicant should provide the rationale for selecting the proposed project.

7 Cumulative and Other CEQA Considerations

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
7.1 Cumulative Impacts		
7.1.1: List of Cumulative Projects a) Provide a detailed table listing past, present, and reasonably foreseeable future projects within and surrounding the project area (approximately 2-mile buffer)[36]. The following information should be provided for each project in the table: i. Project name and type ii. Brief description of the project location(s) and associated actions iii. Distance to and name of the nearest project component iv. Project status and anticipated construction schedule v. Source of the project information and date last checked (for each individual project), including links to any public websites where the information was obtained so it can be reviewed and updated (the project information should be current when the PEA is filed) b) Provide a supporting map (or maps) showing project features and cumulative project locations and/or linear features. Provide associated GIS data.		
7.1.2: Geographic Scope. Define the geographic scope of analysis for each resource topic. The geographic scope of analysis for each resource topic should consider the extent to which impacts can be cumulative. For example, the geographic scope for cumulative noise impacts would be more limited in scale than the geographic scope for biological resource impacts because noise attenuates rapidly with distance. Explain why the geographic scope is appropriate for each resource.		
7.1.3: Cumulative Impact Analysis. Provide an analysis of cumulative impacts for each resource topic included in Chapter 5. Evaluate whether the proposed project impacts are cumulatively considerable[37] for any significant cumulative impacts.		
7.2 Growth-Inducing Impacts		
7.2.1: Growth-Inducing Impacts. Provide an evaluation of the following potential growth-inducing impacts:		

[36] Information on cumulative projects may be obtained from federal, state, and local agencies with jurisdiction over planning, transportation, and/or resource management in the area. Other projects the Applicant is involved in or aware of in the area should be included.

[37] "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.

a) Would the proposed project foster any economic or population growth, either directly or indirectly, in the surrounding environment? b) Would the proposed project cause any increase in population that could further tax existing community service facilities (i.e., schools, hospitals, fire, police, etc.)? c) Would the proposed project remove any obstacles to population growth? d) Would the proposed project encourage and facilitate other activities that would cause population growth that could significantly affect the environment, either individually or cumulatively?		

8 List of Preparers

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
8.1: List of Preparers. Provide a list of persons, their organizations, and their qualifications for all authors and reviewers of each section of the PEA.		

9 References

This section will include, but is not limited to, the following:	PEA Section and Page Number	Applicant Notes, Comments
9.1: Reference List a) Organize all references cited in the PEA by section within a single chapter called "References." b) Within the References chapter, organize all of the Chapter 5 references under subheadings for each resource area section.		
9.2: Electronic References a) Provide complete electronic copies of all references cited in the PEA that cannot be readily obtained for free on the Internet. This includes any company-specific documentation (e.g., standards, policies, and other documents). b) If the reference can be obtained on the Internet, the Internet address will be provided.		

PEA Checklist Attachments

Attachment 1: GIS Data Requirements

This Attachment includes specific requirements and format of GIS data that is intended to be applicable to all PEAs. The specific GIS data requirements may be updated on a project-specific basis during Pre-filing coordination with CPUC's CEQA Unit Staff.

1. GIS data will be provided in an appropriate format (i.e., point, line, polygon, raster) and scale to adequately verify assumptions in the PEA and supporting materials and determine the level of environmental impacts. At a minimum, all GIS data layers will include the following metadata properties:
    a. The source (e.g., report reference), date, title, and preparer (name or company)
    b. Description of the contents and any limitations of the data
    c. Reference scale and accuracy of the data
    d. Complete attributes that correspond to the detailed mapbook, project description, and figures presented in the PEA and/or supporting application materials, including unique IDs, labels, geometry, and other appropriate project details
2. Where precise boundaries of project features may change (e.g., staging areas and temporary construction work areas), the Applicant will provide GIS data layers with representative boundaries to evaluate potential environmental impacts as a worst-case scenario.
3. Provide GIS data for:
    a. All proposed <u>and alternative</u> project facilities including but not limited to existing and proposed/alternative ROWs; substations and switching stations; pole/tower locations; conduit; vaults, pipelines; valves; compressor stations; metering stations; valve stations, gas wellheads; other project buildings, facilities, and components (both temporary and permanent); telecommunication and distribution lines modifications or upgrades related to the project; marker ball and lighting locations; and mileposts, facility perimeters, and other demarcations or segments as applicable
    b. All proposed areas required for construction and construction planning, including all proposed and alternative disturbance areas (both permanent and temporary); access roads; geotechnical work areas; extra work areas (e.g., staging areas, parking areas, lay-down areas, work areas at and around specific pole/tower sites, pull and tension sites, helicopter landing areas); airport landing areas; underground installation areas (e.g. trenches, vaults, underground work areas); horizontal directional drilling, jack and bore, or tunnel areas; blasting areas; and any areas where special construction methods may need to be employed
    c. Within the PEA checklist there are also specific requirements for environmental resources within Chapter 5. All environmental resource GIS data must meet the minimum mapping standards specified in this Attachment.

Attachment 2: Biological Resource Technical Report Standards

Definitions

The following biological resources will be considered within the scope of the PEA and the Biological Resources Technical Report:

Sensitive Vegetation Communities and Habitats

a) Sensitive vegetation communities/habitats identified in local or regional plans, policies, or regulations, or designated by CDFW38 or USFWS
b) Areas that provide habitat for locally unique biotic species/communities (e.g., oak woodlands, grasslands, and forests)
c) Habitat that contains or supports rare, endangered, or threatened wildlife or plant species as defined by CDFW and USFWS
d) Habitat that supports CDFW Species of Special Concern
e) Areas that provide habitat for rare or endangered species and that meet the definition in CEQA Guidelines Section 15380
f) Existing game and wildlife refuges and reserves
g) Lakes, wetlands, estuaries, lagoons, streams, and rivers
h) Riparian corridors

Special-Status Species

a) Species listed or proposed for listing as threatened or endangered under the federal Endangered Species Act (ESA) (50 CFR § 17.12 [listed plants], 17.11 [listed animals] and various notices in the Federal Register [proposed species])
b) Species that are candidates for possible future listing as threatened or endangered under the federal ESA (61 FR § 40, February 28, 1996)
c) Species listed or proposed for listing by the State of California as threatened or endangered under the California ESA (14 CCR § 670.5)
d) Plants listed as rare or endangered under the California Native Plant Protection Act (California Fish and Game Code, Section 1900 et seq.)
e) Species that meet the definitions of rare and endangered under CEQA. CEQA Guidelines Section 15380 provides that a plant or animal species may be treated as "rare or endangered" even if not on one of the official lists.
f) Plants considered by the California Native Plant Society (CNPS) to be "rare, threatened or endangered in California" (California Rare Plant Rank 1A, 1B, 2A, and 2B) as well as California Rare Plant Rank 3 and 4 plant species
g) Species designated by CDFW as Fully Protected or as a Species of Special Concern
h) Species protected under the Federal Bald and Golden Eagle Protection Act
i) Birds of Conservation Concern or Watch List species
j) Bats considered by the Western Bat Working Group to be "high" or "medium" priority (Western Bat Working Group 2015)

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[38] CDFW's Rarity Ranking follows NatureServe's Heritage Methodology (Faber-Langendoen, et al. 2016) in which communities are given a G (global) and S (state) rank based on their degree of imperilment (as measured by rarity, trends, and threats). Communities with a Rarity Ranking of S1 (critically imperiled), S2 (imperiled), or S3 (vulnerable) are considered sensitive by CDFW.

Biological Resource Technical Report Minimum Requirements

Report Contents

The Biological Resource Technical Report will include the following information at a minimum.

a) **Preliminary Agency Consultation.** Describe any pre-survey contact with agencies. Describe any agency approvals that were required for biologists or agency protocols that were applied to the survey effort. Provide copies of correspondence and meeting notes with the names and contact information for agency staff and the dates of consultation as an appendix to the Biological Resources Technical Report.
b) **Records Search.** Provide the results of all database and literature searches for biological resources within and surrounding the project area. Identify all sources reviewed (e.g., CNDDB, CNPS, USFWS, etc.).
c) **Biological Resource Survey Method.** Identify agency survey requirements and protocols applicable to each biological survey that was conducted. Identify the areas where each survey occurred. Identify any limitations for the surveys (e.g., survey timing or climatic conditions) that could affect the survey results.
d) **Vegetation Communities and Land Cover.** Identify all vegetation communities or land cover types (e.g., disturbed or developed) within the biological survey area. The biological survey area should include a 1,000-foot buffer from project facilities to support CPUC's evaluation of indirect effects.
e) **Aquatic Resources.** Identify any wetlands, streams, lakes, reservoirs, estuarine, or other aquatic resources within the biological survey area. Provide a wetland delineation and all data sheets including National Wetlands Inventory maps (or the appropriate state wetland maps, if National Wetlands Inventory maps are not available) that show all proposed facilities and include milepost locations for proposed pipeline routes. Provide a copy of agency verification of the wetland delineation if the delineation has been verified by the U.S. Army Corps of Engineers or CDFW. If the delineation has not been verified, describe the process and timing for obtaining agency verification.
f) **Habitat Assessments.** Evaluate the potential for suitable habitat in the biological survey area for each species identified in the database and literature search.
g) **Native Wildlife Corridors and Nursery Sites.** Identify any wildlife corridors or nursery sites that occur within the biological survey area.
h) **Survey Results.** Describe all survey results and include a copy of any focused (e.g., rare plant, protocol special-status wildlife) biological resources survey reports.

Mapping and GIS Data

Provide detailed maps (at approximately 1:3,000 scale or similar), and all associated GIS data for the Biological Resources Technical Report and any supporting biological survey reports, including:

a) Biological survey area for each survey that was conducted
b) Vegetation communities and land cover types
c) Aquatic resource delineation
d) Special-status plant locations
e) Special-status wildlife locations
f) Avian point count locations
g) Critical habitat
h) California Coastal Commission or Bay Conservation and Development Commission jurisdictional areas

Attachment 3: Cultural Resource Technical Report Standards

Cultural Resource Inventory Report

Provide a cultural resource inventory report that includes archaeological, unique archaeological, and built-environment resources within all areas that could be affected by the proposed project including areas of indirect effect. The inventory report will include the results of both a literature search and pedestrian survey. The contents will address the requirements in *Archaeological Resource Management Reports: Recommended Contents and Guidelines*. The methodology and results of the inventory should be sufficient to provide the reader with an understanding of the nature, character, and composition of newly discovered and previously identified cultural resources so that the required recommendations about the resource(s) CRHR eligibility are clearly understood. No information regarding the location of the cultural resources will be included in these descriptions. The required Department of Parks and Recreation (DPR) 523 forms, including location information and photographs of the resources, are to be included in a removable confidential appendix to the report.[39]

The inventory report will meet the following requirements:

a) The report should clearly discuss the methods used to identify unique archaeological resources (e.g., how the determination was made about the resources' eligibility).
b) The report should identify large resources such as districts and landscapes where resources indicate their presence, even if federal agencies disagree. It is understood that often only a few contributing elements may be in the project area, and that the boundaries of the large resource may need to be revisited as part of future projects. It is acknowledged that boundaries of districts and landscapes can be difficult to define and there is not always good recorded data on these resources.
c) In the case of archaeological resources, the report should discuss whether each one is also a unique archaeological resource and explain why or why not.
d) Descriptions of resources should include spatial relationships to other nearby resources, raw materials sources, and natural features such as water sources and mountains.
e) The evidence that indicates a particular function or age for a resource should be explicitly described with a clear explanation, not simply asserted.

Cultural Resource Evaluation Report

Provide a cultural resource evaluation report. The report contents required by the state of California are outlined in the *Archaeological Resource Management Reports: Recommended Contents and Guidelines*. The evaluation report should also include:

a) Resource descriptions and evaluations together, and not in separate volumes or report sections. This will facilitate understanding of each resource.
b) An evaluation of each potential or eligible California Register of Historical Resources (CRHR) resource within the public archaeology laboratory (PAL) for all seven aspects of integrity[40] using specific examples for each resource. This evaluation needs to be included in the evaluation

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[39] Any aspect of the PEA and associated data that Applicants believe to be confidential will be provided in full but may be marked confidential if allowed pursuant to General Order 66 or latest applicable Commission rule (e.g., see Public Records Act Proceeding R.14-11-001).

[40] The seven aspects of integrity are location, design, setting, materials, workmanship, feeling, and association, as defined in "***Types of Historical Resources and Criteria for Listing in the California Register of Historical Resources***" [14 CCR 4852(c)]).

report for all resources that could be affected by the project even if the resources were not previously evaluated. Previous evaluations should be reviewed to address change over time.

c) An evaluation of each potential or eligible CRHR resource within the PAL under all four criteria using specific examples for each resource. This evaluation needs to be included in the evaluation report for all resources that could be affected by the project even if the resources were not previously evaluated. The cultural resources professional should make their own recommendation regarding eligibility, which does not need to agree with previous recommendations for CRHR or NRHP, as long as it is clearly explained.

d) For **prehistoric archaeological resources**, Criteria 1, 2 and 3[41] should be explicitly considered. Research efforts to search for important events and persons related to the resource must be described. This evaluation needs to be included in the evaluation report for all resources that could be affected by the project even if the resources were not previously evaluated. The cultural resources professional should make their own recommendation, which does not need to agree with previous recommendations for CRHR or NRHP eligibility, as long as it is clearly explained.

e) While **potential unique archaeological resources** could be identified in the records search report or inventory report, the justification for each individual resource to be considered a resource under CEQA should be presented in this report.

f) If surface information collected during survey is sufficient to make an eligibility recommendation, this reasoning should be outlined explicitly for each resource. This is particularly the case for resources that are believed to have buried subsurface components.

g) If archaeological testing or additional historical research was required in order to evaluate a resource, the evaluation report will be explicit about why the work was required, the results for each resource, and the subsequent eligibility recommendation.

h) For large projects with multiple similar resources where the eligibility justifications for similar resources are essentially identical, it is acceptable to discuss these resources as a group. However, eligibility justifications for each individual resource is preferred, so if the grouping strategy is used, the criteria used to group resources must be clearly justified.

i) Large resources such as districts and landscapes may be challenging to fully evaluate in the context of a single project. CPUC encourages the identification and evaluation of these resources with the understanding that often only a few contributing elements may be located within the project area, and that the boundaries of the large resource may need to be revisited as part of future projects. It is understood that a full evaluation of the resource may be beyond the scope of one project. Regardless, the potential for the project to affect any resources within a district or landscape must be defined.

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[41] Criteria for Designation on the California Register are as follows (defined in http://ohp.parks.ca.gov/?page_id=21238):

- Criterion 1: Associated with events that have made a significant contribution to the broad patterns of local or regional history or the cultural heritage of California or the United States.
- Criterion 2: Associated with the lives of persons important to local, California or national history.
- Criterion 3: Embodies the distinctive characteristics of a type, period, region or method of construction or represents the work of a master or possesses high artistic values.
- Criterion 4: Has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California or the nation.

Attachment 4: CPUC Draft Environmental Measures

About this Attachment: The following CPUC Draft Environmental Measures are provided for consideration during PEA development. They should be discussed with the CPUC's CEQA Unit Staff during Pre-filing, especially with respect to the development of Applicant Proposed Measures. The CPUC Draft Environmental Measures may form the basis for mitigation measures in the CEQA document if appropriate to the analysis of potentially significant impacts. These and other CPUC Draft Environmental Measures may be formally incorporated into Chapter 5 of future versions of the PEA Checklist.

5.1 Aesthetics

Aesthetics Impact Reduction During Construction

All project sites will be maintained in a clean and orderly state. Construction staging areas will be sited away from public view where possible. Nighttime lighting will be directed away from residential areas and have shields to prevent light spillover effects. Upon completion of project construction, project staging and temporary work areas will be returned to pre-project conditions, including re-grading of the site and re-vegetation or re-paving of disturbed areas to match pre-existing contours and conditions.

5.3 Air Quality

Dust Control During Construction

The Applicant shall implement measures to control fugitive dust in compliance with all local air district(s) standards. Dust control measures shall include the following at a minimum:

- All exposed surfaces with the potential of dust-generating shall be watered or covered with coarse rock to reduce the potential for airborne dust from leaving the site.
- The simultaneous occurrence of more than two ground disturbing construction phases on the same area at any one time shall be limited. Activities shall be phased to reduce the amount of disturbed surfaces at any one time.
- Cover all haul trucks entering/leaving the site and trim their loads as necessary.
- Use wet power vacuum street sweepers to sweep all paved access road, parking areas, staging areas, and public roads adjacent to project sites on a daily basis (at minimum) during construction. The use of dry power sweeping is prohibited.
- All trucks and equipment, including their tires, shall be washed off prior to leaving project sites.
- Apply gravel or non-toxic soil stabilizers on all unpaved access roads, parking areas, and staging areas at project sites.
- Water and/or cover soil stockpiles daily.
- Vegetative ground cover shall be planted in disturbed areas as soon as possible and watered appropriately until vegetation is established.
- All vehicle speeds shall be limited to fifteen (15) miles per hour or less on unpaved areas.
- Implement dust monitoring in compliance with the standards of the local air district.
- Halt construction during any periods when wind speeds are in excess of 50 mph.

5.5 Cultural Resources

Human Remains (Construction and Maintenance)

Avoidance and protection of inadvertent discoveries that contain human remains shall be the preferred protection strategy with complete avoidance of such resources ensured by redesigning the project. If human remains are discovered during construction or maintenance activities, all work shall be diverted from the area of the discovery, and the CPUC shall be informed immediately. The Applicant shall contact the County Coroner to determine whether or not the remains are Native American. If the remains are determined to be Native American, the Coroner will contact the Native American Heritage Commission (NAHC). The NAHC will then identify the person or persons it believes to be the most likely descendant of the deceased Native American, who in turn would make recommendations for the appropriate means of treating the human remains and any associated funerary objects.

If the remains are on federal land, the remains shall be treated in accordance with the Native American Graves Protection and Repatriation Act (NAGPRA). If the remains are not on federal land, the remains shall be treated in accordance with Health and Safety Code Section 7050.5, CEQA Section 15064.5(e), and Public Resources Code Section 5097.98.

5.8 Greenhouse Gas Emissions

Greenhouse Gas Emissions Reduction During Construction

The following measures shall be implemented to minimize greenhouse gas emissions from all construction sites:

- If suitable park-and-ride facilities are available in the project vicinity, construction workers shall be encouraged to carpool to the job site.
- The Applicant shall develop a carpool program to the job site.
- On road and off-road vehicle tire pressures shall be maintained to manufacturer specifications. Tires shall be checked and re-inflated at regular intervals.
- Demolition debris shall be recycled for reuse to the extent feasible.
- The contractor shall use line power instead of diesel generators at all construction sites where line power is available.
- The contractor shall maintain construction equipment per manufacturing specifications.

5.19 Utilities and Service Systems

Notify Utilities with Facilities Above and Below Ground

The Applicant shall notify all utility companies with utilities located within or crossing the project ROW to locate and mark existing underground utilities along the entire length of the project at least 14 days prior to construction. No subsurface work shall be conducted that would conflict with (i.e., directly impact or compromise the integrity of) a buried utility. In the event of a conflict, areas of subsurface excavation or pole installation shall be realigned vertically and/or horizontally, as appropriate, to avoid other utilities and provide adequate operational and safety buffering. In instances where separation between third-party utilities and underground excavations is less than 5 feet, the Applicant shall submit the intended construction methodology to the owner of the third-party utility for review and approval at least 30 days prior to construction. Construction methods shall be adjusted as necessary to assure that the integrity of existing utility lines is not compromised.

5.20 Wildfire

Construction Fire Prevention Plan

A project-specific Construction Fire Prevention Plan for both construction and operation of the project shall be submitted for review prior to initiation of construction. A draft copy of the Plan shall be provided to the CPUC and state and local fire agencies at least 90 days before the start of any construction activities in areas designated as Very High or High Fire Hazard Severity Zones. Plan reviewers shall also include federal, state, or local agencies with jurisdiction over areas where the project is located. The final Plan shall be approved by the CPUC at least 30 days prior to the initiation of construction activities. The Plan shall be fully implemented throughout the construction period and include the following at a minimum:

- The purpose and applicability of the Plan
- Responsibilities and duties
- Preparedness training and drills
- Procedures for fire reporting, response, and prevention that include:
    - Identification of daily site-specific risk conditions
    - The tools and equipment needed on vehicles and to be on hand at sites
    - Reiteration of fire prevention and safety considerations during tailboard meetings
    - Daily monitoring of the red-flag warning system with appropriate restrictions on types and levels of permissible activity
- Coordination procedures with federal and local fire officials
- Crew training, including fire safety practices and restrictions
- Method(s) for verifying that all Plan protocols and requirements are being followed

A project Fire Marshal or similar qualified position shall be established to enforce all provisions of the Construction Fire Prevention Plan as well as perform other duties related to fire detection, prevention, and suppression for the project. Construction activities shall be monitored to ensure implementation and effectiveness of the Plan.

Fire Prevention Practices (Construction and Maintenance)

The Applicant shall implement ongoing fire patrols during the fire season as defined each year by local, state, and federal fire agencies. These dates vary from year to year, generally occurring from late spring through dry winter periods. During Red Flag Warning events, as issued daily by the National Weather Service, all construction/maintenance activities shall cease, with an exception for transmission line testing, repairs, unfinished work, or other specific activities which may be allowed if the facility/equipment poses a greater fire risk if left in its current state.

All construction/maintenance crews and inspectors shall be provided with radio and cellular telephone access that is operational in all work areas and access routes to allow for immediate reporting of fires. Communication pathways and equipment shall be tested and confirmed operational each day prior to initiating construction/maintenance activities at each work site. All fires shall be reported to the fire agencies with jurisdiction in the area immediately upon discovery of the ignition.

All construction/maintenance personnel shall be trained in fire-safe actions, initial attack firefighting, and fire reporting. All construction/maintenance personnel shall be trained and equipped to extinguish small fires in order to prevent them from growing into more serious threats. All construction/maintenance personnel shall carry at all times a laminated card and be provided a hard hat sticker that list pertinent telephone numbers for reporting fires and defining immediate steps to take if a fire starts. Information on laminated contact cards and hard hat stickers shall be updated and redistributed to all construction/maintenance personnel and outdated cards and hard hat stickers shall be destroyed prior to the initiation of construction/maintenance activities on the day the information change goes into effect.

Construction/maintenance personnel shall have fire suppression equipment on all construction vehicles. Construction/maintenance personnel shall be required to park vehicles away from dry vegetation. Water tanks and/or water trucks shall be sited or available at active project sites for fire protection during construction. The Applicant shall coordinate with applicable local fire departments prior to construction/maintenance activities to determine the appropriate amounts of fire equipment to be carried on vehicles and, should a fire occur, to coordinate fire suppression activities.

13.2.1 Paved Roads

13.2.1.1 General

Particulate emissions occur whenever vehicles travel over a paved surface such as a road or parking lot. Particulate emissions from paved roads are due to direct emissions from vehicles in the form of exhaust, brake wear and tire wear emissions and resuspension of loose material on the road surface. In general terms, resuspended particulate emissions from paved roads originate from, and result in the depletion of, the loose material present on the surface (i.e., the surface loading). In turn, that surface loading is continuously replenished by other sources. At industrial sites, surface loading is replenished by spillage of material and trackout from unpaved roads and staging areas. Figure 13.2.1-1 illustrates several transfer processes occurring on public streets.

Various field studies have found that public streets and highways, as well as roadways at industrial facilities, can be major sources of the atmospheric particulate matter within an area.[1-9] Of particular interest in many parts of the United States are the increased levels of emissions from public paved roads when the equilibrium between deposition and removal processes is upset. This situation can occur for various reasons, including application of granular materials for snow and ice control, mud/dirt carryout from construction activities in the area, and deposition from wind and/or water erosion of surrounding unstabilized areas. In the absence of continuous addition of fresh material (through localized track out or application of antiskid material), paved road surface loading should reach an equilibrium value in which the amount of material resuspended matches the amount replenished. The equilibrium surface loading value depends upon numerous factors. It is believed that the most important factors are: mean speed of vehicles traveling the road; the average daily traffic (ADT); the number of lanes and ADT per lane; the fraction of heavy vehicles (buses and trucks); and the presence/absence of curbs, storm sewers and parking lanes.[10]

The particulate emission factors presented in a previous version of this section of AP-42, dated October 2002, implicitly included the emissions from vehicles in the form of exhaust, brake wear, and tire wear as well as resuspended road surface material. EPA included these sources in the emission factor equation for paved roads since the field testing data used to develop the equation included both the direct emissions from vehicles and emissions from resuspension of road dust.

This version of the paved road emission factor equation only estimates particulate emissions from resuspended road surface material[28]. The particulate emissions from vehicle exhaust, brake wear, and tire wear are now estimated separately using EPA's MOVES[29] model. This approach eliminates the possibility of double counting emissions. Double counting results when employing the previous version of the emission factor equation in this section and MOVES to estimate particulate emissions from vehicle traffic on paved roads. It also incorporates the decrease in exhaust emissions that has occurred since the paved road emission factor equation was developed. Earlier versions of the paved road emission factor equation includes estimates of emissions from exhaust, brake wear, and tire wear based on emission rates for vehicles in the 1980 calendar year fleet. The amount of PM released from vehicle exhaust has decreased since 1980 due to lower new vehicle emission standards and changes in fuel characteristics.

13.2.1.2 Emissions And Correction Parameters

Dust emissions from paved roads have been found to vary with what is termed the "silt loading" present on the road surface. In addition, the average weight and speed of vehicles traveling the road influence road dust emissions. The term silt loading (sL) refers to the mass of silt-size material (equal to or less than 75 micrometers [µm] in physical diameter) per unit area of the travel surface. The total road surface dust loading consists of loose material that can be collected by broom sweeping and vacuuming of the traveled portion of the paved road. The silt fraction is determined by measuring the proportion of the loose dry surface dust that passes through a 200-mesh screen, using the ASTM-C-136 method. Silt loading is the product of the silt fraction and the total loading, and is abbreviated "sL". Additional details on the sampling and analysis of such material are provided in AP-42 Appendices C.1 and C.2.

The surface sL provides a reasonable means of characterizing seasonal variability in a paved road emission inventory. In many areas of the country, road surface loadings [11-21] are heaviest during the late winter and early spring months when the residual loading from snow/ice controls is greatest. As noted earlier, once replenishment of fresh material is eliminated, the road surface loading can be expected to reach an equilibrium value, which is substantially lower than the late winter/early spring values.

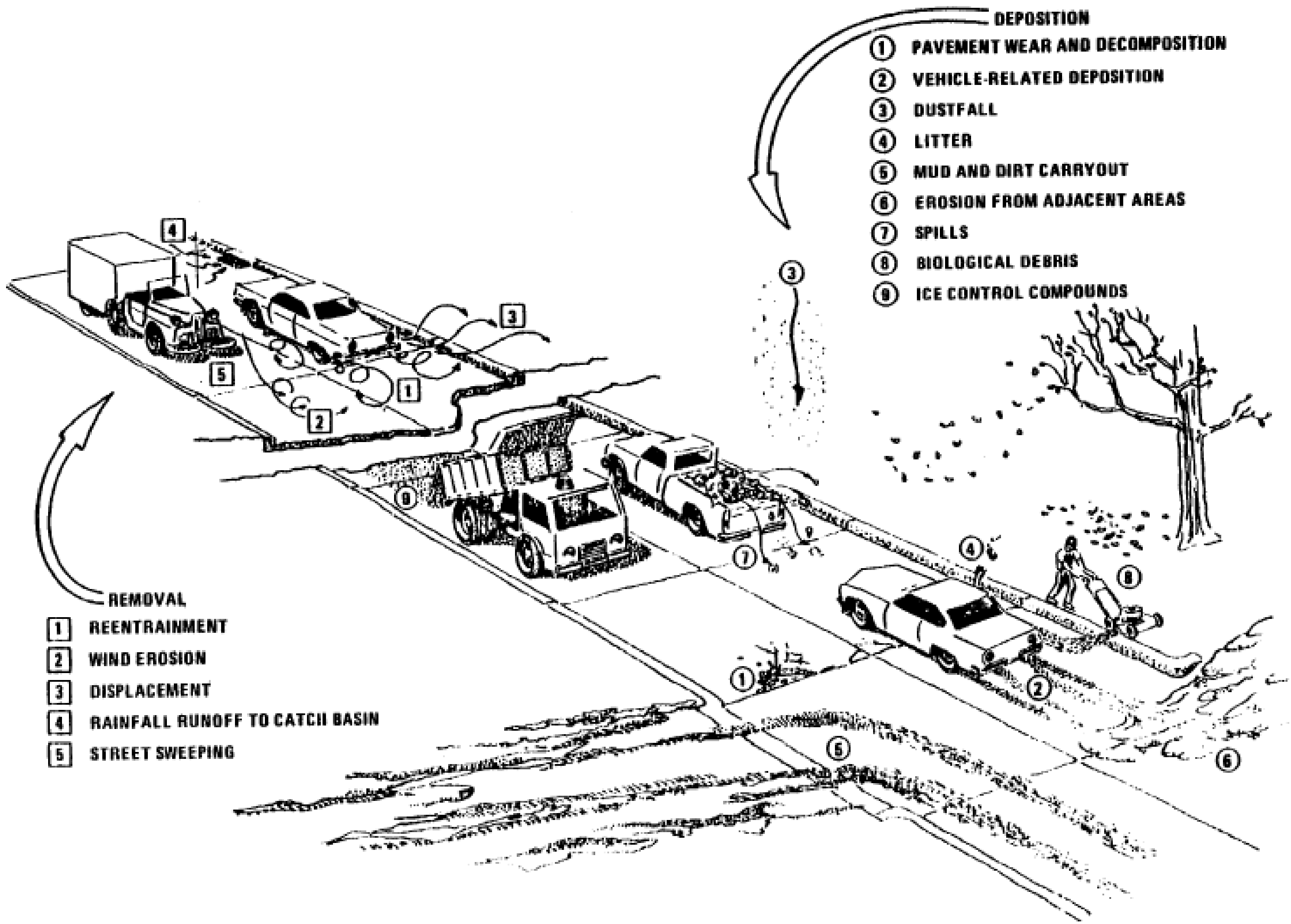

Figure 13.2.1-1. Deposition and removal processes.

13.2.1.3 Predictive Emission Factor Equations[10,29]

The quantity of particulate emissions from resuspension of loose material on the road surface due to vehicle travel on a dry paved road may be estimated using the following empirical expression:

$$E = k\,(sL)^{0.91} \times (W)^{1.02} \qquad (1)$$

where:
- E = particulate emission factor (having units matching the units of k),
- k = particle size multiplier for particle size range and units of interest (see below),
- sL = road surface silt loading (grams per square meter) (g/m^2), and
- W = average weight (tons) of the vehicles traveling the road.

It is important to note that Equation 1 calls for the average weight of all vehicles traveling the road. For example, if 99 percent of traffic on the road are 2 ton cars/trucks while the remaining 1 percent consists of 20 ton trucks, then the mean weight "W" is 2.2 tons. More specifically, Equation 1 is *not* intended to be used to calculate a separate emission factor for each vehicle weight class. Instead, only one emission factor should be calculated to represent the "fleet" average weight of all vehicles traveling the road.

The particle size multiplier (k) above varies with aerodynamic size range as shown in Table 13.2.1-1. To determine particulate emissions for a specific particle size range, use the appropriate value of k shown in Table 13.2.1-1.

To obtain the total emissions factor, the emissions factors for the exhaust, brake wear and tire wear obtained from either EPA's MOBILE6.2 [27] or most recent MOVES [29] software model should be added to the emissions factor calculated from the empirical equation.

Table 13.2.1-1. PARTICLE SIZE MULTIPLIERS FOR PAVED ROAD EQUATION

Size range[a]	Particle Size Multiplier k[b]		
	g/VKT	g/VMT	lb/VMT
PM-2.5[c]	0.15	0.25	0.00054
PM-10	0.62	1.00	0.0022
PM-15	0.77	1.23	0.0027
PM-30[d]	3.23	5.24	0.011

[a] Refers to airborne particulate matter (PM-x) with an aerodynamic diameter equal to or less than x micrometers.

[b] Units shown are grams per vehicle kilometer traveled (g/VKT), grams per vehicle mile traveled (g/VMT), and pounds per vehicle mile traveled (lb/VMT). The multiplier k includes unit conversions to produce emission factors in the units shown for the indicated size range from the mixed units required in Equation 1.

[c] The k-factors for $PM_{2.5}$ were based on the average $PM_{2.5}$:PM_{10} ratio of test runs in Reference 30.

[d] PM-30 is sometimes termed "suspendable particulate" (SP) and is often used as a surrogate for TSP.

Equation 1 is based on a regression analysis of 83 tests for PM-10.[3, 5-6, 8, 27-29, 31-36] Sources tested include public paved roads, as well as controlled and uncontrolled industrial paved roads. The majority of tests involved freely flowing vehicles traveling at constant speed on relatively level roads. However, 22 tests of slow moving or "stop-and-go" traffic or vehicles under load were available for inclusion in the data base.[32-36] Engine exhaust, tire wear and break wear were subtracted from the emissions measured in the test programs prior to stepwise regression to determine Equation 1.[37, 39] The equations retain the quality rating of A (D for PM-2.5), if applied within the range of source conditions that were tested in developing the equation as follows:

Silt loading:	0.03 - 400 g/m^2 0.04 - 570 grains/square foot (ft^2)
Mean vehicle weight:	1.8 - 38 megagrams (Mg) 2.0 - 42 tons
Mean vehicle speed:	1 - 88 kilometers per hour (kph) 1 - 55 miles per hour (mph)

The upper and lower 95% confidence levels of equation 1 for PM_{10} is best described with equations using an exponents of 1.14 and 0.677 for silt loading and an exponents of 1.19 and 0.85 for weight. Users are cautioned that application of equation 1 outside of the range of variables and operating conditions specified above, e.g., application to roadways or road networks with speeds above 55 mph and average vehicle weights of 42 tons, will result in emission estimates with a higher level of uncertainty. In these situations, users are encouraged to consider an assessment of the impacts of the influence of extrapolation to the overall emissions and alternative methods that are equally or more plausible in light of local emissions data and/or ambient concentration or compositional data.

To retain the quality rating for the emission factor equation when it is applied to a specific paved road, it is necessary that reliable correction parameter values for the specific road in question be determined. With the exception of limited access roadways, which are difficult to sample, the collection and use of site-specific silt loading (sL) data for public paved road emission inventories are strongly recommended. The field and laboratory procedures for determining surface material silt content and surface dust loading are summarized in Appendices C.1 and C.2. In the event that site-specific values cannot be obtained, an appropriate value for a paved public road may be selected from the values in Table 13.2.1-2, but the quality rating of the equation should be reduced by 2 levels.

Equation 1 may be extrapolated to average uncontrolled conditions (but including natural mitigation) under the simplifying assumption that annual (or other long-term) average emissions are inversely proportional to the frequency of measurable (> 0.254 mm [0.01 inch]) precipitation by application of a precipitation correction term. The precipitation correction term can be applied on a daily or an hourly basis [26, 38].

For the daily basis, Equation 1 becomes:

$$E_{ext} = [\ k\ (sL)^{0.91} \times (W)^{1.02}\ ]\ (1 - P/4N) \qquad (2)$$

where k, sL, W, and S are as defined in Equation 1 and

E_{ext} = annual or other long-term average emission factor in the same units as k,

P = number of "wet" days with at least 0.254 mm (0.01 in) of precipitation during the averaging period, and

N = number of days in the averaging period (e.g., 365 for annual, 91 for seasonal, 30 for monthly).

Note that the assumption leading to Equation 2 is based on analogy with the approach used to develop long-term average unpaved road emission factors in Section 13.2.2. However, Equation 2 above incorporates an additional factor of "4" in the denominator to account for the fact that paved roads dry more quickly than unpaved roads and that the precipitation may not occur over the complete 24-hour day.

For the hourly basis, equation 1 becomes:

$$E_{ext} = [\ k\ (sL)^{0.91} \times (W)^{1.02}\ ]\ (1 - 1.2P/N) \qquad (3)$$

where k, sL, W, and S are as defined in Equation 1 and

E_{ext} = annual or other long-term average emission factor in the same units as k,
P = number of hours with at least 0.254 mm (0.01 in) of precipitation during the averaging period, and
N = number of hours in the averaging period (e.g., 8760 for annual, 2124 for season 720 for monthly)

Note: In the hourly moisture correction term (1-1.2P/N) for equation 3, the 1.2 multiplier is applied to account for the residual mitigative effect of moisture. For most applications, this equation will produce satisfactory results. Users should select a time interval to include sufficient "dry" hours such that a reasonable emissions averaging period is evaluated. For the special case where this equation is used to calculate emissions on an hour by hour basis, such as would be done in some emissions modeling situations, the moisture correction term should be modified so that the moisture correction "credit" is applied to the first hours following cessation of precipitation. In this special case, it is suggested that this 20% "credit" be applied on a basis of one hour credit for each hour of precipitation up to a maximum of 12 hours.

Note that the assumption leading to Equation 3 is based on analogy with the approach used to develop long-term average unpaved road emission factors in Section 13.2.2.

Figure 13.2.1-2 presents the geographical distribution of "wet" days on an annual basis for the United States. Maps showing this information on a monthly basis are available in the *Climatic Atlas of the United States*[23]. Alternative sources include other Department of Commerce publications (such as local climatological data summaries). The National Climatic Data Center (NCDC) offers several products that provide hourly precipitation data. In particular, NCDC offers *Solar and Meteorological Surface Observation Network 1961-1990* (SAMSON) CD-ROM, which contains 30 years worth of hourly meteorological data for first-order National Weather Service locations. Whatever meteorological data are used, the source of that data and the averaging period should be clearly specified.

It is emphasized that the simple assumption underlying Equations 2 and 3 has not been verified in any rigorous manner. For that reason, the quality ratings for Equations 2 and 3 should be downgraded one letter from the rating that would be applied to Equation 1.

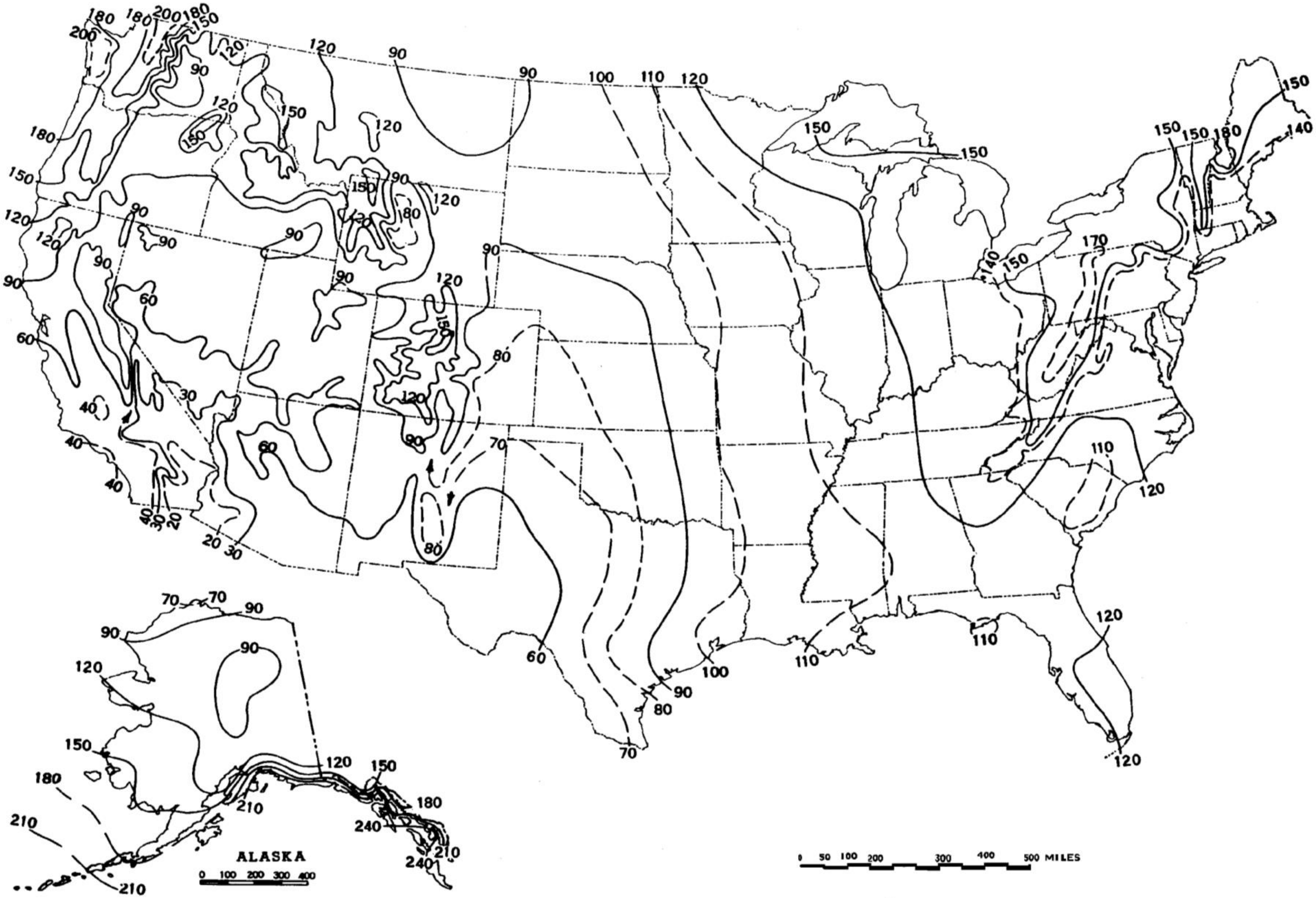

Figure 13.2.1-2. Mean number of days with 0.01 inch or more of precipitation in the United States.

Table 13.2.1-2 presents recommended default silt loadings for normal baseline conditions and for wintertime baseline conditions in areas that experience frozen precipitation with periodic application of antiskid material[24]. The winter baseline is represented as a multiple of the non-winter baseline, depending on the ADT value for the road in question. As shown, a multiplier of 4 is applied for low volume roads (< 500 ADT) to obtain a wintertime baseline silt loading of 4 X 0.6 = 2.4 g/m^2.

Table 13.2.1-2. Ubiquitous Silt Loading Default Values with Hot Spot Contributions from Anti-Skid Abrasives (g/m^2)

ADT Category	< 500	500-5,000	5,000-10,000	> 10,000
Ubiquitous Baseline g/m^2	0.6	0.2	0.06	0.03 0.015 limited access
Ubiquitous Winter Baseline Multiplier during months with frozen precipitation	X4	X3	X2	X1
Initial peak additive contribution from application of antiskid abrasive (g/m^2)	2	2	2	2
Days to return to baseline conditions (assume linear decay)	7	3	1	0.5

It is suggested that an additional (but temporary) silt loading contribution of 2 g/m^2 occurs with each application of antiskid abrasive for snow/ice control. This was determined based on a typical application rate of 500 lb per lane mile and an initial silt content of 1 % silt content. Ordinary rock salt and other chemical deicers add little to the silt loading, because most of the chemical dissolves during the snow/ice melting process.

To adjust the baseline silt loadings for mud/dirt trackout, the number of trackout points is required. It is recommended that in calculating PM_{10} emissions, six additional miles of road be added for each active trackout point from an active construction site, to the paved road mileage of the specified category within the county. In calculating $PM_{2.5}$ emissions, it is recommended that three additional miles of road be added for each trackout point from an active construction site.

It is suggested the number of trackout points for activities other than road and building construction areas be related to land use. For example, in rural farming areas, each mile of paved road would have a specified number of trackout points at intersections with unpaved roads. This value could be estimated from the unpaved road density (mi/sq. mi.).

The use of a default value from Table 13.2.1-2 should be expected to yield only an order-of-magnitude estimate of the emission factor. Public paved road silt loadings are dependent upon: traffic characteristics (speed, ADT, and fraction of heavy vehicles); road characteristics (curbs, number of lanes, parking lanes); local land use (agriculture, new residential construction) and regional/seasonal factors (snow/ice controls, wind blown dust). As a result, the collection and use of site-specific silt loading data is highly recommended. In the event that default silt loading values are used, the quality ratings for the equation should be downgraded 2 levels.

Limited access roadways pose severe logistical difficulties in terms of surface sampling, and few silt loading data are available for such roads. Nevertheless, the available data do not suggest great variation in silt loading for limited access roadways from one part of the country to another. For annual conditions, a default value of 0.015 g/m^2 is recommended for limited access roadways.[9,22] Even fewer of the available data correspond to worst-case situations, and elevated loadings are observed to be quickly depleted because of high traffic speeds and high ADT rates. A default value of 0.2 g/m^2 is recommended for short periods of time following application of snow/ice controls to limited access roads.[22]

The limited data on silt loading values for industrial roads have shown as much variability as public roads. Because of the variations of traffic conditions and the use of preventive mitigative controls, the data probably do not reflect the full extent of the potential variation in silt loading on industrial roads. However, the collection of site specific silt loading data from industrial roads is easier and safer than for public roads. Therefore, the collection and use of site-specific silt loading data is preferred and is highly recommended. In the event that site-specific values cannot be obtained, an appropriate value for an industrial road may be selected from the mean values given in Table 13.2.1-3, but the quality rating of the equation should be reduced by 2 levels.

The predictive accuracy of Equation 1 requires thorough on-site characterization of road silt loading. Road surface sampling is time-consuming and potentially hazardous because of the need to block traffic lanes. In addition, large number of samples is required to represent spatial and temporal variations across roadway networks. Mobile monitoring is a new alternative silt loading or road dust emission characterization method for either paved or unpaved roads. It utilizes a test vehicle that generates and monitors its own dust plume concentration (mass basis) at a fixed sampling probe location. A calibration factor is needed for each mobile monitoring configuration (test vehicle and sampling system), to convert the relative dust emission intensity to an equivalent silt loading or emission factor. Typically, portable continuous particle concentration monitors do not comply with Federal Reference Method (FRM) standards. Therefore, a controlled study must be performed to correlate the portable monitor response to the road silt loading or size specific particle concentration measured with an approved FRM sampling system. In the calibration tests, multiple test conditions should be performed to provide an average correlation with known precision and to accommodate variations in road silt loading, vehicle speed, road dust characteristics and other road conditions that may influence mobile monitoring measurements or emissions characteristics. Because the paved road dust emissions are also dependent on the average vehicle weight for the road segment, it is important that the weight of the test vehicle correspond closely to the average vehicle weight for the road segment or be adjusted using the average vehicle weight relationship in Equation 1. In summary, it is believed that the Mobile Monitoring Method will provide improved capabilities to provide reliable temporally and spatially resolved silt loading or emissions factors with increased coverage, improved safety, reduced traffic interference and decreased cost.[40, 41, 42]

Table 13.2.1-3 (Metric And English Units). TYPICAL SILT CONTENT AND LOADING VALUES FOR PAVED ROADS AT INDUSTRIAL FACILITIES [a]

Industry	No. of Sites	No. Of Samples	Silt Content (%)		No. of Travel Lanes	Total Loading x 10^{-3}			Silt Loading (g/m^2)	
			Range	Mean		Range	Mean	Units[b]	Range	Mean
Copper smelting	1	3	15.4-21.7	19.0	2	12.9 - 19.5	15.9	kg/km	188-400	292
						45.8 - 69.2	55.4	lb/mi		
Iron and steel production	9	48	1.1-35.7	12.5	2	0.006 - 4.77	0.495	kg/km	0.09-79	9.7
						0.020 -16.9	1.75	lb/mi		
Asphalt batching	1	3	2.6 - 4.6	3.3	1	12.1 - 18.0	14.9	kg/km	76-193	120
						43.0 - 64.0	52.8	lb/mi		
Concrete batching	1	3	5.2 - 6.0	5.5	2	1.4 - 1.8	1.7	kg/km	11-12	12
						5.0 - 6.4	5.9	lb/mi		
Sand and gravel processing	1	3	6.4 - 7.9	7.1	1	2.8 - 5.5	3.8	kg/km	53-95	70
						9.9 - 19.4	13.3	lb/mi		
Municipal solid waste landfill	2	7		-	2	-			1.1-32.0	7.4
Quarry	1	6		-	2	-			2.4-14	8.2
Corn wet mills	3	15		-	2	-			0.05 – 2.9	1.1

[a] References 1-2,5-6,11-13. Values represent samples collected from *industrial* roads. Public road silt loading values are presented in Table-13.2.1-2. Dashes indicate information not available.[b] Multiply entries by 1000 to obtain stated units; kilograms per kilometer (kg/km) and pounds per mile (lb/mi).

13.2.1.4 Controls[6,25]

Because of the importance of the silt loading, control techniques for paved roads attempt either to prevent material from being deposited onto the surface (preventive controls) or to remove from the travel lanes any material that has been deposited (mitigative controls). Covering of loads in trucks, and the paving of access areas to unpaved lots or construction sites, are examples of preventive measures. Examples of mitigative controls include vacuum sweeping, water flushing, and broom sweeping and flushing. Actual control efficiencies for any - of these techniques can be highly variable. Locally measured silt loadings before and after the application of controls is the preferred method to evaluate controls. It is particularly important to note that street sweeping of gutters and curb areas may actually increase the silt loading on the traveled portion of the road. Redistribution of loose material onto the travel lanes will actually produce a short-term increase in the emissions.

In general, preventive controls are usually more cost effective than mitigative controls. The cost-effectiveness of mitigative controls falls off dramatically as the size of an area to be treated increases. The cost-effectiveness of mitigative measures is also unfavorable if only a short period of time is required for the road to return to equilibrium silt loading condition. That is to say, the number and length of public roads within most areas of interest preclude any widespread and routine use of mitigative controls. On the other hand, because of the more limited scope of roads at an industrial site, mitigative measures may be used quite successfully (especially in situations where truck spillage occurs). Note, however, that public agencies could make effective use of mitigative controls to remove sand/salt from roads after the winter ends.

Because available controls will affect the silt loading, controlled emission factors may be obtained by substituting controlled silt loading values into the equation. (Emission factors from controlled industrial roads were used in the development of the equation.) The collection of surface loading samples from treated, as well as baseline (untreated), roads provides a means to track effectiveness of the controls over time. The use of Mobile Monitoring Methodologies provide an improved means to track progress in controlling silt loading values.

13.2.1.5 Changes since Fifth Edition

The following changes were made since the publication of the Fifth Edition of AP-42:

October 2002

1) The particle size multiplier for $PM_{2.5}$ was revised to 25% of PM_{10}. The approximately 55% reduction was a result of emission testing using FRM monitors. The monitoring was specifically intended to evaluate the PM-2.5 component of the emissions.

2) Default silt loading values were included in Table 13.2.1-2 replacing the Tables and Figures containing silt loading statistical information.

3) Editorial changes within the text were made indicating the possible causes of variations in the silt loading between roads within and among different locations. The uncertainty of using the default silt loading value was discussed.

4) Section 13.2.1.1 was revised to clarify the role of dust loading in resuspension. Additional minor text changes were made.

5) Equations 2 and 3, Figure 13.2.1-2, and text were added to incorporate natural mitigation into annual or other long-term average emission factors.

December 2003

1) The emission factor equation was adjusted to remove the component of particulate emissions- from exhaust, brake wear, and tire wear. A parameter C representing these emissions was included in the predictive equation. The parameter C varied with aerodynamic size range of the particulate matter. Table 13.2.1-2 was added to present the new coefficients.

2) The default silt loading values in Table 13.2.1-3 were revised to incorporate the results from a recent analysis of silt loading data.

November 2006

1) The $PM_{2.5}$ particle size multiplier was revised to 15% of PM_{10} as the result of wind tunnel studies of a variety of dust emitting surface materials.

2) References were rearranged and renumbered.

January 2011

1) The empirical predictive equation was revised. The revision is based upon stepwise regression of 83 profile emissions tests and an adjustment of individual test data for the exhaust; break wear and tire wear emissions prior to regression of the data.

2) The C term is removed from the empirical predictive equation and Table 13.2.1-2 with the C term values is removed since the exhaust; break wear and tire wear emissions were no longer part of the regressed data.

3) The $PM_{2.5}$ particle size multiplier was revised to 25% of PM_{10} since the PM_{10} test data used to develop the equation did not meet the necessary PM_{10} concentrations for a ratio of 15%.

4) The lower speed of the vehicle speed range supported by the empirical predictive equation was revised to 1 mph.

5) Information was added on an improved methodology to develop spatially and temporally resolved silt loadings or emissions factors by Mobile Monitoring Methodologies.

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Air Quality Analysis

EPA Region 9 Air Quality Maps and Geographic Information

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- Regional Maps (Arizona, California, Guam, Hawaii and Nevada)
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- California
- Nevada
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Below are links to air quality maps from EPA Region 9 (Arizona, California, Hawaii, and Nevada, and tribal lands in the Pacific Southwest). These maps provide information such as the level of air quality in specific areas, the borders of local air permitting agencies, and the location of specially protected federal lands.

Under Section 301(d) of the federal Clean Air Act, the EPA is authorized to treat Indian tribes as states. As such, Indian tribes do not fall under the permitting authority of state or local agencies. Instead, EPA retains permitting authority for all sources of air pollution that are located on tribal lands. However, EPA is developing regulations that will enable the transfer permitting authority to tribal governments on a case-by-case basis.

Regional Maps (Arizona, California, Guam, Hawaii and Nevada)

- Lead (Pb) Attainment Designations in Region 9
- California Air Basins and Counties in EPA Region 9
- Carbon Monoxide (CO) Attainment Designations
- Class I Federal Lands (Parks, Wilderness Areas, etc.)
- Federally-Recognized Tribes in EPA's Pacific Southwest (Region 9)
- Nitrogen Dioxide (NO_2) Attainment Designations
- Ozone (O3) Attainment Designations (2015 8-hour standard)
- Ozone (O_3) Attainment Designations (2008 8-hour standard)
- Ozone (O_3) Attainment Designations (1997 8-hour standard)
- Ozone (O_3) Attainment Designations (1-hour standard)
- 24-Hour Particulate Matter (24-Hour PM-2.5) Attainment Designations
- Annual Particulate Matter (PM-2.5) Attainment Designations
- Particulate Matter (PM-10) Attainment Designations
- Sulfur Dioxide (SO_2) Attainment Designations

Arizona Maps

- Class I Federal Lands (Parks, Wilderness Areas, etc.)
- Native American Tribal Lands and Reservations Web Version | (PDF) (1 pg, map, 210K)

California Maps

- Air Pollution Control District Boundaries and County Line EXIT EPA
- Class I Federal Lands (Parks, Wilderness Areas, etc.)
- Native American Tribal Lands and Reservations Web Version | (PDF) (1 pg, map, 305K)

Nevada Maps

- Class I Federal Lands (Parks, Wilderness Areas, etc.)
- Native American Tribal Lands and Reservations Web Version | (PDF) (1 pg, map, 189K)

For More Information

Fletcher Clover (clover.fletcher@epa.gov)

County Time Series

County Data Info

Please note, Palmer Drought Severity Index (PDSI), Palmer Hydrological Drought Index (PHDI), and Palmer Modified Drought Index (PMDI) are not offered for multiple-month time scales. Data are available for bulk download.

Parameter: Average Temperature

Time Scale: 1-Month

Month: July

Start Year: 1895

End Year: 2023

State: California

County: Ventura County

Base Period

Display Base Period

Start: 1901 End: 2000

Trend

Display Trend

per Decade per Century

Start: 1895 End: 2023

Filter

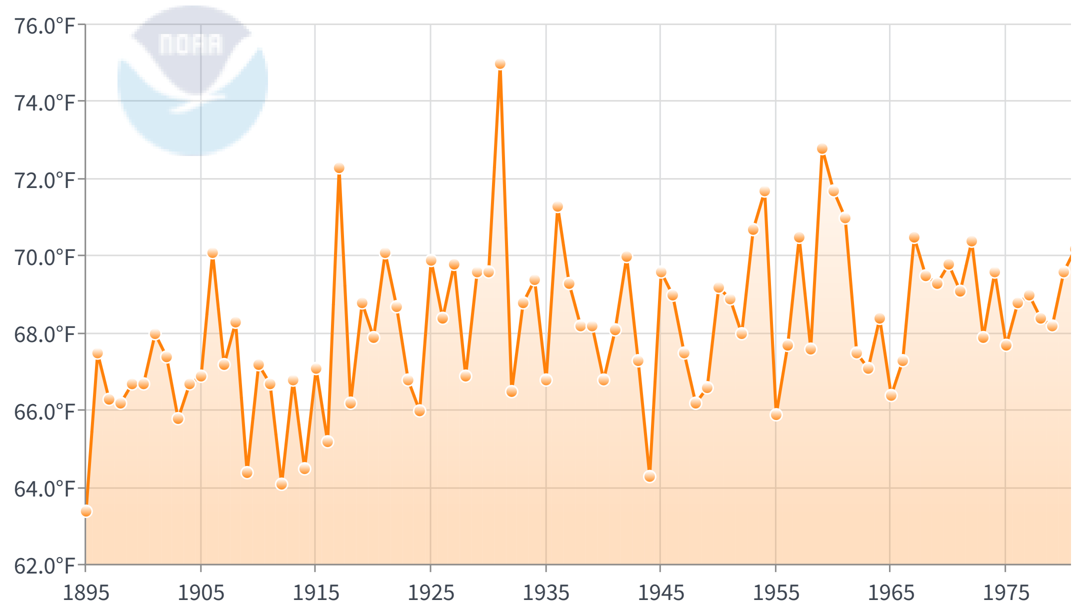
Smoothed Time Series

Binomial Filter LOESS

Plot

Ventura County, California Average Temperature

July



Download: CSV JSON XML

Ventura County, California Average Temperature

July

Date	Average Temperature	Rank (out of 129)
Jul 2023	73.0°F	123

Date	Average Temperature	Rank (out of 129)
Jul 2022	71.4°F	112
Jul 2021	73.5°F	124
Jul 2020	69.8°F	88
Jul 2019	70.3°F	97
Jul 2018	75.5°F	129
Jul 2017	73.8°F	126
Jul 2016	71.7°F	116
Jul 2015	70.2°F	96
Jul 2014	72.6°F	121
Jul 2013	71.9°F	117
Jul 2012	69.0°F	71
Jul 2011	70.1°F	93
Jul 2010	68.5°F	60
Jul 2009	71.5°F	113
Jul 2008	71.3°F	109
Jul 2007	71.4°F	112
Jul 2006	75.2°F	128
Jul 2005	72.2°F	118
Jul 2004	69.8°F	88

Date	Average Temperature	Rank (out of 129)
Jul 2003	73.7°F	125
Jul 2002	70.6°F	102
Jul 2001	68.2°F	50
Jul 2000	68.2°F	50
Jul 1999	68.8°F	63
Jul 1998	70.4°F	99
Jul 1997	68.3°F	55
Jul 1996	71.1°F	106
Jul 1995	69.3°F	76
Jul 1994	69.0°F	71
Jul 1993	67.7°F	39
Jul 1992	69.8°F	88
Jul 1991	68.0°F	45
Jul 1990	71.3°F	109
Jul 1989	70.2°F	96
Jul 1988	70.7°F	104
Jul 1987	64.6°F	6

Date	Average Temperature	Rank (out of 129)
Jul 1986	67.8°F	42
Jul 1985	71.4°F	112
Jul 1984	72.6°F	121
Jul 1983	68.6°F	61
Jul 1982	68.0°F	45
Jul 1981	70.2°F	96
Jul 1980	69.6°F	83
Jul 1979	68.2°F	50
Jul 1978	68.4°F	57
Jul 1977	69.0°F	71
Jul 1976	68.8°F	63
Jul 1975	67.7°F	39
Jul 1974	69.6°F	83
Jul 1973	67.9°F	43
Jul 1972	70.4°F	99
Jul 1971	69.1°F	72
Jul 1970	69.8°F	88

Date	Average Temperature	Rank (out of 129)
Jul 1969	69.3°F	76
Jul 1968	69.5°F	78
Jul 1967	70.5°F	101
Jul 1966	67.3°F	32
Jul 1965	66.4°F	15
Jul 1964	68.4°F	57
Jul 1963	67.1°F	28
Jul 1962	67.5°F	35
Jul 1961	71.0°F	105
Jul 1960	71.7°F	116
Jul 1959	72.8°F	122
Jul 1958	67.6°F	38
Jul 1957	70.5°F	101
Jul 1956	67.7°F	39
Jul 1955	65.9°F	9
Jul 1954	71.7°F	116
Jul 1953	70.7°F	104

Date	Average Temperature	Rank (out of 129)
Jul 1952	68.0°F	45
Jul 1951	68.9°F	67
Jul 1950	69.2°F	73
Jul 1949	66.6°F	17
Jul 1948	66.2°F	11
Jul 1947	67.5°F	35
Jul 1946	69.0°F	71
Jul 1945	69.6°F	83
Jul 1944	64.3°F	3
Jul 1943	67.3°F	32
Jul 1942	70.0°F	90
Jul 1941	68.1°F	49
Jul 1940	66.8°F	22
Jul 1939	68.2°F	50
Jul 1938	68.2°F	50
Jul 1937	69.3°F	76
Jul 1936	71.3°F	109

Date	Average Temperature	Rank (out of 129)
Jul 1935	66.8°F	22
Jul 1934	69.4°F	77
Jul 1933	68.8°F	63
Jul 1932	66.5°F	16
Jul 1931	75.0°F	127
Jul 1930	69.6°F	83
Jul 1929	69.6°F	83
Jul 1928	66.9°F	26
Jul 1927	69.8°F	88
Jul 1926	68.4°F	57
Jul 1925	69.9°F	89
Jul 1924	66.0°F	10
Jul 1923	66.8°F	22
Jul 1922	68.7°F	62
Jul 1921	70.1°F	93
Jul 1920	67.9°F	43
Jul 1919	68.8°F	63

Date	Average Temperature	Rank (out of 129)
Jul 1918	66.2°F	11
Jul 1917	72.3°F	119
Jul 1916	65.2°F	7
Jul 1915	67.1°F	28
Jul 1914	64.5°F	5
Jul 1913	66.8°F	22
Jul 1912	64.1°F	2
Jul 1911	66.7°F	18
Jul 1910	67.2°F	30
Jul 1909	64.4°F	4
Jul 1908	68.3°F	55
Jul 1907	67.2°F	30
Jul 1906	70.1°F	93
Jul 1905	66.9°F	26
Jul 1904	66.7°F	18
Jul 1903	65.8°F	8
Jul 1902	67.4°F	34

Date	Average Temperature	Rank (out of 129)
Jul 1901	68.0°F	45
Jul 1900	66.7°F	18
Jul 1899	66.7°F	18
Jul 1898	66.2°F	11
Jul 1897	66.3°F	14
Jul 1896	67.5°F	35
Jul 1895	63.4°F	1

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OFFICE OF ENVIRONMENTAL HEALTH HAZARD ASSESSMENT

Air Toxics Hot Spots Program

Risk Assessment Guidelines

Guidance Manual for Preparation of Health Risk Assessments

February 2015

Air, Community, and Environmental Research Branch
Office of Environmental Health Hazard Assessment
California Environmental Protection Agency

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Air Toxics Hot Spots Program
Risk Assessment Guidelines

The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments

Office of Environmental Health Hazard Assessment
California Environmental Protection Agency
George V. Alexeeff, Ph.D., Director

Project Leads: Daryn E. Dodge, Ph.D.[a] and Gregory Harris [b]

Reviewed by:

Melanie A. Marty, Ph.D.[a]
Assistant Deputy Director, Division of Scientific Affairs

David Siegel, Ph.D.[a]
Chief, Air, Community, and Environmental Research Branch

OEHHA acknowledges the following contributors:
Abdullah Mahmud, Ph.D [b]
Anthony Servin, P.E.[b]
Steven Yee [b]
Yan-Ping Zuo [b]
James F. Collins, Ph.D., D.A.B.T.[a]
Andrew G. Salmon, M.A., D.Phil.[a]
Aijun Albert Wang, Ph.D.[a]

[a] *Air, Community, and Environmental Research Branch*
Office of Environmental Health Hazard Assessment

[b] *California Air Resources Board*

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Preface

The draft of the *Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments* (Guidance Manual) is a description of the algorithms, recommended exposure variates, cancer and noncancer health values, and the air modeling protocols needed to perform a health risk assessment (HRA) under the Air Toxics Hot Spots Information and Assessment Act of 1987(Health and Safety Code Section 44300 et seq., see Appendix B). The Children's Environmental Health Protection Act of 1999 (Health and Safety Code Section 39606, also contained in Appendix B), which requires explicit consideration of infants and children in assessing risks from air toxics, necessitated revisions of the methods for both noncancer and cancer risk assessment, and of the exposure variates. This draft version of the Guidance Manual updates the previous version (OEHHA, 2003), and reflects advances in the field of risk assessment along with explicit consideration of infants and children.

The information presented in the draft manual is compiled from three technical support documents (TSDs) released by the Office of Environmental Health Hazard Assessment (OEHHA) for the Hot Spots Program. The three TSDs (which are also revised versions, replacing the original four Hot Spots TSDs adopted between 1999 and 2003) underwent public comment and peer review and were adopted for use in the Air Toxics Hot Spots program by the Director of OEHHA. The Technical Support Document for the Derivation of Noncancer Reference Exposure Levels (June, 2008) addressed the methodology for deriving acute, chronic and eight hour Reference Exposure Levels. The Technical Support Document for Cancer Potency Factors (May 2009) addresses the methodology for deriving cancer potency factors and adjusting cancer potency to account for the increased sensitivity of early-in-life exposure to carcinogens. The Technical Support Document for Exposure Assessment and Stochastic Analysis (June 2012) presents the exposure model for the Hot Spots program and reviews the available literature on exposure and relevant fate and transport variates. All three TSDs are available on OEHHA's web site at: http://www.oehha.ca.gov/air/hot_spots/index.html. Excerpts of these three TSDs are presented in this document. There is relatively little new information in the Guidance Manual since the adoption of the TSDs.

The draft Guidance Manual was released for public review. Public comments were received and changes were made in response to some comments. Responses were developed to all public comments. Both the Guidance Manual and OEHHA's response to comments were then reviewed by the State's Scientific Review Panel on Toxic Air Contaminants (SRP), who previously reviewed the three TSDs upon which this guidance is based. Following review by the SRP, OEHHA finalized this Guidance Manual. This Guidance Manual supersedes the risk assessment methods presented in the Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments (OEHHA, 2003), which in turn replaced earlier guidance provided by the California Air Pollution Control Officer's Association (CAPCOA, 1993). This manual updates health effects values, exposure pathway variates (e.g., breathing rates), and continues to use a tiered approach for performing HRAs based on current science and policy assessment. The Technical Support Document for Cancer Potency Factors (OEHHA, 2009) recommends a tenfold early-in-life potency factor adjustment for the third trimester and ages zero to less than two, and a threefold adjustment factor for ages two to less than sixteen. In addition, we recommend evaluating residency periods of nine, thirty and seventy years. This means that exposure variates are needed for the third trimester, ages zero to less than two, ages two to less than nine, ages two to less than 16, ages 16 to less than 30, and ages 16 to 70.

The tiered approach presented in this draft manual provides a risk assessor with flexibility and allows consideration of site-specific differences. Furthermore, risk assessors can tailor the level of effort and refinement of an HRA by using the point-estimate exposure variates or the stochastic treatment of distributions of exposure variates. The four-tiered approach to risk assessment primarily applies to residential cancer risk assessment. Compared to the OEHHA 2003 document, the exposure pathways in the Guidance Manual remain the same. The exposure and risk algorithms are similar, but they have been revised to accept new data or variables that are used in the tiered risk assessment approach.

The draft manual also contains example calculations and an outline for a modeling protocol and an HRA report. A software program, the Hot Spots Analysis and Reporting Program (HARP), has been developed by the Air Resources Board in consultation with OEHHA and Air Pollution Control/Air Quality Management District representatives. The HARP software, which is being updated with the new exposure variates and health values, is the recommended model for calculating and presenting HRA results for the Hot Spots Program. Information on obtaining the HARP software can be found on the ARB's web site at *www.arb.ca.gov* under the Hot Spots Program.

The intent of the Guidance Manual and the HARP software is to incorporate children's health concerns, update risk assessment practices, and to provide consistent risk assessment procedures. The use of consistent risk assessment methods and report presentation has many benefits, such as expediting the preparation and review of HRAs, minimizing revision and resubmission of HRAs, allowing a format for facility comparisons, and cost-effective implementation of HRAs and the Hot Spots Program. Risk assessments prepared with this Guidance Manual may be used for permitting new or modified stationary sources, or public notification, and risk reduction requirements of the Hot Spots Program. The use of uniform procedures allows comparison of risks from different facilities and enables identification of facilities that are problematic from a public health perspective. OEHHA reviews the HRAs to insure they are adequate for decision making, but does not play a role in permitting decisions that may result from the HRAs. OEHHA will provide advice to the Districts when requested on any of the risk assessment methods or health values they have used.

References

CAPCOA, 1993. CAPCOA Air Toxics Hot Spots Program Revised 1992 Risk Assessment Guidelines. California Air Pollution Control Officers Association, October 1993.

OEHHA, 2003. Air Toxics Hot Spots Risk Assessment Guidelines: The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments.

OEHHA, 2008. Air Toxics Hot Spots Risk Assessment Guidelines Technical Support Document for the Derivation of Noncancer Reference Exposure Levels. Available online at: http://www.oehha.ca.gov

OEHHA, 2009. Technical Support Document for Cancer Potency Factors: Methodologies for derivation, listing of available values, and adjustments to allow for early life stage exposures. May 2009. Available online at: http://www.oehha.ca.gov

OEHHA, 2012. Air Toxics Hot Spots Program Risk Assessment Guidelines; Technical Support Document for Exposure Assessment and Stochastic Analysis. Available online at http://www.oehha.ca.gov

1 - Introduction

1.1 Development of Guidelines

The Air Toxics Hot Spots Information and Assessment Act is designed to provide information to state and local agencies and to the general public on the extent of airborne emissions from stationary sources and the potential public health impacts of those emissions. The Hot Spots Act requires that the Office of Environmental Health Hazard Assessment (OEHHA) develop risk assessment guidelines for the Hot Spots program (Health and Safety Code (HSC) Section 44360(b)(2)) (see Appendix B for the text of the HSC). In addition, the Hot Spots Act specifically requires OEHHA to develop a "likelihood of risks" approach to health risk assessment. In response, OEHHA developed a tiered approach to risk assessment where a point estimate approach is first employed. If a more detailed analysis is needed, OEHHA has developed a stochastic, or probabilistic, approach using exposure factor distributions that can be applied in a stochastic estimate of the exposure. A detailed presentation of the tiered approach, risk assessment algorithms, selected exposure variates (e.g., breathing rate), and distributions with a literature review is presented in the *Air Toxics Hot Spots Program Risk Assessment Guidelines*; *Technical Support Document for Exposure Assessment and Stochastic Analysis* (OEHHA, 2012). A summary of this information can be found in Chapter 5 of this document.

The Technical Support Document for the Derivation of Noncancer Reference Exposure Levels (OEHHA, 2008) addresses dose response relationships for noncancer health effects and the methodology for deriving acute, chronic and 8-hour Reference Exposure Levels (RELs). Currently there are 53 acute RELs, 82 chronic RELs, and 10 eight-hour RELs. Review and revision of RELs to take into account new information and sensitive subpopulations including infants and children is an ongoing process. All draft RELs for individual chemicals revised under the current noncancer methodology will undergo public comment and peer review, as mandated by the Hot Spots Act. The Technical Support Document for Cancer Potency Factors (OEHHA, 2009) addresses the methodology for deriving cancer potency factors and adjusting cancer potency to account for the increased sensitivity to early-in-life exposure to carcinogens. This document contains inhalation cancer potency factors and oral cancer potency factors for 142 toxicants and toxicant compound classes developed by OEHHA or developed by other authoritative bodies and endorsed by OEHHA. The OEHHA website (*www.oehha.ca.gov*) should be consulted for the most current adopted chronic, acute and 8-hour RELs and cancer potency factors. In addition, for a small subset of these substances that are subject to airborne deposition and hence human oral and dermal exposure, oral chronic RELs and oral cancer potency factors have been developed by OEHHA. A summary of cancer and noncancer health effects values can be found in Appendix L and Chapters 6 and 7 of the Guidance Manual. All three Technical Support Documents have undergone public and peer review and have been approved by the state's Scientific Review Panel on Toxic Air Contaminants and adopted by OEHHA. The Guidance Manual is undergoing the same public and peer review process.

The Guidance Manual contains a description of the algorithms, recommended exposure variates, and cancer and noncancer health values, and modeling protocols needed to perform a Hot Spots risk assessment under the Hot Spots Act (see Appendix B). The information for the Guidance Manual is taken from the three TSDs. The Guidance Manual supersedes the risk assessment methods presented in the Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments (OEHHA, 2003).

The Guidance Manual is intended to address health risks from airborne contaminants released by stationary sources. Some of the methodology used is common to other regulatory risk assessment applications, particularly for California programs. However, if the reader needs to prepare a Health Risk Assessment (HRA) under another program, the HRA may need additional analyses. Therefore, appropriate California and federal agencies should be contacted. For example, if a facility must comply with HRA requirements under the Resource Conservation and Recovery Act (RCRA) or the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), the California Department of Toxic Substances Control (DTSC) must be contacted to determine if an HRA written to comply with AB 2588 will also satisfy RCRA/CERCLA requirements.

1.2 Use of the Guidance Manual

The intent in developing this Guidance Manual is to provide HRA procedures for use in the Air Toxics Hot Spots Program or for the permitting of existing, new, or modified stationary sources. The Air Resources Board (ARB) website (*www.arb.ca.gov*) provides more information on the Hot Spots Program and risk management guidelines, including recommendations for permitting existing, new, or modified stationary sources. The use of consistent risk assessment procedures and report presentation allows comparison of one facility to another, expedites the review of HRAs by reviewing agencies, and minimizes revision and resubmission of HRAs.

OEHHA recognizes that no one risk assessment procedure or set of exposure variates could perfectly address the many types of stationary facilities in diverse locations in California. Therefore a tiered risk assessment approach was developed to provide flexibility and allow consideration of site-specific differences. The tiered approach to risk assessment is discussed in detail in Chapter 8 of this Guidance.

These guidelines should be used in conjunction with the emission data collected and reported pursuant to requirements of the ARB's *Emission Inventory Criteria and Guidelines Regulations (Title 17, California Code of Regulations, Sections 93300-93300.5*), and the *Emission Inventory Criteria and Guidelines Report for the Air Toxics "Hot Spots" Program* (EICG Report), which is incorporated by reference therein (see ARB's web site: http://www.arb.ca.gov/ab2588/2588guid.htm for the most current version, which was approved on August 27, 2007). This regulation outlines requirements for the collection of emission data, based on an inventory plan, which must be approved by the Air Pollution Control or Air Quality Management District (District). The emissions reported under this program are routine or predictable and include continuous and intermittent releases and predictable process upsets or leaks. Emissions for unpredictable releases (e.g., accidental catastrophic releases) are not reported under this program.

For landfill sites, these guidelines should be applied to the results of the landfill testing required under Health and Safety Code Section 41805.5 as well as to any emissions reported under the emission inventory requirements of the Air Toxics Hot Spots Act (e.g., from flares or other on-site equipment). Districts should be consulted to determine the specific landfill testing data to be used.

1.3 Who is Required to Conduct a Risk Assessment

The Hot Spots Act requires that each local Air Pollution Control District or Air Quality Management District (hereinafter referred to as District) determine which facilities will prepare an HRA. As defined under the Hot Spots Act, an HRA includes a comprehensive analysis of the dispersion of hazardous substances in the environment, their potential for human exposure, and a quantitative assessment of both individual and population-wide health risks associated with those levels of exposure.

Districts are to determine which facilities will prepare an HRA based on a prioritization process outlined in the law. The process by which Districts identify priority facilities for risk assessment involves consideration of potency, toxicity, quantity of emissions, and proximity to sensitive receptors such as hospitals, daycare centers, schools, work-sites, and residences. The District may also consider other factors that may contribute to an increased potential for significant risk to human receptors. As part of this process Districts categorize facilities as high, intermediate, or low priority. The District prioritization process is described in the *CAPCOA Air Toxics Hot Spots Program Facility Prioritization Guidelines, July 1990* (CAPCOA, 1990), although some Districts may have adopted their own method for prioritizing facilities for the purposes of AB2588, permitting, etc. Consult the District for updates to the Prioritization Guidelines. See the Hot Spots Program on ARB's web site at www.arb.ca.gov for more information on facility prioritization procedures.

Facilities designated by a District as "high priority" are required to submit an HRA to the District within 150 days of designation. Districts may grant a 30-day extension. However, a District may require any facility to prepare and submit an HRA according to the District priorities established for purposes of the Hot Spots Act.

1.4 The Hot Spots Analysis and Reporting Program (HARP) Software

The ARB and the Districts have identified a critical need for software to assist with the programmatic aspects of the Hot Spots Program. HARP is computer software used by the ARB, OEHHA, Districts, and facility operators to promote statewide consistency, efficiency, and cost-effective implementation of HRAs and the Hot Spots Program. The HARP software package includes: 1) an Emissions Inventory Database Module, 2) an Air Dispersion Modeling Module, and 3) a Risk Analysis Module. The user-friendly Windows-based package provides for:

1. Electronic implementation of the risk assessment methods presented in the OEHHA guidelines (Guidance Manual);
2. Electronic data transfer from facilities and Districts;
3. The production of reports;
4. Facility prioritization;
5. Air dispersion modeling (AERMOD) of multiple emission releases or facilities for cumulative impact evaluations;
6. A summary report of acute, 8-hour, and chronic health hazard quotients or indices, and cancer risk at the point of maximum impact (PMI), maximally exposed individual resident (MEIR), maximally exposed individual worker (MEIW) and other receptors to be evaluated as needed;
7. Mapping displays of facility property boundaries, risk isopleths, and elevation contours;
8. The ability to display combined risk contours from multiple emission sources;
9. Output of data for use in other “off-the-shelf” Geographic Information Systems (GIS) programs for additional types of analysis; and
10. Census data for determining population-related health impacts showing the number of people exposed at various cancer risk levels and cancer burden.

1.5 Risk Assessment Review Process

The Hot Spots Act risk assessments are reviewed by the local District and by OEHHA. The Districts focus their review on the emissions data and the air dispersion modeling. OEHHA provides comments on the HRA’s general concordance with the Guidelines Manual and the completeness of the reported health risks. The District, taking into account the comments of OEHHA, approves the HRA or returns it to the facility for revision and resubmission. If the HRA is not revised and resubmitted by the facility within 60 days, the District may modify the HRA and approve it as modified. Based on the approved HRA, the District determines if there is a significant health risk associated with emissions from the facility. If the District determines that facility emissions pose a significant health risk, the facility operator provides notice to all exposed individuals regarding the results of the HRA and may be required to take steps to reduce emissions by implementing a risk reduction audit and plan. Notification is to be made according to procedures specified by the District. Each District determines its own levels of significance for cancer and noncancer health effects for notification and risk reduction. See the Hot Spots Program on ARB's web site at www.arb.ca.gov for more information on significance levels selected by each District.

1.6 Uncertainty in Risk Assessment

OEHHA has striven to use the best science available in developing these risk assessment guidelines. However, there is a great deal of uncertainty associated with the process of risk assessment. The uncertainty arises from lack of data in many areas necessitating the use of assumptions. The assumptions used in these guidelines are designed to err on the side of health protection in order to avoid underestimation of risk to the public. Sources of uncertainty, which may overestimate or underestimate risk, include: 1) extrapolation of toxicity data in animals to humans, 2) uncertainty in the estimation of emissions, 3) uncertainty in the air dispersion models, and 4) uncertainty in the exposure estimates. In addition to uncertainty, there is a natural range or variability in measured parameters defining the exposure scenario. Scientific studies with representative sampling and large enough sample sizes can characterize this variability. In the specific context of a Hot Spots risk assessment, the source of variability with the greatest quantitative impact is variation among the human population in such properties as height, weight, food consumption, breathing rates, and susceptibility to chemical toxicants. OEHHA captures at least some of the variability in exposure by developing data driven distributions of intake rates, where feasible, in the TSD for Exposure Assessment (OEHHA, 2012).

Interactive effects of exposure to more than one carcinogen or toxicant are addressed in the risk assessment with default assumptions of additivity. Cancer risks from all carcinogens addressed in the HRA are added. Similarly, non-cancer hazard quotients for substances impacting the same target organ/system are added to determine the hazard index (HI). Although such effects of multiple chemicals are assumed to be additive by default, several examples of synergism (interactive effects greater than additive) are known. For substances that act synergistically, the HRA could underestimate the risks. Some substances may have antagonistic effects (lessen the toxic effects produced by another substance). For substances that act antagonistically, the HRA could overestimate the risks.

Other sources of uncertainty, which may underestimate or overestimate risk, can be found in exposure estimates where little or no data are available (e.g., soil half-life and dermal penetration of some substances from a soil matrix).

The differences among species and within human populations usually cannot be easily quantified and incorporated into risk assessments. Factors including metabolism, target site sensitivity, diet, immunological responses, and genetics may influence the response to toxicants. The human population is much more diverse both genetically and culturally (e.g., lifestyle, diet) than inbred experimental animals. The intraspecies variability among humans is expected to be much greater than in laboratory animals.

In most cases, cancer potency values have been estimated only for the single most affected tumor site. This represents a source of uncertainty in the cancer risk assessment. Adjustment for tumors at multiple sites induced by some carcinogens may result in a higher potency. Some recent assessments of carcinogens include such adjustments. Other uncertainties arise 1) in the assumptions underlying the dose-response model used, and 2) in extrapolating from large experimental doses, where other toxic effects may compromise the assessment of carcinogenic potential, to usually much smaller environmental doses.

When occupational epidemiological data are used to generate a carcinogenic potency or a health protective level for a non-carcinogen, less uncertainty is involved in the extrapolation from workplace exposures to environmental exposures. When using human data, no interspecies extrapolation is necessary eliminating a significant source of uncertainty. However, children are a subpopulation with hematological, nervous, endocrine, and immune systems that are still developing and may be more sensitive to the effects of toxicants. The worker population and risk estimates based on occupational epidemiological data are more uncertain for children than adults. Current risk assessment guidelines include procedures designed to address the possibly greater sensitivity of infants and children, but there are only a few compounds for which these effects have actually been measured experimentally. In most cases, the adjustment relies on default assumptions which may either underestimate or overestimate the true risks faced by infants and children exposed to toxic substances or carcinogens.

Risk estimates generated by an HRA should not be interpreted as the expected rates of disease in the exposed population but rather as estimates of potential for disease, based on current knowledge and a number of assumptions.

In the Hot Spots program, cancer risk is often expressed as the maximum number of new cases of cancer projected to occur in a population of one million people due to exposure to the cancer-causing substance over a 30-year residential period. However, there is uncertainty associated with the cancer risk estimate. An individual’s risk of contracting cancer from exposure to facility emissions may be less or more than the risk calculated in the risk assessment. An individual’s risk not only depends on the individual’s exposure to a specific chemical but also on his or her genetic background, health, diet, lifestyle choices and other environmental and workplace exposures. OEHHA uses health-protective exposure assumptions to avoid underestimating risk. For example, the risk estimate for airborne exposure to chemical emissions uses the health-protective assumption that the individual has a high breathing rate and exposure began early in life when cancer risk is highest.

A Reference Exposure Level (REL) is the concentration level at or below which no adverse non-cancer health effects are anticipated for the specified exposure duration. RELs are based on the most sensitive, relevant, adverse health effect reported in the medical and toxicological literature. RELs are designed to protect the most sensitive individuals in the population by the inclusion of factors that account for uncertainties as well as individual differences in human susceptibility to chemical exposures. The factors used in the calculation of RELs are meant to err on the side of public health protection in order to avoid underestimation of non-cancer hazards. Exceeding the REL does not automatically indicate an adverse health impact. However, increasing concentrations above the REL value increases the likelihood that the health effect will occur.

Risk assessments under the Hot Spots program are often used to compare one source with another and to prioritize concerns. Consistent approaches to risk assessment are necessary to fulfill this function.

1.7 Tiered Approach to Risk Assessment

OEHHA developed a tiered approach to accommodate consideration of site-specific data that may be more appropriate for a given facility than the default variate. The first tier is the simplest point estimate approach to estimating exposure to facility emissions. Tier 1 is the first step in conducting a comprehensive risk assessment using algorithms and point estimates of input values described in the *Technical Support Document for Exposure Assessment and Stochastic Analysis*. (OEHHA, 2012) Each facility conducts a Tier 1 risk assessment to promote consistency across the state in facility risk assessments and facilitate comparisons across facilities. To be health-protective, high-end estimates for the key intake exposure variates are used for the dominant exposure pathways.

Tier 2 allows use of site-specific point estimates of exposure variates as long as these estimates can be justified. For example, if there are data indicating that consumption of fish from an impacted body of water is lower than the OEHHA-recommended fish consumption rate, then the facility can use that data to generate a point estimate for sport-fish consumption from that body of water. The risk assessor must supply the data and methods used for the site-specific estimates, and the site-specific estimates must be reproducible and approved by both the District and OEHHA.

Tier 3 risk assessment involves stochastic analysis of exposure using data-based distributions for the key exposure variates compiled in the OEHHA (2012) *Technical Support Document*. Since a stochastic approach to risk assessment provides more information about the range of risk estimates based on the range of exposures, Tier 3 can serve as a useful supplement to the Tier 1 and 2 approaches. Variance propagation methods (e.g., Monte Carlo analysis) are used to derive a range of cancer risk estimates reflecting the known variability in the inputs. Finally, a Tier 4 approach would use distributions of exposure variates that may be more appropriate for a site, such as the distribution of fish consumption rates for a specific body of water impacted by a facility. As in a Tier 2 approach, the risk assessment must supply the data and methods used for the site-specific distributions for exposure variates, and the site-specific estimates must be justified to and reproducible by the Districts and OEHHA.

1.8 References

CAPCOA, 1990. *CAPCOA Air Toxics Hot Spots Program Facility Prioritization Guidelines.* California Air Pollution Control Officers Association, July 1990.

OEHHA, 2003. Air Toxics Hot Spots Risk Assessment Guidelines: The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments.

OEHHA, 2008. Air Toxics Hot Spots Risk Assessment Guidelines Technical Support Document for the Derivation of Noncancer Reference Exposure Levels. Available online at: http://www.oehha.ca.gov

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OEHHA, 2012. Air Toxics Hot Spots Program Risk Assessment Guidelines; Technical Support Document for Exposure Assessment and Stochastic Analysis. Available online at http://www.oehha.ca.gov

2 - Overview of Health Risk Assessment

2.1 The Model for Risk Assessment

The standard approach currently used for health risk assessment (HRA) was originally proposed by the National Academy of Sciences in the 1983 book: *Risk Assessment in the Federal Government: Managing the Process* (NAS, 1983) and was updated in the Academy's 1994 book: *Science and Judgment in Risk Assessment* (NAS, 1994). In 2009 the National Academy published *Science and Decisions: Advancing Risk Assessment* (NAS, 2009), in which a number of recommendations are made on improving the risk assessment process and expanding it to include community concerns and cumulative risks. The four steps involved in the risk assessment process are 1) hazard identification, 2) exposure assessment, 3) dose-response assessment, and 4) risk characterization. These four steps are briefly discussed below.

2.2 Hazard Identification

For air toxics sources, hazard identification involves the pollutant(s) of concern emitted by a facility, and the types of adverse health effects associated with exposure to the chemical(s), including whether a pollutant is a potential human carcinogen or is associated with other types of adverse health effects. For the Air Toxics Hot Spots Program (Hot Spots), the emitted substances that are addressed in a risk assessment are found in the list of substances designated in the ARB's *Emission Inventory Criteria and Guidelines Regulations (Title 17, California Code of Regulations, Sections 93300-93300.5), and the Emission Inventory Criteria and Guidelines Report* (EICG Report), which is incorporated by reference therein (ARB, 2007*)*. This list of substances is contained in Appendix A of this document and the EICG Report. The list of substances also identifies those substances that are considered human carcinogens or potential human carcinogens.

2.3 Exposure Assessment

The purpose of the exposure assessment is to estimate the extent of public exposure to emitted substances. For the Hot spots program, in practice this means estimating exposures for those emitted substances for which potential cancer risk or noncancer health hazards for acute, repeated 8-hour, and chronic exposures will be evaluated. This involves emission quantification, modeling of environmental transport, evaluation of environmental fate, identification of exposure routes, identification of exposed populations, and estimation of short-term (e.g., 1-hour maximum), 8-hour average, and long-term (annual) exposure levels. These activities are described in Chapters 4 and 5. Chapter 5 also discusses the tiered approach to risk assessment.

The ARB's Emission Inventory Criteria and Guidelines (EICG) Report provides assistance in determining those substances that must be evaluated in an HRA and the reporting requirements of facilities, while the Hot Spots Analysis and Reporting Program (HARP) software can be used to model ground level concentrations at specific off-site locations resulting from facility emissions. The United States Environmental Protection Agency (U.S. EPA) has adopted the AERMOD air dispersion model into its list of regulatory approved models, in place of the previously used ISCST3 model. AERMOD is a steady-state plume model that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and both simple and complex terrain (U.S. EPA, 2009). The Air Resources Board recommends AERMOD for Hot Spots risk assessments. The AERMOD air modeling software will be incorporated into the HARP software, which allows the user to input all dispersion parameters directly into the program to generate air dispersion data. Alternatively, the air dispersion data may be generated separately from HARP using other air dispersion models, and then imported into HARP to generate risk estimates. Data imported into HARP must already be in the format required by HARP. HARP has the flexibility to generate a summary of the risk data necessary for an HRA by either of the above approaches.

Most of the toxicants assessed under the Hot Spots program are volatile organic compounds that remain as gases when emitted into the air. These chemicals are not subject to appreciable deposition to soil, surface waters, or plants. Therefore, human exposure via ingestion or dermal exposure, at least at concentrations typically encountered in the ambient air, is not considered for volatile organic compounds in the Hot Spots risk assessments. While some models indicate potential for dermal exposure to certain volatile organic compounds, at this time, the Hot spots program does not consider this pathway. Significant exposure to volatile organic toxicants emitted into the air occurs through the inhalation pathway, and this pathway is the primary consideration in the Hot Spots risk assessments. A small subset of Hot Spots substances consists of semi-volatile organic and metal toxicants emitted partially or totally as particles subject to deposition. Ingestion and dermal pathways as well as the inhalation pathway must be evaluated for these chemicals. A few of these semi-volatile organic and metal toxicants must also include the breast milk ingestion pathway. Additional ingestion pathways may also need to be evaluated depending on the pathways of exposure for the specific receptor of interest. Table 5.1 in Chapter 5, Table 6.4 in Chapter 6, and Table 7.1 in Chapter 7 list the substances that must be evaluated for multipathway impacts. HARP is designed to assess potential health impacts posed by substances that must be analyzed by a multipathway approach.

2.4 Dose-Response Assessment

Dose-response assessment is the process of characterizing the relationship between exposure to an agent and incidence of an adverse health effect in exposed populations. In quantitative carcinogenic risk assessment, the dose-response relationship is expressed in terms of a potency slope that is used to calculate the probability or risk of cancer associated with an estimated exposure. Cancer potency factors are expressed as the 95^{th} percent upper confidence limit of the slope of the dose response curve estimated assuming continuous lifetime exposure to a substance. Typically, potency factors are expressed as units of inverse dose (e.g., $(mg/kg\ BW/day)^{-1}$) or inverse concentration (e.g., $(\mu g/m^3)^{-1}$). It is assumed in cancer risk assessments that risk is directly proportional to dose and that there is no threshold for carcinogenesis.

The Office of Environmental Health Hazard Assessment (OEHHA) has compiled cancer potency factors, which should be used in risk assessments for the Hot Spots program, in Table 7.1. Cancer potency factors listed in Table 7.1 were derived either by the U.S. EPA or by OEHHA, underwent public and peer-review, and were adopted for use in the program. Chapter 8 describes procedures for use of potency values in estimating excess cancer risk. For a detailed description of cancer potency factors, refer to the *Technical Support Document for Cancer Potency Factors* (OEHHA, 2009).

For noncarcinogenic effects, dose-response data developed from animal or human studies are used to develop acute, 8-hour, and chronic noncancer Reference Exposure Levels (RELs). The acute, 8-hour and chronic RELs are defined as the concentration at which no adverse noncancer health effects are anticipated even in sensitive members of the general population, with infrequent one hour exposures, repeated 8-hour exposures over a significant fraction of a lifetime, or continuous exposure over a significant fraction of a lifetime, respectively. The most sensitive health effect is chosen to develop the REL if the chemical affects multiple organ systems. Unlike cancer health effects, noncancer health effects are generally assumed to have thresholds for adverse effects. In other words, injury from a pollutant will not occur until exposure to that pollutant has reached or exceeded a certain concentration (i.e., threshold) and/or dose. The acute, 8-hour, and chronic RELs are air concentrations intended to be below the threshold for health effects for the general population.

The actual threshold for health effects in the general population is generally not known with any precision. Uncertainty factors are applied to the Lowest Observed Adverse Effects Level (LOAEL) or No Observed Adverse Effects Level (NOAEL) or Benchmark Concentration values from animal or human studies to help ensure that the chronic, 8-hour and acute REL values are below the threshold for human health for nearly all individuals. This guidance manual provides the acute, 8-hour, and chronic Reference Exposure Levels in Tables 6.1 through 6.3. Some substances that pose a chronic or repeated 8-hour inhalation hazard may also present a chronic hazard via non-inhalation routes of exposure (e.g., ingestion of contaminated water, foods, or soils, and dermal absorption). The oral RELs for these substances are presented in Table 6.4. The methodology and derivations for acute, 8-hour, and chronic, RELs are described in the *Technical Support Document for the Derivation of Noncancer Reference Exposure Levels* (OEHHA, 2008).

2.5 Risk Characterization

This is the final step of risk assessment. In this step, modeled concentrations and exposure information, which are determined through exposure assessment, are combined with potency factors and RELs that are developed through dose-response assessment. The use of cancer potency factors to assess total cancer risk and the use of the hazard index approach for evaluating the potential for noncarcinogenic health effects are described in Chapter 8. Example calculations for determining (inhalation) cancer risk and noncancer acute, 8-hour, and chronic hazard quotients and hazard indices are presented in Appendix I. Chapter 9 provides an outline that specifies the content and recommended format of HRA results.

Under the Hot Spots Act, health risk assessments are to quantify both individual and population-wide health impacts (Health and Safety Code, Section 44306) (Appendix B). The health risk assessments are facility specific and the calculated risk should be combined for all pollutants emitted by a single facility. For example, cancer risk from multiple carcinogens is considered additive. For exposures to multiple non-carcinogen pollutants, a hazard index approach is applied for air contaminants affecting the same organ system. All substances emitted by the facility that are on the Hot Spots Act list of substances must be identified in the HRA, including those on the list that do not have a potency value or REL.

For assessing risk, OEHHA has developed two methods for determining dose via inhalation, dermal absorption, and ingestion pathways. These two methods, the point estimate approach and the stochastic exposure assessment approach, are described below and in Chapters 5 and 8. Detailed presentations of these methods can be found in*: Technical Support Document for Exposure Assessment and Stochastic Analysis* (OEHHA, 2012*)*.

2.5.1 *Point Estimate Approach*

OEHHA provides information in this document on average and high-end values for key exposure pathways (e.g., breathing rate for the inhalation exposure pathway). The average and high-end of point estimates in this document are defined in terms of the probability distribution of values for that variate. The mean represents the average values for point estimates and the 95^{th} percentiles represent the high-end point estimates from the distributions identified in OEHHA (2012). Thus, within the limitations of the data, average and high-end point estimates are supported by the distribution.

Tier 1 of the tiered approach to risk assessment, which is briefly discussed in Section 2.5.3 and presented in more detail in Chapter 8, utilizes a combination of the average and high-end point estimates to more realistically estimate exposure in multipathway risk assessments. This method uses high-end exposure estimates for the pathways that are the main drivers of exposure and the average point estimate for the other non-driving exposure pathways. This approach will lessen the issue of compounding high-end exposure estimates, while retaining a health-protective approach for the more important exposure pathways. It is unlikely that an individual receptor would be on the high-end of exposure for all exposure pathways. See Chapter 8 for detailed discussions of how this multipathway methodology is applied to cancer and noncancer calculations. The HARP software can perform this analysis (referred to as the derived approach in the HARP software).

In addition to using an estimate of average and high-end consumption rates, cancer risk evaluations at individual receptors are presented for 9, 30, and 70-year exposure durations. The 9 and 30-year durations correspond to the average and high-end of residency time recommended by U.S. EPA (1997). The California data presented in Appendix L of the Exposure TSD (OEHHA, 2012) are generally supportive of the nationwide data. The 9 and 70-year exposure durations present potential impacts over the range of residency periods, while the 30-year exposure duration is recommended for use as the basis for estimating cancer risk at the MEIR in all HRAs. Population-wide impacts should use the 70-year exposure duration.

The parameters used for all exposure durations assume exposure begins in the last trimester of pregnancy and progresses through the exposure duration of interest (e.g., 9, 30, or 70 years). These assumptions are thus protective of children. Children have higher intake rates on a per kilogram body weight basis (e.g., they breathe, drink and eat more per kg body weight than adults) and thus receive a higher dose from contaminated media. See Chapter 5 for the point estimates that can be used to estimate impacts for children. Chapters 5 and 8 discuss how to calculate cancer risk based on various exposure durations and point estimates. Appendix I contains an example calculation and Chapter 9 clarifies how to present the findings in an HRA.

2.5.2 *Stochastic Exposure Assessment*

OEHHA was directed under the Air Toxics "Hot Spots" program (SB 1731, Calderon, stat. 1992; Health and Safety Code Section 44360(b)(2)) to develop a "likelihood of risk" approach to risk assessment. To satisfy this requirement, OEHHA developed a stochastic approach to risk assessment that utilizes distributions for exposure variates such as breathing rate and water consumption rate rather than a single point estimate. The variability in exposure can be propagated through the risk assessment model using the distributions as input and a Monte Carlo or similar method. The result of such an analysis is a range of risks that at least partially characterizes variability in exposure.

Distributions of key exposure variates that are presented in the *Technical Support Document for Exposure Assessment and Stochastic Analysis* (OEHHA, 2012) were taken from the literature, if adequate, or developed from raw data of original studies. Intake variates such as vegetable consumption are relatively data rich; for these variates reasonable probability distributions can be constructed. However, the data necessary to characterize the variability in risk assessment variates are not always available. For example, for the fate and transport variates (e.g., fish bioaccumulation factors), there are only a few measurements for a given chemical available which precludes the adequate characterization of a probability distribution. We only developed distributions for those key exposure variates that were adequately characterized by data. Development of distributions is described in detail in the *Technical Support Document for Exposure Assessment and Stochastic Analysis* (OEHHA, 2012).

2.5.3 *Tiered Approach to Risk Assessment*

OEHHA recommends using a tiered approach to risk assessment. Tier 1 is a standard point estimate approach using the recommended point estimates presented in this document. If site-specific information is available to modify some point estimates developed in the *Technical Support Document for Exposure Assessment and Stochastic Analysis* (OEHHA, 2012) and is more appropriate to use than the recommended point estimates in this document, then Tier 2 allows use of that site-specific information. Site-specific information should be presented to the District before being used. The District may contact OEHHA for additional advice. Note that all non-default variates need to be adequately justified to OEHHA and the Districts to be used. In Tier 3, a stochastic approach to exposure assessment is used with the data distributions developed in the TSD (OEHHA, 2012) and presented in this document. Tier 4 is also a stochastic approach but allows for utilization of site-specific distributions, if they are justifiable (to OEHHA and the Districts) and more appropriate for the site under evaluation than those recommended in this document. Persons preparing an HRA that has a Tier 2 through Tier 4 evaluation must also include the results of a Tier 1 evaluation. Tier 1 evaluations are required for all HRAs prepared for the Hot Spots Program to promote consistency across the state for all facility risk assessments and allow comparisons across facilities. Chapter 8 provides a summary of the tiered approach and the TSD (OEHHA, 2012) discusses it in detail. Chapter 9 provides an outline that specifies the content and recommended format of HRA results.

2.6 References

ARB, 2007. *Emission Inventory Criteria and Guidelines Regulations (Title 17, California Code of Regulations, Sections 93300-93300.5), and the Emission Inventory Criteria and Guidelines Report* (EICG Report).

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3 - Hazard Identification - Air Toxics Hot Spots Emissions

3.1 The Air Toxics Hot Spots List of Substances and Emissions Inventory

For air toxics sources, hazard identification involves identifying pollutants of concern and whether these pollutants are potential human carcinogens or associated with other types of adverse health effects. For the Air Toxics Hot Spots (Hot Spots) Program, the emitted substances that are addressed in a health risk assessment (HRA) are found in the list of hazardous substances designated in the Air Resources Board's (ARB's) *Emission Inventory Criteria and Guidelines Regulations (Title 17, California Code of Regulations, Sections 93300-93300.5), and the Emission Inventory Criteria and Guidelines Report* (EICG Report), which is incorporated by reference therein (ARB, 2007). This list of substances is contained in both Appendix A of this document and the EICG Report. The list of substances also identifies those substances that are considered human carcinogens or potential human carcinogens.

The substances included on the Hot Spots Program list of substances are defined in the statute as those substances found on lists developed by the following sources:

- International Agency for Research on Cancer (IARC);
- U.S. Environmental Protection Agency (U.S. EPA);
- U.S. National Toxicology Program (NTP);
- ARB Toxic Air Contaminant Identification Program List;
- Hazard Evaluation System and Information Service (HESIS) (State of California);
- Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986) list of carcinogens and reproductive toxicants (State of California);
- Any additional substance recognized by the State Board as presenting a chronic or acute threat to public health when present in the ambient air.

All substances emitted by the facility that are on the Hot Spots Act list of substances must be identified in the HRA.

The ARB EICG Report (ARB, 2007) specifies that each facility subject to the Hot Spots Act must submit an Emission Inventory Report to the local air pollution control or air quality management district. This Emission Inventory Report must identify and account for all listed substances used, manufactured, formulated, or released by the facility. All routine, predictable releases must be reported. These inventory reports include the emission data necessary to estimate off-site levels of facility-released Hot Spots substances. These inventory reports will be discussed in further detail in Chapter 4. See Chapter 9 for an outline that specifies the content and recommended format for presenting the air dispersion modeling and HRA results. As presented in Appendix A, the EICG Report divides the list into three groups for reporting purposes. Potency or severity of toxic effects and potential for facility emission were considered in placing compounds into the three groups.

For the first group (listed in these guidelines in Appendix A-I), all emissions of these substances must be quantified in the HRA. For substances in the second group (listed in these guidelines in Appendix A-II), emissions are not quantified; however, facilities must report whether the substance is used, produced, or otherwise present on-site (i.e., these substances are simply listed in a table in the HRA). Lastly, substances in the third group (Appendix A-III) also only need to be reported in a table in the HRA if they are manufactured by the reporting facility.

Facilities that must comply with the Resource Conservation and Recovery Act and Comprehensive Environmental Response, Compensation and Liability Act (RCRA/CERCLA) requirements for risk assessment need to consult the California Department of Toxic Substances Control (DTSC) Remedial Project Manager to determine which substances must be evaluated in their risk assessment. Some RCRA/CERCLA facilities may emit substances which are not currently listed under the Hot Spots Program but which may require evaluation in a RCRA/CERCLA risk assessment.

3.2 References

ARB, 2007. *Emission Inventory Criteria and Guidelines Regulations (Title 17, California Code of Regulations, Sections 93300-93300.5), and the Emission Inventory Criteria and Guidelines Report* (EICG Report).

4 - Air Dispersion Modeling

The information contained in this section is primarily an abbreviated version of the material found in Chapter 2 of the Air Toxics Hot Spots Risk Assessment Guidelines; Exposure Assessment and Stochastic Analysis Technical Support Document (OEHHA, 2012). Several references have been included in this section to indicate those areas that are covered in more detail in Chapter 2 of the Technical Support Document. However, some air dispersion concepts and procedures have been added to assist the reader in the health risk assessment (HRA) process. In particular, a brief summary of the Hot Spots Analysis and Reporting Program (HARP) software applicability to air dispersion analysis has been included. The HARP software has been developed by the Air Resources Board (ARB), in consultation with OEHHA and Air Pollution Control or Air Quality Management District (District) representatives. The HARP software is the recommended model for calculating and presenting HRA results for the Air Toxics Hot Spots Program (Hot Spots). Information on obtaining the HARP software can be found under the Hot Spots Program on the ARB's web site at *www.arb.ca.gov*. See Chapter 9 for an outline that specifies the content and recommended format for presenting the air dispersion modeling and HRA results.

The U.S. EPA has adopted the AERMOD air dispersion model into their list of regulatory approved models, in place of the previously used ISCST3 model. AERMOD is a steady-state plume model that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and both simple and complex terrain (U.S. EPA, 2009). The Air Resources Board recommends AERMOD for Hot Spots risk assessments.

4.1 Air Dispersion Modeling in Exposure Assessment: Overview

Estimates of air concentrations of emitted toxicants in the surrounding community from a facility's air emissions are needed in order to determine cancer and noncancer risks. One approach to determining the concentration of air pollutants emitted from the facility is to do air monitoring in the surrounding community. However, there are a number of disadvantages to this approach. Ambient air monitoring is costly because good estimates of an annual average concentration typically require monitoring at least one day in six over a year. Because it is costly, monitoring is usually limited to a select number of pollutants, and a limited number of sites. There can be significant risks from some chemicals at or even below the monitoring detection limit, which can add considerable uncertainty to risk estimates if many of the measurements are below or near the detection limit. Monitoring measures not only facility emissions but also general ambient background as well. It can be difficult and expensive to distinguish between the two using monitoring, particularly if general ambient background levels are high relative to the contribution of facility emissions. These limitations often make it impractical to use monitoring in a program such as the Air Toxics Hot Spots program with hundreds of facilities.

Air dispersion models have several advantages over monitoring. Modeling can provide greater spatial detail and the costs are relatively cheap by comparison. For example, dispersion models can estimate the pollutant concentration in air at many receptor locations (hundreds to thousands) and for a multitude of averaging periods. Air dispersion models have been validated using air monitoring.

There are, however, uncertainties associated with the typical usage of air dispersion modeling. The use of meteorological data from the nearest airport may not ideally be the best representation of localized conditions. Gaussian plume air dispersion models ignore calm hours. This can bias model predictions towards underestimation. Some dispersion models offer limited chemical reactions within the algorithms; however, we generally assume the pollutant is inert for the near-field atmospheric travel time. This may bias estimated concentrations towards over-prediction for those pollutants that are highly reactive in the atmosphere. Air dispersion model results are only as good as the emissions estimates and emissions estimates can be uncertain. However, on the whole, the advantages of air dispersion modeling for a program like the Air Toxics Hot Spots far outweigh the disadvantages.

Professional judgment is required throughout the dispersion modeling process. The local air quality district has final authority on modeling protocols. The following guidance is intended to assist in the understanding of dispersion modeling for risk assessments.

Air dispersion modeling includes the following steps (see Figure 1):

1. Create an emission inventory of the toxic releases (Section 4.2)
2. Identify the source types (Section 4.3)
3. Identify the terrain type and land use (Section 4.4)
4. Determine the detail needed for the analysis: screening or refined (Section 4.5)
5. Identify the population exposure (Section 4.6)
6. Identify the receptor network (Section 4.7)
7. Obtain meteorological data (for refined air dispersion modeling only) (Section 4.8)
8. Select an air dispersion model (Section 4.9)
9. Prepare a modeling protocol and submit to the local Air District (hereafter referred to as “the District”) (Section 4.14)
10. Complete the air dispersion analysis
11. If necessary, redefine the receptor network and return to Step 10

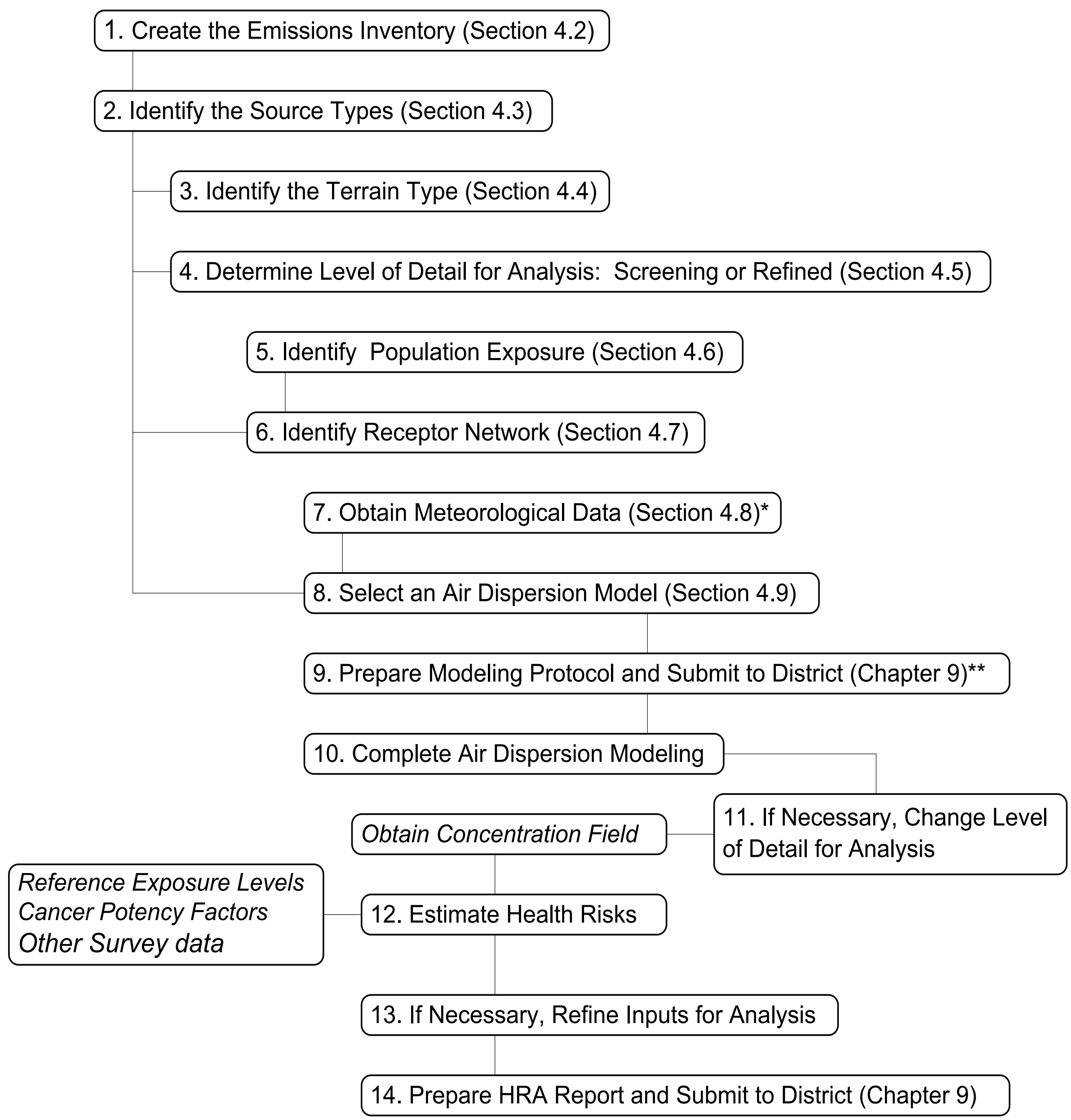
12. Complete the risk assessment

13. If necessary, refine the inputs and/or the model selection and return to Step 8

14. Present the HRA results (Chapter 9 provides an outline that specifies the content and recommended format of HRA results).

The output of the air dispersion modeling analysis includes a receptor field of ground level concentrations of the pollutant in ambient air. These concentrations can be used to estimate an inhaled or ingested dose for the estimation of multipathway cancer risk, or used to determine a hazard index for acute (inhalation), and chronic noncancer multipathway risks. It should be noted that in the Air Toxics “Hot Spots” program, facilities simulate the dispersion of the chemical emitted as an inert compound, and do not model any atmospheric transformations or dispersion of products from such reactions. The U.S. EPA Guideline on Air Quality Models (U.S. EPA, 2005) should be consulted when evaluating reactive pollutants for other regulatory purposes.

Figure 1 Overview of the Air Dispersion Modeling Process.



* Some screening models do not require any meteorological data.

** Optional but strongly recommended.

4.2 Emission Inventories

The Emission Inventory Reports (Inventory Reports) developed under the Hot Spots Program provide data to be used in the HRA and in the air dispersion modeling process. The Inventory Reports contain information regarding emission sources, emitted substances, emission rates, emission factors, process rates, and release parameters (area and volume sources may require additional release data beyond that generally available in Emissions Inventory reports). This information is developed according to the ARB's *Emission Inventory Criteria and Guidelines Regulations (Title 17, California Code of Regulations, Sections 93300-93300.5)*, and the *Emission Inventory Criteria and Guidelines Report* (EICG Report), which is incorporated by reference therein (ARB, 2007*)*.

Updated emission data for process changes, emission factor changes, material/fuel changes, or shutdown must be approved by the District prior to the submittal of the health risk assessment (HRA). Ideally, the District review of updated emissions could be completed within the modeling protocol. In addition, it must be stated clearly in the risk assessment if the emission estimates are based on updated or revised emissions (e.g., emission reductions). This section summarizes the requirements that apply to the emission data which are used for Air Toxics "Hot Spots" Act risk assessments.

4.2.1 *Air Toxics Hot Spots Emissions*

As noted in Chapter 3, Hazard Identification, the HRA should identify all substances emitted by the facility, which are on the Hot Spots Act list of substances (see Appendix A of the Guidance Manual or the EICG Report). The EICG Report specifies that Inventory Reports must identify and account for all listed substances used, manufactured, formulated, or released by the facility. All routine, predictable releases must be reported. Under the regulations, the list is divided into three groups for reporting purposes. The first group (listed in Appendix A-I of the Inventory Guidelines Report) has all pollutants whose emissions must be quantified. The second group (listed in Appendix A-II of the Inventory Guidelines Report) includes substances where emissions do not need to be quantified; however, facilities must report whether the substance is used, produced, or otherwise present on-site. The third group (listed in Appendix A-III of the Emissions Inventory Guidelines Report) includes substances whose emissions need not be reported unless the substance is manufactured by the facility. Chemicals or substances in the second and third groups should be listed in a table in the risk assessment.

Facilities that must comply with the Resource Conservation and Recovery Act and Comprehensive Environmental Response, Compensation and Liability Act (RCRA/CERCLA) requirements for risk assessment need to consult the Department of Toxic Substances Control (DTSC) Remedial Project Manager to determine which substances must be evaluated in their risk assessment in addition to the list of "Hot Spots" chemicals. Some RCRA/CERCLA facilities may emit chemicals that are not currently listed under the "Hot Spots" Program. Chapter 9 provides an outline that specifies the content and recommended format of HRA results.

4.2.1.1 Emission Estimates Used in the Risk Assessment

The HRA must include emission estimates for all substances that are required to be quantified in the facility's emission inventory report. Specifically, HRAs should include both annual average emissions and maximum 1-hour emissions for each pollutant. Maximum 1-hour emissions are used for acute noncancer health impacts while annual emissions are used for chronic exposures (i.e., chronic and 8-hour noncancer health impacts or cancer risk assessment).

Emissions for each substance must be reported for individual emitting processes associated with unique devices within a facility. Total facility emissions for an individual air contaminant will be the sum of emissions, reported by process, for that facility. Information on daily and annual hours of operation, and relative monthly activity, must be reported for each emitting process. Devices and emitting processes must be clearly identified and described and must be consistent with those reported in the emissions inventory report.

The HRA should include tables that present the emission information (i.e., emission rates for each substance released from each process) in a clear and concise manner. The District may allow the facility operator to base the HRA on more current emission estimates than those presented in the previously submitted emission inventory report (i.e., actual enforceable emission reductions realized by the time the HRA is submitted to the District). If the District allows the use of more current emission estimates, the District must review and approve the new emissions estimates prior to use in the HRA. The HRA report must clearly state what emissions are being used and when any reductions became effective. Specifically, a table presenting emission estimates included in the previously submitted emission inventory report as well as those used for the HRA should be presented. The District should be consulted concerning the specific format for presenting the emission information. Chapter 9 provides an outline that specifies the content and recommended format of HRA results. A revised emission inventory report must be submitted to the District prior to submitting the HRA and forwarded by the District to the ARB, if revised emission data are used.

4.2.1.1.1 Molecular Weight Adjustments for the Emissions of Metal Compounds

For most of the Hot Spots toxic metals, the OEHHA cancer potency factors, acute and chronic RELs apply to the weight of the toxic metal atom contained in the overall compound. Some of the Hot Spots compounds contain various elements along with the toxic metal atom (e.g., "Nickel hydroxide", CAS number 12054-48-7, has a formula of H_2NiO_2). Therefore, an adjustment to the reported pounds of the overall compound is needed before applying the OEHHA cancer potency factor for "Nickel and compounds" to such a compound. This ensures that the cancer potency factor, acute or chronic REL is applied only to the fraction of the overall weight of the emissions that are associated with health effects of the metal. In other cases, the Hot Spots metals are already reported as the metal atom equivalent (e.g., CAS 7440-02-0, "Nickel"), and these cases do not use any further molecular weight adjustment. (Refer to Note [7] in Appendix A, List of Substances in the EICG Report for further information on how the emissions of various Hot Spots metal compounds are reported.)

The appropriate molecular weight adjustment factors (MWAF) to be used along with the OEHHA cancer potency factors, acute and chronic RELs for Hot Spots metals can be found in the MWAF column[1] of the table containing OEHHA/ARB Approved Health Values for use in Hot Spots Facility Risk Assessments that is in Appendix L of this document.

As an example, the compound "Nickel hydroxide" has a molecular formula of H_2NiO_2. The atomic weight of each of the elements in this compound, and the fraction they represent of the total weight, are therefore as follows:

Element	Number of atoms	Atomic Weight	Fraction of Total Weight = MWAF
1 x Nickel (Ni)	1 x	58.70	58.70 / 92.714 = **0.6332** (MWAF for Nickel)
2 x Oxygen (O)	2 x	15.999	
2 x Hydrogen (H)	2 x	1.008	
Total Molecular Weight of H_2NiO_2:		92.714	

So, for example, assume that 100 pounds of "Nickel hydroxide" emissions are reported under CAS number 12054-48-7. To get the Nickel atom equivalent of these emissions, multiply by the listed MWAF (0.6332) for Nickel hydroxide:

- 100 pounds x 0.6332 = 63.32 pounds of Nickel atom equivalent.

This step should be completed prior to applying the OEHHA cancer potency factor for "Nickel and compounds" in a calculation for a prioritization score or risk assessment calculation. (Note - The HARP software automatically applies the appropriate MWAF for each Hot Spots chemical (by CAS number), so the emissions should not be manually adjusted when using HARP. Therefore, if using HARP, you would use 100 pounds for Nickel hydroxide and HARP will make the MWAF adjustment for you. If not using HARP, you would use 63.32 pounds.)

[1] The value listed in the MWAF column for Asbestos is not a molecular weight adjustment. This is a conversion factor for adjusting mass and fibers or structures. See Appendix C for more information on Asbestos reporting and risk assessment information or see the EICG report for reporting guidance.

4.2.1.2 Release Parameters

Emission release parameters (e.g., stack height and inside diameter, stack gas exit velocity, release temperature and emission source location in UTM coordinates) are needed as inputs to the air dispersion model. The Inventory Guidelines specify the release parameters that must be reported for each stack, vent, ducted building, exhaust site, or other site of exhaust release. Additional information may be required to characterize releases from non-stack (volume and area) sources; see U.S. EPA dispersion modeling guidelines or specific user's manuals. This information should also be included in the air dispersion section of the risk assessment. This information must be presented in tables included in the risk assessment. Note that some dimensional units needed for the dispersion model may require conversion from the units reported in the Inventory Report (e.g., Kelvin (K) vs. degrees Fahrenheit (°F)). Chapter 9 provides an outline that specifies the content and recommended format of HRA results.

4.2.1.3 Operation Schedule

The HRA should include a discussion of the facility operation schedule and daily emission patterns. For AB2588 purposes, emissions should be reported based on routine and predictable operations. Weekly or seasonal emission patterns may vary and should be discussed. This is especially important in a refined HRA. Diurnal emission patterns should be simulated in the air dispersion model because of diurnal nature of meteorological observations. Diurnal evaluations are important to include since diurnal weather patterns and emission releases may cause significant differences in the concentration at a receptor of interest.

A table should be included listing the emission schedule on an hourly and yearly basis. In addition, the emission schedule and exposure schedule should corroborate any exposure adjustment factors used for approximating an inhaled dose. For more information about exposure adjustment factors, see Section 4.8.1. Alternatively, exposure adjustments can be made through refining the air dispersion analysis. See Section 4.11.1.2(h) for special case modeling or Appendix M. An alternative to including modeling that addresses diurnal influences would be to include a sensitivity study showing, and/or text explaining, the reason(s) why there are no significant differences due to diurnal influences on the emissions from the facility or at the receptor(s) of interest. For more guidance, you can contact the district or reviewing authority**.** Chapter 9 provides an outline that specifies the content and recommended format of HRA results.

4.2.1.4 Emission Controls

The HRA should include a description of control equipment, the emitting processes it serves, and its efficiency in reducing emissions of substances on the Air Toxics "Hot Spots" list. The EICG Report requires that this information be included in the Inventory Reports, along with the emission data for each emitting process. If the control equipment did not operate full-time throughout the year, then the reported overall control efficiency must be adjusted to account for any predictable downtime of the control equipment. Any entrainment of toxic substances to the atmosphere from control equipment should be accounted for; this includes fugitive releases during maintenance and cleaning of control devices (e.g., baghouses and cyclones). Contact the District for guidance with control equipment adjustments. Recommended default deposition rates that are used when calculating potential noninhalation health impacts are listed in Section 5.3.2. Chapter 9 provides an outline that specifies the content and recommended format of HRA results.

4.2.2 *Landfill Emissions*

Emission estimates for landfill sites should be based on testing required under Health and Safety Code, Section (HSC) 41805.5 (AB 3374, Calderon) and any supplemental AB 2588 source tests or emission estimates used to characterize air toxics emissions from landfill surfaces or through off-site migration. The District should be consulted to determine the specific Calderon data to be used in the HRA. The “Hot Spots” Program HRA for landfills should also include emissions of listed substances for all applicable power generation and maintenance equipment at the landfill site. Processes that need to be addressed include stationary internal combustion engines, flares, evaporation ponds, composting operations, boilers, and gasoline dispensing systems.

4.3 Source Characterization

Pollutants are released into the atmosphere in many different ways. The release conditions need to be properly identified and characterized to appropriately use the air dispersion models.

4.3.1 *Source Type*

Source types can be identified as point, line, area, or volume sources for input to the air dispersion model. Several air dispersion models have the capability to simulate more than one source type.

4.3.1.1 Point Sources

Point sources are probably the most common type of source and most air dispersion models have the capability to simulate them. Typical examples of point sources include exhaust stacks. Isolated vents from buildings are special examples of point sources.

4.3.1.2 Line Sources

The version 12345 or newer of the AERMOD can accommodate line sources. Line sources can be also treated as a special case of either an area or a volume source. Examples of line sources include: conveyor belts and rail lines, freeways, and busy roadways. Not all mobile sources may be subject to the Hot Spots program; however, non-motor vehicles that operate within a facility (e.g., ships, trains, and cranes, etc.) are subject to the Hot Spots program. For more information, see the ARB’s Emission Inventory and Criteria Guidelines document or ARB’s interpretation and guidance memorandum to CAPCOA regarding mobile sources which are subject to the “Hot Spots” program. This memo can be found at http://www.arb.ca.gov/ab2588/motorv.pdf.

Mobile sources and rail lines are required to be evaluated under SB 352. SB 352 requires a risk assessment performed under the Hot Spots risk assessment guidance for proposed school sites within 500 feet of a busy roadway. Dedicated air dispersion models are available for motor vehicle emissions from roadways which are a special type of line source. These models (i.e., CALINE3, CAL3QHCR, and CALINE4) are designed to simulate the mechanical turbulence and thermal plume rise due to the motor vehicle activity on the roadway. However, these dedicated models use the Pasquill-Gifford dispersion stability classes for dispersion; the AERMOD dispersion model uses a more advanced continuous stability estimation method based on observations. The limitation with AERMOD is that the user needs to estimate initial mixing (Szo and Syo) for mechanical turbulence and thermal plume rise. Consult with the District prior to conducting roadway modeling to determine model use.

For practical information on how to simulate roadway emission dispersion using these models, see the California Air Pollution Control Officer’s Association (CAPCOA) website at http://www.capcoa.org or the Sacramento Metropolitan AQMD (SMAQMD) website at http://www.airquality.org/ceqa/RoadwayProtocol.shtml. The SMAQMD has a document titled, “Recommended Protocol for Evaluating the Location of Sensitive Land Uses Adjacent to Major Roadways”(January, 2010). The ARB recommends this document for SB-352 risk assessments.

4.3.1.3 Area Sources

Emissions that are to be modeled as area sources are typical of fugitive sources characterized by non-buoyant emissions containing negligible vertical extent (e.g., no plume rise or emissions distributed over a large horizontal area).

Fugitive particulate (PM2.5, PM10, TSP) emission sources include areas of disturbed ground (e.g., open pits, parking lots) which may be present during operational phases of a facility’s life. Also included are areas of exposed material (e.g., storage piles and slag dumps) and segments of material transport where potential fugitive emissions may occur (uncovered haul trucks or rail cars, emissions from unpaved roads). Fugitive emissions may also occur during stages of material handling where particulate material is exposed to the atmosphere (uncovered conveyors, hoppers, and crushers).

Other fugitive emissions emanating from many points of release may be modeled as area sources. Examples include fugitive emissions from valves, flanges, venting, and other connections that occur at ground level or at an elevated level or deck if on a building or structure. Modern dispersion models include an option for an initial vertical extent (Szo) where needed.

Modeling portable equipment as an area source is a case-by-case situation that should be discussed with the District or reviewing authority. Situations may exist where this type of operation is best represented as another type of release.

4.3.1.4 Volume Sources

Non-point sources with emissions containing an initial vertical extent should be modeled as volume sources. The initial vertical extent may be due to plume rise or a vertical distribution of numerous smaller sources over a given area. Examples of volume sources include buildings with natural fugitive or passive ventilation, and line sources such as conveyor belts and rail lines.

4.3.2 *Quantity of Sources*

The number of sources at a facility may influence the selection of the air dispersion model. Some dispersion models are capable of simulating only one source at a time, and are therefore referred to as single-source models (e.g., AERSCREEN).

In some cases, for screening purposes, single-source models may be used in situations involving more than one source using one of the following approaches:

- Combining all sources into one single "representative" source

In order to be able to combine all sources into one single source, the individual sources must have similar release parameters. For example, when modeling more than one stack as a single "representative" stack, the stack gas exit velocities and temperatures must be similar. In order to obtain a conservative estimate, the values leading to the higher concentration estimates should typically be used (e.g., the lowest stack gas exit velocity and temperature, the height of the shortest stack, and a receptor distance and spacing that will provide maximum concentrations, etc.).

- Running the model for each individual source and superimposing results

Superimposition of results of single sources of emissions is the actual approach followed by all the Gaussian models capable of simulating more than one source. Simulating sources in this manner may lead to conservative estimates if worst-case meteorological data are used or if the approach is used with a model that automatically selects worst-case meteorological conditions, especially wind direction. The approach will typically be more conservative the farther apart the sources are because each run would use a different worst-case wind direction.

Additional guidance regarding source merging is provided by the U.S. EPA (1995a). It should be noted that depending upon the population distribution, the total burden can actually increase when pollutants are more widely dispersed. If the total burden from the facility or zone of impact (see Section 4.6.1) could increase for the simplifying modeling assumptions described above, the District should be consulted.

4.4 Terrain Type

Two types of terrain characterizations are required to select the appropriate model. One classification is made according to land type and another one according to terrain topography.

4.4.1 *Terrain Type – Land Use*

Some air dispersion models (e.g., CALINE) use different dispersion coefficients (sigmas) depending on the land use over which the pollutants are being transported. The land use type is also used by some models to select appropriate wind profile exponents. Traditionally, the land type has been categorized into two broad divisions for the purposes of dispersion modeling: urban and rural. Accepted procedures for determining the appropriate category are those suggested by Irwin (1978): one based on land use classification and the other based on population.

The land use procedure is generally considered more definitive. Population density should be used with caution and should not be applied to highly industrialized areas where the population density may be low. For example, in low population density areas a rural classification would be indicated, but if the area is sufficiently industrialized the classification should already be “urban” and urban dispersion parameters should be used.

If the facility is located in an area where land use or terrain changes abruptly, for example, on the coast, the District should be consulted concerning the classification. If need be, the model should be run in both urban and rural modes and the District may require a classification that biases estimated concentrations towards over prediction. As an alternative, the District may require that receptors be grouped according to the terrain between source and receptor.

AERMOD is the U.S. EPA’s preferred dispersion model for a wide range of applications in rural or urban conditions. The users should refer to section 5.0 of the AERMOD Implementation Guide to determine urban or rural conditions.

The Land Use and the Population Density Procedures discussed above are described as follows.

4.4.1.1 <u>Land Use Procedure</u>

(1) Classify the land use within the total area A, circumscribed by a 3 km radius circle centered at the source using the meteorological land use typing scheme proposed by Auer (1978) and shown in Table 4.1.

(2) If land use types I1, I2, C1, R2 and R3 account for 50 percent or more of the total area *A* described in (1), use urban dispersion coefficients. Otherwise, use appropriate rural dispersion coefficients.

4.4.1.2 <u>Population Density Procedure</u>

(1) Compute the average population density (*p*) per square kilometer with *A* as defined in the Land Use procedure described above. (Population estimates are also required to determine the exposed population; for more information see Section 4.6.3.)

(2) If *p* is greater than 750 people/km^2 use urban dispersion coefficients, otherwise, use appropriate rural dispersion coefficients.

Table 4.1 Identification and classification of land use types (Auer, 1978)

Used to define rural and urban dispersion coefficients in certain models.

Type	Use and Structures	Vegetation
I1	*Heavy Industrial* Major chemical, steel and fabrication industries; generally 3-5 story buildings, flat roofs	Grass and tree growth extremely rare; <5% vegetation
I2	*Light-moderate industrial* Rail yards, truck depots, warehouses, industrial parks, minor fabrications; generally 1-3 story buildings, flat roofs	Very limited grass, trees almost totally absent; <5% vegetation
C1	*Commercial* Office and apartment buildings, hotels; >10 story heights, flat roofs	Limited grass and trees; <15% vegetation
R1	*Common residential* Single family dwelling with normal easements; generally one story, pitched roof structures; frequent driveways	Abundant grass lawns and light-moderately wooded; >70% vegetation
R2	*Compact residential* Single, some multiple, family dwelling with close spacing; generally <2 story, pitched roof structures; garages (via alley), no driveways	Limited lawn sizes and shade trees; <30% vegetation
R3	*Compact residential* Old multi-family dwellings with close (<2 m) lateral separation; generally 2 story, flat roof structures; garages (via alley) and ashpits, no driveways	Limited lawn sizes, old established shade trees; <35% vegetation
R4	*Estate residential* Expansive family dwelling on multi-acre tracts	Abundant grass lawns and lightly wooded; >80% vegetation
A1	*Metropolitan natural* Major municipal, state, or federal parks, golf courses, cemeteries, campuses; occasional single story structures	Nearly total grass and lightly wooded; >95% vegetation
A2	Agricultural rural	Local crops (e.g., corn, soybean); >95% vegetation
A3	*Undeveloped* Uncultivated; wasteland	Mostly wild grasses and weeds, lightly wooded; >90% vegetation
A4	Undeveloped rural	Heavily wooded; >95% vegetation
A5	*Water surfaces* Rivers, lakes	

4.4.2 *Terrain Type - Topography*

Surface conditions and topographic features generate turbulence, modify vertical and horizontal winds, and change the temperature and humidity distributions in the boundary layer of the atmosphere. These in turn affect pollutant dispersion and models differ in their need to take these factors into account.

The classification according to terrain topography should ultimately be based on the topography at the receptor location with careful consideration of the topographical features between the receptor and the source. Differentiation of simple versus complex terrain is unnecessary with AERMOD. In complex terrain, AERMOD employs the well-known dividing-streamline concept in a simplified simulation of the effects of plume-terrain interactions. For other plume models, topography can be classified as follows:

4.4.2.1 <u>Simple Terrain (also referred to as “Rolling Terrain”)</u>

Simple terrain is all terrain located below stack height including gradually rising terrain (i.e., rolling terrain). Note that *Flat Terrain* also falls in the category of simple terrain.

4.4.2.2 <u>Intermediate Terrain</u>

Intermediate terrain is terrain located above stack height and below plume height. The recommended procedure to estimate concentrations for receptors in intermediate terrain is to perform an hour-by-hour comparison of concentrations predicted by simple and complex terrain models. The higher of the two concentrations should be reported and used in the risk assessment.

4.4.2.3 <u>Complex Terrain</u>

Complex terrain is terrain located above plume height. Complex terrain models are necessarily more complicated than simple terrain models. There may be situations in which a facility is “overall” located in complex terrain but in which the nearby surroundings of the facility can be considered simple terrain. In such cases, receptors close to the facility in this area of simple terrain will “dominate” the risk analysis and there may be no need to use a complex terrain model. It is unnecessary to determine which terrain dominates the risk analysis for users of AERMOD.

4.5 Level of Detail: Screening vs. Refined Analysis

Air dispersion models can be classified according to the level of detail which is used in the assessment of the concentration estimates as “screening” or “refined”. Refined air dispersion models use more robust algorithms capable of using representative meteorological data to predict more representative and usually less conservative estimates. Refined air dispersion models are, however, more resource intensive than their screening counterparts. It is advisable to first use a screening model to obtain conservative concentration estimates and calculate health risks. If the health risks are estimated to be above the threshold of concern, then use of a refined model to calculate more representative concentration and health risk estimates would be warranted. There are situations when screening models represent the only viable alternative (e.g., when representative meteorological data are not available). The district or reviewing authority should be consulted to determine the appropriate method for determining the level of detail in the modeling analysis. The HARP software will incorporate the capability of using either representative meteorological data from AERMOD or the default meteorological conditions from the AERSCREEN model.

It is acceptable to use a refined air dispersion model in a “screening” mode for this program’s health risk assessments. In this case, a refined air dispersion model is used:

- with worst-case meteorology instead of representative meteorology;

- with a conservative averaging period conversion factor to calculate longer term concentration estimates (see Section 4.10 for more discussion on screening air dispersion models and adjustments factors).

Note that use of worst case meteorology in a refined model is not the normal practice in New Source Review or Ambient Air Quality Standard evaluation modeling.

4.6 Population Exposure

The level of detail required for the analysis (e.g., screening or refined), and the procedures to be used in determining geographic resolution and exposed population require case-by-case analysis and professional judgment. The District should be consulted before beginning the population exposure estimates, and as results are generated, further consultation may be necessary. Some suggested approaches and methods for handling the breakdown of population and performance of a screening or detailed risk analysis are provided in this section.

In addition to estimating individual cancer risk at specific points such as the MEI (maximally exposed individual), OEHHA recommends determining the number of people who reside within the 1×10^{-6}, 1×10^{-5}, 1×10^{-4}, and higher cancer risk isopleths. For noncancer population evaluations, the number of people who reside within the 0.5, one, five, or higher hazard index isopleths should be reported. The HARP software can provide population exposure estimates as cancer burden or as the number of persons exposed to a selected (user identified) health risk/impact level. Information on obtaining the HARP software can be found under the Hot Spots Program on the ARB’s web site at *www.arb.ca.gov*. Chapter 9 provides an outline that specifies the content and recommended format of HRA results.

4.6.1 *Zone(s) of Impact*

As part of the estimation of the population exposure for the cancer risk analysis, it is necessary to determine the geographic area affected by the facility’s emissions. An initial approach to define a “zone of impact” surrounding the source is to generate an isopleth where the total excess lifetime cancer risk from inhalation exposure to all emitted carcinogens is greater than 10^{-6} (one in 1,000,000).

For noncarcinogens, a second, third, and fourth isopleth (to represent the chronic, 8-hour, and acute impacts) should be created to define the zone of impact for the hazard index from both inhalation and noninhalation pathways greater than or equal to 1.0. For clarity these isopleths may need to be presented on separate maps in the HRA.

Contact the District or reviewing authority to discuss inclusion of isopleth maps if all potential health risks fall within the facility boundary and no receptors have, or will ever, be present within the boundary (also see Section 4.7.1 for a discussion of on-site receptors).

The initial "zone of impact" can be determined as follows:

- Use a screening dispersion model (e.g., AERSCREEN) to obtain concentration estimates for each emitted pollutant at varying receptor distances from the source. Several screening models feature the generation of an automatic array of receptors which is particularly useful for determining the zone of impact. In order for the model to generate the array of receptors the user needs to provide some information normally consisting of starting distance, increment and number of intervals.

- Calculate total cancer risk and hazard index (HI) for each receptor location by using the methods provided in the risk characterization sections in Chapter 8 of the Air Toxics Hot Spots Risk Assessment Guidance Manual.

- Find the distance where the total inhalation cancer risk is equal to 10^{-6}; this may require redefining the receptor array in order to have two receptor locations that bound a total cancer risk of 10^{-6}. Next, find the distance where the chronic, 8-hour, and acute health hazard indices are declared significant by the District (e.g., acute, 8-hour, or chronic HI = 1.0).

Some Districts may prefer to use a cancer risk of 10^{-7} or an HI of 0.5 as the zone of impact. Therefore, the District should be consulted before modeling efforts are initiated. If the zone of impact is greater than 25 km from the facility at any point, then the District should be consulted. The District may specify limits on the area of the zone of impact. Ideally, these preferences would be presented in the modeling protocol (see Section 4.14).

Note that when depicting the risk assessment results, risk isopleths must present the total cancer and noncancer risk from both inhalation and noninhalation pathways. The zone of impact should be clearly shown on a map with geographic markers of adequate resolution (see Section 4.6.3.1). The text below discusses methodology for defining the zone of impact and has format recommendations. Chapter 9 provides an outline that specifies the content and recommended format of all HRA results.

The zone of impact can be defined once the exposure assessment (air dispersion modeling) process has determined the pollutant concentrations at each designated off-site receptor and a risk analysis (see Chapter 8) has been performed. For clarity, the cancer and noncancer zone(s) of impact should be presented on separate maps. A map illustrating the carcinogenic zone of impact is required. The District may at its discretion ask for the map illustrating the potential carcinogenic zone of impact to identify the zone of impact for the minimum exposure pathways (inhalation, soil, dermal, and mother's milk) and the zone of impact for all applicable pathways of exposure (minimum pathways plus site/route dependent pathways). Two maps may be needed to accomplish this. The legend of these maps should state the level(s) used for the zone of impact and identify the exposure pathways that were included in the assessment.

The noncancer maps should also clearly identify the noncancer zones of impact. These include the acute (inhalation) zone of impact, 8-hour (inhalation) zone of impact and the chronic (including both inhalation, multipathway) zone of impact. The District may at its discretion require separate chronic inhalation and chronic multipathway zones of impact maps. For clarity, presentation of the two chronic zones of impact may also require two or more maps. The legend of these maps should state the level(s) used for the zone of impact and identify the exposure pathways (and target organs) that were included in the assessment. Further information regarding the methods for determination of hazard indices and cancer risk are discussed in Chapter 8 and Appendix I.

4.6.2 *Screening Population Estimates for Risk Assessments*

A screening risk assessment should include an estimate of the maximum exposed population. For screening risk assessments, a detailed description of the exposed population is not required. The impact area to be considered should be selected to be health protective (i.e., will not underestimate the number of exposed individuals). A health-protective assumption is to assume that all individuals within a large radius of the facility are exposed to the maximum concentration. If a facility must also comply with the RCRA/CERCLA risk assessment requirements, health effects to on-site workers may also need to be addressed. The DTSC's Remedial Project Manager should be consulted on this issue. The District should be consulted to determine the population estimate that should be used for screening purposes. Guidance for one screening method is presented here.

1. Use a screening dispersion model (e.g., AERSCREEN) to obtain concentration estimates for each emitted pollutant at varying receptor distances from the source. Several screening models feature the generation of an automatic array of receptors that is particularly useful for determining the zone of impact. In order for the model to generate the array of receptors, the user needs to provide some information normally consisting of starting distance, increment, and number of intervals.

2. Calculate the potential cancer risk and hazard index for each receptor location by using the methods provided in the risk characterization sections of this document (Chapter 8).

3. Find the distance where the potential cancer risk is equal to District specified levels (e.g., 10^{-6}); this may require redefining the receptor array in order to have

two receptor locations that bound a total cancer risk of 10^{-6}. This exercise should be repeated for the noncancer health impacts.

4. Calculate cancer burden by estimating the number of people in the grid and stipulate that all are exposed at the highest level.

4.6.3 *Refined Population Estimates for Risk Assessments*

The refined HRA requires a detailed analysis of the population exposed to emissions from the facility. Where possible, a detailed population exposure analysis provides estimates of the number of individuals in residences and offsite workplaces, as well as at sensitive receptor sites such as schools, daycare centers and hospitals. The District may require that locations with high densities of sensitive individuals be identified (e.g., schools, daycare centers, hospitals). These population analyses can include exposure estimates for workers and residents through the use of land use maps or other tools. The overall exposed residential and worker populations should be apportioned into smaller geographic subareas. The information needed for each subarea is:

1. The number of exposed persons, and
2. The receptor location at which the calculated ambient air concentration is assumed to be representative of the exposure to the entire population in the subarea.

A multi-tiered approach is suggested for the population analysis. Census tracts, which the facility could significantly impact, should be identified (see Section 4.6.3.1). A census tract should be divided into smaller subareas if it is close to the facility where ambient concentrations vary widely. The District may determine that census tracts provide sufficient resolution near the facility to adequately characterize population exposure or they may prefer the census information to be evaluated using smaller blocks. Further downwind where ambient concentrations are less variable, the census tract level may be acceptable to the District. The District may determine that the aggregation of census tracts (e.g., when the census tracts making up a city are combined) is appropriate for receptors that are considerable distances from the facility.

If a facility must also comply with the RCRA/CERCLA HRA requirements, health effects to on-site workers may also need to be addressed. The DTSC's Remedial Project Manager should be consulted on this issue. In some cases it may be appropriate to evaluate risks to on-site receptors. The district should be consulted about special cases for which evaluation of on-site receptors is appropriate, such as facilities frequented by the public or where people may reside (e.g., military facilities).

4.6.3.1 Census Tracts

For a refined risk assessment, the boundaries of census tracts can be used to define the geographic area to be included in the population exposure analysis. Digital maps showing the census tract boundaries in California can be obtained from "The Thomas

Guide"® on the World Wide Web. Statistics for each census tract can be obtained from the U.S. Census Bureau. The website address for the U.S. Census Bureau is http://www.census.gov. Numerous additional publicly accessible or commercially available sources of census data can be found on the World Wide Web. A specific example of a census tract is given in Appendix K. The HARP software includes U.S. census data and is a recommended tool for performing population exposure estimates.

The two basic steps in defining the area under analysis are:

(1) Identify the "zone of impact" (as defined previously in Section 4.6.1) on a map detailed enough to provide for resolution of the population to the subcensus tract level. (The U.S. Geological Survey (USGS) 7.5-minute series maps and the maps within the HARP software provide sufficient detail.) This is necessary to clearly identify the zone of impact, location of the facility, and sensitive receptors within the zone of impact. If significant development has occurred since the USGS survey, this should be indicated. A specific example of a 7.5-minute series map is given in Appendix K.

(2) Identify all census tracts within the zone of impact using a U.S. Bureau of Census or equivalent map (e.g., Thomas Brothers, HARP Software). If only a portion of the census tract lies within the zone of impact, then only the population that falls within the isopleth should be used in the population estimate or burden calculation. To determine this level of detail, local planning and zoning information may need to be collected. When this more detailed information is not available, then a less refined approach is to include the census data if the centroid of the census block falls within the isopleths of interest. The census tract boundaries should be transferred to a map, such as a USGS map (referred to hereafter as the "base map".)

An alternative approach for estimating population exposure in heavily populated urban areas is to apportion census tracts to a Cartesian grid cell coordinate system. This method allows a Cartesian coordinate receptor concentration field to be merged with the population grid cells. This process can be computerized and minimizes manual mapping of centroids and census tracts. The HARP software includes this function and will provide population estimates that are consistent with the methodology discussed here.

The District may determine that aggregation of census tracts (e.g., which census tracts making up a city can be combined) is appropriate for receptors that are located at considerable distances from the facility. If the District permits such an approach, it is suggested that the census tract used to represent the aggregate be selected in a manner to ensure that the approach is health protective. For example, the census tract included in the aggregate that is nearest (downwind) to the facility should be used to represent the aggregate.

4.6.3.1.1 Subcensus Tract

Within each census tract are smaller population units. These units [urban block groups (BG) and rural enumeration districts (ED)] contain about 1,100 persons. BGs are further broken down into statistical units called blocks. Blocks are generally bounded by four streets and contain an average of 70 to 100 persons. However, this range in population is an average and population units may vary significantly. In some cases, the EDs are very large and identical to a census tract.

The area requiring detailed (subcensus tract) resolution of the exposed residential and worker population will need to be determined on a case-by-case basis through consultation with the District. The District may determine that census tracts provide sufficient resolution near the facility to adequately characterize population exposure.

Employment population data can be obtained at the census tract level from the U.S. Census Bureau or from local planning agencies. This degree of resolution will generally not be sufficient for most risk assessments. For the area requiring detailed analysis, zoning maps, general plans, and other planning documents should be consulted to identify subareas with worker populations.

The boundaries of each residential and employment population area should be transferred to the base map.

4.6.4 *Sensitive Receptor Locations*

Individuals who may be more sensitive to toxic exposures than the general population are distributed throughout the total population. Sensitive populations may include young children and chronically ill individuals. The District may require that locations with high densities of sensitive individuals be identified (e.g., schools, nursing homes, residential care facilities, daycare centers, and hospitals). The HRA should state what the District requirements are regarding identification of sensitive receptor locations.

Although protection of sensitive individuals is incorporated into OEHHA's risk assessment methodology in both cancer risk and noncancer risk assessment, the assessment of risk at the specific location of such sensitive individuals (e.g., schools, hospitals, or nursing homes) may be useful to assure the public that such individuals are being considered in the analysis. For some chemicals (e.g., mercury and manganese) children have been specifically identified as the sensitive subpopulation for noncancer health impacts, so it can be particularly appropriate to assess school sites.

4.7 Receptor Siting

4.7.1 *Receptor Points*

The modeling analysis should contain a network of receptor points with sufficient detail (in number and density) to permit the estimation of the maximum concentrations. Locations that must be identified include:

- The maximum estimated off-site impact or point of maximum impact (PMI),
- The maximum exposed individual at an existing residential receptor (MEIR),
- The maximum exposed individual at an existing occupational worker receptor (MEIW).

Note that some situations may also require that on-site receptor (worker or residential) locations be evaluated. The risk assessor can contact the District or reviewing authority for guidance if on-site exposure situations are present at the emitting facility. However, these on-site locations should be included in the HRA. Some examples where the health impacts of on-site receptors may be appropriate could be military base housing, prisons, universities, day care facilities, or locations where the public may have regular access for the appropriate exposure period (e.g., a lunch time café or museum for acute exposures). When a receptor lives and works on the facility, site, or property, then these receptors should be evaluated and reported under both residential and worker scenarios and the one that is most health protective should be used for risk management decisions. The cancer risk estimates for the onsite residents may use a 30-year exposure duration while the 25-year exposure duration is used for a worker. Under a Tier 2 analysis, alternate exposure durations may be evaluated and presented with all assumptions supported.

All of these locations (i.e., PMI, MEIR, and MEIW) must be identified for potential multipathway carcinogenic and noncarcinogenic effects. It is possible that the estimated PMI, MEIR, and MEIW risk for cancer, chronic noncancer, 8-hour, and acute noncarcinogenic risks occur at different locations or that some of these evaluations may not be necessary (e.g., the receptor does not exist). For example, some facilities will not have off-site workers in the vicinity of the facility and will not need to evaluate worker exposure, or the exposure situation may only require the evaluation of short-term carcinogenic or acute noncancer impacts (see Section 8.2.10 for a discussion of short-term projects). The approval to revise the exposure assessment for a receptor, or to omit the MEIW receptor, should be verified in writing with the District or reviewing authority and included in the HRA.

Other sensitive receptor locations may also be of interest and required to be included in the HRA. The District or reviewing authority should be consulted to determine which sensitive receptor locations must be included.

The results from a screening model (if available) can be used to identify the area(s) where the maximum concentrations are likely to occur. Receptor points should also be located at the population centroids (see Section 4.7.2) and sensitive receptor locations (see Section 4.6.4). The exact configuration of the receptor array used in an analysis will depend on the topography, population distribution patterns, and other site-specific factors. All receptor locations should be identified in the HRA using UTM (Universal Transverse Mercator) coordinates and receptor number. The receptor numbers in the summary tables should match receptor numbers in the computer output (e.g., HARP output files). In addition to actual UTM coordinates, the block/street locations (i.e., north side of 3,000 block of Smith Street) should be provided in the HRA for the PMI, MEIR, and MEIW for carcinogenic and noncarcinogenic health effects. Chapter 9 provides an outline that specifies the content and recommended format of HRA results.

4.7.1.1 Receptor Height

To evaluate localized impacts, receptor height should be taken into account at the point of maximum impact on a case-by-case basis. For example, receptor heights may have to be included to account for receptors significantly above ground level. Flagpole receptors at the height of the breathing zone of a person may need to be considered when the source receptor distance is less than a few hundred meters. Consideration must also be given to the noninhalation pathway analysis which requires modeling of chemical deposition onto soil or water at ground level. For the inhalation pathway, a health protective approach is to select a receptor height from 0 meters to 1.8 meters that will result in the highest predicted downwind concentration. Final approval of this part of the modeling protocol should be with the District or reviewing authority.

4.7.2 *Centroid Locations*

For each subarea analyzed, a centroid location (the location at which a calculated ambient concentration is assumed to represent the entire subarea) should be determined. When population is uniformly distributed within a population unit, a geographic centroid based on the shape of the population unit can be used. If only a portion of the census tract lies within the isopleth or area of interest, then only the population that falls within the isopleth should be used in the calculation for population exposure. To determine this level of detail, local planning and zoning information may need to be collected. Where populations are not uniformly distributed, a population-weighted centroid may be used. Another alternative uses the concentration at the point of maximum impact within that census tract as the concentration to which the entire population of that census tract is exposed. While this less refined approach is commonly accepted, Districts should be contacted to approve this method prior to its use in a risk assessment.

The centroids represent locations that should be included as receptor points in the dispersion modeling analysis. Annual average concentrations should be calculated at each centroid using the modeling procedures presented in this chapter.

For census tracts and BG/EDs, judgments can be made using census tracts maps and street maps to determine the centroid location. At the block level, a geographic centroid is sufficient.

4.7.3 *Spatial Averaging*

Since the inception of the “Hot Spots” and California’s Air Toxics Programs, HRA results for an individual receptor have typically been based on air dispersion modeling results at a single point or location. With a few exceptions, this method has been traditionally used for all types of receptors (e.g., PMI, MEIR, MEIW, pathway receptors, etc.). The assumptions used in risk assessment are designed to prevent underestimation of health impacts to the public resulting in a health protective approach. However, basing risk estimates on a single highest point (PMI, MEIR, or MEIW) does not take into account that a person does not remain at one location on their property, or in one location at the workplace over an extended period of time. Therefore, the average air concentration over a small area is likely to be more representative than using the air concentration at a single point, particularly in those situations where concentrations fall off rapidly around that single point. The concept of averaging air concentrations over a small area is known as spatial averaging.

In order to understand how spatial averaging can impact air dispersion modeling results with various types of facilities, the ARB, in conjunction with the OEHHA, performed sensitivity analyses to evaluate the impacts of spatially averaging air dispersion modeling results (see Appendix C of the Air Toxics Hot Spots Program Risk Assessment Guidelines: Technical Support Document for Exposure Assessment and Stochastic Analysis (EASA)). Based on these sensitivity analyses, it is reasonable and appropriate to include spatial averaging techniques in air toxic risk assessments as supplemental information to Tier 1 information (i.e., modeling results that are based on the air concentration from a single point or location). While all risk assessments must include results based on Tier 1 methodology, the spatially averaged concentrations around the point of interest (e.g., PMI, MEIR, MEIW, multipathway exposure evaluations, etc.) could also be included as an option in risk assessments and acceptable for risk management decisions subject to approval by the District or reviewing agency. Spatial averaging is an option for the purpose of additional refinement to the risk assessment.

A few reasons that support the inclusion of spatially averaged modeled concentrations in risk assessment include the following:

- Averaging results over a small domain will give a more representative picture of individual exposure and risk than an estimate based on one single location within their property.
- Spatial averaging will allow air dispersion modeling and risk assessment results to be characterized as the estimated concentration and risk in a discrete area of interest, rather than an exact value for a single location.
- From a risk communication standpoint, the ARB and OEHHA feel it is more appropriate to present the modeling output and the calculated health impacts as the potential impacts within a small or discrete area, rather than an exact value at a specific point on a grid or map.
- Spatial averaging is the recommended procedure in ARB's Lead Risk Management Guidelines (2001) and has been used in several complex source HRAs [e.g., Roseville Railyard (2004), Ports of LA/LB (2006), Port of Oakland (2008)].
- Spatially averaging the deposition concentrations over pasture land, a garden, or a water body for multipathway exposure scenarios is a planned upgrade for the HARP Software. This will provide an option that will refine multipathway exposure assessments. Average deposition on these types of areas (e.g., a water body) is not necessarily well represented by the single highest point of deposition, or deposition at the geographic center of the water body. Likewise, since produce is grown over the entire surface of the garden and cows graze the

entire pasture, deposition is better estimated by evaluating the entire area rather than using a single point.

4.7.3.1 Spatial Averaging Methodology

The spatial averaging sensitivity study in Appendix C of the EASA is based on simulating emissions from point, volume, area, and line sources. Most source types (e.g., point) are simulated as a small, medium or large source. Line sources are only simulated as small and large. In addition, meteorological data collected at five different locations in California were used. Nested spatial average grids of various domains were used to study the differences on the spatial average concentration. In the case of the 20 meter by 20 meter spatial average nested grid, the spatial average concentration showed little change over the PMI for medium and large sources. In the case for small sources, the spatial average concentration is approximately 45% to 80% of the PMI concentration. Individual source type and meteorological conditions will cause variations in these results.

The results of the spatial averaging sensitivity study in Appendix C of the EASA shows that sources with low plume rise that result in a PMI, MEIW, or MEIR located at or near the property fence line are most sensitive to spatial averaging. Source types with high plume rise (e.g., tall stacks) show a PMI far downwind where the concentration gradient is more gradual and therefore spatial averaging has a lesser effect. While spatial averaging can be used regardless of source size or the location of the PMI, the following conditions generally apply when a source is a good candidate for spatial averaging:

- The MEIR, MEIW, or PMI is located at the fence line or close to the emission source.
- The concentration gradient is high near the PMI. This is more associated with low level plumes such as fugitive, volume, area, or short stacks.
- A long term average is being calculated to represent a multi-year risk analysis based on one to five years of meteorological data. Note that spatial averaging should **not** be used for short term (acute) calculations.

In general, the method for calculating the spatial average in air toxic risk assessments includes the following steps:

1. Locate the point(s) of interest and receptor(s) (i.e., PMI, MEIW, MEIR, and any additional receptor locations of interest or concern) with a grid resolution spacing of no greater than five meters. To achieve this, two or more modeling runs with successively finer nested grid resolutions may be needed to find the final location where the nested grid that will be used for spatial averaging will be placed.

2. Center the spatial average nested grid on the each receptor's location of interest determined in step 1. Limit the nested grid to no larger than 20 meters by 20 meters or 400 square meters. Note that if a portion of the centered and nested grid falls within the facility boundary and the receptor location of interest is outside of the boundary, then adjustments to the nested grid to obtain the spatially-averaged concentration for the offsite receptor are reasonable. This may be done by either repositioning the nested grid to cover 400 square meters of off-boundary area surrounding the receptor or center the nested grid and delete any on-site grid points so that only the offsite grid points surrounding the receptor are used in the spatially averaged concentration. The grid resolution spacing should be no greater than five meters. With a five meter grid resolution, the 20 meter by 20 meter domain will result in 25 receptors. The size, shape, and placement of the domain and the resolution of points are subject to approval by the District, ARB, or other reviewing authority. See the Sections 4.7.3.1.2 and 4.7.3.1.3 below for additional discussion on domain sizing and grid spacing at worksites, pastures, gardens, and water bodies.

3. Some configurations of source activity and meteorological conditions result in a predominant downwind plume center line that is significantly askew from one of the four ordinate directions. In this case, a tilted nested grid is necessary to coincide with the dominant plume centerline. Polar receptors are easier to implement than a tilted rectangular grid. The domain of the polar receptor field should be limited to a 15 meter radius. See Appendix C of the EASA for detailed instructions on tilted polar receptors.

4. Calculate the arithmetic mean of the long term period average concentration (e.g., annual average) of the nested grid of receptors to represent the spatial average. This average is used in the risk calculations.

5. Document and include all methods, assumptions, data, maps, and files used in the spatial averaging analysis and clearly present this information in the risk assessment following the requirements of the District or reviewing authority. Note that in the update to the HARP software, functionality will be included that will assist with spatial averaging and the methodology discussed.

The following sections discuss the use of spatial averaging for various receptor types and exposure pathways.

4.7.3.1.1 Residential Receptors

Follow the steps in Section 4.7.3 outlining the spatial averaging methodology. To remain health protective when evaluating a residential receptor, spatial averaging should not take place using large nested domains. The domain used for spatial averaging should be no larger than 20 meters by 20 meters with a maximum grid spacing resolution of equal to or less than five meters. This domain represents an area that is approximately the size of a small urban lot. The size of the domain and resolution of points shall be subject to approval by the District, ARB, or other reviewing authority.

4.7.3.1.2 Worker Receptors

Offsite worker locations (e.g. MEIW) may also be a candidate for spatial averaging. However, workers can be at the same location during almost their entire daily work shift (e.g., desk/office workers). When this is the situation, then the traditional method of using a single location and corresponding modeled concentration is appropriate. If spatial averaging is used, care should be taken to determine the proper domain size and grid resolution. Follow the steps in Section 4.7.3 outlining the spatial averaging methodology. To be consistent with the residential receptor assumptions and remain health protective, a modeling domain size no larger than 20 meters by 20 meters is recommended with a grid spacing resolution of equal to or less than five meters. However, if workers routinely and continuously move throughout the worksite over a space greater than 20 meters by 20 meters, then a larger domain may be considered.

The HRA or modeling protocol shall support all assumptions used, including, but not limited to, documentation for all workers showing the area where each worker routinely performs their duties and the percentage of time spent in those areas. The final domain size should not be greater than the smallest area of worker movement. Other considerations for determining domain size and grid spacing resolution may include an evaluation of the concentration gradients across the worker area. The grid spacing used within the domain to find the concentration that will be used to calculate health impacts should be sufficient in number and detail to obtain a representative concentration across the area of interest. The size of the domain and resolution of points shall be subject to approval by the District, ARB, or other reviewing authority.

4.7.3.1.3 Pastures, Gardens, or Water Bodies

The simplified approach of using the concentration (deposition rate) at the centroid, a specific point of interest, or the PMI location for an area being evaluated for noninhalation exposures (e.g., a body of water used for fishing, a pasture used for grazing, area of a garden, etc.) is acceptable for use in HRA. However, evaluating deposition concentrations over pasture land, a garden, or a water body for multipathway exposure scenarios using spatial averaging could give more representative estimates of the overall deposition rate. Use of spatial averaging in this application is subject to approval by the District, ARB, or other reviewing authority.

If spatial averaging will be done, follow the steps in Section 4.7.3.1 outlining the spatial averaging methodology. When using spatial averaging over the deposition area, care should be taken to determine the proper domain size to make sure it includes all reasonable areas of potential deposition. The size and shape of the area of interest (e.g., pasture or water body) should be identified and used for the modeling domain. The grid spacing or resolution used within the domain should be sufficient in detail to obtain a representative deposition concentration across the area of interest. One way to determine the grid resolution is to include an evaluation of the concentration gradients across the deposition area. The HRA or modeling protocol shall support all assumptions used, including, but not limited to, documentation of the deposition area (e.g., size and shape of the pasture, garden, or water body, maps, representative coordinates, grid resolution, concentration gradients, etc.). The size of the domain and grid resolution is subject to approval by the reviewing authority.

In lieu of following the details in the paragraph above, the approach used for the other receptors (e.g., MEIR, MEIW) that uses a domain size not greater than 20 meters by 20 meters, located on the PMI within the area of interest, with a maximum grid spacing resolution of five meters, can be used. This default refined approach would apply to deposition areas greater than 20 meters by 20 meters. For smaller deposition areas, the simplified approach of using the PMI for the area, the concentration at the centroid or a specific point of interest, or averaging over the actual smaller domain can be used. This again is subject to approval by the reviewing authority.

The HRA or modeling protocol shall support all assumptions used, including, but not limited to, documentation of the deposition area (e.g., size and shape of the water body, pasture, or garden; all data; maps; representative coordinates, and etc.), and the details clarifying how and where the averaging was done (e.g., location and magnitude of concentration gradients, the grid spacing used).

4.8 Meteorological Data

Refined air dispersion models require hourly meteorological data. The first step in obtaining meteorological data should be to check with the District and the ARB for data availability. Other sources of data include the National Weather Service (NWS), National Climatic Data Center (NCDC), Asheville, North Carolina, ARB meteorological database (METDB), military stations and private networks. Meteorological data for a subset of NWS stations are available from the U.S. EPA Support Center for Regulatory Air Models (SCRAM). The SCRAM can be accessed at www.epa.gov/scram001/main.htm. All meteorological data sources should be approved by the District. Data not obtained directly from the District or the ARB should be checked for quality, representativeness, and completeness. It should be approved by the District before use. U.S. EPA provides guidance (U.S. EPA, 1995e) for these data. Meteorological data may need further processing. Data users can consult with the District or the ARB on how to process the raw meteorological data. The risk assessment should indicate if the District required the use of a specified meteorological data set. All memos indicating District approval of meteorological data should be attached in an appendix. If no representative meteorological data are available, screening procedures should be used as indicated in Section 4.10.

The analyst should acquire enough meteorological data to ensure that the worst-case meteorological conditions are represented in the model results. The US-EPA Guideline on Air Quality Models (U.S. EPA 2005) prefers that the latest five years of consecutive meteorological data be used to represent long term averages (i.e., cancer and chronic impacts). Previous OEHHA guidance allowed the use of the worst-case year to save computer time. The processing speed of modern computers has increased to the point where processing five years of data over one year is no longer burdensome. However, the District may determine that one year of representative meteorological data is sufficient to adequately characterize the facility's impact. This may especially be the case when five years of quality consecutive data are not available.

To determine long term average concentrations the data can be averaged. For calculation of the one-hour maximum concentrations needed to evaluate acute effects, the worst-case year should be used in conjunction with the maximum hourly emission rate. For example, the long term average concentration and one-hour maximum concentration at a single receptor for five years of meteorological data are calculated below:

Year	Annual Average ($\mu g/m^3$)	Maximum One-Hour ($\mu g/m^3$)
1	7	100
2	5	80
3	9	90
4	8	110
5	6	90
5-year average	7	

In the above example, the long-term average concentration over five years is 7 $\mu g/m^3$. Therefore, 7 $\mu g/m^3$ should be used to evaluate carcinogenic and chronic effects (i.e., annual average concentration). The one-hour maximum concentration is the highest one-hour concentration in the five-year period. Therefore, 110 $\mu g/m^3$ is the peak one-hour concentration that should be used to evaluate acute effects.

The higher hourly concentration usually occurs when meteorological dispersion conditions become worse, such as, calm or light wind, inversion, etc. Inversion usually happens in late afternoon through early morning. As the sun goes down, the atmospheric temperature near surface starts to fall, usually faster than the temperature in the upper atmosphere causing a temperature inversion layer to form and extend downward. This inversion layer usually sustains throughout the night, and remains until early morning. Because of the inversion (cold air sitting on warm air at the top of the inversion layer), pollutant vertical mixing is very low in the morning.

When predicted concentrations are high and the mixing height is very low for the corresponding averaging period, the modeling results deserve additional consideration. For receptors in the near field, it is within the model formulation to accept a very low mixing height for short durations. However, it would be unlikely that the very low mixing height would persist long enough for the pollutants to travel into the far field. In the event that the analyst identifies any of these time periods, they should be discussed with the District on a case-by-case basis.

4.8.1 *Meteorological Data Formats*

Most short-term dispersion models require input of hourly meteorological data in a format which depends on the model. U.S. EPA provides software for processing meteorological data for use in U.S. EPA recommended dispersion models. U.S. EPA recommended meteorological processors include the Meteorological Processor for Regulatory Models (MPRM), PCRAMMET, and AERMET. Use of these processors will ensure that the meteorological data used in an U.S. EPA recommended dispersion model will be processed in a manner consistent with the requirements of the model.

Meteorological data for a subset of NWS stations are available on the World Wide Web at the U.S. EPA SCRAM address, http://www.epa.gov/scram001.

4.8.2 *Treatment of Calms*

Calms are hours when the wind speed is below the starting threshold of the anemometer. Gaussian plume models require a wind speed and direction to estimate plume dispersion in the downwind direction.

U.S. EPA's policy is to disregard calms until such time as an appropriate analytical approach is available. The recommended U.S. EPA models contain a routine that eliminates the effect of the calms by nullifying concentrations during calm hours and recalculating short-term and annual average concentrations. Certain models lacking this built-in feature can have their output processed by U.S. EPA's CALMPRO program (U.S. EPA, 1984a) to achieve the same effect. Because the adjustments to the concentrations for calms are made by either the models or the postprocessor, actual measured on-site wind speeds should always be input to the preprocessor. These actual wind speeds should then be adjusted as appropriate under the current U.S. EPA guidance by the preprocessor.

Following the U.S. EPA methodology, measured on-site wind speeds of less than 1.0 m/s, but above the instrument threshold, should be set equal to 1.0 m/s by the preprocessor when used as input to Gaussian models. Calms are identified in the preprocessed data file by a wind speed of 1.0 m/s and a wind direction equal to the previous hour. For input to AERMOD, no adjustment should be made to the site specific wind data. AERMOD can produce model estimates for conditions when the wind speed may be less than 1 m/s but still greater than the instrument threshold. Some air districts provide pre-processed meteorological data for use in their district that treats calms differently. Local air districts should be consulted for available meteorological data. In addition, to reduce the number of calms and missing winds in the surface data, EPA has developed a pre-processor – AERMINUTE – to process 1-minute ASOS wind data for generating hourly average wind speed and directions for input to AERMET in Stage 2. The details can be found in the EPA's AERMINUTE User's Instructions at:

http://www.epa.gov/ttn/scram/models/aermod/aerminute_userguide_v11059_draft.pdf

If the fraction of calm hours is excessive, then an alternative approach may need to be considered to characterize dispersion. The Calpuff model modeling system can simulate calm winds as well as complex wind flow and therefore is a viable alternative. The local air district should be consulted for alternative approaches.

4.8.3 *Treatment of Missing Data*

Missing data refer to those hours for which no meteorological data are available from the primary on-site source for the variable in question. When missing values arise, they should be handled in one of the following ways listed below, in the following order of preference:

(1) If there are other on-site data, such as measurements at another height, they may be used when the primary data are missing. If the height differences are significant, corrections based on established vertical profiles should be made. Site-specific vertical profiles based on historical on-site data may also be appropriate to use if their determination is approved by the reviewing authority. If there is question as to the representativeness of the other on-site data, they should not be used.

(2) If there are only one or two missing hours, then linear interpolation of missing data may be acceptable, however, caution should be used when the missing hour(s) occur(s) during day/night transition periods.

(3) If representative off-site data exist, they may be used. In many cases this approach may be acceptable for cloud cover, ceiling height, mixing height, and temperature. This approach will rarely be acceptable for wind speed and direction. The representativeness of off-site data should be discussed and agreed upon in advance with the reviewing authority.

(4) An imputation methodology may be acceptable, provided it is well-documented, sufficiently justified, and properly applied.

(5) Failing any of the above, the data field should be coded as missing using missing data codes appropriate to the applicable meteorological pre-processor.

Appropriate model options for treating missing data, if available in the model, should be employed. Substitutions for missing data should only be made in order to complete the data set for modeling applications, and should not be used to attain the “regulatory completeness” requirement of 90%. That is, the meteorological data base must be 90% complete on a monthly basis (before substitution) in order to be acceptable for use in air dispersion modeling. The use of any data substitution technique should be thoroughly documented to provide the District or reviewing authority with all the information necessary to determine its approvability.

If the recommended methods for addressing missing meteorological data cannot be achieved as described, then alternative approaches should be discussed and developed in conjunction with the District or reviewing authority.

4.8.4 *Representativeness of Meteorological Data*

The atmospheric dispersion characteristics at an emission source need to be evaluated to determine if the collected meteorological data can be used to adequately represent atmospheric dispersion for the project.

Such determinations are required when the available meteorological data are acquired at a location other than that of the proposed source. In some instances, even though meteorological data are acquired at the location of the pollutant source, they still may not correctly characterize the important atmospheric dispersion conditions.

Considerations of representativeness are always made in atmospheric dispersion modeling whether the data base is "on-site" or "off-site." These considerations call for the judgment of a meteorologist or an equivalent professional with expertise in atmospheric dispersion modeling. If in doubt, the District should be consulted.

4.8.4.1 Spatial Dependence

The location where the meteorological data are acquired should be compared to the source location for similarity of terrain features. For example, in complex terrain, the following considerations should be addressed in consultation with the District:

- Aspect ratio of terrain, i.e., ratio of:
    - Height of valley walls to width of valley;
    - Height of ridge to length of ridge; and
    - Height of isolated hill to width of hill at its base
- Slope of terrain
- Ratio of terrain height to stack/plume height
- Distance of source from terrain (i.e., how close to valley wall, ridge, isolated hill)
- Correlation of terrain feature to prevailing meteorological conditions

Likewise, if the source is located on a plateau or plain, the source of meteorological data used should be from a similar plateau or plain.

Judgments of representativeness should be made only when sites are climatologically similar. Sites in nearby, but different air sheds, often exhibit different weather patterns. For instance, meteorological data acquired along a shoreline are not normally representative of inland sites and vice versa.

Meteorological data collected need to be examined to determine if drainage, transition, and synoptic flow patterns are characteristics of the source, especially those critical to the regulatory application. Consideration of orientation, temperature, and ground cover should be included in the review.

An important aspect of space dependence is height above the ground. Where practical, meteorological data should be acquired at the release height, as well as above or below, depending on the buoyancy of the source's emissions. AERMOD at a minimum requires wind observations at a height above ground between seven times the local surface roughness height and 100 meters.

4.8.4.2 Temporal Dependence

To be representative, meteorological data must be of sufficient duration to define the range of sequential atmospheric conditions anticipated at a site. As a minimum, one full year of on-site meteorological data is necessary to prescribe this time series. Multiple years of data are used to describe variations in annual and short-term impacts. Consecutive years from the most recent, readily available 5-year period are preferred to represent these yearly variations.

4.8.4.3 Further Considerations

It may be necessary to recognize the non-homogeneity of meteorological variables in the air mass in which pollutants disperse. This non-homogeneity may be essential in correctly describing the dispersion phenomena. Therefore, measurements of meteorological variables at multiple locations and heights may be required to correctly represent these meteorological fields. Such measurements are generally required in complex terrain or near large land-water body interfaces.

It is important to recognize that, although certain meteorological variables may be considered unrepresentative of another site (for instance, wind direction or wind speed), other variables may be representative (such as temperature, dew point, cloud cover). Exclusion of one variable does not necessarily exclude all. For instance, one can argue that weather observations made at different locations are likely to be similar if the observers at each location are within sight of one another - a stronger argument can be made for some types of observations (e.g., cloud cover) than others. Although by no means a sufficient condition, the fact that two observers can “see” one another supports a conclusion that they would observe similar weather conditions.

Other factors affecting representativeness include change in surface roughness, topography and atmospheric stability. Currently there are no established analytical or statistical techniques to determine representativeness of meteorological data. The establishment and maintenance of an on-site data collection program generally fulfills the requirement for “representative” data. If in doubt, the District should be consulted.

4.8.5 *Alternative Meteorological Data Sources*

It is necessary, in the consideration of most air pollution problems, to obtain data on site-specific atmospheric dispersion. Frequently, an on-site measurement program must be initiated. As discussed in Section 4.8.3, representative off-site data may be used to substitute for missing periods of on-site data. There are also situations where current or past meteorological records from a National Weather Service station may suffice. These considerations call for the judgment of a meteorologist or an equivalent professional with expertise in atmospheric dispersion modeling. More information on Weather Stations including: National Weather Service (NWS), military observations, supplementary airways reporting stations, upper air and private networks, is provided in "On-Site Meteorological Program Guidance for Regulatory Modeling Applications" (U.S. EPA, 1995e).

4.8.5.1 Recommendations

On-site meteorological data should be processed to provide input data in a format consistent with the particular models being used. The input format for U.S. EPA short-term regulatory models is defined in U.S. EPA's MPRM. The input format for AERMOD is defined in the AERMET meteorological pre-processor. Processors are available on the SCRAM web site. The actual wind speeds should be coded on the original input data set. Wind speeds less than 1.0 m/s but above the instrument threshold should be set equal to 1.0 m/s by the preprocessor when used as input to Gaussian models. Wind speeds below the instrument threshold of the cup or vane, whichever is greater, should be considered calm, and are identified in the preprocessed data file by a wind speed of 1.0 m/s and a wind direction equal to the previous hour. For input to AERMOD, no adjustment should be made to the site specific wind data. AERMOD can produce model estimates for conditions when the wind speed may be less than 1 m/s but still greater than the instrument threshold.

If data are missing from the primary source, they should be handled as follows, in order of preference: (1) substitution of other representative on-site data; (2) linear interpolation of one or two missing hours; (3) substitution of representative off-site data; (4) use of a well-documented and justified imputation methodology; or (5) coding as a missing data field, according to the discussions in Section 4.8.3. The use of any data substitution technique should be thoroughly documented to provide the District or reviewing authority with all the information necessary to determine its approvability.

If the data processing recommendations in this section cannot be achieved, then alternative approaches should be discussed and developed in conjunction with the District or reviewing authority.

4.8.6 *Quality Assurance and Control*

The purpose of quality assurance and maintenance is the generation of a representative amount (90% of hourly values for a year on a monthly basis) of valid data. For more information on data validation consult reference U.S. EPA (1995e). Maintenance may be considered the physical activity necessary to keep the measurement system operating as it should. Quality assurance is the management effort to achieve the goal of valid data through plans of action and documentation of compliance with the plans.

Quality assurance (QA) will be most effective when following a QA Plan which has been signed-off by appropriate project or organizational authority. The QA Plan should contain the following information (paraphrased and particularized to meteorology from Lockhart):

1. Project description - how meteorology data are to be used
2. Project organization - how data validity is supported
3. QA objective - how QA will document validity claims
4. Calibration method and frequency - for data
5. Data flow - from samples to archived valid values
6. Validation and reporting methods - for data
7. Audits - performance and system
8. Preventive maintenance
9. Procedures to implement QA objectives - details
10. Management support - corrective action and reports

It is important for the person providing the quality assurance (QA) function to be independent of the organization responsible for the collection of the data and the maintenance of the measurement systems. Ideally, the QA auditor works for a separate company.

4.9 Model Selection

There are several air dispersion models that can be used to estimate pollutant concentrations and new ones are likely to be developed. U.S. EPA added AERMOD, which incorporates the PRIME downwash algorithm, to the list of preferred models in 2005 as a replacement to ISCST3. CalPuff was added in 2003. The latest version of the U.S. EPA recommended models can be found at the SCRAM Bulletin board located at http://www.epa.gov/scram001. However, any model, whether a U.S. EPA guideline model or otherwise, must be approved for use by the local air district. Recommended models and guidelines for using alternative models are presented in this section. All air dispersion models used to estimate pollutant concentrations for risk assessment analyses must be in the public domain. Classification according to terrain, source type and level of analysis is necessary before selecting a model (see Section 4.4). The selection of averaging times in the modeling analysis is based on the health effects of concern. Annual average concentrations are required for an analysis of carcinogenic or other chronic effects. One-hour maximum concentrations are required for analysis of acute effects.

4.9.1 *Recommended Models*

Recommended air dispersion models to estimate concentrations for risk assessment analyses are generally referenced in US EPA's Guideline on Air Quality Models available at http://www.epa.gov/scram001. Currently AERMOD is recommended for most refined risk assessments in flat or complex terrain and in rural or urban environments[1]. In addition, CalPuff is available where spatial wind fields are highly variable or transport distances are large (e.g., 50 km). AERSCREEN is a screening model based on AERMOD. AERSCREEN can be used when representative meteorological data are unavailable. CTSCREEN is available for screening risk assessments in complex terrain. The most current version of the models should be used for risk assessment analysis. Some facilities may also require models capable of special circumstances such as dispersion near coastal areas. For more information on modeling special cases see Sections 4.12 and 4.13.

Most air dispersion models contain provisions that allow the user to select among alternative algorithms to calculate pollutant concentrations. Only some of these algorithms are approved for regulatory application such as the preparation of health risk assessments. The sections in this guideline that provide a description of each recommended model contain information on the specific switches and/or algorithms that must be selected for regulatory application.

To further facilitate the model selection, the District should be consulted for additional recommendations on the appropriate model(s) or a protocol submitted for District review and approval (see Section 4.14.1).

4.9.2 *Alternative Models*

Alternative models are acceptable if applicability is demonstrated or if they produce results identical or superior to those obtained using one of the preferred models referenced in Section 4.9.1. For more information on the applicability of alternative models refer to the following documents:

- U.S. EPA (2005). "Guideline on Air Quality Models" Section 3.2.2
- U.S. EPA (1992). "Protocol for Determining the Best Performing Model"
- U.S. EPA (1985a). "Interim Procedures for Evaluating Air Quality Models – Experience with Implementation"
- U.S. EPA (1984b). "Interim Procedures for Evaluating Air Quality Models (Revised)"

4.10 Screening Air Dispersion Models

A screening model may be used to provide a maximum concentration that is biased toward overestimation of public exposure. Use of screening models in place of refined modeling procedures is optional unless the District specifically requires the use of a refined model. Screening models are normally used when no representative meteorological data are available and may be used as a preliminary estimate to determine if a more detailed assessment is warranted.

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[1] AERMOD was promulgated by U.S. EPA as a replacement to ISCST3 on November 9, 2006.

Some screening models provide only 1-hour average concentration estimates. Other averaging periods can be estimated based on the maximum 1-hour average concentration in consultation and approval of the responsible air district. Because of variations in local meteorology, the exact factor selected may vary from one district to another. Table 4.2 provides guidance on the range and typical values applied. The conversion factors are designed to bias predicted longer term averaging periods towards overestimation.

Table 4.2 Recommended Factors to Convert Maximum 1-hour Avg. Concentrations to Other Averaging Periods (U.S. EPA, 2011, 1995a; ARB, 1994).

Averaging Time	Range	Typical SCREEN3 Recommended	AERSCREEN Recommended
3 hours	0.8 - 1.0	0.9	1.0
8 hours	0.5 - 0.9	0.7	0.9
24 hours	0.2 - 0.6	0.4	0.6
30 days	0.2 - 0.3	0.3	
Annual	0.06 - 0.1	0.08	0.1

AERSCREEN automatically provides the converted concentration for longer than 1-hour averaging periods. For area sources, the AERSCREEN 3, 8, and 24-hour average concentration are equal to the 1-hour concentration. No annual average concentration is calculated. SCREEN3 values are shown for comparison purposes.

4.10.1 *AERSCREEN*

The AERSCREEN (U.S. EPA, 2011) model is now available and should be used in lieu of SCREEN3 with approval of the local District. AERSCREEN is a screening level air quality model based on AERMOD. AERSCREEN does not require the gathering of hourly meteorological data. Rather, AERSCREEN requires the use of the MAKEMET program which generates a site specific matrix of meteorological conditions for input to the AERMOD model. MAKEMET generates a matrix of meteorological conditions based on local surface characteristics, ambient temperatures, minimum wind speed, and anemometer height.

AERSCREEN is currently limited to modeling a single point, capped stack, horizontal stack, rectangular area, circular area, flare, or volume source. More than one source may be modeled by consolidating the emissions into one emission source.

4.10.2 *Valley Screening*

The Valley model is designed to simulate a specific worst-case condition in complex terrain, namely that of a plume impaction on terrain under stable atmospheric conditions. The algorithms of the VALLEY model are included in other models such as SCREEN3 and their use is recommended in place of the VALLEY model. The usefulness of the VALLEY model and its algorithms is limited to pollutants for which only long-term average concentrations are required. For more information on the Valley model consult the user's guide (Burt, 1977).

4.10.2.1 Regulatory Options

Regulatory application of the Valley model requires the setting of the following values during a model run:

- Class F Stability (rural) and Class E Stability (urban)
- Wind Speed = 2.5 m/s
- 6 hours of occurrence of a single wind direction (not exceeding a 22.5 deg sector)
- 2.6 stable plume rise factor

4.10.3 *CTSCREEN*

The CTSCREEN model (Perry et al., 1990) is the screening mode of the Complex Terrain Dispersion Model (CTDMPLUS). CTSCREEN can be used to model single point sources only. It may be used in a screening mode for multiple sources on a case by case basis in consultation with the District. CTSCREEN is designed to provide conservative, yet theoretically sounder, worst-case 1-hour concentration estimates for receptors located on terrain above stack height. Internally-coded time-scaling factors are applied to obtain other averages (see Table 4.3). These factors were developed by comparing the results of simulations between CTSCREEN and CTDMPLUS for a variety of scenarios and provide conservative estimates (Perry et al., 1990). CTSCREEN produces identical results as CTDMPLUS if the same meteorology is used in both models. CTSCREEN accounts for the three-dimensional nature of the plume and terrain interaction and requires detailed terrain data representative of the modeling domain. A summary of the input parameters required to run CTSCREEN is given in Table 4.4. The input parameters are provided in three separate text files. The terrain topography file (TERRAIN) and the receptor information file (RECEPTOR) may be generated with a preprocessor that is included in the CTSCREEN package. In order to generate the terrain topography file the analyst must have digitized contour information.

Table 4.3 Time-scaling factors internally coded in CTSCREEN

Averaging Period	Scaling Factor
3 hours	0.7
24 hour	0.15
Annual	0.03

Table 4.4 Input Parameters Required to Run CTSCREEN

Parameter	File
Miscellaneous program switches	CTDM.IN
Site Latitude and Longitude (degrees)	CTDM.IN
Site TIME ZONE	CTDM.IN
Meteorology Tower Coordinates (user units)	CTDM.IN
Source Coordinates: x and y (user units)	CTDM.IN
Source Base Elevation (user units)	CTDM.IN
Stack Height (m)	CTDM.IN
Stack Diameter (m)	CTDM.IN
Stack Gas Temperature (K)	CTDM.IN
Stack Gas Exit Velocity (m/s)	CTDM.IN
Emission Rate (g/s)	CTDM.IN
Surface Roughness for each Hill (m)	CTDM.IN
Meteorology: Wind Direction (optional)	CTDM.IN
Terrain Topography	TERRAIN
Receptor Information (coordinates and associated hill number)	RECEPTOR

4.11 Refined Air Dispersion Models

Refined air dispersion models are designed to provide more representative concentration estimates than screening models. In general, the algorithms of refined models are more robust and have the capability to account for site-specific meteorological conditions. For more information regarding general aspects of model selection see Section 4.9.

4.11.1 *AERMOD*

For a wide variety of applications in all types of terrain, the recommended model is AERMOD. AERMOD is a steady-state plume dispersion model for assessment of pollutant concentrations from a variety of sources. AERMOD simulates transport and dispersion from multiple point, area, or volume sources based on an up-to-date characterization of the atmospheric boundary layer. Sources may be located in rural or urban areas and receptors may be located in simple or complex terrain. AERMOD accounts for building wake effects (i.e., plume downwash) based on the PRIME building downwash algorithms. The model employs hourly sequential preprocessed meteorological data to estimate concentrations for averaging times from one hour to one year (also multiple years). AERMOD is designed to operate in concert with two pre-processor codes: AERMET processes meteorological data for input to AERMOD, and AERMAP processes terrain elevation data and generates receptor information for input to AERMOD. Guidance on input requirements may be found in the AERMOD Users Guide.

4.11.1.1 Regulatory Options

U.S. EPA regulatory application of AERMOD requires the selection of specific switches (i.e., algorithms) during a model run. All the regulatory options can be set by selecting the DFAULT keyword. The U.S. EPA regulatory options, automatically selected when the DFAULT keyword is used, are:

- Stack-tip downwash
- Incorporates the effects of elevated terrain
- Includes calms and missing data processing routines
- Does not allow for exponential decay for applications other than a 4-hour half life for SO_2

Additional information on these options is available in the AERMOD User's Guide.

4.11.1.2 Special Cases

a. Building Downwash:
AERMOD automatically determines if the plume is affected by the wake region of buildings when their dimensions are given. The specification of building dimensions does not necessarily mean that there will be downwash. See

Section 4.13.1 for guidance on how to determine when downwash is likely to occur.

b. Area Sources:
The area source algorithm in AERMOD estimates source emission strength by integrating an area upwind of the receptor location. Receptors may be placed within the area itself, downwind of the area or adjacent to the area. However, since the vertical distribution parameter (σ_z) goes to zero as the downwind distance goes to zero, the plume function solution is infinite for a downwind receptor distance of zero. In order to avoid such singularity in the plume function solution, the AERMOD model arbitrarily sets the plume function to zero when the receptor distance is less than one meter. As a result, the area source algorithm will not provide reliable solutions for receptors located within or adjacent to very small areas, with dimensions on the order of a few meters across. In these cases, the receptor should be placed at least one meter outside of the area.

c. Volume Sources:
The volume source algorithms in AERMOD require an estimate of the initial distribution of the emission source. The initial distribution of emissions for a volume source is in the horizontal and vertical directions. When modeling volume source emissions, one needs to provide initial horizontal (σ_{y0}) and vertical (σ_{z0}) dimensions as accurate as possible so that pollutant buoyancy and dispersion are also calculated accurately. US EPA's AERMOD User Guide provides suggested procedures to estimate these initial dimensions based on source type (Table 3-1) (U.S. EPA, 2004a).

d. Line Sources:
Examples of line sources include conveyor belts or roads. Depending on the source, these can be modeled three ways; as a line source, as a series of volume sources, or as an elongated area source. Where the emission source is neutrally buoyant, such as a conveyor belt, AERMOD can be used according to the user guide. In the event that the line source is a roadway, then additional considerations are required.

At the present time, CALINE (CALINE3, CAL3QHCR, and CALINE4) is the only model dedicated to modeling the enhanced mechanical and thermal turbulence created by motor vehicles traveling on a roadway. Of these, CAL3QHCR is the only model that accepts hourly meteorological data and can estimate annual average concentrations. However, CALINE uses the Pasquill-Gifford stability categories which are used in the ISCST model. AERMOD is now the preferred plume model over ISCST3 with continuous plume dispersion calculations based on observations but AERMOD does not include the enhanced roadway turbulence. Therefore, in the case where roadway emissions dominate the risk assessment, it may be most important to simulate the enhanced thermal and mechanical turbulence from motor vehicles with the CAL3QHCR model.

In the case where roadway emissions are a subset of all emissions for the risk assessment, including roadway emissions along with facility emissions, it may be best to use AERMOD for all emissions, roadway and facility, in order to maintain continuity with one dispersion model for the risk assessment. If AERMOD is used, it is important to consider that a major freeway may act similar to a large building which can cause some mixing and therefore initial vertical dispersion. This dispersion could be estimated with sensitivity studies based on wind speed, wind angle, roadway orientation, roadway width, and etc. This could be a complex estimation and needs very adept modeling skills. Roadway modeling should be evaluated on a case-by-case basis in consultation with the District or the reviewing authority.

Line sources inputs include a composite fleetwide emission factor, roadway geometry, hourly vehicle activity (i.e., diurnal vehicle per hour pattern), hourly meteorological data, and receptor placement. For practical information on how to simulate roadway emissions using these models, see CAPCOA's website at http://www.capcoa.org or the Sacramento Metropolitan AQMD (SMAQMD) website at http://www.airquality.org/ceqa/RoadwayProtocol.shtml. The SMAQMD has a document titled, "Recommended Protocol for Evaluating the Location of Sensitive Land Uses Adjacent to Major Roadways"(January, 2010).

e. Complex Terrain:
AERMOD uses the Dividing Streamline (Hc) concept for complex terrain. Above Hc, the plume is assumed to be "terrain following" in the convective boundary layer. Below Hc, the plume is assumed to be "terrain impacting" in the stable boundary layer. AERMOD computes the concentration at any receptor as a weighted function between the two plume states (U.S. EPA, 2004b).

f. Deposition:
AERMOD contains algorithms to model settling and deposition and requires additional information to do so including particle size distribution. For more information consult the AERMOD User's Guide (U.S. EPA, 2004a).

g. Diurnal Considerations:
Systematic diurnal changes in atmospheric conditions are expected along the coast (or any large body of water) or in substantially hilly terrain. The wind speed and direction are highly dependent on time of day as the sun rises and begins to heat the Earth. The sun heats the surface of the land faster than the water surface. Therefore the air above the land warms up sooner than over water. This creates a buoyant effect of warm air rising over land and the cool air from over water moves in to fill the void. Near large bodies of water (e.g., the ocean) this is known as a sea breeze. In complex terrain this is known as upslope flow as the hot air follows the terrain upwards. When the sun sets and the surface of the land begins to cool, the air above also cools and creates a draining effect. Near the water this is the land breeze; in complex terrain this is known as downslope or drainage flow. In addition, for the sea breeze, the atmospheric

conditions change rapidly from neutral or stable conditions over water to unstable conditions over land.

Near the large bodies of water the sea breeze is typical in the afternoon and the land breeze is typical for the early morning before sunrise. In complex terrain upslope flow is typical in the afternoon, while drainage flow is typical at night. Diurnal profiles need to be evaluated in conjunction with the facility emissions since sources can have varied emission profiles (e.g., some sources are continuously emitting while others are intermittent). These intermittent emission profiles may be influenced by diurnal patterns; therefore, they need to be evaluated to properly estimate potential exposures. For these reasons, it is especially important to simulate facility emissions with a hourly diurnal pattern reflective of source activity so that the risk assessment is representative of daily conditions.

h. 8-hour Modeling for the Offsite Worker's Exposure and Residential Exposure: If the ground level air concentrations from a facility operating 5 days a week, 8 hours per day have been estimated by a 24 hour per day annual average, an adjustment factor can be applied to estimate the air concentration that an offsite worker with the same schedule would be exposed to. The 24-hour annual average concentration is multiplied times 4.2.

If the meteorology during the time that the facility is emitting is used, hourly model simulations need to be post-processed to cull out the data needed for the offsite worker exposure. See Appendix M for information on how to calculate the refined offsite worker concentrations using the hourly raw results from the AERMOD air dispersion model. For more discussion on worker exposure, see Section 4.8.1.

Eight-hour exposure modeling can be used to evaluate the potential for health impacts (including effects of repeated exposures) in children and teachers exposed during school hours. Although not required in the HRA, 8-hour exposure modeling could also be performed at the discretion of the District to a residential scenario (i.e., the MEIR) where a facility operates only a portion of the day and exposure to residences are not adequately reflected by averaging concentrations over a 24 hour day.

4.11.1.3 HARP Dispersion Analysis

It is highly recommended that air dispersion analysis be performed using the HARP software. HARP can perform refined dispersion analysis by utilizing the U.S. EPA standard program AERMOD. In the future, the updated version of HARP will link the AERMOD outputs with risk assessment modules.

4.11.2 *CTDMPLUS*

CTDMPLUS is a Gaussian air quality model for use in all stability conditions in complex terrain. In comparison with other models, CTDMPLUS requires considerably more detailed meteorological data and terrain information that must be supplied using specifically designed preprocessors. CTDMPLUS was designed to handle up to 40 point sources.

4.12 Modeling to Obtain Concentrations used for Various Health Impacts

The following section outlines how emissions and air dispersion modeling results are used or adjusted for a receptor that is exposed to either a non-continuous or continuously emitting source.

4.12.1 *Emission Rates for Cancer, Chronic, and Acute Health Impacts*

As discussed in Section 4.2.1.1, the HRA should include both annual average emissions and maximum 1-hour emissions for each pollutant emitted by the facility. Maximum 1-hour emissions are used for acute noncancer health impacts while annual emissions are used for chronic exposures (i.e., chronic and 8-hour noncancer health impacts or cancer risk assessment). When applying the emission rates in the air dispersion analysis, it is important not to artificially inflate or deplete the reported emission inventory.

For annual average emissions, the emissions are spread evenly over the entire year for continuous emitting sources. However, for sources where the emission patterns vary (i.e., non-continuous emitting sources), the emission rate should also account for the facility's emission schedule. If appropriate, the variable emissions rate option (e.g., hour-of-day) should be used in the air dispersion analysis. For more information consult the AERMOD User's Guide (U.S. EPA, 2004a). Also, when calculating emission rates for acute health impacts, it is important the emission rates never exceed the reported maximum 1-hour emissions.

4.12.2 *Modeling and Adjustments for Inhalation Cancer Risk at a Worksite*

Modeled long-term averages are typically used for cancer risk assessments for residents and workers. In an inhalation cancer risk assessment for an offsite worker, the long-term average should represent what the worker breathes during their work shift. However, the long-term averages calculated from AERMOD typically represent exposures for receptors that were present 24 hours a day and seven days per week (i.e., the schedule of a residential receptor). To estimate the offsite worker's concentration, there are two approaches. The more refined, complex, and time consuming approach is to post-process the hourly raw dispersion model output and examine the hourly concentrations that fall within the offsite worker's shift. See Appendix M for information on how to simulate the long-term concentration for the offsite worker that can be used to estimate inhalation cancer risk.

In lieu of post-processing the hourly dispersion model output, the more typical approach is to obtain the long-term average concentration as you would for modeling a residential receptor and approximate the worker's inhalation exposure using an adjustment factor. The actual adjustment factor that is used to adjust the concentration may differ from the example below based on the specifics of the source and worker receptor (e.g., work-shift overlap). Once the worker's inhalation concentration is determined, the inhalation dose is calculated using additional exposure frequency and duration adjustments. See Chapter 5 for more information on the inhalation dose equation.

4.12.2.1 Non-Continuous Sources

When modeling a non-continuously emitting source (e.g., operating for eight hours per day and five days per week), the modeled long-term average concentrations are based on 24 hours a day and seven days per week for the period of the meteorological data set. Even though the emitting source is modeled using a non-continuous emissions schedule, the long-term concentration is still based on 24 hours a day and seven days per week. Thus, this concentration includes the zero hours when the source was not operating. For the offsite worker inhalation risk, we want to determine the long-term concentration the worker is breathing during their work shift. Therefore, the long-term concentration needs to be adjusted so it is based only on the hours when the worker is present. For example, assuming the emitting source and worker's schedules are the same, the adjustment factor is 4.2 = (24 hours per day/8 hours per shift)x(7 days in a week/5 days in a work week). In this example, the long term residential exposure is adjusted upward to represent the exposure to a worker. Additional concentration adjustments may be appropriate depending on the work shift overlap. These adjustments are discussed below.

The calculation of the adjustment factor from a non-continuous emitting source is summarized in the following steps.

a. Obtain the long-term concentrations from air dispersion modeling as is typical for residential receptors (all hours of a year for the entire period of the meteorological data set).

b. Determine the coincident hours per day and days per week between the source's emission schedule and the offsite worker's schedule.

c. Calculate the worker adjustment factor (WAF) using Equation 4.1. When assessing inhalation cancer health impacts, a discount factor (*DF*) may also be applied if the offsite worker's schedule partially overlaps with the source's emission schedule. The discount factor is based on the number of coincident hours per day and days per week between the source's emission schedule and the offsite worker's schedule (see Equation 4.2). The DF is always less than or equal to one.

Please note that worker adjustment factor does not apply if the source's emission schedule and the offsite worker's schedule do not overlap. Since the worker is not present during the time that the source is emitting, the worker is not exposed to the source's emission (i.e., the DF in Equation 4.2 becomes 0).

$$WAF = \frac{H_{residentid}}{H_{source}} \times \frac{D_{residentid}}{D_{source}} \times DF \qquad \text{Eq. 4.1}$$

Where:
WAF = the worker adjustment factor
$H_{residential}$= the number of hours per day the long-term residential concentration is based on (always 24 hours)
H_{source} = the number of hours the source operates per day
$D_{residential}$ = the number of days per week the long-term residential concentration is based on (always 7 days)
D_{source}= the number of days the source operates per week
DF = a discount factor for when the offsite worker's schedule partially overlaps the source's emission schedule. Use 1 if the offsite worker's schedule occurs within the source's emission schedule. If the offsite worker's schedule partially overlaps with the source's emission schedule, then calculate the discount factor using Equation 4.2 below.

$$DF = \frac{H_{coincident}}{H_{worker}} \times \frac{D_{coincident}}{D_{worker}} \qquad \text{Eq. 4.2}$$

Where:
DF = the discount factor for assessing cancer impacts
$H_{coincident}$ = the number of hours per day the offsite worker's schedule and the source's emission schedule overlap
$D_{coincident}$= the number of days per week the offsite worker's schedule and the source's emission schedule overlap
H_{worker} = the number of hours the offsite worker works per day
D_{worker}= the number of days the offsite worker works per week

d. The final step is to estimate the offsite worker's inhalation concentration by multiplying the worker adjustment factor with the long-term residential concentration. The worker's concentration is then plugged into the dose equation and risk calculation.

The HARP software has the ability to calculate worker impacts using an approximation factor and, in the future, it will have the ability to post-process refined worker concentrations using the hourly raw results from an air dispersion analysis.

4.12.2.2 Continuous Sources

If the source is continuously emitting, then the worker is assumed to breathe the long-term annual average concentration during their work shift. Equation 4.1 becomes one and no concentration adjustments are necessary in this situation when estimating the inhalation cancer risk. Note however, if an assessor does not wish to apply the assumption the worker breathes the long-term annual average concentration during the work shift, then a refined concentration can be post-processed as described in Appendix M. All alternative assumptions should be approved by the reviewing authority and supported in the presentation of results.

4.12.3 *Modeling and Adjustments for Noncancer 8-Hour RELs*

For 8-hour noncancer health impacts, we evaluate if the receptor (e.g., worker or resident) is exposed to an 8 hour average concentration, occurring daily, that exceeds the 8-hour REL. The 8 hour RELs were derived primarily for the offsite worker scenario. Although not required in an HRA, residential receptors can be evaluated with an 8-hour

REL at the discretion of the District or Reviewing authority. For ease, we use a worker receptor in this discussion and in the discussion below for a non-continuously emitting source. The daily average concentration is intended to represent the long-term average concentration the worker is breathing during the work shift. In general, there are two approaches for estimating the concentration used for the 8-hour hazard index. The more refined, complex, and time consuming approach is to post-process the hourly dispersion model output and use only the hourly concentrations that are coincident with the offsite worker hours to obtain the long-term concentration. See Appendix M for information on how to simulate the daily average concentration through air dispersion modeling.

Before proceeding through a refined analysis described in Appendix M, the assessor may wish to approximate the long-term concentration, as described below, and calculate the 8-hour hazard index. In lieu of post-processing the hourly dispersion model output described in Appendix M, the more typical approach is to obtain the long-term average concentration as you would for modeling a residential receptor and approximate the worker's inhalation concentration using an adjustment factor. The method for applying the adjustment factor is described in the section below.

The results from the 8-hour hazard index calculations should not be combined with the chronic or acute hazard indices. Each of the potential noncancer health impacts should be reported independently. See Chapter 8 for more discussion on calculating health impacts.

4.12.3.1 Non-Continuous Sources

When modeling a non-continuously emitting source (e.g., operating for eight hours per day and five days per week), the modeled long-term average concentrations are based on 24 hours a day and seven days per week for the period of the meteorological data set. Even though the emitting source is modeled using a non-continuous emissions schedule, the long-term concentration is still based on 24 hours a day and seven days per week. Thus, this concentration includes the zero hours when the source was not operating. For the offsite worker 8-hour hazard index, we want to determine the long-term average daily concentration the worker may be breathing during their work shift. This is similar to the cancer approximation adjustment method with one difference; there is no adjustment for partial overlap between the worker's schedule and the source's emission schedule. The reason for this difference in methodology is because the 8-hour REL health factors are designed for repeated 8-hour exposures and cannot readily be adjusted to other durations of exposure. The 8-hour RELs should be used for typical daily work shifts of 8-9 hours. For further questions, assessors should contact OEHHA, the District, or reviewing authority to determine if the 8-hour RELs should be used in your HRA. Any discussions or directions to exclude the 8-hour REL evaluation should be documented in the HRA.

When calculating the long-term average daily concentration for the 8-hour REL comparison, the long-term residential concentration needs to be adjusted so it is based only on the operating hours of the emitting source with the assumption the offsite worker's shift falls within the emitting source's schedule. For example, assuming the emitting source operates 8 hours per day, 5 days per week and the offsite worker's schedules falls anywhere within this period of emissions, then the adjustment factor is 4.2 = (24 hours per day/8 hours of emissions per day)x(7 days in a week/5 days of emissions per week). In this example, the long term residential exposure is adjusted upward to represent the 8-hour exposure to a worker. <u>No adjustments are applied for partial work shift overlap with the emitting source.</u> If the source emits at night, then see Appendix N for additional recommendations.

Using the approximation factor is a screening method. If the 8-hour hazard index is above a threshold of concern with this method, the district or assessor should contact OEHHA for further guidance regarding the substance of concern. If necessary, further evaluation can be performed using the refined daily average modeling methodology discussed in Appendix M.

The calculation of the adjustment factor from a non-continuous emitting source is summarized in the following steps.

b. Obtain the long-term concentrations from air dispersion modeling as is typical for residential receptors (all hours of a year for the entire period of the meteorological data set).

c. Calculate the worker adjustment factor (WAF) using Equation 4.3. The source's emission schedule is assumed to overlap offsite worker's schedule. Note that the worker adjustment factor and the 8-hour inhalation REL do not apply if the source's emission schedule and the offsite worker's schedule do not overlap at some point.

$$WAF = \frac{H_{residentid}}{H_{source}} \times \frac{D_{residentid}}{D_{source}} \qquad \text{Eq. 4.3}$$

Where:

WAF = the worker adjustment factor
$H_{residential}$= the number of hours per day the long-term residential concentration is based on (always 24 hours)
H_{source} = the number of hours the source operates per day
$D_{residential}$ = the number of days per week the long-term residential concentration is based on (always 7 days).
D_{source}= the number of days the source operates per week.

d. The final step is to estimate the offsite worker's daily average inhalation concentration by multiplying the WAF with the long-term residential concentration. The worker's concentration is then used to calculate the 8-hour hazard index. This method using the approximation factor is a screening method. If the 8-hour hazard index is above a threshold of concern, the district or assessor should contact OEHHA for further guidance regarding the substance of concern.

In the future, the HARP software will have the ability to use 8-hour RELs, calculate worker impacts using an approximation factor, and to post-process worker concentrations using the hourly raw results from an air dispersion analysis.

4.12.3.2 Continuous Sources

If the source is continuously emitting, then the worker is assumed to breathe the long-term annual average concentration during their work shift and no concentration adjustments are made when estimating 8-hour health impacts. Note however, if an assessor does not wish to assume the worker breathes the long-term annual average concentration during the work shift, then a refined concentration can be post-processed as described in Appendix M. All alternative assumptions should be approved by the reviewing authority and supported in the presentation of results.

Note that 8-hour RELs are not typically used for continuously emitting sources for residential receptors. In this situation it is only necessary to estimate a chronic Hazard Index using the annual average concentrations and chronic RELs. However, there may be situations where the District may wish to assess an 8-hour Hazard Index, for example, where there are significant differences in modeled concentration of emissions during the day due to diurnal wind patterns.

4.12.4 *Modeling and Adjustment Factors for Noncancer Chronic RELs*

Potential chronic noncancer health impacts use the long-term annual average concentration regardless of the emitting facility's schedule. No adjustment factors should be used to adjust this concentration. Chronic RELs are used to assess not only residential health impacts, but in many cases worker health impacts as well. There are currently only a limited number of substances with an 8-hour inhalation REL, and a facility may emit only, or mostly, substances that currently have just a chronic REL. Until there are 8-hour RELs for all the Hot Spots substances emitted from a specified facility, we recommend determining the chronic HI for the MEIW to adequately protect the offsite worker.

The results from the chronic hazard index calculations are not combined with the 8-hour or acute hazard indices. All potential noncancer results should be reported independently. See Chapter 8 for more discussion on calculating health impacts.

4.12.5 *Modeling and Adjustments for Oral Cancer Potencies and Oral RELs*

When estimating the cancer risk or noncancer health impacts from noninhalation pathways, no adjustment is made to the long-term annual average concentration regardless of the emitting facility's schedule. Since the media (e.g., soil) at the receptor location where deposition takes place for noninhalation pathways is continuously present, the concentrations used for all noninhalation pathways are not adjusted (up or down) by an adjustment factor. However, some adjustments are made to the concentration once the pollutants reach the media, for example, pollutants undergo decay in soils. In addition, when the dose for each pathway is calculated, exposure adjustments may also be made. See Chapter 5 of this document and the Technical

Support Document for Exposure Assessment and Stochastic Analysis (OEHHA, 2012) to get more information on these types of adjustments. Oral cancer potencies and oral RELs are used to assess both residential or worker health impacts.

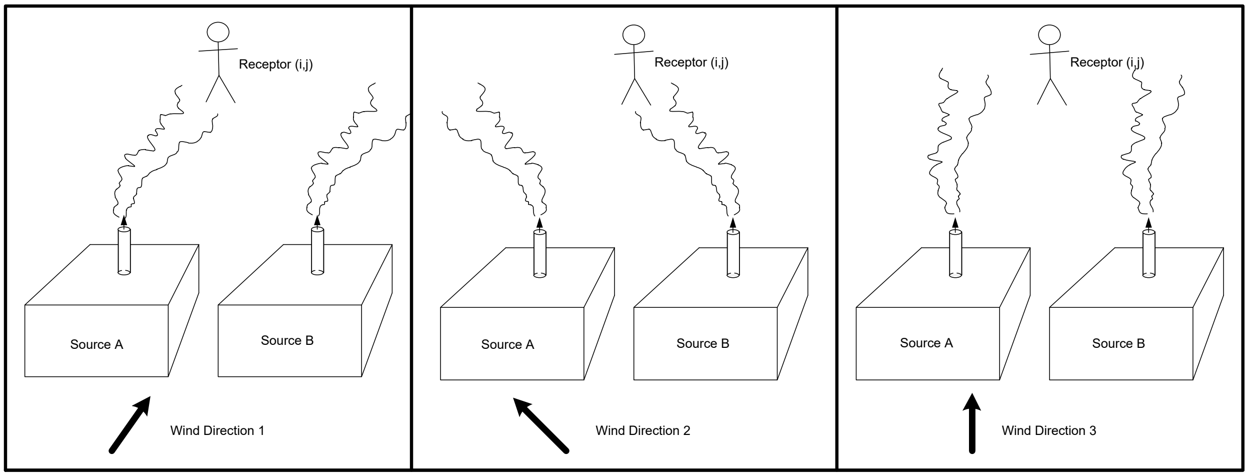
4.12.6 *Modeling One-Hour Concentrations using Simple and Refined Acute Calculations*

Modeled one-hour concentrations are needed for the acute health hazard index calculations. HARP has two methods to calculate this concentration: Simple and Refined. As an aid to understanding the differences between Simple and Refined, Figure 2 shows three possible conditions showing how wind direction may vary and impact a downwind receptor (i,j) differently from just two sources (A and B).

For the Simple calculation, HARP stores only the maximum one-hour concentration at each receptor (i,j) from each source (A and B) as the dispersion model marches down each hour of the simulation (e.g., one to five years of hourly data). At the end of the simulation period, HARP reports back only the maximum impacts at each receptor from each source regardless of which hour of the simulation period this occurred. For example, the Simple Maximum Acute Impacts would be the summation of Source A impacts from Wind Direction 1 and Source B impacts from Wind Direction 2 as shown in Figure 2.

For the Refined simulation, HARP stores each hourly concentration at each receptor (i,j) from each source. At the end of the simulation period, HARP evaluates the coincident impact at each receptor from all sources for each hour of the simulation period. In this case the maximum impacts will be identified by a particular hour of the period with associated wind speed, direction, and atmospheric conditions. For example, the Refined Maximum Acute impact from Sources A and B on receptor (i,j) could be from any wind direction (1,2, or 3) as shown in Figure 2. Since HARP stores all simulations for all sources – at all receptors – for all hours to calculate the refined impacts, there is great potential to fill large amounts of disk storage space. The Refined simulation provides a more representative picture of the maximum acute hazard index from a facility. The Simple calculation will provide an upper bound to the acute hazard index.

Figure 2 Acute Scenarios



4.13 Modeling Special Cases; Specialized Models

Special situations arise in modeling some sources that require considerable professional judgment; a few are outlined below. It is recommended that the reader consider retaining professional consultation services if the procedures are unfamiliar. The following sections, taken mostly from the document “On-Site Meteorological Program Guidance for Regulatory Modeling Applications” (U.S. EPA, 1995e), provide general information on data formats and representativeness. Some Districts may have slightly different recommendations from those given here.

4.13.1 *Building Downwash*

The entrainment of a plume in the wake of a building can result in the “downwash” of the plume to the ground. This effect can increase the maximum ground-level concentration downwind of the source. Therefore, stack sources must be evaluated to determine whether building downwash is a factor in the calculation of maximum ground-level concentrations.

The PRIME algorithm, included with AERMOD, has several advances in modeling building downwash effects including enhanced dispersion in the wake, reduced plume rise due to streamline deflection and increased turbulence, and continuous treatment of the near and far wakes (Schulman, 2000).

Complicated situations involving more than one building may necessitate the use of the Building Profile Input Program (BPIP) which can be used to generate the building dimension section of the input file of the ISC models (U.S. EPA, 1993). The BPIP program calculates each building’s direction-specific projected width. The Building Profile Input Program for PRIME (BPIPPRM) is the same as BPIP but includes an algorithm for calculating downwash values for input into the PRIME algorithm which is contained in such models as AERMOD. The input structure of BPIPPRM is the same as that of BPIP.

4.13.2 *Deposition*

There are two types of deposition: wet deposition and dry deposition. Wet deposition is the incorporation of gases and particles into rain-, fog- or cloud water followed by a precipitation event and also rain scavenging of particles during a precipitation event. Wet deposition of gases is therefore more important for water soluble chemicals; particles (and hence particle-phase chemicals) are efficiently removed by precipitation events (Bidleman, 1988). Dry deposition refers to the removal of gases and particles from the atmosphere.

In the Air Toxics "Hot Spots" program, deposition is quantified for particle-bound pollutants and not gases. Wet deposition of water-soluble gas phase chemicals is thus not considered. When calculating pollutant mass deposited to surfaces without including depletion of pollutant mass from the plume, airborne concentrations remaining in the plume and deposition to surfaces can be overestimated, thereby resulting in overestimates of both the inhalation and multi-pathway risk estimates. However, neglecting deposition in the air dispersion model, while accounting for it in the multipathway health risk assessment, is a conservative, health protective approach (CAPCOA, 1987; Croes, 1988). Misapplication of plume depletion can also lead to possible underestimates of multi-pathway risk and for that reason no depletion is the default assumption. If plume depletion is incorporated, then some consideration for possible resuspension is warranted. An alternative modeling methodology accounting for plume depletion can be discussed with the Air District and used in an approved modeling protocol.

Although not generally used, several air dispersion models can provide downwind concentration estimates that take into account the upwind deposition of pollutants to surfaces and the consequential reduction of mass remaining in the plume. Air dispersion models having deposition and plume depletion algorithms require particle distribution data that are not always readily available. These variables include particle size, mass fraction, and density for input to AERMOD. In addition, the meteorological fields need to include additional parameters including relative humidity, precipitation, cloud cover, and surface pressure. Consequently, depletion of pollutant mass from the plume often is not taken into account.

In conclusion, multipathway risk assessment analyses normally incorporate deposition to surfaces in a screening mode, specifically by assigning a default deposition velocity of 2 cm/s for controlled sources and 5 cm/s for uncontrolled sources in lieu of actual measured size distributions (ARB, 1989). For particles (and particle-phase chemicals), the deposition velocity depends on particle size and is minimal for particles of diameter approximately 0.1-1 micrometer; smaller and larger particles are removed more rapidly.

4.13.3 *Short Duration Emissions*

Short-duration emissions (i.e., much less than an hour) require special consideration. In general, "puff models" provide a better characterization of the dispersion of pollutants having short-duration emissions. Continuous Gaussian plume models have traditionally been used for averaging periods as short as about 10 minutes and are not recommended for modeling sources having shorter continuous emission duration.

4.13.4 *Fumigation*

Fumigation occurs when a plume that was originally emitted into a stable layer in the atmosphere is mixed rapidly to ground-level when unstable air below the plume reaches plume level. Fumigation can cause very high ground-level concentrations. Typical situations in which fumigation occurs are:

- Breaking up of a nocturnal radiation inversion by solar warming of the ground surface (rising warm unstable air); note that the break-up of a nocturnal radiation inversion is a short-lived event and should be modeled accordingly.
- Shoreline fumigation caused by advection of pollutants from a stable marine environment to an unstable inland environment
- Advection of pollutants from a stable rural environment to a turbulent urban environment

SCREEN3 incorporates concentrations due to inversion break-up and shoreline fumigation and is limited to maximum hourly evaluations. The Offshore and Coastal Dispersion Model incorporates overwater plume transport and dispersion as well as changes that occur as the plume crosses the shoreline – hourly meteorological data are needed from both offshore and onshore locations.

4.13.5 *Raincap on Stack*

The presence of a raincap or any obstacle at the top of the stack hinders the momentum of the exiting gas. The extent of the effect is a function of the distance from the stack exit to the obstruction and of the dimensions and shape of the obstruction.

On the conservative side, the stack could be modeled as having a non-zero, but negligible exiting velocity, effectively eliminating any momentum rise. Such an approach would result in final plume heights closer to the ground and therefore higher concentrations nearby. There are situations where such a procedure might lower the actual population-dose and a comparison with and without reduced exit velocity should be examined.

Plume buoyancy is not strongly reduced by the occurrence of a raincap. Therefore, if the plume rise is dominated by buoyancy, it is not necessary to adjust the stack conditions. (The air dispersion models determine plume rise by either buoyancy or momentum, whichever is greater.)

The stack conditions should be modified when the plume rise is dominated by momentum and in the presence of a raincap or a horizontal stack. Sensitivity studies with the SCREEN3 model, on a case-by-case basis, can be used to determine whether plume rise is dominated by buoyancy or momentum. The District should be consulted before applying these procedures.

- Set exit velocity to 0.001 m/sec
- Turn stack tip downwash off
- Reduce stack height by 3 times the stack diameter

Stack tip downwash is a function of stack diameter, exit velocity, and wind speed. The maximum stack tip downwash is limited to three times the stack diameter in the AERMOD air dispersion model. In the event of a horizontal stack, stack tip downwash should be turned off and no stack height adjustments should be made. Note: This approach may not be valid for large (several meter) diameter stacks.

An alternative, more refined, approach could be considered for stack gas temperatures which are slightly above ambient (e.g., ten to twenty degrees Fahrenheit above ambient). In this approach, the buoyancy and the volume of the plume remain constant and the momentum is minimized.

- Turn stack tip downwash off
- Reduce stack height by 3 times the stack diameter ($3D_o$)
- Set the stack diameter (D_b) to a large value (e.g., 10 meters)
- Set the stack velocity to $V_b = V_o\ (D_o/D_b)^2$

Where V_o and D_o are the original stack velocity and diameter and V_b and D_b are the alternative stack velocity and diameter for constant buoyancy. This approach is advantageous when $D_b >> D_o$ and $V_b << V_o$ and should only be used with District approval.

In the presence of building downwash and in the event that PRIME downwash is being utilized in AERMOD, an alternative approach is recommended. PRIME algorithms use the stack diameter to define initial plume radius and to solve conservation laws. The user should input the actual stack diameter and exit temperature but set the exit velocity to a nominally low value (e.g., 0.001 m/s). Also since PRIME does not explicitly consider stack-tip downwash, no adjustments to stack height should be made.

Currently U.S. EPA is BETA testing options for capped and horizontal releases in AERMOD. It is expected that these options will replace the above guidance when BETA testing is complete.

4.13.6 *Landfill Sites*

Landfills should be modeled as area sources. The possibility of non-uniform emission rates throughout the landfill area should be investigated. A potential cause of non-uniform emission rates would be the existence of cracks or fissures in the landfill cap (where emissions may be much larger). If non-uniform emissions exist, the landfill should be modeled with several smaller areas assigning an appropriate emission factor to each one of them, especially if there are nearby receptors (distances on the same order as the dimensions of the landfill).

4.14 Specialized Models

Some models have been developed for application to very specific conditions. Examples include models capable of simulating sources where both land and water surfaces affect the dispersion of pollutants and models designed to simulate emissions from specific industries.

4.14.1 *Buoyant Line and Point Source Dispersion Model (BLP)*

BLP is a Gaussian plume dispersion model designed for the unique modeling problems associated with aluminum reduction plants, and other industrial sources where plume rise and downwash effects from stationary line sources are important.

4.14.1.1 Regulatory Application

Regulatory application of BLP model requires the selection of the following options:

- rural (IRU=l) mixing height option;
- default (no selection) for all of the following: plume rise wind shear (LSHEAR), transitional point source plume rise (LTRANS), vertical potential temperature gradient (DTHTA), vertical wind speed power law profile exponents (PEXP), maximum variation in number of stability classes per hour (IDELS), pollutant decay (DECFAC), the constant in Briggs' stable plume rise equation (CONST2), constant in Briggs' neutral plume rise equation (CONST3), convergence criterion for the line source calculations (CRIT), and maximum iterations allowed for line source calculations (MAXIT); and
- terrain option (TERAN) set equal to 0.0, 0.0, 0.0, 0.0, 0.0, 0.0.

For more information on the BLP model consult the user's guide (Schulman and Scire, 1980).

4.14.2 *Offshore and Coastal Dispersion Model (OCD)*

OCD (DiCristofaro and Hanna, 1989) is a straight-line Gaussian model developed to determine the impact of offshore emissions from point, area or line sources on the air quality of coastal regions. OCD incorporates "over-water" plume transport and dispersion as well as changes that occur as the plume crosses the shoreline. Hourly meteorological data are needed from both offshore and onshore locations. Additional data needed for OCD are water surface temperature, over-water air temperature, mixing height, and relative humidity.

Some of the key features include platform building downwash, partial plume penetration into elevated inversions, direct use of turbulence intensities for plume dispersion, interaction with the overland internal boundary layer, and continuous shoreline fumigation.

4.14.2.1 Regulatory Application

OCD has been recommended for use by the Minerals Management Service for emissions located on the Outer Continental Shelf (50 FR 12248; 28 March 1985). OCD is applicable for over-water sources where onshore receptors are below the lowest source height. Where onshore receptors are above the lowest source height, offshore plume transport and dispersion may be modeled on a case-by-case basis in consultation with the District.

4.14.3 *Shoreline Dispersion Model (SDM)*

SDM (PEI, 1988) is a hybrid multipoint Gaussian dispersion model that calculates source impact for those hours during the year when fumigation events are expected using a special fumigation algorithm and the MPTER regulatory model for the remaining hours.

SDM may be used on a case-by-case basis for the following applications:

- tall stationary point sources located at a shoreline of any large body of water;
- rural or urban areas;
- flat terrain;
- transport distances less than 50 km;
- 1-hour to 1-year averaging times.

4.15 Interaction with the District

The risk assessor must contact the District to determine if there are any specific requirements. Examples of such requirements may include, but are not limited to: specific receptor location guidance, specific usage of meteorological data, and specific report format (input and output). See Chapter 9 for more information on the format and content of modeling protocols and HRAs.

4.15.1 *Submittal of Modeling Protocol*

It is strongly recommended that a modeling protocol be submitted to the District for review and approval prior to extensive analysis with an air dispersion model. The modeling protocol is a plan of the steps to be taken during the air dispersion modeling process. Following is an example of the format that may be followed in the preparation of the modeling protocol. **Consult with the District to confirm format and content requirements or to determine the availability of District modeling guidelines before submitting the protocol.**

Outline for a Modeling Protocol

I. ***Introduction***

Include the facility name, address, and a brief overview describing the facility's operations.

- Provide a description of the terrain and topography surrounding the facility and potential receptors.
- Indicate the format in which data will be provided. Ideally, the report and summary of data will be on paper and all data and model input and output files will be provided electronically (e.g., compact disk or CD).
- Identify the guidelines used to prepare the protocol (e.g., District Guidelines).

II. ***Emissions***

For each pollutant and process whose emissions are required to be quantified in the HRA, list the annual average emissions (pounds/year and grams/second) and the maximum one-hour emissions (pounds/hour and grams/second)[2]. Maximum 1-hour emissions are used for acute noncancer health impacts while annual emissions are used for chronic exposures (i.e., chronic and 8-hour noncancer health impacts or cancer risk assessment).

- Identify the reference and method(s) used to determine emissions (e.g., source tests, emission factors, etc.). Clearly indicate any emission data that are not reflected in the previously submitted emission inventory report. In this event, a revised emission inventory report will need to be submitted to the District.
- Identify if this will be a multipathway assessment based on emitted substances.

III. ***Models / Modeling Assumptions***

Specify the model and modeling assumptions

- Identify the model(s) to be used, including the version number.
- Identify the model options that will be used in the analysis.

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[2] Except radionuclides, for which annual and hourly emissions are reported in Curies/year and millicuries/hour, respectively.

- Identify the modeling domain(s) and the spacing of receptor grid(s). Grid spacing should be sufficient in number and detail to capture the concentration at all of the receptors of interest.

- Indicate complex terrain options that may be used, if applicable.

- Identify the source type(s) that will be used to represent the facility's operations (e.g., point, area, or volume sources, flare options or other).

- Indicate the preliminary source characteristics (e.g., stack height, gas temperature, exit velocity, dimensions of volume source, etc.).

- Identify and support the use of urban or rural dispersion coefficients for those models that require dispersion coefficients. For other models, identify and support the parameters required to characterize the atmospheric dispersion due to land characteristics (e.g., surface roughness, Monin-Obukhov length).

IV. Meteorological Data

Specify the type, source, and year(s) of hourly meteorological data (e.g., hourly surface data, upper air mixing height information).

- State how the data are representative for the facility site.

- Describe QA/QC procedures.

- Identify any gaps in the data; if gaps exist, describe how the data gaps are filled.

V. Deposition

- Specify the method to calculate deposition (if applicable).

VI. Receptors

Specify the type and location of receptors. Include all relevant information describing how the individual and population-related receptors will be evaluated.

- Identify and describe the location(s) of known or anticipated potential sensitive receptors, the point of maximum impact (PMI), and the maximum exposed individual residential (MEIR) and worker (MEIW) receptors. Identify any special considerations or grids that will be used to model these receptors. This information should correspond with information provided in Section III (e.g., fine receptor spacing of 20 meters at the fence line and centered on the maximum impacts; coarse receptor spacing of 100 meters out to 2,000 meters; extra coarse spacing of 1,000 meters out to 20,000 meters).

- Identify if spatial averaging will be used. Include necessary background information on each receptor including how the domain and spacing will be determined for each receptor or exposure pathway.

- Describe how the cancer burden or population impact estimates are calculated. Clarify the same information for the presentation of noncancer population impacts (e.g., centroids of the census tracts in the area within the zone of impact).

- Specify that actual UTM coordinates and the block/street locations (i.e., north side of 3,000 block of Smith Street), where possible, will be provided for specified receptor locations.

- Identify and support the use of any exposure adjustments (e.g., time a location, diurnal).

- Include the list of anticipated exposure pathways that will be included and indicate which substance will be evaluated in the multipathway assessment. Identify if sensitive receptors are present and which receptors will be evaluated in the HRA.

VII. Maps

Identify how the information will be graphically presented.

- Indicate which cancer risk isopleths will be plotted for the cancer zone of impact (e.g., 10^{-7}, 10^{-6} see Section 4.6.1).

- Indicate the hazard quotients or hazard indices to be plotted for the noncancer acute, 8 hour, and chronic zones of impact (e.g., 0.5, 1.0, etc.).

4.16 Health Risk Assessment Report

This section describes the information related to the air dispersion modeling process that needs to be reported in the risk assessment. This section is also presented in Chapter 9, Summary of the Requirements for a Modeling Protocol and a Health Risk Assessment Report, in Section 9.2. The District may have specific requirements regarding format and content (see Section 4.15). Sample calculations should be provided at each step to indicate how reported emissions data were used. Reviewing agencies must receive input, output, and supporting files of various model analyses on computer-readable media (e.g., CD).

4.16.1 *Information on the Facility and its Surroundings*

Report the following information regarding the facility and its surroundings:

- Facility Name

- Location (UTM coordinates and street address)
- Land use type (see Section 2.4)
- Local topography
- Facility plot plan identifying:
  - source locations
  - property line
  - horizontal scale
  - building heights
  - emission sources

4.16.2 *Source and Emission Inventory Information*[3]

4.16.2.1 Release Parameters

Report the following information for each release location in table format:

- Release location identification number
- Release name
- Release type (e.g., point, volume, area, line, pit, etc.)
- Source identification number(s) used by the facility that emit out of this release location
- Release location using UTM coordinates
- Release parameters by release type (e.g., shown for point source):
  - Stack height (m), stack diameter (building dimensions for downwash), exhaust gas exit velocity (m/s), exhaust gas volumetric flow rate (ACFM), exhaust gas exit temperature (K), etc.

4.16.2.2 Source Description and Operating Schedule

The description and operating schedule for each source should be reported in table form including the following information:

- Source identification number used by the facility
- Source name
- Number of operating hours per day and per year (e.g., 0800-1700, 2700 hr/yr)
- Number of operating days per week (e.g., Mon-Sat)
- Number of operating days or weeks per year (e.g., 52 wk/yr excluding major holidays)
- Release point identification number(s) for where source emissions are released

[3] Health and Safety Code section 44346 authorizes facility operators to designate certain "Hot Spots" information as trade secret. Section 44361(a) requires districts to make health risk assessments available for public review upon request. Section 44346 specifies procedures to be followed upon receipt of a request for the release of trade secret information. See also the Inventory Guidelines Report regarding the designation of trade secret information in the Inventory Reports.

- Fraction of source emissions emitted at each release point by release point ID number

4.16.2.3 Emission Control Equipment and Efficiency

Report emission control equipment and efficiency by source and by substance

4.16.2.4 Emissions Data Grouped By Source

Report emission rates for each toxic substance, grouped by source (i.e., emitting device or process identified in Inventory Report), in table form including the following information:

- Source name
- Source identification number
- Substance name and CAS number (from Inventory Guidelines)
- Annual average emissions for each substance (lb/yr)
- Hourly maximum emissions for each substance (lb/hr)

4.16.2.5 Emissions Data Grouped by Substance

Report facility total emission rate by substance for all emitted substances listed in the Air Toxics “Hot Spots” Program including the following information:

- Substance name and CAS number (from Inventory Guidelines)
- Annual average emissions for each substance (lb/yr)
- Hourly maximum emissions for each substance (lb/hr)

4.16.2.6 Emission Estimation Methods

Report the methods used in obtaining the emissions data indicating whether emissions were measured or estimated. Clearly indicate any emission data that are not reflected in the previously submitted emission inventory report and submit a revised emission inventory report to the district. A reader should be able to reproduce the risk assessment without the need for clarification.

4.16.2.7 List of Substances

Include tables listing all "Hot Spots" Program substances which are emitted, plus any other substances required by the District. Indicate substances to be evaluated for cancer risks and noncancer health impacts.

4.16.3 *Exposed Population and Receptor Location*

Report the following information regarding exposed population and receptor locations. See Chapter 9 and specific sections within this chapter for more detailed information.

- Description of zone of impact including map showing the location of the facility, boundaries of zone of impact, census tracts, emission sources, sites of maximum exposure, and the location of all appropriate receptors. This should be a true map (one that shows roads, structures, etc.), drawn to scale, and not just a schematic drawing. USGS 7.5 minute maps or GIS based maps are usually the most appropriate choices. (If significant development has occurred since the user's survey, this should be indicated.)
- Separate maps for the cancer risk zone of impact and the hazard index (noncancer) zone of impact(s). The cancer zone of impact should include isopleths down to at least the 1/1,000,000 risk level. Because some districts use a level below 1/1,000,000 to define the zone of impact, the District should be consulted. Three separate maps (to represent both chronic, 8-hour, and acute HI) should be created to define the zone of impact for the hazard index from both inhalation and noninhalation pathways greater than or equal to 0.5. The point of maximum impact (PMI), maximum exposed individual at a residential receptor (MEIR), the maximum exposed individual worker (MEIW), and any other locations of interest for both cancer and noncancer risks should be located on the maps.
- Tables identifying population units and sensitive receptors (UTM coordinates, receptor IDs, and street addresses of specified receptors).
- Heights or elevations of the receptor points.
- For each receptor type (e.g., PMI, MEIR, MEIW, and any other location(s) of interest) that will utilize spatial averaging, the domain size and grid resolution must be clearly identified. If another domain or grid resolution other than 20 meters by 20 meters with 5-meter grid spacing will be used for a receptor, then care should be taken to determine the proper domain size and grid resolution that should be used. For a worker, the HRA shall support all assumptions used, including, but not limited to, documentation for all workers showing the area where each worker routinely performs their duties. The final domain size should not be greater than the smallest area of worker movement. Other considerations for determining domain size and grid spacing resolution may include an evaluation of the concentration gradients across the worker area. The grid spacing used within the domain should be sufficient in number and detail to obtain a representative concentration across the area of interest. When spatial averaging over the deposition area of a pasture, garden, or water body, care should be taken to determine the proper domain size to make sure it includes all reasonable areas of potential deposition. The size and shape of the pasture, garden, or water body of interest should be identified and used for the modeling domain. The grid spacing or resolution used within the domain should be sufficient in detail to obtain a representative deposition concentration across the area of interest. One way to determine the grid resolution is to include an evaluation of the concentration gradients across the deposition area. The HRA shall support all assumptions used, including, but not limited to, documentation of the deposition area (e.g., size and shape of the pasture or water body, maps,

representative coordinates, grid resolution, concentration gradients, etc.). The use or spatial averaging is subject to approval by the reviewing authority. This includes the size of the domain and grid resolution that is used for spatial averaging of a worksite or multipathway deposition area.

4.16.4 *Meteorological Data*

If meteorological data were not obtained directly from the District, then the report must clearly indicate the data source and time period used. Meteorological data not obtained from the District must be submitted in electronic form along with justification for their use including information regarding representativeness and quality assurance.

The risk assessment should indicate if the District required the use of a specified meteorological data set. All memos indicating the District's approval of meteorological data should be attached in an appendix.

4.16.5 *Model Selection and Modeling Rationale*

The report should include an explanation of the model chosen to perform the analysis and any other decisions made during the modeling process. The report should clearly indicate the name of the models that were used, the level of detail (screening or refined analysis) and the rationale behind the selection.

Also report the following information for each air dispersion model used:

- version number
- selected options and parameters in table form
- Identify the modeling domain(s) and the spacing of receptor grid(s). Grid spacing should be sufficient in number and detail to capture the concentration at all receptors of interest.

4.16.6 *Air Dispersion Modeling Results*

- Maximum hourly and annual average concentrations of chemicals at appropriate receptors such as the residential and worker MEI receptors
- Annual average and maximum one-hour (and 30-day average for lead only) concentrations of chemicals at appropriate receptors listed and referenced to computer printouts of model outputs
- Model printouts (numbered), annual concentrations, maximum hourly concentrations
- Disk with input/output files for air dispersion program (e.g., the AERMOD input file containing the regulatory options and emission parameters, receptor locations, meteorology, etc.)
- Include tables that summarize the annual average concentrations that are calculated for all the substances at each site. The use of tables that present the relative contribution of each emission point to the receptor concentration is recommended. (These tables should have clear reference to the computer

model which generated the data. It should be made clear to any reader how data from the computer output were transferred to these tables.) [As an alternative, the above two tables could contain just the values for sites of maximum impact (i.e., PMI, MEIR and MEIW), and sensitive receptors, if required. All the values would be found in the Appendices.]

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5 - Exposure Assessment
Estimation of Concentration and Dose

5.1 Introduction

This chapter provides a summary of how toxicant ground level air concentrations estimated from air dispersion modeling or monitoring results are used to determine dose at receptors of interest. This chapter includes all the algorithms and data (e.g., point estimates, distributions, and transfer factors) that are needed to determine the substance-specific concentration in exposure media and the dose at a receptor of interest. The determination of exposure concentration and dose precedes the calculations of potential health impacts. See Chapter 8 and Appendix I for information on calculating potential health impacts.

At a minimum, three receptors are evaluated in Hot Spots health risk assessments (HRA) (see Section 4.7); these are:

- the Point of Maximum Impact (PMI),
- the Maximally Exposed Individual Resident (MEIR), and
- the Maximally Exposed Individual Worker (MEIW).

The PMI is defined as the receptor point(s) with the highest acute, 8-hour, chronic, or cancer health impact outside the facility boundary. The facility boundary is defined as the property line. Often the fence is on the property line. The MEIR is typically defined as the existing off-site residence(s) (i.e., house, apartment or other dwelling) with the highest acute, chronic, or cancer health impact. Calculating an 8-hour hazard index is not required for the MEIR, but can be performed at the discretion of the District. The MEIW is typically defined as the existing offsite workplace with the highest acute, 8-hour, chronic, or cancer health impact.

In addition, it may be necessary to determine risks at sensitive receptors (e.g., schools, day care centers, elder care centers, and hospitals). The District or reviewing authority should be consulted in order to determine the appropriate sensitive receptors for evaluation. Some situations may require that on-site receptor (worker or residential) locations be evaluated. Some examples where the health impacts of on-site receptors may be appropriate could be military base housing, prisons, universities, or locations where the public may have regular access for the appropriate exposure period (e.g., a lunch time café or museum for acute exposures). The risk assessor should contact the Air Pollution Control or Air Quality Management District (the District) for guidance about any on-site exposure situations at the emitting facility. These on-site locations should be included in the health risk assessment (HRA). If the facility emits multiple substances from two or more stacks, the acute, 8-hour, chronic, and cancer health impacts at the PMI may be located at different physical locations. The MEIR or MEIW cancer, acute, 8-hour, and chronic receptors may also be at different locations.

The process for determining dose at the receptor location, and ultimately potential health impacts, will likely include air dispersion modeling, and, with less frequency, air monitoring data. Air dispersion modeling combines the facility emissions and release parameters and uses default or site-specific meteorological conditions to estimate downwind, ground-level concentrations at various (user-defined) receptor locations. Air dispersion modeling is described in Chapter 4 and is presented in detail in the *Air Toxics Hot Spots Program Risk Assessment Guidelines; Technical Support Document for Exposure Assessment and Stochastic Analysis (OEHHA, 2012a*).

In summary, the process of using air dispersion modeling results as the basis of an HRA follows these four steps:

- Air dispersion modeling is used to estimate annual average and maximum one-hour ground level concentrations (GLC). The air dispersion modeling results are expressed as an air concentration or in terms of (Chi over Q) for each receptor point. (Chi over Q) is the modeled downwind air concentration (Chi) based on an emission rate of one gram per second (Q). (Chi over Q) is expressed in units of micrograms per cubic meter per gram per second, or (μg/m^3)/(g/s). (Chi over Q) is sometimes written as (χ/Q) and is sometimes referred to as the dilution factor.

- When multiple substances are evaluated, the χ/Q is normally utilized since it is based on an emission rate of one gram per second. The χ/Q at the receptor point of interest is multiplied by the substance-specific emission rate (in g/s) to yield the substance-specific ground-level concentration (GLC) in units of μg/m^3. The following equations illustrate this point.

$$\mathbf{GLC} = \left(\chi/\mathbf{Q}\right) \mathbf{x} \left(\mathbf{Q}_{\mathbf{substance}}\right)$$

$$\chi/\mathbf{Q} = \left(\mathbf{Chi\ \ over\ Q}\right) \mathbf{in} \left(\frac{\mu\mathbf{g}/\mathbf{m}^3}{\mathbf{g}/\mathbf{s}}\right)\mathbf{, from\ model\ results\ with\ unit\ emission\ rate}$$

$$\mathbf{Q}_{\mathbf{substance}} = \mathbf{substance\ specific\ emission\ rate}\left(\mathbf{g}/\mathbf{s}\right)$$

- The applicable exposure pathways (e.g., inhalation, soil contact, fish consumption) are identified for the emitted substances, and the receptor locations are identified. This determines which exposure algorithms in this chapter are ultimately used to estimate dose. After the exposure pathways are identified, the fate and transport algorithms described in this chapter are used to estimate concentrations in the applicable exposure media (e.g., soil or water) and the exposure algorithms are used to determine the substance-specific dose.

- The dose is used with cancer and noncancer health values to calculate the potential health impacts for the receptor (Chapter 8). An example calculation using the high-end point-estimates for the inhalation (breathing) exposure pathway can be found in Appendix I. Appendix I and Chapters 5 (this Section) and 8 also contain information on how the annual average and maximum one-hour ground level concentrations are used for chronic, 8-hour, and acute health risk calculations.

The algorithms in this chapter are also used to calculate media concentrations and dose in the rare instance, for the Hot Spots program, when monitoring equipment was used rather than air dispersion modeling to obtain a receptor's substance-specific GLC. One situation that is specific to monitored data is the treatment of results below the sampling method level of detection (LOD). In short, it is standard risk assessment practice when monitoring results are reported both above and below the LOD to use one-half of the LOD for those sample concentrations reported below the LOD. If all testing or monitoring results fall below the LOD, then assessors should contact the District for appropriate procedures. For more information about reporting emissions under the Hot Spots Program, see the ARB's *Emission Inventory Criteria and Guidelines Regulations (Title 17, California Code of Regulations, Sections 93300-93300.5),* and the *Emission Inventory Criteria and Guidelines Report* (EICG Report), which is incorporated by reference therein (ARB, 2007*)*.

The recommended model for calculating and presenting HRA results for the Hot Spots Program is the HARP software, available from the Air Resources Board (ARB). More information on HARP and directions for downloading the software can be found on the ARB's web site at http://www.arb.ca.gov/toxics/harp/downloads.htm.

5.2 Criteria for Exposure Pathway Evaluation

In order to determine total dose to the receptor the applicable pathways of exposure need to be identified. The inhalation pathway must be evaluated for all Hot Spots substances emitted by the facility. A small subset of Hot Spots substances is subject to deposition onto soil, plants, and water bodies. These substances need to be evaluated by the appropriate noninhalation pathways, as well as by the inhalation pathway, and the results must be presented in all HRAs. These substances include semi-volatile organic chemicals and heavy metals. Such substances are referred to as multipathway substances. Two steps are necessary to determine if a substance should be evaluated for multipathway impacts:

1. Determine whether the substance or its group (e.g., dioxins, PAHs) is listed in Table 5.1.
2. Determine if the substance has an oral reference exposure level (REL) listed in Table 6.4, or if it has an oral cancer slope factor listed in Table 7.1. Two other references for checking the presence of oral health factors are OEHHA's website (OEHHA, 2012b) and the *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values* on the Air Resources Board website (ARB, 2012). Oral or noninhalation exposure pathways include the ingestion of soil, angler-caught fish, drinking water from surface water sources, mother's milk,

homegrown produce, beef, pork, chicken, eggs and cow's milk. The dermal pathway is also evaluated via contact with contaminated soil.

For all multipathway substances, the minimum exposure pathways that must be evaluated at every residential site (in addition to inhalation) are soil ingestion and dermal exposure. If dioxins, furans, PCBs, PAHs or lead are emitted, then the breast-milk consumption pathway also becomes mandatory. The other exposure pathways (e.g., the ingestion of homegrown produce or angler-caught fish) are evaluated on a site-by-site basis. If the resident can be exposed through an impacted exposure pathway, then it must be included in the HRA. However, if there are no vegetable gardens or fruit trees within the zone of impact for a facility, for example, then the produce pathways need not be evaluated. Note that on-site residential receptors are potentially subject to inhalation and noninhalation exposure pathways. Table 8.2 identifies the residential and worker receptor exposure pathways that are mandatory and those that are dependent on the site-specific decisions. While residents can be exposed though several exposure pathways, worker receptors are only evaluated for inhalation, soil ingestion, and dermal exposure using point estimates.

Table 5.1 shows the multipathway substances that, based on available scientific data, can be considered for each noninhalation exposure pathway. The exposure pathways that are evaluated for a substance depend on two factors: 1) whether the substance is considered a multipathway substance for the Hot Spots Program (Table 5.1), and 2) what the site-specific conditions are. A multipathway substance may be excluded from a particular exposure pathway because its physical-chemical properties can preclude significant exposure via the pathway. For example, some water-soluble substances do not appreciably bioaccumulate in fish; therefore, the fish pathway is not appropriate. In addition, if a particular exposure pathway is not impacted by the facility or is not present at the receptor site, then the pathway is not evaluated. For example, if a fishable water body is not impacted by the facility, or the water source is impacted but no receptor uses it for fishing, then the angler-caught fish pathway is not evaluated.

Table 5.1 Specific Pathways to be Analyzed for Each Multipathway Substance

Substance	Soil Ingestion	Dermal	Meat, Milk & Egg Ingestion	Fish Ingestion	Exposed Vegetable Ingestion	Leafy Vegetable Ingestion	Protected Vegetable Ingestion	Root Vegetable Ingestion	Water Ingestion	Breast Milk Ingestion
Inorganic chemicals										
Arsenic & compounds	X	X	X	X	X	X	X	X	X	
Beryllium & compounds	X	X	X	X	X	X	X	X	X	
Cadmium & compounds	X	X	X	X	X	X	X	X	X	
Chromium VI & compounds	X	X	X[a]	X	X	X	X	X	X	
Fluorides (soluble compounds)	X	X	X		X	X	X	X	X	
Lead & compounds	X	X	X	X	X	X	X	X	X	X
Mercury & compounds	X	X	X	X	X	X	X	X	X	
Nickel & compounds	X	X	X	X	X	X	X	X	X	
Selenium & compounds	X	X	X	X	X	X	X	X	X	
Organic chemicals										
Creosotes	X	X	X	X	X	X			X	X
Diethylhexylphthalate	X	X	X	X	X	X			X	
Hexachlorobenzene	X	X	X	X	X	X			X	
Hexachlorocyclohexanes	X	X	X	X	X	X			X	
4,4'-Methylene dianiline	X	X			X	X			X	
Pentachlorophenol[b]										
PCBs	X	X	X	X	X	X			X	X
Polychlorinated dibenzo-p-dioxins and dibenzofurans	X	X	X	X	X	X			X	X
PAHs	X	X	X	X	X	X			X	X

[a] Cow's milk only; no multipathway analysis for meat and egg ingestion
[b] To be evaluated by pathway in future amendments to the Hot Spots Program

5.3 Estimation of Concentrations in Air, Soil, and Water

Once emissions exit the source, the substances emitted will be dispersed in the air. The substances in the exhaust gas with high vapor pressures will remain largely in the vapor phase, and substances with lower vapor pressures will tend to adsorb to fly ash or other particulate matter. The emission plume may contain both vapor phase substances and particulates. A semivolatile organic toxicant can partition into both vapor and particulate phases. Particulates will deposit on vegetation, on soil, and in water at a rate that is dependent on the particle size. Use the 0.02 m/s deposition rate for emission sources that have verifiable particulate matter control devices or for emission sources that may be uncontrolled but only emit particulate matter that is less than 2.5 microns (e.g., internal combustion engines). The following algorithms are used to estimate concentrations in environmental media including air, soil, water, vegetation, and animal products.

5.3.1 *Air*

The ground level concentration (GLC, or C_{air} as shown in EQ 5.3.1) of a substance in air is a function of the facility emission rate and the dilution factor (χ/Q) at the points under evaluation.

A. Equation 5.3.1: $\boxed{C_{air} = Q_{substance} \times {}^{\chi}/Q}$

1. C_{air} = Ground level concentration ($\mu g/m^3$)
2. $Q_{substance}$ = Substance emission rate (g/sec)
3. ${}^{\chi}/_{Q}$ = Dilution factor provided by dispersion modeling ($\mu g/m^3/g/sec$)

a. Recommended values for EQ 5.3.1:

1. $Q_{substance}$ = Facility-specific, substance emission rate
2. ${}^{\chi}/_{Q}$ = For point of interest, site specific, from dispersion modeling

b. Assumptions for EQ 5.3.1:

1. No plume depletion
2. Emission rate is constant, i.e., assumes steady state

5.3.2 *Soil*

The average concentration of the substance in soil (C_s) is a function of the deposition, accumulation period, chemical specific soil half-life, mixing depth, and soil bulk density. For simplicity and health protection, the Tier 1 default assumes 70-year soil deposition for the accumulation period at end of 70-year facility lifetime. The risk assessor may also choose a supplemental Tier 2 approach, subject to District approval or reviewing authority approval, in which the assessor applies a soil accumulation period based on the facility's start date of operation (e.g., historical date when emissions began), or the current exposure conditions, and the expected duration of operation.

A. Equation 5.3.2 A: $\boxed{C_s = Dep \times X / (K_s \times SD \times BD \times T_t)}$

1. C_s = Average soil concentration over the evaluation period ($\mu g/kg$)
2. Dep = Deposition on the affected soil area per day ($\mu g/m^2$-d)
3. X = Integral function for soil accumulation (d), see **EQ 5.3.2 C** below
4. K_s = Soil elimination constant (d^{-1})
5. SD = Soil mixing depth (m)
6. BD = Soil bulk density (kg/m^3)
7. T_t = Soil exposure duration or soil accumulation period (d)

a: Recommended default values for EQ 5.3.2 A:

1. Dep = Calculated in EQ 5.3.2 B
2. X = Calculated in EQ 5.3.2 C
3. K_s = Calculated in EQ 5.3.2 D
4. SD = 0.01 (m) for playground setting (soil ingestion and dermal pathways) and 0.15 (m) for agricultural setting (produce and meat pathways)
5. BD = 1,333 (kg/m^3)
6. T_t = 25,550 (d) = 70 years

b: Assumptions for EQ 5.3.2 A:

1. Substances are uniformly mixed in soil.
2. Substances are not leached or washed away, except where evidence exists to the contrary.
3. It is assumed that toxicants accumulate in the soil for 70 years from deposition over the 70 year lifespan of the facility. Use 70-year soil accumulation (T_t) for Tier 1 estimation of 9-, 30- and 70-year residential exposure, and 25-year off-site worker exposure.
4. For a receptor ingesting mother's milk, the mother is exposed from birth to 25 years of age; the infant is then born and receives mother's milk for one year. Default assumes 70-year soil accumulation for mother's milk pathway. See Table 5.1 for information on which substances or groups of substances must be evaluated by the mother's milk pathway.

B. Equation 5.3.2 B:

$$\textbf{Dep} = C_{air} \times \text{Dep-rate} \times 86{,}400$$

1. C_{air} = Ground level concentration ($\mu g/m^3$)
2. Dep-rate = Vertical rate of deposition (m/sec)
3. 86,400 = Seconds per day conversion factor (sec/d)

a: Recommended default values for EQ 5.3.2 B:

1. C_{air} = Calculated above in EQ 5.3.1 A
2. Dep-rate = Use 0.02 meters/second for controlled sources, or 0.05 meters/second for uncontrolled sources.

b: Assumptions for EQ 5.3.2 B:

1. Deposition rate remains constant. A deposition rate must be used when determining potential noninhalation health impacts. In the absence of facility specific information on the size of the emitted particles, the default values for deposition rate should be used. Currently, the default value of 0.02 meters per second is used for emission sources that have verifiable particulate matter control devices or for emission sources that may be uncontrolled but only emit particulate matter that is less than 2.5 microns

(e.g., internal combustion engines). The 0.05 meters per second default value is used for risk assessment if the emissions are uncontrolled. If other deposition rate factors are used, sufficient support documentation must be included with the HRA.

C. Equation 5.3.2 C: $$X = [\{e^{-Ks * Tf} - e^{-Ks * To}\} / K_s] + T_t$$

1. e = 2.718
2. K_s = Soil elimination constant
3. T_f = End of soil accumulation evaluation period (d)
4. T_o = Beginning of soil accumulation evaluation period (d)
5. T_t = Total days of soil exposure (soil accumulation period) T_f-T_o (d)

a: Recommended default values for EQ 5.3.2 C:

1: K_s = Calculated in EQ 5.3.2 D
2: T_f = 25,550 (d) = 70 years. Total soil exposure time at end of facility operation
3: T_o = 0 (d) The initial time (start period) of soil exposure to all receptors that are impacted by the soil pathway.

Note: Under a Tier 2 scenario, the risk assessor may also adjust T_f and T_t, subject to District approval, to replicate current soil accumulation and expected accumulation at the end of facility operation.

D. Equation 5.3.2 D: $$K_s = 0.693 / t_{1/2}$$

1. 0.693 = Natural log of 2
2. $t_{1/2}$ = Chemical specific soil half-life (d)

a: Recommended default values for EQ 5.3.2 D:

1. $t_{1/2}$ = Chemical-specific. See Table 5.2

5.3.3 *Water*

The water pathway is evaluated if a standing water body (e.g., pond or lake) is impacted by facility emissions and is used as a source for drinking water by food-producing animals or humans, or is a source of angler-caught fish. The average concentration of the substance in water (C_w) is a function of direct deposition and material carried in by surface run-off. However, only the contribution from direct deposition will be considered at this time.

A. Equation 5.3.3 A: $$C_w = C_{depw}$$

1. C_w = Average concentration in water (μg/kg)
2. C_{depw} = Contribution due to direct deposition (μg/kg)

B. Equation 5.3.3 B: $$C_{depw} = Dep \times SA \times 365 / (WV \times VC)$$

1. Dep = Deposition on water body per day ($\mu g/m^2/d$)
2. SA = Water surface area (m^2)
3. 365 = Days per year (d/yr)
4. WV = Water volume (kg)
5. VC = Number of volume changes per year

a: Recommended default values for EQ 5.3.3 B:

1. Dep = Calculated above in EQ 5.3.2 B
2. SA = Site specific water surface area (m^2)
3. WV = Site specific water volume in (kg) (1L = 1 kg)
4. VC = Site specific number of volume changes per year (SA, WV, and VC values can be obtained from the appropriate Department of Water Resources (DWR) Regional office)

b: Assumptions for EQ 5.3.3 B:

1. With the exception of dilution via number of volume changes per year, all material deposited into the water remains suspended or dissolved in the water column and is available for bioaccumulation in fish.

5.3.4 *Estimation of Concentrations in Vegetation, Animal Products, and Mother's Milk*

Estimates of the concentration of the substance in vegetation, animal products and mother's milk require the use of the results of the air, water, and soil environmental fate evaluation. Plants, animals and nursing mothers will be exposed to the substances at the concentrations previously calculated in Section 5.31 to 5.33 above.

5.3.4.1 Vegetation

The average concentration of a substance in and on vegetation (C_v) is a function of direct deposition of the substance onto the vegetation and of root translocation or uptake from soil contaminated by the substance. We currently recommend root translocation only for the inorganic compounds.

A. Equation 5.3.4.1 A: $$C_v = C_{depv} + C_{trans}$$

1. C_v = Average concentration in and on specific types of vegetation ($\mu g/kg$)
2. C_{depv} = Concentration due to direct deposition ($\mu g/kg$)
3. C_{trans} = Concentration in vegetation due to root translocation or uptake ($\mu g/kg$) – see EQ 5.3.4.1 C below

B. Equation 5.3.4.1 B: $C_{depv} = [Dep \times IF / (k \times Y)] \times (1 - e^{-kT})$

1. Dep = Deposition on affected vegetation per day ($\mu g/m^2/d$)
2. IF = Interception fraction
3. k = Weathering constant (d^{-1})
4. Y = Yield (kg/m^2)
5. e = Base of natural logarithm (2.718)
6. T = Growth period (d)

a: Recommended default values for EQ 5.3.4.1 B:

1. Dep = Calculated above in EQ 5.3.2 B
2. IF = Crop specific:
   - a: Root crops = 0.0
   - b: Leafy crops = 0.2
   - c: Protected crops = 0.0
   - d: Exposed crops = 0.1
   - e: Pasture = 0.7
3. k = 0.1 (d^{-1})
4. Y = 2 (kg/m^2) for root, leafy, protected, exposed and pasture [CA Department of Food and Agriculture dot maps]
5. T = 45 (d) for leafy crops
   T = 90 (d) for exposed crops

b: Crop-type definitions for EQ 5.3.4.1 B:

1. **Leafy** crop category consists of broad-leafed vegetables in which the leaf is the edible part. Examples include spinach, lettuce, cabbage, and kale.
2. **Root** crop category includes vegetables in which the edible portion is underground. Examples are potato, radish, and carrot.
3. **Exposed** produce category consists of crops with a small surface area subject to air deposition. Examples include strawberries, tomato, cucumber, zucchini, green bean and bell pepper.
4. **Protected** produce category consists of crops in which the edible part is not exposed to air deposition (e.g., the exposed skin of the crop is removed and not eaten). Examples are corn, pea, pumpkin and oranges.

Tables H-9 through H-15 in Appendix H provide more examples of various leafy, root, exposed and protected crop types.

c: Assumptions for EQ 5.3.4.1 B:

1. No deposition on root or protected crops
2. No uptake and translocation of deposited chemicals onto crops

C. Equation 5.3.4.1 C: (for inorganic compounds)

$$C_{trans} = C_s \times UF_2$$

1. C_s = Average soil concentration (μg/kg)
2. UF_2 = Uptake factor based on soil concentration

a: Recommended default values for EQ 5.3.4.1 C:

1. C_s = Calculated above in EQ 5.3.2 A
2. UF_2 = See Table 5.2

D. Equation 5.3.4.1 D: (for organic compounds)

$$UF_2 = [(0.03 \times K_{ow}^{0.77}) + 0.82] / [(K_{oc})(F_{oc})]$$

1. 0.03 = Empirical constant
2. K_{ow} = Octanol:water partition factor
3. 0.77 = Empirical constant
4. 0.82 = Empirical constant
5. K_{oc} = Organic carbon partition coefficient
6. F_{oc} = Fraction organic carbon in soil

a: Recommended default values for EQ 5.3.4.1 D:

1. K_{ow} = Chemical specific, see Table 5.2
2. K_{oc} = Chemical specific, see Table 5.2
3. F_{oc} = 0.1

b: Assumptions for EQ 5.3.4.1 D:

1. OEHHA currently has no recommended root uptake factors for organic compounds listed in Table 5.2. Evidence suggests this route is insignificant compared to airborne deposition. Nevertheless, if it becomes necessary in specific cases to assess root uptake for an organic compound, Equation 5.3.4.1 D would be the algorithm OEHHA recommends using to assess root uptake.

5.3.4.2 Animal Products

The average concentration of the substance in animal products (C_{fa}) depends on which routes of exposure exist for the animals. Animal exposure routes include inhalation, soil ingestion, ingestion of contaminated feed and pasture, and ingestion of contaminated water.

A. Equation 5.3.4.2:

$$C_{fa} = \text{(Inhalation + Water ingestion + Feed ingestion + Pasture/Grazing ingestion + Soil ingestion)} * Tco$$

1. C_{fa} = Average concentration in farm animals and their products (μg/kg)
2. Inhalation, water ingestion, etc. = Dose through inhalation, water ingestion, etc. (μg/d)
3. Tco = Chemical-specific transfer coefficient of contaminant from diet to animal product (d/kg)

a: Recommended default values for EQ 5.3.4.2:

1. Tco = See Tables 5.3a and 5.3b

b: Assumptions for EQ 5.3.4.2:

1. The Tco for a given chemical is the same for all exposure routes

5.3.4.2.1 Inhalation

A. Equation 5.3.4.2.1: $\text{Inhalation} = BR_a \times C_{air}$

1. Inhalation = Dose through inhalation (μg/d)
2. BR_a = Breathing rate for animal (m^3/d)
3. C_{air} = Ground-level concentration (μg/m^3)

a: Recommended default values for EQ 5.3.4.2.1:

1. BR_a = See Table 5.4
2. C_{air} = Calculated above in EQ 5.3.1 A

b: Assumptions for EQ 5.3.4.2.1:

1. All material inhaled is 100% absorbed

5.3.4.2.2 Water Ingestion

The water ingestion pathway is applied if there are surface water sources of drinking water, such as springs, ponds or lakes, which are exposed to airborne deposition of facility emissions. Due to the site-specific nature for this exposure pathway, OEHHA recommends that the risk assessor conduct a survey at the site to estimate the fraction of contaminated drinking water ingested by the animals, if such sources exist.

A. Equation 5.3.4.2.2: $$\text{Water ingestion} = WI_a \times FSW \times C_w$$

1. Water ingestion = Dose through water ingestion (μg/d)
2. WI_a = Water ingestion for animal (kg/d)
3. FSW = Fraction of water ingested from a contaminated body of water (site-specific)
4. C_w = Average concentration in water (μg/kg)
   For water 1 kg = 1 L

a: Recommended default values for EQ 5.3.4.2.2:

1. WI_a = See Table 5.4
2. FSW = Site specific fraction, need to survey water ingestion practices in affected area
3. C_w = Calculated above in EQ 5.3.3 A

5.3.4.2.3 Feed Ingestion

The fraction of feed intake by cattle, pigs and poultry that is contaminated by facility emissions can vary considerably depending on the manner in which the animals are raised. Due to the site-specific nature for this exposure pathway, OEHHA recommends that the risk assessor conduct a survey at the site to estimate the fraction of contaminated feed eaten by the animals. For a Tier 1 assessment, default values are provided by OEHHA (see Table 5.4 and Table 5.4 footnotes) for estimation of exposure to the animals.

Agricultural mixing depth should be used for calculating soil concentration for feed and pasture contamination.

5.3.4.2.3.1 Feed Ingestion

A. Equation 5.3.4.2.3.1: $$\text{Feed ingestion} = (1.0 - FG) \times FI \times L \times C_v$$

1. Feed ingestion = Dose through the ingestion of feed (μg/d) that is harvested after it is impacted by source emissions
2. FG = Fraction of diet provided by grazing (site-specific)
3. FI = Feed ingestion rate (kg/d)
4. L = Fraction of locally grown (source impacted) feed that is not pasture (site-specific)
5. C_v = Concentration in feed (μg/kg)

a: Recommended default values EQ 5.3.4.2.3.1:

1. FG = Default values in Table 5.4 footnote b, although a site-specific survey for the fraction of diet provided by grazing is recommended
2. FI = See Table 5.4
3. L = Default values in Table 5.4 footnote b, although a site-specific survey for fraction of locally grown (source impacted) feed that is not pasture is recommended
4. C_v = As calculated above in EQ 5.3.4.1 A

b: Assumptions for EQ 5.3.4.2.3.1:

1. Feed (FI) transported from an off-site location (i.e., not grown locally) is not contaminated by facility emissions.

5.3.4.2.3.2 Pasture/Grazing ingestion

A. **Equation 5.3.4.2.3.2:** $\boxed{\textbf{Pasture/Grazing ingestion} = FG \times C_v \times FI}$

1. Pasture/Grazing ingestion = Dose through pasture/grazing (μg/d)
2. FG = Fraction of diet provided by grazing (site-specific)
3. C_v = Concentration in pasture/grazing material (μg/kg)
4. FI = Feed ingestion rate (kg/d)

a: Recommended default values EQ 5.3.4.2.3.2:

1. FG = Default values in Table 5.4 for fraction of diet provided by grazing, although a site-specific survey is recommended
2. C_v = As calculated above in EQ 5.3.4.1 A
3. FI = See Table 5.4

5.3.4.2.4 Soil ingestion

The feeds provided to dairy and beef cattle may contain small quantities of soil. A larger fraction of soil by weight of food is taken up during grazing. Rooting behavior by pigs with access to soil will result in soil ingestion. Likewise, poultry with free access to soil or pasture will also ingest soil. Defaults for soil ingestion are shown in Table 5.4.

A. Equation 5.3.4.2.4 A: $\boxed{\textbf{Soil ingestion} = SI_a \times C_s}$

1. Soil ingestion = Dose through soil ingestion (μg/d)
2. SI_a = Soil ingestion rate for animal (kg/d)
3. C_s = Average soil concentration (μg/kg)

a: Recommended default values for EQ 5.3.4.2.4 A:

1. SI_a = Calculated below
2. C_s = Calculated above in EQ 5.3.2 A

B. Equation 5.3.4.2.4 B: $$\boxed{SI_a = [(1 - FG) \times FS_f \times FI] + [FG \times FS_p \times FI]}$$

1. FG = Fraction of diet provided by grazing
2. FS_f = Soil ingested as a fraction of feed ingested
3. FI = Feed ingestion rate (kg/d)
4. FS_p = Soil ingested as a fraction of pasture ingested

a: Recommended default values for EQ 5.3.4.2.4 B:

1. FG = Site specific fraction of diet provided by grazing
2. FS_f = See Table 5.4
3. FI = See Table 5.4
4. FS_p = See Table 5.4

b: Assumptions for EQ 5.3.4.2.4 B:

1. The transfer coefficient is the same for all exposure routes.
2. Soil ingested in feed (FS_f) transported from an off-site location (i.e., not grown locally) is assumed not to be contaminated by facility emissions.

5.3.4.3 Bioaccumulation in Angler-Caught Fish

The average concentration in fish (C_f) is based on the concentration in water and a chemical-specific bioaccumulation factor.

A. Equation 5.3.4.3: $$\boxed{Ct = Cw \times BAF}$$

1. Ct = Concentration in wet weight tissue (muscle) of fish (µg/kg)
2. Cw = Concentration in water (µg/kg)
3. BAF = Fish bioaccumulation factor (unitless)

a: Recommended default values for Equation 5.3.4.3:

1. Cw = As calculated above in Equation 5.3.3 A
2. BAF = Chemical-specific; see Table 5.2

b: Assumptions for Equation 5.3.4.3:

1. For conversion of a chemical concentration in a volume of water shown as μg/L, 1 L water = 1 kg water; thus, for concentration of chemical in water, μg/L = μg/kg.
2. For organic chemicals, BAFs lipid-normalized to adult rainbow trout with 4% lipid content in muscle tissue
3. For organic chemicals, BAFs based on the freely dissolved fraction in water under conditions of average particulate organic carbon and dissolved organic carbon in U.S. lakes and other water bodies
4. For inorganic compounds, BAFs based on wet weight muscle tissue concentration and on the total water concentration of the inorganic compound in water.
5. Contaminant concentrations are uniform in water based on dispersion

5.3.4.4 Bioaccumulation in Mother's Milk

The average concentration of a chemical in mother's milk (C_m) is a function of the mother's exposure through all exposure routes (i.e., inhalation, ingestion via food, drinking water, and soil, and dermal absorption via skin contact with soil contaminated with the chemical), the contaminant half-life in the mother's body, and transfer of absorbed chemical to mother's milk. The contaminant half-life in the body and transfer to mother's milk is incorporated in biotransfer coefficients (Tco) in Equation 5.3.4.4. See the TSD (OEHHA, 2012a), Appendix J for details on development of biotransfer factors. The substances assessed by the mother's milk pathway are shown in Table 5.1.

A. Equation 5.3.4.4: $$C_m = [(D_{inder} \times Tco_{m\_inder}) + (D_{ing} \times Tco_{m\_ing})] \times BW$$

1. C_m = Concentration in mother's milk (mg/kg-milk)
2. D_{inder} = The sum of DOSEair + DOSEdermal through inhalation and dermal absorption (mg/kg-BW-day)
3. D_{ing} = The sum of DOSEfood + DOSEsoil + DOSEwater through ingestion (mg/kg-BW-day)
4. Tco_{m_inder} = Biotransfer coefficient from inhalation and dermal absorption to mother's milk (d/kg-milk)
5. Tco_{m_ing} = Biotransfer coefficient from ingestion to mother's milk (d/kg-milk)
6. BW = Body weight of mother (Kg)

a: Recommended cancer risk default values for EQ 5.3.4.4:

1. D_{ing} = As calculated through ingestion of soil in EQ 5.4.3.1.1 + home-grown produce in EQ 5.4.3.2.1 + home-raised animal products in EQ 5.4.3.2.2 + drinking water in EQ 5.4.3.3.1 + angler-caught fish in EQ 5.4.3.4.1
2. D_{inder} = As calculated through inhalation in EQ 5.4.1.1 + dermal exposure in EQ 5.4.2.1
3. Tco_{m_inder} = See Table 5.5
4. Tco_{m_ing} = See Table 5.5

b: Recommended noncancer risk default values for EQ 5.3.4.4:

1. D_{ing} = As calculated through ingestion of soil in EQ 5.4.3.1.2 + home-grown produce and home-raised animal products in EQ 5.4.3.2.3 + drinking water in EQ 5.4.3.3.2 + angler-caught fish in EQ 5.4.3.4.2
2. D_{inder} = As calculated through inhalation in EQ 5.4.1.1 + dermal exposure in EQ 5.4.2.2
3. Tco_{m_inder} = See Table 5.5
4. Tco_{m_ing} = See Table 5.5

c: Assumptions for EQ 5.3.4.4:

1. Default age of mother at birth is 25 years of age, then nurses the infant for 1 year; Use 16<30 year old high-end (95th percentile) daily breathing rate and intake rates for D_{ing} and D_{inder} for estimating dose to mother.
2. For inhalation dose to mother's milk, it is recommended that the EF variate in EQ 5.4.1.1 is left out for calculation of inhalation dose in the mother's milk pathway.
3. Biotransfer coefficient, Tco_{m_inder}, the same for both inhalation and dermal pathways based on lack of first-pass metabolism through the liver for both of these pathways.
4. Biotransfer coefficient, Tco_{m_ing}, the same for all ingestion pathways based on first-pass metabolism through the liver.
5. For chemicals in Table 5.5 lacking either an oral or inhalation Tco, use the oral Tco for the absent inhalation Tco (i.e., for PCDDs and PCDFs and dioxin-like PCBs), or the inhalation Tco for the absent oral Tco (i.e., for lead) in Equation 5.3.4.4.
6. The concentration in the mother's milk is determined using the derived approach to risk assessment. This method allows use of the high-end dose point estimate for driving exposure pathways and the average dose point estimates for other exposure pathways. See Sections 8.2.6 (cancer) and 8.3.3 (noncancer) for the description of the methodology on how to implement the derived methodology.

Table 5.2a Substance-Specific Default Values for Organic Multipathway Substances

				Root Uptake Factors					
Multipathway Substance	Log K_{oc}	Log K_{ow}	Fish BAF	Root	Leafy	Exposed	Protected	GRAF[2]	Soil HalfLife (days)
Creosotes	NA	NA	$8 \times 10^{+2}$	NA	NA	NA	NA	1.0	$4.3 \times 10^{+2}$
Diethylhexyl-phthalate	5.34[1]	7.63[1]	$4 \times 10^{+1}$	NA	NA	NA	NA	1.0	$1.5 \times 10^{+1}$
Dioxins and Furans	NA	NA	$3 \times 10^{+5}$	NA	NA	NA	NA	0.43	$7.0 \times 10^{+3}$
Hexachlorobenzene	NA	NA	$8 \times 10^{+4}$	NA	NA	NA	NA	1.0	$1.0 \times 10^{+8}$
Hexachlorocyclo-hexanes	NA	NA	$3 \times 10^{+3}$	NA	NA	NA	NA	1.0	$9.4 \times 10^{+1}$
4,4’-Methylene dianiline	2.24[3]	1.59[4]	NA	NA	NA	NA	NA	1.0	$4.6 \times 10^{+2}$
Pentachlorophenol[5]									
Polycyclic Aromatic Hydrocarbons (PAHs)	NA	NA	$8 \times 10^{+2}$	NA	NA	NA	NA	1.0	$4.3 \times 10^{+2}$
Polychlorinated Biphenyls	NA	NA	$2 \times 10^{+6}$	NA	NA	NA	NA	1.0	$3.2 \times 10^{+3}$

(1) Averaged log Kow and Koc values determined by most reliable methods (Staples et al., 1997)

(2) GRAF (Gastrointestinal Relative Absorption Factor). The guidelines allow for adjusting for bioavailability where the evidence warrants. For example, there are good data which indicate that dioxin is not as available to an organism when bound to soil or fly ash matrices relative to when it is in solution or in food. Therefore, a bioavailability factor is incorporated into the model to account for this difference. When information becomes available for other chemicals of concern, this type of bioavailability will be incorporated into the model.

(3) Measured by Hansch et al. (1985)

(4) Estimated according to methodology of Lyman et al. (1990)

(5) To be evaluated for specific default values in future amendments to the Hot Spots Program.

NA - Data Not Available or Not Applicable

Table 5.2b Substance-Specific Default Values for Inorganic Multipathway Substances

				Root Uptake Factors					
Multipathway Substance	Log K_{oc}	Log K_{ow}	Fish BAF	Root	Leafy	Exposed	Protected	GRAF[1]	Soil HalfLife (days)
Arsenic & Inorganic Compounds	NA	NA	$2 \times 10^{+1}$	8×10^{-3}	1×10^{-2}	2×10^{-2}	7×10^{-2}	1.0	$1.0 \times 10^{+8}$
Beryllium & Compounds	NA	NA	$4 \times 10^{+1}$	5×10^{-3}	2×10^{-4}	8×10^{-3}	3×10^{-4}	1.0	$1.0 \times 10^{+8}$
Cadmium & Compounds	NA	NA	$4 \times 10^{+1}$	8×10^{-2}	1×10^{-1}	2×10^{-2}	1×10^{-2}	1.0	$1.0 \times 10^{+8}$
Chromium VI & Compounds	NA	NA	$2 \times 10^{+1}$	$3 \times 10^{+0}$	3×10^{-1}	2×10^{-2}	7×10^{-2}	1.0	$1.0 \times 10^{+8}$
Fluorides (soluble compounds)	NA	NA	NA	9×10^{-3}	4×10^{-2}	4×10^{-3}	4×10^{-3}	1.0	$1.0 \times 10^{+8}$
Lead & Compounds	NA	NA	$2 \times 10^{+1}$	4×10^{-3}	8×10^{-3}	7×10^{-3}	3×10^{-3}	1.0	$1.0 \times 10^{+8}$
Mercury & Inorganic Compounds[2]	NA	NA	$8 \times 10^{+1}$	2×10^{-2}	2×10^{-2}	9×10^{-3}	1×10^{-2}	1.0	$1.0 \times 10^{+8}$
Nickel and compounds	NA	NA	$2 \times 10^{+1}$	6×10^{-3}	1×10^{-2}	3×10^{-3}	3×10^{-2}	1.0	$1.0 \times 10^{+8}$
Selenium & compounds	NA	NA	$1 \times 10^{+3}$	7×10^{-2}	6×10^{-2}	4×10^{-2}	3×10^{-1}	1.0	$1.0 \times 10^{+8}$

(1) GRAF (Gastrointestinal Relative Absorption Factor). The guidelines allow for adjusting for bioavailability where the evidence warrants. For example, there are good data which indicate that dioxin is not as available to an organism when bound to soil or fly ash matrices relative to when it is in solution or in food. Therefore, a bioavailability factor is incorporated into the model to account for this difference. When information becomes available for other chemicals of concern, this type of bioavailability will be incorporated into the model.

(2) Methyl mercury (MeHg) is not represented in the category “mercury & inorganic compounds”. The BAF for methyl mercury is orders of magnitude higher than for inorganic mercury. Assessment of MeHg for the fish pathway is not directly applicable to the Hot Spots program, as no facilities are known to emit MeHg directly into the air (OEHHA, 2012; OEHHA, 2006), but it may be formed by action of microbes in sediment. Assessing the methylation of mercury deposited into a water body is difficult, and is also very water body-specific. At this time OEHHA cannot address this issue in the Hot Spots program, but will consider addressing this problem in future amendments of the Guidance.

NA - Data Not Available or Not Applicable.

Table 5.3a Animal Transfer Coefficients for Persistent Organic Chemicals

Organic Chemical	Tco (d/kg)[a]				
	Cow's Milk	Chicken Egg	Chicken Meat	Cattle Meat	Pig Meat
Diethylhexylphthalate	9×10^{-5}	0.04	0.002	6×10^{-4}	5×10^{-4}
Hexachlorobenzene	0.02	20	10	0.2	0.08
Hexachlorocyclohexanes	0.01	7	5	0.2	0.09
PAHs	0.01	0.003	0.003	0.07	0.06
Polychlorinated biphenyls					
Congener 77	0.001	6	4	0.07	0.4
81	0.004	10	7	0.2	0.4
105	0.01	10	7	0.6	0.7
114	0.02	10	7	0.9	0.7
118	0.03	10	7	1	0.7
123	0.004	10	7	0.2	0.7
126	0.04	10	7	2	0.7
156	0.02	10	8	0.9	2
157	0.01	10	8	0.5	2
167	0.02	10	8	1	2
169	0.04	10	8	2	2
189	0.005	10	8	0.2	1
Unspeciated (PCB 126)[b]	0.04	10	7	2	0.7
PCDD/Fs					
Congener 2,3,7,8-TCDD	0.02	10	9	0.7	0.1
1,2,3,7,8-PeCDD	0.01	10	9	0.3	0.09
1,2,3,4,7,8-HxCDD	0.009	10	6	0.3	0.2
1,2,3,6,7,8-HxCDD	0.01	10	6	0.4	0.1
1,2,3,7,8,9-HxCDD	0.007	7	3	0.06	0.02
1,2,3,4,6,7,8-HpCDD	0.001	5	2	0.05	0.2
OCDD	0.0006	3	1	0.02	0.1
2,3,7,8-TCDF	0.004	10	6	0.1	0.02
1,2,3,7,8-PeCDF	0.004	30	10	0.1	0.01
2,3,4,7,8-PeCDF	0.02	10	8	0.7	0.09
1,2,3,4,7,8-HxCDF	0.009	10	5	0.3	0.1
1,2,3,6,7,8-HxCDF	0.009	10	6	0.3	0.09
2,3,4,6,7,8-HxCDF	0.008	5	3	0.3	0.06
1,2,3,7,8,9-HxCDF	0.009	3	3	0.3	0.03
1,2,3,4,6,7,8-HpCDF	0.002	3	1	0.07	0.06
1,2,3,4,7,8,9-HpCDF	0.003	3	1	0.1	0.02
OCDF	0.002	1	0.6	0.02	0.03
Unspeciated (2,3,7,8-TCDD)[b]	0.02	10	9	0.7	0.1

[a] All Tco values were rounded to the nearest whole number.

[b] For unspeciated mixtures, use PCB 126 Tcos to represent the class of PCBs, and 2378-TCDD Tcos to represent the class of PCDDs/Fs.

Table 5.3b Animal Transfer Coefficients for Inorganic Chemicals

Inorganic Metals and Chemicals	Tco (d/kg)[a]				
	Cow's Milk	Chicken Egg	Chicken Meat	Cattle Meat	Pig Meat
Arsenic	5×10^{-5}	0.07	0.03	2×10^{-3}	0.01[b]
Beryllium	9×10^{-7}	0.09	0.2	3×10^{-4}	0.001
Cadmium	5×10^{-6}	0.01	0.5	2×10^{-4}	0.005
Chromium (VI)	9×10^{-6}	NA[c]	NA	NA	NA
Fluoride	3×10^{-4}	0.008	0.03	8×10^{-4}	0.004[b]
Lead	6×10^{-5}	0.04	0.4	3×10^{-4}	0.001[b]
Mercury	7×10^{-5}	0.8	0.1	4×10^{-4}	0.002[b]
Nickel	3×10^{-5}	0.02	0.02	3×10^{-4}	0.001
Selenium	0.009	3	0.9	0.04	0.5

[a] All Tco values were rounded to the nearest whole number.
[b] The meat Tco was estimated using the metabolic weight adjustment ratio of 4.8 from cattle to pig
[c] NA – no data available or was not applicable

Table 5.4 Point Estimates for Animal Pathway

Parameter	Beef Cattle	Lactating Dairy Cattle	Pigs	Meat Poultry	Egg-laying Poultry
BW (body weight in kg)	533	575	55	1.7	1.6
BR_a (inhalation rate in m^3/d)	107	115	7	0.4	0.4
WI_a (water consumption in kg/d)	45	110	6.6	0.16	0.23
FI (Food Intake in kg/d) DMI[a] and/or pasture grazing[b]	9	22	2.4	0.13	0.12
FS_f (soil fraction of feed)	0.01	0.01	NA	NA	NA
FS_p (soil fraction of pasture)	0.05	0.05	0.04	0.02	0.02

[a] Dry matter intake
[b] For beef and dairy cattle, pasture grazing is assumed to be leafy vegetation (grasses, including greenchop) and accounts for half of the cattle's diet (FG=0.5 in Section 5.3.4.2.3). The default assumes on-site pasture grazing contaminated by facility emissions. Fraction of feed or dry matter intake (e.g., hay, grain) grown on-site is assumed to be contaminated by facility emissions and fraction of feed that is grown off-site is not assumed to be contaminated. A default may be used that assumes all feed is grown off-site (L=0 in Section 5.3.4.2.3), but a survey is recommended to verify the fractions of feed grown on-site and off-site.

For pigs with access to soil, but usually confined to a pen, default assumes no pasture grazing (FG=0 in Section 5.3.4.2.3). For feed, estimated intake consists of equal portions of all plant types including exposed, leafy, protected and root in which 10% (L=0.1 in Section 5.3.4.2.3) of the diet is homegrown and contaminated by facility emissions. The fraction of feed that was transported from an off-site location is assumed not to be contaminated by facility emissions.

For poultry including egg-laying and broiler chickens that have access to soil, default assumes no pasture grazing (FG=0 in Section 5.3.4.2.3). Estimated feed intake is composed of equal proportions of all plant types with 5% (L=0.05 in Section 5.3.4.2.3) homegrown and contaminated by facility emissions. The fraction of feed grown off-site and transported to the receptor was not contaminated by facility emissions.

NA - Not applicable. Assume FS_f is equal to zero.

Table 5.5 Mother's Milk Transfer Coefficients (Tco_m)[a]

Chemical/chem. group	Tco_m (day/kg-milk)
PCDDs - oral[b]	3.7
PCDFs - oral[b]	1.8
Dioxin-like PCBs - oral[b]	1.7
PAHs – inhalation[c]	1.55
PAHs – oral	0.401
Lead - inhalation[d]	0.064

[a] These compound classes represent the chemicals of greatest concern for the mother's milk pathway under the Hot Spots program. It is expected that additional transfer coefficients will be developed for other multipathway chemicals in the Hot Spots Program as data becomes available and is reviewed.

[b] Use the oral Tco_m for the inhalation and dermal pathways. The PCDD, PCDF and dioxin-like PCB Tcos were derived using a Random-effects model from individual Tco_m estimates for 7 PCDDs, 9 PCDFs and 12 dioxin-like PCBs (See OEHHA, 2012, Appendix J).

[c] Use the inhalation Tco_m for the dermal pathway

[d] Use the inhalation Tco_m for the ingestion and dermal pathways

5.4 Estimation of Dose

Once the concentrations of substances are estimated in air, soil, water, plants, and animal products, they are used to evaluate estimated exposure to people. Exposure is evaluated by calculating the daily dose in milligrams per kilogram body weight per day (mg/kg/d). The following algorithms calculate this dose for exposure through inhalation, dermal absorption, and ingestion pathways. All chemicals must be assessed for exposure through inhalation. If there are emissions of one or more of the subset of semi- or non-volatile multipathway substances, the soil ingestion pathway and the dermal soil exposure pathway are also assessed. The mother's milk pathway may also be a mandatory pathway depending on the multipathway substance released (See Table 5.1). The other exposure pathways may also need to be assessed if a survey of the exposure site shows they are present (e.g., ingestion of water, home-grown crops, home-raised animal products, and angler-caught fish).

This section contains average and high-end point estimates and data distributions for adults and children for many exposure pathways. The point-estimates and data distributions for children fall within the 3rd trimester, 0<2, 2<9, and 2<16 year age groupings. The point-estimates and data distributions for adults fall within the 16<30 and 16-70 year age groupings. When evaluating 9-, 30-, and 70-year exposure durations for cancer risk assessment, assessors will use distributions starting at the third trimester.

Workers are assessed for cancer risk as adults using 8-hour breathing rate point estimates (See Table 5.8). Point estimates for workers are listed under "offsite worker." OEHHA has not developed stochastic distributions for worker exposure. Therefore, there is no Tier 3 stochastic approach for offsite worker cancer risk assessment.

5.4.1 *Estimation of Exposure through Inhalation*

The dose through the inhalation route is estimated for cancer risk assessment and noncancer hazard assessment. Both residential and offsite worker exposures are considered. Since residential exposure includes near-continuous long-term exposure at a residence and workers are exposed only during working hours (i.e., 8 hours/day), different breathing rate distributions are used.

5.4.1.1 Residential Inhalation Dose for Cancer Risk Assessment

Exposure through inhalation is a function of the breathing rate, the exposure frequency, and the concentration of a substance in the air. For residential exposure, the breathing rates are determined for specific age groups, so inhalation dose (Dose-air) is calculated for each of these age groups, 3rd trimester, 0<2, 2<9, 2<16, 16<30 and 16-70 years. OEHHA used the mother's breathing rates to estimate dose for the 3rd trimester fetus assuming the dose to the fetus during the 3rd trimester is the same as the mother's dose. These age-specific groupings are needed in order to properly use the age sensitivity factors for cancer risk assessment (see Chapter 8). A Tier 1 evaluation uses the high-end point estimate (i.e., the 95th percentiles) breathing rates for the inhalation pathway in order to avoid underestimating cancer risk to the public, including children. A possible exception for using high-end breathing rates are when there is exposure to multipathway substances and two of the non-inhalation pathways drive the risk, rather than the inhalation pathway (see Chapter 8).

A. Equation 5.4.1.1: $\boxed{\textbf{Dose-air} = C_{air} \times \{BR/BW\} \times A \times EF \times 10^{-6}}$

1. Dose-air = Dose through inhalation (mg/kg/d)
2. C_{air} = Concentration in air ($\mu g/m^3$)
3. {BR/BW} = Daily Breathing rate normalized to body weight (L/kg body weight - day)
4. A = Inhalation absorption factor (unitless)
5. EF = Exposure frequency (unitless), days/365 days
6. 10^{-6} = Micrograms to milligrams conversion, liters to cubic meters conversion

a: Recommended default values for EQ 5.4.1.1:

1. {BR/BW} = Daily breathing rates by age groupings, see As supplemental information, the assessor may wish to evaluate the inhalation dose by using the mean point estimates in Table 5.6 to provide a range of breathing rates for cancer risk assessment to the risk manager.
2. Table (point estimates) and Table 5.7 (parametric model distributions for Tier III stochastic risk assessment). For Tier 1 residential estimates, use 95th percentile breathing rates in Table 5.6.
3. A = 1
4. EF = 0.96 (350 days/365 days in a year for a resident)

b: Assumption for EQ 5.4.1.1:

1. The fraction of chemical absorbed (A) is the same fraction absorbed in the study on which the cancer potency or Reference Exposure Level is based.

As supplemental information, the assessor may wish to evaluate the inhalation dose by using the mean point estimates in Table 5.6 to provide a range of breathing rates for cancer risk assessment to the risk manager.

Table 5.6 Point Estimates of Residential Daily Breathing Rates for 3rd trimester, 0<2, 2<9, 2<16, 16<30 and 16-70 years (L/kg BW-day)

	3rd Trimester[a]	0<2 years	2<9 years	2<16 years	16<30 years	16<70 years
	L/kg-day					
Mean	225	658	535	452	210	185
95th Percentile	361	1090	861	745	335	290

[a] 3rd trimester **breathing rates** based on breathing rates of pregnant women using the assumption that the dose to the fetus during the 3rd trimester is the same as that to the mother.

Table 5.7 Daily Breathing Rate Distributions by Age Group for Residential Stochastic Analysis (L/kg BW-day)

	3rd Trimester	0<2 years	2<9 years	2<16 years	16<30 years	16-70 years
Distribution	Max extreme	Max extreme	Max extreme	Log-normal	Logistic	Logistic
Minimum	78	196	156	57	40	13
Maximum	491	2,584	1,713	1,692	635	860
Scale	59.31	568.09	125.59		40.92	36.19
Likeliest	191.50	152.12	462.61			
Location				-144.06		
Mean	225	658	535	452	210	185
Std Dev	72	217	168	172	75	67
Skewness	0.83	2.01	1.64	1.11	0.83	1.32
Kurtosis	3.68	10.61	7.88	6.02	5.17	10.83
Percentiles						
5%	127	416	328	216	96	86
10%	142	454	367	259	118	104
25%	179	525	427	331	161	141
50%	212	618	504	432	207	181
75%	260	723	602	545	252	222
80%	273	758	631	572	261	233
90%	333	934	732	659	307	262
95%	361	1090	861	745	335	290
99%	412	1430	1140	996	432	361

5.4.1.2 Offsite Worker (MEIW) Inhalation Dose for Cancer Risk Assessment

For worker exposure, the default assumes working age begins at 16 years, and that exposures to facility emissions occur during the work shift, typically up to 8 hours per day during work days. Breathing rates that occur over an 8-hour period vary depending on the intensity of the activity (See Table 5.8), and are used to estimate the inhalation dose. The 8-hour breathing rates may also be useful for cancer risk assessment of children and teachers exposed at schools during school hours.

Another risk management consideration for the offsite worker scenario for cancer assessment of a Hot Spots facility is whether there are women of child-bearing age at the MEIW location and whether the MEIW has a daycare center. Since the third trimester is only a short segment of the 25 year exposure duration used for the MEIW, the resulting risk estimate would not differ significantly. An exception to this assumption is high exposure to carcinogens over a short period, as might occur during short-term projects (see Section 8.2.10). In this case, risk assessment during the third trimester may be warranted. However, if there is onsite daycare at the MEIW, then the risks to the children will be underestimated using the offsite adult worker scenario due to increased exposure (per kg body weight) and increased sensitivity to carcinogen exposure (see Section 8.2.1). In this case, the Districts may wish to include a calculation of inhalation dose for the children in the onsite daycare, assuming they could be there from 0 to age 6 years.

Exposed workers may be engaged in activities ranging from desk work, which would reflect breathing rates of sedentary/passive or light activities, to farm worker activities, which would reflect breathing rates of moderate intensity (See Table 5.9). OEHHA recommends default (Tier 1) point estimate 8-hour breathing rates in L/kg-8-hrs based on the mean and 95th percentile of moderate intensity activities, 170 and 230 L/kg-8-hrs, respectively, for adults 16-70 years old.

Many facilities operate non-continuously, as in only 8-10 hours per day, but the air dispersion modeling is performed as if the emissions were uniformly emitted over 24 hours a day, 7 days per week. The air dispersion computer model used, including AERMOD and other models, typically calculate an annual average air concentration based on actual operating conditions but also include the hours of nonoperation in the average concentration.

Therefore, there are two components that determine the worker exposure to facility emissions:

1) What is the estimated concentration the worker is exposed to (i.e., breathes), during the work shift, and

2) What is the amount of time the offsite worker's schedule overlaps with the facility's emission schedule?

There are two approaches to estimating the modeled concentration the worker is breathing during the work shift. The first approach uses a worker adjustment factor (i.e., the WAF) to approximate what the worker is breathing based on the modeling run used for residential receptors. The second approach uses a special modeling run with the hourly raw results from an air dispersion analysis and is described in Appendix M.

The first and more basic approach is to obtain the long term average concentration as you would for modeling a residential receptor, then adjusting this exposure concentration using the calculated WAF (EQ 5.4.1.2 B) to estimate the concentration the offsite worker is exposed to during the work shift (shown as (C_{air} × WAF) in EQ 5.4.1.2 A). This method is characteristic of a default approach used in a Tier 1 assessment. Once the exposure concentration is determined, the worker's inhalation dose (Dose-air) can be calculated as shown in EQ 5.4.1.2 A.

The second approach for determining the air concentration the worker is exposed to uses a refined modeling run where the hourly raw dispersion model output are post processed to examine the hourly concentrations that fall within the offsite worker's shift. This method provides a more representative estimate of the air concentration, but is more complex, and time consuming than the first method. See Appendix M for information on how to simulate the long term concentration for the offsite worker that can be used to estimate inhalation cancer risk.

The HARP software has the ability to calculate worker impacts using an approximation factor and, in the future, it will have the ability to post process refined worker concentrations using the hourly raw results from an air dispersion analysis.

If the off-site worker's shift does not completely overlap the emission schedule of the facility, then a Discount Factor (DF) may be applied to the WAF. Calculation of the DF is shown in EQ 5.4.1.2 C. The default assumption is that the offsite worker's shift falls completely within the emission schedule of the facility, in which case DF=1. Use of a DF less than 1 requires a survey at the MIEW to verify that some portion of the off-site worker shift is not subject to the facility emissions.

A. Equation 5.4.1.2 A: $\boxed{\text{Dose-air} = (C_{air} \times WAF) \times \{BR/BW\} \times A \times EF \times 10^{-6}}$

1. Dose-air = Dose through inhalation (mg/kg/d)
2. C_{air} = Annual average concentration in air ($\mu g/m^3$)
3. WAF = Worker air concentration adjustment factor (unitless)
4. {BR/BW} = Eight-hour breathing rate normalized to body weight (L/kg body weight - day)
5. A = Inhalation absorption factor (unitless)
6. EF = Exposure frequency (unitless), days/365 days)
7. 10^{-6} = Micrograms to milligrams conversion, Liters to cubic meters conversion

a: Recommended default values for EQ 5.4.1.2 A:

1. WAF = See EQ. 5.4.1.2 B for formula to calculate WAF, or App. M for refined post-processing modeling to calculate WAF.
2. {BR/BW} = For workers, use age16-70 year, 95th percentile, moderate intensity 8-hour point estimate breathing rates (see Table 5.8). No worker breathing rate distributions exist for stochastic risk assessment.
3. A = 1
4. EF = 0.68 (250 days / 365 days). Equivalent to working 5 days/week, 50 weeks/year.

b: Assumption for EQ 5.4.1.2 A:

1. The fraction of chemical absorbed (A) through the lungs is the same fraction absorbed in the study on which the cancer potency factor is based.
2. The source emits during the daylight hours. Calculate WAF (EQ 5.4.1.2 B) if a special post-processing modeling run described in App. M was not completed. For nighttime emissions and exposure scenarios, see Appendix N.

B. Equation 5.4.1.2 B: $$WAF = (H_{res} / H_{source}) \times (D_{res} / D_{source}) \times DF$$

1. WAF = Worker adjustment factor (unitless)
2. H_{res} = Number of hours per day the annual average residential air concentration is based on (always 24 hours)
3. H_{source} = Number of hours the source operates per day
4. D_{res} = Number of days per week the annual average residential air concentration is based on (always 7 days)
5. D_{source} = Number of days the emitting source operates per week
6. DF = Discount factor, for when the offsite worker's schedule partially overlaps the source's emission schedule

b: Recommended default values for EQ 5.4.1.2 B:

1. DF = 1 for offsite worker's schedule occurring within the source's emission schedule. A site-specific survey may be used to adjust the DF using EQ 5.4.1.2 C.

C. Equation 5.4.1.2 C: $$DF = (H_{coincident} / H_{worker}) \times (D_{coincident} / D_{worker})$$

1. $H_{coincident}$ = Number of hours per day the offsite worker's schedule and the source's emission schedule coincide
2. H_{worker} = Number of hours the offsite worker works per day
3. $D_{coincident}$ = Number of days per week the offsite worker's schedule and the source's emission schedule coincide
4. D_{worker} = Number of days the offsite worker works per week

Tier 2 adjustments for EQ 5.4.1.2 A-C may be used for:

1. Eight-hour breathing rate. Point estimates in Table 5.8 for lower breathing rates of sedentary/passive and light intensity work activities may be substituted in site-specific Tier 2 scenarios. Table 5.9 can be used to estimate breathing rate intensities for various job activities. Use of different breathing rates requires a survey of the exposed workplace and approval by Air District, ARB and OEHHA.
2. Discount Factor (DF) in EQ 5.4.1.2 C. If a site-specific survey of the offsite worker schedule only partially overlaps with the source's emission schedule, then a DF less than 1 may be calculated. Use of a DF less than 1 requires a survey of the exposed workplace and approval by the Air District or ARB.

The 8-hour breathing rates are based on minute ventilation rates derived by U.S. EPA (2009). U.S. EPA employed a metabolic equivalent (METS) approach for estimating breathing rates. This method determines daily time-weighted averages of energy expenditure (expressed as multipliers of the basal metabolic rate) across different levels of physical activity. The 8-hour breathing rates shown in Table 5.8 are divided into three categories:

Sedentary & Passive Activities (METS $\leq$ 1.5)

Light Intensity Activities (1.5 < METs $\leq$ 3.0)

Moderate Intensity Activities (3.0 < METs $\leq$ 6.0)

For example, a METS = 1 is roughly equivalent to energy expenditure during sleep and is close to the basal metabolic rate. A METS activity that is two to three times greater (METS = 2 to 3) is characteristic of light intensity activities, such as administrative office work or sales work as shown in Table 5.9.

Under a Tier 1 scenario, the risk assessor may simply use the 95th percentile breathing rate for moderate intensity activities of 230 L/kg-8 hrs in Eq. 5.4.1.2 A to calculate the daily dose via the inhalation route to the worker. In an example of a Tier 2 scenario, the risk assessor surveys the workplace and determines that the worker(s) at the MEIW receptor are primarily sitting at a desk performing administrative-type work on a computer. Referring to Table 5.9, this activity corresponds most closely to "administrative office work" with a mean activity level of 1.7 and a SD = 0.3. This level of activity is considered "light intensity activity" (i.e., 1.5 < METs $\leq$ 3.0). With the prior approval of the Air District or ARB, the risk assessor may then use the 95th percentile breathing rate of 100 L/kg-8 hr for light intensity activities in Equation 5.4.1.2 A.

Table 5.8. Eight-Hour Breathing Rate (L/kg per 8 Hrs) Point Estimates for Males and Females Combined[a,b]

	0<2 years	2<9 years	2<16 years	16<30 years	16-70 years
	Sedentary & Passive Activities (METS $\leq$ 1.5)				
Mean	200	100	80	30	30
95th Percentile	250	140	120	40	40
	Light Intensity Activities (1.5 < METs $\leq$ 3.0)				
Mean	490	250	200	80	80
95th Percentile	600	340	270	100	100
	Moderate Intensity Activities (3.0 < METs $\leq$ 6.0)				
Mean	890	470	380	170	170
95th Percentile	1200	640	520	240	230

[a] For pregnant women, OEHHA recommends using the mean and 95th percentile 8-hour breathing rates based on moderate intensity activity of 16<30 year-olds for 3rd trimester.
[b.] Breathing rates in the table may be used for worker, school, or residential exposures

Table 5.9. METS Distributions for Workplace and Home Activities

Activity Description	Mean	Median	SD	Min	Max
Workplace Activities					
Administrative office work	1.7	1.7	0.3	1.4	2.7
Sales work	2.9	2.7	1.0	1.2	5.6
Professional	2.9	2.7	1.0	1.2	5.6
Precision/production/craft/repair	3.3	3.3	0.4	2.5	4.5
Technicians	3.3	3.3	0.4	2.5	4.5
Private household work	3.6	3.5	0.8	2.5	6.0
Service	5.2	5.3	1.4	1.6	8.4
Machinists	5.3	5.3	0.7	4.0	6.5
Farming activities	7.5	7.0	3.0	3.6	17.0
Work breaks	1.8	1.8	0.4	1.0	2.5
Household/Neighborhood Activities					
Sleep or nap	0.9	0.9	0.1	0.8	1.1
Watch TV	1.0	1.0	-	1.0	1.0
General reading	1.3	1.3	0.2	1.0	1.6
Eat	1.8	1.8	0.1	1.5	2.0
Do homework	1.8	1.8	-	1.8	1.8
General personal needs and care	2.0	2.0	0.6	1.0	3.0
Indoor chores	3.4	3.0	1.4	2.0	5.0
Care of plants	3.5	3.5	0.9	2.0	5.0
Clean house	4.1	3.5	1.9	2.2	5.0
Home repairs	4.7	4.5	0.7	4.0	6.0
General household chores	4.7	4.6	1.3	1.5	8.0
Outdoor chores	5.0	5.0	1.0	2.0	7.0
Walk/bike/jog (not in transit) age 20	5.8	5.5	1.8	1.8	11.3
Walk/bike/jog (not in transit) age 30	5.7	5.7	1.2	2.1	9.3
Walk/bike/jog (not in transit) age 40	4.7	4.7	1.8	2.3	7.1

Table 5.10 lists some WAFs for a few typical scenarios. For example, if the source is continuously emitting, then the offsite worker is assumed to breathe the long-term annual average concentration during their work shift. The WAF then becomes one and no concentration adjustments are necessary in this situation when estimating the inhalation cancer risk. If the source is non-continuously emitting for 8 hours/day, 5 days/week and the offsite worker's shift completely overlaps the emitting facility's operating schedule, then the WAF would be 4.2:

$$(24 \text{ hrs/day} / 8 \text{ hrs/day}) \times (7 \text{ days/week} / 5 \text{ days/week}) = 4.2$$

If the offsite worker's 8 hour/day shift only overlaps the emitting facility's operation schedule for 4 hrs/day, then the WAF is 2.1 because the DF = 0.5 will reduce the WAF by half: DF = (4 hrs/day / 8 hrs/day) x (5 days/week / 5 days/week) = 0.5

Table 5.10: Example Worker Adjustment Factors (WAF) to Convert a Long-Term Daily Average Emission Concentration to an Off-Site Worker Receptor Exposure

Off-Site Workers' Shift Overlap with Facility's Emission Schedule[a]	Facility Operating Schedule	Adjustment Factor
8 hrs/day, 5 days/week	Continuous (24 hrs/7 days/week)	1.0
8 hrs/day, 5 days/week[b]	Non-continuous (8 hrs/5 days/week)	4.2
4 hrs/day, 5 days/week	Non-continuous (8 hrs/5 days/week)	2.1

[a] Worker works 8 hours per day, 5 days per week
[b] Workers' work hours completely overlap the facilities operating hours

5.4.1.3 Inhalation Dose for Children at Schools and Daycare Facilities for Cancer Risk Assessment

The 8-hour breathing rates and inhalation dose equations (EQ 5.4.1.2 A-C) may also be used to estimate risk to children when exposures occur while at school or at day care facilities. Breathing rate point estimates to use in Table 5.8 depend on the ages of the children at the exposed schools and day cares. As a Tier 1 default, moderate intensity breathing rates are recommended. Equations 5.4.1.2 A-C is used in the same way to estimate dose in children as it is for workers.

5.4.1.4 Non-Cancer Inhalation Exposure for Workers and Residents

For typical daily work shifts of 8-9 hours, acute, 8-hour and chronic Reference Exposure Levels (RELs) described in Chapter 8 are used in health risk assessments to characterize the noncancer risks using the Hazard Index approach described in Chapter 8 and in OEHHA (2008). Uncertainty factors are already incorporated into the RELs used to assess noncancer risk, as explained in Chapter 8, so all that is needed to evaluate the noncancer hazard is the air concentration that the worker is exposed to. The modeled maximum 1-hour air concentration is determined for acute hazard assessment and the annual average air concentration is determined for chronic hazard assessment. The modeled average air concentration during a work shift is determined for 8-hour hazard assessment using the adjusted annual average air concentration described below.

The 8-hour RELs are primarily designed to address offsite worker inhalation exposure at the MEIW because they better characterize the daily intermittent exposures of workers than the chronic RELs do. They are used in estimating the 8 hour Hazard Index for offsite workers. The 8-hour RELs should be used for typical daily work shifts of 8-9 hours. For further questions, assessors should contact OEHHA, the District, or reviewing authority to determine if the 8-hour RELs should be used in your HRA. Any discussions or directions to exclude the 8-hour REL evaluation should be documented in the HRA.

Note, however, there are only a handful of 8-hour RELs currently adopted for use in the Hot Spots program. Therefore, we also recommend performing chronic noncancer exposure assessment for the offsite worker (MEIW) based on the annual average air concentration at the MEIW. Evaluation of the chronic Hazard Index should help protect workers who routinely work longer than 8 hour shifts. Exposure to multipathway substances also requires noncancer hazard assessment for the dermal and oral soil exposure pathways for offsite workers. Because there are few 8-hour RELs currently available, hazard assessment for the noninhalation pathways for multipathway substances is only applied when estimating the chronic Hazard Index.

In addition, the Districts may wish to determine if there is an onsite daycare at the MEIW and include a calculation of the chronic and 8-hour inhalation dose for children, although onsite hazard assessment is not a requirement for a Hot Spots risk assessment.

As explained in Section 5.4.1.2 for cancer risk, the modeled annual average air concentration is adjusted to the air concentration that the worker is actually exposed to if the facility operates non-continuously. The typical method for this adjustment is by calculating the Worker Adjustment Factor (WAF) shown in EQ 5.4.1.4 B and multiplying this value by the annual average air concentration (C_{air}, in $\mu g/m^3$) in EQ 5.4.1.4 A.

Unlike cancer risk assessment, no discount factor (DF) is applied in noncancer assessment for partial overlap between the worker's schedule and the source's emission schedule. Adjustments for worker vacations, work shifts for shortened weeks (e.g., 1 - 4 days), and worker time away on weekends are also not appropriate.

An alternative refined post-processing method, described in Appendix M, may be used to estimate the air concentration the worker is exposed to during their work schedule. OEHHA may be consulted about the particular chemical involved if it is important to make a more refined analysis.

The equation to adjust the annual average air concentration to a worker 8-hour exposure concentration (i.e., the adjusted annual average ground level concentration) is expressed as:

<u>A. Equation 5.4.1.4 A</u>: $$\textbf{Adjusted } C_{air}\ (\mu g/m^3) = C_{air} \times WAF$$

Where WAF is determined as:

<u>B. Equation 5.4.1.4 B</u>: $$WAF = (H_{res} / H_{source}) \times (D_{res} / D_{source})$$

<u>a: Assumptions for EQ 5.4.1.4 B:</u>

1. No adjustment of the WAF allowed for partial overlap of the worker's schedule and the source's emission schedule.

Alternatives for calculating off-site worker Adjusted C_{air} in EQ 5.4.1.4 A-B:

1. Rather than calculate the WAF for a non-continuous emitting facility, a post-processing of the hourly raw dispersion model output and examination of the hourly concentrations that fall within the offsite worker's shift can be conducted to estimate the air concentration the worker is exposed to. This method is a more refined, complex, and time consuming approach, but should result in a more representative exposure concentration. See Appendix M for information on how to simulate the exposure concentration for the off-site worker.
2. For continuously-emitting facilities (i.e., 24 hrs/day, 7 days/week), if an assessor does not wish to assume the worker breathes the long-term annual average concentration during the work shift, then a refined concentration can also be post-processed as described in Appendix M. All alternative assumptions should be approved by the reviewing authority and supported in the presentation of results.

For residential exposure to non-continuously operating facilities, the modeled maximum 1-hour and chronic air concentrations at the MEIR are determined for noncancer hazard assessment. Hazard assessment for repeated 8-hour exposure at the MEIR is not required. Chronic exposure assessment based on the annual average air concentration should adequately protect individuals, in part because residents are considered to be present at the MEIR at or near 24 hrs per day. Many facilities operate for periods longer than 8 hours per day and the hazards are better characterized based on chronic exposure. Nevertheless, differences between 8-hour and chronic exposures (i.e., higher daily 8-hour exposures vs. lower longer daily exposure 24 hrs/day) may result in different toxicological responses including potentially greater toxicological responses with either 8-hour or chronic exposure. There may also be cases such as special meteorological situations (e.g., significant diurnal-nocturnal meteorological differences) where the 8-hour REL will be more protective than the chronic REL. Thus, the air districts may also elect to have an 8-hour hazard assessment performed at the MEIR, using daily 8 hour exposures and the 8 hr RELs.

Eight-hour exposure assessment is not recommended for continuously emitting sources for residential receptors. In this situation it is only necessary to estimate chronic exposure based on the annual average concentration. However, there may be situations where the air district may wish to assess an 8-hour residential exposure to continuously operating facilities, for example, where there are significant differences in modeled concentration of emissions during the day due to diurnal wind patterns.

For estimating the air concentration from non-continuously operating facilities, EQ 5.4.1.4.A is also used to adjust the annual average concentration to what the residents are exposed to. This is the air concentration that the 8-hour REL will be compared to as discussed in Chapter 8. The alternative refined post-processing method described in Appendix M may also be used to estimate residential exposure.

In summary, the requirements for noncancer hazard assessment using the Hazard Index approach at the MEIW and MEIR are as follows.

For offsite worker exposure:

- Acute hazard assessment based on the maximum 1-hour air concentrations and 1-hour RELs
- Eight-hour hazard assessment based on daily average 8-hour exposure (estimated using adjusted annual average air concentration in EQ 5.4.1.4 A and B or by post-processing method in App. M) for those substances with 8-hour RELs
- Chronic hazard assessment based on annual average exposure and chronic RELs, and oral chronic RELs for noninhalation routes of multipathway substances

For residential exposure:

- Acute hazard assessment based on the maximum 1-hour air concentration and 1-hour RELs
- Eight-hour hazard assessment based on daily average 8-hour exposure not required, but can be performed at the discretion of the air districts for exposure to non-continuously operating facilities based on the adjusted annual average air concentration (EQ 5.4.1.4 A and B or method in App. M). Eight-hour assessments not recommended for exposure to continuously operating facilities
- Chronic hazard assessment based on annual average exposure and chronic RELs, and oral chronic RELs for noninhalation routes of multipathway substances

5.4.1.5 Exposure Frequency and Age Groupings for Noncancer Hazard Assessment

For cancer risk, the basic assumption is that risk is associated with cumulative dose of carcinogen. Thus, the dose used to estimate cancer risk can be adjusted for exposure frequency, as well as time spent within the MEIR or MEIW location. Chronic RELs are not necessarily related to cumulative dose. Thus, adjusting the estimated dose used to calculate hazard index for exposure frequency or time away from the MEIR or MEIW is not appropriate.

The average daily dose for chronic noncancer assessment is based on exposure beginning at birth to 70 years of age, necessitating calculation of a time-weighted average for age 0-2, 2-16 and 16-70 years. Since we are not applying Age Sensitivity Factors for assessing non-cancer hazard, the 3rd trimester is not explicitly called out for determining dose, as it is for cancer risk assessment. Rather adult exposure is considered, which would include pregnant women in any trimester. Both inhalation and oral RELs incorporate safety factors to protect sensitive human populations.

5.4.2 *Estimation of Exposure through Dermal Absorption*

Exposure through dermal absorption (dose-dermal) is a function of the soil or dust loading of the exposed skin surface, the amount of skin surface area exposed, and the concentration and availability of the substance. In the previous edition of OEHHA's exposure guidelines document (OEHHA, 2000), we recommended using specified average and high-end point estimate values for four of the variates (body weight, exposed surface area of skin, soil load on skin and frequency of exposure) in the stochastic analysis for dermal dose. This equation required multiplying values together, which could lead to overly conservative exposure estimates when high-end values were used. By combining information from the four variates into one composite distribution, over-conservatism may be avoided.

To this end, OEHHA created a new variate, "annual dermal load", or ADL, which is a composite of the body surface area (BSA) per kg body weight, exposure frequency, and soil adherence variates. Point estimates from the composite "annual dermal load" can be used for point estimate assessments while parameters and information on the type of distribution (e.g., lognormal) can be used for Tier III stochastic risk assessments. For details on the development of the ADL, refer to the Technical Support Document for Exposure and Stochastic Analysis (OEHHA, 2012).

5.4.2.1 Dermal Dose for Cancer Risk Assessment

The dose through residential dermal exposure to contaminated soil varies by age and is calculated for each age group (e.g., 3rd trimester, 0<2 yrs, 2<9 yrs, 2<16 yrs, 16<30 and 16-70 yrs). These age-specific groupings are needed in order to properly use the age sensitivity factors for cancer risk assessment (see Chapter 8). This pathway is also assessed for exposure to offsite workers; a separate ADL for offsite workers is presented in Table 5.11. Children at a MEIW daycare, if present, may also be assessed for exposure if the District deems it advisable.

A. Equation 5.4.2.1: $$\boxed{Dose_{dermal} = ADL \times Cs \times ABS \times 10^{-9} / 365}$$

1. $Dose_{dermal}$ = Exposure dose through dermal absorption (mg/kg-d)
2. ADL = Annual dermal load (mg soil/kg BW-yr)
3. C_s = Average soil concentration (μg/kg)
4. ABS = Fraction absorbed across skin (unitless)
5. 10^{-9} = Conversion factor for chemical & soil (μg to mg, mg to kg)
6. 1/365 = Conversion factor for ADL from yrs to days

a: Recommended default values for EQ 5.4.2.1:

1. ADL = See Table 5.11 (point estimates) & Table 5.12 a-d (distributions)
2. C_s = Calculated above in EQ 5.3.2 A
3. ABS = See Table 5.13

b: Assumption for EQ 5.4.2.1:

1. The ADL for the third trimester of the fetus is based on the ADL of the mother; when normalized to body weight, we assume that exposure to the

mother and the fetus will be the same. The mother's exposure is based on that of adults 16-30 years of age in Table 5.11 and 5.12d.

2. Exposure frequency (EF) for vacation time spent away from exposure does not appear as a variate in EQ 5.4.2.1, as it is incorporated in the ADL and includes a 2-week vacation per year away from dermal soil exposure for both residents and offsite workers.

Climate will strongly influence people's choice of clothing. Due to California's varied climatic regions and existing data on clothing choices at different temperatures, three levels of climatic conditions, warm, mixed, and cold, are used to describe California's climate regions:

1. A warm climate is characteristic of Southern California areas such as Los Angeles, which can have warm to hot temperatures throughout the year.
2. A "mixed" climate is one that has warm-to-hot temperatures during much of the year (daily highs over 80 degrees are common), roughly from April to October, and cold temperatures (lows near or below freezing) during the remainder of the year. The mountains and central valley are examples of a mixed climate.
3. A cold climate is representative of San Francisco, Eureka, and other northern coastal communities, which have cool temperatures (daily highs of less than 65 degrees) for the majority of the year and can receive a considerable amount of fog and rainfall.

OEHHA recommends consulting the local air district for assistance on selecting the most appropriate climate.

Table 5.11 Recommended Annual Dermal Load Point Estimates (in mg/kg-yr) for Dermal Exposure

	3rd Trimester[a]	Children 0<2 yrs	Children 2<9 yrs	Children 2<16 yrs	Adults[b]	Offsite Worker[c]
Warm climate						
Mean	1.2×10^3	3.6×10^3	7.5×10^3	6.4×10^3	1.2×10^3	2.6×10^3
95th percentile	2.6×10^3	4.3×10^3	9.1×10^3	8.5×10^3	2.6×10^3	5.0×10^3
Mixed climate						
Mean	1.1×10^3	2.2×10^3	6.6×10^3	5.7×10^3	1.1×10^3	2.6×10^3
95th percentile	2.4×10^3	2.9×10^3	8.7×10^3	8.1×10^3	2.4×10^3	5.0×10^3
Cold climate						
Mean	0.7×10^3	1.2×10^3	3.1×10^3	2.8×10^3	0.7×10^3	2.6×10^3
95th percentile	2.1×10^3	1.9×10^3	5.2×10^3	5.1×10^3	2.1×10^3	5.0×10^3

[a] The ADL for the 3rd trimester of the fetus is based on the ADL of the mother; when normalized to body weight, we assume that exposure to the mother and the fetus will be the same

[b] Residential adult ADLs are for both 16<30 and 16-70 year age groups

[c] Assumes exposure only to face, hands and forearms regardless of climate region

Tables 5.12a - d Annual Dermal Load Distributions by Age Group and Climate for Stochastic Analysis

Table 5.12a Annual Dermal Load (mg/kg-yr) Distributions for the 0<2 Year Age Group

Climate Type	Warm climate	Mixed climate	Cold climate
Distribution	Student's t	Logistic	Triangular
Minimum			0.2×10^3
Likeliest			0.7×10^3
Maximum			2.6×10^3
Scale	0.41	0.28	
Deg. freedom	3		
Midpoint	3.6×10^3		
Mean	3.6×10^3	2.2×10^3	1.2×10^3
50^{th} percentile	3.6×10^3	2.2×10^3	0.9×10^3
90^{th} percentile	4.1×10^3	2.8×10^3	1.9×10^3
95^{th} percentile	4.3×10^3	2.9×10^3	1.9×10^3
99^{th} percentile	4.7×10^3	3.1×10^3	2.1×10^3

Table 5.12b Annual Dermal Load (mg/kg-yr) Distributions for the 2<9 Year Age Group

Climate Type	Warm climate	Mixed climate	Cold climate
Distribution	Min extreme	Min extreme	Triangular
Minimum			0.4×10^3
Likeliest	8.0×10^3	7.3×10^3	1.9×10^3
Maximum			6.9×10^3
Scale	0.1	1.3	
Mean	7.5×10^3	6.6×10^3	3.1×10^3
50^{th} percentile	7.7×10^3	6.5×10^3	2.3×10^3
90^{th} percentile	8.7×10^3	8.4×10^3	5.1×10^3
95^{th} percentile	9.1×10^3	8.7×10^3	5.2×10^3
99^{th} percentile	9.7×10^3	9.4×10^3	5.7×10^3

Table 5.12c Annual Dermal Load (mg/kg-yr) Distributions for the 2<16 Year Age Group

Climate Type	Warm climate	Mixed climate	Cold climate
Distribution	Min extreme	Logistic	Triangular
Minimum			0.3×10^3
Likeliest	7.2×10^3		1.6×10^3
Maximum			6.9×10^3
Scale	1.29	0.91	
Mean	6.4×10^3	5.7×10^3	2.8×10^3
50th percentile	6.6×10^3	5.7×10^3	2.2×10^3
90th percentile	8.1×10^3	7.7×10^3	4.8×10^3
95th percentile	8.5×10^3	8.1×10^3	5.1×10^3
99th percentile	9.3×10^3	8.9×10^3	5.6×10^3

Table 5.12d Annual Dermal Load (mg/kg-yr) Distributions for Residential Adults (Age 16-30 and 16-70 Years) [a] and Offsite Workers

Receptor	Residential Adult			Offsite Worker
Climate Type	**Warm**	**Mixed**	**Cold**	**All Climates [b]**
Distribution	Beta	Beta	Gamma	Lognormal
Minimum	0.2×10^3	0.02×10^3		
Maximum	3.3×10^3	0.3×10^3		
Scale			0.07	
Mean	1.2×10^3	1.1×10^3	0.7×10^3	2.6×10^3
50th percentile	1.2×10^3	1.0×10^3	0.5×10^3	2.3×10^3
90th percentile	2.4×10^3	2.1×10^3	1.6×10^3	4.5×10^3
95th percentile	2.6×10^3	2.4×10^3	2.1×10^3	5.0×10^3
99th percentile	2.9×10^3	2.6×10^3	2.3×10^3	6.4×10^3

[a] The ADL distribution for the 3rd trimester is based on the ADL distribution of the mother; we assume the same ADL distribution for residential adult (the mother) and the fetus

[b] Face, hands and forearms are exposed only, regardless of climate

Table 5.13 Dermal Absorption Fraction Factors (ABS) as Percent from Soil for Semi-Volatile and Solid Chemicals under the OEHHA "Hot Spots" Program

Chemical	ABS
Inorganic chemicals	
Arsenic	6
Beryllium	3
Cadmium	0.2
Chromium (VI)	2
Fluorides (soluble compounds)	3
Lead	3
Mercury	4
Nickel	2
Selenium	3
Organic chemicals	
Creosotes	13
Diethylhexylphthalate	9
Hexachlorobenzene	4
Hexachlorocyclohexanes	3
4,4'methylene dianiline	10
Pentachlorophenol	[a]
Polychlorinated biphenyls	14
Polychlorinated dibenzo-p-dioxins and dibenzofurans	3
Polycyclic aromatic hydrocarbons	13

[a] To be determined in future amendments to the Hot Spots Program

Skin permeability is related to the solubility or strength of binding of the chemical in the delivery matrix (soil or other particles) versus the receptor matrix, the skin's stratum corneum. Fractional dermal absorption point estimate values were derived by OEHHA from available literature sources for the semi-volatile and nonvolatile chemicals in the "Hot Spots" program. The rationale for the chemical-specific dermal absorption fraction values, and the use of default values in cases where sufficient data are lacking, can be found in Appendix F of the Technical Support Document for Exposure and Stochastic Analysis (OEHHA, 2012).

5.4.2.2 Chronic Noncancer Dermal Dose

Dermal exposure, and thus annual dermal load (ADL), varies by age group. Therefore, a time-weighted average ADL for age 0-70 years (0-2, 2-16, and 16-70 years) is estimated for chronic residential exposure using ADL values in Table 5.12. This exposure pathway is also assessed for offsite workers using the offsite worker ADL values in Table 5.12d. Children at a MEIW daycare, if present, may also be assessed for exposure if the District deems it advisable. The contribution to the dermal dose is determined for each age group in EQ 5.4.2.2:

A. Equation 5.4.2.2: $\boxed{Dose_{dermal} = ADL \times Cs \times ABS \times 10^{-9} \times ED/AT \times (1/350)}$

1. $Dose_{dermal}$ = Exposure dose through dermal absorption (mg/kg/d)
2. ADL = Annual dermal load (mg/kg-yr), age-specific
3. Cs = Average soil concentration (μg/kg)
4. ABS = Fraction absorbed across skin (unitless)
5. 10^{-9} = Conversion factor for chemical & soil (μg to mg, mg to kg)
6. 1/350 = Conversion factor for ADL from yrs to days (Note: this conversion is needed to remove EF, expressed as 350 days/365 days, from the ADLs in Table 5.12a-d)
7. ED = Exposure duration for specified age groups: 2 yrs for 0<2, 14 yrs for 2<16, 54 yrs for 16-70 for residential exposure,
8. AT = Averaging time for residential exposure – 70 yrs

a: Recommended default values for EQ 5.4.2.2:

1. ADL = See Table 5.11 for point estimates by age group, climate region and receptor type (resident or worker)
2. Cs = Calculated above in EQ 5.3.2 A
3. ABS = See Table 5.13

b: Recommended off-site worker default modifications to EQ 5.4.2.2:

1. Chronic dermal dose to the off-site worker assumes only adult exposure and is incorporated into the off-site worker ADL in Table 5.12d.
2. A time-weighted average estimate of dose is not necessary and the ED and AT variates are left out of EQ 5.4.2.2 for dermal dose to the worker.

c: Recommended nursing mother default modifications to EQ 5.4.2.2:

1. For dermal dose to mother's milk, use the ADL for age 16-30 years in Table 5.12d.
2. The ED and AT variates in EQ 5.4.2.2 are left out for dermal dose in the mother's milk pathway.

d: Assumptions for EQ 5.4.2.2:

1. For cancer risk assessment, Exposure Frequency (EF) for vacation time away from exposure is incorporated into the ADLs shown in Tables 5.11 and 5.12 using the basic assumption that cancer risk is associated with cumulative dose of carcinogen. The dose used to estimate cancer risk can be adjusted for EF, and for time spent within the MEIR or MEIW location. Chronic RELs are not necessarily related to cumulative dose. Thus, adjusting the estimated dose for EF at the MEIR or MEIW is not appropriate, and the unadjusted daily rate is used in EQ 5.4.2.2.
2. For worker exposure, the annual average concentration should not be adjusted to account for worker and facility emission schedules, as done for

inhalation cancer risk assessment. The pollutant will be deposited and accumulate in the soil in the absence or presence of the worker; therefore, the total deposition and soil concentration will be dependent on the annual average air concentration.

For residential chronic exposure, the dermal dose contribution for each age group is summed together to obtain the time-weighted average daily dermal dose for chronic hazard assessment:

(ADL age 0<2 × Cs × ABS × 10^{-9} × 2 / 70 × (1/350)) +

(ADL age 2<16 × Cs × ABS × 10^{-9} × 14 / 70 × (1/350)) +

(ADL age 16-70 × Cs × ABS × 10^{-9} × 54 / 70 × (1/350)) = Chronic $\text{Dose}_{\text{dermal}}$

5.4.3 *Estimation of Exposure through Ingestion*

Exposure through ingestion is a function of the concentration of the substance in the ingested soil, water, and food, the gastrointestinal absorption of the substance, and the amount ingested.

5.4.3.1 Exposure through Ingestion of Soil

There are no distributions for soil ingestion currently recommended. Tier III stochastic risk assessments should include a high-end point estimate of soil ingestion, soil loading, exposure frequency and soil area.

5.4.3.1.1 Soil Ingestion Dose for Cancer Risk

The exposure dose through residential soil ingestion varies by age and is calculated for each age group ((e.g., 3rd trimester, 0<2 yrs, 2<9 yrs, 2<16 yrs, 16<30 and 16-70 yrs). These age-specific groupings are needed in order to properly use the age sensitivity factors for cancer risk assessment (see Chapter 8). This pathway is also assessed for exposure to off-site workers. Children at a MEIW daycare, if present, may also be assessed for exposure if the District deems it advisable. The dose from inadvertent soil ingestion can be estimated by the point estimate approach using the following general equation:

A. Equation 5.4.3.1.1: $$DOSE_{soil} = C_{soil} \times GRAF \times SIR \times 10^{-9} \times EF$$

1. $DOSE_{soil}$ = Dose from soil ingestion (mg/kg BW-day)
2. 10^{-9} = Conversion factor (μg to mg, mg to kg)
3. C_{soil} = Concentration of contaminant in soil (μg/kg)
4. GRAF = Gastrointestinal relative absorption fraction, chemical-specific (unitless)
5. SIR = Soil ingestion rate (mg/kg BW-day)
6. EF = Exposure frequency (unitless), (days/365 days)

a: Recommended default values for EQ 5.4.3.1.1:

1. C_{soil} = Calculated above in EQ 5.3.2 A
2. GRAF = See Table 5.2
3. SIR = See Table 5.14
4. EF = 350 d/year resident, 250 d/year worker

In this approach, it is assumed that the soil ingested contains a representative concentration of the contaminant(s) and the concentration is constant over the exposure period.

The term **GRAF**, or gastrointestinal relative absorption factor, is defined as the fraction of contaminant absorbed by the GI tract relative to the fraction of contaminant absorbed from the matrix (feed, water, other) used in the study(ies) that is the basis of either the cancer potency factor (CPF) or the Reference Exposure Level (REL). If no data are available to distinguish absorption in the toxicity study from absorption from the environmental matrix in question (i.e., soil), then GRAF = 1. The GRAF allows for adjustment for absorption from a soil matrix if it is known to be different from absorption across the GI tract in the study used to calculate the CPF or REL. In most instances, the GRAF will be 1.

Table 5.14 Recommended Soil Ingestion Rate (SIR) Estimates for Adults and Children (mg/kg-day)*

Age Groups (years)	Mean (mg/kg-day)	95^{th} % (mg/kg-day)
3rd Trimester[a]	0.7	3
0<2	20	40
2<9	5	20
2<16	3	10
16<30	0.7	3
16 to 70	0.6	3
PICA adult	NR	-

[a] Assumed to be the mother's soil ingestion rate (adult age 16 <30)
* Soil includes outdoor settled dust
NR = No recommendation

5.4.3.1.2 Chronic Noncancer Dose for Soil Ingestion

The soil ingestion rate varies by age. A time-weighted average approach is used to combine soil intake rates of the age groupings (i.e., 0<2 yrs, 2<16 yrs, and 16-70 yrs) to determine the residential soil ingestion dose for chronic noncancer hazard assessment. This pathway is also assessed for exposure to offsite workers using the adult intake values for age 16-70 years in Table 5.14. Children at a MEIW daycare, if present, may also be assessed for exposure if the District deems it advisable. The contribution to the soil ingestion dose by each age group is determined in EQ 5.4.3.1.2:

A. Equation 5.4.3.1.2: $\boxed{\mathbf{DOSE_{soil} = C_{soil} \times GRAF \times SIR \times 10^{-9} \times ED/AT}}$

1. $DOSE_{soil}$ = Dose from soil ingestion (mg/kg BW-day)
2. 10^{-9} = Conversion factor (μg to mg, mg to kg)
3. C_{soil} = Concentration of contaminant in soil (μg/kg)
4. GRAF = Gastrointestinal relative absorption fraction, unitless; chemical-specific
5. SIR = Soil ingestion rate (mg/kg BW-day)
6. ED = Exposure duration for a specified age group: 2 yrs for 0<2, 14 yrs for 2<16, 54 yrs for 16-70
7. AT = Averaging time for lifetime exposure – 70 yrs

a: Recommended default values for EQ 5.4.3.1.2:

1. C_{soil} = Calculated above in EQ 5.3.2 A
2. GRAF = See Table 5.2
3. SIR = See Table 5.14; use 16-70 age group SIR for workers

b: Recommended off-site worker default modifications to EQ 5.4.3.1.2:

1. A time-weighted average estimate of dose is not necessary and the ED and AT variates are left out of EQ 5.4.3.1.2 for oral soil dose to the worker.

c: Recommended nursing mother default modifications to EQ 5.4.3.1.2:

1. For mother's ingested soil dose to milk, use the SIR for age 16-30 years in Table 5.14.
2. The ED and AT variates in EQ 5.4.3.1.2 are left out for soil ingestion dose in the mother's milk pathway.

d: Assumptions for EQ 5.4.3.1.2:

1. For worker exposure, the annual average concentration should not be adjusted to account for overlap of worker and facility emission schedules. The pollutant will be deposited and accumulate in the soil in the absence or presence of the worker; therefore, the total deposition and soil concentration will be dependent on the annual average air concentration.

For residential exposure, the soil ingestion dose contribution for each age group is summed together to obtain the time-weighted average daily soil intake dose for chronic hazard assessment:

(SIR for age 0<2 yrs × C_{soil} × GRAF × 10^{-9} × 2 / 70) +

(SIR for age 2<16 yrs × C_{soil} × GRAF × 10^{-9} × 14 / 70) +

(SIR for age 16-70 yrs × C_{soil} × GRAF × 10^{-9} × 54 / 70) = Chronic $Dose_{soil}$

5.4.3.2 Exposure through Ingestion of Food

The exposure through food ingestion can be through ingestion of home-grown plant products (categorized as leafy, protected, exposed and root produce), home-raised animals (categorized as meat, cow's milk and eggs), angler-caught fish and mother's milk. When a specific food pathway is a dominant pathway (e.g., homegrown produce), and multiple pathways such as home raised meat, milk, and eggs categories all need to be assessed, the 95th percentile default consumption rate for the driving exposure pathway is used, while the mean consumption values for the remaining exposure pathways (i.e., food categories) are used. See Section 8.2.6 for a complete discussion of the methodology on how to implement the derived methodology.

5.4.3.2.1 Dose for Cancer Risk from Home-Grown Produce

Exposure through ingesting home-grown produce (DOSEp) is a function of the type of crop (i.e., exposed, leafy, protected, root), gastrointestinal relative absorption factor, bioavailability and the fraction of plant ingested that is homegrown. The calculation is done for each type of crop, then summed to get total dose for this pathway. The exposure dose through ingestion of home-grown produce varies by age and is calculated for each age group (e.g., 3rd trimester, 0<2 yrs, 2<9 yrs, 2<16 yrs, 16<30 and 16-70 yrs). These age-specific groupings are needed in order to properly use the age sensitivity factors for cancer risk assessment (see Chapter 8).

A. Equation 5.4.3.2.1: $$\boxed{\mathbf{DOSEp = C_v \times IP \times GRAF \times L \times EF \times 10^{-6}}}$$

1. DOSEp = Exposure dose through ingestion of home-grown produce (mg/kg/d)
2. C_v = Concentration in specific type of crop, i.e., exposed, leafy, protected, root (μg/kg)
3. IP = Consumption of specific type of crop (g/kg BW*day)
4. GRAF = Gastrointestinal relative absorption factor (unitless)
5. L = Fraction of plant type consumed that is home-grown or locally grown (unitless)
6. EF = Exposure frequency (unitless, days/365 days)
7. 10^{-6} = Conversion factors (μg/kg to mg/g)

a: Recommended default values for Equation 5.4.3.2.1:

1. C_v = Calculated above in EQ 5.3.4.1 A
2. IP = See Table 5.15 (point estimates) and 5.16a-e (distributions)
3. GRAF = See Table 5.2
4. L = Site-specific survey is recommended. Otherwise, see Table 5.17 for Tier I default values
5. EF = 0.96 (350 d/365 d in a yr)

Once the dose for each type of crop that applies is calculated (See Section 5.3.4.1 for definition of crops types), the doses are summed to get the total dose for the home-grown produce pathway:

Total DOSEp = DOSEp (leafy) + DOSEp (root) + DOSEp (exposed) + DOSEp (protected)

The total home-grown produce dose will need to be calculated for each age group that applies.

5.4.3.2.2 Dose for cancer risk from home-raised meat, eggs, and cow's milk

Exposure through ingesting home-raised or farm animal products ($DOSE_{fa}$) is a function of the type of food (meat, eggs and cow's milk), gastrointestinal relative absorption factor, bioavailability and the fraction of food ingested that is home-raised. The only meat sources considered here are beef, pork and poultry. Unlike the home-grown produce pathway, the dose is calculated and presented separately for each type of home-raised food. The age-specific groupings to determine dose (3rd trimester, 0<2 yrs, 2<9 yrs, 2<16 yrs, 16<30 yrs or 16-70 yrs) is needed in order to properly use the age sensitivity factors for cancer risk assessment (see Chapter 8).

A. Equation 5.4.3.2.2: $$DOSE_{fa} = C_{fa} \times I_{fa} \times GRAF \times L \times EF \times 10^{-6}$$

1. $DOSE_{fa}$ = Exposure dose through ingestion of home-raised animal product (mg/kg/d)
2. C_{fa} = Concentration in animal product, e.g., beef, pork, poultry, dairy, eggs (μg/kg)
3. I_{fa} = Consumption of animal product (g/kg BW-day)
4. GRAF = Gastrointestinal relative absorption factor (unitless)
5. L = Fraction of animal product consumed that is home-raised or locally produced (unitless)
6. EF = Exposure frequency (unitless, days/365 days)
7. 10^{-6} = Conversion factors (μg/kg to mg/g)

a: Recommended default values for EQ 5.4.3.2.2:

1. C_{fa} = Calculated above in EQ 5.3.4.2 A
2. I_{fa} = See Table 5.15 (point estimates) and Table 5.16a-e (distributions)
3. GRAF = See Table 5.2
4. L = Site-specific survey is recommended. Otherwise, see Table 5.17 for Tier I default values
5. EF = 0.96 (350 days / 365 days in a year)

5.4.3.2.3 Chronic Noncancer Dose for Ingestion of Food

For oral noncancer hazard assessment, a time-weighted average approach is used to combine food ingestion rates for the age groups (i.e., 0<2, 2<16 and 16-70 yrs) to estimate the chronic dose for residential exposure. The equation used to estimate dose through home-grown produce and home-raised meat/eggs/cow's milk is similar and is shown below in one equation. Similar to the cancer risk dose calculation, home-grown produce is presented as a total dose for all types of crops (See Section 5.4.3.2.1) and home-raised animal product dose is presented separately for each type of animal product that applies (See Section 5.4.3.2.2).

The contribution to the food intake dose is determined for each age group in EQ 5.4.3.2.3:

A. Equation 5.4.3.2.3: $\boxed{DOSE_{food} = C_{food} \times I_{food} \times GRAF \times L \times 10^{-6} \times ED/AT}$

1. $DOSE_{food}$ = Exposure dose through ingestion of home-grown produce or home-raised animal product (mg/kg/d)
2. C_{food} = Concentration (μg/kg) in produce (e.g., exposed, leafy, protected, root) or animal product (e.g., beef, pork, poultry, dairy, eggs)
3. I_{food} = Consumption of produce or animal product (g/kg BW-day)
4. GRAF = Gastrointestinal relative absorption factor (unitless)
5. L = Fraction of produce or animal product consumed that is home-grown (unitless)
6. 10^{-6} = Conversion factors (μg/kg to mg/g)
7. ED = Exposure duration for a specified age group (2 yrs for 0<2, 14 yrs for 2<16, 54 yrs for 16-70
8. AT = Averaging time for lifetime exposure: 70 yrs

a: Recommended default values for EQ 5.4.3.2.3:

1. C_{food} = Calculated above in EQ 5.3.4.1 A (for home-grown produce) or EQ 5.3.4.2 A (for home-raised animal products)
2. I_{food} = Age-specific, see Table 5.15 for point estimates
3. GRAF = See Table 5.2
4. L = Site-specific survey is recommended. Otherwise, see Table 5.17 for Tier I default values

b: Recommended nursing mother default modifications to EQ 5.4.3.2.3:

1. For the mother's dose to milk through ingested food, use the food intake rates for age 16-30 years in Table 5.15 and 5.16d.
2. The ED and AT variates in EQ 5.4.3.2.3 are left out for ingested food dose in the mother's milk pathway.

Following calculation of the intake dose contributions for each age group, the intake rates for home-grown produce and the intake rates for home-raised animal products are summed separately to obtain the residential time-weighted average intake dose for chronic residential exposure to home-grown produce and to home-raised animal products:

(I_{food} for age 0<2 yrs × C_{food} × GRAF × L × 10^{-6} × 2 / 70) +

(I_{food} for age 2<16 yrs × C_{food} × GRAF × L × 10^{-6} × 14 / 70) +

(I_{food} for age 16-70 yrs × C_{food} × GRAF × L × 10^{-6} × 54 / 70) = Chronic $Dose_{food}$

Table 5.15 Recommended Average and High End Point Estimate Values for Home Produced Food Consumption (g/kg-day)[a]

Food Category	Third Trimester[b]		Ages 0<2		Ages 2<9	
Produce	Avg.	High End	Avg.	High End	Avg.	High End
Exposed	1.9	5.9	11.7	30.2	7.4	21.7
Leafy	0.9	3.2	3.8	10.8	2.5	7.9
Protected	1.7	5.8	5.9	17.5	4.7	13.3
Root	1.7	4.6	5.7	15.3	3.9	10.8
Meat						
Beef	2.0	4.8	3.9	11.3	3.5	8.6
Pork	0.9	2.9	2.9	10.5	2.2	7.8
Poultry	1.8	4.7	4.5	11.4	3.7	9.0
Milk	5.4	15.9	50.9	116.1	23.3	61.4
Eggs	1.6	4.2	6.1	15.0	3.9	9.4
	Ages 2<16		Ages 16<30		Ages 16-70	
Produce	Avg.	High End	Avg.	High End	Avg.	High End
Exposed	5.5	16.6	1.9	5.9	1.8	5.6
Leafy	1.7	5.8	0.9	3.2	1.1	3.4
Protected	3.6	10.6	1.7	5.8	1.6	5.2
Root	3.0	8.7	1.7	4.6	1.5	4.2
Meat						
Beef	3.0	7.6	2.0	4.8	1.7	4.4
Pork	1.8	5.7	0.9	2.9	0.9	2.8
Poultry	3.0	7.5	1.8	4.7	1.5	3.8
Milk	16.5	48.4	5.4	15.9	4.3	13.2
Eggs	3.1	8.1	1.6	4.2	1.3	3.4

[a] April 22, 2022: Transcription errors in Table 5.15 were corrected in accordance with corrections made to the source table, Table 7.1 of the 2012 Exposure Assessment and Stochastic Analysis Technical Support Document (EASA TSD). In the original Table 7.1 of the EASA TSD, data from Table 7.12 were incorrectly copied onto the “Ages 2<16” column. The corrected Table 7.1 replaces the data for this age group with data from Table 7.11 and replaces the column header “Ages 2>16” with “Ages 2<16”. Additionally, the corrected Table 7.1 also switches the order of meat types in the Food Category column to reflect the order shown in the source data tables (Tables 7.8 – 7.13 of EASA TSD). The corrections made to Table 7.1 of the EASA TSD on April 22, 2022 were also made to Table 5.15 of this document.).

[b] Food consumption values for 3rd trimester calculated by assuming that the fetus receives the same amount of contaminated food on a per kg BW basis as the mother (adult age 16 to less than 30).

Table 5.16a - e Parametric Models of Per Capita Food Consumption by Age Group for Stochastic Analysis

Table 5.16a Per Capita Food Consumption (g/kg-day) for Ages 0<2

Food Category	Distrib. Type	Anderson-Darling Statistic	Mean	Std. Dev	Location	Scale	Shape	Like-liest
Produce								
Exposed	Gamma	60			0.01	6.56	0.830	
Leafy	Gamma	167			0.01	3.30	1.161	
Protected	LogN	67	6.03	7.31				
Root	Gamma	83			0.06	4.44	1.28	
Meat								
Beef	LogN	16	1.97	1.73				
Poultry	LogN	58	4.5	4.08				
Pork	LogN	230	3.00	4.46				
Dairy	Max Ext.	169				27.82		33.79
Eggs	LogN	172	6.11	4.21				

Table 5.16b Per Capita Food Consumption (g/kg-day) for Ages 2<9

Food Category	Distribution Type	Anderson-Darling Statistic	Mean	Std. Dev	Location	Scale	Shape	Rate
Produce								
Exposed	Exponential	206						0.14
Leafy	LogN	127	2.64	3.89				
Protected	Weibull	68			0.02	4.76	1.063	
Root	LogN	60	3.95	3.85				
Meat								
Beef	LogN	35	3.55	2.79				
Poultry	LogN	17	3.71	2.67				
Pork	LogN	66	2.25	2.84				
Milk	LogN	12	23.4	20.78				
Eggs	LogN	38	3.93	3.00				

Table 5.16c Per Capita Food Consumption (g/kg-day) for Ages 2<16

Food Category	Distribution Type	Anderson-Darling Statistic	Mean	Std. Dev	Location	Scale	Shape
Produce							
Exposed	Gamma	60			0.01	6.54	0.8325
Leafy	LogN	68	1.83	2.91			
Protected	Gamma	47			0.00	3.69	0.9729
Root	LogN	51	3.10	3.44			
Meat							
Beef	LogN	10	2.96	2.49			
Poultry	LogN	27	2.98	2.52			
Pork	LogN	48	1.84	2.79			
Milk	LogN	35	16.8	19.2			
Eggs	LogN	71	3.16	2.95			

Table 5.16d Per Capita Food Consumption (g/kg-day) for Ages 16-30[a]

Food Category	Distribution Type	Anderson-Darling Statistic	Mean	Std. Dev	Location	Scale	Shape
Produce							
Exposed	Gamma	70			0.01	2.05	0.9220
Leafy	Weibull	191			0.00	0.88	0.8732
Protected	LogN	93	1.81	3.31			
Root	LogN	43	1.69	1.69			
Meat							
Beef	LogN	26	1.98	1.54			
Poultry	LogN	26	1.80	1.42			
Pork	LogN	242	1.01	1.74			
Milk	Gamma	22			0.02	5.66	0.9421
Eggs	LogN	29	1.55	1.36			

[a] These distributions are also recommended for the third trimester. Food consumption values for 3rd trimester are calculated by assuming that the fetus receives the same amount of contaminated food on a per kg BW basis as the mother (adult age 16<30).

Table 5.16e Per Capita Food Consumption (g/kg-day) for Ages 16-70

Food Category	Distribution Type	Anderson-Darling Statistic	Mean	Std. Dev	Location	Scale	Shape
Produce							
Exposed	Gamma	148			0.01	2.07	0.8628
Leafy	Gamma	83			0.00	1.15	0.9713
Protected	Gamma	78			0.01	1.90	0.8325
Root	Gamma	14			0.00	1.28	1.166
Meat							
Beef	LogN	20	1.75	1.40			
Poultry	LogN	18	1.53	1.18			
Pork	LogN	190	0.97	1.59			
Milk	Gamma	20			0.00	4.50	0.9627
Eggs	LogN	30	1.3	1.01			

Table 5.17 Default Values for L in EQs 5.4.3.2.1., 5.4.3.2.2 and 5.4.3.2.3: Fraction of Food Intake that is Home-Produced

Food Type	Households that Garden[a]	Households that Farm[a]
Avg. Total Veg & Fruits	0.137	0.235
	Households that Garden/Hunt[b]	Households that Farm[b]
Beef	0.485	0.478
Pork	0.242	0.239
Poultry	0.156	0.151
Eggs	0.146	0.214
Total Dairy (Cow's milk)	0.207	0.254

[a] As a default for home-produced leafy, exposed, protected and root produce, OEHHA recommends 0.137 as the fraction of produce that is home-grown. The households that grow their own vegetables and fruits are the population of concern. In rural situations where the receptor is engaged in farming, OEHHA recommends 0.235 as the default value for fraction of leafy, exposed, protected and root produce that is home-grown.

[b] OEHHA recommends the fraction home-raised under "Households that raise animals/hunt" (for beef, pork, poultry (chicken), eggs and dairy (cow's milk), with the exception of rural household receptors engaged in farming. OEHHA recommends that the fractions listed under "Households that farm" be used for the rural household receptors.

5.4.3.3 Exposure through Ingestion of Water

Intake of drinking water varies by age on a ml per kg body weight per day basis resulting in differences in exposure dose by age. The age-specific groupings to determine dose are needed in order to properly use the age sensitivity factors for cancer risk assessment (see Chapter 8) and to calculate a time-weighted average dose for chronic noncancer assessment.

5.4.3.3.1 Dose for Cancer Risk through Ingestion of Water

$DOSE_{water}$ is calculated for each age group (i.e., 3rd trimester, 0<2 yrs, 2<9 yrs, 2<16 yrs, 16<30 yrs and 16-70 yrs), then incorporated into EQ 8.2.5 in Chapter 8 to determine cancer risk through exposure in drinking water.

A. Equation 5.4.3.3.1: $\boxed{\mathbf{DOSE_{water} = C_w \times WIR \times ABS_{wa} \times Fdw \times EF \times 10^{-6}}}$

1. $DOSE_{water}$ = Exposure dose through ingestion of water (mg/kg BW/d)
2. C_w = Water concentration (μg/L)
3. WIR = Water ingestion rate (ml/kg BW-day)
4. ABS_{wa} = Gastrointestinal relative absorption factor (unitless)
5. Fdw = Fraction of drinking water from contaminated source
6. EF = Exposure frequency (unitless, days/365 days)
7. 10^{-6} = Conversion factors (mg/μg)(L/ml)

a: Recommended default values for EQ 5.4.3.3.1:

1. C_w = Calculated above 5.3.3 A
2. WIR = See 5.18 (point estimates) and Table 5.19 (distributions)
3. ABS_{wa} = Default set to 1
4. Fdw = Default set to 1, although a site-specific survey is recommended for this variate
5. EF = 0.96 (350 days/365 days in a year)

5.4.3.3.2 Chronic Noncancer Dose through Ingestion of Water

Because water intake varies by age group, a time-weighted average intake approach is used to determine the daily water ingestion dose for chronic residential exposure. The contribution to the water ingestion dose is determined for each age group (i.e., 0<2, 2<16 and 16-70 yrs) in EQ 5.4.3.3.2.

A. Equation 5.4.3.3.2:

$$DOSE_{water} = \boxed{C_w \times WIR \times ABSwa \times Fdw \times 10^{-6} \times ED/AT}$$

1. $DOSE_{water}$ = Exposure dose through ingestion of water (mg/kg BW/d)
2. C_w = Water concentration (μg/L)
3. WIR = Water ingestion rate (ml/kg BW-day)
4. ABSwa = Gastrointestinal absorption factor
5. Fdw = Fraction of drinking water from contaminated source (site-specific)
6. 10^{-6} = Conversion factors (mg/μg)(L/ml)
7. ED = Exposure duration for a specified age group: 2 yrs for 0<2, 14 yrs for 2<16, 54 yrs for 16-70
8. AT = Averaging time for residential exposure: 70 yrs

a: Recommended default values for EQ 5.4.3.3.2:

1. C_w = Calculated above in 5.3.3 A
2. WIR = See 5.18 (point estimates)
3. ABSwa = Default set to 1
4. Fdw = Default set to 1, although a site-specific survey is recommended for this variate

b: Recommended nursing mother default modifications to EQ 5.4.3.3.2:

1. For the dose to mother's milk through water ingestion, use the WIR for age 16-30 years in Table 5.18.
2. The ED and AT variates in EQ 5.4.3.3.2 are left out for ingested water dose in the mother's milk pathway.

The water intake dose contribution for each age group is summed together to obtain the time-weighted average daily residential water ingestion dose:

(WIR for age 0<2 yrs × C_w × ABSwa × Fdw × 10^{-6} × 2 / 70) +

(WIR for age 2<16 yrs × C_w × ABSwa × Fdw × 10^{-6} × 14 / 70) +

(WIR for age 16-70 yrs × C_w × ABSwa × Fdw × 10^{-6} × 54 / 70) = Chronic $Dose_{water}$

Table 5.18 Recommended Point Estimate Tap Water Intake Rates (ml/kg-day)

Point Estimates				
Using Mean Values	**For the Age Period**	**9-year scenario**	**30-year scenario**	**70-year scenario**
	3rd trimester	18	18	18
	0<2 years	113	113	113
	2<9 years	26	-	-
	2<16 years	-	24	24
	16-30 years	-	18	-
	16-70 years	-	-	18
Using 95th-percentile values	**For the Age Period**	**9-year scenario**	**30-year scenario**	**70-year scenario**
	3rd trimester	47	47	47
	0<2 years	196	196	196
	2<9 years	66	-	-
	2<16 years	-	61	61
	16-30 years	-	47	-
	16-70 years	-	-	45

Table 5.19 Recommended Distributions of Tap Water Intake Rates (ml/kg-day) for Stochastic Risk Assessment

	9-year scenario	**30-year scenario**	**70-year scenario**
0<2 years	**Max Extreme** Likeliest = 93 Scale = 35	**Max Extreme** Likeliest = 93 Scale = 35	**Max Extreme** Likeliest = 93 Scale = 35
2<9 years	**Weibull** Location = 0.02 Scale = 29 Shape = 1.3		
2<16 years		**Gamma** Location = 0.19 Scale = 15.0 Shape = 1.6	**Gamma** Location = 0.19 Scale = 15.0 Shape = 1.6
16-30 years		**Gamma** location=0.49 scale=13.6 shape=1.26	
16-70 years			**Beta** min=0.17 max=178 alpha=1.5 beta= 12.9

5.4.3.4 Exposure through Ingestion of Angler-caught Fish

Exposure through ingestion of angler-caught fish ($DOSE_{fish}$) is a function of the fraction of fish ingested that is caught in the exposed water body, which differs for each age grouping, and the gastrointestinal absorption factor. Ingestion of angler-caught fish on a mg/kg body weight per day basis varies by age resulting in differences in exposure dose by age. The age-specific groupings to determine dose is needed primarily to properly use the age sensitivity factors for cancer risk assessment (see Chapter 8) and to calculate a time-weighted average dose for chronic noncancer assessment.

5.4.3.4.1 Cancer Risk Dose via Ingestion of Angler-Caught Fish

$DOSE_{fish}$ is calculated for each age group separately (i.e., 3rd trimester, 0<2 yrs, 2<9 yrs, 2<16 yrs, 16<30 yrs and 16-70 yrs), then incorporated into EQ 8.2.5 in Chapter 8 to determine cancer risk through exposure to angler-caught fish.

A. Equation 5.4.3.4.1: $$\mathbf{DOSE_{fish} = C_t \times I_{fish} \times Gf \times L \times EF \times 10^{-6}}$$

1. $DOSE_{fish}$ = Dose via ingestion of angler-caught fish (mg/kg BW-day)
2. Ct = Concentration in fish muscle tissue (μg/kg)
3. I_{fish} = Angler-caught fish ingestion rate (g/kg BW per day)
4. Gf = Gastrointestinal absorption factor (unitless)
5. L = Fraction of fish caught at exposed site (unitless)
6. EF = Exposure frequency (days/365 days)
7. 10^{-6} = Conversion factor (mg/μg, kg/g)

a: Recommended default values for Equation 5.4.3.4.1:

1. Ct = Calculated above in Equation 5.3.4.7
2. I_{fish} = See Table 5.20 (point estimates) and Table 5.21 (distributions)
3. Gf = Default set to 1
4. L = Default set to 1 for fraction of fish caught locally, although a site-specific survey is recommended for this variate
5. EF = 0.96 (350 days/365 days in a yr)

5.4.3.4.2 Chronic Noncancer Dose via Ingestion of Angler-Caught Fish

Angler-caught fish consumption varies by age group. A time-weighted average intake for residential consumption over 70 years is used to determine dose for average and high-end exposure. The contribution to the angler-caught fish consumption dose is determined for each age group in EQ 5.4.3.4.2:

A. Equation 5.4.3.4.2: $\boxed{\mathbf{DOSE_{fish} = C_t \times I_{fish} \times Gf \times L \times 10^{-6} \times ED/AT}}$

1. $DOSE_{fish}$ = Dose via ingestion of angler-caught fish (mg/kg BW-day)
2. C_t = Concentration in fish muscle tissue (µg/kg)
3. I_{fish} = Angler-caught fish ingestion rate (g/kg BW per day)
4. Gf = Gastrointestinal absorption factor (unitless)
5. L = Fraction of fish caught at exposed site (unitless)
6. 10^{-6} = Conversion factor (mg/µg, kg/g)
7. ED = Exposure duration for a specified age group: 2 yrs for 0<2, 14 yrs for 2<16 and 54 yrs for 16-70
8. AT = Averaging time for chronic exposure – 70 yrs

a: Recommended default values for Equation 5.4.3.4.2:

1. C_t = Calculated above in Equation 5.3.4.7
2. I_{fish} = See Table 5.20 (point estimates)
3. Gf = Default set to 1
4. L = Default set to 1 for fraction of fish caught locally, although a site-specific survey is recommended for this variate

b: Recommended nursing mother default modifications to EQ 5.4.3.4.2:

1. For the dose to mother's milk through fish consumption, use the I_{fish} for age 16-30 years in Table 5.20.
2. The ED and AT variates in EQ 5.4.3.4.2 are left out for the dose via fish consumption in the mother's milk pathway.

Following calculation of the angler-caught fish consumption dose contribution for each age group, 0<2 yr, 2<16 yr and 16-70 yr fish consumption doses are summed together to obtain the residential chronic dose:

(I_{fish} for age 0<2 yrs × C_t × Gf × L × 10^{-6} × 2 / 70) +

(I_{fish} for age 2<16 yrs × C_t × Gf × L × 10^{-6} × 14 / 70) +

(I_{fish} for age 16-70 yrs × C_t × Gf × L × 10^{-6} × 54 / 70) = Chronic $Dose_{fish}$

Table 5.20 Point Estimate Values for Angler-Caught Fish Consumption (g/kg-day) by Age Group

	Third Trimester	0 <2 Years	2<9 Years	2<16 Years	16<30 Years	16-70 Years
Mean	0.38	0.18	0.36	0.36	0.38	0.36
95th Percentile	1.22	0.58	1.16	1.16	1.22	1.16

Table 5.21 Empirical Distribution for Angler-Caught Fish Consumption (g/kg-day)

Mean	Percentile									
	10th	20th	30th	40th	50th	60th	70th	80th	90th	95th
Third trimester, 2<9, 2<16, 16<30 and 16-70-year age groups										
0.36	0.06	0.09	0.12	0.16	0.21	0.27	0.36	0.50	0.79	1.16
0<2-year age group										
0.18	0.03	0.05	0.06	0.08	0.11	0.14	0.18	0.25	0.40	0.58

5.4.3.5 Mother's Milk

Exposure through mother's milk ingestion (Dose-Im) is a function of the average concentration of the substance in mother's milk and the amount of mother's milk ingested. The minimum pathways that the nursing mother is exposed to include inhalation, soil ingestion, and dermal, since the chemicals evaluated by the mother's milk pathway are multipathway chemicals. Other pathways may be appropriate depending on site conditions (e.g., the presence of vegetable gardens or home grown chickens). The compounds currently considered for the mother's milk pathway are:

1. Dioxins and Furans (PCDDS and PCDFs)
2. Polychlorinated biphenyls (PCBs)
3. Polycyclic Aromatic Hydrocarbons (PAHs), including creosotes
4. Lead

These compound classes represent the chemicals of greatest concern for the mother's milk pathway under the Hot Spots program, and for which data are available to estimate transfer coefficients. It is expected that additional transfer coefficients will be developed for other multipathway chemicals in the Hot Spots Program as data becomes available and is reviewed. The nursing mother in the mother's milk pathway is not herself subject to the mother's milk pathway. The summed average daily dose (mg/kg BW-day) from all pathways is calculated for the nursing mother using the equations that follow.

5.4.3.5.1 Cancer Risk Dose to Infant via Mother's Milk

A. Equation 5.4.3.5.1: $\boxed{\textbf{Dose-Im} = C_m \times BMI_{bw} \times EF \times 10^{-3}}$

1. Dose-Im = Dose to infant through ingestion of mother's milk (mg/kg BW per day)
2. C_m = Concentration of contaminant in mother's milk (mg/kg milk)
3. BMI_{bw} = Daily breast-milk ingestion rate (g/kg BW-day)
4. EF = Frequency of exposure (days / 365 days)
5. 10^{-3} = Conversion factor (kg to g)

a: Recommended default values for EQ 5.4.3.5.1:

1. C_m = See EQ 5.3.4.8
2. BMI_{bw} = See Table 5.22 for point estimates. For distribution (parametric model) for Tier 3 stochastic risk assessments see Table 5.23.
3. EF = 1 (all 365 days of the first year of birth)

b: Assumptions for EQ 5.4.3.5.1:

1. For the MEIR, mother is exposed from birth up to 25 years of age when the infant is born. The exposed infant is then fully breastfed only during the first year of life.
2. For cancer risk assessment, exposure of breast-feeding infants to contaminants in breast milk applies only to the first year of the 0<2 yr age group for calculation of risk to this group, which then can be summed with the risk calculated for the other age groups (See Chapter 8).

5.4.3.5.2 Chronic Noncancer Dose to Infant via Mother's Milk

For oral noncancer hazard assessment, exposure of the infant through mother's milk ingestion occurs during the first year of life. After one year of age, the mother's milk pathway is not a factor for noncancer assessment.

A. Equation 5.4.3.5.2: $\boxed{\text{Dose-Im} = C_m \times BMI_{bw} \times 10^{-3}}$

1. Dose-Im = Dose to infant through ingestion of mother's milk (mg/kg BW/d)
2. C_m = Concentration of contaminant in mother's milk (mg/kg milk)
3. BMI_{bw} = Daily breast-milk ingestion rate (g/kg BW-day)
4. 10^{-3} = Conversion factor (kg to g)

a: Recommended default values for EQ 5.4.3.5.2:

1. C_m = See EQ 5.3.4.8
2. BMI_{bw} = See Table 5.22 for point estimates

Table 5.22 Default Point Estimates for Breast Milk Intake (BMI_{bw}) for Breastfed Infants

Infant Group	Intake (g/kg-day)
Fully breastfed over the first year (i.e., fed in accordance with AAP recommendations)	
Mean	101
95th percentile	139

Table 5.23 Recommended Distribution of Breast Milk Intake Rates Among Breastfed Infants for Stochastic Assessment* (Averaged Over an Individual's First Year of Life)

	Mean (SD)	Percentile							
		5	10	25	50	75	90	95	99
Intake (g/kg-day)	101 (23)	62	71	85	101	116	130	139	154

* For stochastic analysis, the mother's milk data are normally distributed.

5.5 References

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6 - Dose-Response Assessment for Noncarcinogenic Endpoints

6.1 Derivation of Toxicity Criteria for Noncancer Health Effects

Dose-response assessment describes the quantitative relationship between the amount of exposure to a substance (the dose) and the incidence or occurrence of an adverse health impact (the response). Dose-response information for noncancer health effects is used to determine Reference Exposure Levels (RELs). Inhalation RELs are air concentrations or doses at or below which adverse noncancer health effects are not expected even in sensitive members of the general population under specified exposure scenarios. The acute RELs are for infrequent 1 hour exposures that occur no more than once every two weeks in a given year, although this time frame of exposure does not necessarily apply to chemicals that can bioaccumulate (e.g., dioxins and furans, PCBs, and various metals). The chronic RELs are for 24 hour per day exposures for at least a significant fraction of a lifetime, defined as about 8 years (≥12 percent of a 70-year lifespan). The 8-hour RELs are for repeated 8-hour exposures for a significant fraction of a lifetime such as the exposures that offsite workers might typically receive. Eight-hour RELs are only available for 10 chemicals at present, but OEHHA will develop 8-hour RELs as we re-evaluate our existing RELs to ensure they are protective of children's health, and as we develop RELs for new chemicals. There are oral chronic RELs for some chemicals in the Hot Spots program that are semivolatile or nonvolatile and thus subject to deposition and oral ingestion or dermal exposure. The methodology for developing RELs is similar to that used by U.S. EPA in developing the inhalation Reference Concentrations (RfCs) and oral Reference Doses (RfDs).

Review and revision of RELs to take into account new information and sensitive subpopulations including infants and children is an ongoing process. All draft RELs for individual chemicals revised under the current noncancer methodology will undergo public comment and peer review, as mandated by the Hot Spots Act. .

The first step in determining an acute, 8-hour, or chronic REL is to determine a point of departure. The point of departure is preferably determined by the benchmark concentration procedure applied to human or animal studies, but if this method of calculation cannot be used with a particular data set, a no observed adverse effect level (NOAEL) or lowest observed adverse effect level (LOAEL) may be used as the point of departure. The benchmark concentration method (also referred to as the benchmark dose method for oral exposures) is a preferred method to estimate a point of departure because it takes all of the available dose-response data into account to statistically estimate, typically, a 5 percent response rate.

Dosimetric or toxicokinetic adjustments are often made to the point of departure to adjust for differences in dosimetry or kinetics across species or among humans. Time adjustments are generally applied to adjust experimental exposure to the exposure of interest for the REL (e.g., 1 hour for acute, continuous for chronic). A modified Haber's equation is used where needed to adjust studies with different exposure times to the one-hour period needed for acute RELs. A simple Haber's law (C x T) adjustment for exposure period duration is used for most 8-hour and chronic RELs.

The time and dosimetry adjusted point of departure is divided by uncertainty factors that reflect the limitations in the current toxicology of the chemical. For example, an interspecies uncertainty factor is applied to account for the differences between humans and animals when an animal study is used. An intraspecies uncertainty factor is usually included to account for differences in susceptibility among the human population. In addition, where benchmark dose modeling is not suitable and a NOAEL is not available, a LOAEL to NOAEL uncertainty factor may be applied when the LOAEL serves as the point of departure. If a chronic study is not available to serve as a basis for a chronic REL, then a subchronic uncertainty factor (for chronic and 8-hour RELs only) may also be applied. Finally, if there are data deficiencies, for example, lack of a developmental toxicity study for a chemical, then a database deficiency factor may be applied. The individual uncertainty factors, which range from 2 to 10 depending on the limitations in the data, are multiplied together for a total uncertainty factor. The point of departure is then divided by the total UF to obtain the REL.

The most sensitive toxicological end point is selected as the basis for the REL when there are multiple adverse health effects. The selection of the most sensitive endpoint as the basis for a REL helps ensure that the REL is protective for all health effects. The use of uncertainty factors helps ensure that the REL is protective for nearly all individuals, including sensitive subpopulations, within the limitations of current scientific knowledge. For detailed information on the methodology and derivations for RELs, including guidance on selection of uncertainty factors, see the Air Toxics Hot Spots Risk Assessment Guidelines Technical Support Document for the Derivation of Noncancer Reference Exposure Levels (OEHHA, 2008).

It should be emphasized that exceeding the acute or chronic REL does not necessarily indicate that an adverse health impact will occur. The REL is not the threshold where population health effects would first be seen. However, levels of exposure above the REL have an increasing but undefined probability of resulting in an adverse health impact, particularly in sensitive individuals (e.g., depending on the toxicant, the very young, the elderly, pregnant women, and those with acute or chronic illnesses). The significance of exceeding the REL is dependent on the seriousness of the health endpoint, the strength and interpretation of the health studies, the magnitude of combined safety factors, and other considerations. In addition, there is a possibility that a REL may not be protective of certain small, unusually sensitive human subpopulations. Such subpopulations can be difficult to identify and study because of their small numbers, lack of knowledge about toxic mechanisms, and other factors. It may be useful to consult OEHHA staff when a REL is exceeded (hazard quotient or hazard index is greater than 1.0). Chapter 8 discusses the methods used for determining potential noncancer health impacts and Appendix I presents example calculations used to determine a hazard quotient (HQ) and hazard indices (HI).

Tables 6.1 through 6.3 list the currently adopted acute, 8-hour, and chronic inhalation RELs. Some substances that pose a long-term inhalation hazard may also present a chronic hazard via non-inhalation (oral, dermal) routes of exposure. The oral RELs for these substances are presented in Table 6.3. Appendix L provides a consolidated listing of all the acute, 8-hour, and chronic RELs with the respective target organs that are approved for use by OEHHA and ARB for the Hot Spots Program. Periodically, new or updated RELs are adopted by OEHHA and these guidelines will be updated to reflect those changes. See OEHHA's web site at *www.oehha.ca.gov* (look under "Air", then select "Hot Spots Guidelines") to determine if any new or updated RELs have been adopted since the last guideline update.

6.2 Acute Reference Exposure Levels

OEHHA developed acute RELs for assessing potential noncancer health impacts for short-term, one-hour peak exposures to facility emissions (OEHHA, 2008; http://www.oehha.ca.gov/air/allrels.html). By definition, an acute REL is an exposure that is not likely to cause adverse health effects in a human population, including sensitive subgroups, exposed to that concentration (in units of micrograms per cubic meter or $\mu g/m^3$) for the specified exposure duration on an intermittent basis.

The target organ systems and the acute RELs for each substance are presented in Table 6.1. Many acute RELs are based on mild adverse effects, such as mild irritation of the eyes, nose, or throat, or may result in other mild adverse physiological changes. For most individuals, it is expected that the mild irritation and other adverse physiological changes will not persist after exposure ceases. For RELs that have been recently developed or revised, the notation "sensory irritation" has been added in parenthesis in Table 6.1 for those chemicals that have an acute REL based on sensory irritation of the respiratory system (i.e., nose , throat) and/or eyes.

Other acute RELs are based on reproductive/developmental endpoints, such as teratogenicity or fetotoxicity, which are considered severe adverse effects. The inhalation pathway is the only pathway to assess for acute exposure. Other non-inhalation pathways of exposure are evaluated for worker and residential scenarios where the exposures are chronic or repeated daily in nature. The oral RELs are used to evaluate the non-inhalation pathways of exposure. Noninhalation (oral) RELs are discussed in Section 6.5. Chapter 8 discusses the methods used for determining noncancer acute health impacts. Appendix I presents an example calculation used to determine an HQ and HI.

Table 6.1 Acute Inhalation Reference Exposure Levels (RELs) and Acute Hazard Index Target Organ System(s)

Substance	Chemical Abstract Service Number (CAS)	Acute Inhalation REL ($\mu g/m^3$)	Acute Hazard Index Target Organ Systems(s)
Acetaldehyde	75-07-0	$4.7 \times 10^{+2}$	Eyes; Respiratory System (sensory irritation)
Acrolein	107-02-8	$2.5 \times 10^{+0}$	Eyes; Respiratory System (sensory irritation)
Acrylic Acid	79-10-7	$6.0 \times 10^{+3}$	Eyes; Respiratory System
Ammonia	7664-41-7	$3.2 \times 10^{+3}$	Eyes; Respiratory System
Arsenic and Inorganic Arsenic Compounds (including arsine)	7440-38-2	2.0×10^{-1}	Development; Cardiovascular System; Nervous System
Benzene	71-43-2	$2.7 \times 10^{+1}$	Reproductive/Developmental; Immune System; Hematologic System
Benzyl Chloride	100-44-7	$2.4 \times 10^{+2}$	Eyes; Respiratory System
1,3-Butadiene	106-99-0	$6.6 \times 10^{+2}$	Development
Caprolactam	105-60-2	$5.0 \times 10^{+1}$	Eyes (sensory irritation)
Carbon Disulfide	75-15-0	$6.2 \times 10^{+3}$	Nervous System; Reproductive/Developmental
Carbon Monoxide [a]	630-08-0	$2.3 \times 10^{+4}$	Cardiovascular System
Carbon Tetrachloride	56-23-5	$1.9 \times 10^{+3}$	Alimentary System (Liver); Nervous System Reproductive/Developmental
Chlorine	7782-50-5	$2.1 \times 10^{+2}$	Eyes; Respiratory System
Chloroform	67-66-3	$1.5 \times 10^{+2}$	Nervous System; Respiratory System; Reproductive/Developmental
Chloropicrin	76-06-2	$2.9 \times 10^{+1}$	Eyes; Respiratory System
Copper and Compounds	7440-50-8	$1.0 \times 10^{+2}$	Respiratory System
1,4-Dioxane	123-91-1	$3.0 \times 10^{+3}$	Eyes; Respiratory System
Epichlorohydrin	106-89-8	$1.3 \times 10^{+3}$	Eyes; Respiratory System
Ethylene Glycol Monobutyl Ether	111-76-2	$1.4 \times 10^{+4}$	Eyes; Respiratory System
Ethylene Glycol Monoethyl Ether	110-80-5	$3.7 \times 10^{+2}$	Reproductive/Developmental
Ethylene Glycol Monoethyl Ether Acetate	111-15-9	$1.4 \times 10^{+2}$	Nervous System; Reproductive/Developmental
Ethylene Glycol Monomethyl Ether	109-86-4	$9.3 \times 10^{+1}$	Reproductive/Developmental
Formaldehyde	50-00-0	$5.5 \times 10^{+1}$	Eyes (sensory irritation)
Hydrogen Chloride	7647-01-0	$2.1 \times 10^{+3}$	Eyes; Respiratory System
Hydrogen Cyanide	74-90-8	$3.4 \times 10^{+2}$	Nervous System
Hydrogen Fluoride	7664-39-3	$2.4 \times 10^{+2}$	Eyes; Respiratory System
Hydrogen Selenide	7783-07-5	$5.0 \times 10^{+0}$	Eyes; Respiratory System
Hydrogen Sulfide [a]	7783-06-4	$4.2 \times 10^{+1}$	Nervous System
Isopropanol	67-63-0	$3.2 \times 10^{+3}$	Eyes; Respiratory System
Mercury and Inorganic Mercury Compounds	7439-97-6	6.0×10^{-1}	Nervous System; Development
Methanol	67-56-1	$2.8 \times 10^{+4}$	Nervous System
Methyl Bromide	74-83-9	$3.9 \times 10^{+3}$	Nervous System; Respiratory System; Reproductive/Developmental

Substance	Chemical Abstract Service Number (CAS)	Acute Inhalation REL ($\mu g/m^3$)	Acute Hazard Index Target Organ Systems(s)
Methyl Chloroform	71-55-6	$6.8 \times 10^{+4}$	Nervous System
Methyl Ethyl Ketone	78-93-3	$1.3 \times 10^{+4}$	Eyes; Respiratory System
Methylene Chloride	75-09-2	$1.4 \times 10^{+4}$	Nervous System; Cardiovascular System
Nickel and Nickel Compounds	7440-02-0	2.0×10^{-1}	Immune System
Nitric Acid	7697-37-2	$8.6 \times 10^{+1}$	Respiratory System
Nitrogen Dioxide [a]	10102-44-0	$4.7 \times 10^{+2}$	Respiratory System
Ozone [a]	10028-15-6	$1.8 \times 10^{+2}$	Eyes; Respiratory System
Perchloroethylene (Tetrachloroethylene)	127-18-4	$2.0 \times 10^{+4}$	Eyes; Nervous System; Respiratory System
Phenol	108-95-2	$5.8 \times 10^{+3}$	Eyes; Respiratory System
Phosgene	75-44-5	$4.0 \times 10^{+0}$	Respiratory System
Propylene Oxide	75-56-9	$3.1 \times 10^{+3}$	Eyes; Respiratory System; Reproductive/Developmental
Sodium Hydroxide	1310-73-2	$8.0 \times 10^{+0}$	Eyes; Skin; Respiratory System
Styrene	100-42-5	$2.1 \times 10^{+4}$	Eyes; Respiratory System; Reproductive/Developmental
Sulfates [a]	N/A	$1.2 \times 10^{+2}$	Respiratory System
Sulfur Dioxide [a]	7446-09-5	$6.6 \times 10^{+2}$	Respiratory System
Sulfuric Acid and Oleum	7664-93-9 8014-95-7	$1.2 \times 10^{+2}$	Respiratory System
Tetrachloroethylene (Perchloroethylene)	127-18-4	$2.0 \times 10^{+4}$	Eyes; Nervous System; Respiratory System
Toluene	108-88-3	$3.7 \times 10^{+4}$	Nervous System; Respiratory System; Eyes; Reproductive/Developmental
Triethylamine	121-44-8	$2.8 \times 10^{+3}$	Nervous System; Eyes
Vanadium Pentoxide	1314-62-1	$3.0 \times 10^{+1}$	Eyes; Respiratory System
Vinyl Chloride	75-01-4	$1.8 \times 10^{+5}$	Nervous System; Eyes; Respiratory System
Xylenes (m,o,p-isomers)	1330-20-7	$2.2 \times 10^{+4}$	Eyes; Respiratory System; Nervous System

[a] California Ambient Air Quality Standard

6.3 8-hour Reference Exposure Levels

OEHHA has developed 8-hour RELs for assessing potential noncancer health impacts for exposures to the general public that occur on a recurrent basis, but only during a portion of each day (OEHHA, 2008; http://www.oehha.ca.gov/air/allrels.html). Eight-hour RELs are compared to air concentrations that represent an average (daily) 8-hour exposure. They were designed to address off-site worker exposure at the MEIW, but may also be used at the Districts' discretion to characterize 8-hour residential noncancer exposures, particularly for non-continuous facility operations where exposure is based on air concentrations during facility operation (i.e., the zero emission hours are not included) rather than averaged over 24-hours/day, 7 days/week as assessed for chronic exposure. The 8-hour RELs can also be used to assess exposure of students and teachers while at school (OEHHA, 2008). These RELs were developed because of concerns that applying the chronic REL in some scenarios was overly conservative. By definition, an 8-hour REL is an exposure that is not likely to cause adverse health effects in a human population, including sensitive subgroups, exposed to that concentration (in units of micrograms per cubic meter or μg/m^3) for an 8-hour exposure duration on a regular (including daily) basis.

The RELs, target organ systems, and the averaging time for substances that can present a potential hazard from inhalation for 8 hours on a daily basis are presented in Table 6.2. Chapter 8 discusses the methods used for determining noncancer 8-hour health impacts. Appendix I presents an example calculation used to determine an HQ and HI.

Any substances in Table 6.2 with Development or Reproductive System as a target organ system are represented in HARP and in the Appendix L REL tables under the single endpoint "Reproductive/Development".

Table 6.2 Eight-Hour Inhalation Reference Exposure Levels (RELs) and 8-Hour Hazard Index Target Organ System(s)

Substance	Chemical Abstract Service Number (CAS)	Chronic Inhalation REL (μg/m^3)	Chronic Inhalation Hazard Index Target Organ System(s)
Acetaldehyde	75-07-0	$3.0 \times 10^{+2}$	Respiratory System
Acrolein	107-02-8	7.0×10^{-1}	Respiratory System
Arsenic & Inorganic Arsenic Compounds	7440-38-2	1.5×10^{-2}	Cardiovascular System; Development; Nervous System; Respiratory System; Skin
Benzene	71-43-2	$3.0 \times 10^{+0}$	Hematologic System
1,3-Butadiene	106-99-0	$9.0 \times 10^{+0}$	Reproductive System
Caprolactam	105-60-2	$7.0 \times 10^{+0}$	Respiratory System
Formaldehyde	50-0-0	$9.0 \times 10^{+0}$	Respiratory System
Manganese & Manganese Compounds	7439-96-5	1.7×10^{-1}	Nervous System
Mercury & Inorganic Mercury Compounds	7439--97-6	6.0×10^{-2}	Nervous System; Development; Kidney
Nickel & Nickel Compounds	7440-02-0	6.0×10^{-2}	Respiratory System; Immune System

6.4 Chronic Reference Exposure Levels

OEHHA has developed chronic RELs for assessing noncancer health impacts from long-term exposure. (OEHHA, 2008; see also http://www.oehha.ca.gov/air/allrels.html) A chronic REL is a concentration level (expressed in units of micrograms per cubic meter (μg/m^3) for inhalation exposure and in a dose expressed in units of milligrams per kilogram-day (mg/kg-day) for oral exposures) at or below which no adverse health effects are anticipated following long-term exposure. Long-term exposure for these purposes has been defined by U.S. EPA as at least 12% of a lifetime, or about eight years for humans. Table 6.3 lists the chronic noncancer RELs that should be used in the assessment of chronic health effects from inhalation exposure. Appendix L provides a consolidated listing of all the acute, 8-hour and chronic RELs and target organs that are approved for use by OEHHA and ARB for the Hot Spots Program. Periodically, new or updated RELs are adopted by OEHHA. See OEHHA's web site http://www.oehha.ca.gov/air/allrels.html to determine if any new or updated RELs have been adopted since the last guideline update.

The organ system(s) associated with each chronic REL are also presented in Table 6.3. Any substances in Table 6.3 with Development or Reproductive System as a target organ system are represented in HARP and in the Appendix L REL tables under the single endpoint "Reproductive/Development". Chapter 8 discusses the methods used for determining potential noncancer health impacts and Appendix I presents example calculations used to determine a HQ and HI.

Table 6.3 Chronic Inhalation Reference Exposure Levels (RELs) and Chronic Hazard Index Target Organ System(s)

Substance	Chemical Abstract Service Number (CAS)	Chronic Inhalation REL ($\mu g/m^3$)	Chronic Inhalation Hazard Index Target Organ System(s)
Acetaldehyde [a]	75-07-0	$1.4 \times 10^{+2}$	Respiratory System
Acrolein	107-02-8	3.5×10^{-1}	Respiratory System
Acrylonitrile	107-13-1	$5.0 \times 10^{+0}$	Respiratory System
Ammonia	7664-41-7	$2.0 \times 10^{+2}$	Respiratory System
Arsenic & Inorganic Arsenic Compounds	7440-38-2	1.5×10^{-2}	Cardiovascular System; Development; Nervous System; Respiratory System; Skin
Benzene	71-43-2	$3.0 \times 10^{+0}$	Hematologic System
Beryllium and Beryllium Compounds	7440-41-7	7.0×10^{-3}	Immune System; Respiratory System
1,3-Butadiene	106-99-0	$2.0 \times 10^{+0}$	Reproductive System
Cadmium and Cadmium Compounds	7440-43-9	2.0×10^{-2}	Kidney; Respiratory System
Caprolactam	105-60-2	$2.2 \times 10^{+0}$	Respiratory System
Carbon Disulfide	75-15-0	$8.0 \times 10^{+2}$	Nervous System; Reproductive System
Carbon Tetrachloride	56-23-5	$4.0 \times 10^{+1}$	Alimentary System (Liver); Development; Nervous System
Chlorine	7782-50-5	2.0×10^{-1}	Respiratory System
Chlorine Dioxide	10049-04-4	6.0×10^{-1}	Respiratory System
Chlorinated Dibenzo-*p*-dioxins [b]			
2,3,7,8-Tetrachlorodibenzo-*p*-dioxin [b]	1746-01-6	4.0×10^{-5}	Alimentary System (Liver); Development; Endocrine System; Hematologic System; Reproductive System; Respiratory System
1,2,3,7,8-Pentachlorodibenzo-*p*-dioxin [b]	40321-76-4	4.0×10^{-5}	
1,2,3,4,7,8-Hexachlorodibenzo-*p*-dioxin [b]	39227-28-6	4.0×10^{-4}	
1,2,3,6,7,8-Hexachlorodibenzo-*p*-dioxin [b]	57653-85-7	4.0×10^{-4}	
1,2,3,7,8,9-Hexachlorodibenzo-*p*-dioxin [b]	19408-74-3	4.0×10^{-4}	
1,2,3,4,6,7,8-Heptachlorodibenzo-*p*-dioxin [b]	35822-46-9	4.0×10^{-3}	
1,2,3,4,6,7,8,9-Octachlorodibenzo-*p*-dioxin [b]	3268-87-9	1.3×10^{-1}	

Table 6.3 Chronic Inhalation Reference Exposure Levels (RELs) and Chronic Hazard Index Target Organ System(s)

Substance	Chemical Abstract Service Number (CAS)	Chronic Inhalation REL ($\mu g/m^3$)	Chronic Inhalation Hazard Index Target Organ System(s)
Chlorinated Dibenzofurans [b]			
2,3,7,8-Tetrachlorodibenzofuran [b]	5120-73-19	4.0×10^{-4}	Alimentary System (Liver); Development; Endocrine System; Hematologic System; Reproductive System; Respiratory System
1,2,3,7,8-Pentachlorodibenzofuran [b]	57117-41-6	1.3×10^{-3}	
2,3,4,7,8-Pentachlorodibenzofuran [b]	57117-31-4	1.3×10^{-4}	
1,2,3,4,7,8-Hexachlorodibenzofuran [b]	70648-26-9	4.0×10^{-4}	
1,2,3,6,7,8-Hexachlorodibenzofuran [b]	57117-44-9	4.0×10^{-4}	
1,2,3,7,8,9-Hexachlorodibenzofuran [b]	72918-21-9	4.0×10^{-4}	
2,3,4,6,7,8-Hexachlorodibenzofuran [b]	60851-34-5	4.0×10^{-4}	
1,2,3,4,6,7,8-Heptachlorodibenzofuran [b]	67562-39-4	4.0×10^{-3}	
1,2,3,4,7,8,9-Heptachlorodibenzofuran [b]	55673-89-7	4.0×10^{-3}	
1,2,3,4,6,7,8,9-Octachlorodibenzofuran [b]	39001-02-0	1.3×10^{-1}	
Chlorobenzene	108-90-7	$1.0 \times 10^{+3}$	Alimentary System (Liver); Kidney; Reproductive System
Chloroform	67-66-3	$3.0 \times 10^{+2}$	Alimentary System (Liver); Development; Kidney
Chloropicrin	76-06-2	4.0×10^{-1}	Respiratory System
Chromium VI & Soluble Chromium VI Compounds (except chromic trioxide)	18540-29-9	2.0×10^{-1}	Respiratory System
Chromic Trioxide (as chromic acid mist)	1333-82-0	2.0×10^{-3}	Respiratory System
Cresol Mixtures	1319-77-3	$6.0 \times 10^{+2}$	Nervous System
1,4-Dichlorobenzene	106-46-7	$8.0 \times 10^{+2}$	Alimentary System (Liver); Kidney; Nervous System; Respiratory System
1,1-Dichloroethylene (Vinylidene Chloride)	75-35-4	$7.0 \times 10^{+1}$	Alimentary System (Liver)
Diesel Exhaust [a]	N/A	$5.0 \times 10^{+0}$	Respiratory System
Diethanolamine	111-42-2	$3.0 \times 10^{+0}$	Hematologic System; Respiratory System
N,N-Dimethylformamide	68-12-2	$8.0 \times 10^{+1}$	Alimentary System (Liver); Respiratory System
1,4-Dioxane	123-91-1	$3.0 \times 10^{+3}$	Alimentary System (Liver); Cardiovascular System; Kidney
Epichlorohydrin	106-89-8	$3.0 \times 10^{+0}$	Eyes; Respiratory System
1,2-Epoxybutane	106-88-7	$2.0 \times 10^{+1}$	Cardiovascular System; Respiratory System
Ethylbenzene	100-41-4	$2.0 \times 10^{+3}$	Alimentary System (Liver); Kidney; Development; Endocrine System
Ethyl Chloride	75-00-3	$3.0 \times 10^{+4}$	Alimentary System (Liver); Development
Ethylene Dibromide	106-93-4	8.0×10^{-1}	Reproductive System
Ethylene Dichloride	107-06-2	$4.0 \times 10^{+2}$	Alimentary System (Liver)
Ethylene Glycol	107-21-1	$4.0 \times 10^{+2}$	Development; Kidney; Respiratory System
Ethylene Glycol Monoethyl Ether	110-80-5	$7.0 \times 10^{+1}$	Hematologic System; Reproductive System
Ethylene Glycol Monoethyl Ether Acetate	111-15-9	$3.0 \times 10^{+2}$	Development

Table 6.3 Chronic Inhalation Reference Exposure Levels (RELs) and Chronic Hazard Index Target Organ System(s)

Substance	Chemical Abstract Service Number (CAS)	Chronic Inhalation REL ($\mu g/m^3$)	Chronic Inhalation Hazard Index Target Organ System(s)
Ethylene Glycol Monomethyl Ether	109-86-4	$6.0 \times 10^{+1}$	Reproductive System
Ethylene Glycol Monomethyl Ether Acetate	110-49-6	$9.0 \times 10^{+1}$	Reproductive System
Ethylene Oxide	75-21-8	$3.0 \times 10^{+1}$	Nervous System
Fluorides (except hydrogen fluoride)	N/A	$1.3 \times 10^{+1}$	Bone and Teeth; Respiratory System
Formaldehyde	50-00-0	$9.0 \times 10^{+0}$	Respiratory System
Glutaraldehyde	111-30-8	8.0×10^{-2}	Respiratory System
Hexane (n-)	110-54-3	$7.0 \times 10^{+3}$	Nervous System
Hydrazine	302-01-2	2.0×10^{-1}	Alimentary System (Liver); Endocrine System
Hydrogen Chloride	7647-01-0	$9.0 \times 10^{+0}$	Respiratory System
Hydrogen Cyanide	74-90-8	$9.0 \times 10^{+0}$	Cardiovascular System; Endocrine System; Nervous System
Hydrogen Fluoride	7664-39-3	$1.4 \times 10^{+1}$	Bone and Teeth; Respiratory System
Hydrogen Sulfide	7783-06-4	$1.0 \times 10^{+1}$	Respiratory System
Isophorone	78-59-1	$2.0 \times 10^{+3}$	Alimentary System (Liver); Development
Isopropanol	67-63-0	$7.0 \times 10^{+3}$	Development; Kidney
Maleic Anhydride	108-31-6	7.0×10^{-1}	Respiratory System
Manganese & Manganese Compounds	7439-96-5	9.0×10^{-2}	Nervous System
Mercury & Inorganic Mercury Compounds	7439-97-6	3.0×10^{-2}	Nervous System; Development; Kidney
Methanol	67-56-1	$4.0 \times 10^{+3}$	Development
Methyl Bromide	74-83-9	$5.0 \times 10^{+0}$	Development; Nervous System; Respiratory System
Methyl Chloroform	71-55-6	$1.0 \times 10^{+3}$	Nervous System
Methyl Isocyanate	624-83-9	$1.0 \times 10^{+0}$	Reproductive System; Respiratory System
Methyl tertiary-Butyl Ether	1634-04-4	$8.0 \times 10^{+3}$	Alimentary System (Liver); Eyes; Kidney
Methylene Chloride	75-09-2	$4.0 \times 10^{+2}$	Cardiovascular System; Nervous System
4,4'-Methylene Dianiline (& its dichloride)	101-77-9	$2.0 \times 10^{+1}$	Alimentary System (Liver); Eyes
Methylene Diphenyl Isocyanate	101-68-8	7.0×10^{-1}	Respiratory System
Naphthalene	91-20-3	$9.0 \times 10^{+0}$	Respiratory System
Nickel & Nickel Compounds (except nickel oxide)	7440-02-0	1.4×10^{-2}	Hematologic System; Respiratory System
Nickel Oxide	1313-99-1	2.0×10^{-2}	Respiratory System
Perchloroethylene (Tetrachloroethylene)[a]	127-18-4	$3.5 \times 10^{+1}$	Alimentary System (Liver); Kidney
Phenol	108-95-2	$2.0 \times 10^{+2}$	Alimentary System (Liver); Cardiovascular System; Kidney; Nervous System
Phosphine	7803-51-2	8.0×10^{-1}	Alimentary System (Liver); Hematologic System; Kidney; Nervous System; Respiratory System

Table 6.3 Chronic Inhalation Reference Exposure Levels (RELs) and Chronic Hazard Index Target Organ System(s)

Substance	Chemical Abstract Service Number (CAS)	Chronic Inhalation REL ($\mu g/m^3$)	Chronic Inhalation Hazard Index Target Organ System(s)
Phosphoric Acid	7664-38-2	$7.0 \times 10^{+0}$	Respiratory System
Phthalic Anhydride	85-44-9	$2.0 \times 10^{+1}$	Respiratory System
Polychlorinated biphenyls (PCBs)[b]			
3,3',4,4'-Tetrachlorobiphenyl (77) [b]	35298-13-3	4.0×10^{-1}	Alimentary System (Liver); Developmental; Endocrine System; Hematologic System; Reproductive System; Respiratory System
3,4,4',5-Tetrachlorobiphenyl (81) [b]	70362-50-4	1.3×10^{-1}	
2,3,3',4,4'- Pentachlorobiphenyl (105) [b]	32598-14-4	$1.3 \times 10^{+0}$	
2,3,4,4'5- Pentachlorobiphenyl (114) [b]	74472-37-0	$1.3 \times 10^{+0}$	
2,3'4,4',5- Pentachlorobiphenyl (118) [b]	31508-00-6	$1.3 \times 10^{+0}$	
2',3,4,4',5- Pentachlorobiphenyl (123) [b]	65510-44-3	$1.3 \times 10^{+0}$	
3,3',4,4',5- Pentachlorobiphenyl (126) [b]	57465-28-8	4.0×10^{-4}	
2,3,3',4,4',5-Hexachlorobiphenyl (156) [b]	38380-08-4	$1.3 \times 10^{+0}$	
2,3,3',4,4',5'-Hexachlorobiphenyl (157) [b]	69782-90-7	$1.3 \times 10^{+0}$	
2,3',4,4',5,5'-Hexachlorobiphenyl (167) [b]	52663-72-6	$1.3 \times 10^{+0}$	
3,3',4,4'5,5'- Hexachlorobiphenyl (169) [b]	32774-16-6	1.3×10^{-3}	
2,3,3'4,4',5,5'-Heptachlorobiphenyl (189) [b]	39635-31-9	$1.3 \times 10^{+0}$	
Propylene	115-07-1	$3.0 \times 10^{+3}$	Respiratory System
Propylene Glycol Monomethyl Ether	107-98-2	$7.0 \times 10^{+3}$	Alimentary System (Liver)
Propylene Oxide	75-56-9	$3.0 \times 10^{+1}$	Respiratory System
Selenium and Selenium compounds (other than Hydrogen Selenide)	7782-49-2	$2.0 \times 10^{+1}$	Alimentary System (Liver); Cardiovascular System; Nervous System
Silica (crystalline, respirable)	N/A	$3.0 \times 10^{+0}$	Respiratory System
Styrene	100-42-5	$9.0 \times 10^{+2}$	Nervous System
Sulfuric Acid	7664-93-9	$1.0 \times 10^{+0}$	Respiratory System
Toluene	108-88-3	$3.0 \times 10^{+2}$	Development; Nervous System; Respiratory System
2,4-Toluene Diisocyanate	584-84-9	7.0×10^{-2}	Respiratory System
2,6-Toluene Diisocyanate	91-08-7	7.0×10^{-2}	Respiratory System
Trichloroethylene [a]	79-01-6	$6.0 \times 10^{+2}$	Eyes; Nervous System
Triethylamine	121-44-8	$2.0 \times 10^{+2}$	Eyes
Vinyl Acetate	108-05-4	$2.0 \times 10^{+2}$	Respiratory System
Xylenes (m, o, p-isomers)	1330-20-7	$7.0 \times 10^{+2}$	Nervous System; Respiratory System; Eyes

[a] These peer-reviewed values were developed under the Toxic Air Contaminant (TAC) Program mandated by AB1807 (California Health and Safety Code Sec. 39650 *et seq.*).

[b] The OEHHA has adopted the World Health Organization Toxicity Equivalency Factor (TEF) scheme for evaluating the cancer risk and noncancer hazard due to exposure to samples containing mixtures of polychlorinated dibenzo-*p*-dioxins (PCDD) (also referred to as chlorinated dioxins and dibenzofurans), polychlorinated dibenzofurans (PCDF) and polychlorinated biphenyls (PCBs). The TEF values are revised from time to time to reflect new data and increased scientific knowledge. Currently OEHHA recommends use of the 2005 revision to the WHO TEF values (WHO_{05}-TEF). See Appendix E for more information about the scheme and for the methodology for calculating 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD) equivalents for PCDD and PCDFs. For

convenience, OEHHA has calculated chronic REL values for speciated PCDDs, PCDFs and PCBs based on the WHO_{05} TEF values and the chronic REL for 2,3,7,8-TCDD using the procedure discussed in Appendix E. The chronic REL values can be used to calculate a hazard index when the mixtures are speciated from individual congener ground level concentrations. In those cases where speciation of dioxins and furans has not been performed, then 2,3,7,8-TCDD serves as the surrogate for dioxin and furan emissions.

N/A Not Applicable

6.5 Chronic Oral (Noninhalation) Reference Exposure Levels

As specified throughout the guidelines, estimates of long-term exposure resulting from facility air emissions of specific compounds must be analyzed for both inhalation and noninhalation (multipathway) pathways of exposure for humans. Facilities often emit substances under high temperature and pressure in the presence of particulate matter. While some of these substances are expected to remain in the vapor phase, other substances such as metals and semi-volatile organics can be either emitted as particles, form particles after emission from the facility, or adhere to existing particles. Some substances will partition between vapor and particulate phases. Substances in the particulate phase can be removed from the atmosphere by settling and, thus, potentially present a significant hazard via noninhalation pathways.

Particulate-associated chemicals can be deposited directly onto soil, onto the leaves or fruits of crops, or onto surface waters. Exposure via the oral route is the predominant noninhalation pathway, resulting in the noninhalation RELs being referred to as 'oral RELs' in this document. The oral RELs are used for both ingestion and dermal exposures, and are applied using the chronic non-inhalation exposures in the residential scenario and the worker scenarios. The oral RELs are expressed as doses in milligrams of substance (consumed and dermally absorbed) per kilogram body weight per day (mg/kg-day).

Table 6.4 lists the chronic noncancer RELs to be used in the assessment of chronic health effects from noninhalation pathways of exposure. Any substances in Table 6.4 with Development or Reproductive System as a target organ system are represented in HARP and in the Appendix L REL tables under the single endpoint "Reproductive/Development". Appendix L provides a consolidated listing of all chronic RELs and target organs that are approved for use by OEHHA and ARB for the Hot Spots Program. Periodically, new or updated RELs are adopted by OEHHA and these guidelines will be updated to reflect those changes. See OEHHA's web page at http://www.oehha.ca.gov/air/allrels.html to determine if any new or updated RELs have been adopted since the last guideline update. Chapter 8 discusses the methods used for determining potential noncancer health impacts and Appendix I presents example calculations used to determine a HQ and HI.

Table 6.4 Chronic Noninhalation 'Oral' Reference Exposure Levels (RELs) and Chronic Hazard Index Target Organ System(s)

Substance	Chemical Abstract Service No. (CAS)	Chronic Oral REL (mg/kg-day)	Chronic Oral Hazard Index Target Organ System(s)
Arsenic & Inorganic Arsenic Compounds	7440-38-2	3.5×10^{-6}	Development; Nervous System; Respiratory System; Cardiovascular System; Skin
Beryllium and Beryllium Compounds	7440-41-7	2.0×10^{-3}	Alimentary System (Gastrointestinal Tract)
Cadmium and Cadmium Compounds	7440-43-9	5.0×10^{-4}	Kidney
Chlorinated Dibenzo-*p*-dioxins [a]			
2,3,7,8-Tetrachlorodibenzo-*p*-dioxin [a]	1746-01-6	1.0×10^{-8}	Alimentary System (Liver); Developmental; Endocrine System; Hematologic System; Reproductive System; Respiratory System
1,2,3,7,8-Pentachlorodibenzo-*p*-dioxin [a]	40321-76-4	1.0×10^{-8}	
1,2,3,4,7,8-Hexachlorodibenzo-*p*-dioxin [a]	39227-28-6	1.0×10^{-7}	
1,2,3,6,7,8-Hexachlorodibenzo-*p*-dioxin [a]	57653-85-7	1.0×10^{-7}	
1,2,3,7,8,9-Hexachlorodibenzo-*p*-dioxin [a]	19408-74-3	1.0×10^{-7}	
1,2,3,4,6,7,8-Heptachlorodibenzo-*p*-dioxin [a]	35822-46-9	1.0×10^{-6}	
1,2,3,4,6,7,8,9-Octachlorodibenzo-*p*-dioxin [a]	3268-87-9	3.3×10^{-5}	
Chlorinated Dibenzofurans [a]			
2,3,7,8-Tetrachlorodibenzofuran [a]	5120-73-19	1.0×10^{-7}	Alimentary System (Liver); Development; Endocrine System; Hematologic System; Reproductive System; Respiratory System
1,2,3,7,8-Pentachlorodibenzofuran [a]	57117-41-6	3.3×10^{-7}	
2,3,4,7,8-Pentachlorodibenzofuran [a]	57117-31-4	3.3×10^{-8}	
1,2,3,4,7,8-Hexachlorodibenzofuran [a]	70648-26-9	1.0×10^{-7}	
1,2,3,6,7,8-Hexachlorodibenzofuran [a]	57117-44-9	1.0×10^{-7}	
1,2,3,7,8,9-Hexachlorodibenzofuran [a]	72918-21-9	1.0×10^{-7}	
2,3,4,6,7,8-Hexachlorodibenzofuran [a]	60851-34-5	1.0×10^{-7}	
1,2,3,4,6,7,8-Heptachlorodibenzofuran [a]	67562-39-4	1.0×10^{-6}	
1,2,3,4,7,8,9-Heptachlorodibenzofuran [a]	55673-89-7	1.0×10^{-6}	
1,2,3,4,6,7,8,9-Octachlorodibenzofuran [a]	39001-02-0	3.3×10^{-5}	
Chromium VI & Soluble Chromium VI Compounds (including chromic trioxide)	18540-29-9	2.0×10^{-2}	Hematologic System
Fluorides (including hydrogen fluoride)	7664-39-3	4.0×10^{-2}	Bone and Teeth
Mercury & Mercury Inorganic Compounds	7439-97-6	1.6×10^{-4}	Kidney; Nervous System; Development
Nickel & Nickel Compounds (including nickel oxide)	7440-02-0	1.1×10^{-2}	Development
Polychlorinated biphenyls (PCBs) (speciated) [a]			
3,3',4,4'-Tetrachlorobiphenyl (77) [a]	35298-13-3	1.0×10^{-4}	Alimentary System (Liver); Developmental; Endocrine System; Hematologic System; Reproductive System; Respiratory System
3,4,4',5-Tetrachlorobiphenyl (81) [a]	70362-50-4	3.3×10^{-5}	
2,3,3',4,4'- Pentachlorobiphenyl (105) [a]	32598-14-4	3.3×10^{-4}	
2,3,4,4'5- Pentachlorobiphenyl (114) [a]	74472-37-0	3.3×10^{-4}	
2,3'4,4',5- Pentachlorobiphenyl (118) [a]	31508-00-6	3.3×10^{-4}	
2',3,4,4',5- Pentachlorobiphenyl (123) [a]	65510-44-3	3.3×10^{-4}	
3,3',4,4',5- Pentachlorobiphenyl (126) [a]	57465-28-8	1.0×10^{-7}	
2,3,3',4,4',5-Hexachlorobiphenyl (156) [a]	38380-08-4	3.3×10^{-4}	
2,3,3',4,4',5'-Hexachlorobiphenyl (157) [a]	69782-90-7	3.3×10^{-4}	
2,3',4,4',5,5'-Hexachlorobiphenyl (167) [a]	52663-72-6	3.3×10^{-4}	
3,3',4,4'5,5'- Hexachlorobiphenyl (169) [a]	32774-16-6	3.3×10^{-7}	
2,3,3'4,4',5,5'- Heptachlorobiphenyl (189) [a]	39635-31-9	3.3×10^{-4}	

Table 6.4 Chronic Noninhalation 'Oral' Reference Exposure Levels (RELs) and Chronic Hazard Index Target Organ System(s)

Substance	Chemical Abstract Service No. (CAS)	Chronic Oral REL (mg/kg-day)	Chronic Oral Hazard Index Target Organ System(s)
Selenium and Selenium Compounds (other than hydrogen selenide)	7782-49-2	5.0×10^{-3}	Alimentary System (Liver); Cardiovascular System; Nervous System

a The OEHHA has adopted the World Health Organization Toxicity Equivalency Factor (TEF) scheme for evaluating the cancer risk and noncancer risk due to exposure to samples containing mixtures of polychlorinated dibenzo-*p*-dioxins (PCDD) (also referred to as chlorinated dioxins and dibenzofurans), polychlorinated dibenzofurans (PCDF), and polychlorinated biphenyls (PCBs). The TEF values are revised from time to time to reflect new data and increased scientific knowledge. Currently OEHHA recommends use of the 2005 revision to the WHO TEF values (WHO_{05}-TEF). See Appendix E for more information about the scheme and for the methodology for calculating 2,3,7,8-equivalents for PCDD and PCDFs. For convenience, OEHHA has calculated chronic 'oral' REL values for speciated PCDDs, PCDFs, and PCBs based on the WHO_{05} TEF values and the chronic 'oral' REL for 2,3,7,8-tetrachlorodibenzo-*p*-dioxin using the procedure discussed in Appendix E. The chronic 'oral' REL values can be used to calculate a hazard index when the mixtures are speciated from individual congener ground level concentrations. In those cases where speciation of dioxins and furans has not been performed, then 2,3,7,8-TCDD serves as the surrogate for dioxin and furan emissions.

6.6 References

OEHHA, 2008. Air Toxics Hot Spots Risk Assessment Guidelines Technical Support Document for the Derivation of Noncancer Reference Exposure Levels. Available online at: http://www.oehha.ca.gov

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7 - Dose-Response Assessment for Carcinogens

7.1 Introduction

Dose-response assessment characterizes the quantitative relationship between the amount of exposure to a substance (the dose) and the incidence or occurrence of injury (the response). The process often involves establishing a toxicity value or criterion to use in assessing potential health risk. The toxicity criterion, or health guidance value, for carcinogens is the cancer potency slope (potency factor), which describes the potential risk of developing cancer per unit of average daily dose over a 70-year lifetime. Cancer inhalation and oral potency factors have been derived by the Office of Environmental Health Hazard Assessment (OEHHA) or by the United States Environmental Protection Agency (U.S. EPA) and approved by the State's Scientific Review Panel on Toxic Air Contaminants. They are available for many of the substances listed in Appendix A (List of Substances) as carcinogens. Table 7.1 and Appendix L list the inhalation and oral cancer potency factors that should be used in multipathway health risk assessments (HRAs) for the Hot Spots Program.

The details on the methodology of dose-response assessment for carcinogens and the approved cancer potency factors are provided in the Air Toxics Hot Spots Risk Assessment Guidelines. Part II. Technical Support Document for Cancer Potency Factors: Methodologies for derivation, listing of available values, and adjustments to allow for early life stage exposures. May, 2009. (OEHHA, 2009; see http://www.oehha.ca.gov/air/hot_spots/tsd052909.html).

7.2 Carcinogenic Potency

Cancer potency factors used for both the inhalation and oral routes in the Hot Spots program are generally the 95% upper confidence limits (UCL) on the modeled dose-response slope at the low dose range. The cancer slope factor assumes continuous lifetime exposure to a substance, and is expressed in units of inverse dose [i.e., $(mg/kg/day)^{-1}$]. Another common potency expression is in units of inverse concentration [$(\mu g/m^3)^{-1}$)] when the slope is based on exposure concentration rather than dose; this is termed the unit risk factor. To accommodate the use of age-specific exposure variates, the Hot Spots program has translated the unit risk factors based on concentration to units of inverse dose. This allows calculation of risk for age groupings, as exposure varies with age. It also allows for application of Age Sensitivity Factors for early life exposures.

It is assumed in cancer risk assessments that risk is directly proportional to dose and that, for most carcinogens, there is no threshold for carcinogenesis. The derivation of inhalation and oral cancer potency factors takes into account information on pharmacokinetics, when available, and on the mechanism of carcinogenic action.

Table 7.1 and Appendix L list inhalation and oral cancer potency factors that should be used in risk assessments for the Hot Spots Program. Chapter 8 describes procedures for use of potency factors in estimating potential cancer risk.

7.2.1 *Inhalation Cancer Potency Factors*

The risk assessment methodology and algorithms presented in Chapter 8 express the inhalation cancer slope factors in units of inverse dose (i.e., $(mg/kg/day)^{-1}$). Breathing rates, expressed in units of liters per kilogram of body weight-day (L/kg-day), are multiplied with the air concentrations, coupled with the appropriate unit conversion factor, to estimate dose in mg/kg-day. This allows estimation of average and high-end cancer risk point estimates. Estimation of a distribution of cancer risk based on variability in breathing rate can be obtained by Monte Carlo methods using the distributions of breathing rates in L/kg-day, which can then be converted to a dose distribution in mg/kg BW based on the intake rate. Unit risk factors [in the units of inverse concentration (i.e., $(\mu g/m^3)^{-1}$], which were used in previous guidelines for the Hot Spots program, are still listed in the TSD (OEHHA, 2009) and may prove useful in other risk assessment applications.

The average daily inhalation dose (mg/kg-day) multiplied by the cancer potency factor $(mg/kg\text{-}day)^{-1}$ will give the inhalation cancer risk (unitless), which is an expression of the chemical's cancer risk during a 70-year lifespan of exposure. For example, an inhalation cancer risk of 5×10^{-6} is the same as stating that an individual has an estimated probability of developing cancer from their exposure of 5 chances per million people exposed. A more complete description of how potential cancer risk is calculated from the exposure dose and cancer potency factors is provided in Chapter 8. Appendix I presents an example calculation for determining cancer risk.

A list of current inhalation potency factors is provided in Table 7.1. Periodically, new or revised cancer potency factors will be peer reviewed by the State's Scientific Review Panel on Toxic Air Contaminants (SRP) and adopted by the Director of OEHHA. For new or updated numbers, consult the OEHHA web site at (http://www.oehha.ca.gov/air/hot_spots/tsd052909.html) to determine if any new or updated cancer potency factors have been adopted since this guideline update. New cancer potency factors that have been approved by the SRP and adopted by the Director of OEHHA should be incorporated into Hot Spots risk assessment for facilities that emit those chemicals.

7.2.2 *Oral Cancer Potency Factors*

Under the Hot Spots Program, a few substances are evaluated for exposure and risk from non-inhalation pathways – these are referred to as multipathway substances. Multipathway substances have the potential to impact a receptor through inhalation and noninhalation (oral and dermal) exposure routes. These substances include heavy metals and semi-volatile organic substances such as dioxins, furans, and polycyclic aromatic hydrocarbons (PAHs). These substances commonly exist in the particle phase or partially in the particle phase when emitted into the air. They can therefore be deposited onto soil, vegetation, and water. Noninhalation exposure pathways considered under the Hot Spots Program include the ingestion of soil, homegrown produce, meat, milk, surface water, breast milk, and fish as well as dermal exposure to contaminants deposited in the soil. See Table 5.1 for a list of the multipathway substances.

Table 7.1 and Appendix L list oral cancer potency factors in units of $(mg/kg\text{-}day)^{-1}$ that should be used for assessing the potential cancer risk for these substances through noninhalation exposure pathways. The cancer risk from these individual pathways is calculated by multiplying the dose (mg/kg-day) times the oral cancer potency factor $(mg/kg\text{-}day)^{-1}$ to yield the potential cancer risk (unitless) from non-inhalation exposures. Chapter 5 provides all of the algorithms to calculate exposure dose through all of the individual exposure pathways. Appendix I provides a sample calculation for dose and cancer risk using the inhalation exposure pathway.

Three carcinogens (cadmium, beryllium, and nickel), although subject to deposition, are only treated as carcinogenic by the inhalation route and not by the oral route. Therefore, there are no oral cancer potency factors for these substances. However, the oral doses of these substances need to be estimated because of their noncancer toxicity. See Chapters 6 and 8, and Appendices I and L for dose-response factors, and calculations to address these substances.

Table 7.1 Inhalation and Oral Cancer Potency Factors

Substance	Chemical Abstract Service Number (CAS)	Inhalation Potency Factor $(mg/kg\text{-}day)^{-1}$	Oral Slope Factor $(mg/kg\text{-}day)^{-1}$
Acetaldehyde	75-07-0	1.0×10^{-2}	
Acetamide	60-35-5	7.0×10^{-2}	
Acrylamide	79-06-1	$4.5 \times 10^{+0}$	
Acrylonitrile	107-13-1	$1.0 \times 10^{+0}$	
Allyl chloride	107-05-1	2.1×10^{-2}	
2-Aminoanthraquinone	117-79-3	3.3×10^{-2}	
Aniline	62-53-3	5.7×10^{-3}	
Arsenic (inorganic)	7440-38-2	$1.2 \times 10^{+1}$	$1.5 \times 10^{+0}$
Asbestos [#]	1332-21-4	$2.2 \times 10^{+2}$ [#]	
Benz[*a*]anthracene [BaP]	56-55-3	3.9×10^{-1}	$1.2 \times 10^{+0}$
Benzene	71-43-2	1.0×10^{-1}	
Benzidine	92-87-5	$5.0 \times 10^{+2}$	
Benzo[*a*]pyrene	50-32-8	$3.9 \times 10^{+0}$	$1.2 \times 10^{+1}$
Benzo[*b*]fluoranthrene [BaP]	205-99-2	3.9×10^{-1}	$1.2 \times 10^{+0}$
Benzo[*j*]fluoranthrene [BaP]	205-82-3	3.9×10^{-1}	$1.2 \times 10^{+0}$
Benzo[*k*]fluoranthrene [BaP]	207-08-9	3.9×10^{-1}	$1.2 \times 10^{+0}$
Benzyl chloride	100-44-7	1.7×10^{-1}	
Beryllium	7440-41-7	$8.4 \times 10^{+0}$	
Bis(2-chloroethyl) ether	111-44-4	$2.5 \times 10^{+0}$	
Bis(chloromethyl)ether	542-88-1	$4.6 \times 10^{+1}$	
1,3-Butadiene	106-99-0	6.0×10^{-1}	
Cadmium (and compounds)	7440-43-9	$1.5 \times 10^{+1}$	
Carbon tetrachloride	56-23-5	1.5×10^{-1}	
Chlorinated Dibenzo-p-dioxins [A]			
2,3,7,8-Tetrachlorodibenzo-*p*-dioxin	1746-01-6	$1.3 \times 10^{+5}$	$1.3 \times 10^{+5}$
1,2,3,7,8-Pentachlorodibenzo-*p*-dioxin	40321-76-4	$1.3 \times 10^{+5}$	$1.3 \times 10^{+5}$
1,2,3,4,7,8-Hexachlorodibenzo-*p*-dioxin	39227-28-6	$1.3 \times 10^{+4}$	$1.3 \times 10^{+4}$
1,2,3,6,7,8-Hexachlorodibenzo-*p*-dioxin	57653-85-7	$1.3 \times 10^{+4}$	$1.3 \times 10^{+4}$
1,2,3,7,8,9-Hexachlorodibenzo-*p*-dioxin	19408-74-3	$1.3 \times 10^{+4}$	$1.3 \times 10^{+4}$
1,2,3,4,6,7,8-Heptachlorodibenzo-*p*-dioxin	35822-46-9	$1.3 \times 10^{+3}$	$1.3 \times 10^{+3}$
1,2,3,4,,6,7,8,9-Octachlorodibenzo-*p*-dioxin	3268-87-9	$3.9 \times 10^{+1}$	$3.9 \times 10^{+1}$
Chlorinated Dibenzofurans [A]			
2,3,7,8-Tetrachlorodibenzofuran	5120-73-19	$1.3 \times 10^{+4}$	$1.3 \times 10^{+4}$
1,2,3,7,8-Pentachlorodibenzofuran	57117-41-6	$3.9 \times 10^{+3}$	$3.9 \times 10^{+3}$
2,3,4,7,8-Pentachlorodibenzofuran	57117-31-4	$3.9 \times 10^{+4}$	$3.9 \times 10^{+4}$
1,2,3,4,7,8-Hexachlorodibenzofuran	70648-26-9	$1.3 \times 10^{+4}$	$1.3 \times 10^{+4}$
1,2,3,6,7,8-Hexachlorodibenzofuran	57117-44-9	$1.3 \times 10^{+4}$	$1.3 \times 10^{+4}$
1,2,3,7,8,9-Hexachlorodibenzofuran	72918-21-9	$1.3 \times 10^{+4}$	$1.3 \times 10^{+4}$
2,3,4,6,7,8-Hexachlorodibenzofuran	60851-34-5	$1.3 \times 10^{+4}$	$1.3 \times 10^{+4}$

Table 7.1 Inhalation and Oral Cancer Potency Factors

Substance	Chemical Abstract Service Number (CAS)	Inhalation Potency Factor $(mg/kg\text{-}day)^{-1}$	Oral Slope Factor $(mg/kg\text{-}day)^{-1}$
1,2,3,4,6,7,8-Heptachlorodibenzofuran	67562-39-4	$1.3 \times 10^{+3}$	$1.3 \times 10^{+3}$
1,2,3,4,7,8,9-Heptachlorodibenzofuran	55673-89-7	$1.3 \times 10^{+3}$	$1.3 \times 10^{+3}$
1,2,3,4,,6,7,8,9-Octachlorodibenzofuran	39001-02-0	$3.9 \times 10^{+1}$	$3.9 \times 10^{+1}$
Chlorinated paraffins	108171-26-2	8.9×10^{-2}	
Chloroform	67-66-3	1.9×10^{-2}	
4-Chloro-*o*-phenylenediamine	95-83-0	1.6×10^{-2}	
p-Chloro-*o*-toluidine	95-69-2	2.7×10^{-1}	
Chromium (hexavalent)	18540-29-9	$5.1 \times 10^{+2}$	5×10^{-1}
Chrysene [BaP]	218-01-9	3.9×10^{-2}	1.2×10^{-1}
Creosote	8001-58-9	*	
p-Cresidine	120-71-8	1.5×10^{-1}	
Cupferron	135-20-6	2.2×10^{-1}	
2,4-Diaminoanisole	615-05-4	2.3×10^{-2}	
2,4-Diaminotoluene	95-80-7	$4.0 \times 10^{+0}$	
Dibenz[*a,h*]acridine [BaP]	226-36-8	3.9×10^{-1}	$1.2 \times 10^{+0}$
Dibenz[*a,j*]acridine [BaP]	224-42-0	3.9×10^{-1}	$1.2 \times 10^{+0}$
Dibenz[*a,h*]anthracene [BaP]	53-70-3	$4.1 \times 10^{+0}$	$4.1 \times 10^{+0}$
Dibenzo[*a,e*]pyrene [BaP]	192-65-4	$3.9 \times 10^{+0}$	$1.2 \times 10^{+1}$
Dibenzo[*a,h*]pyrene [BaP]	189-64-0	$3.9 \times 10^{+1}$	$1.2 \times 10^{+2}$
Dibenzo[*a,l*]pyrene [BaP]	189-55-9	$3.9 \times 10^{+1}$	$1.2 \times 10^{+2}$
Dibenzo[*a,l*]pyrene [BaP]	191-30-0	$3.9 \times 10^{+1}$	$1.2 \times 10^{+2}$
7H-Dibenzo[*c,g*]carbazole [BaP]	194-59-2	$3.9 \times 10^{+0}$	$1.2 \times 10^{+1}$
1,2-Dibromo-3-chloropropane	96-12-8	$7.0 \times 10^{+0}$	
1,4-Dichlorobenzene	106-46-7	4.0×10^{-2}	
3,3'-Dichlorobenzidine	91-94-1	$1.2 \times 10^{+0}$	
1,1-Dichloroethane	75-34-3	5.7×10^{-3}	
Diesel exhaust [B]	NA	$1.1 \times 10^{+0}$	
Diethylhexylphthalate	117-81-7	8.4×10^{-3}	8.4×10^{-3}
p-Dimethylaminoazobenzene	60-11-7	$4.6 \times 10^{+0}$	
7,12-Dimethylbenz[*a*]anthracene [BaP]	57-97-6	$2.5 \times 10^{+2}$	$2.5 \times 10^{+2}$
1,6-Dinitropyrene [BaP]	42397-64-8	$3.9 \times 10^{+1}$	$1.2 \times 10^{+2}$
1,8-Dinitropyrene [BaP]	42397-65-9	$3.9 \times 10^{+0}$	$1.2 \times 10^{+1}$
2,4-Dinitrotoluene	121-14-2	3.1×10^{-1}	
1,4-Dioxane	123-91-1	2.7×10^{-2}	
Epichlorohydrin	106-89-8	8.0×10^{-2}	
Ethyl benzene	100-41-4	8.7×10^{-3}	1.1×10^{-2}
Ethylene dibromide	106-93-4	2.5×10^{-1}	
Ethylene dichloride	107-06-2	7.2×10^{-2}	
Ethylene oxide	75-21-8	3.1×10^{-1}	

Table 7.1 Inhalation and Oral Cancer Potency Factors

Substance	Chemical Abstract Service Number (CAS)	Inhalation Potency Factor $(mg/kg\text{-}day)^{-1}$	Oral Slope Factor $(mg/kg\text{-}day)^{-1}$
Ethylene thiourea	96-45-7	4.5×10^{-2}	
Formaldehyde	50-00-0	2.1×10^{-2}	
Hexachlorobenzene	118-74-1	$1.8 \times 10^{+0}$	
Hexachlorocyclohexanes (technical grade)	608-73-1	$4.0 \times 10^{+0}$	$4.0 \times 10^{+0}$
Hydrazine	302-01-2	$1.7 \times 10^{+1}$	$3.0 \times 10^{+0}$
Indeno[1,2,3-*cd*]pyrene BaP	193-39-5	3.9×10^{-1}	$1.2 \times 10^{+0}$
Lead and lead compounds	7439-92-1	4.2×10^{-2}	8.5×10^{-3}
Lindane	58-89-9	$1.1 \times 10^{+0}$	$1.1 \times 10^{+0}$
Methyl tertiary-butyl ether	1634-04-4	1.8×10^{-3}	
3-Methylcholanthrene BaP	56-49-5	$2.2 \times 10^{+1}$	$2.2 \times 10^{+1}$
5-Methylchrysene BaP	3697-24-3	$3.9 \times 10^{+0}$	$1.2 \times 10^{+1}$
4, 4'-Methylene bis(2-chloroaniline) (MOCA)	101-14-4	$1.5 \times 10^{+0}$	
Methylene chloride	75-09-2	3.5×10^{-3}	
4,4'-Methylenedianiline	101-77-9	$1.6 \times 10^{+0}$	$1.6 \times 10^{+0}$
Michler's ketone	90-94-8	8.6×10^{-1}	
Naphthalene	91-20-3	1.2×10^{-1}	
Nickel (and compounds)	7440-02-0	9.1×10^{-1}	
5-Nitroacenaphthene BaP	602-87-9	1.3×10^{-1}	1.3×10^{-1}
6-Nitrochrysene BaP	7496-02-8	$3.9 \times 10^{+1}$	$1.2 \times 10^{+2}$
2-Nitrofluorene BaP	607-57-8	3.9×10^{-2}	1.2×10^{-1}
1-Nitropyrene BaP	5522-43-0	3.9×10^{-1}	$1.2 \times 10^{+0}$
4-Nitropyrene BaP	57835-92-4	3.9×10^{-1}	$1.2 \times 10^{+0}$
N-Nitroso-n-butylamine	924-16-3	$1.1 \times 10^{+1}$	
N-Nitroso-N-methylethylamine	10595-95-6	$2.2 \times 10^{+1}$	
N-Nitrosodi-*n*-propylamine	621-64-7	$7.0 \times 10^{+0}$	
N-Nitrosodiethylamine	55-18-5	$3.6 \times 10^{+1}$	
N-Nitrosodimethylamine	62-75-9	$1.6 \times 10^{+1}$	
N-Nitrosodiphenylamine	86-30-6	9.0×10^{-3}	
p-Nitrosodiphenylamine	156-10-5	2.2×10^{-2}	
N-Nitrosomorpholine	59-89-2	$6.7 \times 10^{+0}$	
N-Nitrosopiperidine	100-75-4	$9.4 \times 10^{+0}$	
N-Nitrosopyrrolidine	930-55-2	$2.1 \times 10^{+0}$	
Pentachlorophenol	87-86-5	1.8×10^{-2}	
Perchloroethylene	127-18-4	2.1×10^{-2}	5.1×10^{-2}
Polychlorinated biphenyls (PCBs) (unspeciated mixture)	1336-36-3		
(high risk) P1		$2.0 \times 10^{+0}$	$2.0 \times 10^{+0}$
(low risk) P2		4.0×10^{-1}	4.0×10^{-1}
(lowest risk) P3		7.0×10^{-2}	7.0×10^{-2}

Table 7.1 Inhalation and Oral Cancer Potency Factors

Substance	Chemical Abstract Service Number (CAS)	Inhalation Potency Factor $(mg/kg\text{-}day)^{-1}$	Oral Slope Factor $(mg/kg\text{-}day)^{-1}$
Polychlorinated biphenyls[P4] (PCBs) (speciated)			
3,3’,4,4’-Tetrachlorobiphenyl (77)	35298-13-3	$1.3 \times 10^{+1}$	$1.3 \times 10^{+1}$
3,4,4’,5-Tetrachlorobiphenyl (81)	70362-50-4	$3.9 \times 10^{+1}$	$3.9 \times 10^{+1}$
2,3,3’,4,4’- Pentachlorobiphenyl (105)	32598-14-4	$3.9 \times 10^{+0}$	$3.9 \times 10^{+0}$
2,3,4,4’5- Pentachlorobiphenyl (114)	74472-37-0	$3.9 \times 10^{+0}$	$3.9 \times 10^{+0}$
2,3’4,4’,5- Pentachlorobiphenyl (118)	31508-00-6	$3.9 \times 10^{+0}$	$3.9 \times 10^{+0}$
2’,3,4,4’,5- Pentachlorobiphenyl (123)	65510-44-3	$3.9 \times 10^{+0}$	$3.9 \times 10^{+0}$
3,3’,4,4’,5- Pentachlorobiphenyl (126)	57465-28-8	$1.3 \times 10^{+4}$	$1.3 \times 10^{+4}$
2,3,3’,4,4’,5-Hexachlorobiphenyl (156)	38380-08-4	$3.9 \times 10^{+0}$	$3.9 \times 10^{+0}$
2,3,3’,4,4’,5’-Hexachlorobiphenyl (157)	69782-90-7	$3.9 \times 10^{+0}$	$3.9 \times 10^{+0}$
2,3’,4,4’,5,5’-Hexachlorobiphenyl (167)	52663-72-6	$3.9 \times 10^{+0}$	$3.9 \times 10^{+0}$
3,3’,4,4’5,5’- Hexachlorobiphenyl (169)	32774-16-6	$3.9 \times 10^{+3}$	$3.9 \times 10^{+3}$
2,3,3’4,4’,5,5’- Heptachlorobiphenyl (189)	39635-31-9	$3.9 \times 10^{+0}$	$3.9 \times 10^{+0}$
Potassium bromate	7758-01-2	4.9×10^{-1}	
1,3-Propane sultone	1120-71-4	$2.4 \times 10^{+0}$	
Propylene oxide	75-56-9	1.3×10^{-2}	2.4×10^{-1}
1,1,2,2-Tetrachloroethane	79-34-5	2.0×10^{-1}	
Thioacetamide	62-55-5	$6.1 \times 10^{+0}$	
2,4-Toluene diisocyanate	584-84-9	3.9×10^{-2}	
2,6-Toluene diisocyanate	91-08-7	3.9×10^{-2}	
1,1,2-Trichloroethane (vinyl trichloride)	79-00-5	5.7×10^{-2}	
Trichloroethylene	79-01-6	7.0×10^{-3}	1.5×10^{-2}
2,4,6-Trichlorophenol	88-06-2	7.0×10^{-2}	
Urethane	51-79-6	$1.0 \times 10^{+0}$	
Vinyl chloride	75-01-4	2.7×10^{-1}	

Notes for Table 7.1

\# Asbestos: [100 PCM fibers/m^3]$^{-1}$ A unit risk factor of 2.7 x 10^{-6} (μg/m^3)$^{-1}$ and an inhalation cancer potency factor of 2.2 x 10^{+2} (mg/kg BW*day)$^{-1}$ are available (see Appendix C for explanation).

BaP PAHs and PAH Derivatives: Many have potency equivalency factors relative to benzo[*a*]pyrene (see Appendix G). For multipathway chemicals, including PAHs, the oral slope factor is considered the same as the inhalation potency factor unless otherwise noted in the Table.

A Polychlorinated Dibenzo-*p*-dioxins, Polychlorinated Dibenzofurans and speciated poly chlorinated biphenyls: (see Appendix E). For convenience, OEHHA has calculated cancer potency factors for speciated polychlorinated dibenzo-*p*-dioxin, polychlorinated dibenzofuran and polychlorinated biphenyl congeners using the procedure in Appendix E.

B Diesel Exhaust is listed as a Toxic Air Contaminant by the Air Resources Board as "Particulate Matter from Diesel-Fueled Engines". (See Appendix D)

* Creosote: Can be calculated using Potency Equivalency Factors contained in the benzo[*a*]pyrene Toxic Air Contaminant document and in Appendix G of these guidelines.

P1 Polychlorinated Biphenyls (PCBs): High Risk is for use in cases where congeners with more than four chlorines do not comprise less (are greater) than one-half percent of total PCBs. The high risk number is the default for unspeciated PCB mixtures.

P2 The low risk number is generally not applicable to the Hot Spots program. The Hot Spots program addresses PCBs emitted by stationary facilities. It cannot be assumed that such emissions would occur by simple evaporation. There is a dermal absorption factor applied in evaluation of the dermal pathway for PCBs so the medium risk would not apply to dermal exposure (OEHHA, 2009). The water pathway does not include an assumption that PCB isomers are water soluble, so the medium number would not apply to the water pathway.

P3 Polychlorinated Biphenyls (PCBs): Lowest Risk is for use in cases where congeners with more than four chlorines comprise less than one-half percent of total PCBs. In order for the low number to be used, scientific justification needs to be presented.

P4 Number in parentheses is the IUPAC #, the PCB nomenclature is IUPAC. For multipathway chemicals, including PCBs, the oral slope factor is considered the same as the inhalation potency factor unless otherwise noted in the Table.

7.3 References

OEHHA, 2009. Air Toxics Hot Spots Risk Assessment Guidelines. Part II. Technical Support Document for Cancer Potency Factors: Methodologies for derivation, listing of available values, and adjustments to allow for early life stage exposures. May, 2009. Available online at: http://www.oehha.ca.gov/air/hot_spots/tsd052909.html

8 - Risk Characterization for Carcinogens and Noncarcinogens and the Requirements for Hot Spots Risk Assessments

8.1 Introduction

Risk characterization is the final step of the health risk assessment (HRA). In this step, information developed through the exposure assessment is combined with information from the dose-response assessment to characterize risks to the general public from emissions. In the Hot Spots program, OEHHA conducts the dose-response assessment during the development of cancer potency factors and Reference Exposure Levels. These are used in conjunction with the exposure estimates to estimate cancer risk and evaluate hazard from noncancer toxicity of emitted chemicals. Under the Air Toxics Hot Spots (Hot Spots) Act, risk characterizations should present both individual and population-wide health risks (Health and Safety Code Section (HSC) 44306). Persons preparing HRAs for the Hot Spots Program should consult the local Air Pollution Control or Air Quality Management District (District) to determine if the District has special guidelines to assist with HRA format or other requirements of the Hot Spots Program.

OEHHA is recommending that a 30-year exposure duration be used as the basis for estimating cancer risk at the maximum exposed individual resident (MEIR) in the Hot Spots Program. This exposure duration represents the time of residency for 90 to 95% of Californians at a single location and should provide adequate public health protection against individual risk. We also recommend including the 9 and 70-year cancer risk at the MEIR as supplemental information. Note that a 70-year exposure duration is required to estimate cancer burden or provide an estimate of population-wide risk.

This chapter provides guidance on how to evaluate the risk characterization component of risk assessments required by the Hot Spots Program. A general summary of the risk characterization components includes the following items and information.

- The locations of the point of maximum impact (PMI), the MEIR, and the maximum exposed individual worker (MEIW) are to be identified. The PMI, MEIW, and MEIR for cancer risk and for noncancer hazard indices (averaging times for acute 1-hour, repeated 8-hour, and chronic hazard indices) may not be the same location; all should be identified.

- The location of any specified sensitive receptors (e.g., schools, hospitals, daycare, or eldercare facilities - contact the District or reviewing authority for more information) should be identified

- Estimates of population-wide cancer risk and noncancer hazard

This information must be clearly presented in cross-referenced text, tables, figures, and maps. Chapter 9 provides an outline that specifies the content and recommended format of HRA results. The HARP software is the recommended model for calculating HRA results for the Hot Spots Program. Information on obtaining the HARP software can be found under the Air Toxics Program on the ARB's web site at www.arb.ca.gov.

8.1.1 *Tiered Approach to Risk Assessment*

The tiered approach for risk assessment that is presented in detail in the TSD (OEHHA, 2012) and summarized here should be reviewed prior to conducting the health risk assessment. The tiered approach to risk assessment and the health impacts evaluation described here are included in the HARP software.

The tiered approach provides a risk assessor with flexibility and allows consideration of site-specific differences (Table 8.1). The four-tiered approach to risk assessment is intended to primarily apply to residential cancer risk assessment, both for inhalation and noninhalation pathways. Risk assessors can tailor the level of effort and refinement of an HRA by using either the point estimate exposure assumptions as the basis of the exposure and risk assessment, or both the point estimate and a stochastic treatment of exposure factor distributions.

Table 8.1 The Tiered Approach to Risk Assessment

Tier	Description	When Applied
Tier 1	Utilizes OEHHA default point estimates of exposure variates	All risk assessments must include a Tier 1 assessment
Tier 2	Utilizes site-specific point estimates for exposure variates (justified, and approved by OEHHA)	A Tier 2 approach may be presented in addition to Tier 1
Tier 3	Utilizes OEHHA distributions of exposure variates	A Tier 3 approach may be presented in addition to Tier 1
Tier 4	Utilizes site-specific distributions of exposure variates (justified, and approved by OEHHA)	A Tier 4 approach may be presented in addition to Tier 1

Tier 1 is a standard point estimate approach that uses the recommended exposure variate (e.g., breathing or water ingestion rate) point estimates presented in this document. Derivations of these values are described in detail in OEHHA (2012). The results of the Tier 1 evaluations are required to be presented in the risk characterization section for all HRAs prepared for the Hot Spots Program. Thus, persons preparing an HRA using Tier 2 through Tier 4 evaluations must also include the risk characterization results of a Tier 1 evaluation in the HRA.

As discussed in OEHHA (2012), if the risk characterization results from a Tier 1 assessment are above a regulatory level of concern, the risk assessor may want to proceed with more site-specific analysis as described in Tier 2, or use a more resource-intensive stochastic modeling effort described in Tier 3 and Tier 4 (for cancer risk). While further evaluation may provide more information to the risk manager on which to base decisions, the Tier 1 evaluation is useful in comparing risks among a large number of facilities and must be included in all HRAs.

Tier 2 analysis allows the use of available and justifiable site-specific exposure variates (e.g., fish consumption), when presenting the potential health impacts. The site-specific information applied in a Tier 2 assessment must be adequately justified and approved by OEHHA and the District. In Tier 3, a stochastic approach to exposure assessment is taken using the distributions for the exposure pathways presented in the TSD (OEHHA, 2012) and in Chapter 5 of this Guidance Manual. The exposure distributions apply only to a residential receptor and are used only for the determination of cancer risk. OEHHA has not developed exposure intake distributions for workers to use in the offsite worker exposure scenario. Tier 4 is also a stochastic approach for the residential exposure scenario but allows for utilization of site-specific exposure variate distributions if they are justifiable and more appropriate for the site under evaluation than those derived in OEHHA (2012). Alternative site-specific distributions must be approved by OEHHA and the District. For an off-site worker cancer risk evaluation, Tiers 3 and 4 do not apply. Tier 3 and Tier 4 analyses show what a distribution of potential cancer risk may be to an individual or population based on a distribution of exposure inputs (e.g., water ingestion rate) rather than specific point estimates of exposure.

Table 8.2 summarizes OEHHA's recommendations for use of the four Tiers in cancer and noncancer risk assessment.

Table 8.2 Tiers for Residential and Offsite Worker Cancer and Noncancer Hot Spots Risk Assessments

Tier	Cancer		Non Cancer Chronic and 8-Hour	
	Inhalation	Noninhalation	Inhalation	Noninhalation
Tier-1	X	X	X	X
Tier-2	X	X		X[b]
Tier-3	X[a]	X[a]		
Tier-4	X[a]	X[a]		

[a] Applies to residential exposure scenario only
[b] Applies to chronic noncancer exposure only

OEHHA has not developed a stochastic approach (Tier 3 or 4) for estimating noncancer health impacts using acute, 8-hour, and chronic Reference Exposure Levels (RELs). Tier 1 is the only option for determining noncancer health impacts from inhalation exposure since calculating the hazard quotient involves dividing the ground level air concentrations for the specified exposure duration by the appropriate RELs. However, chronic noninhalation noncancer risks involve a calculation of dose from oral or dermal pathways to which site-specific evaluations could be considered under a Tier 2 approach.

<u>Small foot-print facilities – Tier 2 or Tier 4</u>

Some facilities subject to the Air Toxics Hot Spots Act (e.g., some in the industry-wide categories such as gas stations or dry cleaners) have very small zones of impact. In some of these instances, there will be very few receptors within the zone of impact. It isn't possible to develop special recommendations for exposure variates for all possible exposure scenarios. Alternative breathing rates (point estimates or distributions) may be used as part of Tier 2 or Tier 4 risk assessments with appropriate supporting justification in the case of a very small zone of impact. OEHHA is willing to work with risk managers at ARB and the Districts on this issue.

8.2 Risk Characterization for Carcinogens

Cancer risk is calculated by multiplying the daily inhalation or oral dose (calculated in Chapter 5), by a cancer potency factor, the age sensitivity factor, the frequency of time spent at home (for residents only), and the exposure duration divided by averaging time, to yield the excess cancer risk (see section 8.2.4). As described below, the excess cancer risk is calculated separately for each age grouping and then summed to yield cancer risk at the receptor location. A brief description of the age sensitivity factors, exposure duration, and frequency of time spent at home are included in Sections 8.2.1 to 8.2.3 below. These factors are discussed in detail in OEHHA (2009) and OEHHA (2012).

8.2.1 *Adjustment for Early Life Stage Exposures to Carcinogens*

Studies have shown that young animals are more sensitive than adult animals to exposure to many carcinogens (OEHHA, 2009). Therefore, OEHHA developed age sensitivity factors (ASFs) to take into account the increased sensitivity to carcinogens during early-in-life exposure (Table 8.3). These factors were developed and described in detail in OEHHA (2009). In the absence of chemical-specific data, OEHHA recommends a default ASF of 10 for the third trimester to age 2 years, and an ASF of 3 for ages 2 through 15 years to account for potential increased sensitivity to carcinogens during childhood.

Table 8.3 Age Sensitivity Factors by Age Group for Cancer Risk Assessment

Age Group	Age Sensitivity Factor (unitless)
3rd Trimester	10
0<2 years	10
2<9 years	3
2<16 years	3
16<30 years	1
16-70 years	1

For specific carcinogens where data indicate enhanced sensitivity during life stages other than the immediate postnatal and juvenile periods, or for which data demonstrate ASFs different from the default ASFs, the chemical-specific data should be used in order to adequately protect public health.

The risk assessments generated under the Air Toxics Hot Spots Act are reviewed by OEHHA. If a risk assessor had data indicating there are no windows of susceptibility early in life or that a different ASF should be used for a specific carcinogen and wanted to use these data, OEHHA would review the material as part of the review of the risk assessment.

8.2.2 *Fraction of Time Spent at Home for Cancer Risk Assessment*

OEHHA and ARB evaluated information from activity patterns databases to estimate the fraction of time at home (FAH) during the day (OEHHA, 2012). This information can be used to adjust exposure duration and cancer risk from a specific facility's emissions, based on the assumption that exposure to the facility's emissions are not occurring away from home. From the third trimester to age <2 years, 85% of time is spent at home (Table 8.4). From age 2 through <16 years, 72% of time is spent at home. From age 16 years and greater, 73% of time is spent at home. Facilities with any school within the 1×10^{-6} (or greater) isopleth should use FAH = 1 for the child age groups (3rd Trimester, 0<2 years, and 2<16 years). See Appendix I for an example calculation using the FAH.

Table 8.4 Recommendations for Fraction of Time at Home (FAH) for Evaluating Residential Cancer Risk

Age Range	Fraction of Time at Residence
3rd Trimester, and 0<2 years	0.85[1]
2<16 years[2]	0.72[1]
16-70 years[3]	0.73

[1] Use FAH = 1 if a school is within the 1×10^{-6} (or greater) cancer risk isopleth

[2] Also use FAH = 0.72 for 2<9 yr age group.
[3] Also use FAH = 0.73 for 16<30 yr age group.

The FAH is calculated based on a diary of trips taken over a 24-hour period on the survey day. Ninety-five percent of the diary days were on weekdays. Participants can select “vacation” as one of their trips. However, vacation time represented only a fraction (0.68%) of the over 175,000 trips recorded in the survey. Because much of these vacation trips were presumed to be within-day trips and were only a small fraction of total trips, there is likely little overlap with the Exposure Frequency (EF) variate used in the dose equations in Chapter 5.

8.2.3 *Exposure Duration for Estimating Cancer Risk to Residents and Off-Site Workers*

OEHHA recommends that an exposure duration (residency time) of 30 years be used to estimate individual cancer risk for the maximally exposed individual resident (MEIR) (Table 8.5). OEHHA also recommends that the 30-year exposure duration be used as the basis for public notification and risk reduction audits and plans. The Districts, however, may opt to use the 70 year cancer risk for notification and risk reduction audits and plans.

Note that the 30-year exposure duration starts in the third trimester to accommodate the increased susceptibility of exposures in early life (OEHHA, 2009), and would apply to both the point estimate and stochastic approaches.

Table 8.5 Summary of Recommendations for Exposure Duration for Individual Cancer Risk at the MEIR and MEIW

Receptor	*Recommendation*
Resident (MEIR)	30 years
Resident (supplemental Information)	9 years for central tendency; 70 years for maximum (lifetime)
Worker (MEIW)	25 years

Exposure durations of 9-years and 70-years are also recommended to be evaluated for the MEIR to show the range of cancer risk based on residency periods. If a facility is notifying the public regarding cancer risk, the 9- and 70-year cancer risk estimates are useful for people who have resided in their current residence for periods shorter and longer than 30 years.

The 9-, 30-, and 70-year exposures are chosen to coincide with U.S. EPA’s estimates of the average (9 years), high-end estimates (30-years) of residence time, and a lifetime residency (70 years). These estimates are also consistent with what is known about residence time in California. Together, the 9-, 30-, and 70-year cancer risk calculations provide a useful presentation of cancer risk and the relationship to duration of residency and, thus, exposure to a facility’s emissions.

For the maximally exposed individual worker (MEIW), OEHHA recommends using an exposure duration of 25 years to estimate individual cancer risk for the off-site worker scenario (Table 8.5). This duration represents approximately the 95th percentile of job tenure with the same employer in the U.S.

8.2.4 *Calculating Residential and Offsite Worker Inhalation Cancer Risk*

Residential Receptors

For residential inhalation exposure, cancer risk must be separately calculated for specified age groups (Eq. 8.2.4A, see Section 8.2.1), because of age differences in sensitivity to carcinogens and age differences in intake rates (per kg body weight). Separate risk estimates for these age groups provide a health-protective estimate of cancer risk by accounting for greater susceptibility in early life, including both age-related sensitivity and amount of exposure. The following equation illustrates the formula for calculating residential inhalation cancer risk. See Appendix I for a detailed example calculation.

A. **Equation 8.2.4 A:** $$RISK_{inh\text{-}res} = DOSE_{air} \times CPF \times ASF \times ED/AT \times FAH$$

7. $RISK_{inh\text{-}res}$ = Residential inhalation cancer risk
8. $DOSE_{air}$ = Daily inhalation dose (mg/kg-day)
9. CPF = Inhalation cancer potency factor (mg/kg-day^{-1})
10. ASF = Age sensitivity factor for a specified age group (unitless)
11. ED = Exposure duration (in years) for a specified age group
12. AT = Averaging time for lifetime cancer risk (years)
13. FAH = Fraction of time spent at home (unitless)

a: Recommended default values for EQ 8.2.4 A:

5. $DOSE_{air}$ = Calculated for each age group from Eq. 5.4.1
6. CPF = Substance-specific (see Table 7.1)
7. ASF = See Section 8.2.1
8. ED = 0.25 years for 3rd trimester, 2 years for 0<2, 7 years for 2<9, 14 years for 2<16, 14 years for 16<30, 54 years for 16-70
9. AT = 70 years*
10. FAH = See Table 8.4

*Although AT actually sums to 70.25 years when the 3rd trimester (0.25 years) is included, OEHHA recommends rounding AT = 70 years (and rounding residential exposure durations at 9- and 30-years rather than 9.25- and 30.25-years) to simplify the calculation without causing a significant adjustment. Note that the dose for the 3rd trimester is based on the breathing rate of pregnant women using the assumption that the dose to the fetus during the 3rd trimester is the same as that to the mother.

Cancer risks calculated above for individual age groups are summed to estimate cancer risk for 9-, 30- and 70-year exposures as shown below. Note that this example includes the Fraction of Time Spent at Home (FAH) for each age grouping.

Calculation of Inhalation Cancer Risk from the Third Trimester to Age Nine:

$RISK_{inh\text{-}res}$ = ($DOSE_{air}$ third trimester × CPF × 10 × 0.25/70 years × $FAH_{3rd\ tri\ <2}$) + ($DOSE_{air}$ age 0<2 × CPF × 10 × 2/70 × $FAH_{3rd\ tri\ <2}$) + ($DOSE_{air}$ age 2<9 × CPF × 3 × 7/70 years × $FAH_{2<9}$)

Calculation of Inhalation Cancer Risk from Third Trimester to Age 30:

$RISK_{inh\text{-}res}$ = ($DOSE_{air}$ third trimester × CPF × 10 × 0.25/70 years × $FAH_{3rd\ tri\ <2}$) + ($DOSE_{air}$ age 0<2 × CPF × 10 × 2/70 × $FAH_{3rd\ tri\ <2}$) + ($DOSE_{air}$ age 2<16 × CPF × 3 × 14/70 × $FAH_{2<16}$) + ($DOSE_{air}$ age 16<30 × CPF × 1 × 14/70 years × $FAH_{16\text{-}30}$)

Calculation of Inhalation Cancer Risk from Third Trimester to Age 70:

$RISK_{inh\text{-}res}$ = ($DOSE_{air}$ third trimester × CPF × 10 ×0.25/70 years× $FAH_{3rd\ tri\ <2}$) + ($DOSE_{air}$ age 0<2 × CPF × 10 × 2/70 × $FAH_{3rd\ tri\ <2}$) + ($DOSE_{air}$ age 2<16 × CPF × 3 × 14/70 × $FAH_{2<16}$) + ($DOSE_{air}$ age 16<70 × CPF × 1 × 54/70 years × $FAH_{16\text{-}70}$)

Expressing cancer risk in “chances per million” is useful as a risk communication tool for the public, but cancer risk can also be expressed in other ways, such as “chances per 100,000” (cancer risk × 10^5) or “chances per 10 million” (cancer risk × 10^7). To convert the resulting cancer risk estimate to chances of developing cancer per million individuals exposed, multiply the cancer risk by 10^6:

$$\text{Cancer risk} \times 10^6 = \text{chances per million}$$

For exposure to multiple carcinogenic substances, Table 8.7 and Table I.5 in Appendix I are examples of how cancer risks of individual substances are summed to determine the total cancer risk.

<u>Worker Receptors</u>

For assessment of off-site worker cancer risk at the MEIW, the default assumes working age begins at 16 years. Note that the residential FAH factor in Eq. 8.2.4.A above does not apply for workers. The daily inhalation dose ($DOSE_{air}$) (as calculated in Chapter 5, EQ 5.4.1.2) is based on the adjusted 8-hour concentration at the MEIW (for non-continuous sources) and amount of time the offsite worker’s schedule overlaps with the facility’s emission schedule. The duration of exposure at the MEIW receptor is 25 years, as discussed in the TSD (OEHHA, 2012).

B. <u>Equation 8.2.4 B:</u> $\boxed{RISK_{inh\text{-}work} = DOSE_{air} \times CPF \times ASF \times ED/AT}$

1. $RISK_{inh\text{-}work}$ = Worker inhalation cancer risk

a: Recommended default values for EQ 8.2.4 B:

1. $DOSE_{air}$ = Calculated for workers in Eq. 5.4.1.2
2. CPF = Substance specific (see Table 7.1)
3. ASF = 1 for working age 16-70 yrs (See Section 8.2.1)
4. ED = 25 years
5. AT = 70 yrs for lifetime cancer risk

<u>Work Locations with Daycare Facilities:</u>

An additional risk management consideration for offsite worker cancer risk assessment of a Hot Spots facility is whether there are women of child bearing age at the MEIW location and whether the MEIW has a daycare center. In the case of women of child-bearing age at the MEIW, the Districts may wish to treat the off-site MEIW in the same way as the residential scenario to account for the higher susceptibility during the third trimester of pregnancy (i.e., use of an ASF=10 for third trimester exposure). If there is onsite daycare at the MEIW, then the risks to the children will be underestimated using the offsite adult worker scenario. In this case, the Districts may wish to include a cancer risk assessment for the children in the onsite daycare, assuming they could be there from 0 to age 6 years (ED = 6 years) and using the appropriate exposure factors to calculate $DOSE_{air}$, fraction of time at worksite (e.g., hrs at daycare per 24 hrs), and ASFs in EQ 8.2.4 B to account for the higher susceptibility of infants and children to carcinogens.

Children at a MEIW daycare may also be assessed for noninhalation exposures. Typically, soil ingestion and dermal exposure will be the most common noninhalation pathways. However, all pathways that are present at the daycare should be included. See section 8.2.6 for more discussion of multipathway risk assessment methods.

8.2.5 *Calculation of Noninhalation Cancer Risk*

A small subset of Hot Spots substances is subject to deposition onto the soil, plants, and water bodies (see Table 5.1). These substances need to be evaluated by the appropriate noninhalation pathways, as well as by the inhalation pathway, and the risk characterization results must be presented in all HRAs. These substances include semi-volatile organic chemicals and heavy metals.

For all multipathway substances, the exposure pathways that must be evaluated at every residential and worker site (in addition to inhalation) are soil ingestion and dermal exposure. If PAHs (and creosotes), lead, dioxins, furans, or PCBs are emitted, then the breast-milk consumption pathway becomes mandatory for residential receptors. OEHHA has developed transfer coefficients for these chemicals from the mother to breast milk (see OEHHA, 2012 for details). The other exposure pathways (e.g., ingestion of homegrown produce or fish) are only evaluated for residential receptors if the facility impacts that exposure medium and the receptor under evaluation can be exposed to that medium or pathway. For example, if the facility does not impact a fishable body of water within the isopleth of the facility, or the impacted water body does not sustain fish that are consumed by fishers, then the fish pathway will not be considered for that facility or receptor.

Table 8.6 identifies the residential receptor exposure pathways that are mandatory and those that are dependent on the available routes of exposure. Table 8.6 also identifies the three exposure pathways that are relevant for a worker receptor. The cancer risk estimates should be presented in the risk characterization section of the risk assessment for all the appropriate pathways.

Table 8.6 Mandatory and Site/Route Dependent Exposure Pathways

Mandatory Exposure Pathways	Site/Route Dependent Exposure Pathways
• Inhalation[w] • Soil Ingestion[w] • Dermal Exposure to Contaminated Soil[w] • Breast Milk Consumption[*]	• Homegrown Produce Ingestion • Angler-Caught Fish Ingestion • Drinking Water Ingestion • Home-Raised Animal Product Ingestion (Dairy (Cow's) Milk, Meat (Beef, Pork, Chicken) and Egg).

(w) Identifies the appropriate exposure pathways that should be evaluated for a worker. These pathways are inhalation, dermal exposure, and the soil ingestion pathway.
(*) If PAHs (including creosotes), lead, dioxins, furans, or PCBs are emitted, then the breast-milk consumption pathway becomes mandatory.

The noninhalation residential cancer risk is calculated using the same steps as inhalation cancer risk described in Section 8.2.4. A dose (see Chapters 4 and 5) from the pathway under evaluation (e.g., soil ingestion) is multiplied by the substance-specific oral slope factor, expressed in units of inverse dose (i.e., $(mg/kg/day)^{-1}$) (Table 7.1), the appropriate age sensitivity factor (ASF), and exposure duration divided by averaging time to yield the cancer risk for a specified age grouping. Cancer risk for each age group is summed as appropriate for the exposure duration. The FAH factor is relevant only to the inhalation pathway and is not appropriate to use in the noninhalation pathways.

Equation 8.2.5 illustrates the formula for calculating noninhalation cancer risk. Details (data, algorithms, and guidance) for each exposure pathway are presented in Chapter 5 and in OEHHA (2012).

A. **Equation 8.2.5:** $\boxed{RISK_{noninh} = DOSE_{noninh} \times CPF_{oral} \times ASF \times ED/AT}$

1. $RISK_{noninh}$ = Noninhalation pathway cancer risk
2. $DOSE_{noninh}$ = Daily dose (mg/kg-day) for a specified non-inhalation pathway for each age group
3. CPF_{oral} = Oral cancer potency (slope) factor (mg/kg-day^{-1})
4. ASF = Age sensitivity factor for a specified age group (unitless)
5. ED = Exposure duration (in years) for a specified age group
6. AT = Averaging time for lifetime cancer risk

a: Recommended default values for EQ 8.2.5:

1. $DOSE_{noninh}$ = Calculated in Chapter 5 dose algorithms for each age group and for each noninhalation route in Table 8.6 the receptor is exposed to
2. CPF_{oral} = Substance-specific (see Table 7.1)
3. ASF = See Section 8.2.1
4. ED = Residents: 0.25 years for 3rd trimester, 2 years for 0<2, 7 years for 2<9, 14 years for 2<16, 14 years for 16<30, 54 years for 16-70
   = Offsite worker: 25 yrs
5. AT = 70 years

Estimating cancer risk for 9-, 30- and 70-years by summing the individual age-group cancer risks is the same as that shown for the inhalation route in Section 8.2.4. The exception is that the FAH variate is only appropriate for the residential inhalation pathway and is not a factor for oral and dermal exposure pathways.

Calculation of Noninhalation Cancer Risk from Third Trimester to Age 30:

$RISK_{noninh\text{-}res}$ = ($DOSE_{noninh}$ third trimester × CPF × 10 × 0.25/70 years) + ($DOSE_{noninh}$ age 0<2 × CPF × 10 × 2/70) + ($DOSE_{noninh}$ age 2<16 × CPF × 3 × 14/70) + ($DOSE_{noninh}$ age 16<30 × CPF × 1 × 14/70 years)

To convert this estimated probability of risk to chances per million of developing cancer, multiply the estimated cancer risk for each noninhalation exposure route by 10^6. This result is useful communication tool to compare risks for each pathway of exposure.

$$\text{Cancer risk} \times 10^6 = \text{cancer risk expressed as chances per million}$$

For assessment of the offsite worker the typical noninhalation pathways that apply for worker cancer risk are the dermal exposure pathway and the soil ingestion pathway.

Children at a MEIW daycare may also be assessed for noninhalation exposures. Typically, soil ingestion and dermal exposure will be the most common noninhalation pathways. However, all pathways that are present at the daycare should be included.

8.2.6 *Multipathway Cancer Risk Methodology*

Under a Tier 1 assessment, it is necessary to calculate the total cancer risk from both inhalation and noninhalation exposures if multipathway substances are emitted from the facility. The calculation of cancer risk that includes exposure to a multipathway substance or substances has three steps:

1) Calculate cancer risk for the inhalation pathway (EQ 8.2.4 A for residents, EQ 8.2.4 B for off-site workers) for all substances, and the noninhalation pathways that apply (EQ 8.2.5) for all multipathway substances, using high-end point estimates of intake rates.
2) For each multipathway substance, identify the two exposure pathways with the highest risk. These are the dominant pathways that are to be assessed using high-end point estimates of intake rates for the total cancer risk. For all other pathways, the average point estimate of intake rates may be used to calculate the pathway cancer risk (See OEHHA (2012) for more information).
3) To calculate total cancer risk, all inhalation and noninhalation pathways are summed together for all substances.

The final cancer risk calculation using a combination of high-end and average exposure parameters is referred to as the derived risk in the HARP software. This is described in Chapter 1, Section 1.4.1 of OEHHA (2012). The inhalation route is almost always one of the two dominant pathways in a multipathway cancer risk assessment. Therefore, in most cases only one noninhalation pathway would be calculated using a high-end dose point estimate. For all other pathways, the average point estimate may be used to calculate the pathway cancer risk.

For example, if dermal exposure and soil ingestion risks are calculated, then the cancer risks from these pathways would be summed along with the inhalation cancer risks to give the total cancer risk for the single multipathway substance:

Cancer Risk (inhalation) + Cancer Risk (dermal) + Cancer Risk (soil) = Total Risk

The mother's milk pathway also becomes a mandatory pathway to assess risk in nursing infants if the mother is exposed to specific substances (see Table 5.1).

Many facilities will emit multiple carcinogenic substances. If multiple substances are emitted, the substance-specific cancer risks for all exposure pathways are summed to give the (total) multipathway cancer risk at the receptor location. The HARP software will display not only the multipathway risk for each carcinogenic substance, but also show a breakdown of the cancer risk from each exposure pathway. Table 8.7 shows the results of a multipathway risk assessment for a hypothetical facility. While not presented in the following table, it is critical to identify the driving exposure pathways and the driving substances in a multipathway cancer risk assessment when summarizing and presenting the HRA results. See Chapter 9 for more information.

Table 8.7 Multipathway Assessment of a Hypothetical Facility 30-Year Cancer Risk

Substance	Cancer Risk[a]	Cancer risk[b] (chances per million)
Arsenic	1.1×10^{-5} (i) 3×10^{-7} (ni)	11 (i) 0.3 (ni)
Benzene	2.92×10^{-4} (i)	292 (i)
2,3,7,8-TCDD (dioxin)	1.06×10^{-4} (i) 5.7×10^{-5} (ni)	106 (i) 57 (ni)
1,3-Butadiene	6.0×10^{-6} (i)	6 (i)
Total Facility Cancer Risk	**4.723×10^{-4}**	**472**

[a] As calculated in EQ 8.2.4 A or EQ 8.2.5
[b] Calculated as: cancer risk × 10^6 = chances per million
i = inhalation pathway contribution
ni = noninhalation pathway contribution

Cancer risk in Table 8.7 for the multipathway substances, arsenic and 2,3,7,8-TCDD, is arranged by the inhalation pathway risk and the sum of all noninhalation pathway risks. The total facility multipathway cancer risk is the sum of all inhalation and noninhalation pathways.

Cancer risks from different substances are treated additively in risk assessment generally, and in the Hot Spots Program in part because many carcinogens act through the common mechanism of DNA damage. The additive assumption is reasonable from a public health point of view. Other possible interactions of multiple carcinogens include synergism (effects are greater than additive) or antagonism (effects are less than additive). The type of interaction is both chemical and dose dependent and in most cases the data are not available to adequately characterize these interactions.

8.2.7 *Multipathway Cancer Risk for Infant Exposure to Mother's Milk*

The mother' milk pathway becomes mandatory if the nursing mother is exposed to one or more of the following multipathway substances: dioxins and furans, PCBs, PAHs including creosotes, and lead. The default assumption inherent in the intake rate is that the infant's only source of food is breast for the first year (e.g., is fully breastfed, see OEHHA, 2012, for details), which is one-half of the 0<2 year age group used in the Hot Spots program. Thus, the cancer risk by the mother's milk pathway will need to be calculated with a modified cancer risk equation using a different exposure duration:

A. **Equation 8.2.7:** $$RISK_{mm} = \text{Dose-Im} \times CPF_{oral} \times ASF \times ED/AT$$

1. $RISK_{mm}$ = Infant cancer risk via mother's milk pathway
2. Dose-Im = Daily dose (mg/kg-day) to infant from mother's milk
3. CPF_{oral} = Oral cancer slope factor ($mg/kg\text{-}day^{-1}$)
4. ASF = Age sensitivity factor for infant (unitless)
5. ED = Exposure duration (in years) for infant
6. AT = Averaging time for lifetime cancer risk

a: Recommended default values for EQ 8.2.7:

6. Dose-Im = Calculated from EQ 5.4.3.5.2, dose to infant via mother's milk
7. CPF_{oral} = Substance-specific (see Table 7.1)
8. ASF = 10 (See Section 8.2.1)
9. ED = 1 yr (1^{st} yr of 0<2 yr age group)
10. AT = 70 years

Once the cancer risk is determined for the mother's milk pathway for each applicable substance, the pathway risk is summed with other pathway risks.

For Tier 1, the derived approach for cancer risk assessment should be used if the mother's milk pathway applies. As outlined in Section 8.2.6, the two dominant pathways will be calculated using high-end point estimates of intake rates; all additional pathways may be calculated using average point estimates of intake rates. There will be four mandatory pathways to assess (inhalation, mother's milk, soil ingestion and dermal exposure) for cancer risk when exposure to dioxins/furans, PCBs, PAHs including creosotes, and/or lead occurs. Therefore, if the infant is exposed to no other additional site-specific noninhalation pathway(s), only the two dominant pathways among the four will be assessed for cancer risk using high-end point estimates of intake rates; and the others would be assessed using the average point estimate of intake rate.

In short, multipathway cancer risk for a substance is estimated by summing the potential inhalation and noninhalation cancer risks for the receptor location of interest. See the discussion of Tier 1 in Section 8.2.6 or the TSD for more information on the method used to determine the multipathway cancer risk.

8.2.8 *Cancer Risk Characterization for Stochastic Risk Assessment*

Risk characterization for a stochastic risk assessment is similar to that described for the point-estimate approach. However, the stochastic risk assessment produces a distribution of risk that accounts for some of the natural variability in exposure-related factors, such as breathing rates or water intake. The cancer risk distribution for inhalation cancer risk, for example, is generated by multiplying randomly selected values from the breathing rate distribution by the ground level air concentration, and the cancer potency factor. A variation of the Monte Carlo method called Latin hypercube sampling is the method by which the values from the breathing rate distribution are selected. If noninhalation pathways need to be evaluated, the same process is followed for each pathway and the risk is summed to give an overall inhalation and noninhalation cancer risk distribution. Further, the specification of Age Sensitivity Factors and the need to separately calculate risks require that a Monte Carlo sampling be conducted for each age group and the cancer risk distributions are then summed across age groups.

The HARP software will perform an HRA using a Monte Carlo analysis with either OEHHA-provided or user-provided data distributions and will include the statistics for the distributions. In risk assessments that have chosen to use the distribution of exposure variates, the cancer risk distribution for a 30-year residential exposure duration (MEIR) should be presented in the risk characterization section We also recommend including the 9 and 70-year cancer risk at the MEIR as supplemental information. Note that a 70-year exposure duration is required to estimate cancer burden or provide an estimate of population-wide risk. A stochastic approach has not been developed for acute, 8-hour, and chronic noncancer health impacts or worker (MEIW) exposures.

8.2.9 *Use of Individual Cancer Risk and Population-wide Cancer Risk*

Cancer risk for an individual receptor and a representation of population-wide cancer risk are both important components of a risk assessment. The individual receptor approach reflects the exposures that may occur to an individual receptor over a period of time at a specific location. The individual cancer risk approach has some inherent limitations in terms of illustrating and potentially protecting population-based public health. For example, a facility with a small emissions footprint may impact a few individuals with a high individual potential cancer risk; whereas, a facility with a larger emission footprint may have a lower potential cancer risk for an individual receptor but expose many more people to those levels. Since this larger emitting facility can impact many more people, the population-wide health impacts are magnified due to the larger number of people exposed to the facility’s emissions. This potential for higher population impacts is not captured by the individual receptor risk methodology. Therefore, the individual and population-wide heath impacts should be presented for all facilities to provide a more complete illustration of the facility’s health impacts.

8.2.9.1 Population Risk

For facilities with large emission footprints (e.g., refineries, ports, or rail yards, etc.), population-based health impacts are critical to provide a better illustration of the potential impacts of emissions since large numbers of people may be exposed to the emissions. The individual cancer risk approach has some inherent limitations in terms of protecting public health. A small facility with a single stack can impact a few individuals with an individual cancer risk that is unacceptable, whereas a large facility may have an individual cancer risk that is below the acceptable limit for individual risk but exposes many more people. Thus, the population-wide impacts are larger for the large facility. Population-wide risk is independent of individual risk, and assumes that a population (not necessarily the same individuals) will live in the impacted zone over a

70-year period. Thus, a 70-year exposure duration is required for estimates of population-wide risks.

To evaluate population risk, one method that regulatory agencies have used is the cancer burden method to account for the number of excess cancer cases that could occur in a population.

Cancer Burden

The cancer burden can be calculated by multiplying the cancer risk at a census block centroid by the number of people who live in the census block, and adding up the estimated number of potential cancer cases across the zone of impact. The result of this calculation is a single number that is intended to estimate of the number of potential cancer cases within the population that was exposed to the emissions for a lifetime (70 years).

The cancer burden is calculated on the basis of lifetime (70-year) risks (whereas individual cancer risk at the MEIR is based on 30-year residential exposure). Cancer burden is independent of how many people move in or out of the vicinity of an individual facility. For example, if 10,000 people are exposed to a carcinogen at a concentration with a 1×10^{-5} cancer risk for a lifetime the cancer burden is 0.1, and if 100,000 people are exposed to a 1×10^{-5} risk the cancer burden is 1.

Estimate of Population Wide Risk

An estimate of the number of people exposed at various cancer risk levels can provide perspective on the magnitude of the potential public health threat posed by a facility. This approach is intended as a replacement for or addition to the cancer burden calculation used by some Districts in the past. The new approach provides a much easier way for the general public to interpret results when compared to cancer burden estimates. A facility in a sparsely populated area can have a public health impact different from the same facility in a highly populated area; however, under the cancer burden method, those differences may not be seen. Some suggested approaches and methods for performance of a screening or refined population exposure analyses are provided in Section 4.6.

The District or reviewing authority should be consulted before beginning the population exposure estimates and, as results are generated, further consultation may be necessary. Note that a 70-year exposure duration is required to estimate cancer burden or provide an estimate of population-wide risk.

The zone of impact for estimating the number of persons exposed to a cancer risk from facility emissions should be set at a minimum of a 10^{-6} cancer risk level (see Section 4.6.1). Some Districts may prefer to use a cancer risk of 10^{-7} to define the carcinogenic zone of impact. The total number of persons exposed to a series of potential risk levels can be presented to aid risk managers in understanding the magnitude of the potential public health impacts.

The HARP software can provide population-level risk estimates as cancer burden or as the number of persons exposed to a selected (user-identified) cancer risk level at block level centroids.

8.2.9.2 Population Estimates for Noncancer Health Impacts

A noncancer chronic, 8-hour, and acute population estimate of the number of people exposed to acute, 8-hour, and chronic HQs or HIs exceeding 0.5 or 1.0, in increments of 1.0, should also be presented. For example, a facility with a maximum chronic HI of 4.0 would present the number of people exposed to a chronic HI of 0.5, 1.0, 2.0, 3.0, and 4.0. The isopleths used in this determination should be drawn using the smallest feasible grid size. The same methods that are described in Chapter 4 and Section 8.2.9 (for the population exposure estimate for cancer risk) should be used in the chronic, 8-hour and acute population estimates. Population estimates for acute, 8-hour, and chronic health impacts should be presented separately.

8.2.9.3 Factors That Can Impact Population Risk – Cumulative Impacts

Although the Hot Spots program is designed to address the impacts of single facilities and not aggregate or cumulative impacts, there are a number of known factors that influence the susceptibility of the exposed population and thus may influence population risk. Socioeconomic status influences access to health care, nutrition, and outcome after cancer diagnosis. Community unemployment can affect exposure and residency time near a facility. Factors that affect the vulnerability of the population are discussed in the report *Cumulative Impacts: Building a Scientific Foundation* (OEHHA, 2010). Information on many of these factors is relatively easy to obtain at the census tract level. The OEHHA recommends that these types of factors be considered by the risk manager, along with the quantitative measures of population risk. OEHHA is in the process of developing guidance on quantification of the impact of these factors.

8.2.10 *Cancer Risk Evaluation of Short Term Projects*

The local air pollution control districts sometimes use the risk assessment guidelines for the Hot Spots program in permitting decisions for short-term projects such as construction or waste site remediation. Frequently, the issue of how to address cancer risks from short-term projects arises.

Cancer potency factors are based on animal lifetime studies or worker studies where there is long-term exposure to the carcinogenic agent. There is considerable uncertainty in trying to evaluate the cancer risk from projects that will only last a small fraction of a lifetime. There are some studies indicating that dose rate changes the potency of a given dose of a carcinogenic chemical. In others words, a dose delivered over a short time period may have a different potency than the same dose delivered over a lifetime.

The OEHHA's evaluation of the impact of early-in-life exposure has reduced some of the uncertainty in evaluating the cancer risk to the general population for shorter-term exposures, as it helps account for susceptibility to carcinogens by age at exposure (OEHHA, 2009).

Due to the uncertainty in assessing cancer risk from very short-term exposures, we do not recommend assessing cancer risk for projects lasting less than two months at the MEIR. We recommend that exposure from projects longer than 2 months but less than 6 months be assumed to last 6 months (e.g., a 2-month project would be evaluated as if it lasted 6 months). Exposure from projects lasting more than 6 months should be evaluated for the duration of the project. In all cases, for assessing risk to residential receptors, the exposure should be assumed to start in the third trimester to allow for the use of the ASFs (OEHHA, 2009). Thus, for example, if the District is evaluating a proposed 5-year mitigation project at a hazardous waste site, the cancer risks for the residents would be calculated based on exposures starting in the third trimester through the first five years of life.

For the MEIW, we recommend using the same minimum exposure requirements used for the residential receptor (i.e., no evaluation for projects less than 2 months; projects longer than 2 months but less than 6 months are assumed to last 6 months; projects longer than 6 months would be evaluated for the duration of the project). Although the off-site worker scenario assumes that the workers are 16 years of age or older with an Age-Sensitivity Factor of 1, another risk management consideration for short-term project cancer assessment is whether there are women of child bearing age at the worksite and whether the MEIW receptor has a daycare center. In this case, the Districts may wish to treat the off-site MEIW in the same way as the residential scenario to account for the higher susceptibility during the third trimester of pregnancy, and for higher susceptibility of infants and children.

Finally, the risk manager may want to consider a lower cancer risk threshold for risk management for very short-term projects. Typical District guidelines for evaluating risk management of Hot Spots facilities range around a cancer risk of 1 per 100,000 exposed persons as a trigger for risk management. Permitting thresholds also vary for each District. There is valid scientific concern that the rate of exposure may influence the risk – in other words, a higher exposure to a carcinogen over a short period of time may be a greater risk than the same total exposure spread over a much longer time period. In addition, it is inappropriate from a public health perspective to allow a lifetime acceptable risk to accrue in a short period of time (e.g., a very high exposure to a carcinogen over a short period of time resulting in a 1×10^{-5} cancer risk). Thus, consideration should be given for very short term projects to using a lower cancer risk trigger for permitting decisions.

8.3 Noncancer Acute, 8-Hour, and Chronic Inhalation Health Impacts – the Hazard Index Approach

All substances in the Hot Spots Program that have noncancer health impacts at a receptor must be evaluated through the inhalation pathway. Estimates of noncancer inhalation health impacts are determined by dividing an airborne concentration at the receptor by the appropriate Reference Exposure Level (REL). This is termed the Hazard Index Approach. A REL is used as an indicator of potential noncancer health impacts and is defined as the concentration at which no adverse noncancer health effects are anticipated. When a health impact calculation is performed for a single substance, then it is called the hazard quotient (HQ). Each REL for a substance will have one or more target organ systems (e.g., respiratory system, nervous system, etc.) where the substance can have a noncancer health impact. Thus, all HQs have specified target organ systems associated with them. The sum of the Hazard Quotients of all chemicals emitted that impact the same target organ is termed the Hazard Index. Inhalation RELs for noncancer health impacts have been developed for acute, 8-hour, and chronic exposures to a number of Hot Spots substances. Acute RELs are designed to protect against the maximum 1-hour ground level concentration at the receptor. Eight-hour RELs are designed to protect people with daily 8-hour schedules, such as offsite workers, in an impacted zone. The 8-hour RELs should be used for typical daily work shifts of 8-9 hours. For further questions, assessors should contact OEHHA, the District, or reviewing authority to determine if the 8-hour RELs should be used in your HRA. Any discussions or directions to exclude the 8-hour REL evaluation should be documented in the HRA. Chronic RELs protect against long-term exposure to the annual average air concentration spread over 24 hours/day, 7 days/week.

OEHHA has added 8-hour RELs to the set of noncancer RELs that were previously comprised of acute and chronic RELs (OEHHA, 2008). Specifically, 8-hour RELs are air concentrations at or below which health impacts would not be expected even for sensitive subpopulations in the general population with repeated daily 8-hour exposures over a significant fraction of a lifetime. The 8-hour RELs can be used to evaluate the potential for health impacts (including effects of repeated exposures) in offsite workers, and to children and teachers exposed during school hours. Although not required in the HRA, they could also be applied by the Districts to a residential scenario where a facility operates only a portion of the day and exposure to residences is not adequately reflected by averaging concentrations over a 24 hour day. The number of chemicals with 8-hour RELs will increase as OEHHA re-evaluates RELs for chemicals under SB-25 to ensure that they are protective of children's health.

Acute, 8-hour, and chronic RELs are needed because the dose metrics and even the health impact endpoints may be different with the different exposure durations of acute, daily 8-hour, and chronic exposures. Also, although chronic REL values are lower or set the same as 8-hour RELs, there are some cases such as special meteorological situations (e.g., significant diurnal-nocturnal meteorological differences) or intermittent exposures where the 8-hour REL may be more protective than the chronic REL.

Chapter 4 describes air dispersion modeling and both Chapter 6 and Appendix L list the needed dose-response information to evaluate non-cancer hazards. Appendix I presents sample calculations for determining acute HQs and HIs, 8-hour HQs and HIs, and chronic multipathway HQs and HIs. Chapter 9 provides an outline of information required for risk characterization. The HARP software will calculate the HQ and HI for Hot Spots risk assessments.

8.3.1 *Calculation of Noncancer Inhalation Hazard Quotient and Hazard Index*

To calculate the acute HQ, the maximum 1-hour ground level concentration (in $\mu g/m^3$) of a substance at a receptor is divided by the acute 1-hour REL (in $\mu g/m^3$) for the substance:

$$\text{Acute Hazard Quotient} = \frac{\text{1-Hour Max Concentration } (\mu g/m^3)}{\text{Acute REL } (\mu g/m^3)}$$

To calculate the chronic HQ, the annual average ground level concentration of a substance is divided by the chronic REL for the substance:

$$\text{Chronic Hazard Quotient} = \frac{\text{Annual Average Concentration } (\mu g/m^3)}{\text{Chronic REL } (\mu g/m^3)}$$

To calculate the 8-hour HQ, the adjusted annual average ground level concentration of a substance (represented as “Adjusted C_{air}” in EQ 5.4.1.4 A) is divided by the 8-hour REL for the substance:

$$\text{8-hour Hazard Quotient} = \frac{\text{Adjusted Annual Average Concentration } (\mu g/m^3)}{\text{8-hour REL } (\mu g/m^3)}$$

The daily 8-hour average ground level concentrations used for calculating the 8-hour HQs are derived as described in Chapter 4.

An HQ of 1.0 or less indicates that adverse health effects are not expected to result from exposure to emissions of that substance. As the HQ increases above one, the probability of human health effects increases by an undefined amount. However, it should be noted that a HQ above one is not necessarily indicative of health impacts due to the application of uncertainty factors in deriving the RELs.

If a receptor is exposed to multiple substances that target the same organ system, then the HQs for the individual substances are summed to obtain a Hazard Index (HI) for that target organ.

Table 8.8 is an example of an HRA spreadsheet showing acute inhalation HQs arranged by target organ system for several substances. The bottom row shows the summed HQs by target organ system to derive the HIs.

Table 8.8 Individual Hazard Quotients and Total Hazard Index for Acute Inhalation Exposure

Substance	Reproductive/ Developmental	Nervous System	Cardiovascular System	Respiratory System	Eye
Ammonia				0.6	0.6
Arsenic	0.2	0.2	0.2		
Benzene	0.02				
Chlorine				0.7	0.7
Total Hazard Index	**0.22**	**0.2**	**0.2**	**1.3**	**1.3**

A more detailed example of calculating HQs and HIs and of determining noncancer health impacts is shown in Appendix I.

Hazard quotients or HIs for different target organs are not summed together (e.g., do not add the impacts for the eye to the cardiovascular system). Chapter 6 and Appendix L have lists of the organ systems affected by each substance. Unlike the cancer risk algorithms, no exposure duration adjustment (e.g., 9 yrs / 70 yrs) should be made for noncancer assessments.

There are limitations to this method of assessing cumulative noncancer health impacts. The impact on organ systems may not be additive if health effects occur by different mechanisms. However, the impact on organ systems could also be synergistic. An analysis by a trained health professional familiar with the substance's toxicological literature is usually needed to determine the public health significance of an HQ or HI above one. It is recommended that the Air District contact OEHHA if this situation presents itself. For assessing the noncancer health impacts of lead, different procedures are used; please see Appendix F.

8.3.2 *Calculating Noninhalation (oral) Noncancer Hazard Quotient and Hazard Index*

Similar to the situation with multipathway carcinogenic substances, multipathway substances that present a noncancer hazard are assessed by noninhalation routes of exposure (see Table 8.6). Noninhalation routes of exposure are assessed only for chronic exposure. There are no oral acute RELs since it is generally anticipated that health effects from a single exposure via the oral route at typical environmental levels resulting from deposition of facility emissions would be insignificant relative to the inhalation route. The multipathway substances with noninhalation RELs, called chronic oral RELs, are shown in Table 6.4. Similar to inhalation exposure, the hazard quotient for a noninhalation pathway is obtained by dividing the dose in milligrams per kilogram-day (mg/kg-day) by the oral REL also expressed in units of mg/kg-day:

$$\text{Chronic Non-inhalation HQ} = \frac{\text{Chronic Noninhalation Dose (mg/kg-day)}}{\text{Chronic Oral REL (mg/kg-day)}}$$

The calculated chronic oral HQs are combined with the chronic inhalation HQs for determining the chronic HIs for each affected target organ (see Section 8.3.4). The point estimates and algorithms for calculating the oral dose for all applicable exposure pathways and receptors (e.g., workers or residents) are explained in Chapter 5.

The chronic oral dose calculated in mg/kg-day is based on a time-weighted average 70-year residential exposure combining the 0<2, 2<16 and 16-70 year age groups. Unlike the assessment of cancer risk, no exposure duration adjustment should be made when estimating HQs. In other words, the variates ED and AT in the cancer risk EQ 8.2.5 in Section 8.2.5 are not used for estimating the noncancer HQs. See Appendix I for an example calculation.

8.3.3 *Multipathway Noncancer Risk Methodology*

To determine multipathway chronic noncancer health impacts, it is necessary to calculate the total hazard index from both inhalation and noninhalation exposures. The calculation of HIs has several steps:

1) First, the inhalation HQ is calculated for each substance emitted (Section 8.3.1).
2) Second, if the substance has an oral REL, then the non-inhalation HQ is calculated as shown above using high-end point-estimates for intake rates for each noninhalation pathway that applies.
3) Third, if there are more than two noninhalation pathways to consider for a multipathway substance, then the oral HQ is calculated using high-end point estimates in the dose equation for the two dominant pathways. For any additional noninhalation pathways, the HQs are calculated using average point estimates in the dose equation. This step applies only to residential receptors.
4) Fourth, all noninhalation pathway HQs for a multipathway substance are then summed together by target organ to obtain the total noninhalation HQ for a multipathway substance.
5) The final step is to sum the inhalation and noninhalation HQs together by target organ to determine the HIs. This step is displayed in Table 8.9. If there is only one substance, then the multipathway HQ is the same as the HI.

Table 8.9 Substance-Specific Chronic Inhalation and Noninhalation Hazard Quotients and the Hazard Index by Target Organ System

Substance	Respiratory System	Hematologic System	Alimentary System	Endocrine System	Development	Reproductive System	Nervous System	Cardiovascular System	Skin
Ammonia	0.8								
Arsenic					0.04(i) 0.1(ni)		0.04(i) 0.1(ni)	0.04(i) 0.1(ni)	0.04(i) 0.1(ni)
Benzene		0.08			0.08		0.08		
2,3,7,8-TCDD (dioxin)	0.1(i) 0.2(ni)	0.1(i) 0.2(ni)	0.1(i) 0.2(ni)	0.1(i) 0.2(ni)	0.1(i) 0.2(ni)	0.1(i) 0.2(ni)			
Nickel	0.4(i)	0.4(i)	0.1(ni)						
Hazard Index	**1.50**	**0.78**	**0.40**	**0.3**	**0.52**	**0.30**	**0.22**	**0.14**	**0.14**

i = inhalation pathway contribution

ni = noninhalation pathway contribution

Table 8.9 shows the calculated chronic HIs by combining the chronic inhalation HQs and chronic oral HQs. The HQs or HIs for different target organs are not added together (e.g., do not add the impacts for the respiratory system to the nervous system). The noninhalation pathways for TCDD and arsenic in Table 8.9 have all the noninhalation pathways that apply incorporated into their HQ values. For example, the noninhalation value for arsenic (HQs = 0.1) includes at least the soil ingestion and dermal soil pathways in the HQs because these are the mandatory noninhalation pathways to take into account with exposure to a multipathway substance. For TCDD, the mother's milk pathway is an additional mandatory noninhalation pathway to take into account (See Table 5.1). If there are exposures to any of the site-specific pathways, then these would be included too. A more detailed example calculation of HIs is shown in Appendix I.

When exposure to more than two noninhalation pathways occur, using the high-end point estimates of intake rates for only the two dominant noninhalation pathways will lessen the issue of compounding high-end exposure estimates, while retaining a health-protective approach for the more important exposure pathways. It is unlikely that an individual receptor would be on the high-end of exposure for all the non-inhalation intake parameters (exposure pathways).

8.3.4 *Summary - Acute, 8-Hour and Chronic Hazard Index Calculation at the MEIR and MEIW*

Eight-hour RELs were developed principally for exposure of individuals during 8-hour work schedules. The 8-hour RELs should be used for typical daily work shifts of 8-9 hours. For further questions, assessors should contact OEHHA, the District, or reviewing authority to determine if the 8-hour RELs should be used in your HRA. Any discussions or directions to exclude the 8-hour REL evaluation should be documented in the HRA. There are currently only a limited number of substances with an 8-hour inhalation REL. Over time as the science supporting REL values for individual substances is reviewed and the RELs are revised by OEHHA, more 8-hour RELs will be developed.

Therefore, for the MEIR, we recommend:

- Estimating the acute Hazard Index based on the maximum 1-hour air concentration and 1-hour RELs
- Estimating the chronic Hazard Index based on the annual average air concentration and the chronic RELs, and the oral RELs for multipathway substances

An 8-hour hazard index based on the daily average 8-hour exposure is not required for the MEIR, but can be performed at the discretion of the District for exposure to non-continuously operating facilities using the adjusted annual average air concentration (See EQ 5.4.1.4 A and B or method in App. M). Eight-hour hazard assessments are not recommended for exposure to continuously operating facilities.

For the MEIW, we recommend:

- Estimating the acute Hazard Index based on the maximum 1-hour air concentration and 1-hour RELs
- Estimating the 8-hour Hazard Index based on daily average 8-hour exposure for those chemicals with 8-hour RELs
- Estimating the chronic Hazard Index based on the annual average air concentration and chronic RELs, and oral RELs for multipathway substances

Until there are 8-hour RELs for many of the Hot Spots substances that have a chronic REL value, we recommend determining the chronic HI for the MEIW to adequately protect the offsite worker.

8.3.5 *Evaluation of Background Criteria Pollutants*

The District should be contacted to determine if the contribution of background criteria pollutants to respiratory health effects is required to be included in an HRA for the Hot Spots Program. If inclusion is required, the methods for calculating the health impact from acute and chronic exposure (respiratory endpoint) is the standard HI approach (see Sections 8.3.1 and 8.3.4). There are currently no 8-hour RELs for criteria pollutants, so 8-hour health impacts from criteria pollutants are not assessed in HRAs. The background criteria pollutant contribution should be calculated if the HI from the facility's emissions exceeds 0.5 in either the acute or chronic assessment for the respiratory endpoint.

The most recent criteria pollutant concentration data should be obtained from the ARB's ambient air monitoring network and can be found in the *California Almanac of Emissions and Air Quality* on their web site at *www.arb.ca.gov*. For determining the criteria pollutant contribution in HI calculations, the annual average concentration data should be taken from a monitoring site near the facility. If background contributions are unavailable, the District may direct the risk assessor to make an alternative assumption. The criteria pollutants that should be included in acute and chronic assessments for the respiratory endpoint are ozone, nitrogen dioxide, sulfur dioxide, sulfates, and hydrogen sulfide.

8.4 Uses of Exposure Duration Adjustments for Onsite Receptors

Onsite workers are protected by CAL OSHA and typically are not evaluated under the Hot Spots program. Exceptions may include a worker who also lives on the facility property such as at prisons, military bases, and universities that have worker housing within the facility. Another scenario where the District may require assessment of on-site worker exposure and risk is when a facility (e.g., airport) has multiple businesses owned by different entities within the facility/property (e.g., rental car agencies, restaurants, etc.). In these situations the evaluation of onsite cancer risks, and/or acute, 8-hour, and chronic noncancer hazard indices is appropriate under the Hot Spots program. If the onsite receptor under evaluation can be exposed through a noninhalation exposure pathway, then that exposure pathway must also be included. When a receptor lives and works on the facility, site, or property, then these receptors should be evaluated and reported under both residential and worker scenarios and the one that is most health-protective should be used for risk management decisions.

The cancer risk estimates for the on-site residents may use a 30-year exposure duration while the 25-year exposure duration is used for a worker. Under a Tier 2 analysis, alternate exposure durations may be evaluated and presented with all assumptions supported. See section 8.2.10 for more discussion of short-term exposures.

Other situations that may require on-site receptor assessment include the presence of locations where the public may have regular access for the appropriate exposure period (e.g., a lunchtime café, store, or museum for acute exposures). The District or reviewing authority should be consulted on the appropriate evaluations for the risk for all onsite receptors.

8.5 References

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9 - Summary of the Requirements for a Modeling Protocol and a Health Risk Assessment Report

The AB 2588 program is a community right-to-know act. Although risk assessment is a technical field, AB 2588 risk assessments need to be clear and understandable to the educated lay person. An Executive Summary that explains the process and the results of the risk assessment in lay terms is necessary. Clear risk communication is imperative in situations where the facility is required to notify the surrounding community. In addition, the risk assessment is by law reviewed by the local Air Pollution Control or Air Quality Management District (District) and OEHHA in order to ensure that AB 2588 risk assessment procedures have been followed. This chapter clarifies the type of information that is needed for District and OEHHA review of modeling protocols and health risk assessments (HRAs).

The material presented here is intended to promote transparent, consistent presentation and efficient review of the modeling protocol and the health risk assessment report (products). We recommend that persons preparing these products consult with the local District to determine if the District has modeling or HRA guidelines that supersede these products. If the District does not have guidelines for these products, then we recommend Section 9.1 be used for modeling protocols and Section 9.2 be used for the presentation of HRAs. Persons preparing modeling protocols and HRAs should specify the guidelines that were used to prepare their products.

9.1 Submittal of a Modeling Protocol

It is strongly recommended that a modeling protocol be submitted to the District for review and approval prior to extensive analysis with an air dispersion model. The modeling protocol is a plan of the steps to be taken during the air dispersion modeling and risk assessment process. We encourage people who are preparing protocols to take advantage of the protocol step and fully discuss anticipated methodologies for any portion of your project that may need special consideration. Below, we have provided an example of the format that may be followed in the preparation of the modeling protocol. **Consult with the District to confirm format and content requirements or to determine the availability of District modeling guidelines before submitting the protocol.**

9.1.1 *Outline for a Modeling Protocol*

I. Introduction

Include the facility name, address, and a brief overview describing the facility's operations.

- Provide a description of the terrain and topography surrounding the facility and potential receptors.
- Indicate the format in which data will be provided. Ideally, the report and summary of data will be on paper and all data and model input and output files will be provided electronically (e.g., compact disk or CD).
- Identify the guidelines used to prepare the protocol (e.g., District Guidelines).

II. Emissions

For each pollutant and process whose emissions are required to be quantified in the HRA, list the annual average emissions (pounds/year and grams/second) and the maximum one-hour emissions (pounds/hour and grams/second)[1]. Maximum 1-hour emissions are used for acute noncancer health impacts while annual emissions are used for chronic exposures (i.e., chronic and 8-hour noncancer health impacts or cancer risk assessment).

- Identify the reference and method(s) used to determine emissions (e.g., source tests, emission factors, etc.). Clearly indicate any emission data that are not reflected in the previously submitted emission inventory report. In this event, a revised emission inventory report will need to be submitted to the District.
- Identify if this will be a multipathway assessment based on emitted substances.

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1 Except radionuclides, for which annual and hourly emissions are reported in Curies/year and millicuries/hour, respectively.

III. Models / Modeling Assumptions

Specify the model and modeling assumptions

- Identify the model(s) to be used, including the version number.
- Identify the model options that will be used in the analysis.
- Identify the modeling domain(s) and the spacing of receptor grid(s). Grid spacing should be sufficient in number and detail to capture the concentration at all of the receptors of interest.
- Indicate complex terrain options that may be used, if applicable.
- Identify the source type(s) that will be used to represent the facility's operations (e.g., point, area, or volume sources, flare options or other).
- Indicate the preliminary source characteristics (e.g., stack height, gas temperature, exit velocity, dimensions of volume source, etc.).
- Identify and support the use of urban or rural dispersion coefficients for those models that require dispersion coefficients. For other models, identify and support the parameters required to characterize the atmospheric dispersion due to land characteristics (e.g., surface roughness, Monin-Obukhov length).

IV. Meteorological Data

Specify the type, source, and year(s) of hourly meteorological data (e.g., hourly surface data, upper air mixing height information).

- State how the data are representative for the facility site.
- Describe QA/QC procedures.
- Identify any gaps in the data; if gaps exist, describe how the data gaps are filled.

V. Deposition

- Specify the method to calculate deposition (if applicable).

VI. Receptors

Specify the type and location of receptors. Include all relevant information describing how the individual and population-related receptors will be evaluated.

- Identify and describe the location(s) of known or anticipated potential sensitive receptors, the point of maximum impact (PMI), the maximum exposed individual residential (MEIR), and worker (MEIW) receptors. Identify any special considerations or grids that will be used to model these receptors. This information should correspond with information provided in Section III (e.g., fine receptor spacing of 20 meters at the fence line and centered on the maximum impacts; coarse receptor spacing of 100 meters out to 2,000 meters; extra coarse spacing of 1,000 meters out to 20,000 meters).

- Identify if spatial averaging will be used. Include necessary background information on each receptor including how the domain and spacing will be determined for each receptor or exposure pathway.

- Describe how the cancer burden or population impact estimates are calculated. Clarify the same information for the presentation of noncancer population impacts (e.g., centroids of the census tracts in the area within the zone of impact).

- Specify that actual UTM coordinates and the block/street locations (i.e., north side of 3,000 block of Smith Street), where possible, will be provided for specified receptor locations.

- Identify and support the use of any exposure adjustments (e.g., time at location, diurnal).

- Include the list of anticipated exposure pathways that will be included and indicate which substance will be evaluated in the multipathway assessment. Identify if sensitive receptors are present and which receptors will be evaluated in the HRA.

VII. Maps

Identify how the information will be graphically presented.

- Indicate which cancer risk isopleths will be plotted for the cancer zone of impact (e.g., 10^{-7}, 10^{-6} see Section 4.6.1).

- Indicate the hazard quotients or hazard indices to be plotted for the noncancer acute, 8 hour, and chronic zones of impact (e.g., 0.5, 1.0, etc.).

9.2 Health Risk Assessment Report

The purpose of this section is to provide an outline to assist with the preparation and review of HRAs. This outline specifies the key components that should be included in HRAs. All information used for the report must be presented in the HRA. Ideally, the HRA report and a summary of data used in the HRA will be on paper and all data and model input and output files will be provided electronically (e.g., CD). Persons preparing HRAs for the Hot Spots Program should consult the District to determine if HRA guidelines or special formats are to be followed when preparing and presenting the HRA's results.

If District guidelines or formats do not exist that supersede this outline, then the HRA should follow the format presented here. If the HRA is prepared for other programs, the reviewing authority should be consulted for clarification of format and content. We recommend that those persons preparing HRAs specify the guidelines that were used to prepare their product. **The HRA may be considered deficient by the reviewing authority if components that are listed here are not included**.

9.2.1 *Outline for the Health Risk Assessment Report*

I. Table of Contents

- Section headings with page numbers indicated.
- Tables of tables and Table of figures with page numbers indicated.
- Appendices with page numbers indicated.

II. Executive Summary

Overview of all relevant information regarding the project or facility.

- Facility identifier number (consult the District).

- Description of facility operations and a list identifying emitted substances including table of maximum 1-hour emissions, and annual average emissions.

- Provide a brief description of acute, 8-hour, chronic, and cancer health impacts of the emitted substances, based on OEHHA's descriptions in the appropriate Technical Support Documents.

- Text presenting overview of dispersion modeling and exposure assessment.

- Text describing estimated cancer risk for carcinogens, noncancer Hazard Quotients and Hazard Indices and a table showing target organ systems by substance for noncancer impacts.

- Summarize the individual and population-wide health impacts including the driving substance(s) and the driving exposure pathways:

    - Location (block/street location; e.g., north side of 3,000 block of Smith Street) and description of the off-site point of maximum impact (PMI), maximum exposed individual resident (MEIR), and maximum exposed individual worker (MEIW).

    - Location (block/street location; e.g., north side of 3,000 block of Smith Street) and description of any on-site receptors that were evaluated at the facility (consult District or agency).

    - Location (block/street location; e.g., north side of 3,000 block of Smith Street) and description of any sensitive receptors that are required by the district or reviewing authorities (consult District or agency).

      NOTE: When presenting information described in the following bullets, cancer risk should be presented separately for a residential 30-year, Tier–1 analysis. Results of other exposure assumptions (e.g., 9 or 70-year) or other tier evaluations should also be presented, and must be clearly labeled. For the Hot Spots Program, while the 30-year exposure duration is recommended as the basis for public notification and risk reduction audits and plans, the District has discretion to use the 70 year exposure scenario for its decisions. In addition, the 70 year cancer risk must be calculated to estimate population-wide impacts.

    - Text presenting an overview of the total cancer risk (including multipathway substances, if present) at the PMI, MEIR, MEIW, and sensitive receptors. Provide a table of cancer risk by substance for the MEIR and MEIW (if applicable). Include a statement indicating which of the substances appear to contribute most to (drive) the potential health impacts. In addition, identify the exposure pathways evaluated in the HRA.

    - Provide a map of the facility and surroundings and identify the location of the MEIR, MEIW, PMI, and other locations or receptors of interest.

    - Provide a map of 30-year and 70-year cancer risk zone of impact(s), if applicable.

    - Text presenting an overview of the acute and chronic noncancer hazard quotients and the (total) hazard indices for the PMI, MEIR, MEIW, and sensitive receptors. Additionally, include 8-hour hazard quotients and hazard indices for the MEIW. Include separate statements (for acute, 8-hour, and chronic exposures) indicating which of the substances appear to drive the potential health impacts. In addition, clearly identify the primary target organ(s) that are impacted from acute, 8-hour, and chronic exposures.

- Identify any sensitive subpopulations (e.g., child daycare facilities, schools, nursing homes) of concern.

- Table and text presenting an overview of estimates of population exposure (e.g., cancer burden or population estimates from HARP) (consult District or agency) (see Section 8.4).

- Version of the Risk Assessment Guidelines and computer program(s) used to prepare the risk assessment (e.g., HARP).

III. Risk Assessment Procedures

A. Hazard identification

- Table and text identifying all substances emitted from the facility, plus any other substances required by the District or reviewing authority. Include the CAS number of the substance and the physical form of the substance if possible. [The Hot Spots substances are listed in Appendix A, and also in the ARB's Emission Inventory Criteria and Guidelines Regulations (Title 17, California Code of Regulations, Sections 93300-93300.5), and the Emission Inventory Criteria and Guidelines Report (EICG Report), which is incorporated by reference therein (ARB, 1997)].

- Table and text identifying all substances that are evaluated for cancer risk and/or noncancer acute, 8-hour, and chronic health impacts. In addition, identify any multipathway substances that present a cancer risk or chronic noncancer hazard via noninhalation routes of exposure.

- Describe the types and amounts of continuous or intermittent predictable emissions from the facility that occurred during the reporting year. As required by statute, releases from a facility include spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping (fugitive), leaching, dumping, or disposing of a substance into ambient air. Include the substance(s) released and a description of the processes that resulted in long-term and continuous releases.

B. Exposure Assessment

This section describes the information related to the air dispersion modeling process that needs to be reported in the risk assessment; the information is also presented in Chapter 4 (see Section 4.15). The District may have specific requirements regarding format and content (see Section 4.14). Sample calculations should be provided at each step to indicate how reported emissions data were used. Reviewing agencies must receive input, output, and supporting files of various model analyses on computer-readable media (e.g., CD).

1. *Information on the Facility and its Surroundings*

Report the following information regarding the facility and its surroundings:

- Facility Name
- Location (UTM coordinates and street address)
- Land use type (see Section 2.4)
- Local topography
- Facility plot plan identifying:
  - source locations
  - property line
  - horizontal scale
  - building heights
  - emission sources

2. *Source and Emission Inventory Information*

a. *Release Parameters*

Report the following information for each release location in table format:

- Release location identification number
- Release name
- Release type (e.g., point, volume, area, line, pit, etc.)
- Source identification number(s) used by the facility for sources that emit out of this release location
- Release location using UTM coordinates
- Release parameters by release type (e.g., shown for point source):
- Stack height (m), stack diameter (building dimensions for downwash, exhaust gas exit velocity (m/s), exhaust gas volumetric flow rate (ACFM), exhaust gas exit temperature (K), etc.

b. *Source Description and Operating Schedule*

The description and operating schedule for each source should be reported in table form including the following information:

- Source identification number used by the facility
- Source name
- Number of operating hours per day and per year (e.g., 0800-1700, 2700 hr/yr)
- Number of operating days per week (e.g., Mon-Sat)

- Number of operating days or weeks per year (e.g., 52 wk/yr excluding major holidays)
- Release point identification number(s) for where source emissions are released
- Fraction of source emissions emitted at each release point by release point ID number

c. *Emission Control Equipment and Efficiency*

- Report emission control equipment and efficiency by source and by substance

d. *Emissions Data Grouped By Source*

Report emission rates for each toxic substance, grouped by source (i.e., emitting device or process identified in Inventory Report), in table form including the following information:

- Source name
- Source identification number
- Substance name and CAS number (from Inventory Guidelines)
- Annual average emissions for each substance (lb/yr)
- Hourly maximum emissions for each substance (lb/hr)

e. *Emissions Data Grouped by Substance*

Report facility total emission rate by substance for all emitted substances listed in the Air Toxics “Hot Spots” Program including the following information:

- Substance name and CAS number (from Inventory Guidelines)
- Annual average emissions for each substance (lb/yr)
- Hourly maximum emissions for each substance (lb/hr)

f. *Emission Estimation Methods*

Report the methods used in obtaining the emissions data indicating whether emissions were measured or estimated. Clearly indicate any emission data that are not reflected in the previously submitted emission inventory report and submit a revised emission inventory report to the district. A reader should be able to reproduce the risk assessment without the need for clarification.

g. *List of Substances*

Include tables listing all "Hot Spots" Program substances which are emitted, plus any other substances required by the District. Indicate substances to be evaluated for cancer risks and noncancer effects.

h. *Exposed Population and Receptor Location*

Report the following information regarding exposed population and receptor locations:

- Description of zone of impact including map showing the location of the facility, boundaries of zone of impact, census tracts, emission sources, sites of maximum exposure, and the location of all appropriate receptors. This should be a true map (one that shows roads, structures, etc.), drawn to scale, and not just a schematic drawing. USGS 7.5 minute maps or GIS based maps are usually the most appropriate choices. (If significant development has occurred since the user's survey, this should be indicated.)

- Separate maps for the cancer risk zone of impact and the hazard index (noncancer) zone of impact(s). The cancer zone of impact should include isopleths down to at least the 1/1,000,000 risk level. Because some districts use a level below 1/1,000,000 to define the zone of impact, the District should be consulted. For the noncancer zone of impact, three separate isopleths (to represent chronic, 8-hour, and acute HI) should be created to define the zone of impact for the hazard index from both inhalation and noninhalation pathways greater than or equal to 0.5. The point of maximum impact (PMI), maximum exposed individual at a residential receptor (MEIR), and maximum exposed individual worker (MEIW) for both cancer and noncancer risks should be located on the maps.

- Tables identifying population units and sensitive receptors (UTM coordinates, receptor IDs or index from the modeling, and street addresses of specified receptors)

- Heights or elevations of the receptor points.

- **Spatial averaging**: For each receptor type (e.g., PMI, MEIR, and MEIW, or other location of interest) that will utilize spatial averaging, the domain size and grid resolution must be clearly identified. If another domain or grid resolution other than 20 meters by 20 meters with 5-meter grid spacing will be used for a receptor, then care should be taken to determine the proper domain size and grid resolution that should be used. For a worker, the HRA shall support all assumptions used, including, but not limited to, documentation for all workers showing the area where each worker routinely performs their duties. The final domain size should not be greater than the smallest area of worker movement. Other considerations for determining domain size and grid spacing resolution may include an evaluation of the concentration gradients across the worker area. The grid spacing used within the domain should be sufficient in number and detail to obtain a representative concentration across the area of interest. When spatial averaging over the deposition area of a pasture, garden, or water body, care should be taken to determine the proper domain size to make sure it includes all reasonable areas of potential deposition. The size and shape of the pasture, garden, or water body of interest should be identified and used for the modeling domain. The grid spacing or resolution used within the domain should be sufficient in detail to obtain a representative deposition concentration across the area of interest. One way to determine the grid resolution is to include an evaluation of the concentration gradients across the deposition area. The HRA shall support all assumptions used, including, but not limited to, documentation of the deposition area (e.g., size and shape of the pasture or water body, maps, representative coordinates, grid resolution, concentration gradients, etc.). The use or spatial averaging is subject to approval by the reviewing authority. This includes the size of the domain and grid resolution that is used for spatial averaging of a worksite or multipathway deposition area.

3. Meteorological Data

If meteorological data were not obtained directly from the District, then the report must clearly indicate the data source and time period used. Meteorological data not obtained from the District must be submitted in electronic form along with justification for their use including information regarding representativeness and quality assurance.

The risk assessment should indicate if the District required the use of a specified meteorological data set. All memos indicating the District's approval of meteorological data should be attached in an appendix.

4. Model Selection and Modeling Rationale

The report should include an explanation of the model chosen to perform the analysis and any other decisions made during the modeling process. The report should clearly indicate the name of the models that were used, the level of detail (screening or refined analysis) and the rationale behind the selection.

Also report the following information for each air dispersion model used:

- Version number
- Selected options and parameters in table form

- Identify the modeling domain(s) and the spacing of receptor grid(s). Grid spacing should be sufficient in number and detail to capture the concentration at all receptors of interest.

5. Air Dispersion Modeling Results

The report should include tables, text, and appendices that clearly present all of the following information

- Maximum hourly and annual average concentrations of chemicals at appropriate receptors such as the residential and worker MEI receptors

- Annual average and maximum one-hour (and 30-day average for lead only) concentrations of chemicals at appropriate receptors listed and referenced to computer printouts of model outputs

- Model printouts (numbered), annual concentrations, maximum hourly concentrations

- Disk with input/output files for air dispersion program (e.g., the AERMOD input file containing the regulatory options and emission parameters, receptor locations, meteorology, etc.)

- Include tables that summarize the annual average concentrations that are calculated for all the substances at each site. The use of tables that present the relative contribution of each emission point to the receptor concentration is recommended. (These tables should have clear reference to the computer model which generated the data. It should be made clear to any reader how data from the computer output were transferred to these tables.) [As an alternative, the above two tables could contain just the values for sites of maximum impact (i.e., PMI, MEIR and MEIW), and sensitive receptors, if required. All the values would be found in the Appendices.]

C. ***<u>Health Values Used in Dose-Response and Dose Estimates</u>***

- Provide tables of the acute, 8-hour and chronic inhalation RELs, chronic oral RELs (if applicable), and cancer potency factors for each substance that is quantified in the HRA.

- Identify the guidelines (title and date) that were used to obtain these factors, or indicate whether newly approved values obtained from the OEHHA website were used.

- Provide a table of target organ systems for each noncancer substance, including acute (1 hour), 8-hour, and chronic inhalation, and chronic oral (if applicable).

- Include tables of the estimated dose for each substance by each exposure pathway at the PMI, MEIR, MEIW, and at any sensitive receptor locations (required by the District).

*D. **Risk Characterization***

The Hot Spots Analysis and Reporting Program (HARP) will generate the risk characterization data needed for the outline below. Any data needed to support the risk characterization findings should be clearly presented and referenced in the text and appendices. A listing of HARP output files that meet these HRA requirements is provided in this outline under the section entitled “Appendices”. All HARP files should be included in the HRA. Ideally, the HRA report and a summary of data used in the HRA will be on paper and all data and model input and output files will be provided electronically (e.g., CD). Information on obtaining copies of HARP is available on the California Air Resources Board’s Internet web site under the Air Toxics Program at www.arb.ca.gov.

NOTE: The cancer risk for the PMI, MEIR, and sensitive receptors of interest must be presented in the HRA’s text, tables, and maps. OEHHA recommends that cancer risk for a 30-year exposure duration be presented for the MEIR, and that cancer risk for 9-year and 70-year exposure durations for the MEIR be presented to provide the risk managers with supplemental information. Note that the assessment of population impacts must be based on a 70-year exposure duration; thus all risk assessments need to estimate cancer risk for a 70-year exposure duration in order to report the number of individuals residing in the risk isopleths, or to calculate cancer burden if the District so requires. In addition, some Districts may opt to make risk management decisions based on a 70-year exposure duration. The MEIW location should use a 25-year exposure period.

All HRAs must include the results of a Tier-1 exposure assessment (see Chapter 2 and 8, or the 2012 TSD). If the reviewing authority specifies that additional exposure periods should be presented, or if persons preparing the HRA would like to present additional information (i.e., exposure duration adjustments or the inclusions of risk characterizations using Tier-2 through Tier-4 exposure data), then this information should be presented in separate, clearly titled, sections, tables, and text.

The following information should be presented in this section of the HRA. If not fully presented here, then by topic, clearly identify the section(s) and pages within the HRA where this information is presented.

- Description of receptors to be quantified.

- Table and text providing the location [UTM coordinates, receptor ID number or index from the modeling, and the block/street address (e.g., north side of 3,000 block of Smith Street)] and description of the PMI, MEIR, and MEIW for both cancer and noncancer risks.

- Separate tables and text providing description of the PMI and MEIR for 30-year cancer risk, and 9- or 70-year cancer risk.

- Tables and text describing MEIW 25-year cancer risk.

- Table and text providing the location [UTM coordinates, receptor ID number or index from the modeling, and the block/street address (e.g., north side of 3,000 block of Smith Street)] and description of any sensitive receptor that is of interest to the District or reviewing authorities (consult District or agency).

- Provide any exposure information that is used for risk characterization (e.g., concentrations at receptors, emissions information, census information, figures, zone of impact maps, etc.). If multipathway substances are emitted, identify the site/route dependent exposure pathways (e.g., water ingestion) for the receptor(s), where appropriate (e.g., MEIR).

- Provide a summary of the site-specific inputs used for each exposure pathway (e.g., water or grazing intake assumptions). This information may be presented in an appendix with the information clearly presented and cross-referenced to the text. In addition, provide reference to the appendix (section and page number) that contains the modeling (i.e., HARP/dispersion modeling) files that show the same information.

- If any exposure parameters were used other than those provided in the Air Toxics Risk Assessment Guidelines: Technical Support Document for Exposure Assessment and Stochastic Analysis (2012), they must be presented in detail. The derivation and data used must be presented so that it is clear to the reviewer. The justification for using site-specific exposure parameters must be clearly presented.

- Table and text presenting the potential multipathway cancer risk by substance, by pathway, and total, at the PMI, MEIR, MEIW, and sensitive receptor locations (required by the District).

- Table and text presenting the acute (inhalation only) and chronic noncancer (inhalation and oral) hazard quotients (by substance, exposure pathways, and target organs) and the (total) hazard indices by substance and target organs for the PMI, MEIR, MEIW, and sensitive receptors. For 8-hour exposure at the MEIW (inhalation only), table and text presenting hazard quotients (by substance, exposure pathways, and target organs) and the (total) hazard indices by substance and target organs. Note:

Chronic noncancer results should be shown with inhalation and oral contributions (shown separately) and for the combined (multipathway) impact.

- Identify any sensitive subpopulations (e.g., child daycare facilities, schools, nursing homes) of concern.

- Table and text presenting estimates of population exposure (e.g., population exposure estimates or cancer burden from HARP) (consult District or agency). Tables should indicate the number of persons exposed to a (total) cancer risk greater than 10^{-7}, 10^{-6}, 10^{-5}, 10^{-4}, etc., and total hazard quotient or hazard index greater than 0.5, 1.0, 2.0, and 3.0, etc. Provide a table that shows excess cancer burden for each population unit and the total excess cancer burden, if cancer burden calculation is required.

- Provide maps that illustrate the HRA results for the three sub-bullet points below. These maps should be an actual street map of the area impacted by the facility with elevation contours and actual UTM coordinates, and the facility boundaries clearly labeled. In some cases the elevation contours will make the map too crowded and should therefore not appear. This should be a true map (one that shows roads, structures, etc.), drawn to scale, and not just a schematic drawing. USGS 7.5-minute maps are usually the most appropriate choice (see Section 4.6).

    - The facility (emission points and boundaries), the locations of the PMI, MEIR, MEIW, and sensitive receptors.

    - Maps of the cancer zone of impacts (e.g., 10^{-6} or 10^{-7} levels - consult District or Agency). The map should clearly identify the zone of impact for the inhalation pathway, the minimum exposure pathways (soil ingestion, dermal exposure, and breast-milk consumption) if multipathway substances are emitted, and the zone of impact for all the applicable exposure pathways (minimum exposure pathways plus any additional site/route specific pathways) for multipathway analyses. Two maps may be needed to accomplish this. The legend of these maps should state the level(s) used for the zone of impact and identify the exposure pathways that were included in the assessment.

    - Maps of the noncancer hazard index (HI) zone of impacts (e.g., 0.5 or 1.0 - consult District or Agency). The noncancer maps should clearly identify the noncancer zones of impact. These include the acute (inhalation), 8-hour (inhalation), chronic (inhalation), and chronic (multipathway) zones of impact. For clarity, presentation of the noncancer zones of impact may require two or more maps. The legend of these maps should state the level(s) used for the zone of impact and identify the exposure pathways.

- The risk assessor may want to include a discussion of the strengths and weaknesses of the risk analyses and associated uncertainty directly related to the facility HRA.

- If appropriate, comment on the possible alternatives for control or remedial measures. How do the risks compare?

- If possible, identify any community concerns that influence public perception of risk.

- Sample calculations may be needed for all analyses in the HRA if proprietary software other than HARP was used. The District should be consulted. These calculations should be clearly presented and referenced to the findings they are supporting in the HRA text.

- Version of the Risk Assessment Guidelines and computer program used to prepare the risk assessment.

- If software other than HARP is used for the health assessment modeling, all supporting material must be included with the HRA (e.g., all algorithms and parameters used in a clear, easy to review format).

E. ***References***

Include any references used for the HRA in this section.

F. ***Appendices***

The appendices should contain all data, sample calculations, assumptions, and all modeling and risk assessment files that are needed to reproduce the HRA results. Ideally, a summary of data used in the HRA will be on paper and all data and model input and output files will be provided electronically (e.g., CD), unless otherwise specified by the district or reviewing authority. All appendices and the information they contain should be referenced, clearly titled, and paginated.

Potential Appendix Topics (if not presented elsewhere in the HRA report):

- List of all receptors locations (UTM coordinates, receptor ID number or index from the modeling, and the block/street address (e.g., north side of 3,000 block of Smith Street)) for the PMI, MEIR, MEIW, and sensitive receptors.
- List of all emitted substances.
- All emissions files.

- List of dose-response factors (Reference Exposure Levels and cancer potency factors).
- All air dispersion modeling input and output files. Detailed discussions of meteorological data, regulatory options, emission parameters, receptor locations, etc.
- Census data.
- Maps.
- Identify the site/route dependent exposure pathways for the receptor(s), where appropriate (e.g., MEIR). Provide a summary of the site-specific inputs used for each pathway (e.g., water or grazing intake assumptions) and the data to support them.
- All calculations used to determine emissions, concentrations, and potential health impacts at the PMI, MEIR, MEIW, and sensitive receptors.
- All HRA model input and output (HARP) files for receptors of concern.
- (Total) cancer and noncancer impacts by receptor, substance, and exposure pathway (by endpoint for noncancer) at all receptors.
- Presentation of alternate risk assessment methods (e.g., alternate exposure durations, or Tier-2 to Tier-4 evaluations with supporting information).

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List of Abbreviations

A - Area
AB2588 - Air Toxics “Hot Spots” Information and Assessment Act, 1987
ACFM - Actual Cubic Feet per Minute
ADL - Annual Dermal Load
AQMD - Air Quality Management District (District)
ARB - Air Resources Board
ASF - Age Sensitivity Factor
AT - Average Time for Lifetime Cancer Risk
BAF - Bioaccumulation Factor
BG - Urban Block Groups
BLP - Buoyant Line and Point Source Dispersion Model
BMI - Breast Milk Intake
BPIP - Building Profile Input Program
BPIPPRM - Building Profile Input Program for PRIME
BSA - Body Surface Area
BW - Bodyweight
C_{air} - annual average air concentration
CALMPRO - Calms processor program
CAPCOA - California Air Pollution Control Officer’s Association
CAS - Chemical Abstracts Service
CERCLA - Comprehensive Environmental Response, Compensation and Liability Act
C_f - Average concentration of a substance in fish
C_m - Average concentration of a substance in mother’s milk (mislabeled on 114 as Cf)
C_{fa} - Average concentration of a substance in animal products
CONST2 - Constant in the Briggs’ stable plume rise equation using BLP
CONST3 - Constant in the Briggs’ neutral plume rise equation using BLP
CPF - Cancer Potency Factor
CRIT - Convergence criterion for the line source calculations using BLP
Cs - Concentration of Substance in the Soil
CTDMPLUS - Complex Terrain Dispersion Model
CTSCREEN - Complex Terrain Screening Model
Cv - Average concentration of a substance in and on vegetation
Cw - Concentration of a Substance in the Water
DECFAC - Pollutant decay factor for use with BLP
DF - Discount Factor
$DOSE_{air}$ - Daily inhaled dose
$DOSE_{fa}$ - Exposure through ingesting home-raised or farm animal products
$DOSE_{fish}$ - Exposure through ingestion of angler-caught fish
Dose-Im - Exposure through mother’s milk ingestion
$DOSE_p$ - Exposure through ingesting home-grown produce
$DOSE_{water}$ - Exposure through ingesting water

DTHTA - Vertical potential temperature gradient
DTSC - Department of Toxic Substance Control
EASA - Exposure Assessment and Stochastic Analysis
ED - Rural Enumeration Districts or Exposure Duration (in years)
EF - Exposure Frequency
EICG - Emission Inventory Criteria and Guidelines
EPA - Environmental Protection Agency
EQ - Equation
F - Fahrenheit
FAH - Fraction of Time at Home
FG - Fraction of diet provided by grazing
GIS - Geographic Information Systems
GLC - Ground-Level Concentrations
GRAF - Gastrointestinal Relative Absorption Factor
HARP - Hot Spots Analysis and Reporting Program
HESIS - Hazard Evaluation System and Information Service
HI - Hazard Index
HQ - Hazard Quotient
HRA - Health Risk Assessment
HSC - Health and Safety Code
IARC - International Agency for Research on Cancer
IDELS - Maximum variation in number of stability classes per hour (BLP option)
ISCST3 - Industrial Source Complex Short Term
IUPAC - International Union of Pure and Applied Chemistry
K - Kelvin
L - Fraction of locally-grown (source-impacted) feed that is not pasture (site-specific)
LOAEL - Lowest Observed Adverse Effects Level
LOD - Level of Detection
LSHEAR - Plume rise wind shear (BLP option)
LTRANS - Transitional point source plume rise (BLP option)
MAXIT - Maximum iterations allowed for line source calculations (BLP option)
MEIR - Maximally Exposed Individual Resident
MEIW - Maximally Exposed Individual Worker
METDB - Meteorological Database
METS - Metabolic Equivalents
MPRM - Meteorological Processor for Regulatory Models
MWAF - Molecular Weight Adjustment Factor
NAS - National Academy of Sciences
NCDC - National Climatic Data Center
NOAEL-No Observed Adverse Effects Level
NTP - National Toxicology Program
NWS - National Weather Station
OCD - Offshore and Coastal Dispersion Model
OEHHA - Office of Environmental Health Hazard Assessment
p - Population density
PAH - Polycyclic Aromatic Hydrocarbons

PCB - Polychlorinated Biphenyl
PCDD - Polychlorinated dibenzo-p-dioxins
PCDF - Polychlorinated dibenzofurans
PEXP - Vertical wind speed power law profile exponents
PM2.5 - Particulate Matter less than 2.5 microns in diameter
PM10 - Particulate Matter less than 10 microns in diameter
PMI - Point of Maximum Impact
QA - Quality Assurance
QC - Quality Control
RCRA - Resource Conservation and Recovery Act
REL - Reference Exposure Level
RfC - Reference Concentration
RfD - Reference Dose
SCRAM - Support Center for Regulatory Air Models
SDM - Shoreline Dispersion Model
SIR - Soil Ingestion Rate
SMAQMD - Sacramento Metropolitan Air Quality Management District
SRP - Scientific Review Panel
TAC - Toxic Air Contaminant
Tco – Biotransfer coefficient
TEF - Toxic Equivalency Factor
TERAN – Terrain option in BLP
TSD - Technical Support Document
TSP - Total Suspended Particulates
UCL - Upper Confidence Limits
USGS - U.S. Geological Survey
UTM - Universal Transvers Mercator
WAF - Worker Adjustment Factor
WHO - World Health Organization

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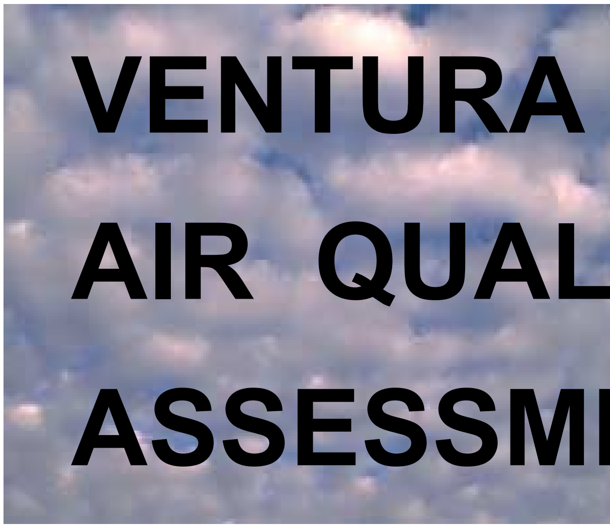

VENTURA COUNTY AIR QUALITY ASSESSMENT GUIDELINES

October 2003

Ventura County
Air Pollution
Control District

VENTURA COUNTY

AIR QUALITY ASSESSMENT

GUIDELINES

Adopted by the Ventura County

Air Pollution Control Board

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Ventura County Air Pollution Control District
Planning and Evaluation Division
669 County Square Drive, 2nd Floor
Ventura, California 93003
805/645-1400

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VENTURA COUNTY AIR POLLUTION CONTROL DISTRICT

Mission Statement

To protect public health and agriculture from the adverse effects of air pollution by identifying air pollution problems and developing a comprehensive program to achieve and maintain state and federal air quality standards.

Air Pollution Control Officer

Michael Villegas

Planning and Evaluation Division Manager

Scott Johnson

Authors

The Ventura County Air Quality Assessment Guidelines is authored by staff of the Planning and Evaluation Division of the Ventura County Air Pollution Control District, as follows:

Chuck Thomas, Supervising Air Quality Specialist
Genie McGaugh, Supervising Air Quality Specialist
Janna Minsk, Air Quality Specialist II (former)
Molly Pearson, Air Quality Specialist I (former)
Elaine Searcy, Air Quality Specialist II
Alicia Stratton, Air Quality Specialist II
Andy Brown, Air Quality Specialist II

Editorial Assistance

Suzanne Taylor, Management Assistant II

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1. INTRODUCTION

1.1 INTRODUCTION

The California Environmental Quality Act (CEQA) requires evaluation of the environmental impacts, including air quality impacts, of proposed projects. CEQA applies to all discretionary activities proposed or approved by California public agencies, unless an exemption applies. The *Ventura County Air Quality Assessment Guidelines* (Guidelines) is an advisory document that provides lead agencies, consultants, and project applicants with a framework and uniform methods for preparing air quality evaluations for environmental documents.

The Guidelines recommend specific criteria and threshold levels for determining whether a proposed project may have a significant adverse air quality impact. The Guidelines also provide mitigation measures that may be useful for mitigating the air quality impacts of proposed projects. It should be noted, however, that these are guidelines only, and their use is not required or mandated by the Ventura County Air Pollution Control District (APCD or District). The final decision of whether to use these Guidelines rests with the lead agency responsible for approving the project.

The Guidelines are available for purchase from the District by calling 805/645-1433, or they can be downloaded free of charge from the District website at http://www.vcapcd.org/pubs.htm. This document is divided into eight chapters:

- Chapter 1: Introduction
- Chapter 2: Environmental Setting
- Chapter 3: Air Quality Significance Thresholds
- Chapter 4: Air Quality Management Plan Consistency
- Chapter 5: Estimating Ozone Precursor Emissions
- Chapter 6: Assessing Project-Specific, Localized, Non-Ozone Impacts
- Chapter 7: Mitigation Measures
- Chapter 8: General Conformity

The Guidelines are not applicable to equipment or operations required to have Ventura County APCD permits (Authority to Construct or Permit to Operate). APCD permits are generally required for stationary and portable (non-vehicular) equipment or operations that may emit air pollutants. This permit system is separate from CEQA and involves reviewing equipment design, followed by inspections, to ensure that the equipment will be built and operated in compliance with APCD regulations. The District has a two-step permit processing system. An Authority to Construct must be obtained before initiating construction or installation of the equipment or operations subject to APCD permit requirements. The second step of the process requires the applicant to apply for a Permit to Operate upon completion of construction or installation authorized by an Authority to Construct.

Moreover, the emissions from equipment or operations requiring APCD permits are not counted towards the air quality significance thresholds. This is for two reasons. First, such equipment or processes are subject to the District's New Source Review permit system, which is designed to produce a net air quality improvement. Second, facilities are required to mitigate emissions from equipment or processes subject to APCD permit by using emission offsets and by installing Best Available Control Technology (BACT) on the process or equipment.

To determine whether or not the proposed equipment or operation requires an APCD Permit, contact the APCD Engineering Division at 805/645-1401. Table 1-1 lists examples of equipment and operations that may require an APCD permit pursuant to the APCD Rules and Regulations. See Appendix B, Common Equipment and Processes Requiring a Ventura County APCD Permit To Operate, for more a more detailed list of processes and equipment that require an APCD Permit to Operate.

The District assists project applicants and lead agencies with preparation of environmental documents by providing air quality data and other needed information. The District also reviews and comments on air quality sections of environmental documents and prepares air quality sections of environmental documents for agencies upon request.

The District may be involved in the CEQA process in several ways, as described below:

Lead Agency - The District acts as a lead agency when it has the primary authority to implement or approve a discretionary project. This typically occurs when air pollution rules and air quality plans are developed.

Responsible Agency - The District acts as a responsible agency when it has discretionary approval authority over an aspect of a project, but does not have the primary discretionary authority of a lead agency. As a responsible agency, the District may coordinate the environmental review process with the District's permitting process.

Commenting Agency - The APCD acts as a commenting agency for projects that have the potential to impact air quality and for which it is not a lead agency or a responsible agency. To this end, the APCD regularly reviews and provides comments on environmental documents prepared by lead agencies.

TABLE 1-1
EXAMPLES OF EQUIPMENT AND OPERATIONS THAT MAY REQUIRE AN APCD PERMIT

<u>Combustion Equipment</u>
- Boilers and process heaters
- Engines 50 HP or greater
- Gas turbines
- Incinerators

<u>Equipment That Emit Dust or Other Particulate Matter</u>
- Concrete batch plants
- Asphalt concrete plants
- Rock, sand, and aggregate plants
- Abrasive blasting operations

<u>Equipment and Processes That Emit Solvents or Other Reactive Organic Compounds (ROC)</u>
- Dry-cleaning machines
- Gasoline tanks and dispensing facilities
- Contaminated soil or groundwater remediation systems
- General painting and coating operations

<u>Equipment and Processes That Emit Air Toxics or May Cause a Nuisance</u>
- Chrome plating operations
- Operations such as spa, bathtub, or counter-top manufacturing that use polyester resins
- Wood stripping operations that use methylene chloride
- Agricultural produce fumigation chambers that use organic gases

The District is available for consultation at any time during the project review and approval process. At certain times, consultation is required by CEQA. When the District has discretionary approval authority over an aspect of a project for which another public agency is serving as lead agency, the District should be consulted as a responsible agency. Moreover, CEQA requires and provides opportunities for District review before the preparation of the environmental document and during public review of the completed environmental document.

The District encourages local jurisdictions to address air quality issues as early as possible in the project review process. Local jurisdictions should work with project applicants on issues such as potential land use conflicts and site design to encourage transportation alternatives to the automobile. Resolving land use and site design issues while a proposal is at the conceptual stage maximizes opportunities to incorporate measures to minimize a project's air quality impacts. By the time a project gets to the CEQA process, it may be more costly and time-consuming to redesign the project to incorporate air quality mitigation measures. Therefore, features benefiting air quality should be incorporated into a project before significant resources have been expended designing the project.

In Ventura County, motor vehicles are the largest category of air pollutant emissions. Land use decisions are critical to air quality planning because land use patterns influence transportation usage. The District encourages site planning that incorporates land use design features that benefit air quality. Project applicants and consultants should consider land use design issues during project design to:

- Encourage the development of higher density housing and employment centers near public transit corridors.
- Encourage compact development featuring a mix of uses that locates residences near jobs and services.
- Provide services such as food sales, banks, post offices, and other personal services within office parks and other large developments.
- Encourage infill development.
- Ensure that the design of streets, sidewalks, and bike paths within a development encourages walking and biking.
- Orient building entrances toward sidewalks and transit stops.
- Provide landscaping to reduce energy demand for cooling.
- Orient buildings to minimize energy required for heating and cooling.

1.2 BACKGROUND

Air pollution is hazardous to human health. It also diminishes the yield and quality of many agricultural crops, reduces atmospheric visibility, degrades soils and materials, and damages native vegetation. State and national ambient air quality standards are established to protect public health and welfare, and minimize the effects mentioned above. These standards pertain to pollutants in ambient air, the air that people breathe outside of buildings as they go about their daily activities.

The federal government has established National Ambient Air Quality Standards (NAAQS) to protect public health (primary standards); and welfare, such as property and agriculture (secondary standards). California has separate, more stringent standards. There are state and national standards for ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM), and lead (Pb). In addition, California has standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles. Table 2-1, "Ambient Air Quality Standards," presents federal and state ambient air quality standards. Regions throughout the state and country are classified as being either attainment or nonattainment areas, depending on the number of times an air quality standard has been exceeded.

The air pollutants of most concern in Ventura County are ozone and particulate matter. Ventura County is an attainment area for all standards presented in Table 2-1, "Ambient Air Quality Standards," except the following:

Ozone	1 Hour	State and Federal: Nonattainment
	8 Hour	Federal: Not designated*
PM_{10}	24 Hour	State: Nonattainment**
	Annual Average	State: Nonattainment**
$PM_{2.5}$	24 Hour	Federal: Not designated
	Annual Average	State and Federal: Not designated

* The California Air Resources Board (ARB)has recommended to the United States Environmental Protection Agency (U.S. EPA) a designation of nonattainment for Ventura County.

** The ARB has designated Ventura County a nonattainment area based upon the state 24 hour and annual average PM_{10} standards

Check the District website at http://www.vcapcd.org for the most current attainment status.

Ozone, the primary ingredient of smog, is formed in the atmosphere through complex chemical reactions involving ROC, nitrogen oxides (NOx), and ultraviolet energy from the sun.

Particulate matter is comprised of very small solids or liquids, such as dust, soot, aerosols, fumes, and mists. The particles of primary concern are those with an aerodynamic diameter of 10 microns or smaller (PM_{10}). From a health perspective, the most damaging component of PM_{10} is the fine particle fraction 2.5 microns or smaller ($PM_{2.5}$). These particles have the greatest likelihood of being inhaled deeply and remaining in the lungs.

The federal Clean Air Act Amendments of 1990 (CAAA) require that states achieve the NAAQS by specified dates, based on the severity of an area's air quality problem. Ventura County is designated a severe ozone nonattainment area, and as such, is required by the CAAA to attain the federal one-hour ozone standard by November 15, 2005 (see Section 1.3.2, "Federal Clean Air Act"). Ventura County has made significant progress toward attainment of the federal one-hour ozone standard. For years 2000 - 2002, Ventura County averaged only one ozone exceedance day per year, technically meeting the federal standard. Ventura County is still officially designated a nonattainment area for the federal standard, however. Ventura County has not been designated for the federal eight-hour ozone standard.

As of April 2003, air quality data indicate that Ventura County is in compliance with the federal annual $PM_{2.5}$ standard; official designation has not yet taken place.

Ventura County must also comply with the requirements of the California Clean Air Act (CCAA). The CCAA became effective January 1, 1989, and requires that all areas of California attain and maintain the State Ambient Air Quality Standards by the earliest practicable date (see Section 1.3.3, "California Clean Air Act"). Ventura County frequently exceeds the state ozone standard and is designated a severe ozone nonattainment area. The state ozone standard is more stringent than the federal one-hour ozone standard, and will be more difficult to attain.

PM_{10} concentrations in Ventura County exceed the state 24-hour air quality standard. Ventura County has not yet been classified for the state new PM_{10} or $PM_{2.5}$ annual average standards.

1.3 REGULATORY SETTING

1.3.1 California Environmental Quality Act

CEQA (Public Resources Code (PRC) §§21000 - 21177) was enacted by the State Legislature in 1970. The purpose of CEQA is to help ensure that governmental decision-makers and the public are fully informed of potential significant environmental effects of proposed projects and activities. CEQA also requires that environmental impacts be avoided or reduced where feasible. Project alternatives must be considered that accomplish the project purpose if the project is found to have significant impacts. Mitigation measures are employed when no feasible alternative can be identified. Any feasible mitigation measure that reduces the severity of a significant impact to insignificance must be implemented. When there are no feasible, viable alternatives, and there are no feasible mitigation measures available to reduce the project's impact, a statement of overriding considerations can be adopted. This enables a public agency to approve a project despite significant environmental effects. However, a public agency that approves a project with significant impacts after all feasible mitigation measures have been applied, must disclose to the public its reasons for approving the project despite the significant impacts.

CEQA applies to activities directly undertaken by governmental agencies, activities financed in whole or in part by governmental agencies, and private activities that require approval from governmental agencies. There are several basic steps in the CEQA process. First, an agency determines whether a project is subject to CEQA or exempt from CEQA analysis. Second, if the project is subject to CEQA, the agency prepares an

Initial Study to determine whether the project may have a significant effect on the environment. If there is no substantial evidence that the project may have a significant effect, the agency prepares a Negative Declaration (ND). If the project can be modified to avoid or reduce the significant effect to a level of less than significant (and there is no substantial evidence that the project as revised may have a significant effect), the agency prepares a Mitigated Negative Declaration (MND). If the Initial Study shows that the project may have a significant effect, and the effects cannot be reduced to a less than significant level with an MND, the agency prepares an Environmental Impact Report (EIR).

An EIR is a detailed report that analyzes the environmental effects of a project, identifies potential measures to mitigate identified significant adverse environmental effects, and potential project alternatives. If mitigation measures or alternatives are not available or are infeasible, a project may still be approved if the lead agency makes certain formal findings.

The California Resources Agency adopts procedures, known as the "CEQA Guidelines" (California Code of Regulations (CCR) §§15000 - 15387), that provide detailed steps that lead agencies must follow to implement CEQA. Sections of CEQA and the CEQA Guidelines that are relevant for the preparation of air quality analyses are presented in Appendix C, Sections of CEQA and the CEQA Guidelines Relevant to Air Quality Impact Analysis.

1.3.2 Federal Clean Air Act

The first comprehensive national air pollution legislation was the federal Clean Air Act of 1970. In 1977, the federal Clean Air Act was amended to require plans for meeting the national health-based standards "as expeditiously as practicable," but no later than December 31, 1982. However, the Clean Air Act permitted the U.S. EPA to extend the attainment date of some ozone and carbon monoxide nonattainment areas.

In 1990, the federal Clean Air Act was significantly amended. Under the CAAA, areas that do not meet the federal one-hour ozone standard are classified according to the severity of each area's respective ozone problem. The classifications are Marginal, Moderate, Serious, Severe, and Extreme. Marginal areas are closest to meeting the federal one-hour ozone standard. Extreme areas have the worst air quality problems. Areas with more severe ozone problems have progressively more stringent requirements to meet under the federal Clean Air Act. An area's classification determines how long the area has to attain the federal ozone standard. Marginal areas had three years; Moderate areas - six years; Serious areas - nine years; Severe areas - either 15 or 17 years, depending on the magnitude of their ozone problem; and, Extreme areas - 20 years. The South Coast Air Basin is the only area in the country designated as Extreme. Ventura County is a Severe area for ozone and must attain the federal one-hour ozone standard by 2005.

The CAAA contain a number of requirements designed to improve air quality. These include motor vehicle emission limits, pollution controls on industrial facilities, use of low-polluting vehicle fuels, permit and compliance programs, and economic incentives to encourage industries to voluntarily curtail emissions.

In July 1997, the U.S. EPA approved new federal standards for $PM_{2.5}$, and modified the PM_{10} and ozone standards. The new federal standards are presented in Table 2-1, "Ambient Air Quality Standards."

1.3.3 California Clean Air Act

The CCAA was enacted on September 30, 1988, and became effective January 1, 1989. The purpose of the CCAA is to achieve the more stringent health-based state clean air standards at the earliest practicable date.

The state standards are more stringent than the federal air quality standards. Similar to the federal Clean Air Act, the CCAA also classifies areas according to pollution levels. Under the CCAA, Ventura County is a severe ozone nonattainment area, and is a state PM_{10} nonattainment area. The CCAA requires that the standards be attained at the earliest practicable date. Further, districtwide air emissions must be reduced at least five percent per year (averaged over three years) for each nonattainment pollutant or its precursors. A district may achieve a smaller average reduction if the district can demonstrate that, despite inclusion of every feasible measure in its air quality plan, it is unable to achieve the five percent annual reduction in emissions.

On June 20, 2002, the ARB approved revisions to the PM_{10} annual average standard, and established an annual average standard for $PM_{2.5}$. These standards are presented in Table 2-1, "Ambient Air Quality Standards."

1.3.4 Ventura County Air Quality Management Plan

The 1991 Air Quality Management Plan (AQMP) was prepared in response to the CCAA. The 1991 Plan elaborated on information contained in the 1982 and 1987 AQMPs. It also included new and modified control measures designed to move the county further toward achieving state clean air standards.

The 1994 AQMP was prepared to satisfy the planning requirements of the CAAA and to outline a strategy for meeting the federal one-hour ozone clean air standard while accommodating anticipated growth. The Plan indicated that Ventura County would attain the federal one-hour air quality standard for ozone by 2005.

The District prepared a revision to the 1994 AQMP in 1995. This revision updated information that had changed since the 1994 AQMP, including minor adjustments to the 1990 baseline emission inventory, actions taken by the ARB to approve additional control strategies, changes to the photochemical modeling, and several other changes. The 1995

Plan Revision indicated that Ventura County would attain the federal one-hour ozone standard by 2005. It focused on ways to reduce ozone levels, and did not address PM_{10}, since Ventura County is an attainment area for the federal PM_{10} standard. The U.S. EPA approved the 1994 AQMP and 1995 AQMP Revision on February 7, 1997.

The District prepared a 1997 AQMP Revision to update the proposed adoption and implementation dates for nine control measures that were included in the 1995 Plan Revision. The U.S. EPA approved the 1997 AQMP Revision on April 21, 1998.

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2. ENVIRONMENTAL SETTING

2.1 INTRODUCTION

Section 15125 of the California Environmental Quality Act (CEQA) Guidelines states that "an environmental impact report (EIR) must include a description of the environment in the vicinity of the project, as it exists before the commencement of the project, from both a local and regional perspective." This chapter of the *Ventura County Air Quality Assessment Guidelines* (Guidelines) can be used as the basis for the air quality setting section of environmental documents. It also provides a description of the environmental factors that affect regional and local air pollutants.

The information in the air quality setting section of an EIR should include a discussion of the existing levels of air pollutants at the proposed project site and significant sources of air emissions, both stationary and mobile, at the site.

2.2 AIR QUALITY SETTING

The United States Environmental Protection Agency (U.S. EPA) and the California Air Resources Board (ARB) have established ambient air quality standards to protect the health and welfare of the general public. Regions throughout the state and country are classified as being either attainment or nonattainment for specific criteria pollutants, depending on the number of times an air quality standard is exceeded. Table 2-1, "Ambient Air Quality Standards," shows federal and state air quality standards for criteria pollutants.

Ventura County is located in the South Central Coast Air Basin (comprised of Ventura County, Santa Barbara County, and San Luis Obispo County, see Figure 2-1, "Ventura County Air Pollution Control District Boundaries").

Ventura County is a severe nonattainment area for the federal and state one-hour ozone standards, and has been recommended by the ARB as a nonattainment area for the federal eight-hour ozone standard. Table 2-2, "Number of Days Exceeding the Federal and State Ambient Air Quality Standards for Ozone," shows the number of days exceeding the federal and state ozone standards from 1990 to 2002. Table 2-3, "Maximum Ozone Concentrations - Ventura County," shows the maximum one-hour ozone concentrations in Ventura County during this same period. Ozone concentrations have declined steadily at most air monitoring stations, as have the number of exceedances, since 1980. These air quality improvements have occurred despite a growing population. Between 1980 and 2002, Ventura County's population increased by 253,500, a 47.6 percent increase. Although ozone levels have declined significantly in recent years, the county still experiences frequent violations of the state ozone standard. Inland areas of the county (Simi Valley, Thousand Oaks, and Piru) exceed the ozone standard more frequently than the coastal areas.

TABLE 2-1
AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	California Standards [1]	National Standards [2]	
		Concentration [3]	Primary [3,4]	Secondary [3,5]
Ozone (O_3)	1 Hour	0.09 ppm (180 μg/m^3)	0.12 ppm (235 μg/m^3) [6]	Same as Primary Standard
	8 Hour	-----	0.08 ppm (157 μg/m^3) [6]	
Fine Particulate Matter ($PM_{2.5}$)	24 Hour	No Separate State Standard	65 μg/m^3	Same as Primary Standard
	Annual Arithmetic Mean	12 μg/m^3 *	15 μg/m^3	
Respirable Particulate Matter (PM_{10})	24 Hour	50 μg/m^3	150 μg/m^3	Same as Primary Standard
	Annual Arithmetic Mean	20 μg/m^3 *	50 μg/m^3	
Carbon Monoxide (CO)	8 Hour	9.0 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	None
	1 Hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	-----	0.053 ppm (100 μg/m^3)	Same as Primary Standard
	1 Hour	0.25 ppm (470 μg/m^3)	-----	
Lead	30 Day Average	1.5 μg/m^3	-----	-----
	Calendar Quarter	-----	1.5 μg/m^3	Same as Primary Standard
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	-----	0.030 ppm (80 μg/m^3)	-----
	24 Hour	0.04 ppm (105 μg/m^3)	0.14 ppm (365 μg/m^3)	-----
	3 Hour	-----	-----	0.5 ppm (1300 μg/m^3)
	1 Hour	0.25 ppm (655 μg/m^3)	-----	-----
Visibility Reducing Particles	8 Hour	Extinction coefficient of 0.23 per kilometer – visibility of ten miles or more (0.07 – 30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent.	No National Standards	
Sulfates	24 Hour	25 μg/m^3		
Hydrogen Sulfide	1 Hour	0.03 ppm (42 μg/m^3)		

* On June 20, 2002, the Air Resources Board approved staff's recommendation to revise the PM_{10} annual average standard to 20 μg/m^3 and to establish an annual average standard for $PM_{2.5}$ of 12 μg/m^3. These standards took effect on July 5, 2003. Information regarding these revisions can be found at http://www.arb.ca.gov/research/aaqs/std-rs/std-rs.htm.

1. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, suspended particulate matter PM_{10}, $PM_{2.5}$, and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.
2. National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The 1-hour ozone standard is attained when the expected number of days per calendar year with maximum hourly concentrations over the standard is equal or less than one. The 8-hour ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when 99 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact U.S. EPA for further clarification and current national policies.
3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25^{o}C and a reference pressure of 760 torr, Most measurements of air quality are to be corrected to a reference temperature of 25^{o}C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
4. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect public health.
5. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse affects of a pollutant.
6. New national 8-hour ozone and fine particulate matter standards were promulgated by U.S. EPA on July 18, 1997. Contact U.S. EPA for further clarification and current national policies.

FIGURE 2-1
VENTURA COUNTY AIR POLLUTION CONTROL DISTRICT BOUNDARIES

TABLE 2-2
NUMBER OF DAYS EXCEEDING THE FEDERAL AND STATE AMBIENT AIR QUALITY STANDARDS FOR OZONE
(1-hour standard*)

Location	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
El Rio	0/9**	0/12	3/17	1/8	0/7	0/7	0/8	0/2	0/1	0/1	0/0	0/0	0/0
Ventura	0/5	2/12	0/4	2/5	0/3	0/4	1/10	0/2	0/0	0/0	0/0	0/0	0/0
Simi Valley	14/86	32/97	6/58	8/40	15/80	22/85	13/73	2/47	4/37	2/31	1/31	2/32	0/14
Piru	4/46	4/44	0/15	0/4	2/19	1/20	0/17	0/6	1/4	0/3	0/3	0/16	0/10
Ojai	2/27	4/30	4/33	1/23	2/17	2/27	2/38	0/10	0/13	0/7	0/15	1/17	1/15
Thousand Oaks	3/27	0/20	2/31	4/22	2/28	1/28	5/26	0/20	1/13	0/9	0/6	0/4	0/3
Countywide	18/99	33/106	10/69	13/58	17/88	23/90	17/80	2/59	5/41	2/33	1/37	2/34	1/23

*Federal 1-hour standard: >0.12 parts per million; State 1-hour standard: >0.09 parts per million.
**Number of days exceeding national standard/number of days exceeding state standard.
Source: Ventura County Air Pollution Control District (APCD), February 2003.

TABLE 2-3
MAXIMUM OZONE CONCENTRATIONS - VENTURA COUNTY
(hourly average - parts per million)

Location	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
El Rio	0.12	0.12	0.14*	0.14	0.12	0.12	0.12	0.10	0.11	0.10	0.08	0.09	0.09
Ventura	0.11	0.13	0.11*	0.14	0.10	0.12	0.13	0.11	0.09	0.09	0.08	0.09	0.08
Simi Valley	0.16	0.17	0.14	0.15	0.16	0.17	0.16	0.13	0.17	0.13	0.13	0.13	0.12
Piru	0.14	0.15	0.12	0.11	0.14	0.13	0.12	0.11	0.13	0.10	0.10	0.12	0.12
Ojai	0.14	0.17	0.15	0.14	0.13	0.14	0.14	0.11	0.11	0.11	0.11	0.13	0.13
Thousand Oaks	0.17	0.12	0.13*	0.13	0.14	0.15	0.14	0.12	0.13	0.11	0.10	0.12	0.12

*Does not meet representative criteria.

Source: Ventura County APCD, February 2003.

Ventura County also is a nonattainment area for the state standard for PM_{10} (particulate matter with an aerodynamic diameter of 10 microns or smaller). Table 2-4, "Number of Days Exceeding the State Ambient Air Quality Standards for PM_{10}," shows the number of violations of the state PM_{10} standard from 1990 to 2002.

Ambient levels of other pollutants in Ventura County do not violate state or federal standards.

TABLE 2-4
NUMBER OF DAYS EXCEEDING THE STATE AMBIENT AIR QUALITY STANDARDS FOR PM_{10}
(24-hour standard*)

Location	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
El Rio	10	4	5	4	2	3	1	3	1	1	1	2	2
Ventura	4	4	2	1	1	2	0	**	**	**	**	**	**
Simi Valley	11	16	7	4	4	8	2	4	0	6	3	4	3
Piru	8	11	5	5	2	4	5	8	1	2	3	1	1
Ojai	7	7	1	1	1	0	0	0	2	2	0	0	0
Thousand Oaks	**	**	3	2	4	4	1	3	0	5	6	1	0
Countywide	20	24	10	10	8	9	7	13	3	10	9	5	6

*Greater than 50 micrograms per cubic meter.
**No monitor at location.

Source: Ventura County APCD, February 2003.

2.3 METEOROLOGICAL FACTORS AFFECTING AIR QUALITY

The air above Ventura County often exhibits weak vertical and horizontal dispersion characteristics, which limit the dispersion of emissions and cause increased ambient air pollutant levels. Persistent temperature inversions prevent vertical dispersion. The inversions act as a "ceiling" that prevents pollutants from rising and dispersing. Mountain ranges act as "walls" that inhibit horizontal dispersion of air pollutants.

The diurnal land/sea breeze pattern common in Ventura County recirculates air contaminants. Air pollutants are pushed toward the ocean during the early morning by the land breeze, and toward the east during the afternoon, by the sea breeze. This creates a "sloshing" effect, causing pollutants to remain in the area for several days. Residual emissions from previous days accumulate and chemically react with new emissions in the presence of sunlight, thereby increasing ambient air pollutant levels.

This pollutant "sloshing" effect happens most predominantly from May through October ("smog" season). Air temperatures are usually higher and sunlight more intense during the "smog" season. This explains why Ventura County experiences the most exceedances of the state and federal ozone standards during this six-month period.

2.4 EFFECTS OF AIR POLLUTION

2.4.1 Health Effects

Ambient air pollution is a major public health concern. The most well-known acute air pollution episodes occurred in the Meuse Valley, Belgium in 1930 (60 deaths); in Donora, Pennsylvania in 1948 (20 deaths); and London, England in 1952 (4,000 deaths). Although acute air pollution episodes with such readily evident excess deaths are now unlikely in the United States, air pollution continues to be linked to respiratory illness and a slight increase in death rates.

According to the ARB, 80,000 deaths that occur each year in California may be attributed to illnesses aggravated by air pollution. While air pollution affects everyone, some people are more susceptible to its effects than others. Research has established that air pollution:

- Aggravates heart and lung illnesses.
- Adds stress to the cardiovascular system, forcing the heart and lungs to work harder to provide oxygen to the body.
- Speeds the aging process of the lungs, accelerating the loss of lung capacity.
- Damages respiratory system cells even after symptoms of minor irritation disappear.
- May cause immunological changes.
- Causes lung inflammation.
- Increases health care utilization (hospitalization, physician, and emergency room visits).
- May contribute to the development of diseases such as asthma, bronchitis, emphysema, and cancer.
- May cause a reduction in life span.

The federal government estimates that between 10 and 12 percent of United States total health costs are attributable to air pollution-related illnesses. Air pollution is thought to be responsible for a two percent loss in United States worker efficiency. If ozone pollution were reduced in urban areas, there would be approximately 49.9 million fewer cases of air pollution-related illnesses annually in the United States; asthma attacks alone would decrease by 1.9 million annually.

On a per-capita basis, the health benefits measured in dollars from reducing ozone concentrations to federal and state one-hour standards are estimated to be $196 and $214 each year, respectively, for every person living in the South Coast Air Basin (the greater Los Angeles area). Per capita annual health benefits associated with meeting federal and state particulate standards are estimated to be $575 and $972, respectively. Assuming the per capita savings in the South Coast Air Basin are applicable to Ventura County, the projected health cost savings for achieving the PM_{10} standard in Ventura County is estimated to be $45 to $69 million per year. According to the U.S. EPA, for every dollar spent on air pollution controls since 1970, $45 has been gained in health and environmental benefits.

2.4.2 Effects on Plants

2.4.2.1 Damage to Agriculture

Increased health costs are only one portion of the total economic effects that result from air pollution. Many of the major agricultural crops grown in California, including Ventura County, are significantly damaged by air pollution, with from 20 to 50 percent of losses in some crop yields. Studies on the effects of smog exposure on fruit trees (specifically orange trees, ornamental plants, and home garden plants) have shown reductions in fruit yield and visible plant damage resulting from smog. One study showed that productivity of Valencia orange trees can be reduced by 30 percent when exposed to ozone levels that frequently occur in Southern California. Another study showed that naval orange trees produced about 50 percent more fruit when protected from smog. In addition, trees protected from smog dropped fewer leaves. The statewide average yield loss for citrus due to air pollution was about 11 percent in 1988.

Smog and particulates interfere with photosynthesis and can injure leaves, reduce growth, reduce crop quality, reduce reproductive capacity, increase weed and pest infestation, and/or kill the plant, thereby reducing crop yield. Damage often occurs before visible symptoms of injury are noticed. Particulates also can interfere with beneficial biological pest control by preventing beneficial insects from preying on agricultural crop-eating pests.

Areas in California where plant damage from air pollution has been reported coincides with the areas of highest population density. These areas include a triangular zone extending from the Mexican border to approximately 80 miles north and eastward of Ventura. Some of the greatest plant damage from air pollution is seen on fruit and vegetable crops, and flowers.

According to a 1987 study by the ARB, a number of important statewide crops suffer substantial yield losses due to ozone. Air pollution has been estimated to cost the agricultural industry in California between $150 million and $1 billion a year. An economic analysis of the costs of air pollution to agriculture attributes 90 percent of direct crop losses from air pollution to ozone. Nationally, ozone is estimated to account for a five to ten percent loss in agricultural production. The cost of this loss from ozone is about $5 billion each year. The greatest agricultural losses due to air pollution are in those crops in which the foliage is the marketed portion of the plant, such as lettuces, alfalfa, and spinach. Beans are no longer commercially grown in Southern California because of their susceptibility to air pollution.

Damage to agricultural crops from air pollution is an economic concern in Ventura County. According to the ARB, several agricultural crops grown in Ventura County suffer from exposure to air pollution. One study concluded that ozone exposure in Ventura County caused a reduction in orange crop yield of 19 percent in 1991. For that same year, lemon crops suffered an eight percent yield reduction, sweet corn seven percent, and dry beans 19 percent yield reductions, respectively.

2.4.2.2 Damage to Natural Vegetation

Air pollution is known to harm all major native plant groups, including flowering plants, conifers, ferns, mosses, lichens, and fungi. The effects on native vegetation are similar to those of agricultural crops. In the Geysers region of Napa, Lake, and Sonoma counties, injury to native plants, such as oaks and maples, has taken place downwind of geothermal power plants. Trees and other plant life in the San Joaquin Valley and adjacent Sierra Nevada Mountains suffer from air pollution generated in the upwind urban areas. Ozone damage has been observed in the forests of Southern California and in the Sierra Nevada mountains. Certain species of oak and pine trees are sensitive to air pollution.

Studies on Ponderosa and Jeffrey Pines trees in the 1980s revealed that two out of every five Ponderosa and Jeffrey Pine trees exhibited needle damage from air pollution. The National Park Service has measured an eleven percent reduction in the growth rate of selected Jeffrey Pine trees since 1965. Pine needles exposed to ozone develop yellow, blotchy marks and needles older than two years fall off, giving branches a whiskbroom appearance. Needles and debris from trees killed by smog not only increase the risk of forest fire, but reduce seed germination and the chances of seedling survival.

Coastal sage scrub and chaparral also are sensitive to air pollutants. The most important effect is a reduced ability to cope with drought, disease, and insects. Air pollution may put these plants at a reproductive disadvantage by causing them to produce fewer seeds. These conditions can lead to changes in succession, resulting in a totally different plant community occupying a site.

Total yield and quality of forage and range are all affected by air pollution. This presents serious consequences for the state’s livestock industry. Compared to grasses grown in clean air, loss in yield of grasses grown in smoggy air is as high as 10 to 20 percent. Moreover, ozone reduces carbohydrate levels of grasses by up to 56 percent.

2.4.3 Damage to Materials

In addition to human health and vegetation, air pollution also damages materials such as plastics, rubber, paint, and metals. Damage includes erosion and discoloration of paint, cracking of rubber, corrosion of metals and electrical components, soiling and decay of building stone and concrete, fading, a reduction of tensile strengths of fabrics, and soiling and crumbling of nonmetallic building materials. High smog concentrations significantly shorten the lifespan of materials, which increases maintenance and replacement costs. The national cost of damage to materials caused by ozone is estimated to range from $1.5 to $3.9 billion every year.

2.5 CRITERIA AIR POLLUTANTS

A criteria air pollutant is any air pollutant for which ambient air quality standards have been set by the U.S. EPA or the ARB. Criteria pollutants include ozone (O_3), fine particulate matter ($PM_{2.5}$), respirable particulate matter (PM_{10}), carbon monoxide (CO), nitrogen dioxide (NO_2), lead (Pb), sulfur dioxide (SO_2), visibility-reducing particles, sulfates, and hydrogen sulfide. The sections below provide more detail about the criteria pollutants of concern in Ventura County.

2.5.1 Ozone

Ozone is formed in the atmosphere by a series of complex chemical reactions and transformations in the presence of sunlight. Oxides of nitrogen (NOx) and reactive organic compounds (ROC) are the principal constituents in these reactions. Ozone is a pungent, colorless, toxic gas and is the major air pollutant of concern in Ventura County.

Sources: Ozone is known as a secondary pollutant because it is formed in the atmosphere through a complex series of chemical reactions, rather than emitted directly into the air. The major sources of NOx in Ventura County are motor vehicles and other combustion processes. The major sources of ROC in Ventura County are motor vehicles, cleaning and coating operations, petroleum production and marketing operations, and solvent evaporation.

Effects: Ozone is a strong irritating gas that can chemically burn and cause narrowing of airways, forcing the lungs and heart to work harder to provide oxygen to the body. A powerful oxidant, ozone is capable of destroying organic matter – including human lung and airway tissue; it essentially burns through cell walls. Ozone damages cells in the lungs, making the passages inflamed and swollen. Ozone also causes shortness of breath, nasal congestion, coughing, eye irritation, sore throat, headache, chest discomfort, breathing pain, throat dryness, wheezing, fatigue, and nausea. It can damage alveoli, the individual air sacs in the lungs where oxygen and carbon dioxide are exchanged. Ozone has been associated with a decrease in resistance to infections. People most likely to be affected by ozone include the elderly, the young, and athletes. Ozone may pose its worst health threat to people who already suffer from respiratory diseases such as asthma, emphysema, and chronic bronchitis.

2.5.2 Particulate Matter 10 Microns or Smaller in Diameter (PM_{10})

PM_{10} consists of particulate matter (fine dusts and aerosols) ten microns or smaller in aerodynamic diameter. Ten microns is about one-seventh the width of a human hair. When inhaled, particles larger than ten microns generally are caught in the nose and throat and do not enter the lungs. PM_{10} gets into the large upper branches of the lungs just below the throat, where they are caught and removed (by coughing, spitting, or swallowing).

Sources: The primary sources of PM_{10} include: dust, paved and unpaved roads, diesel exhaust, acidic aerosols, construction and demolition operations, soil and wind erosion, agricultural operations, residential wood combustion, and smoke. Secondary sources of PM_{10} include tailpipe emissions and industrial sources. these sources have different constituents, and therefore, varying effects on health. Road dust is compost of many particles other than soil dust. It also includes engine exhaust, tire rubber, oil, and truck load spills. Diesel exhaust contains many toxic particle and elemental carbon (soot), and is considered a toxic air contaminant in California. Airborne particles absorb and adsorb toxic substances and can be inhaled and lodge in the lungs. Once in the lungs, the toxic substances can be adsorbed into the bloodstream and carried throughout the body.

PM_{10} concentrations tend to be lower during the winter months because meteorology greatly affects PM_{10} concentrations. During rain, concentrations are relatively low, and on windy days, PM_{10} levels can be high. Photochemical aerosols, formed by chemical reactions with manmade emissions, may also influence PM_{10} concentrations.

Effects: Elevated ambient particulate levels are associated with premature death, an increased number of asthma attacks, reduced lung function, aggravation of bronchitis, respiratory disease, cancer, and other serious health effects.

Short-term exposure to particulates can lead to coughing, minor throat irritation, and a reduction in lung function. Long-term exposure can be more harmful. The U.S. EPA estimates that eight percent of urban non-smoker lung cancer risk is due to PM_{10} in soot from diesel trucks, buses, and cars. Additional studies by the U.S. EPA and the Harvard School of Public Health estimate that 50,000 to 60,000 deaths per year in the United States are caused by particulates. PM_{10} particles collect in the upper portion of the respiratory system, affecting the bronchial tubes, nose, and throat. They contribute to aggravation of asthma, premature death, increased number of asthma attacks, bronchitis, reduced lung function, respiratory disease, aggravation of respiratory and cardiovascular disease, alteration of lung tissue and structure, changes in respiratory defense mechanisms, and cancer.

2.5.3 Particulate Matter 2.5 Microns or Smaller in Diameter ($PM_{2.5}$)

$PM_{2.5}$ is a mixture of particulate matter (fine dusts and aerosols) 2.5 microns or smaller in aerodynamic diameter. 2.5 micrometers is approximately 1/30 the size of a human hair; so small that several thousand of them could fit on the period at the end of this sentence. Particles 2.5 microns or smaller get down into the deepest portions of the lungs where gas exchange occurs between the air and the blood stream. These are the most dangerous particles because the deepest portions of the lungs have no efficient mechanisms for removing them. If these particles are soluble in water, they pass directly into the blood stream within minutes. If they are not soluble in water, they are retained deep in the lungs and can remain there permanently.

Sources: $PM_{2.5}$ particles are emitted from activities such as industrial and residential combustion processes, wood burning, and from diesel and gasoline-powered vehicles. They are also formed in the atmosphere from gases such as sulfur dioxide, nitrogen oxides, ammonia, and volatile organic compounds that are emitted from combustion activities, and then become particles as a result of chemical transformations in the air (secondary particles).

Effects: $PM_{2.5}$ infiltrates the deepest portions of the lungs and remains there longer, increasing the risks of long-term disease, including chronic respiratory disease, cancer, and increased and premature death. Other effects include increased respiratory stress and disease, decreased lung function, alterations in lung tissue and structure, and alterations in respiratory tract defense mechanisms.

2.5.4 Carbon Monoxide

Carbon monoxide is a common colorless, odorless, highly toxic gas. It is produced by natural and anthropogenic combustion processes.

Sources: The major source of CO in urban areas is incomplete combustion of carbon-containing fuels (primarily gasoline, diesel fuel, and natural gas). However, it also results from combustion processes, including forest fires and agricultural burning. Over 80 percent of the CO emitted in urban areas is contributed by motor vehicles.

Ambient CO concentrations are generally higher in the winter, usually on cold, clear days and nights with little or no wind. Low wind speeds inhibit horizontal dispersion, and surface inversions inhibit vertical mixing.

Traffic-congested intersections have the potential to result in localized high levels of CO. These localized areas of elevated CO concentrations are termed CO “hotspots.” CO hotspots are defined as locations where ambient CO concentrations exceed the State Ambient Air Quality Standards (20 ppm, 1-hour; 9 ppm, 8-hour).

Effects: When inhaled, CO does not directly harm the lungs. The impact from CO is on oxygenation of the entire body. CO combines chemically with hemoglobin, the oxygen-transporting component of blood. This diminishes the ability of blood to carry oxygen to the brain, heart, and other vital organs. Red blood cells have 220 times the attraction for CO than for oxygen. This affinity interferes with movement of oxygen to the body's tissues. Effects from CO exposure include headaches, nausea, and death. People with heart ailments are at risk from low-level exposure to CO. Also sensitive are people with chronic respiratory disease, the elderly, infants and fetuses, and people suffering from anemia and other conditions that affect the oxygen-carrying capacity of blood. High levels of CO in a concentrated area can result in asphyxiation. Studies show a synergistic effect when CO and ozone are combined.

2.5.5 Nitrogen Dioxide

Nitrogen dioxide is formed in the atmosphere primarily by the rapid reaction of the colorless gas nitric oxide (NO) with atmospheric oxygen. It is a reddish brown gas with an odor similar to that of bleach. NO_2 participates in the photochemical reactions that result in ozone.

Sources: The greatest source of NO, and subsequently NO_2, is the high-temperature combustion of fossil fuels such as in motor vehicle engines and power plant boilers. NO_2 and NO are referred to collectively as NOx.

Effects: NO_2 can irritate and damage the lungs, cause bronchitis and pneumonia, and lower resistance to respiratory infections such as influenza. Researchers have identified harmful effects similar to those caused by ozone, with progressive changes over four hours of exposure. Negative health effects are apparent after exposure to NO_2 levels as low as 0.11 ppm for a few minutes. This level of exposure may elicit or alter sensory responses. Higher concentrations (0.45 - 1.5 ppm) may cause impaired pulmonary function, increased incidence of acute respiratory disease, and difficult breathing for both bronchitis sufferers and healthy persons.

2.5.6 Lead

Lead is a bluish-gray metal that occurs naturally in small quantities. Lead also occurs in a variety of compounds such as lead acetate, lead chloride, lead chromate, lead nitrate, and lead oxide. Pure lead is insoluble in water. However, some lead compounds are water-soluble.

Sources: Lead and lead compounds in the atmosphere often come from fuel combustion sources, such as the burning of solid waste, coal, and oils. Historically, the largest source of lead in the atmosphere resulted from the combustion of leaded gasoline in motor vehicles. However, with the phase-out of leaded gasoline, concentrations of lead in the air have substantially decreased. Industrial sources of atmospheric lead include steel and iron factories, lead smelting and refining, and battery manufacturing. Atmospheric lead may also result from lead in entrained dust and dirt contaminated with lead. Lead-based paints were commonly used in the past, and lead paint chips or dust can be inhaled or ingested.

Effects: Acute health effects of lead may include gastrointestinal distress (such as colic), brain and kidney damage, and even death. Lead also has numerous chronic health effects, including anemia, central nervous system damage, and male and female reproductive dysfunction, as well as effects on blood pressure, kidney function, and vitamin D metabolism. Developing fetuses and children are particularly sensitive to lower concentrations of blood lead, and the effects may include increased risk of pre-term delivery, low birth weight, and the impairment of hearing, growth, and mental development. The U.S. EPA's Office of Air Quality Planning and Standards ranks lead as a "high concern" pollutant based on its severe chronic toxicity. Human studies regarding the cancer risks of lead have been inconclusive. However, the U.S. EPA considers lead to be a probable human carcinogen.

2.5.7 Sulfur Dioxide

Sulfur dioxide is a colorless gas with a sharp, irritating odor. It can react in the atmosphere to produce sulfuric acid and sulfates, which contribute to acid deposition and atmospheric visibility reduction. It also contributes to the formation of PM_{10}.

Sources: Most of the SO_2 emitted into the atmosphere is from burning sulfur-containing fossil fuels by mobile sources such as marine vessels and farm equipment, and stationary fuel combustion.

Effects: SO_2 irritates the mucous membranes of the eyes and nose, and may also affect the mouth, trachea, and lungs. Healthy people may experience sore throats, coughing, and breathing difficulties when exposed to high concentrations. SO_2 causes constriction of the airways and poses a health hazard to asthmatics, who are very sensitive to SO_2. Research indicates that normally-breathing asthmatics performing moderate to heavy exercise will experience SO_2-induced bronchoconstriction (breathing difficulties) when breathing SO_2 for at least five minutes at concentrations lower than one part per million. Consecutive SO_2 exposures (repeated within 30 minutes or less) result in a diminished response compared with the initial exposure. Children often experience more respiratory tract infections when they are exposed to SO_2.

2.6 TOXIC AIR CONTAMINANTS

Toxic air contaminants (TACs), also referred to as hazardous air pollutants, are air pollutants (excluding O_3, CO, SO_2, and NO_2) that may reasonably be anticipated to cause cancer, developmental effects, reproductive dysfunction, neurological disorders, heritable gene mutations, or other serious or irreversible acute or chronic health effects in humans.

TACs are regulated under different federal and state regulatory processes than ozone and the other criteria air pollutants. Health effects of TACs may occur at extremely low levels and it is typically difficult to identify levels of exposure that do not produce adverse health effects.

TACs generally consist of four types: organic chemicals, such as benzene, dioxins, toluene, and percholorethylene; inorganic chemicals such as chlorine and arsenic; fibers such as asbestos; and metals such as mercury, cadmium, chromium, and nickel. These air contaminants are defined by the U.S. EPA, the State of California, and other governmental agencies. Currently, more than 900 substances are regulated TACs under federal, state, and local regulations. Appendix D, Major Toxic Air Contaminant Regulations and Common Toxic Air Contaminant Sources and Substances, presents the major federal and state programs and regulations to reduce toxic air contaminant emissions.

Sources: Toxic air contaminants are produced by a great variety of sources, including industrial facilities such as refineries, chemical plants, chrome plating operations, and surface coating operations; commercial facilities such as dry cleaners and gasoline stations, motor vehicles, especially diesel-powered vehicles; and, consumer products. TACs can be released as a result of normal industrial operations, as well as from accidental releases during process upset conditions.

Effects: Health effects from TACs vary with the type of pollutant, the concentration of the pollutant, the duration of exposure, and the exposure pathway. TACs usually get into the body through breathing, although they can also be ingested, or absorbed through the skin.

Adverse effects on people tend to be either acute (short-term) or chronic (long-term). Acute effects result from short-term, high levels of airborne toxic substances. These effects may include nausea, skin irritation, caridiopulomary distress, and even death. Chronic effects result from long-term, low level exposure to airborne toxic substances. Effects can range from relatively minor to life-threatening. Less serious chronic effects can include skin rashes, dry skin, coughing throat irritation, and headaches. More serious chronic effects can include lung, liver, and kidney damage; nervous system damage; miscarriages, and genetic and birth defects; and, cancer. Many TACs can have both carcinogenic and non-carcinogenic health effects.

2.7 OTHER POLLUTANTS OF CONCERN

2.7.1 San Joaquin Valley Fever

San Joaquin Valley Fever (formally known as Coccidioidomycosis) is an infectious disease caused by the fungus *Coccidioides immitis*. San Joaquin Valley Fever is also known as Valley Fever, Desert Fever, or Cocci.

Sources: Infection is caused by inhalation of *Coccidioides immitis* spores that have become airborne when dry, dusty soil or dirt is disturbed by wind, construction, farming, or other activties. The Valley Fever fungus tends to be found at the base of hillsides, in virgin, undisturbed soil. It usually grows in the top few inches of soil, but can grow down to 12 inches. The fungus does not survive well in highly populated areas because there is not usually enough undisturbed soil for the fungus to grow. Additionally, the fungus is not likely to be found in soil that has been or is being cultivated and fertilized. This is because manmade fertilizers, such as ammonium sulfate, enhance the growth of the natural microbial competitors of the Valley Fever fungus. Infection is most frequent during summers that follow a rainy winter or spring, especially after wind and dust storms. Valley Fever infection is common only in arid and semiarid areas of the Western Hemisphere. In the United States, it is mostly found from Southern California to southern Texas. In Ventura County, the Valley Fever fungus is most prevalent in the county's dry, inland regions.

Effects: In its primary form, symptoms appear as a mild upper respiratory infection, acute bronchitis, or pneumonia. The most common symptoms are fatigue, cough, chest pain, fever, rash, headache, and joint aches, although 60 percent of people infected are asymptomatic and do not seek medical attention. In the remaining 40 percent, symptoms range from mild to severe. A small percentage, less than one percent, die as a result of the disease.

The incubation period for the primary infection is from one to four weeks. Occasionally, a progressive form of Valley Fever develops from the primary form and may appear after a few weeks, months, or even years. In this progressive form, Valley Fever may cause a chronic infection of many organs, including the skin, lymph glands, spleen, liver, bones, kidneys, and brain. Individuals most vulnerable to Valley Fever are agricultural workers, construction and road workers, and archeologists, because they are exposed to the soil where the fungus might be just below the surface. Many infections, however, occur in persons without occupational exposure. Of those without an occupational risk of contracting the disease, the most susceptible are those with suppressed immune systems due to such conditions as organ transplants, HIV infection, Hodgkin's disease, diabetes, and pregnancy (3^{rd} trimester). Domestic animals, especially dogs, are also susceptible to Valley Fever.

There are about 100,000 new cases of Valley Fever per year in the southwestern United States. The average number of reported new cases of Valley Fever in Ventura County before 1994 was 40 per year. In 1994, the year of the Northridge earthquake, the number of reported new cases of Valley Fever was 243. This increase was attributed to the great quantities of airborne dust generated by the Northridge earthquake. Since 1995, the number of reported cases has been comparable to the average before 1994. However, the actual number of cases may be much higher because Valley Fever is often misdiagnosed as the flu and not reported by physicians.

2.7.2 Odors

Odors are substances in the air that pose a nuisance to nearby land uses such as residences, schools, daycare centers, and hospitals. Odors are typically not a health concern, but can interfere with the use and enjoyment of nearby property.

Sources: Odors may be generated by a wide variety of sources. Following are examples of facilities and operations that may generate significant odors:

- Wastewater treatment facilities
- Sanitary landfills
- Transfer stations
- Composting facilities
- Asphalt batch plants
- Painting and coating operations
- Fiberglass operations
- Food processing facilities
- Feed lots/ dairies
- Petroleum extraction, transfer, processing, and refining operations and facilities
- Chemical manufacturing operations and facilities
- Rendering plants

Effects: Objectionable odors created by a facility or operation may cause a nuisance or annoyance to surrounding populations.

2.7.3 Fugitive Dust

Fugitive dust refers to solid particulate matter that becomes airborne because of wind action and human activities. Fugitive dust particles are mainly soil minerals, but also can be sea salt, pollen, spores, tire particles, etc. About half of fugitive dust particles (by weight) are larger than 10 microns and settle quickly. Fugitive dust particles 10 microns or smaller can remain airborne for weeks.

Sources: The primary sources of fugitive dust are grading and excavation operations associated with road and building construction, aggregate mining and processing operations, and sanitary landfill operations. Unpaved roadways also are a large source of fugitive dust. Other sources of fugitive dust include demolition activities, unpaved roadway shoulders, vacant lots, material stockpiles, abrasive blasting operations, and off-road vehicles. The amount of fugitive dust created by such activities is dependent largely on the type of soil, type of operation taking place, size of the area, degree of soil disturbance, soil moisture content, and wind speed.

Effects: When fugitive dust particles are inhaled, they can travel easily to the deep parts of the lungs and may remain there, causing respiratory illness, lung damage, and even premature death in sensitive people. Fugitive dust also may be a nuisance to those living and working nearby. Dust blown across roadways can lead to traffic accidents by reducing visibility. Fugitive dust can soil and damage materials and property, such as fabrics, vehicles, and buildings. Particulates deposited on agricultural crops can lower crop quality and yield. Additionally, fugitive dust can lead to the spread of San Joaquin Valley Fever, a potential health hazard caused by a fungus that lives in the soil.

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3. AIR QUALITY SIGNIFICANCE THRESHOLDS

3.1 INTRODUCTION

The Ventura County Air Pollution Control District (APCD or District) reviews and comments on the adequacy and accuracy of environmental documents for projects that may affect air quality in Ventura County. Such documents include Notices of Preparation, Initial Studies, Negative Declarations, Mitigated Negative Declarations (MND), and Environmental Impact Reports (EIR). The APCD recommends that an MND or an EIR be prepared for projects that meet one or more of the significance criteria listed below.

As stated in Chapter 1, these criteria are guidelines only. The final decision on the significance of air quality impacts, the appropriate environmental document, and mitigation measures, lies with the lead agency for the project. These Guidelines are not applicable to equipment, operations, or processes required to have an APCD Permit to Operate.

3.2 DEFINITION OF SIGNIFICANCE

Section 15002(g) of the California Environmental Quality Act (CEQA) Guidelines defines "significant effect on the environment" as "a substantial adverse change in the physical conditions that exist in the area affected by the proposed project." When an environmental document identifies a significant environmental effect, the government agency approving the project must make findings as to whether the adverse environmental effects have been substantially reduced or if not, why they were not substantially reduced. Appendix G, Environmental Checklist Form, of the state CEQA Guidelines presents a model initial study checklist. This checklist includes suggested criteria, in question format, for determining whether a project will have a "potentially significant impact" on air quality. According to the criteria, a project will have a "potentially significant impact" on air quality if it will:

- Conflict with or obstruct implementation of the applicable air quality plan.
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation.
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors).
- Expose the public (especially schools, day care centers, hospitals, retirement homes, convalescence facilities, and residences) to substantial pollutant concentrations.
- Create objectionable odors affecting a substantial number of people.

According to Appendix G, a "potentially significant impact" finding is appropriate if there is substantial evidence that an effect may be significant.

In addition, the Ventura County Air Pollution Control Board has adopted a policy stating that general development projects whose emissions are expected to meet or exceed the criteria in Section 3.3, "Recommended Significance Criteria," will have a potentially significant adverse impact on air quality.

3.3 RECOMMENDED SIGNIFICANCE CRITERIA

The following are suggested threshold criteria for determining whether an EIR or an MND should be prepared for a development project to address potential adverse air quality impacts. Tests of significance are not limited to the criteria listed below. Other factors, especially those related to the location of the project and potential impacts on nearby populations (e.g., schools, day care centers, residences, and hospitals) also should be examined. These include: proximity of the project to populated areas, proximity of the proposed project to other pollutant sources (e.g., industrial facilities emitting odorous or hazardous substances), and projects with potential land use conflicts.

3.3.1 Criteria Pollutants

1. <u>Ozone (based on emission levels of reactive organic compounds and oxides of nitrogen)</u>

   The following are the reactive organic compounds (ROC) and nitrogen oxides (NOx) thresholds that the Ventura County Air Pollution Control Board has determined will individually and cumulatively jeopardize attainment of the federal one-hour ozone standard, and thus have a significant adverse impact on air quality in Ventura County. Chapter 5, Estimating Ozone Precursor Emissions, presents procedures for estimating project emissions.

   (a) Ojai Planning Area*

Reactive Organic Compounds:	5 pounds per day
Nitrogen Oxides:	5 pounds per day

   (b) Remainder of Ventura County**

Reactive Organic Compounds:	25 pounds per day
Nitrogen Oxides:	25 pounds per day

   * The Ojai Planning Area is the area defined as the "Ojai Valley" in Ventura County Non-Coastal Zoning Ordinance, Article 12, Section 8112-2, plus the Ventura (Ojai) Non-growth Area (NGA) (as depicted in the *1987 Ventura County Air Quality Management Plan* (AQMP), Appendix E-87, Figure E-1,

"Map of Ventura County with Growth/Nongrowth Areas," page E-11). In these Guidelines, see Figure 3-1, "Ojai Planning Area."

** The City of Simi Valley uses a significance threshold of 13.7 tons per year of reactive organic compounds or nitrogen oxides, as directed by the City of Simi Valley City Council.

2. <u>Criteria Pollutants – General</u>

A project that may cause an exceedance of any ambient air quality standard (state or federal), or may make a substantial contribution to an existing exceedance of an air quality standard will have a significant adverse air quality impact. "Substantial" is defined as making measurably worse an existing exceedance of a state or federal ambient air quality standard. For example, a project that directly or indirectly produces large quantities of carbon monoxide (CO) could cause an exceedance of the state or federal CO standards. Such a determination may require the use of an appropriate air quality model.

3. <u>Ozone – Cumulative Impacts Based on Project-Specific AQMP Consistency</u>

A project with emissions of two pounds per day or greater of ROC, or two pounds per day or greater of NOx that is found to be inconsistent with the AQMP will have a significant cumulative adverse air quality impact. A project with emissions below two pounds per day of ROC, and below two pounds per day of NOx, is not required to assess consistency with the AQMP.

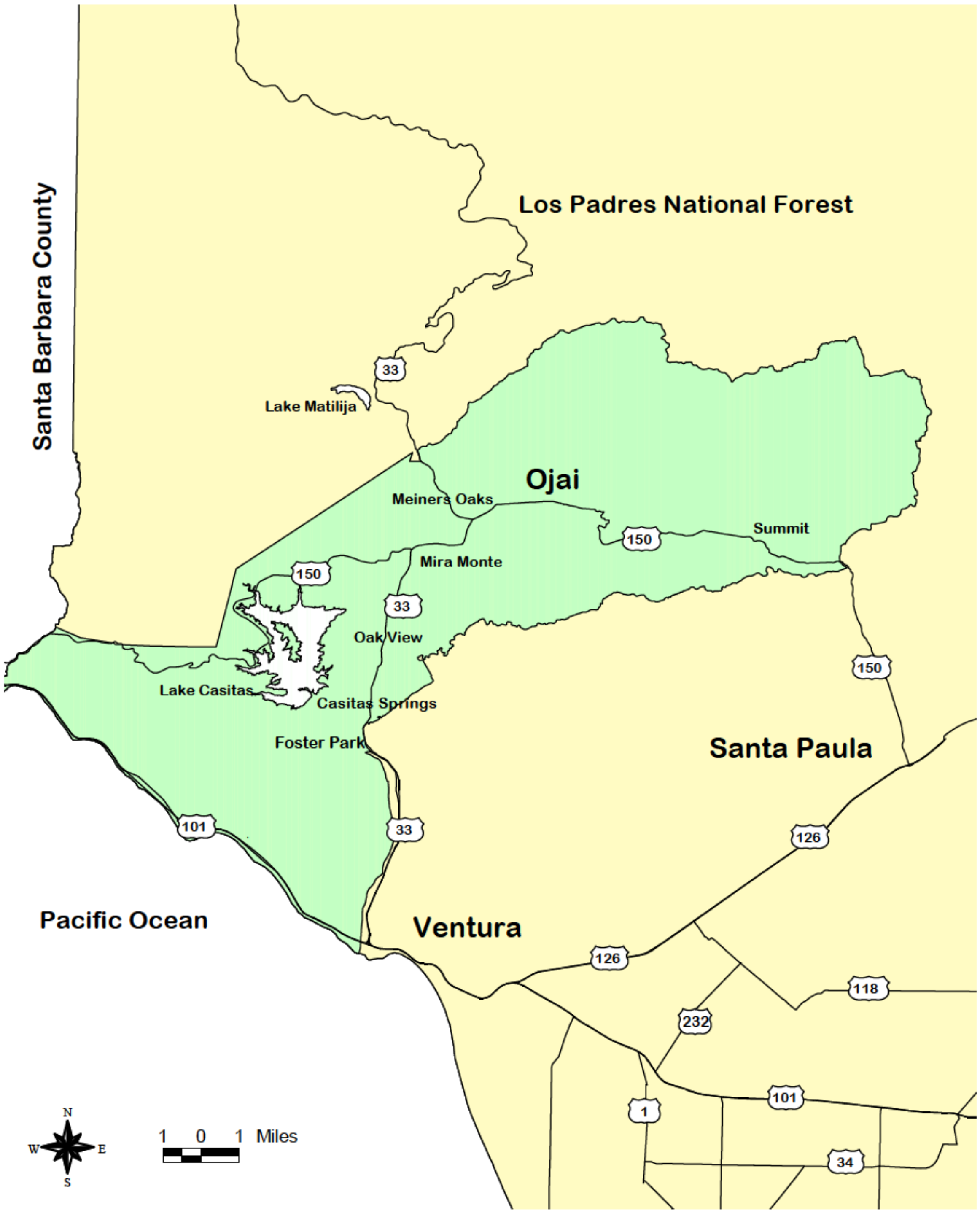
Inconsistent projects are usually those that cause the existing population to exceed the population forecasts contained in the most recently adopted AQMP. Chapter 4, Air Quality Management Plan Consistency, presents specific procedures for determining project consistency with the AQMP. Those procedures should be followed before making a final consistency determination for a project.

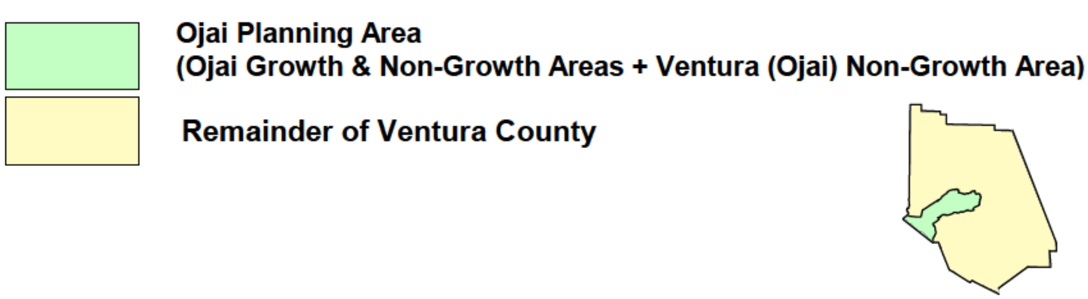
4. <u>Ozone – Cumulative Impacts Based on General Plan AQMP Consistency</u>

Any General Plan Amendment or revision that would provide directly or indirectly for increased population growth above that forecasted in the most recently adopted AQMP will have a significant cumulative adverse air quality impact.

FIGURE 3-1

OJAI PLANNING AREA





3.3.2 Other Pollutants of Concern

1. Fugitive Dust

   (a) A project that may be reasonably expected to generate fugitive dust emissions in such quantities as to cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which may endanger the comfort, repose, health, or safety of any such person or the public, or which may cause, or have a natural tendency to cause, injury or damage to business or property (see California Health and Safety Code, Division 26, §41700) will have a significant adverse air quality impact.

   (b) A project for which an appropriate air dispersion modeling analysis shows a possible violation of an ambient particulate standard will have a significant adverse air quality impact.

   Chapter 6, Assessing Project-Specific, Localized, Non-Ozone Impacts, includes a discussion of fugitive dust emissions.

2. Toxic Air Contaminants

   Impacts from toxic air contaminants (TACs) may be estimated by conducting a health risk assessment (HRA). The HRA procedure involves the use of an air quality model and a protocol approved by the APCD. Following are the recommended significance thresholds:

   (a) Lifetime probability of contracting cancer is greater than 10 in one million (as identified in an HRA).

   (b) Ground-level concentrations of non-carcinogenic toxic air pollutants would result in a Hazard Index of greater than 1 (as identified in an HRA).

   The Hazard Index is determined by dividing the “annual exposure level” by the “reference exposure level.” The “annual exposure level” (AEL) is the estimated annual average concentration level of a TAC that is estimated to occur as a result of the proposed project. The “reference exposure level” (REL) is a concentration level or dose, at or below which no adverse health effects are anticipated. RELs generally are based on the most sensitive adverse health effect reported in the medical and toxicological literature.

   Chapter 6, Assessing Project-Specific, Localized, Non-Ozone Impacts, includes a discussion of toxic air pollutants.

3. Odors

A qualitative assessment indicating that a project may reasonably be expected to generate odorous emissions in such quantities as to cause detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which may endanger the comfort, repose, health, or safety of any such person or the public, or which may cause, or have a natural tendency to cause, injury or damage to business or property (see California Health and Safety Code, Division 26, §41700) will have a significant adverse air quality impact.

Chapter 6, Assessing Project-Specific, Localized, Non-Ozone Impacts, provides a discussion of odors.

3.4 CHOOSING THE APPROPRIATE ENVIRONMENTAL DOCUMENT FOR AIR QUALITY IMPACT ANALYSES

1. Negative Declaration

A negative declaration is appropriate if all of the following apply:

- The project will emit less than 5 pounds per day of ROC and less than 5 pounds per day of NOx in the Ojai Planning Area, or less than 25 pounds per day of ROC and less than 25 pounds per day of NOx in the remainder of the county.
- The project will be consistent with the most recently adopted AQMP.
- The project does not require a General Plan Amendment that will directly or indirectly increase population growth above that forecasted in the most recently adopted AQMP.
- The project will not have any other significant adverse air quality impacts.

2. Mitigated Negative Declaration

A mitigated negative declaration is appropriate if all of the following apply:

- Mitigation measures have been agreed to by the project applicant that reduce project emissions to less than 5 pounds per day of ROC and less than 5 pounds per day of NOx in the Ojai Planning Area, or less than 25 pounds per day of ROC and less than 25 pounds per day of NOx in the remainder of the county.
- The project will be consistent, or made to be consistent, with the most recently adopted AQMP.
- The project does not require a General Plan Amendment that will directly or indirectly increase population growth above that forecasted in the most recently adopted AQMP.

- There are no other significant air quality impacts, or the applicant has agreed to mitigate all other air quality impacts.

- The project applicant has agreed to mitigate project-related significant air quality impacts through a revision to the project description.

3. Environmental Impact Report

An EIR should be prepared for any project that meets or exceeds one or more of the significance criteria listed in Section 3.3, "Significance Criteria," and the project cannot qualify for an MND.

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4. AIR QUALITY MANAGEMENT PLAN CONSISTENCY

4.1 INTRODUCTION

The primary objective of the *Ventura County Air Quality Management Plan* (AQMP) is to provide continuous air pollutant emission reductions over time, with the goal of attaining the federal and state standards for ozone. City and county growth consistent with the AQMP is a vital component of the overall AQMP ozone control strategy to ensure continued progress towards attaining the federal and state ozone standards.

Section 15125(d) of the California Environmental Quality Act (CEQA) Guidelines stipulates that Environmental Impact Reports (EIR) shall discuss "any inconsistencies between a proposed project and applicable general plans and regional plans. Such regional plans include, but are not limited to, the applicable air quality attainment or maintenance plan (or State Implementation Plan)..." Moreover, pursuant to Appendix G, "Environmental Checklist Form," of the state CEQA Guidelines, a project that would "conflict with or obstruct implementation of the applicable air quality plan" may have a significant adverse air quality impact. The lead agency proposing to approve or implement the project is responsible for making the AQMP consistency determination.

An environmental document for a proposed project must address project consistency with the AQMP. Project consistency with the AQMP can be determined by comparing the actual population growth in the county with the projected growth rates used in the AQMP. The projected growth rate in population is used as an indicator of future emissions from population-related emission categories in the AQMP. These emission estimates are used, in part, to project the date by which Ventura County will attain the federal ozone standard. The County of Ventura Planning Division maintains an ongoing population tracking system. Therefore, a demonstration of consistency with the population forecasts used in the most recently adopted AQMP should be used for assessing project consistency with the AQMP.

However, if there are more recent population forecasts that have been adopted by the Ventura Council of Governments (VCOG) where the total county population is lower than that included in the most recently adopted AQMP population forecasts, lead agencies may use the more recent VCOG forecasts for determining AQMP consistency.

The geographic subareas used in the forecasts are known as growth and non-growth areas. These areas are based on a network of analysis zones created by the State Department of Transportation and the Ventura County Public Works Agency. The growth and non-growth areas are comprised of aggregated analysis zones.

Figure 4-1, "Ventura County Growth and Non-growth Areas," is a map that shows the growth and non-growth areas of the county. This map is based on the February 1998 version of the 1990 Analysis Zones map prepared by the Graphics Division of the

Resource Management Agency. The entire present and projected boundary area of each of the ten cities in the county is within a respective growth area. In addition to the ten growth areas, there are three unincorporated growth areas. The unincorporated growth areas include urbanized development that has already occurred, or is expected to occur under the Ventura County General Plan. An example is the Piru Growth Area. The remainder of the AQMP population forecast covers the unincorporated non-growth areas. These areas are not expected to receive significant urban development. All of the non-growth areas, except for the Ojai Non-growth Area, are aggregated together for AQMP consistency assessment purposes. The excepted area comprises part of the Ojai Valley.

4.2 PROCEDURES FOR DETERMINING CONSISTENCY WITH THE AQMP

The following sections describe the procedures for determining project consistency with the AQMP. Consistency with the AQMP does not mean that a project will not have a significant project-specific adverse air quality impact. However, inconsistency with the AQMP is considered a significant cumulative adverse air quality impact.

A project with estimated emissions two pounds per day or greater of reactive organic compounds (ROC), or two pounds per day or greater of nitrogen oxides (NOx) that is inconsistent with the AQMP will have a significant cumulative adverse air quality impact. Inconsistent projects are usually those that cause the existing population to exceed the population forecasts contained in the most recently adopted AQMP (see Table 4-1, "1995 AQMP Population Forecasts").

In addition to addressing consistency with the population forecasts, the air quality impact assessment should also address project consistency with emission reduction strategies included in the AQMP. The AQMP contains a number of transportation and energy control measures that help to reduce project emissions. These often can be used to help reduce a project's indirect emissions. Transportation and energy conservation control measures should be incorporated into the project design early in the planning process.

4.2.1 Projects Exempt from Consistency Assessments

A project that conforms to the applicable General Plan designation and has emissions below two pounds per day of ROC, and below two pounds per day of NOx, is not required to assess consistency with the AQMP. Consequently, a project with emissions below these levels is also considered to have a less than significant cumulative adverse air quality impact.

4.2.2 General Plan Amendments

Any General Plan Amendment that will result in population growth above that forecasted in the most recently adopted AQMP is inconsistent with the AQMP. It will therefore have a significant cumulative adverse air quality impact.

TABLE 4-1
1995 AQMP POPULATION FORECASTS*

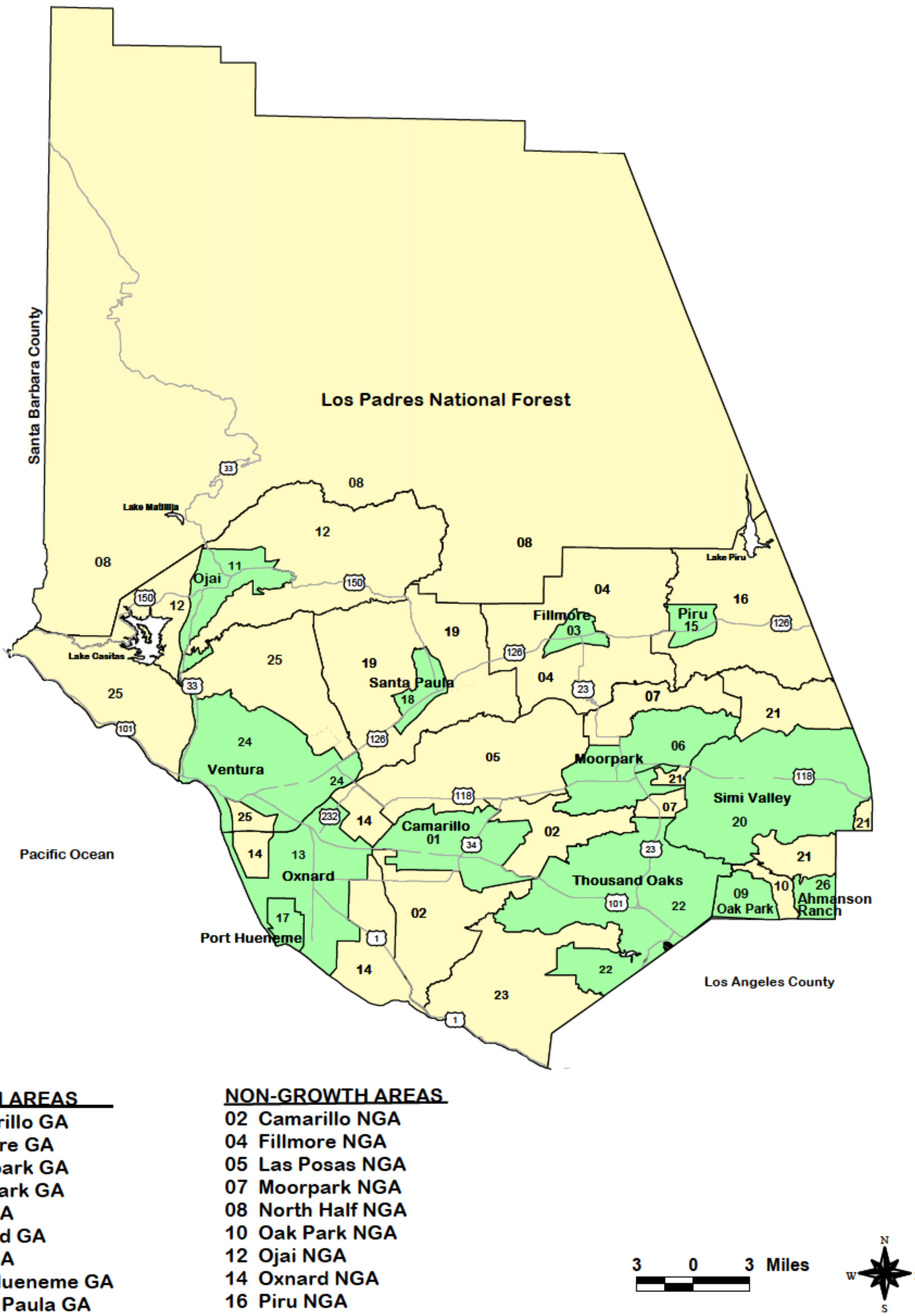
	2000	2001	2002	2003	2004	2005
Growth Areas						
Ahmanson Ranch	5,203	5,500	5,793	6,087	6,379	6,669
Camarillo	67,916	68,761	69,599	70,428	71,253	72,072
Fillmore	17,833	17,991	18,149	18,305	18,460	18,614
Moorpark	39,591	40,975	42,389	43,791	45,185	46,570
Oak Park	17,098	17,098	17,100	17,100	17,101	17,101
Oxnard	161,000	162,408	163,800	165,184	166,557	167,918
Piru	1,604	1,634	1,667	1,697	1,727	1,759
Port Hueneme	25,875	26,236	26,595	26,950	27,304	27,654
Santa Paula	30,070	30,548	31,021	31,493	31,963	32,429
Simi Valley	121,170	123,212	125,235	127,243	129,232	131,207
Thousand Oaks	122,816	124,010	125,192	126,369	127,533	128,691
Ventura	110,000	111,001	112,001	112,999	114,000	115,000
Ojai G/NGAs**	30,060	30,258	30,456	30,648	30,837	31,032
Non-growth Areas						
Aggregated NGAs***	26,182	26,592	26,978	27,379	27,758	28,158
County Total	776,418	786,224	795,975	805,673	815,289	824,874

* Based on population forecasts adopted by VCOG on June 24, 1993, and used in the 1995 AQMP Revision, Appendix E-95. Population forecasts from the most recently adopted AQMP should be used for AQMP consistency analyses. If there are more recent population forecasts that have been adopted by VCOG where the total county population is lower than that included in the most recently adopted AQMP, lead agencies may use the more recent VCOG forecasts for determining AQMP consistency. Contact APCD staff at 805/645-1427 or 805/645-1439 for questions about the most current population forecasts.

** G/NGAs = Growth and Non-growth areas.

*** Excludes the Ojai Non-growth Area.

FIGURE 4-1
VENTURA COUNTY GROWTH AND NON-GROWTH AREAS



GROWTH AREAS
01 Camarillo GA
03 Fillmore GA
06 Moorpark GA
09 Oak Park GA
11 Ojai GA
13 Oxnard GA
15 Piru GA
17 Port Hueneme GA
18 Santa Paula GA
20 Simi Valley GA
22 Thousand Oaks GA
24 Ventura GA
26 Ahmanson Ranch GA

NON-GROWTH AREAS
02 Camarillo NGA
04 Fillmore NGA
05 Las Posas NGA
07 Moorpark NGA
08 North Half NGA
10 Oak Park NGA
12 Ojai NGA
14 Oxnard NGA
16 Piru NGA
19 Santa Paula NGA
21 Simi Valley NGA
23 Thousand Oaks NGA
25 Ventura NGA

4.2.3 General Land Use Development Projects

The following procedures should be used to determine project consistency with the AQMP for projects conforming to applicable general plans and having emissions of two pounds or greater per day of ROC or two pounds or greater per day of NOx.

Using Figure 4-1, “Ventura County Growth and Non-growth Areas,” determine the growth or non-growth area in which the project is located. If the appropriate growth or non-growth area cannot be determined, contact the APCD Planning Division at 805/645-1427 or 805/645-1439.

If the project is in a growth area, refer to Section 4.2.3.1, “Projects Located in Growth Areas (Except Ojai Growth Area).” If the project is in a non-growth area, refer to Section 4.2.3.2, “Projects Located in Non-growth Areas (Except Ojai Non-growth Area).” If the project is located in the Ojai Growth or Non-growth area, refer to Section 4.2.3.3, “Projects Located in the Ojai Growth and Non-growth Areas.”

4.2.3.1 Projects Located in Growth Areas (Except Ojai Growth Area)

1. Determine if the project conforms to the applicable General Plan.

2. Determine the current estimated population of the growth area. This information can be provided by APCD Planning Division staff.

3. Compare the current estimated population of the growth area (obtained in step 2 above) with the growth area population target for the next year. For example, if the current year is 2000, compare the estimated existing population of the growth area with the population target for 2001. Refer to Table 4-1, “1995 AQMP Population Forecasts.”

   If the current estimated population of the growth area is below its next year’s population target, and the project conforms to the applicable General Plan designation, the project is determined to be consistent with the AQMP.

4. If the current estimated population of the growth area exceeds its next year’s population target, the project should be found to be inconsistent with the AQMP. Inconsistency with the AQMP is considered a significant cumulative adverse air quality impact.

4.2.3.2 Projects Located in Non-growth Areas (Except Ojai Non-growth Area)

1. Determine if the project conforms to the applicable General Plan.

2. Determine the current estimated population of the aggregated non-growth areas.

This information can be provided by APCD Planning Division staff.

3. Compare the current estimated population of the aggregated non-growth areas (obtained in step 2 above) with the aggregated non-growth area population target for the next year. For example, if the current year is 2000, compare the estimated existing population of the aggregated non-growth areas with the population target for 2001. Refer to Table 4-1, "1995 AQMP Population Forecasts."

   If the current estimated population of the aggregated non-growth areas is below its next year's population target, and the project conforms to the applicable General Plan designation, the project is determined to be consistent with the AQMP.

4. If the current estimated population of the aggregated non-growth areas exceeds its next year's population target, the project should be found to be inconsistent with the AQMP. Inconsistency with the AQMP is considered a significant cumulative adverse air quality impact.

4.2.3.3 Projects Located in the Ojai Growth and Non-growth Areas

Consistency with the population forecasts for the Ojai Growth and Non-growth Areas (also known as the Ojai Valley) is assured due to Article 12 of the Ventura County Non-Coastal Zoning Ordinance. Article 12, which was adopted in July 1982, established a residential building permit allocation program to ensure consistency with the adopted AQMP population projections.

4.3 INCONSISTENCY WITH THE AQMP AND CUMULATIVE ADVERSE AIR QUALITY IMPACTS

A project that is determined to be inconsistent with the AQMP is also determined to have a significant cumulative adverse air quality impact. If a project is inconsistent, there are several options:

1. The project could be revised to eliminate the inconsistency. Project revisions might require that the project be phased, reduced in size, or delayed to ensure consistency with the AQMP population forecasts.

2. Mitigation measures could be applied to reduce or eliminate the inconsistency. This could consist of a jurisdiction adopting a residential building permit allocation program to pace population growth with the AQMP population forecasts in such a way as to ensure that population projections contained in the AQMP are not exceeded.

3. The project could be denied.

4. The project could be approved if the lead agency determines and issues a statement

that there are overriding considerations to approve the project. This does not relieve the decision-making body of the requirement to mitigate the impact to the maximum extent feasible, as required by Section 15126(c) of the CEQA Guidelines.

A finding that a project is consistent with the AQMP does not necessarily ensure that a project will not have a significant project-specific adverse impact on air quality. The recommended criteria for determining whether a project will have an adverse impact on air quality can be found in Section 3.3, “Recommended Significance Criteria.”

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5. ESTIMATING OZONE PRECURSOR EMISSIONS

5.1 INTRODUCTION

The primary source of air pollutant emissions associated with residential, commercial, institutional, and some industrial land uses, is motor vehicles. These land uses may not result in significant amounts of direct emissions, but they may generate motor vehicle trips, whose emissions may adversely affect air quality. These land uses are therefore often referred to as "indirect" emission sources.

This chapter describes four methods that are recommended for estimating ozone precursor emissions, all based on the URBEMIS computer program. The California Air Resources Board (ARB) originally developed this program in 1982. As of October 2003, the most current version of the URBEMIS program is URBEMIS2002. This computer program is designed to estimate air emissions from land use development projects. URBEMIS2002 uses ARB's most recent motor vehicle emission factor model, EMFAC2002 (hence the nameURBEMIS2002). As stated in Chapter 1, the Guidelines are not applicable to equipment or operations required to have Ventura County APCD permits (Authority to Construct or Permit to Operate). Moreover, the emissions from equipment or operations requiring APCD permits are not counted towards the air quality significance thresholds.

Previous versions of URBEMIS (URBEMIS versions 1 through 5) were designed to estimate only motor vehicle emissions from trips generated by land use development. URBEMIS has been enhanced so that the user also can estimate construction and area source emissions. Area sources are groups of similar emission sources that do not contribute significant amounts of emissions individually, but do contribute significantly in the aggregate. Examples of area sources include fuel combustion from natural gas appliances, utility engines (including landscape maintenance equipment), and consumer products. URBEMIS also now allows the user to select mitigation measures for construction emissions, area source emissions, and project operational emissions (see Sections 7.4, "Construction Mitigation," 7.5.1, "Area Source Mitigation Measures," and 7.5.2, "Operational Mitigation Measures"). URBEMIS2002 contains several additional land uses, major enhancements to the construction emissions and mitigation measures module, and includes a screening analysis option.

Motor vehicle trip rates in URBEMIS are based primarily on the average daily trip data for the various land uses in the Institute of Transportation Engineers' (ITE) publication *Trip Generation*, Sixth Edition (1997). Motor vehicle trip generation rates different than those listed in ITE's *Trip Generation* or URBEMIS can be used if the lead agency is provided justification and documentation to its satisfaction that such changes are warranted. Documentation and justification of any changes to the URBEMIS default values should be included in the environmental document.

URBEMIS requires entry of specific information concerning the number and type of units for each land use. It also requires entry of information specific to Ventura County. Ventura County-specific default inputs are contained in copies of the program obtained from the Ventura County Air Pollution Control District (APCD or District), the ARB (http://www.arb.ca.gov/planning/urbemis/urbemis2002/urbemis2002.htm), or the South Coast Air Quality Management District (http://www.aqmd.gov/ceqa/urbemis.html).

Ventura County-specific default inputs to the URBEMIS computer program are presented in Section 5.3.3.1, "Ventura County-Specific Default Inputs to the URBEMIS Computer Program." Input values other than the Ventura County-specific defaults may be used for calculating emissions. Likewise, modified trip generation rates and percent work trips also may be used. However, as stated earlier, if different values are used, full documentation and justification for the different values should be provided to the satisfaction of the lead agency that such changes are warranted

Appendix E, Definition of Land Use Categories for Trip Generation and Project Emission Calculation Purposes, contains definitions of all of the land uses contained in ITE's *Trip Generation*. The sixth edition of the ITE manual contains nineteen new land use classifications, revisions to several land use descriptions, and updated trip generation factors for various land uses. Not all of the land uses in ITE's *Trip Generation* are in URBEMIS. However, URBEMIS inputs can be easily modified so that emissions from land uses not in URBEMIS can be calculated using URBEMIS.

Appendix F, Project Screening Analysis Tables, contains land uses, organized by project size and year of project completion, listing the size of land use (in terms of dwelling units, square feet, or fueling positions) that will exceed the reactive organic compounds (ROC) and oxides of nitrogen (NOx) significance thresholds described in Chapter 3 (see also Section 5.3.1, "Project Screening Analysis Tables"). Projects smaller than the applicable values in Appendix F will not have a significant adverse impact on air quality with respect to ROC and/or NOx emissions. Although a project may fall below the applicable ROC or NOx threshold values in Appendix F, the project should still be assessed for other potential significant air quality impacts, such as fugitive dust, odors, toxic air contaminants, and project consistency with the AQMP.

APCD recommends that lead agencies use the most recent version of URBEMIS adopted by the ARB and the corresponding version of EMFAC. Trip generation factors should be obtained from the most recent version of ITE's *Trip Generation*, or other sources, as appropriate, with justification and documentation to the satisfaction of the lead agency that such changes are warranted.

5.2 CALCULATING OZONE PRECURSOR EMISSIONS FROM PROJECT CONSTRUCTION

Construction operations generate ROC, NOx, fugitive dust emissions, and possibly air toxics. This section discusses methodologies for calculating ROC and NOx emissions from project construction. The methodology to estimate fugitive dust emissions is presented in Section 6.2, "Fugitive Dust." The methodology to estimate toxic air contaminant emissions is presented in Section 6.5, "Toxic Air Contaminants."

The primary sources of construction-related ROC and NOx emissions are gasoline- and diesel-powered, heavy-duty, mobile construction equipment, such as scrapers and motor graders. ROC and NOx emissions associated with heavy-duty mobile construction equipment should be quantified based on the type of equipment anticipated to be used. Most of such equipment is diesel-powered. URBEMIS can be used to calculate ROC and NOx emissions from heavy-duty mobile construction equipment. URBEMIS divides construction emissions into three phases: demolition (Phase 1), site grading (Phase 2), and building construction (Phase 3). Building construction is further subdivided into building equipment, architectural coating, asphalt paving, and worker trips. If the URBEMIS program is used to calculate ozone precursor emissions from project construction, the program should be run separately for the construction emissions and for the operational emissions, and the results should not be combined for purposes of comparing to applicable thresholds.

The URBEMIS User's Guide presents emission factors, equipment horsepower, load factors, and hours per day of operation that can be used to manually estimate ROC and NOx emissions associated with diesel- and gasoline-powered heavy-duty mobile construction equipment. The emission factors in the table are presented in pounds per hour. The emission equation used by URBEMIS for each piece of equipment is as follows:

Equipment Emissions (pounds per day) = # of pieces of equipment * grams per brake horsepower-hour * equipment horsepower * hours/day * load factor

Grams per brake-horsepower hour is based on the construction year and on the average life expectancy of the equipment type. Grams per brake horsepower hour emissions and average equipment life expectancy are from Appendix B of the California Air Resources Board's (ARB's) off-road model (California Air Resources Board 2000). Emission factors used in URBEMIS are found in Appendix H of the URBEMIS User's Guide.

Construction-related emissions (including portable engines and portable engine-driven equipment subject to the ARB's Statewide Portable Equipment Registration Program, and used for construction operations or repair and maintenance activities) of ROC and NOx are not counted towards the two significance thresholds, since these emissions are temporary. However, construction-related emissions should be mitigated if estimates of

ROC and NOx emissions from the heavy-duty construction equipment anticipated to be used for a particular project exceed the 5 pounds per day threshold in the Ojai Planning Area, or the 25 pounds per day threshold in the remainder of the county. Mitigation measures to reduce such emissions are listed in Section 7.4.3, “ROC and NOx Construction Mitigation Measures” and in the mitigation module of URBEMIS.

5.3 CALCULATING OPERATIONAL EMISSIONS

This section presents three methods for assessing whether project emissions will be significant: a screening analysis (Section 5.3.1, “Project Screening Analysis Tables”), a minimal run screening analysis using URBEMIS (Section 5.3.2, “URBEMIS Computer Program -Screening Analysis Mode”), or a detailed run (Section 5.3.3, “URBEMIS Computer Program - Detailed Run”). Lead agencies need not perform the detailed run unless the screening analysis tables or screening analysis URBEMIS run indicates that the project will exceed the 5 pounds per day threshold for ROC and NOx in the Ojai Planning Area, or the 25 pounds per day threshold for ROC and NOx in the remainder of the county as described in Chapter 3, Air Quality Significance Thresholds.

For purposes of determining whether or not the project will have a significant adverse impact on air quality, those project-related ROC and NOx emissions from equipment that is required to have a Ventura County APCD Permit to Operate need not be considered. Such emissions should be subtracted from total project emissions before making a determination as to whether or not the project will have an adverse impact on air quality. Emissions that should be counted toward the ROC and NOx significance threshold include any emissions that will occur as a result of approval of some type of discretionary use permit.

The project screening analysis mode in the URBEMIS program and the project screening analysis tables in Appendix F of this Guidelines use the default vehicle fleet mix for calculating estimated project emissions. Therefore, for projects where the fleet mix includes a greater percentage of heavy-duty vehicle trips than the default fleet mix, project emissions may be significantly underestimated in the screening analysis mode and the screening analysis tables. An example of this situation might be a warehouse facility where the vehicle trips are predominantly heavy-duty diesel trips. The District recommends that if a lead agency determines that the expected vehicle fleet mix for a project will include more heavy duty vehicles than the default fleet mix, project screening analyses are not appropriate.

5.3.1 Project Screening Analysis Tables

Appendix F identifies project sizes (by project type and year of project completion) that will exceed the ROC or NOx significance thresholds. The tables in Appendix F were generated using the default values for Ventura County, and the default trip generation rates in URBEMIS. These trip generation rates are from the ITE’s *Trip Generation*, Sixth

Edition, and other sources, as documented in the User's Guide for URBEMIS. The "pass-by trip" option was selected for all land use categories. Emissions from area sources (e.g., natural gas usage, landscaping equipment, and consumer products) have also been included in the tables. The screening analysis in Appendix F does not account for any air quality mitigation measures. For each land use, the applicable unit numbers and/or project size was increased until the resultant ROC emissions or NOx emissions exceeded the 5 and 25 pounds per day significance thresholds.

Generally, NOx emissions exceed the significance thresholds before ROC emissions, and therefore usually indicate the project size that will exceed the applicable significance threshold. The years of project completion in Appendix F are those for which there are EMFAC2002 emission factors.

Projects smaller than the applicable threshold values in Appendix F will not have a significant adverse impact on air quality with respect to the one-hour ozone standard. Although a project may fall below the applicable ROC or NOx threshold values in Appendix F, the project should still be assessed for other potential significant air quality impacts, including, but not limited to, fugitive dust, odors, toxic air contaminants, and project consistency with the AQMP.

If a project is a single land use type (e.g., single family detached housing), Appendix F can be used to determine whether the project is likely to exceed the significance thresholds. If the project is near the size necessary to exceed the significance thresholds, the URBEMIS program should be run, using either the screening analysis mode (see Section 5.3.2, "URBEMIS Computer Program - Screening Analysis Mode"), or a detailed run (see Section 5.3.3, "URBEMIS Computer Program - Detailed Run"). Also, if a project has unique conditions that deviate from the Ventura County default values (see Section 5.3.3.1), the screening analysis is not appropriate, and a detailed run should be performed.

APCD recommends that lead agencies use the most recent version of URBEMIS adopted by the ARB and the corresponding version of EMFAC. Therefore, if a more current version of URBEMIS is available, the District recommends using the more current version of URBEMIS instead of the tables in Appendix F.

5.3.2 URBEMIS Computer Program - Screening Analysis Mode

The URBEMIS screening analysis mode is appropriate if the project contains more than one land use, or if the lead agency has trip generation data from other sources (e.g., traffic studies). Completing a run as described in this section will provide emission estimates that do not account for any air quality mitigation measures, pass-by trips, internal trips, or double-counting adjustments. It relies on the default inputs for Ventura County, and requires only the most basic information about the project. The Summary output lists project area and operational emissions separately, and then adds the emissions together for an estimate of total project emissions. The Detailed output lists project area and operational emissions. Therefore, project area and operational emissions must be added together to estimate total project emissions. If output from an URBEMIS screening analysis run produces ROC and/or NOx emissions estimates at, near, or over the applicable significance threshold, a detailed URBEMIS run should be conducted.

Although an URBEMIS screening analysis run may produce ROC and/or NOx emission estimates less than the applicable significance threshold, the subject project still should be assessed for other potential significant air quality impacts, such as fugitive dust, odors, toxic air contaminants, and project consistency with the AQMP.

5.3.3 URBEMIS Computer Program - Detailed Run

A detailed URBEMIS run is appropriate if any of the following apply: 1) the screening analysis tables indicate that the proposed project will likely exceed ROC or NOx significance thresholds; 2) the URBEMIS screening analysis mode shows project emissions at, near, or over the applicable ROC or NOx significance threshold; 3) mitigation measures will be included in the project; or 4) a more detailed analysis of the project is desired. See Section III, "Using URBEMIS2002," Appendix B, "Area Source Emissions," and Appendix C, "Operational (Motor Vehicle) Emissions," of the URBEMIS7G manual for further details. The Summary output lists project area and operational emissions separately, and then adds the emissions together for an estimate of total project emissions. The Detailed output lists project area and operational emissions separately. Therefore, for an estimate of total project emissions from the Detailed output, project area and operational emissions should be added together.

As with the Appendix F screening analysis tables and the URBEMIS screening analysis mode, if a detailed URBEMIS run indicates that project ROC and NOx emissions will be below the applicable significance threshold, the project still should be assessed for other potential significant air quality impacts, including, but not limited to, fugitive dust, odors, toxic air contaminants, and project consistency with the AQMP.

5.3.3.1 Ventura County-Specific Default Inputs to the URBEMIS Computer Program

The following default values should be used for projects located in Ventura County. These default values may be replaced with more specific project data. However, justification and documentation for the changes should be provided to the satisfaction of the lead agency that such changes are warranted. Documentation and justification of any changes to the URBEMIS default values should be included in the environmental document. If a more current version of the URBEMIS program is available and has updated Ventura County default values, those values should be used instead.

Project Area: Ventura County.

Target Year: Year of project occupancy, or, if not an available choice in the program, the year of project occupancy rounded to the nearest five-year increment.

Ambient Temperature: Use 75° for the summer ambient temperature. Use 50° for the winter ambient temperature.

Trip Characteristics:

Average Speed		Trip Percentages	Trip Lengths Urban	Rural
40	Home-based work	27.4	12.0	15.0
40	Home-based shop	17.7	7.8	10.0
40	Home-based other	54.9	10.0	10.0
40	Commercial-based commute		10.0	15.0
40	Commercial-based non-work		10.0	15.0

Note: Trip percentages for "home-based" trips must add to 100 percent.

5.3.3.2 Area Emissions Estimates

Area sources are sources that individually emit fairly small quantities of air pollutants, but cumulatively may generate significant quantities of emissions. Area source emissions include fuel combustion from natural gas appliances, utility engines (including landscape maintenance equipment), and consumer products. APCD recommends that area source emissions be estimated for all projects that have these types of emission sources. The Summary output lists project area and operational emissions separately, and then adds these emissions together for an estimate of total project emissions. The Detailed output lists project area and operational emissions separately. Therefore, for an estimate of total project emissions from the Detailed output, project area and operational emissions should be added together.

5.3.3.3 Adjustment for Double Counting of Pass-by and Diverted-linked Trips

Traffic generation rates for certain land uses can be overestimated by double counting vehicle trips. This occurs when an establishment attracts some of its trips from traffic passing the site while on the way to another location. Not accounting for the pass-by and diverted-linked trips can substantially overstate indirect source emissions associated with a proposed land use project. By quantifying pass-by and diverted-linked rates for projects, a more accurate representation of indirect source emissions can be obtained.

Trip-making can be categorized as:

> Primary Trips: Trips made for the specific purpose of visiting the project. A home-to-shopping-to-home combination of trips is a primary trip set.
>
> Pass-by Trips: Trips made as intermediate stops on the way from an origin to a primary trip destination. Pass-by trips are defined as trips from traffic passing the site on an adjacent street that contains direct access to the project. These trips do not require a diversion from another roadway, and do not add additional mileage. An example is a stop at a convenience store on the way home from work.
>
> Diverted-linked Trips: Trips attracted from the traffic on roadways within the vicinity of the project but requiring a diversion from that roadway to another roadway to gain access to the project site. These roadways could include streets or freeways adjacent to the project, but without direct access to the project.

The URBEMIS computer program offers a method to adjust estimates of project emissions to account for pass-by and diverted-linked trips. While in the URBEMIS program, the Operational Emissions main screen provides an option for selecting pass-by trip adjustments. Clicking this box instructs the program to apply the recommended pass-by and diverted-linked rates. Table 3 of the URBEMIS User's Guide shows estimates of pass-by and diverted linked trip percentages used in the URBEMIS program.

The URBEMIS program can be used to adjust for pass-by and diverted-linked trips only when a default land use category is used. Within any of the default land use categories, the trip generation rate may be modified, and the "pass-by trips" option still works properly. However, if a non-default land use option is used (i.e., the "blank" row in the "Select/Edit Land Use" screens), the "pass-by trips" option does not work properly.

For more information about the use of this program feature, see the URBEMIS User's Guide (Section III.8.1, "Specifying Vehicle Emissions," and Appendix C, "Operational (Motor Vehicle) Emissions, Pass-By Trips").

5.3.3.4 Adjustment for Double Counting of Internal Trips in Multi-use Projects

Trip generation rates in URBEMIS include both motor vehicle trip generation and attraction. Vehicle trips that originate within, and stay within, project boundaries are called internal trips. Therefore, URBEMIS may double count trips if a project contains both residential and non-residential components. However, URBEMIS contains a routine that minimizes double counting of internal trips in mixed-use projects and area plans, master plans, community plans, specific plans, and general plans. The routine only applies if at least one residential and one non-residential land use is specified by the URBEMIS user and the user selects the double-counting correction setting. The routine is described in the URBEMIS User's Guide (Section III.8.1, "Specifying Vehicle Emissions," and Appendix C, "Operational (Motor Vehicle) Emissions, Double Counting of Multiuse Projects").

5.4 CALCULATING EMISSIONS FROM PROJECT-RELATED STATIONARY SOURCES

Air emissions from any project-related stationary air emission sources that do not require permits from the District should be estimated and included in total project emissions.

Stationary sources are non-mobile equipment, devices, operations, or processes that directly emit air pollutants. Most stationary sources are associated with commercial and industrial facilities and operations. Examples of stationary sources are industrial engines and boilers, turbines, spray paint booths, electronic component manufacturing operations, ready-mixed concrete facilities, plating operations, printing operations, plastic products manufacturing, and coffee roasters.

Air emissions from a wide range of stationary sources are controlled through the District's air pollution permit program. The District permit program mitigates emission increases from stationary sources by requiring emission control devices, emission and process limits, and emission offsets. Appendix B, Common Equipment and Processes Requiring a Ventura County APCD Permit to Operate, provides guidance for determining if equipment and processes will require an APCD Permit to Operate. In addition to Appendix B, lead agencies can refer to District Rule 23, Exemptions from Permit, for a detailed list of equipment and processes that do not require a District permit. Rule 23 is available from the ARB's website at http://www.arb.ca.gov/drdb/ven/curhtml/r23.htm. Lead agencies and project applicants also can contact the District's Engineering Division at 805/645-1401 for any questions regarding equipment, operations, and processes that may require a District permit.

Air emissions for equipment, operations, and processes that do not require a District permit may be calculated using emission factors available from the District. Lead agencies and project applicants can contact the District's Permit Section at 805/645-1401 for information regarding appropriate emission factors and emission calculation methodology for a wide range of stationary sources. In addition to District emission factors, emission factors for stationary sources can be obtained from Volume I of the Environmental Protection Agency's *Compilation of Air Pollutant Emission Factors* (AP-42). AP-42, Volume I, contains information on over 200 stationary source categories, and is available at the United States Environmental Protection Agency (U.S. EPA) website at www.epa.gov/ttn/chief/ap42.html.

Emission factor information also may be available from certified environmental documents and from air emissions tests of the subject equipment or very similar equipment. Lead agencies can contact the District at 805/645-1401 to inquire about any appropriate emission test data that the District may have for a particular stationary source or source type.

6. ASSESSING PROJECT-SPECIFIC, LOCALIZED, NON-OZONE IMPACTS

6.1 INTRODUCTION

The previous chapter presented a methodology for assessing project impacts on regional ozone levels. This chapter presents information on how to assess a project's impacts on pollutant levels other than ozone. These impacts tend to be localized near the area where they are produced.

Project construction and operation activities can result in several air pollutants whose effects are often localized near the area of their origin. Such air quality effects are termed local air quality impacts and include, but are not necessarily limited to, fugitive dust, carbon monoxide (CO), toxic air contaminants (TACs), odors, and entrained fungal spores that cause San Joaquin Valley Fever.

Many of these pollutants can adversely impact the general population, especially those most likely to suffer adverse health effects from air pollution, such as children, the elderly, and those suffering from acute and chronic medical conditions. Land uses where such people are likely to reside or spend a substantial amount of time include residences, schools, playgrounds, day care centers, job sites, retirement homes, convalescent homes, and hospitals.

The project environmental document should identify any land uses near the project site that may have people who are particularly sensitive to localized, non-ozone air quality impacts. Reasonably foreseeable such land uses should be identified as well. This would include potential land uses that could reasonably be sited nearby based on zoning or land use designations.

The location of a development project is a major factor in determining whether it will cause or be impacted by localized, non-ozone air quality impacts. The potential for adverse localized, non-ozone air quality impacts increases as the distance between the source of such emissions and sensitive populations decreases. Localized air pollutants can adversely affect all members of the population, and thus any consideration of potential air quality impacts should include all members of the population. Localized air pollution impacts generally occur in one of two ways: 1) A new source of air pollutants is proposed close to existing populations (An example would be an industrial facility proposed for a site near a residential area or a day-care center); and, 2) A new development proposed near an existing industrial facility.

To minimize localized air pollution impacts, lead agencies should consider limiting or avoiding the following types of potential land use conflicts:

- A development project near a congested intersection or roadway. High traffic volumes and congested conditions can lead to high but localized concentrations of CO, particulate matter (PM), or TACs.
- Development projects close to a source of TACs or high traffic levels.
- Development projects near a source of odorous emissions. Although odors generally do not pose a health risk, they can be a nuisance if they interfere with the use of neighboring land uses.
- Development projects near a source of high levels of dust emissions. Fugitive dust can pose health risks (when it results in elevated PM_{10} and $PM_{2.5}$ levels) and can be a nuisance if it interferes with neighboring land uses.

When evaluating whether a development proposal has the potential to result in localized impacts, lead agency staff should consider the nature of the proposed development and its potential to produce air pollutant emissions, the distance between the emitting facility and the potentially affected population, the direction of prevailing winds, and local topography. Often, providing a buffer zone between the source of emissions and the subject population will alleviate the problem.

6.2 FUGITIVE DUST

The Ventura County Air Pollution Control District (APCD or District) recommends minimizing fugitive dust, especially during grading and excavation operations, rather than quantifying fugitive dust emissions. Therefore, the mitigation measures described in Section 7.4.1, "Fugitive Dust Mitigation Measures," should be applied to all project-related dust-generating operations and activities. Occasionally, the District may recommend that a project's potential to affect ambient particulate concentrations be analyzed with an appropriate air pollutant dispersion computer model. The purpose of such an analysis is to help determine if the amount of dust that will be generated by project-related activities will cause an exceedance of an ambient particulate air quality standard.

If the analysis indicates a possible violation of an ambient particulate air quality standard, a finding of significant impact should be made and appropriate mitigating measures identified. The District will recommend that PM modeling be conducted if, in its opinion, project-related activities and operations may generate airborne PM in such quantities as to cause an exceedance of a particulate ambient air quality standard in an area where people live and work, including, but not limited to, residential areas, schools, day care centers, office complexes, and hospitals. Examples of projects that may require supplemental modeling include mining and quarrying operations, landfills, and excavation and grading operations for large development projects. If the District recommends a particulate modeling analysis, it will provide guidance as to appropriate models and modeling protocols.

6.3 SAN JOAQUIN VALLEY FEVER

There is no recommended threshold for a significant San Joaquin Valley Fever impact. However, listed below are factors that may indicate a project's potential to create significant Valley Fever impacts:

- Disturbance of the top soil of undeveloped land (to a depth of about 12 inches)
- Dry, alkaline, sandy soils.
- Virgin, undisturbed, non-urban areas.
- Windy areas.
- Archaeological resources probable or known to exist in the area (Native American midden sites).
- Special events (fairs, concerts) and motorized activities (motocross track, All Terrain Vehicle activities) on unvegetated soil (non-grass).
- Non-native population (i.e., out-of-area construction workers).

The lead agency should consider the factors above that are applicable to the project or the project site. The likelihood that the Valley Fever fungus may be present and impact nearby land uses (or the project itself) increases with the number of the above factors applicable to the project or the project site. Based on these or other factors, if a lead agency determines that project activities may create a significant Valley Fever impact, the District recommends that the lead agency consider the Valley Fever mitigation measures listed in Section 7.4.2, "Valley Fever Mitigation Measures." These mitigation measures focus on fugitive dust control to minimize fungal spore entrainment, as well as minimizing worker exposure.

6.4 CARBON MONOXIDE

The District recommends use of the CALINE4 computer model to determine if a project may create or contribute to an existing CO hotspot. CALINE4 is the latest in a series of line source air quality models developed by the California Department of Transportation (Caltrans). Given the magnitude of the CO source, site geometry, and local meteorology, CALINE4 can predict pollutant concentrations for receptors located within 500 meters of a roadway. In addition to predicting concentrations of relatively inert pollutants such as CO, the model can predict nitrogen dioxide (NO_2) and suspended particle concentrations. It also has special options for modeling air quality near intersections, street canyons, and parking facilities.

Historically, the CALINE series of models required relatively minimal input from the user. Spatial and temporal arrays of wind direction, wind speed, and diffusivity were not needed by the models. While CALINE4 uses more input parameters than its predecessors, it is still considered a very easy model to implement. For most applications, optional inputs can be bypassed and many other inputs can be assigned assumed worst-case values.

In addition to CALINE4, Caltrans has developed a CO hotspot screening procedure. This procedure can be used to provide a quick "worst-case" estimate of ambient CO concentrations near a roadway intersection. The screening procedure is contained in Caltrans' *Transportation Project-Level Carbon Monoxide Protocol* (CO Protocol). Both CALINE4 and the CO Protocol, including the CO screening procedure, can be downloaded from the Caltrans Environmental Division's webpage, located at http://www.dot.ca.gov/hq/env/air/index.htm.

6.4.1 Screening Procedure for Carbon Monoxide Analysis

A CO hotspot screening analysis using the screening procedure in Caltrans' CO Protocol should be conducted for any project with indirect emissions greater than the applicable ozone project significance thresholds in Section 3.3.1 that may significantly impact roadway intersections that are currently operating at, or are expected to operate at, Levels of Service E, or F. A CO hotspot screening analysis should also be conducted for any project-impacted roadway intersection at which a CO hotspot might occur. It is especially important to conduct such an analysis if a proposed project will either create or contribute to a CO hotspot that may adversely affect the public, especially the young, the elderly, and those with medical conditions that could be exacerbated by elevated CO concentrations. If the screening analysis indicates that there may be a CO hotspot, the CALINE4 model should be run as outlined in Appendix B, "Detailed Analysis," of the Caltrans CO Protocol.

The screening analysis was designed to estimate 1-hour and 8-hour CO concentrations for projects involving signalized intersections. The methodology estimates 1-hour CO levels, which then can be converted to estimates of 8-hour CO levels. Screening procedures for additional types of projects were under development at the time the Caltrans CO Protocol was being developed and will be released as supplements to the protocol.

Using the screening methodology to calculate an 8-hour average CO concentration as presented in the Caltrans CO Protocol, it is not possible for a project to result in a modeled 1-hour exceedance of the 1-hour CO standard without also causing a violation of the corresponding 8-hour standard. This is a consequence of using a "persistence factor" to convert the modeled 1-hour concentration to an 8-hour concentration.

The purpose of the screening procedure is to obtain conservative estimates of CO concentrations without having to run CALINE4. Step-by-step instructions on how to use the screening procedure are given in Appendix A, "Screening Procedure," of the Caltrans CO Protocol.

The screening procedure is not applicable to all projects. If the screening procedure assumptions are not appropriate for the subject project, the screening procedure is not applicable, and the CALINE4 model should be used. The main limitations of the screening procedure are presented in Table 6-1, "Scenarios That Should Not Be Modeled Using the Screening Procedure."

TABLE 6-1
SCENARIOS THAT SHOULD NOT BE MODELED USING THE SCREENING PROCEDURE

Vehicles in cold start mode greater than 50%
Percentage of heavy-duty gasoline trucks greater than 1.2%
Traffic volumes greater than 1,000 vehicles/hour/lane
January mean minimum temperature less than 35^{o} F

The screening analysis requires the user to input certain information, such as intersection type, traffic volume, analysis year, background CO concentration, and average cruise speed. All of the needed information is outlined in the screening protocol. Most of the information is project-specific and must be supplied. The APCD recommends that the highest CO concentration reported over the last three years for either the El Rio or Simi Valley air monitoring stations (whichever is nearest the project site) be used for the background CO concentrations. Table 6-2 gives the highest 1-hour and 8-hour CO concentrations for both the El Rio and Simi Valley monitoring stations for 2000 - 2002. Contact the District at 805/645-1427 for updated information on carbon monoxide levels. The average speed should be the same as that used in the URBEMIS emissions analysis. Typically, that will be 40 miles per hour.

TABLE 6-2
HIGHEST BACKGROUND CARBON MONOXIDE CONCENTRATIONS FOR – 2000 - 2002 AT THE EL RIO AND SIMI VALLEY MONITORING STATIONS
(parts per million)

	1-hour	8-hour
El Rio	2.3	1.6
Simi Valley	6.2	4.3

6.4.2 Detailed Procedure for Carbon Monoxide Analysis

If the screening procedure is not applicable for the subject project, or if the screening procedure indicates a potential CO hotspot, the CALINE4 model should be run as outlined in Appendix B, "Detailed Analysis," of the Caltrans CO Protocol.

CALINE4 also requires the user to supply certain input parameters. The inputs should be as recommended in the CO Protocol, except that the background CO concentrations should be the highest 1-hour and 8-hour CO concentration reported over the last three years for either the El Rio or Simi Valley air monitoring stations (whichever is nearest the project site, see Table 6-2). If inputs other than those recommended in the Caltrans CO Protocol or these Guidelines are used, they should be justified and documented to the satisfaction of the lead agency that such changes are warranted. Documentation and justification of any changes to the CO Protocol default values should be included in the environmental document.

If the CALINE4 model indicates that the project may cause a CO hotspot (or contribute to an existing hotspot), a finding of significant impact should be made, unless mitigation measures can be implemented that reduce the hotspot concentration to less than the applicable CO standard. Mitigation measures to reduce significant CO impacts are discussed in Section 7.5.5, "Carbon Monoxide Mitigation."

6.5 TOXIC AIR CONTAMINANTS

All projects that may emit TACs should be assessed to determine whether those TAC emissions may adversely impact nearby populations. When considering potential TAC impacts, lead agencies should consider both of the following situations: 1) a proposed new or modified facility that may emit TACs near existing land uses; and, 2) a new land use proposed near an existing facility that emits TACs.

6.5.1 Determining Whether the Project Will Emit Toxic Air Contaminants

The first step in deteriming whether a proposed project may adversely impact nearby populations with TACs is for the lead agency to determine whether the subject project will emit toxic substances. This information may be obtained from the project applicant as part of the permit review process. The lead agency should inquire about the types and amounts of toxic substances the facility may use and emit to the atmosphere. Lead agencies also can refer to Appendix D, Major Toxic Air Contaminant Regulations and Common Toxic Air Contaminant Sources and Substances, for a list of common TAC sources and substances that may be encountered at facilities in Ventura County. Moreover, many types of equipment and processes that require a District Permit to Operate also emit TACs. Therefore, lead agencies can refer to Appendix B, Common Equipment and Processes Requiring a Ventura County APCD Permit to Operate.

In addition to the TAC sources and substances listed in Appendix D, the lead agency also should refer to the extensive list of toxic chemicals called the *Title III List of Lists, Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-to-know Act (EPCRA) and Section 112(r) of the Clean Air Act, as Amended.* This list can be downloaded from http://www.epa.gov/ceppo/pubs/title3.pdf. This consolidated chemical list includes chemicals subject to reporting requirements under Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), also known as the Emergency Planning and Community Right-to-Know Act (EPCRA), and chemicals listed under Section 112(r) of Title III of the Clean Air Act (CAA) of 1990, as amended. Lead agencies also can refer to State of California's Office of Environmental Health Hazard Assessment (OEHHA) website at http://www.oehha.ca.gov/home.html. This page provides access to OEHHA's Toxicity Criteria Database, the Proposition 65 list of chemicals known to the State of California to cause cancer, birth defects or other reproductive harm, and information regarding TAC health risk assessments.

Finally, lead agencies can contact the District's Air Toxics Section at 805/645-1405 or 805/645-1478 to obtain information regarding whether a facility, facility type, or operation emits or will emit TACs. This can be particularly important and useful because health risk assessments have been conducted for many such facilities in Ventura County under the District's Air Toxics "Hotspots" Program. These health risk assessments are on file with the District and are available for public review.

6.5.2 Assessing the Impact of Toxic Air Contaminant Emissions

If a lead agency determines that a project it is considering will emit TACs, the next step is to assess the potential of those toxic emissions to adversely impact nearby populations. This determination can be made by conducting an appropriate TAC health risk assessment.

The California Air Pollution Control Officers Association (CAPCOA) has developed TAC health risk assessment guidelines to provide consistent, statewide procedures for preparing the health risk assessments required under the Air Toxics "Hot Spots" Act. The title of these guidelines is *CAPCOA Air Toxics "Hot Spots" Program Revised 1992 Risk Assessment Guidelines*. The current version of the CAPCOA guidelines is dated October 1993. The CAPCOA guidelines can be downloaded from the California Air Resource Board's (ARB) website at http://www.arb.ca.gov/ab2588/riskassess.htm.

The District has prepared a supplement to the CAPCOA guidelines for preparing health risk assessments in Ventura County. The District's supplemental guidelines is titled *Supplement to the CAPCOA Air Toxics "Hot Spots" Program Risk Assessment Guidelines*. The current version of this document is dated March 23, 1995, and can be downloaded from the District's website at http://www.vcapcd.org/air_toxics.htm. The District recommends that lead agencies conduct TAC risk assessments in accordance with the CAPCOA Risk Assessment Guidelines, as supplemented by the District's supplemental guidelines.

The CAPCOA Risk Assessment Guidelines contain procedures for both screening level and formal health risk assessments. Because formal TAC health risk assessments can be complex and time consuming, a screening health risk analysis is useful for quickly defining a worst-case estimate of risk and for determining if further analysis using a formal health risk assessment is needed. However, a screening health risk assessment for a project is not appropriate if the assumptions and parameters on which the screening risk analysis is based are not suitable for the subject project. In such a case, the screening analysis may not be accurate and a formal risk assessment should be conducted.

If the results of the screening analysis show that the lifetime excess cancer risk to the maximum exposed individual is less than one in one-million and the hazard indices for acute and chronic noncancer health effects are less than 0.1, no further analysis for TAC impacts is needed. If the results are greater than these values, then a formal health risk assessment should be conducted. The results of both the screening health risk assessment and the formal health risk assessment should be included and documented in the environmental document for the project.

Lead agencies also should consult with the District's Engineering and Permit Division at 805/645-1421 or 805/645-1405 as early as possible in their respective project review and approval process for projects that will emit TACs. Such projects also may require a Permit to Operate from the District. All projects that require a District Permit to Operate are evaluated by the District for potential TAC impacts. Moreover, California Health and Safety Code §42301.6 and Public Resources Code §21151.8 (a)(2), require that any new school, or proposed industrial or commercial project site located within 1,000 feet of a school, must be referred to the District for review.

6.5.3 Projects Near Existing Sources of Toxic Air Contaminants

Proposed new land uses that will be located within one-quarter mile of an existing source (or sources) of TACs should be evaluated for the potential to be impacted by those TACs. A lead agency processing a land use entitlement for a project near an existing source of toxic air emissions should consult with the District's Air Toxics Section to review any toxic air emissions information, especially health risk assessments, the District may have regarding that source of toxic air emissions. Such information may have been gathered by the District pursuant to the District's AB 2588 Air Toxics "Hot Spots" Program and as part of the air pollution permit process for facilities that require air pollution permits.

If the District has required a health risk assessment for the existing TAC source, the lead agency should, in consultation with the District, review that health risk assessment to determine an area around the source within which people in the proposed project would be exposed to either a cancer or noncancer risk in excess of the significance thresholds for

TACs presented in Section 3.3.2, "Other Pollutants of Concern." If there is more than one source of toxic air emissions within one-quarter mile of the proposed project, the lead agency should develop an individual health risk for the proposed project based on the health risk assessments for all of the identifed toxic air emissions sources.

If a health risk assessment has not been done for the nearby source of TACs, the lead agency should make a reasonable attempt to gather toxic air emissions information from that source. No proprietary information should be needed to perform the health risk assessments. A health risk assessment then should be conducted for that source if the lead agency has obtained sufficient information on which to base the assessment. The lead agency should consult with the District's Air Toxics Section to determine whether the location of the proposed project relative to the TAC source has the potential to subject people in the proposed project to TAC risks in excess of the TAC significance thresholds presented in Section 3.3.2, "Other Pollutants of Concern." Pursuant to CEQA §15151, the sufficiency of the air toxics analysis should be reviewed in light of what is reasonably feasible.

Based on the results of the preceding analyses, a determination should be made by the lead agency as to whether the subject project, as proposed, would subject the population of the project to significant TAC impacts. If it is determined that the population would be subjected to a significant TAC impact, appropriate mitigation measures should be proposed to reduce that impact to acceptable levels. TAC mitigation measures are discussed in Section 7.5.6, "Toxic Air Contaminant Mitigation."

6.5.4 Asbestos

Asbestos is listed as a TAC by both the State of California and by the U.S. EPA. It is discussed in these Guidelines as a separate TAC issue because of its widespread presence in the environment, its human health implications, and its concern among the public.

Construction projects sometimes require the demolition of existing buildings at the project site. Depending upon the types of building materials that were used and the year in which the building was constructed, many different areas and fixtures in a building may contain asbestos. Exposure to asbestos may cause serious health effects. For example, asbestos exposure can increase the risk of lung cancer by five times. Cancer of the stomach and internal organs such as the mouth, esophagus, larynx, kidneys, and colon can also be caused by asbestos exposure. Asbestos is likely to be found in buildings constructed before 1979 and almost certain to be present in those built before 1950.

Demolition or renovation activities involving asbestos materials are subject to the National Emissions Standards for Hazardous Air Pollutants (NESHAP) regulations as listed in the Code of Federal Regulations (40 CFR Part 61, Subpart M). These regulations apply to commercial projects as well as some types of residential projects, and require a thorough inspection (or survey) of the site that is to be demolished or renovated to determine whether asbestos materials are present. These regulations also contain notification and remediation requirements.

Demolition or renovation activities involving asbestos materials also are subject to APCD Rule 62.7, Asbestos, Demolition and Renovation. The District's Compliance Division should be contacted at 805/645-1443 to determine any asbestos inspection and compliance requirements before commencing demolition or renovation of any building. Compliance with APCD Rule 62.7 is adequate to ensure that asbestos entrainment will not cause a significant adverse impact.

Additional information regarding asbestos materials and regulation of activities involving asbestos can be found at the District's website located at http://www.vcapcd.org/asbestos.htm.

6.6 ODORS

The environmental document for a proposed project should include an assessment of the potential for a proposed project to cause a public nuisance by subjecting surrounding land uses to objectionable odors. A public nuisance is defined by APCD Rule 51, Nuisance, as "...such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or to the public, or which cause, or have a natural tendency to cause, injury or damage to business or property." The assessment also should evaluate the potential for a proposed project to be impacted by objectionable odors from nearby existing or proposed land uses. Potential odor impacts on residential areas, schools, day care centers, playgrounds, retirement homes, convalescent homes, hospitals, and job sites warrant the closest examination. Any project that has the potential to create a public nuisance by subjecting members of the public to objectionable odors should be deemed to have a significant odor impact.

The first step in an odor analysis is to determine whether the proposed project (or nearby source) could generate odorous emissions in such quantities as to be a nuisance to nearby land uses (or to the proposed project). This should be based on information submitted by the project applicant and on the lead agency's and the District's knowledge and experience with the same or similar facility type. For example, new housing developments generally do not cause odor nuisances to nearby land uses. However, a proposed fiberglass manufacturing facility near an existing or proposed residential development may pose a nuisance to the residents of that development because of odors. Table 6-3, "Project Screening Distances for Odorous Land Uses," lists facility types known to emit objectionable odors and thus may be sources of nuisance odors to nearby land uses. The list is a guide and, as such, is not all-inclusive. Other types of facilities not on the list also may generate objectionable odors. Lead agencies should consider the odor potential of each new project based on its type and its location with respect to other land uses that may be adversely affected by any odors the proposed project may generate.

For projects that may generate odorous emissions, or may be impacted by odorous emissions, the next step is to determine if the potential source of the odors, or the potential receptor of the odors, is closer than the screening distances in Table 6-3.

If the source (or a similar type) is listed on Table 6-3, and the distance between the source and the receptor of the subject odors is closer than the distances in Table 6-3, a more thorough evaluation should be conducted. The evaluation should be based on possible objectionable odors associated with the same or similar facilities, the type and potential severity of the odorous emissions, the probability of process operations (including possible short-term process upsets) releasing odorous emissions, complaint history associated with those projects (contact the District's Compliance Division at 805/645-1445 for information regarding a facility's complaint history), the distance between the potential odorous source, prevailing wind direction and speed, the percentage of time that a potential affected population will be located downwind of the proposed project, and any other information that the lead agency finds applicable.

For a project locating near an existing source of odorous emissions, a significant odor impact may occur if the odor source has:

- More than one confirmed odor complaint per year with the District, averaged over a three-year period.
- Three unconfirmed odor complaints per year with the District, averaged over a three-year period.

Any odor complaints should be mapped in relation to the odor source to establish a general boundary for any possible odor impacts. It should be noted that, due to confidentiality requirements regarding citizen nuisance complaints to the District, only the block number of any such complaints will be given. The name and address of the complainants, and the date of the complaints, will not be given.

For new projects that may emit odorous emissions, the analysis should consider the distance and frequency of odor complaints that have occurred in the vicinity of similar facilities.

If it is determined that a proposed project may either cause a significant odor impact, or be significantly impacted by odors from an existing facility, all feasible mitigation measures should be applied to minimize or eliminate the odors. Mitigation measures to reduce significant odor impacts are discussed in Section 7.5.7, "Odor Mitigation."

TABLE 6-3
PROJECT SCREENING DISTANCES
FOR ODOROUS LAND USES

Land Use	Screening Distance
Wastewater Treatment Facilities*	2 miles
Sanitary Landfills*	1 mile
Solid Waste Transfer Station*	1 mile
Composting Facilities*	1 mile
Asphalt Batch Plants*	1 mile
Painting and Coating Operations*	1 mile
Fiberglass Operations*	1 mile
Food Processing Facilities*	1 mile
Coffee Roasters**	1 mile
Commercial Charbroiling**	1 mile
Feed Lots/Dairies*	1 mile
Petroleum Refineries*	2 miles
Chemical Manufacturing Facilities*	1 mile
Green Waste and Recycling Operations**	2 miles
Wastewater Pumping Facilities**	1 mile
Mushroom Farms**	2 miles
Petroleum Extraction, Processing, Storage, and Non-retail Marketing Facilities**	1 mile
Rendering Plants*	1 mile
Metal Smelting Plants**	1 mile

*Guide for Assessing and Mitigating Air Quality Impacts, Table 4-2, "Project Screening Trigger Levels for Potential Odor Sources," San Joaquin Valley Unified Air Pollution Control District, August 1998.

**Ventura County APCD staff, August 2000.

7. MITIGATION MEASURES

7.1 INTRODUCTION

This chapter provides guidance on selecting mitigation measures for projects that may have a significant impact on air quality. The chapter also includes guidance for evaluating mitigation measure effectiveness, implementation, and monitoring. The mitigation measure tables in the chapter contain measures, organized by type, that project proponents and public agencies can consider to mitigate a project's air quality impacts. The tables of mitigation measures are not intended to be exhaustive, and lead agencies and project proponents are encouraged to identify and quantify additional appropriate mitigation measures for specific projects. Mitigation measures to reduce emissions from project construction are presented in Section 7.4, "Construction Mitigation." Section 7.5, "Project Mitigation" presents measures that can be used to reduce emissions during the "operational" period of the project, after project construction has been completed.

7.2 CEQA REQUIREMENTS FOR MITIGATION MEASURES

The California Environmental Quality Act (CEQA) Guidelines require that Environmental Impact Reports (EIRs) "describe measures which could minimize significant adverse impacts" (California Code of Regulations (CCR) §15126(c)). In addition, the CCR states that "a public agency should not approve a project as proposed if there are feasible alternatives or mitigation measures that would substantially lessen any significant effects that the project would have on the environment" (CCR §15021(a)(2)).

"Feasible" means "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors" (CCR §15364). Lead agencies are responsible for determining the feasibility of mitigation measures. If impacts identified in the environmental analysis cannot be mitigated below the significance threshold, they must, nevertheless, be reduced as much as feasible. Air quality thresholds of significance are discussed in Chapter 3, Air Quality Significance Thresholds.

In making a finding concerning the feasibility of mitigation measures, the CCR allows public agencies to find that "specific economic, legal, social, technological, or other considerations, including provision of employment opportunities for highly trained workers, make infeasible the mitigation measures or project alternatives in the final EIR" (CCR §15091(a)(3)). However, in making such a finding, CCR §15091(b) states that the findings "shall be supported by substantial evidence in the record." Furthermore, the courts have ruled that the agency must present some explanation to supply the logical step between the ultimate finding and the facts in the record.

It is possible that project emissions will still be significant after inclusion of all feasible mitigation measures. A public agency may approve a project with a significant environmental impact. According to the CEQA Guidelines, "if the specific economic, legal, social, technological, or other benefits of a proposed project outweigh the unavoidable adverse environmental effects, the adverse environmental effects may be considered 'acceptable'" (CCR §15093(a)). In doing so, "the agency shall state in writing the specific reasons to support its action based on the final EIR and/or other information in the record" (CCR §15093(b)). The decision-making agency must make a statement in the record of its views on the ultimate balancing of the merits of approving the project despite the environmental impact. If an agency makes a statement of overriding consideration, the statement should be included in the record of the project approval and should be mentioned in the notice of determination.

An air quality section of an environmental document must identify all potential effects of a project on the environment and examine available alternatives to avoid, minimize, reduce, eliminate, or compensate for significant impacts. For each potential adverse impact, mitigation measures should be identified to reduce impacts below the air quality threshold of significance (see Section 3.3, "Significance Criteria"). Design modifications that could reduce impacts also should be considered. The control effectiveness of each measure should be quantified to the extent possible. If a measure cannot be quantified, a qualitative discussion should be provided explaining the benefits of the proposed mitigation measure. If a proposed mitigation measure has the potential to cause a significant effect, the effects of the mitigation measure should be discussed, though in less detail than the proposed project (CCR §15126.4(D)).

7.2.1 Effectiveness Estimates

Mitigation measure effectiveness estimates should be based on reasonable assumptions about the project. When developing mitigation measures for environmental documents, the lead agency should document all assumptions and sources used in determining the measure's effectiveness. This includes what emissions will be affected by the measure, how the measure will affect the targeted emissions, the source of the effectiveness estimate for the measure, and any circumstances that warrant effectiveness beyond the minimum effectiveness estimates contained in URBEMIS, these Guidelines, or other sources.

7.2.2 Implementation, Monitoring, and Enforceability

The lead agency should identify the method of measure implementation, monitoring, and enforceability at the time of measure development, including:

- Who is responsible for implementation.
- What must be done, and for how long.
- Where it is to be carried out.

- An implementation schedule, including interim implementation targets if the project is to be phased.
- What additional measures, if any, must be done and by whom if: 1) the measure is implemented but does not achieve the anticipated emission reductions, or 2) the entity responsible for implementation fails to implement the measure.
- Who is responsible for monitoring measure implementation.
- Criteria for assessing whether the measure has been implemented.
- Enforcement mechanisms to ensure implementation.

Implementation

CEQA provides that mitigation includes "reducing or eliminating the impact over time by preservation or maintenance operations during the life of the action" (CCR §15370(d)). However, for many projects, the life of the action may be difficult to determine. Residential projects may have a life span of 50 years or more. Commercial and industrial projects may have a life span of 10 years or less. Frequently, jurisdictions will issue conditional use permits for commercial and industrial projects for only 5 or 10 years, after which the project must reapply for an extension or modification of the existing conditional use permit, at which time additional conditions may be imposed.

Monitoring

CEQA requires that a public agency that incorporates changes or alterations to a project to mitigate significant effects must also adopt monitoring or reporting requirements for the mitigation measures that it imposes. Monitoring or reporting requirements must be adopted for mitigation measures required through EIRs and for Mitigated Negative Declarations (MNDs). The monitoring or reporting requirements must be adopted when the agency makes findings required by CEQA for project approval (Public Resources Code (PRC) §21081.6(a)). Each lead agency should determine how long monitoring or reporting requirements are necessary given that the motor vehicle fleet is becoming cleaner over time and that new technology will be available in the future that will substantially lessen the emissions thereafter.

Enforceability

The lead agency should structure mitigation measure implementation and enforcement in such a way as to maximize the likelihood that the measure will be fully implemented, as required by Public Resources Code §21081.6(b), which states:

> A public agency shall provide that measures to mitigate or avoid significant effects on the environment are fully enforceable through permit conditions, agreements, or other measures. Conditions of project approval may be set forth in referenced documents which address required mitigation measures or, in the case of the adoption of a plan, policy, regulation, or other public project, by incorporating the mitigation measures into the plan, policy, regulation, or project design.

A lead agency can implement mitigation measures through such mechanisms as land use entitlement conditions, recording the conditions on the property title, incorporating the mitigation measures in a development agreement, incorporating the mitigation measures into the project description or specific plan, or by drawing up a mitigation agreement between the project proponent and the lead agency.

7.3 PLAN-LEVEL MITIGATION

This section describes Ventura County Air Pollution Control District (APCD or District) recommendations for lead agencies preparing environmental documents for large-scale plans and policy documents including (but not limited to): general, community, master, area, specific, and local coastal plans. Since these plans and policy documents are intended to guide development patterns, they are an ideal mechanism to encourage land use design and development that minimizes air quality impacts. The most appropriate stage to address issues, such as allowable land use densities, mixing of land uses, street standards, and parking requirements, is at the plan level. Many of the specific mitigation measures discussed in Section 7.5.2, "Operational Mitigation Measures," can be promoted at the plan level through zoning ordinances, parking standards, and design guidelines. Additionally, both the California Air Resources Board website at http://www.arb.ca.gov and the U.S. Environmental Protection Agency website at http://epa.gov have recommendations for designing projects to reduce air quality impacts. Incorporating air quality strategies into plan and policy documents can minimize the need for mitigation of individual development proposals.

Cities and the County should consider the following strategies when developing or revising plan and policy documents:

- A commitment to determine and mitigate project level and cumulative air quality impacts under CEQA (including implementation of the transportation control measures in the *Ventura County Air Quality Management Plan* (AQMP), such as the Transportation Demand Management (TDM) Facilities Ordinance (TCM B), Non-motorized Strategies (TCM D), and Regional Transit Programs (TCM E)).
- A commitment to integrate land use plans, transportation plans, and air quality plans.
- A commitment to plan land uses in ways that support a multi-modal transportation system.

- A commitment to take local action to support programs that reduce congestion and vehicle trips.

7.4 CONSTRUCTION MITIGATION

The mitigation measures described in this section are designed to control emissions caused by project construction activities - grading, clearing, excavation, earth moving, and mobile equipment necessary to perform these activities. Measures to control fugitive dust caused by project construction are presented in Section 7.4.1, “Fugitive Dust Mitigation Measures.” Measures to control Valley Fever fungal spore entrainment are presented in Section 7.4.2, “Valley Fever Mitigation Measures.” Measures to control reactive organic compounds (ROC) and oxides of nitrogen (NOx) emissions from project construction are presented in Section 7.4.3, “ROC and NOx Construction Mitigation Measures.”

As discussed in Section 5.2, “Calculating Ozone Precursor Emissions from Project Construction,” construction-related ROC and NOx emissions are not counted toward the ROC and NOx significance thresholds, since these emissions are only temporary. Therefore, when calculating project emissions using URBEMIS, construction emissions should not be included in the analysis; only area source emissions and operational emissions boxes should be included. However, after project emissions have been calculated, the user may want to access the construction mitigation measures component of the program. If so, in the “Load an Existing Project” screen, select “Edit These Project Settings,” then check the construction box in the “Project Emission Sources” panel. This will enable you to access the construction module of the URBEMIS program, including the mitigation measure screens. Additional mitigation measures not quantified by URBEMIS can be included in the construction emissions analysis by choosing the user defined mitigation tabs for each of the three construction phases.

Since the air pollutant levels in Ventura County exceed the state and federal ozone standards and the state PM_{10} standard, APCD recommends that lead agencies include measures in Sections 7.4.1, “Fugitive Dust Mitigation Measures,” and 7.4.3, “ROC and NOx Construction Mitigation Measures,” in all projects that include construction activities, with special attention given to projects that require a grading permit. If the project poses a risk for Valley Fever (see Section 6.3, “San Joaquin Valley Fever”), APCD recommends that the measures in Section 7.4.2, “Valley Fever Mitigation Measures,” be included (in addition to the measures in Section 7.4.1, “Fugitive Dust Mitigation Measures,” to minimize Valley Fever fungal spore entrainment.

7.4.1 Fugitive Dust Mitigation Measures

Control techniques for fugitive dust generally involve watering, chemical dust control agents for soil stabilization, scheduling of activities, and vehicle speed control. Watering, the most common and generally least expensive method, provides only temporary dust control. Watering also usually requires the use of diesel-powered watering trucks or pumps. The effectiveness of water for fugitive dust control depends greatly on the prevailing weather conditions and frequency of application. Chemical dust control agents provide longer dust suppression, but are not effective in reducing the large portion of construction dust emissions caused by grading, excavation, and cut-and-fill operations. Dust control agents for soil stabilization are useful primarily for application on completed cuts, fills, and unpaved roadways. Fugitive dust emissions from inactive portions of a construction site can be reduced up to 80 percent with chemical stabilizers. Chemical stabilizers, however, may be costly and should be limited to environmentally-safe materials to avoid adverse effects on plant and animal life.

Scheduling activities during periods of low wind speed will also reduce fugitive dust emissions. Low wind speeds typically occur during morning hours. Highest wind speeds are observed during Santa Ana wind conditions, which commonly occur between October and February with December having the highest frequency of events. Additionally, vehicle speed control can reduce fugitive dust emissions from unpaved roads and areas at construction sites by up to 60 percent, assuming compliance with a 15 miles per hour (mph) on-site speed limit.

Fugitive dust mitigation measures are presented below, as a model Fugitive Dust Mitigation Plan. This model plan is intended to be a starting point for lead agencies to use for fugitive dust mitigation. As new measures become available or known, lead agencies should add them to their standard list of fugitive dust mitigation measures. The model fugitive dust plan can be incorporated into a project in a variety of ways, including (but not limited to): part of a project description, developer agreement, as project conditions, or as part of a larger air quality or project mitigation plan.

7.4.1.1 Model Fugitive Dust Mitigation Plan

1. The area disturbed by clearing, grading, earth moving, or excavation operations shall be minimized to prevent excessive amounts of dust.
2. Pre-grading/excavation activities shall include watering the area to be graded or excavated before commencement of grading or excavation operations. Application of water (preferably reclaimed, if available) should penetrate sufficiently to minimize fugitive dust during grading activities.
3. Fugitive dust produced during grading, excavation, and construction activities shall be controlled by the following activities:
   a) All trucks shall be required to cover their loads as required by California Vehicle Code §23114.
   b) All graded and excavated material, exposed soil areas, and active portions of the construction site, including unpaved on-site roadways, shall be treated to prevent fugitive dust. Treatment shall include, but not necessarily be limited to, periodic

watering, application of environmentally-safe soil stabilization materials, and/or roll-compaction as appropriate. Watering shall be done as often as necessary and reclaimed water shall be used whenever possible.

4. Graded and/or excavated inactive areas of the construction site shall be monitored by (indicate by whom) at least weekly for dust stabilization. Soil stabilization methods, such as water and roll-compaction, and environmentally-safe dust control materials, shall be periodically applied to portions of the construction site that are inactive for over four days. If no further grading or excavation operations are planned for the area, the area should be seeded and watered until grass growth is evident, or periodically treated with environmentally-safe dust suppressants, to prevent excessive fugitive dust.
5. Signs shall be posted on-site limiting traffic to 15 miles per hour or less.
6. During periods of high winds (i.e., wind speed sufficient to cause fugitive dust to impact adjacent properties), all clearing, grading, earth moving, and excavation operations shall be curtailed to the degree necessary to prevent fugitive dust created by on-site activities and operations from being a nuisance or hazard, either off-site or on-site. The site superintendent/supervisor shall use his/her discretion in conjunction with the APCD in determining when winds are excessive.
7. Adjacent streets and roads shall be swept at least once per day, preferably at the end of the day, if visible soil material is carried over to adjacent streets and roads.
8. Personnel involved in grading operations, including contractors and subcontractors, should be advised to wear respiratory protection in accordance with California Division of Occupational Safety and Health regulations.

7.4.2 Valley Fever Mitigation Measures

As discussed in Section 6.3, “San Joaquin Valley Fever,” if the project site poses a risk for Valley Fever, APCD recommends that the lead agency include appropriate Valley Fever mitigation measures in the environmental document for the project. These measures should be considered, in addition to the fugitive dust mitigation measures listed in Section 7.4.1, “Fugitive Dust Mitigation Measures,” to minimize Valley Fever risk during project construction:

1. Restrict employment to persons with positive coccidioidin skin tests (since those with positive tests can be considered immune to reinfection).
2. Hire crews from local populations where possible, since it is more likely that they have been previously exposed to the fungus and are therefore immune.
3. Require crews to use respirators during project clearing, grading, and excavation operations in accordance with California Division of Occupational Safety and Health regulations.

4. Require that the cabs of grading and construction equipment be air-conditioned.
5. Require crews to work upwind from excavation sites.
6. Pave construction roads.
7. Where acceptable to the fire department, control weed growth by mowing instead of discing, thereby leaving the ground undisturbed and with a mulch covering.
8. During rough grading and construction, the access way into the project site from adjoining paved roadways should be paved or treated with environmentally-safe dust control agents.

7.4.3 ROC and NOx Construction Mitigation Measures

As discussed in Chapter 5, Estimating Ozone Precursor Emissions, ozone precursor emissions from construction vehicles can be substantial. However, there are very few feasible measures available to reduce these emissions. APCD recommends the following measures to mitigate ozone precursor emissions from construction motor vehicles:

1. Minimize equipment idling time.
2. Maintain equipment engines in good condition and in proper tune as per manufacturers' specifications.
3. Lengthen the construction period during smog season (May through October), to minimize the number of vehicles and equipment operating at the same time.
4. Use alternatively fueled construction equipment, such as compressed natural gas (CNG), liquefied natural gas (LNG), or electric, if feasible.

7.5 PROJECT MITIGATION

The mitigation measures described in this section are designed to control emissions caused by activities at the project site after construction is completed and the project is operational. Mitigation measures to control area source emissions from the project are presented in Section 7.5.1, "Area Source Mitigation Measures." Mitigation measures to control operational emissions are presented in Section 7.5.2, "Operational Mitigation Measures." Mitigation measures that can be applied to a project, but which may take place at a location other than the project site, are presented in Section 7.5.3, "Off-Site TDM Fund."

URBEMIS contains project mitigation measure options. When running the program, checking the "Mitigation Measures" boxes in the main screens for area source emissions and operational emissions can access those options, respectively. Additional mitigation measures not quantified by URBEMIS can be included in the project emissions analysis by choosing "New Area Source Mitigation Measures" in the Area Emissions main screen (see Section III.7 of the URBEMIS User's Guide), and by choosing "User Measure" in the Operational Emissions main screen (see Section III.8 of the URBEMIS User's Guide).

7.5.1 Area Source Mitigation Measures

Area sources are sources that individually emit small quantities of air pollutants, but which cumulatively may generate significant quantities of emissions. Area source emissions include fuel combustion from natural gas appliances, utility engines (including landscape maintenance equipment), and consumer products. Area source mitigation measures include, but are not limited to, energy efficiency measures to reduce air emissions associated with energy generation and use. Such measures include increasing structural energy efficiency beyond the requirements of California's Title 24 energy efficiency standards (Title 24, California Code of Regulations, Part 6 - *California Energy Efficiency Standards for Residential and Nonresidential Buildings*. Title 24, Part 6 can be downloaded from http://www.energy.ca.gov/title24/.

Area source mitigation measures to reduce project emissions are listed in Table 7-1, "Area Source Mitigation Measures."

APCD recommends that area source mitigation measures be included in all projects that have been determined to have a significant air quality impact. If, after including all feasible area source mitigation measures, the project still exceeds the ROC and NOx significance thresholds, operational mitigation measures (Section 7.5.2, "Operational Mitigation Measures") should be applied to the project.

TABLE 7-1
AREA SOURCE MITIGATION MEASURES

Emission Source	Mitigation Measure	Emission Reduction (%) ROC	NOx
Residential Water Heaters	Use solar or low emission water heaters	11	9.5
	Use central water heating systems	9	8
Residential Heating	Orient buildings to the north for natural cooling and heating	14	13
	Increase walls and attic insulation beyond Title 24* requirements	14	13
Residential Landscape Maintenance	Provide electric maintenance equipment	100	100
Commercial Water Heaters	Use solar or low-emission water heaters	0.5	0.5
	Use central water heating systems	0.5	0.5
Commercial Heating	Orient buildings to the north for natural cooling and heating	11	13.5
	Increase walls and attic insulation beyond Title 24* requirements	10	9
Commercial Landscape Maintenance	Provide electric maintenance equipment	100	100
Industrial Heating	Orient buildings to the north for natural cooling and heating	2	3

*Title 24, California Code of Regulations, Part 6 - California Energy Efficiency Standards for Residential and Nonresidential Buildings

Source: URBEMIS User's Guide, Yolo-Solano Air Quality Management District, November 2002.

7.5.2 Operational Mitigation Measures

Operational emissions include emissions associated with motor vehicle trips generated by or attracted to land uses, and from dust generated by motor vehicles associated with the project on paved or unpaved roads. For many land uses, motor vehicle trips are often the primary source of emissions associated with the project. These motor vehicle trip emissions associated with land uses are often referred to as "indirect sources" of emissions. Broadly speaking, mitigation measures to reduce emissions from project operation include strategies that reduce vehicle trips or vehicle miles traveled (VMT), use of low emission vehicles, and measures that improve traffic flow or reduce congestion.

The URBEMIS program categorizes operational mitigation measures by project type - either residential or non-residential (commercial/industrial). The program requires input of two types of information: 1) information about the environment surrounding the project area (called "Environmental Factors" on the Operational Emission Sources main screen), and 2) information about the mitigation actually being done for the project (called "Vehicle Trip Mitigation"). URBEMIS applies the environmental factors created by the project environment screens to the project specific mitigation measures. This results in percent reduction in trips and reductions in VMT. Correction factors are then applied to account for differences in measure effectiveness by trip type and trip distance. Emission factors are then applied to the trips and VMT reductions to yield mitigation measure emission reductions.

Environmental Factors

Environmental factors describe conditions that exist or are planned around the project area with regard to the pedestrian, bicycle, and transit environment. These screens require a qualitative assessment of conditions surrounding the project areas. The user has two options: selecting the default settings, which is the level achievable by a standard suburban-oriented subdivision or commercial development; or, developing environmental factors by going through a series of screens describing the pedestrian, transit, and bicycle environment surrounding the project.

One factor that lead agencies should consider in evaluating the project environment is each jurisdiction's locally-adopted Transportation Demand Management (TDM) Facilities Ordinance. These ordinances were adopted by all of the cities and the County of Ventura as required by state law related to the Congestion Management Plan (CMP) requirements. The Ventura County Transportation Commission adopted a model ordinance which contains the following seven basic elements, which were to be included in all local ordinances in Ventura County:

1. Standards for the number, size, and location of preferential carpool and vanpool parking spaces.
2. Standards for the number and location of bicycle racks and/or lockers.
3. Requirements for the provision, where feasible and appropriate, of transit stop improvements (i.e., bus pullouts, bus pads, shelters, etc.)
4. Requirement for the provision of a transportation information center at non-residential developments serving 50 or more employees.
5. Safe and convenient access for pedestrians and bicyclists from the external circulation system to on-site buildings or internal streets/sidewalks.
6. A formal role for transit operators in the local jurisdiction's environmental and developmental review processes.
7. Requirements for large developments to address the provision of needed services in close proximity to either jobs or housing.

Vehicle Trip Mitigation

The Vehicle Trip Mitigation screens describe measures associated with the specific project being implemented. URBEMIS categorizes these project measures as follows: regional and non-regional transit measures, residential measures, and non-residential measures. Operational mitigation measures to reduce project emissions are listed in Table 7-2, "Operational Mitigation Measures." APCD recommends that the mitigation measures selected for a project be developed and implemented within a comprehensive on-site program, where possible, to enhance the effectiveness of the individual measures. Appendix R-94, Transportation Control Measure Documentation, of the *Ventura County Air Quality Management Plan* can also be used for information about transportation control measures.

As stated in Section 5.3, "Calculating Emissions from Residential, Commercial, Industrial, and Institutional Development Projects," emissions from stationary sources, including industrial equipment, are controlled through the Ventura County APCD permit, inspection, and enforcement programs and procedures, and, therefore, are not addressed in these Guidelines.

APCD recommends that operational mitigation measures be included in projects that have been determined to have a significant air quality impact, even after including all feasible area source mitigation measures (Section 7.5.1, "Area Source Mitigation Measures"). If the project exceeds the ROC and NOx significance thresholds after inclusion of area and operational mitigation measures (Sections 7.5.1, "Area Source Mitigation Measures," and 7.5.2, "Operational Mitigation Measures"), off-site TDM fund mitigation measures (Section 7.5.3, "Off-site TDM Fund") should be applied to the project.

Project applicants may propose other mitigation measures not included in these Guidelines. Project applicants and lead agencies should consult with the Ventura County APCD before including miscellaneous mitigation measures in an environmental document.

TABLE 7-2
OPERATIONAL MITIGATION MEASURES

Measure Type	Mitigation Measure	Max. Trip Reduction (%)*
Residential		
Transit Infrastructure	Project density meets transit level of service requirements	6
	Provide transit shelters, benches, etc.	2
	Provide street lighting	0.5
	Provide route signs and displays	0.5
	Provide bus turnouts/bulbs	1
Pedestrian Infrastructure	Mixed use project (residential oriented)	3
	Provide sidewalks and/or pedestrian paths	1
	Provide direct pedestrian connections	1
	Provide pedestrian safety design/infrastructure	0.5
	Provide street furniture and artwork	0.5
	Provide street lighting	0.5
	Provide pedestrian signalization and signage	0.5
Bicycle Infrastructure	Provide bike lanes/paths connecting to bikeway system	2
Trip Reduction/VMT	Park-and-ride lots	**
	Satellite telecommuting center	***
Commercial/Industrial		
Transit Infrastructure	Project density meets transit level of service requirements	6
	Provide transit shelters, benches, etc.	2
	Provide street lighting	0.5
	Provide route signs and displays	0.5
	Provide bus turnouts/bulbs	1
Pedestrian Infrastructure	Mixed use project (commercial oriented)	1
	Floor area ratio 0.75 or greater	1
	Provide wide sidewalks and onsite pedestrian facilities	1
	Project uses parking structure(s)/small dispersed lots	1

TABLE 7-2 (CONTINUED)

Measure Type	Mitigation Measure	Max. Trip Reduction (%)*
Commercial/Industrial		
Pedestrian Infrastructure (cont'd)	Provide street lighting	0.5
	Project provides shade trees to shade sidewalks	0.5
	Project provides street art and/or street furniture	0.5
	Project uses zero building setback with entrance on street	0.5
	Provide pedestrian safety designs/infrastructure at crossings	0.5
	Articulated storefront display windows for visual interest	0.25
	No long uninterrupted walls along pedestrian access routes	0.25
Bicycle Infrastructure	Provide bike lanes/paths connecting to bikeway system	2
	Provide secure bicycle parking	1
	Provide employee lockers and showers	1
Trip Reduction	Charge for employee parking	
	- more than $5/day	10
	- $3-$5/day	4
	- less than $3/day	2
	Shuttle/minibus service to transit/multi-modal center	2
	Preferential carpool/vanpool parking	1.5
	Parking limited (below minimum)	1
	Employee rideshare incentive program	1
	Day care center on-site or within ½ mile	1
	Employee telecommuting program	40
	Compressed work schedule	
	- 3/36	40
	- 4/40	20
	- 9/80	10
	Charge for customer parking	
	- $1/hour	11
	- $0.60/hour	5
	- $0.25/hour	2

TABLE 7-2 (CONTINUED)

Measure Type	Mitigation Measure	Max. Trip Reduction (%)*
Commercial/Industrial VMT	Lunch/shopping shuttle service	1.5
	Provide on-site shops and services	
	- many frequently needed services	5
	- some frequently needed services	3
	- minor services	1
Trip Reduction/VMT	Park-and-ride lots	**
	Satellite telecommuting center	***

*URBEMIS Program Screens, Yolo-Solano Air Quality Management District, November 2002.
**number of spaces x 89% x miles/trip = miles reduced.
***number of workstations x 89% x miles/trip = miles reduced.

7.5.3 Contribution to an Off-Site TDM Fund

The Off-Site TDM Fund is a mitigation measure than can be used by project proponents for projects and programs that exceed the ROC and NOx significance thresholds. This measure applies to commercial, industrial, institutional, and residential projects, and calls for contributing to a city or county mobile source emission reduction fund established specifically to reduce emissions from transportation sources. The amount of funding is commensurate with the amount of emissions that need to be mitigated. Mitigation programs that could be funded through such an off-site TDM fund include (but are not limited to) public transit service, vanpool programs/subsidies, rideshare assistance programs, and off-site TDM facilities.

APCD recommends that this mitigation measure be implemented only after all feasible area and operational mitigation measures (Sections 7.5.1, “Area Source Mitigation Measures,” and 7.5.2, “Operational Mitigation Measures”) have been applied to the development project, and project emissions are still considered significant. The amount of funding should be commensurate with the quantity of emissions left to be mitigated after application of all other feasible area and operational source mitigation measures. The following conditions should apply to the use of the funds collected (including accumulated interest) under an Off-site TDM Fund:

1. The lead agency should determine the basis for collection and how the funds are to be spent. The funds should be spent or committed to a mitigation project within five years of receipt of the funds.

2. Funds should be used for mitigation projects or programs in areas that are either directly or indirectly impacted by the development project and are within Ventura County. Ridesharing arrangements or public transit services that originate outside the area but serve the area directly or indirectly impacted by the development project are also eligible uses of the funds.
3. The lead agency should establish an off-site TDM fund to receive and hold the funds until the funds are spent on an approved mitigation project or program.
4. Funds should not be used for traffic engineering projects, including signal synchronization, intersection improvements, and channelization, as these projects are related to improving traffic congestion and not air quality.
5. Any on-site or off-site TDM facilities provided by a development project to mitigate its emissions before determining the funding should not be credited toward the funds paid by the development project as a mitigation measure. Doing so would be taking credit for the mitigation twice.
6. A development project that is to be developed in phases should calculate the pro-rata share of funding from each phase of development based on emissions for the year of complete buildout. Such pro-rata share of funding should be paid in one lump sum or spread out evenly over three years in order to minimize the initial cost and provide a stable funding source.
7. The lead agency should report annually to its respective governing board on collection, expenditure, and use of collected funds.
8. The calculation and use of funding to a mobile source emission reduction fund must be in accordance with all applicable statutory requirements.

The cost of reducing emissions through funding an off-site TDM fund can be determined using the equation shown below. The cost should be calculated separately for ROC and NOx. The amount is based on only the higher of the two costs, since funding will result in mitigation programs that reduce both pollutants. Usually, the cost to mitigate NOx emissions will be greater than the cost to mitigate ROC emissions because the NOx emissions for most projects are greater than ROC emissions.

$$TC_{(\text{ROC or NOx})} = EE_{(\text{ROC or NOx})} \times UC_{(\text{ROC or NOx})} \times D \times 3 \text{ years}$$

where:

$TC_{(\text{ROC or NOx})}$ = Total cost for TDM fund mitigation program

$EE_{(\text{ROC or NOx})}$ = Excess emissions; pounds per day of ROC or NOx over the applicable significance threshold

$UC_{(\text{ROC or NOx})}$ = Unit cost per lb. of ROC or NOx reduced
ROC = $5.18 (for projects completed in 2000)
NOx = $7.54 (for projects completed in 2000)

D = Days of operation per year

The unit cost is $5.18 per pound of ROC reduced, and $7.54 per pound of NOx reduced, for development projects that will be completed in 2000. These amounts are based on the cost-effectiveness of ridesharing programs as calculated using the 2000 - 2001 fiscal year budget for Southern California Rideshare's (SCR) Ventura Office, the expected number of rideshare arrangements that SCR expected to form in Ventura County during 2000 - 2001, a Ventura County-specific light-duty vehicle fleet, and home-work commute trip emissions estimated by URBEMIS7G. The TDM funding unit cost (ROC or NOx) should be indexed to inflation for development projects that will be completed in future years. The recommended inflation factor can be calculated by dividing the most recent January Consumer Price Index (CPI) (All Urban Consumers (All Items 1982-84 = 100)) value for the Los Angeles-Riverside-Orange County, California region by the January 2000 CPI index value, which was 167.9. Consumer Price Index information is developed by the U. S. Department of Labor Statistics and can be found on their web site at http://stats.bls.gov/. The Consumer Price Index CPI information also can be found at the Department of Industrial Relations web site located at http://www.dir.ca.gov/dlsr/PresentCCPI.html#Bookmark1.

At a minimum, the Ventura County APCD recommends that all development projects with significant air quality impacts fully mitigate the excess emissions through funding measures for at least three years. This method of determining the amount results in an annual cost to fully mitigate both ROC and NOx emissions associated with a development project below the 5 pounds per day threshold in the Ojai Planning Area, or below the 25 pounds per day threshold in the remainder of the county.

Funding of this kind is considered to have lessened or reduced the significant environmental impact of the subject development project (see Section 7.2, "CEQA Requirements for Mitigation Measures"). A jurisdiction may allow a development project to spread the amount over the three-year period in order to minimize the initial cost to the project proponent. In most cases, the emissions from a development project will still exceed the 5 pounds per day threshold in the Ojai Planning Area, or 25 pounds per day threshold in the remainder of the county after the three-year funding. Therefore, each lead agency should determine if overriding considerations are necessary to approve the development project due to these emissions.

7.5.4 Fugitive Dust Mitigation

Mitigation measures should be identified for a project if operation of the project will cause significant fugitive dust impacts. Mitigation measures identified as construction mitigation in the Model Fugitive Dust Mitigation Plan in Section 7.4.1, "Fugitive Dust Mitigation Measures," are also applicable to fugitive dust generated by project operation.

7.5.5 Carbon Monoxide Mitigation

Mitigation measures, including changes in the project, should be identified that will eliminate, or at least reduce, any modeled CO hotspots as much as feasible. Such mitigation measures will typically involve reducing traffic congestion and improving traffic flow and/or reducing idling time on roadways impacted by the project. Examples of such mitigation measures include roadway widening, adding new turn and through lanes, and changing signal light timing. The effectiveness of any proposed CO mitigation measures should be quantified by estimating the effects of the measures on traffic volumes, congestion, and/or speeds, and then remodeling the CO concentrations with CALINE4.

7.5.6 Toxic Air Contaminant Mitigation

Specific mitigation measures should be identified and considered for those projects that may release toxic or hazardous air contaminants to the atmosphere in amounts that may be injurious to nearby populations. Such mitigation measures should consider both routine and non-routine toxic air pollutant releases. Mitigation measures may involve handling, storage, and disposal methods that minimize release of the subject substances to the atmosphere. In some cases, air pollution control devices or process operation modifications can be employed. Furthermore, new facilities that may release toxic or hazardous substances to the atmosphere should not be located adjacent to residences, schools, day care centers, hospitals or similar land uses where people live or frequent. Conversely, such land uses should not be located near existing facilities that emit toxic and/or hazardous air contaminants.

7.5.7 Odor Mitigation

Specific mitigation measures should be identified and considered for those projects that may release odorous emissions in such quantities as to cause a public nuisance to nearby populations.

For some projects, operational changes, add-on controls, or process changes, such as carbon adsorption, incineration, or relocation of stacks/vents, can minimize odorous emissions. The lead agency may contact the District for further information regarding appropriate add-on emission controls and other technological methods to minimize odorous emissions. In many cases, however, the most effective mitigation strategy is to provide a sufficient distance, or buffer zone, between the odor source and the receptor(s) to ensure that the public will not be subjected to nuisance levels of odorous emissions. Odor mitigation measures placed on projects that are odor receptors (e.g., residential areas) that rely on sealing buildings, filtering air, or disclosure statements are not appropriate in place of technological control or buffer zones.

In establishing the size of the buffer zone, the lead agency should assess such factors as the severity of the potential odors, the length of time that potentially affected populations will be affected by the odors, prevailing wind direction and speed, and actions taken (or that will be taken) at the facility to control odorous emissions. A safety margin should also be considered in establishing the buffer zone to allow for possible future expansions of operations at the source of the odors. Lead agencies can consult the District regarding the appropriate buffer zone size for particular projects that may create significant odor impacts.

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8. GENERAL CONFORMITY

8.1 INTRODUCTION

Section 176(c) of the federal Clean Air Act (CAA) states that federal agencies cannot carry out, fund, or approve any project unless the project conforms to the applicable State Implementation Plan's (SIP) purpose of eliminating or reducing the severity and number of violations of the national ambient air quality standards and achieving expeditious attainment of these standards. A SIP is a compilation of all of a state's air quality plans and rules that have been approved by the U.S. Environmental Protection Agency (U.S. EPA). The applicable SIP in Ventura County is the most recent *Ventura County Air Quality Management Plan* (AQMP) approved by the U.S. EPA plus all Ventura County Air Pollution Control District (APCD) rules and regulations approved by the U.S. EPA.

There are two types of federal conformity actions: general (non-transportation) and transportation. Pursuant to CAA requirements, the U.S. EPA developed general and transportation conformity regulations that implement Section 176(c). U.S. EPA promulgated the general conformity criteria and procedures (Title 40 of the Code of Federal Regulations (CFR) Part 6; Part 51, Subpart W; and Part 93, Subpart B) on November 30, 1993. U.S. EPA promulgated the transportation conformity criteria and procedures (Title 40 of the CFR, Part 51, Subpart T; and Part 93, Subpart A) on November 24, 1993, and last revised them August 15, 1997. Transportation conformity, which is not discussed in these Guidelines, applies to federal actions related to transportation plans, programs, and projects under Title 23 U.S. Code or the Federal Transit Act.

The criteria and procedures required the District to adopt a general conformity rule and submit it to the U.S. EPA by November 30, 1994. The Ventura County Air Pollution Control Board adopted Rule 220, General Conformity, on May 9, 1995. Rule 220 incorporates U.S. EPA's general conformity criteria and procedures by reference. The U.S. EPA approved Rule 220 on April 23, 1999, and the rule became effective June 22, 1999.

8.2 RESPONSIBILITY FOR CONFORMITY DETERMINATIONS

Federal agencies are responsible for making conformity determinations for projects that require a federal action, as described below. The federal agency responsible for issuing the permit, approval, or funding should be contacted if an individual, group, or local agency thinks that a project might be subject to the general conformity regulation. The individual, group, or local agency can contact the District if the federal agency is unfamiliar with the federal general conformity requirement.

The APCD recommends that conformity analyses be conducted concurrently with any environmental review for the project required pursuant to CEQA.

8.3 APPLICABILITY

The CAA defines a federal action as any activity engaged in by a department, agency, or instrumentality of the federal government; or any activity that a department, agency or instrumentality of the federal government supports in any way, provides financial assistance for, licenses, permits, or approves. For general conformity, this definition excludes activities related to transportation plans, programs, and projects (including highway and transit actions) developed, funded or approved under Title 23 U.S.C. or the Federal Transit Act, which are subject to the transportation conformity rule. The federal transportation conformity rule is incorporated largely by reference into District Rule 221, Transportation Conformity.

The federal general conformity criteria and procedures contain provisions for making conformity determinations for federal health-based air quality standards for ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide, particulate matter 10 microns or less in diameter, and lead. The criteria and procedures apply in areas designated nonattainment for any federal air quality standard and to all air quality maintenance areas. Since Ventura County is nonattainment only for the federal one-hour ozone standard, conformity determinations apply only to reactive organic compounds (ROC) and oxides of nitrogen (NOx) emissions.

The rule specifies *de minimis* thresholds, based on the severity of the nonattainment problem, under which conformity determinations are not needed. If the total of direct and indirect emissions from an activity are projected to equal or exceed the *de minimis* thresholds, and if it is not an exempt activity or an activity that is presumed to conform under the federal rule, then the federal agency must conduct a general conformity analysis. Since Ventura County is designated a federal severe ozone nonattainment area, the applicable *de minimis* threshold is 25 tons per year of ROC or NOx.

Calculation of emissions from a federal activity includes direct and indirect emissions. Direct emissions are emissions of a criteria pollutant or its precursors that are caused or initiated by the federal action and occur at the same time and place as the action. Indirect emissions are emissions of a criteria pollutant or its precursors that: 1) are caused by the federal action, but may occur later in time and/or may be further removed in distance from the action itself, but are still reasonably foreseeable; and 2) the federal agency can practicably control and will maintain a control over due to a continuing program responsibility. The federal general conformity rule does not specify examples of indirect emissions, as it is up to the federal agency to make that determination.

The general preamble to the federal general conformity rule states that the following types of federal actions, among others, are likely to be subject to conformity review:

- Prescribed burning activities by federal agencies or on federal lands.

- Private actions taking place on federal land under an approval, permit, or leasing agreement, such as mineral extraction, timber harvesting, or ski resort construction.
- Direct emissions from Corps of Engineers (COE) permit actions.
- Wastewater treatment plant construction or expansion actions.
- Federal construction projects such as buildings, laboratories, and reservoirs on federal land.
- Project-level minerals management leasing activities.
- New airports or airport expansion actions.
- Actions taking place on federal lands or in federal facilities.

The general preamble to the federal general conformity rule states that the following types of federal actions are not covered by the conformity rule:

- Activities associated with property disposal at military closure and realignment bases through sale or other transfer of title.
- Leasing agreements associated with military base closure and realignment, where transfer of title is required to be conveyed upon satisfaction of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) requirements, and where the military service leases the property without retaining continuing authority to control the property except as necessary to assure satisfaction of CERCLA requirements.
- Certain indirect emissions related to COE permits for discharging dredged or fill material.
- National Pollutant Discharge Elimination System (NPDES) permit actions since many of these actions are taken under State rules and, as such, are not federal actions.

8.4 SUMMARY OF CRITERIA FOR MAKING A POSITIVE CONFORMITY DETERMINATION

A federal agency can make a positive conformity determination by meeting any of several criteria in the rule. Criteria that relate to ozone conformity analyses are summarized below. For specific information about the requirements of the general conformity rule, see Title 40 of the CFR, Part 51, Subpart W; and Part 93, Subpart B.

- Emissions from the action are fully offset within the same area through a revision to the applicable SIP or a similarly enforceable measure that creates emissions reductions so that there is no net increase in emissions of that pollutant.
- Emissions for the project are specifically identified and accounted for in the applicable SIP attainment or maintenance demonstration (1995 Ventura County Air Quality Management Plan, Appendix E-95, *Emission Forecast Documentation*).

- The action (or portion thereof) is specifically included in a current transportation plan and transportation improvement program that have been found to conform to the applicable SIP under the transportation conformity regulation.
- Where a SIP has not been approved since 1990, the baseline emissions reflect historic activity levels that occurred in the geographic area.
- Regional water and/or wastewater projects are sized to meet only the needs of population projections that are in the applicable SIP.

8.5 REPORTING REQUIREMENTS AND PUBLIC PARTICIPATION

A federal agency conducting a conformity analysis must provide a 30-day notice describing the proposed action and a copy of the federal agency's draft conformity determination to the appropriate U.S. EPA Regional Office (Region IX), Land Managers, State and local air quality agencies (California Air Resource Board and the APCD), and the Metropolitan Planning Organization (i.e., Southern California Association of Governments (SCAG) and the Ventura Council of Governments (VCOG) or otherwise designated agency).

After making a final conformity determination, a federal agency must notify, within 30 days, the appropriate U.S. EPA Regional Office (Region IX), Land Managers, State and local air quality agencies (ARB and the APCD), and the Metropolitan Planning Organization (i.e., SCAG, VCOG, or otherwise designated agency).

Additionally, a federal agency must:

- Make draft conformity determinations and supporting materials available for public review.
- Place an advertisement in a daily newspaper in the area that would be affected by a proposed action before acting on a draft conformity determination.
- Provide opportunity for written public comments.
- Respond to comments received, making comments and responses available upon request.
- Place an advertisement in a daily newspaper in the area that would be affected by the action after making a final conformity determination.

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APPENDIX A
GLOSSARY AND ACRONYMS

This appendix defines terms and acronyms used in these Guidelines.

Glossary

Aerosol - a particle of solid or liquid matter that can remain suspended in the air because of its small size (generally under one micron).

Air Basin - an area of the state designated by the ARB pursuant to Subdivision (a) of Section 39606 of the California Health and Safety Code (CH&SC).

Air Monitoring - the periodic or continuous sampling and analysis of air pollutants in ambient air or from individual pollutant sources.

Air Pollutants - substances that are foreign to the atmosphere or are present in the natural atmosphere to the extent that they may result in adverse effects on humans, animals, vegetation, and materials. Common air pollutants are ozone, nitrogen dioxide, particulate matter, sulfur dioxide, and carbon monoxide. Air pollution is defined in the CH&SC as any discharge, release, or other propagation into the atmosphere, and includes, but is not limited to, smoke, charred paper, dust, soot, grime, carbon, fumes, gases, odors, particulate matter, acids, or any combination thereof.

Air Pollution Control District (APCD) - a local agency with authority to regulate stationary sources of air pollution (such as refineries, manufacturing facilities, and power plants) within a given county, and governed by a District Air Pollution Control Board composed of the elected county supervisors and city representatives.

Air Pollution Control Officer (APCO) - the executive officer of the Air Pollution Control District appointed by the Air Pollution Control Board.

Air Quality Management Plan (AQMP) - a plan prepared by an air pollution control district or agency to comply with either the federal Clean Air Act or the California Clean Air Act. An AQMP contains measures that will be taken to attain and maintain federal and state ambient air quality standards. In California, air districts prepare air quality management plans that are included in the state's SIP that is required by the federal Clean Air Act. Such plans are also referred to as Clean Air Plans or Clean Air Attainment Plans.

Alternative Fuels - fuels such as methanol, ethanol, natural gas, and liquid petroleum gas that are cleaner burning with lower air emissions.

Ambient Air - air present at a particular time and place outside of structures. Often used interchangeably with outdoor air.

Anthropogenic - of, relating to, influenced, or caused by humans.

Area Sources - also known as “area-wide” sources, these include multiple stationary emission sources such as water heaters, gas furnaces, fireplaces, and woodstoves. The CCAA requires districts to include these area sources in AQMPs.

Attainment - achieving and maintaining the air quality standards (both state and federal) for a given air pollutant.

Attainment Area - an area that is in compliance with the National and/or California Ambient Air Quality Standards.

California Ambient Air Quality Standards (CAAQS) - specified concentrations of air pollutants, recommended by the California Department of Health Services and adopted into regulation by the Air Resources Board, which relate the intensity and composition of air pollution to undesirable effects. CAAQS are the standards that must be met per the requirements of the California Clean Air Act.

California Clean Air Act (CCAA) - a California law passed in 1988 that provides the basis for air quality planning and regulation independent of federal regulations, and which establishes new authority for attaining and maintaining California’s air quality standards by the earliest practicable date. A major element of the Act is the requirement that local APCDs in violation of the CAAQS must prepare attainment plans that identify air quality problems, causes, trends, and actions to be taken for attainment.

California Air Resources Board (ARB) - California’s lead air quality agency, consisting of a nine-member Governor-appointed board, responsible for motor vehicle air pollution control, and having oversight authority over California’s air pollution management program.

California Department of Transportation (Caltrans) - a state department that oversees the state’s transportation intrastructure.

California Environmental Quality Act (CEQA) - a state law intended to protect the environment of California. It is also known as the CEQA statutes, and is codified in Sections 21000 through 21177 of the Public Resources Code. CEQA establishes mandatory ways by which governmental (public agency) decision makers are informed about the potential significant environmental effects of proposed projects. CEQA also mandates the identification of ways to avoid or significantly reduce damage to the environment. After preliminary review or the completion of an Initial Study, the Lead Agency may decide to prepare an Environmental Impact Report (EIR) for a project.

CEQA Guidelines - regulations prescribed by the Secretary for Resources to be followed by all state and local agencies in California in the implementation of CEQA, beginning at Sec. 15000, California Code of Regulations (CCR).

CALINE4 - a California Department of Transportation air quality model for estimating pollutant concentrations (primarily carbon monoxide, nitrogen dioxide, and particulates) near a roadway.

Carbon Monoxide (CO) - a colorless, odorless gas resulting from the incomplete combustion of fossil fuels. Over 80 percent of the CO emitted in urban areas is contributed by motor vehicles. CO interferes with the blood's ability to carry oxygen to the body's tissues and results in numerous adverse health effects. CO is a criteria air pollutant.

CO Hot Spots - an area, usually an intersection or congested segment of a highway, that exceeds the federal or state carbon monoxide standard.

Clean Air Act (CAA) - federal law passed in 1970 and amended in 1977 and 1990 that sets primary and secondary National Ambient Air Quality Standards for major air pollutants and thus forms the basis for the national air pollution control effort.

Concentration - the amount of an air pollutant present in a unit sample, usually measured in parts per million (ppm) or micrograms per cubic meter.

Conformity - a requirement in the federal Clean Air Act that no department, agency, or instrumentality of the federal government shall engage in, support in any way, or provide financial assistance for, license, permit, or approve any activity that does not conform with the State Implementation Plan (SIP) by causing or contributing to an increase in air pollutant emissions, or violation of an air pollutant standard, or frequency of violating that standard.

Consistency - a term used in CEQA to determine if a project is consistent by furthering the goals and objectives of, and will not interfere with the implementation of, applicable regional plans.

Criteria Air Pollutant - an air pollutant for which acceptable levels of exposure can be determined and for which a federal or state Ambient Air Quality Standard has been set. Examples include: ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, and PM_{10} (see individual pollutant definitions).

District - the Ventura County Air Pollution Control District is an air pollution control district as defined by the CH&SC Section 40150. The District encompasses all of Ventura County.

EMFAC - an ARB program of emission factors used for most California motor vehicle emissions models.

Emission Factor - the amount of a specific pollutant emitted from a specified polluting source per unit quantity of material handled, processed, or burned.

Emission - an air contaminant released to the atmosphere.

Emissions Inventory - an estimate of the quantity of pollutants emitted into the atmosphere over a specific period such as a day or a year. Considerations that go into an inventory include type and location of sources, the processes involved, and the level of activity.

Emission Standards - as used in these Guidelines, means United States Federal (EPA), State of California (ARB), or Ventura County Air Pollution Control District standards or limits for air contaminant emissions.

Environmental Impact Report (EIR) - a detailed report prepared under CEQA describing and analyzing the significant effects of a project and discussing ways to mitigate or avoid the effects [CCR §15362].

Environmental Protection Agency (EPA) - the federal agency charged with setting policy and guidelines, and carrying out legal mandates, for the protection of national environmental resources in the United States.

Exceedance - a monitored level of concentration of any air contaminant higher than the national or state ambient air quality standards.

Growth Area - a geographic subarea used in Ventura County population forecasts to refer to an area where urban development has already taken place or is expected to take place.

Indirect Source - facilities, buildings, structures, properties, and/or roads which, through their construction to their operation, indirectly contribute to air pollution. This includes projects and facilities that attract or generate mobile sources activity (autos and trucks) such as shopping centers, employment sites, schools, and housing developments, that result in emissions of any regulated air pollutant.

Level of Service (LOS) - a scale that is used to rate the service (i.e., speed and maneuverability) on roadways. An LOS of "A" means that traffic is flowing freely, while "F" refers to severely congested conditions.

Mitigated Negative Declaration (MND) - a type of negative declaration prepared for a project when the initial study has identified potentially significant effects on the environment, but (1) revisions in the project plans or proposals made by, or agreed to by, the applicant before the proposed negative declaration and initial study are released for public review would avoid the effects or mitigate the effects to a point where clearly no significant effect on the environment would occur, and (2) there is no substantial evidence in light of the whole record before the public agency that the project, as revised, may have a significant effect on the environment [Public Resources Code §21064.5].

Mitigation - measures taken to avoid or reduce a significant effect including:

- Avoiding the impact altogether by not taking a certain action or parts of an action.
- Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
- Rectifying the impact by repairing, rehabilitating, or restoring the impacted environment.
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
- Compensating for the impact by replacing or providing substitute resources or environments [California Code of Regulations §15370].

National Ambient Air Quality Standards (NAAQS) - standards set by the EPA for the maximum levels of air pollutants that can exist in the ambient air without unacceptable effects on human health or public welfare.

New Source Review (NSR) - the mechanism to assure that new and modified stationary sources will not interfere with the attainment or maintenance of any ambient air quality standard, or prevent reasonable further progress towards the attainment or maintenance of any ambient air quality standard. A program used in a nonattainment area to permit or site new industrial facilities, or modifications to existing industrial facilities, that emit nonattainrnent criteria air pollutants. The two major requirements of NSR are best available control technology and emission offsets.

Negative Declaration - a written statement briefly describing the reasons that a proposed project will not have a significant effect on the environment and does not require the preparation of an environmental impact report [Public Resources Code §21064].

Nonattainment Area - an area identified by the EPA or ARB as not meeting the NAAQS or CAAQS for a given pollutant.

Non-growth Area - a geographic subarea used in Ventura County population forecasts to refer to an area where urban development is not expected to occur.

Ojai Planning Area - an area defined as the “Ojai Valley” in the Ventura County Non-Coastal Zoning Ordinance, Article 12, Section 8112-2 (Ojai Growth and Non-growth areas) plus the Ventura (Ojai) NGA.

Ojai Valley - an area defined as the "Ojai Valley" in the Ventura County Non-Coastal Zoning Ordinance, Article 12, Section 8112-2 (Ojai Growth and Non-growth Areas).

Oxides of Nitrogen - a reddish-brown gas with an odor similar to bleach. The major source of this pollutant is the high temperature combustion of fossil fuels. Health effects include irritation and damage to the lungs and lower resistance to respiratory infections.

Ozone - a pungent, pale blue (but often invisible), reactive, toxic gas consisting of three oxygen atoms. In the atmosphere, it is a product of the photochemical processes involving the solar radiation. Ozone exists in the stratosphere, as well as at the earth's surface. Ozone in the stratosphere protects living organisms near the earth's surface from ultraviolet rays from the Sun. Ozone at the earth's surface is a criteria air pollutant and causes numerous adverse health effects.

Ozone Precursors - compounds such as reactive organic compounds and oxides of nitrogen, occurring either naturally or as a result of human activities, which contribute to the formation of ozone, the principal component of smog.

Particulate Matter - Fine ($PM_{2.5}$) - $PM_{2.5}$ is a mixture of very small particles with an aerodynamic diameter equal to or less than 2.5 microns. $PM_{2.5}$ consists of particles directly emitted into the air and particles formed in the air from the chemical transformation of gaseous pollutants. $PM_{2.5}$ particles are emitted from activities such as industrial and residential combustion, and from vehicle exhaust. Particles 2.5 microns or smaller infiltrate deepest portions of the lungs, increasing the risks of long-term disease, including chronic respiratory disease, cancer, and increased and premature death.

Particulate Matter - Respirable (PM_{10}) - any particulate matter with an aerodynamic diameter equal to or less than 10 microns. PM_{10} consists of particles directly emitted into the air and particles formed in the air from chemical transformations of gaseous pollutants. PM_{10} particles are emitted from activities such as industrial and residential combustion, and from vehicle exhaust. PM_{10} causes adverse health effects, atmospheric visibility reduction, and is a criteria air pollutant.

Pedestrian Oriented Development (POD) - any of a number of design strategies that emphasize pedestrian access over automobile access. They typically provide pedestrian amenities such as sidewalks, street trees, commercial at-street frontage, safe street crossings, etc.

Permit - written authorization from the Air Pollution Control District for the construction or operation of equipment that may create or control regulated air emissions.

Project - an activity that may cause either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment, and that is any of the following:

- An activity directly undertaken by a public agency.
- An activity undertaken by a person that is supported, in whole or in part, through contracts, grants, subsidies, loans, or other forms of assistance from one or more public agencies.
- An activity that involves the issuance to a person of a lease, permit, license, certificate, or other entitlement for use by one or more public agencies [Public Resources Code §21065].

Reactive Organic Compounds (ROC) - any organic compound containing at least one carbon atom except for specific exempt compounds (see District Rule 2) found to be non-photochemically reactive and thus not participating in smog formation. Sometimes referred to as reactive organic gases, non-methane organic compounds, or volatile organic compounds.

Sensitive Receptors - facilities or land uses that include members of the population that are particularly sensitive to the effects of air pollutants, such as children, the elderly, and people with illnesses. Examples include schools, hospitals, and daycare centers.

Significant Effect on the Environment - a phrase used to indicate that an environmental effect of a project is at a level requiring the detailed analysis of an EIR and that the effect is severe enough to consider disapproving or changing the project to avoid the effect. The terms "significant effect" and "significant impact" are interchangeable under CEQA [CCR §15382].

Soil stabilizers - chemical or other agents that are applied to soil surfaces to stabilize and mitigate PM_{10} fugitive dust emissions by creating a wind-resistant crust. Typically applied to disturbed surface areas next to roadways, base ground areas, dirt parking lots and roadway shoulders, and exposed construction areas.

Southern California Association of Governments (SCAG) - the organization, known in federal law as the Council of Governments and Metropolitan Planning Organization, representing Los Angeles, Ventura, San Bernardino, Riverside, Orange, and Imperial Counties and the cities within those six counties. As the designated Metropolitan Planning Organization, the Association of Governments is mandated by the federal government to research and draw up plans for transportation, growth management, hazardous waste management, and air quality. Additional mandates exist at the state level.

Statement of Overriding Considerations - a written statement by a lead agency giving reasons for approving a project having environmental impacts that have not been mitigated to a level of insignificance.

State Implementation Plan (SIP) - a document prepared by each state, and subject to EPA approval, describing existing air quality conditions and measures that will be taken to attain and maintain National Ambient Air Quality Standards. A SIP is a compilation of all of a state's air quality plans and rules that have been approved by the U.S. Environmental Protection Agency (EPA). In California, air districts prepare nonattainment area plans that are included in the state's SIP. The applicable SIP in Ventura County is the most recent Ventura County Air Quality Management Plan (AQMP) approved by the U.S. EPA plus all Ventura County Air Pollution Control District (APCD) rules and regulations approved by the EPA.

Sulfur Dioxide - a colorless, extremely irritating gas or liquid whose chemical formula is SO_2. Sulfur dioxide enters the atmosphere as a pollutant mainly as a result of burning high sulfur-content fuel oils and coal, and from chemical processes occurring at chemical plants and refineries. National Ambient Air Quality Standards and California State Air Quality Standards have been established for sulfur dioxide.

Telecommute - a work mode where individuals perform job requirements for part or all of the work week at off-site facilities, such as private residences or satellite work centers (rather than commuting to the primary worksite). This reduces vehicle trips (if telecommuting from a residence) or vehicle miles traveled (if telecommuting from a satellite center) and associated air emissions.

Toxic Air Contaminant - air pollutants (excluding ozone, carbon monoxide, PM_{10}, sulfur dioxide, nitrogen dioxide) that may reasonably be anticipated to cause cancer, developmental effects, reproductive dysfunctions, neurological disorders, heritable gene mutations or other serious or irreversible acute or chronic health effects in humans. Toxic air pollutants are regulated under different federal and state regulatory processes than ozone and the other criteria air pollutants. Health effects from exposure to toxic air pollutants may occur at extremely low levels.

Transit Oriented Development (TOD) - mixed-use neighborhoods, up to 160 acres in size, which are developed around a transit stop and core commercial area. The entire TOD must be within an average of a 2,000 foot walking distance of a transit stop. Secondary areas of lower density housing, schools, parks, and commercial and employment uses, surround TODs for up to one mile.

Transportation Control Measures (TCM) - air pollutant control measures in the AQMP that are directed at reducing air emissions by reducing vehicle travel. Both the federal and state law specify requirements for TCMs.

URBEMIS - a computer program used to estimate indirect source emissions from new and modified land uses (e.g., shopping centers, housing developments, and offices).

Ventura Council of Governments (VCOG) - a governmental organization comprised of the County of Ventura, and the ten cities in Ventura County. The purpose of VCOG is to provide a vehicle for the member entities and other interested persons, public and private, to engage in regional, cooperative, and comprehensive planning. VCOG has historically been under contract to the Southern California Association of Governments to idenfity and refine regionally significant transportation problems, needs, investments, and programs related to the development of the Regional Transportation Plan.

Volatile Organic Compounds (VOCs) - any organic compound containing at least one carbon atom except for specific exempt compounds (see District Rule 2) found to be non-photochemically reactive and thus not participating in smog formation. In this document, VOC is synonymous with reactive organic gases and reactive organic compounts.

Acronyms

ADT	average daily (motor vehicle) trips
APCB	Air Pollution Control Board
APCO	Air Pollution Control Officer
APCD	Air Pollution Control District
AQMP	Air Quality Management Plan
ARB	California Air Resources Board
CAA	federal Clean Air Act
CAAQS	California Ambient Air Quality Standard(s)
CCAA	California Clean Air Act
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFC	chlorofluorocarbons
CFR	Code of Federal Regulations
CH&SC	California Health and Safety Code
CO	carbon monoxide
District	Ventura County Air Pollution Control District
DTIM	Direct Travel Impact Model
EIR	Environmental Impact Report
EMFAC	ARB's On-Road Motor Vehicle Emissions Model
EPA	United States Environmental Protection Agency
GUIDELINES	Ventura County Air Quality Assessment Guidelines
ISR	indirect source review
ITE	Institution of Transportation Engineers
LOS	level of service

MND	Mitigated Negative Declaration
ND	Negative Declaration
NAAQS	National Ambient Air Quality Standard
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO	nitrogen oxide
NO_2	nitrogen dioxide
NOP	Notice of Preparation
NOx	oxides of nitrogen
O_3	ozone
$PM_{2.5}$	fine particulate matter of 2.5 microns in diameter or smaller
PM_{10}	particulate matter of 10 microns in diameter or smaller
Pb	lead
Plan	Air Quality Management Plan
PPM	parts per million
PRC	Public Resources Code
ROC	reactive organic compounds
ROG	reactive organic gases
SCAG	Southern California Association of Government
SIP	State Implementation Plan
SO_2	sulfur dioxide
SOx	oxides of sulfur
TAC	toxic air pollutant
TCM	transportation control measures
$\mu g/m^3$	microgram per cubic meter
URBEMIS	Urban Emissions Model
VCOG	Ventura Council of Governments
VMT	vehicle miles traveled
VOC	volatile organic compounds (see ROC)

APPENDIX B
COMMON EQUIPMENT AND PROCESSES REQUIRING A VENTURA COUNTY APCD PERMIT TO OPERATE

This appendix contains a document available through the APCD Engineering and Enforcement Divisions of the Ventura County APCD that provides guidance for determining whether or not equipment and processes will require an APCD Permit to Operate.

COMMON EQUIPMENT AND PROCESSES REQUIRING A VENTURA COUNTY APCD PERMIT TO OPERATE

Disclaimer: This list is intended to be used only as general guidance in determining equipment that requires an APCD Permit to Operate. For more detailed information, refer to APCD Rule 10, "Permits Required", and APCD Rule 23, "Exemptions from Permit", or call the APCD Engineering Section at 805/645-1401.

Combustion Equipment

- Boilers or process heaters with a maximum rated heat input of 1.0 MMBTU/Hr or greater
- Engines which are 50 HP or greater including but not limited to the following:
  - -Oil well and water well drilling rigs
  - -Portable electrical generators
  - -Portable wood chippers
  - -Portable air compressors

  Note: Vehicle engines for autos, trucks, bulldozers, forklifts, etc. are exempt. Emergency electrical generators and emergency water pumps are exempt. Portable engines registered with the state PERP are exempt.
- Gas turbines
- Incinerators, including crematories
- Ovens and furnaces

  Note: Restaurant barbecue equipment is exempt. Ovens or furnaces used in residential units are exempt.
- Burn-off ovens for auto engine parts
- Waste gas flares

Equipment Which Emits Dust or Other Particulate Matter

- Concrete batch plants
- Asphalt concrete plants
- Rock, sand, and aggregate plants
- Abrasive blasting and sand blasting operations

  Note: Water blasting equipment using engines less than 50 HP is exempt.
- Metal melting furnaces

Equipment and Processes Which Emit Solvents or Other Reactive Organic Compounds

- Drycleaning machines using organic solvents
- Gasoline tanks and dispensing facilities

  Note: Diesel tanks and waste oil tanks are exempt. Gasoline tanks less than 250 gallons in capacity are exempt.
- Contaminated soil or groundwater remediation systems including air stripping towers
- General painting and coating equipment if more than 200 pounds of solvents are emitted in a year (roughly 25 gallons)
- Any painting of automobiles, trucks, or mobile equipment
- Printing operations if more than 200 pounds of solvents are emitted in a year
- Use of adhesives or sealants if more than 200 pounds of solvents are emitted in a year
- Cold degreasers and vapor degreasers
- Cleaning operations if more than 200 pounds of solvents are emitted in a year
- Oil wells and oilfield storage and process tanks
- Other organic liquid storage tanks with a capacity of more than 5,000 gallons
- Semiconductor or electronic component manufacturing
- Expandable polystyrene foam manufacturing

Equipment and Processes Which Emit Air Toxics or May Cause a Nuisance

- Chrome plating operations
- Operations such as spa, bathtub or counter-top manufacturing which use polyester resins
- Wood stripping operations using methylene chloride
- Agricultural produce fumigation chambers using organic gases
- Ethylene oxide sterilizers (used in hospitals or food processing)

COMMON EQUIPMENT FOR WHICH AN APCD PERMIT TO OPERATE IS NOT REQUIRED IS LISTED BELOW:

- *Heating, air conditioning and ventilation (HVAC) equipment that is not used for air pollution control. The boilers or engines used with HVAC equipment must be evaluated separately using the combustion equipment information listed above.*
- *Vacuum cleaning systems for housekeeping purposes*
- *Refrigeration units not used for air pollution control*
- *Equipment for cutting, grinding or drilling metals or plastics*
- *Equipment for sawing, sanding or drilling wood*

IMPORTANT: Equipment and processes exempt from obtaining an APCD Permit to Operate may still need to be considered in an environmental document prepared pursuant to CEQA.

(Revised 03/00)

APPENDIX C
SECTIONS OF CEQA AND THE CEQA GUIDELINES RELEVANT TO AIR QUALITY IMPACT ANALYSIS

This appendix contains sections of CEQA and the CEQA Guidelines that are relevant to air quality impact analysis. The complete text of CEQA and the CEQA Guidelines can be found on the CERES website at: http://ceres.ca.gov/topic/env_law/ceqq/.

Section 21000 - State agencies shall regulate to prevent environmental damage

Declares that the maintenance of a quality environment for the people of California now and in the future is a matter of statewide concern. Further declares that all agencies of the state government which regulate activities of private individuals, corporations, and public agencies which are found to affect the quality of the environment, shall regulate such activities so that major consideration is given to preventing environmental damage, while providing a decent home and satisfying living environment for every Californian.

Section 15063 - Initial Study

(1) If the agency determines that there is substantial evidence that any aspect of the project, either individually or cumulatively, may cause a significant effect on the environment, regardless of whether the overall effect is adverse or beneficial, the lead agency shall do one of the following:

  (A) Prepare an EIR, or

  (B) Use a previously prepared EIR that the lead agency determines would adequately analyze the project at hand.

(2) The lead agency shall prepare a Negative Declaration if there is no substantial evidence that the project or any of its aspects may cause a significant effect on the environment.

Section 15064 - Determining the Significance of the Environmental Effects Caused by a Project and Section 15358 - Effects

Provides guidance as to whether an effect is significant or not. In evaluating the significance of the environmental effect of a project, the lead agency shall consider the direct physical changes in the environment which may be caused by the project and reasonably foreseeable indirect physical changes in the environment caused by the project. Effects analyzed under CEQA must be related to a physical change.

Section 15065 - Mandatory Findings of Significance

Establishes criteria for the lead agency in determining whether a project may have a significant effect on the environment. If a project meets the criteria set forth in this section, an EIR should be prepared.

Section 15070 - Decision to Prepare a Negative Declaration or Mitigated Negative Declaration

Provides discussion of under what circumstances a public agency shall prepare or have prepared a ND or an MND. If an applicant can modify the project in such a manner that would avoid significant effects identified after submitting the application, an EIR may be avoided by preparation of an MND.

Section 15091 - Findings

(a) No public agency shall approve or carry out a project for which an EIR has been certified which identifies one or more significant environmental effects of the project unless the public agency makes one or more written findings for each of those significant effects, accompanied by a brief explanation of the rationale for each finding. The possible findings are:

   (1) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the final EIR.

   (2) Such changes or alterations are within the responsibility and jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by such other agency or can and should be adopted by such other agency.

   (3) Specific economic, legal, social, technological, or other considerations, including provision of employment opportunities for highly trained workers, make infeasible the mitigation measures or project alternatives identified in the final EIR.

(b) The findings required by subsection (a) shall be supported by substantial evidence in the record.

(c) The finding in subsection (a)(2) shall not be made if the agency making the finding has concurrent jurisdiction with another agency to deal with identified feasible mitigation measures or alternatives. The finding in subsection (a)(3) shall describe the specific reasons for rejecting identified mitigation measures and project alternatives.

(d) When making the findings required in subsection (a)(1), the agency shall also adopt a program for reporting on or monitoring the changes which it has either required in the project or made a condition of approval to avoid or substantially lessen significant environmental effects. These measures must be fully enforceable through permit conditions, agreements, or other measures.

(e) The public agency shall specify the location and custodian of the documents or other material which constitute the record of the proceedings upon which its decision is based.

(f) A statement made pursuant to Section 15093 does not substitute for the findings required by this section.

Section 15092 - Approval

(a) After considering the final EIR and in conjunction with making findings under Section 15091, the lead agency may decide whether or how to approve or carry out the project.

(b) A public agency shall not decide to approve or carry out a project for which an EIR was prepared unless either:

(1) The project as approved will not have a significant effect on the environment, or

(2) The agency has:

(A) Eliminated or substantially lessened all significant effects on the environment where feasible as shown in findings under Section 15091, and

(B) Determined that any remaining significant effects on the environment found to be unavoidable under Section 15091 are acceptable due to overriding concerns as described in Section 15093.

(c) With respect to a project which includes housing development, the public agency shall not reduce the proposed number of housing units as a mitigation measure if it determines that there is another feasible specific mitigation measure available that will provide a comparable level of mitigation.

Section 15093 - Statement of Overriding Considerations

The Statement of Overriding Considerations requires the decision-making agency to balance, as applicable, the economic, legal, social, technological, or other benefits of a proposed project against its unavoidable environmental risks when determining whether to approve the project. If the specific economic, legal, social, technological, or other benefits of a proposed project outweigh the unavoidable adverse environmental effects, the adverse environmental effects may be considered "acceptable." The statement of overriding considerations shall be supported by substantial evidence in the record.

Section 15097 - Mitigation Monitoring or Reporting

This section applies when a public agency has made the findings required under paragraph (1) of subdivision (a) of Section 15091 relative to an EIR or adopted a MND in conjunction with approving a project. The public agency shall adopt a program for monitoring or reporting on the revisions which it has required in the project and the measures it has imposed to mitigate or avoid significant environmental effects.

Section 15125 - Environmental Setting

States that, "An EIR must include a description of the physical environmental conditions in the vicinity of the project as they exist at the time the notice of preparation is published, or if no notice of preparation is published, at the time environmental analysis is commenced, from both a local and regional perspective." An EIR "shall discuss any inconsistencies between the proposed project and applicable general plans and regional plans," such as the applicable air quality attainment or maintenance plan or State Implementation Plan.

Section 15126 - Consideration and Discussion of Environmental Impacts

Requires that, "All phases of a project must be considered when evaluating its impact on the environment: planning, acquisition, development, and operation." Also requires that the following subjects be discussed in the EIR:

(a) Significant environmental effects of the proposed project.

(b) Significant environmental effects which cannot be avoided if the proposed project is implemented.

(c) Significant irreversible environmental changes which would be involved in the proposed project should it be implemented.

(d) Growth-inducing impact of the proposed project.

(e) The mitigation measures proposed to minimize the significant effects.

(f) Alternatives to the proposed project.

Section 15130 - Discussion of Cumulative Impacts

Cumulative impacts shall be discussed in an EIR when the project's incremental effect is cumulatively considerable, as defined in Section 15065(c). The elements necessary to provide an adequate discussion of cumulative impacts include:

(1) Either:

(A) A list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the agency, or

(B) A summary of projections contained in an adopted general plan or related planning document, or in a prior environmental document which has been adopted or certified, which described or evaluated regional or areawide conditions contributing to the cumulative impact. Any such planning document shall be referenced and made available to the public at a location specified by the lead agency;

(2) A summary of the expected environmental effects to be produced by those projects with specific reference to additional information stating where that information is available, and

(3) A reasonable analysis of the cumulative impacts of the relevant projects. An EIR shall examine reasonable, feasible options for mitigating or avoiding the project's contribution to any significant cumulative effects. Previously approved land-use documents such as general plans, specific plans, and local coastal plans may be used in cumulative impact analysis.

Section 15355 - Cumulative Impacts

Defines "cumulative impacts" as "two or more individual impacts which, when considered together, are considerable or which compound or increase other environmental impacts." States that the individual effects may be changes resulting from a single project or a number of separate projects. The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects.

Section 15370 - Mitigation

"Mitigation" includes:

(a) Avoiding the impact altogether by not taking a certain action or parts of an action.

(b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.

(c) Rectifying the impact by repairing, rehabilitating, or restoring the impacted environment.

(d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.

(e) Compensating for the impact by replacing or providing substitute resources or environment.

<u>Section 15382 - Significant Effect on the Environment</u>

'Significant effect on the environment' means a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance. A social or economic change related to a physical change may be considered in determining whether the physical change is significant.

<u>Appendix G - Environmental Checklist Form</u>

With respect to air quality, a project may be deemed to have a significant effect on the environment if it will:

(a) Conflict with or obstruct implementation of the applicable air quality plan.

(b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation.

(c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).

(d) Expose sensitive receptors to substantial pollutant concentrations.

(e) Create objectionable odors affecting a substantial number of people.

According to Appendix G, a "potentially significant impact" finding is appropriate if there is substantial evidence that an effect may be significant.

APPENDIX D
MAJOR TOXIC AIR CONTAMINANT REGULATIONS AND COMMON TOXIC AIR CONTAMINANT SOURCES AND SUBSTANCES

Appendix D presents the major federal and state programs and regulations to reduce toxic air contaminant (TAC) emissions. Appendix D also presents a list of common TAC sources and substances that may be encountered in Ventura County.

Table D-1, Common Sources of Toxic Air Contaminants, lists common land uses that may emit TACs. Table D-1 also lists the most common TACs associated with each listed land use. It should be noted that, because of the large number of land uses that may emit TACs, and the large number of TACs, Table D-1 is only a guide and, as such, is not all-inclusive. It does not list all land uses that may emit TACs. Moreover, not all listed land uses emit all of the listed toxic substances. Conversely, the listed land uses may emit TACs that are not included in Table D-1.

Table D-2, Toxic Air Contaminants, lists substances that the California Air Resources Board (ARB) has found to present a chronic or acute threat to public health when found in the ambient air.

Further information regarding TACs and the State of California's Air Toxics Program is available at the ARB's website (http://www.arb.ca.gov/html/brochure/airtoxic.htm). Further information about the District's Air Toxics Program can be found at the District website (http://www.vcapcd.org/air_toxics.htm). The District also publishes annual reports that summarize the District's TAC program. These reports rank facilities according to the cancer risk posed, identify the facilities posing non-cancer health risks, and describe the status of the development of control measures. These reports are available from the District's Air Toxics section. The District's 1999 TAC program report also can be downloaded from the District webpage.

Federal Clean Air Act Amendments of 1990

The federal Clean Air Act Amendments of 1990 (Title III, Section 112) mandate that the United States Environmental Protection Agency (U.S. EPA) issue emission standards on a specified schedule for certain categories of sources that emit one or more of the 188 TACs listed in Title III. The emission standards are being issued in two phases. In the first phase (1992 - 2000), the U.S. EPA is required to develop technology-based emission standards, called Maximum Achievable Control Technology (MACT). In the second phase, (2001 - 2008) the U.S. EPA is required to issue health risk-based emission standards to address risks remaining after implementation of the MACT standards.

The Tanner Toxic Act (Assembly Bill 1807)

The Tanner Act (Health & Safety Code §39650 et seq.) is a California law that established the framework for California's TAC identification and control program. The Tanner Act became effective in 1984 and requires the ARB to identify TACs and the appropriate measures to limit emissions of those substances. The ARB then adopts the appropriate degree of regulation and adopts Air Toxics Control Measures (ATCMs). The control measures are the minimum regulations that must be imposed by each air district in the state. The air districts must adopt rules that are at least as stringent as the ATCMs.

Air Toxics "Hot Spots" Information and Assessment Act (Assembly Bill 2588)

The Air Toxics "Hot Spots" Information and Assessment Act (Health & Safety Code §44300 et seq.) was adopted by the California Legislature in 1987 in response to increasing public concern about emissions of toxic chemicals in the air. It was known at that time that the majority of the United States population lived near at least one facility that released toxic chemicals into the air on a routine basis. Existing federal, state, and local air toxics programs looked at new sources only, or looked at existing sources one industry and one chemical at a time. Under AB 2588, stationary sources must submit a comprehensive inventory of routine releases of over 600 toxic compounds to the air from their facilities to the District. Based on the results of the inventories, the District requires facility owners to perform health risk assessments for the subject toxic emissions. If the emissions from a facility are determined through the risk assessment to pose a significant risk, the District requires the facility to notify people who are exposed of the results of the health risk assessment. Owners of facilities that pose a significant health risk also have to develop and implement a plan to reduce the risks to below significance levels. Further information regarding TACs and the State of California's AB 2588 Air Toxics Program is available at the ARB's website (http://www.arb.ca.gov/html/brochure/airtoxic.htm). Further information about the District's AB 2588 air toxics program can be found at the District website (http://www.vcapcd.org/air_toxics.htm). The District also publishes annual reports that summarize the District's AB 2588 TAC program. These reports rank facilities according to the cancer risk posed, identify the facilities posing non-cancer health risks, and describe the status of the development of control measures. These reports are available from the District's Air Toxics section. The Districts' 1999 AB 2588 program report also can be downloaded from the above District webpage.

Facility Toxic Air Contaminant Risk Reduction Audit and Plan (Senate Bill 1731)

Senate Bill 1731 (Health & Safety Code, §44390, et seq.) requires local air districts to establish a program to reduce risks from existing facilities in the AB 2588 air toxics program that are deemed by the District to pose a significant health risk.

Waters Bill (Assembly Bill 3205)

The Waters Bill (Health & Safety Code §§42301.6 - 42301.9) requires that an air district considering an application for a proposed new or modified source of TACs located within 1,000 feet of a school to prepare a public notice that fully describes the proposed project or modification. The air district must then distribute or mail the public notice to the parents or guardians of students enrolled in any school located within one-quarter mile of the proposed project and to each address within a 1,000 foot radius of the proposed project.

Air Monitoring of Disposal Sites (Assembly Bill 3374)

Assembly Bill 3374 (Health & Safety Code §41805.5, et seq.) requires owners of solid waste disposal sites, including inactive sites, to submit to local air pollution control districts a solid waste air quality assessment test report.

Ventura County Air Pollution Control District Toxic Air Contaminant Rules

In addition to the preceding federal and state air toxic programs, the District regulates TACs through several District rules: Rule 36, New Source Review - Hazardous Air Pollutants; Rule 62, Hazardous Materials and Airborne Toxics; Rule 62.1, Hazardous Materials; Rule 62.3, Hexavalent Chromium; Rule 62.5, Dioxins - Medical Waste Incinerators; Rule 62.6, Ethylene Oxide - Sterilization and Aeration; and Rule 62.7, Asbestos - Demolition and Renovation.

TABLE D-1

COMMON SOURCES OF TOXIC AIR CONTAMINANTS

Product, Process, or Facility	Substance
Acoustic Ceiling, Asbestos Products, Caulk, and Gasket Manufacturing	Asbestos
Aerospace Manufacturing	Hexavalent Chromium
Autobody Shop	Benzene, Toluene, Xylene
Auto Machine Shop	Asbestos
Biomedical Research Laboratory	Benzene, Carbon Tetrachloride, Chloroform, Formaldehyde, Methylene Chloride, Phenol, Xylenes
Boat Yard	Epoxy Resins, Toluene, Xylenes
Brake Realignment & Manufacturing	Asbestos
Brake Shoe Rebuilders and Recyclers	Asbestos
Chemical Manufacturing	Various
Chrome Plating	Hexavalent Chromium, Cadmium
College/University	Cadmium, Hexavalent Chromium, Ethylene Oxide
Electrical Equipment Manufacturing	Cadmium, Chromium, Nickel, PCBs, Trichloroethylene, 1,4-Dioxane
Electronic Equipment Manufacturing	1,4-Dioxane, Cadmium, Chromium, Nickel, Trichloroethylene
Fiberglass Manufacturing	Styrene
Gasoline Station	Benzene, Methyl-tertiary butyl ether, Toluene, Xylene
Graphite Manufacturing	Dioxins, Dibenzofurans
Groundwater Clean-up	Benzene, Percholorethylene, Trichloroethylene
Hospital	Dioxins, Debenzofurans, Cadmium, Ethylene Oxide
Industrial Heating and Steam Needs	Cadmium, Hexavalent Chromium
Landfill	Benzene, Vinyl Choride
Medical Clinic & Laboratory	Ethylene Oxide
Medical Equipment Sterilization	Ethylene Oxide
Natural Gas Plant	Acetaldehyde, Benzene, Formaldehyde, Propylene, Toluene, Xylene
Medical Equipment Sterilization	Ethylene Oxide
Natural Gas Plant	Acetaldehyde, Benzene, Formaldehyde, Propylene, Toluene, Xylene
Petroleum Refinery	Benzene, Cadmium
Oil Production Facility	Acetaldehyde, Benzene, Formaldehyde, Propylene
Petroleum Tank	Benzene
Printing Services	1,2,4-Tri-methylbenzene, Ethyl Benzene, Ethylene glycol monobutyl ether, Methylene chloride, Propylene, Xylenes
Wastewater Treatment	Benzene, Carbon Tetrachloride, Ethylene Dichloride, Ethylene Dibromide, Chloroform, Perchloroethylene, Trichloroethylene,

TABLE D-2

COMMON TOXIC AIR CONTAMINANTS

Substance	CAS Number**
Acenaphthene [PAH,POM]	83329
Acenaphthylene [PAH,POM]	208968
Acetaldehyde	75070
Acetamide	60355
Acetonitrile	75058
Acetophenone	98862
2-Acetylaminofluorene [PAH-Derivative, POM]	53963
Acrolein	107028
Acrylamide	79061
Acrylic Acid	79107
Acrylonitrile	107131
Allyl chloride	107051
Aluminum	7429905
Aluminum oxide (fibrous forms)	1344281
2-Aminoanthraquinone [PAH-Derivative, POM]	117793
4-Aminobiphenyl [POM]	92671
Amitrole	61825
Ammonia	7664417
Ammonium nitrate	6484522
Ammonium sulfate	7783202
Aniline	62533
o-Anisidine	90040
Anthracene [PAH, POM]	120127
Antimony	7440360
Antimony Compounds, not elsewhere listed.	-----
Antimony trioxide	1309644
Arsenic	7440382
Arsenic Compounds (inorganic)	1016
Arsenic Compounds (other than inorganic)	1017
Arsine	7784421
Asbestos	1332214
Barium	7440393
Barium chromate	10294403
Barium Compounds	-----
Benz[a]anthracene [PAH, POM]	56553

Substance	CAS Number**
Benzene	71432
Benzidine (and its salts) [POM]	92875
Benzidene-based dyes	1020
Benzo[a]pyrene [PAH, POM]	50328
Benzo[b]fluoranthene [PAH, POM]	205992
Benzo[e]pyrene [PAH,POM]	192972
Benzo[g,h,i]perylene	191242
Benzo[j]fluoranthene [PAH, POM]	205823
Benzo[k]fluoranthene [PAH, POM]	207089
Benzofuran	271896
Benzoic trichloride {Benzotrichloride}	98077
Benzoyl chloride	98884
Benzoyl peroxide	94360
Benzyl chloride	100447
Beryllium	7440417
Beryllium Compounds	-----
Biphenyl [POM]	92524
Bis(2-chloroethyl)ether {DCEE}	111444
Bis (chloromethyl) ether	542881
Bis(2-ethlyhexyl) adipate	103231
Bromine	7726956
Bromine Compounds (inorganic)	-----
Bromine pentaflourid	7789302
Bromoform	75252
1,3-Butadiene	106990
Butyl acrylate	141322
n-Butyl alcohol	71363
sec-Butyl alcohol	78922
tert-Butyl alcohol	75650
Butyl benzyl phthalate	85687
Cadmium	7440439
Cadmium Compounds	-----
Calcium chromate	13765190
Calcium cyanamide	156627
Caprolactam	105602

Substance	CAS Number**
Captafol	2425061
Captan	133062
Carbaryl [PAH-Derivative, POM]	63252
Carbon black extracts	1050
Carbon disulfide	75150
Carbon monoxide (A-II)	630080
Carbon tetrachloride	56235
Carbonyl sulfide	463581
Carrageenan (degraded)	1055
Catechol	120809
Chloramben	133904
Chlordane	57749
Chlorinated fluorocarbon 113 {CFC 113}	76131
Chlorinated paraffins (avg chain length C12)	108171262
Chlorine	7782505
Chlorine dioxide	10049044
Chloroacetic acid	79118
2-Chloroacetophenone	532274
p-Chloroaniline	106478
Chlorobenzene	108907
Chlorobenzenes, not elsewhere listed:	1058
Chlorobenzilate {Ethyl-4,4'-dichlorobenzilate}	510156
Chlorodifluoromethane {Freon 22}	75456
Chloroform	67663
Chloromethyl methyl ether (technical grade)	107302
Chlorophenols, not elsewhere listed.	1060
4-Chloro-o-phenylenediamine	95830
2-Chlorophenol	-----
Chloropicrin	76062
Chloroprene	126998
p-Chloro-o-toluidine	95692
Chromium	7440473
Chromium (hexavalent)	18540299
Chromium Compds. (other than hexavalent)	-----
Chromium trioxide	1333820
Chrysene [PAH, POM]	218019
Cobalt	7440484

Substance	CAS Number**
Cobalt Compounds	-----
Coke oven emissions	1066
Copper	7440508
Copper Compounds	-----
Creosotes	1070
p-Cresidine	120718
Cresols (mixtures of) {Cresylic acid}	1319773
m-Cresol	108394
o-Cresol	95487
p-Cresol	106445
Crotonaldehyde	4170303
Cumene	98828
Cumene hydroperoxide	80159
Cupferron	135206
Cyanide compounds, not elsewhere listed.	1073
Cyclohexane	110827
Cyclohexanol	108930
Cycloheximide	66819
Decabromodiphenyl oxide [POM]	1163195
Dialkylnitrosamines	1075
2,4-Diaminoanisole	615054
Diaminotoluenes (mixed isomers)	1078
2,4-Diaminotoluene {2,4-Toluenediamine}	95807
Diazomethane	334883
Dibenz[a,h]acridine [POM]	226368
Dibenz[a,h]anthracene [PAH, PAM]	53703
Dibenz[a,j]acridine [POM]	224420
7H-Dibenzo[c,g]carbazole	194592
Dibenzo[a,e]pyrene [PAH, POM]	192654
Dibenzo[a,h]pyrene [PAH, POM]	189640
Dibenzo[a,i]pyrene [PAH, POM]	189559
Dibenzo[a,l]pyrene [PAH, POM]	191300
Dibenzofuran [POM]	132649
1,2-Dibromo-3-chloropropane	96128
2,3-Dibromo-1-propanol	96139
Dibutyl phthalate	84742
1,2-Dichlorobenzene	95501

Substance	CAS Number**
1,3-Dichlorobenzene	541731
p-Dichlorobenzene {1,4-Dichlorobenzene}	106467
Dichlorobenzenes (mixed isomers)	25321226
3,3'-Dichlorobenzidine	91941
Dichlorodiphenyldichloroethylene {DDE} [POM]	72559
1,1-Dichloroethane {Ethylidene dichloride}	75343
Dichlorofluoromethane {Freon 12}	75434
2,4-Dichlorophenol	120832
Dichlorophenoxyacetic acid, salts and esters	94757
1,2-Dichloropropane {Propylene dichloride}	78875
1,3-Dichloropropene	542756
Dichlorovos {DDVP}	62737
Dicofol [POM]	115322
Diesel engine exhaust, particulate matter	9901
Diesel engine exhaust, total organic gas	9902
Diesel fuel (marine)	-----
Diethanolamine	111422
Di (2-ethylhexyl) phthalate	117817
Diethyl sulfate	64675
Diethylene glycol	111466
Diethylene glycol dimethyl ether	111966
Diethylene glycol monobutyl ether	112345
Diethylene glycol monoethyl ether	111900
Diethylene glycol monomethyl ether	111773
3,3'-Dimethoxybenzidine [POM]	119904
4-Dimethylaminoazobenzene [POM]	60117
N,N-Dimethylaniline	121697
7,12-Dimethylbenz[a]anthracene	57976
3,3'-Dimethylbenzidine {o-Tolidine} [POM]	119937
Dimethyl carbamoyl chloride	79447
N,N-Dimethyl formamide	68122
1,1-Dimethylhydrazine	57147
Dimethyl phthalate	131113
Dimethyl sulfate	77781
Dimethylamine	124403
4,6-Dinitro-o-cresol and salts	534521
2,4-Dinitrophenol	51285

Substance	CAS Number**
1,6-Dinitropyrene [PAH-Derivative, POM]	42397648
1,8-Dinitropyrene [PAH-Derivative, POM]	42397659
Dinitrotoluenes (mixed isomers)	25321146
2,4-Dinitrotoluene	121142
2,6-Dinitrotoluene	606202
1,4-Dioxane	123911
Dioxins/Dibenzofuran	-----
Diphenylhydantoin [POM]	630933
1,2-Diphenylhydrazine {Hydrazobenzene}	122667
Dipropylene glycol	25265718
Dipropylene glycol monomethyl ether	34590948
Direct Black 38 [PAH-Derivative, POM]	1937377
Direct Blue 6 [PAH-Derivative, POM]	2602462
Direct Brown 95 (technical grade) [POM]	16071866
Environmental tobacco smoke	1090
Epichlorohydrin	106898
1,2-Epoxybutane	106887
Epoxy Resins	1091
Erionite	12510428
Ethyl acrylate	140885
Ethyl benzene	100414
Ethyl chloride {Chloroethane}	75003
Ethylene	74851
Ethylene dibromide {1,2-Dibromoethane}	106934
Ethylene dichloride {1,2-Dichloroethane}	107062
Ethylene glycol	107211
Ethylene glycol diethyl ether	629141
Ethylene glycol dimethyl ether	110714
Ethylene glycol monobutyl ether	111762
Ethylene glycol monoethyl ether	110805
Ethylene glycol monoethyl ether acetate	111159
Ethylene glycol monomethyl ether	109864
Ethylene glycol monomethyl ether acetate	110496
Ethylene glycol monopropyl ether	2807309
Ethylene oxide	75218
Ethylene thiourea	96457
Ethyleneimine {Aziridine}	151564

Substance	CAS Number**
Fluoranthene [PAH, POM]	206440
Fluorene [PAH, POM]	86737
Fluorides and compounds	1101
Fluorocarbons (brominated/chlorinated)	1104/1103
Formaldehyde	50000
Furan	110009
Gasoline Engine exhaust, particulate matter	9910
Gasoline Engine exhaust, total organic gas	9911
Gasoline vapors	1110
Glasswool fibers	1111
Glutaraldehyde	111308
Glycol ethers and their acetates	1115
Heptachlor	76448
Hexachlorobenzene	118741
Hexachlorobutadiene	87683
Hexachlorocyclohexane	1120
alpha-Hexachlorocyclohexane	319846
beta-Hexachlorocyclohexane	319857
Hexachlorocyclopentadiene	77474
Hexachloroethane	67721
Hexamethylene-1,6,-diisocyanate	822060
Hexamethylphosphoramide	680319
Hexane	110543
Hydrazine	302012
Hydrochloric acid	7647010
Hydrocyanic acid	74908
Hydrogen bromide	10035106
Hydrogen fluoride	7664393
Hydrogen Selenide	7783075
Hydrogen sulfide	7783064
Hydroquinone	123319
Indeno[1,2,3,-cd]pyrene [PAH, POM]	193395
Iodine-131	24267569
Iron pentacarbonyl	13463406
Isocyanates	1125
Isophorone	78591
Isoprene, ex. from vegetative emission sources	78795

Substance	CAS Number**
Isopropyl Alcohol	67630
4,4’-Isopropylidenediphenol [POM]	80057
Lead	7439921
Lead compounds (inorganic)	1128
Lead acetate	301042
Lead chromate	7758976
Lead phosphate	7446277
Lead subacetate	1335326
Lead compounds (other than inorganic)	1129
Lindane (gamma-Hexachlorocyclohexane)	58899
Maleic anhydride	108316
Manganese	7439965
Manganese compounds	-----
Mercuric chloride	7487947
Mercury	7439976
Mercury compounds, not elsewhere listed:	-----
Methanol	67561
Methoxychlor [POM]	72435
Methyl bromide {Bromomethane}	74839
Methyl chloride {Chloromethane}	74873
Methyl chloroform {1,1,1-Trichloroethane}	71556
Methyl ethyl ketone {2-Butanone}	78933
Methyl hydrazine	60344
Methyl iodide {Iodomethane}	74884
Methyl isobutyl ketone {Hexone}	108101
Methyl isocyanate	624839
Methyl mercury {Dimethylmercury}	593748
Methyl methacrylate	80626
2-Methyl naphthalene [PAH, POM]	91576
Methyl tert-butyl ether	1634044
2-Methylaziridine {1,2-Propyleneimine}	75558
3-Methylcholanthrene [PAH-Derivative, POM]	56495
5-Methylchrysene [PAH-Derivative, POM]	3697243
4,4-Methylene bis (2-Chloroaniline)	101144
Methylene chloride {Dichloromethane}	75092
Methylene diphenyl isocyanate	101688
4,4-Methylenedianiline	101779

Substance	CAS Number**
2-Methyllactonitrile {Acetone cyanohydrin}	75865
2-Methylpyridine	109068
Michler's ketone [POM]	90948
Mineral fibers (manmade/non-manmade)	1136/1135
Molybdenum trioxide	1313275
Naphthalene	91203
Nickel	7440020
Nickel compounds, not elsewhere listed:	-----
Nickel acetate	373024
Nickel carbonate	3333393
Nickel carbonyl	13463393
Nickel hydroxide	12054487
Nickel Oxide	1313991
Nickel refinery dust from the pyrometallurgical	1146
Nickel subsulfide	12035722
Nickelocene	1271289
Nitric Acid	7697372
Nitrilotriacetic acid	139139
Nitrobenzene	98953
4-Nitrobiphenyl [POM]	92933
6-Nitrochrysene [PAH-Derivative, POM]	7496028
2-Nitrofluorene [PAH-Derivative, POM]	607578
Nitrogen dioxide	10102440
Nitrogen mustard N-oxide	302705
4-Nitrophenol	100027
2-Nitropropane	79469
1-Nitropyrene [PAH-Derivative, POM]	5522430
p-Nitrosodiphenylamine [POM]	156105
N-Nitroso-N-methylurea	684935
N-Nitrosodi-n-butylamine	924163
N-Nitrosodi-n-propylamine	621647
N-Nitrosodiethanolamine	1116547
N-Nitrosodiethylamine	55185
N-Nitrosodimethylamine	62759
N-Nitrosomethylethylamine	10595956
N-Nitrosomorpholine	59892
N-Nitrosopiperidine	100754

Substance	CAS Number**
N-Nitrosopyrrolidine	930552
Ozone	10028156
PAHs, total, w/ind components reported	1150
PAHs, total, w/o ind components reported	1151
Parathion	56382
Particulate matter	-----
PCBs (Polychlorinated biphenyls) [POM]	1336363
Pentachloronitrobenzene {Quintobenzene}	82688
Pentachlorophenol	87865
Peracetic acid	79210
Perchloroethylene {Tetrachloroethene}	127184
Perylene [PAH,POM]	198550
Phenanthrene [PAH, POM]	85018
Phenol	108952
p-Phenylenediamine	106503
2-Phenylphenol [POM]	90437
Phosgene	75445
Phosphine	7803512
Phosphoric Acid	7664382
Phosphorus	7723140
Phosphorus oxychloride	10025873
Phosphorus pentachloride	10026138
Phosphorus pentoxide	1314563
Phosphorus trichloride	7719122
Phthalic anhydride	85449
Polychlorinated dibenzo-p-dioxins	1085/1086
2,3,7,8-Tetrachlorodibenzo-p-dioxin {TCDD}	1746016
1,2,3,7,8-Pentachlorodibenzo-p-dioxin [POM]	40321764
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin [POM]	39227286
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin [POM]	57653857
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin [POM]	19408743
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	35822469
1,2,3,4,5,6,7,8-Octachlorodibenzo-p-dioxin	3268879
Total Heptachlorodibenzo-p-dioxin [POM]	37871004
Total Hexachlorodibenzo-p-dioxin [POM]	34465468
Total Pentachlorodibenzo-p-dioxin [POM]	36088229
Total Tetrachlorodibenzo-p-dioxin [POM]	41903575

Substance	CAS Number**
Polychlorinated dibenzofurans {PCDF)	1080
2,3,7,8-Tetrachlorodibenzofuran [POM]	51207319
1,2,3,7,8-Pentachlorodibenzofuran [POM]	57117416
2,3,4,7,8-Pentachlorodibenzofuran [POM]	57117314
1,2,3,4,7,8-Hexachlorodibenzofuran [POM]	70648269
1,2,3,6,7,8-Hexachlorodibenzofuran [POM]	57117449
1,2,3,7,8,9-Hexachlorodibenzofuran [POM]	72918219
2,3,4,6,7,8-Hexachlorodibenzofuran [POM]	60851345
1,2,3,4,6,7,8-Heptachlorodibenzofuran [POM]	67562394
1,2,3,4,7,8,9-Heptachlorodibenzofuran [POM]	55673897
1,2,3,4,5,6,7,8-Octachlorodibenzofuran [POM]	39001020
Total Heptachlorodibenzofuran [POM]	38998753
Total Hexachlorodibenzofuran [POM]	55684941
Total Pentachlorodibenzofuran [POM]	30402154
Total Tetrachlorodibenzofuran [POM]	55722275
Polycyclic aromatic hydrocarbons	-----
Polycyclic organic matter	-----
Potassium bromate	7758012
1,3-Propane sultone	1120714
beta-Propiolactone	57578
Propionaldehyde	123386
Propoxur {Baygon}	114261
Propylene	115071
Propylene glycol monomethy ether	107982
Propylene glycol monomethyl ether acetate	108656
Propylene oxide	75569
Pyrene [PAH, POM]	129000
Pyridine	110861
Quinoline	91225
Quinone	106514
Radionuclides	1165
Radon and its decay products	1166
Reserpine [POM]	50555
Residual (heavy) fuel oils	-----
Rockwool fibers	1168
Selenium	7782492
Selenium compounds, not elsewhere listed:	-----

Substance	CAS Number**
Selenium sulfide	7446346
Silica, crystalline	1175
Silver	7440224
Silver compounds	-----
Slagwool fibers	1181
Sodium dichromate	10588019
Sodium hydroxide	1310732
Strontium chromate	7789062
Styrene	100425
Styrene oxide	96093
Sulfates	-----
Sulfur dioxide	7446095
Sulfuric Acid	7664939
Talc containing asbestiform fibers	1190
Terephthalic acid	100210
1,1,2,2-Tetrachloroethane	79345
2,3,4,6-Tetrachlorophenol	58902
Tetrachlorophenols	-----
Thallium	7440280
Thallium Compounds	-----
Thioacetamide	62555
Thiourea	62566
Titanium tetrachloride	7550450
Toluene	108883
Toluene diisocyanates, not elsewhere listed:	1204
Toluene-2,4-diisocyanate	584849
Toluene-2,6-diisocyantes	91087
o-Toluidine	95534
Toxaphene {Polychlorinated camphenes}	8001352
Tributyl phosphate	126738
1,2,4-Trichlorobenzene	120821
1,1,2-Trichloroethane {Vinyl trichloride}	79005
Trichloroethylene	79016
Trichlorofluoromethane {Freon 11}	75694
2,4,5-Trichlorophenol	95954
2,4,6-Trichlorophenol	88062
1,2,3-Trichloropropane	96184

Substance	CAS Number**
Triethyl phosphine	78400
Triethylamine	121448
Triethylene glycol dimethyl ether	112492
Trifluralin	1582098
Trimethyl phosphate	512561
1,2,4-Trimethylbenzene	95636
2,2,4-Trimethylpentane	540841
Triorthocresyl phosphate [POM]	78308
Triphenyl phosphate [POM]	115866
Triphenyl phosphite [POM]	101020
Urethane {Ethyl carbamate}	51796
Vanadium (fume or dust)	7440622
Vanadium Pentoxide	1314621
Vinyl acetate	108054
Vinyl bromide	593602

Substance	CAS Number**
Vinyl chloride	75014
Vinyl fluoride	75025
4-Vinylcyclohexene	100403
Vinylidene chloride	75354
Wood preservatives (arsenic and chromate)	1206
Xylene	1210
m-Xylene	108383
o-Xylene	95476
p-Xylene	106423
Zinc	7440666
Zinc compounds, not elsewhere listed:	-----
Zinc oxide	1314132

**CAS Registry Number: The Chemical Abstracts Service Registry Number (CAS) is designation assigned by the American Chemical Society's Chemical Abstract Service and uniquely identifies a specific compound regardless of the name or naming system used.

Source: Engineering Division, Ventura County APCD, May 2000.

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APPENDIX E
DEFINITION OF LAND USE CATEGORIES FOR TRIP GENERATION AND PROJECT EMISSION CALCULATION PURPOSES

Appendix E contains the land use codes and definitions of all of the land uses contained in ITE's *Trip Generation* (Sixth Edition - 1997). Not all of the land uses in ITE's *Trip Generation* are in URBEMIS. However, URBEMIS inputs can be modified so that emissions from land uses not in URBEMIS can be calculated using URBEMIS.

LAND USE: 010 - Waterport/Marine Terminal
A waterport, or marine terminal, is an area for the transfer of materials between land and sea and possibly for the storage of these materials.

LAND USE: 021 - Commercial Airport
A commercial airport accommodates commercial passenger service. The commercial airports surveyed also accommodated general aviation activities. Commercial airports are characterized by long runways for serving large jets, and extensive terminal facilities. However, some commercial airports have shorter runways and serve exclusively intrastate and commuter airlines.

LAND USE: 022 - General Aviation Airport
A general aviation airport is primarily designed for the use of small private and corporate aircraft, not for commercial passenger service. It is usually characterized by short runways, few or no terminal facilities, and many small aircraft.

LAND USE: 030 - Truck Terminal
Truck terminals are facilities where goods are transferred between trucks, trucks and railroads, or trucks and ports.

LAND USE: 090 - Park-and-Ride Lot with Bus Service
A bus park and ride station is a site used for the transfer of people between private vehicles and buses. It typically contains a bus passenger shelter, a parking lot, and circulation facilities for buses, as well as private motor vehicles. A significant number of passengers are dropped off.

LAND USE: 093 - Light Rail Transit Station with Parking
Light rail transit stations are transportation stations that provide park-and-ride activity. These stations are areas for the transfer of people between private vehicles and light rail transportation. They usually contain automobile parking areas; a transfer station; a passenger shelter; ticketing facilities; and ancillary amenities, such as rest rooms, vending machines, and coffee/newspaper stands. Drop off/pick-up and carpool areas may also be provided.

LAND USE: 110 - General Light Industrial

Light industrial facilities usually employ fewer than 500 persons and have an emphasis on activities other than manufacturing. Nevertheless, the distinction between light industrial and manufacturing is sometimes vague. Typical light industrial activities include printing plants, material testing laboratories, assemblers of data processing equipment, and power stations. All of the facilities surveyed were free-standing and devoted to a single use.

LAND USE: 120 - General Heavy Industrial

Heavy industrial facilities usually have a high number of employees per industrial plant and could also be categorized as manufacturing facilities. The distinction between heavy industrial and manufacturing is vague. However, heavy industrial uses would be limited to the manufacturing of large items.

LAND USE: 130 - Industrial Park

Industrial parks contain many industrial or related facilities. They are characterized by a mix of manufacturing, service, and warehouse facilities with a wide variation in the proportion of each type of use from one location to another. Many industrial parks contain highly diversified facilities, some with a large number of small businesses and others with one or two dominant industries.

LAND USE: 140 - Manufacturing

Manufacturing facilities are sites where the primary activity is the conversion of raw materials or parts into finished products. Size and type of activity may vary substantially from one facility to another. In addition to production of goods, manufacturing facilities generally also have office, warehouse, research, and associated functions.

LAND USE: 150 - Warehousing

Warehouses are facilities that are primarily devoted to storage of materials. They may also include office and maintenance areas.

LAND USE: 151 - Mini-Warehouse

A mini-warehouse is a building in which a storage unit or vault is rented for the storage of goods. Each unit is physically separated from other units and access is usually provided through an overhead door or other common access point.

LAND USE: 152 - High-Cube Warehouse

High-cube warehouses are a new type of warehouse used for the storage of manufactured goods prior to their distribution to retail outlets. These facilities consist of large shells of steel buildings and large halls, often sub-divided for individual tenants, with a typical ceiling height of 24 to 26 feet. They are also characterized by a small employment count due to a high level of mechanization, truck activities frequently outside of the peak hour of the adjacent street system, and good freeway access.

LAND USE: 170 - Utilities
Utilities generally include offices space, electromechanical or industrial space, or parts and equipment storage areas.

LAND USE: 210 - Single Family Detached Housing
Any single family detached home on an individual lot is included in this category. A typical example is a home in a modern subdivision.

LAND USE: 220 - Apartment
An apartment is defined as a rental dwelling unit that is located within the same building as at least three other dwelling units. Examples of this category are quadruplexes and all types of apartment buildings.   The apartments in this land use include both low-rise or 'walk-up' dwellings and high-rise multi-family dwellings.

LAND USE: 221 - Low-Rise Apartment
This land use includes apartments (rental dwelling units) in rental buildings that have one or two levels (floors), such as garden apartments.

LAND USE: 222 - High-Rise Apartment
This land use includes apartments (rental dwelling units) in rental buildings that have more than ten levels (floors), and most likely have one or more elevators.

LAND USE: 223 - Mid-Rise Apartment
This land use includes apartments (rental dwelling units) in rental buildings that have more than two levels (floors) and less than nine levels.

LAND USE: 224 - Rental Townhouse
This land use includes townhouse communities with rented rather than owned units, and a minimum of two attached units per building structure.

LAND USE: 230 - Residential Condominium/Townhouse
Residential condominiums are defined as single-family ownership units that have at least one other single family owned unit within the same building structure. Both condominiums and townhouses are included in this category.

LAND USE: 231 - Low-Rise Residential Condominium/Townhouse
This land use includes condominiums and townhouses in buildings that have one or two levels (floors).

LAND USE: 232 - High-Rise Residential Condominium/Townhouse
This land use includes condominiums and townhouses in buildings that have three or more levels (floors).

LAND USE: 233 - Luxury Condominium/Townhouse

This land use includes condominiums and townhouses in buildings with luxury facilities or services.

LAND USE: 240 - Mobile Home Park

Mobile home parks generally consist of trailers shipped, sited, and installed on permanent foundations. Typically, they have community facilities such as recreation rooms, swimming pools, and laundry facilities. Many such parks restrict occupancy to adults.

LAND USE: 250 - Retirement Community

Retirement communities - restricted to adults or senior citizens - contain residential units similar to apartments or condominiums and are usually self-contained villages. They may also contain special services such as medical services, dining facilities, and some limited supporting retail facilities.

LAND USE: 251 - Elderly Housing - Detached

Elderly housing (detached) - restricted to senior citizens - contain residential units similar to single family housing, and are sometimes self-contained villages. They may also contain special services such as medical facilities, dining facilities, and some limited supporting retail facilities.

LAND USE: 252 - Congregate Care Facility

A congregate care facility typically consists of one or more multi-unit buildings designed for elderly living. These facilities might also contain dining rooms, medical facilities, and recreational facilities.

LAND USE: 253 - Elderly Housing - Attached

Elderly housing (attached) - restricted to senior citizens - contain residential units similar to apartments and condominiums, and are sometimes self-contained villages. They may also contain special services such as medical facilities, dining facilities, and some limited supporting retail facilities.

LAND USE: 260 - Recreational Homes

Recreational homes are usually located in a resort containing local services and complete recreational facilities. These dwellings are often second homes used by the owner periodically or rented on a seasonal basis.

LAND USE: 270 - Residential Planned Unit Development

Residential planned unit developments, for the purposes of trip generation, are defined as containing any combination of residential land uses, and might also contain supporting services such as limited retail and recreational facilities. The description of a PUD is general in nature since these developments vary by density and type of dwelling. It is therefore recommended that when information on the number and type of dwellings is known, the trip generation should be calculated on the basis of the known type of dwellings rather than on the basis of land use 270.

LAND USE: 310 - Hotel

A hotel is a place of lodging that provides sleeping accommodations, restaurants, cocktail lounges, meeting and banquet rooms or convention facilities, and other retail and service shops. Some of the sites included in this land use category are actually large motels providing the facilities of a hotel noted above.

LAND USE: 311 - All Suites Hotel

All suites hotels are places of lodging that provide sleeping accommodations, a small restaurant and lounge, and a small amount of meeting space. Each suite includes a sitting room and separate bedroom; often, limited kitchen facilities are provided within the suite. These hotels are located primarily in suburban areas.

LAND USE: 312 - Business Hotel

Business hotels are places of lodging aimed toward the business traveler. They provide sleeping accommodations and other limited facilities, such as a breakfast buffet bar and an afternoon beverage bar (no lunch or dinner is served, and no meeting facilities are provided). Each unit is a large single room. All locations nationwide are in suburban areas.

LAND USE: 320 - Motel

A motel is a place of lodging providing sleeping accommodations and often, a restaurant. Motels generally offer free on-site parking and provide little or no meeting space.

LAND USE: 330 - Resort Hotel

Resort hotels are similar to hotels (land use 310) in that they provide sleeping accommodations, restaurants, cocktail lounges, retail shops, and guest services. The primary difference is that resort hotels cater to the tourist and vacation business, often providing a variety of recreational facilities, rather than convention and meeting business. Resort hotels are normally located in suburban or outlying locations on larger sites than conventional hotels.

LAND USE: 411 - City Park

City parks are owned and operated by a city. The city parks surveyed varied widely as to location, type, and number of facilities, including boating or swimming facilities, ball fields, camp sites, and picnic facilities. Because of the variety of facilities as well as local conditions such as weather, seasonal use of the individual sites is quite different. For example, some of the sites are used primarily for boating or swimming, while others are used for softball games.

LAND USE: 412 - County Park

County parks are owned and operated by a county. The county parks surveyed varied widely as to location, type, and number of facilities, including boating or swimming facilities, ball fields, camp sites, picnic facilities, and general open space. Because of the variety of facilities as well as local conditions such as weather, seasonal use of the individual sites is quite different. For example, some of the sites are used primarily for boating or swimming, while others are used for softball games.

LAND USE: 413 - State Park

State parks are owned and operated by a state. The state parks surveyed varied widely as to location and type and amount of facilities, including hiking trails, boating or swimming facilities, ball fields, camp sites, picnic facilities, and general open space. Because of the variety of facilities as well as local conditions such as weather, seasonal use of the individual sites is quite different. For example, some of the sites are used primarily for boating or swimming, while others are used for hiking or camping.

LAND USE: 414 - Water Slide Park

A water slide park contains water slides, wading pools, refreshment stands, and picnic areas.

LAND USE: 415 - Beach Park

A beach park contains a beach, and possibly other facilities such as changing rooms, rest rooms, picnic facilities, hiking, fishing, and camp sites. Often, in ‘season’ lifeguards are provided.

LAND USE: 416 - Campground/Recreational Vehicle Park

Campgrounds and recreational vehicle parks are recreational sites that accommodate campers, trailers, tents, and recreational vehicles. They are found in a variety of locations and provide a variety of facilities, often including restrooms with showers, recreational facilities such as a swimming pool, a convenience store, and a laundromat.

LAND USE: 417 - Regional Park

Regional parks are owned and operated by a regional park authority. The regional parks surveyed varied widely as to location and type and amount of facilities, including hiking trails, lakes, pools, ball fields, camp sites, picnic facilities and general open space. Because of the variety of facilities as well as local conditions such as weather, seasonal use of the individual sites is quite different. For example, some of the sites are used primarily for boating or swimming, while others are used for hiking or camping, etc.

LAND USE: 418 - National Monument

National monuments vary widely as to type of facilities and location. Many house scenic observation points or towers, or are historical monuments.

LAND USE: 420 - Marina
Marinas can include both public and private facilities. In addition to docks and berths for boats, some of the sites surveyed also had social and club activities, limited retail, and restaurants.

LAND USE: 430 - Golf Course
The golf courses included in this analysis were 9, 18, and 27 hole municipal courses and private country clubs. Some sites have driving ranges and clubhouses with a pro shop, and/or restaurant, lounge, and banquet facilities. Many of the municipal courses do not have any of these facilities.

LAND USE: 431 - Miniature Golf Course
Miniature golf courses are free-standing and consist of one or more individual putting courses, and may or may not include limited game rooms or refreshment services.

LAND USE: 432 - Golf Driving Range
Golf driving ranges are outdoor facilities containing driving tees for golfers to practice. These facilities may also provide individual or small group lessons; some sites have pro shops and/or small refreshments facilities.

LAND USE: 435 - Multipurpose Recreational Facility
Multipurpose recreational facilities contain two or more of the following land uses combined at one site: miniature golf, batting cages, video arcade, bumper boats, go-carts, and golf driving ranges.

LAND USE: 441 - Live Theater
Live theater is in a building or open air setting and includes a stage, a backstage area, dressing rooms, seats for the audience, and a lobby area.

LAND USE: 443 - Movie Theater without matinee
A movie theater consists of audience seating, single or multiple screens and auditoriums, and a lobby and refreshment stand. Movie theaters without matinees show movies on weekday evenings and weekends only; there are no weekday daytime showings.

LAND USE: 444 - Movie Theater with matinee
A movie theater consists of audience seating, single or multiple screens and auditoriums, and a lobby and refreshment stand. Movie theaters with matinees show movies on weekday afternoons and evenings, as well as on weekends.

LAND USE: 452 - Horse Racetrack
The horse racetrack where data was collected includes a spectator stadium, parking, track, stables, and housing for workers.

LAND USE: 453 - Automobile Racetrack
Automobile racetracks are facilities that contain a racetrack, spectator seating, parking, and restaurant/refreshment areas.

LAND USE: 454 - Dog Racetrack
Dog racetracks include a spectator stadium, parking, track, and possibly stables and housing for workers.

LAND USE: 460 - Arena
An arena is a large indoor structure in which spectator events are held. These events vary from professional ice hockey and basketball to non-sporting events such as concerts, shows, or religious services. Arenas are generally provided with large parking facilities, except when located in or around the downtown of a large city.

LAND USE: 465 - Ice Rink
Ice rinks are facilities used for ice-skating oriented sports and entertainment activities. They may contain spectator seating, refreshment areas, and amenities.

LAND USE: 473 - Casino/Video Lottery Establishment
Casino/video lottery establishments are businesses that provide electronic or manually controlled slot machines. Full food service is generally not provided at these facilities; however, refreshments and alcoholic beverages may be served.

LAND USE: 480 - Amusement Park
An amusement park contains rides, entertainment, refreshment stands, and picnic areas.

LAND USE: 481 - Zoo
A zoo contains wild animals, refreshment stands, and picnic areas.

LAND USE: 491 - Tennis Courts
Tennis courts are indoor or outdoor facilities specifically designed for playing tennis. Other on-site facilities may include limited spectator seating and a parking lot. Tennis courts can either be public or private facilities.

LAND USE: 492 - Racquet Club
Racquet clubs are privately-owned facilities with tennis courts, and other facilities often including swimming pools and whirlpools, saunas, racquetball and handball courts, exercise classes, and weightlifting equipment.

LAND USE: 493 - Health Club
Health clubs are privately-owned facilities that may include swimming pools, whirlpools, saunas, tennis, racquetball and handball courts, exercise classes, weightlifting and gymnastics equipment, locker rooms, and a restaurant or snack bar.

LAND USE: 494 - Bowling Alley
Bowling alleys are recreational facilities that include bowling lanes. A small lounge, restaurant and/or snack bar, video games and pool tables, may also be available.

LAND USE: 495 - Recreational Community Center
Recreational community centers are facilities similar to and including YMCAs, often including classes and clubs for adults and children, day care or a nursery school, meeting rooms, swimming pools and whirlpools, saunas, tennis, racquetball, and handball courts, exercise classes, weightlifting and gymnastics equipment, locker rooms, and a restaurant or snack bar.

LAND USE: 501 - Military Base
Most of the military bases surveyed were air force bases, containing offices, training facilities, housing facilities, dining facilities, and recreational facilities.

LAND USE: 520 - Elementary School
Elementary schools serve students between the kindergarten and middle school or junior high school levels. Usually, they are centrally located in residential communities in order to facilitate student access and have no student drivers.

LAND USE: 521 - Private School (K-12)
Private schools serve students between kindergarten and high school, students may travel a long distance to get to private schools.

LAND USE: 522 - Middle School/Junior High School
Middle schools or junior high schools serve students who have completed elementary school and have not yet entered high school.

LAND USE: 530 - High School
High schools are for students who have completed middle school or junior high school. The high schools analyzed were generally separated from other land uses and had exclusive access points and parking facilities. Acreage and floor space varied widely with populations served and the social and economic characteristics of the area.

LAND USE: 540 - Junior/Community College
This land use includes two-year junior colleges or community colleges. A number of two year institutions have sizable evening programs. The two year colleges analyzed were generally separated from other land uses and had exclusive access points, and parking facilities. Acreage, floor space, staff, and parking accommodations vary widely with populations served and the social and economic characteristics of the area; thus, the student enrollment seems to be the most consistent basis for establishing trip generation rates.

LAND USE: 550 - University/College

This land use includes four-year and graduate educational institutions. Acreage, floor space, staff, and parking accommodations vary widely with populations served and the social and economic characteristics of the area; thus, the student enrollment seems to be the most consistent basis for establishing trip generation rates.

LAND USE: 560 - Church

A church is a building providing public worship facilities, and generally houses an assembly hall or sanctuary, meeting rooms, classrooms, and occasionally dining, catering, or party facilities.

LAND USE: 561 - Synagogue

A synagogue is a building providing public worship facilities, and generally houses an assembly hall or sanctuary, meeting rooms, classrooms, and occasionally dining, catering, or party facilities. The Sabbath is celebrated on Friday evenings and all day Saturday. Reform, conservative, and orthodox synagogues each have different trip characteristics.

LAND USE: 565 - Day Care Center

A day care center is a facility where care for pre-school age children is provided, normally during the daytime hours. Day care facilities generally include classrooms, offices, eating areas, and playgrounds. Some centers also provide after-school care for older children.

LAND USE: 566 - Cemetery

A cemetery is a place for burying the dead, possibly including buildings used for funeral services, a mausoleum, and a crematorium.

LAND USE: 571 - Prison

A prison is a place for housing persons convicted of committing a crime or awaiting trial, usually including cells, dining and food preparation facilities, limited recreational facilities, work areas, and offices.

LAND USE: 590 - Library

A library can be either a public or private facility, and houses shelves containing books, reading rooms, or areas, and possibly, meeting rooms.

LAND USE: 591 - Lodge/Fraternal Organization

A lodge/fraternal organization typically includes a club house with dining and drinking facilities, recreational and entertainment facilities, and meeting rooms.

LAND USE: 610 - Hospital

The term hospital refers to an institution where medical or surgical care is given to non-ambulatory and ambulatory patients, and overnight accommodations are provided. The term does not, however, refer to medical clinics (facilities that provide diagnoses and outpatient care only) or to nursing homes (facilities devoted to the care of persons unable to care for themselves).

LAND USE: 620 - Nursing Home

A nursing home is defined as any facility whose primary function is to care for persons unable to care for themselves. The term is applicable not only to rest homes, which are primarily for the aged, but also to chronic and convalescent homes. This type of facility is characterized by residents who do little or no driving. Traffic is primarily generated by employees, visitors, and deliveries.

LAND USE: 630 - Clinic

A clinic is defined as any facility that provides limited diagnostic and outpatient medical care, but is unable to provide prolonged in-house medical/surgical care.

LAND USE: 710 - General Office Building

A general office building houses multiple tenants; it is a location where affairs of businesses, commercial or industrial organization, or professional persons or firms are conducted. An office building or buildings may contain a mixture of tenants including professional services, insurance companies, investment brokers, and tenant services such as a bank or savings and loan, a restaurant or cafeteria, and service retail facilities.

LAND USE: 714 - Corporate Headquarters Building

A corporate headquarters building is a single tenant office building housing the corporate headquarters of a company or organization, and generally containing offices, meeting rooms, space for file storage and data processing, a restaurant or cafeteria, and other service functions.

LAND USE: 715 - Single Tenant Office Building

A single tenant office building generally contains the offices, meeting rooms, and space for file storage and data processing of a single business or company, and possible other service functions including a restaurant or cafeteria.

LAND USE: 720 - Medical-Dental Office Building

A medical office is a facility that provides diagnoses and outpatient care on a routine basis but is unable to provide prolonged in-house medical/surgical care. A medical office is generally operated by one or more private physicians or dentists.

LAND USE: 730 - Government Office Building

A government office building is an individual building containing the entire function or simply one agency of a city, county, state, federal government or other governmental unit. It differs from a government office complex - land use 733 (formerly called a civic center) in that it is not a group of several buildings that are interconnected with pedestrian walkways.

LAND USE: 731 - State Motor Vehicles Department
The State Motor Vehicles Department is typically an office-type building housing driver license testing, vehicle registration, and related functions.

LAND USE: 732 - U.S. Post Office
A U.S. Post Office is a federal building housing service windows for mailing packages and letters, post office boxes, offices, and sorting and distributing facilities for mail, and vehicle storage areas.

LAND USE: 733 - Government Office Complex
A government office complex is a complex of buildings housing a variety of functions of a city, county, state, federal government or other governmental unit, or multiple governmental units. It differs from a government office building (land use 730) in that it is a group of buildings that are interconnected with pedestrian walkways. This land use was formerly called a civic center.

LAND USE: 750 - Office Park
Office parks are generally suburban subdivisions or planned unit developments containing general office buildings and support services such as banks, savings and loan institutions, restaurants, and service stations arranged in a park-like or campus-like atmosphere.

LAND USE: 760 - Research and Development Center
Research centers are facilities or groups of facilities devoted nearly exclusively to research and development activities. They may also contain offices and light fabrication areas.

LAND USE: 770 - Business Park
Business parks consist of a group of flex-type or incubator one-or two-story buildings served by a common roadway system. The tenant space is flexible to house a variety of uses; the rear side of the building is usually served by a garage door. Tenants may be start-up companies or small mature companies that require a variety of space.

LAND USE: 812 - Building Materials and Lumber Store
A building materials/lumber store is a small free-standing building that sells hardware, building materials, and lumber. The lumber may be in the main building or in a yard or storage shed. The storage areas are not included in the total gross floor areas reported. The buildings contained in this land use are less than 25,000 gross square feet in size.

LAND USE: 813 - Free-Standing Discount Superstore
The discount superstores in this category are similar to the free-standing discount stores described in land use 815 with the exception that they also contain a full service grocery department under the same roof that shares entrances and exits with the discount store area. They are free-standing stores with off-street parking. The stores usually offer a

variety of customer services, centralized cashiering, and a wide range of products. They typically maintain long store hours seven days a week. The stores included in this data are often the only store on a site, but can also be found in mutual operation with a related or unrelated garden center and/or service station. They also are sometimes found as separate parcels within a retail complex with their own dedicated parking area.

LAND USE: 814 - Specialty Retail Center

Specialty retail centers are generally small strip shopping centers containing a variety of retail shops, specializing in quality apparel, hard goods, services such as real estate office, dance studios, or florists, and small restaurants.

LAND USE: 815 - Free-Standing Discount Store

The discount stores in this category are free-standing with off-street parking. They usually offer a variety of customer services, centralized cashiering, and a wide range of products. They typically maintain long store hours seven days a week. The stores included in this data are often the only store on a site, but can also be found in mutual operation with a related or unrelated garden center or service station. They also are sometimes found as separate parcels within a retail complex with their own dedicated parking.

LAND USE: 816 - Hardware/Paint Store

Hardware and paint stores are generally free-standing buildings with off-street parking.

LAND USE: 817 - Nursery (Garden Center)

A nursery or garden center is a free-standing building with a yard of planting or landscape stock. The nurseries surveyed primarily serve the general public. Some have large greenhouses; some offer landscaping services. Most have office, storage, and shipping facilities. This type of business is characterized by seasonal variations in trip characteristics.

LAND USE: 818 - Nursery (Wholesale)

A wholesale nursery is a free-standing building with a yard of planting or landscape stock. The nurseries surveyed primarily serve contractors and suppliers. Some have large greenhouses; some offer landscaping services. Most have office, storage, and shipping facilities. This type of business is characterized by seasonal variations in trip characteristics.

LAND USE: 820 - Shopping Center

A shopping center is an integrated group of commercial establishments that is planned, developed, owned, and managed as a unit. Its composition is related to its market area in terms of size, location, and type of store. Shopping centers provide on-site parking facilities. Surveys for this land use included neighborhood centers, community centers, regional centers, and super regional centers. They ranged in size from 1,700 to 2,200,000 square feet of gross leasable area. Some of the centers included non-merchandising uses such as office buildings, movie theaters, post offices, banks, health clubs, and recreational facilities such as ice skating rinks or indoor miniature golf courses.

LAND USE: 823 - Factory Outlet Center

A factory outlet center is a type of shopping center that primarily houses factory outlet stores, attracting customers from a wide geographic area, very often even from a larger area than a regional shopping center.

LAND USE: 831 - Quality Restaurant

This land use consists of eating establishments of high quality and with turnover rates generally of at least one hour or longer. Generally, quality restaurants do not serve breakfast, some do not serve lunch; all serve dinner. Typically, the restaurants included in this land use are not a chain, and reservations are required.

LAND USE: 832 – High-Turnover (Sit-Down) Restaurant

This land use consists of sit-down eating establishments with turnover rates generally of one hour or less. This type of restaurant is usually moderately priced and frequently belongs to a restaurant chain. Generally, these restaurants serve lunch and dinner; they may also be open for breakfast and are sometimes open 24 hours per day. Some facilities contained within this land use may also contain a bar area for serving food and alcoholic drinks.

LAND USE: 833 - Fast-Food Restaurant without Drive-Through Window

This land use includes fast-food restaurants without drive-through windows. This type of restaurant is characterized by a large carryout clientele; long hours of service (some are open for breakfast, all are open for lunch and dinner, some are open late at night or 24 hours); and high turnover rates for eat-in customers.

LAND USE: 834 - Fast-Food Restaurant with Drive-Through Window

This land use includes fast-food restaurants with drive-through windows. This type of restaurant is characterized by a large carryout clientele; long hours of service (some are open for breakfast, all are open for lunch and dinner, some are open late at night or 24 hours); and high turnover rates for eat-in customers.

LAND USE: 835 - Fast-Food Restaurant with Drive-Through Window and No Indoor Seating

This category includes fast-food restaurants with drive-through service only. These facilities typically have very small building areas and may provide a limited amount of outside seating.

LAND USE: 836 - Drinking Place

A drinking place contains a bar where alcoholic beverages and snacks are served and possibly some type of entertainment such as music, television screens, video games, or pool tables.

LAND USE: 837 - Quick Lubrication Vehicle Shop

A quick lubrication vehicle shop is a business where the primary activity is to perform oil change services for vehicles. Other ancillary services provided may include preventative maintenance, such as fluid and filter changes. Automobile repair service is generally not provided.

LAND USE: 840 - Automobile Care Center

An automobile care center houses numerous tenants providing automobile related services, including a mix of repair and servicing facilities, automobile stereo installation, seat cover upholstering, etc.

LAND USE: 841 - New Car Sales

New car sales facilities are generally located as strip development along major arterial streets that already have a preponderance of commercial development. Generally included are automobile services and parts sales along with a sometimes substantial used-car sales operation. Some dealerships also include leasing activities and truck sales and servicing.

LAND USE: 843 - Automobile Parts Sales

Automobile parts facilities specialize in the sale of automobile parts for do-it-yourself maintenance and repair. Items sold at these facilities include items such as spark plugs, distributor caps, and batteries. These facilities are not equipped for on-site vehicle repair.

LAND USE: 844 - Gasoline/Service Station

Service stations generally are located at intersections or freeway interchanges and have facilities for fueling motor vehicles. They may also include facilities for servicing and repairing motor vehicles. This land use includes service stations without convenience stores or car washes. The independent variable "vehicle fueling position" is defined as the maximum number of vehicles that can be fueled simultaneously.

LAND USE: 845 - Gasoline/Service Station with Convenience Market

Service stations generally are located at intersections or freeway interchanges. This land use includes service stations with convenience markets where the primary business is the fueling of motor vehicles, although they may also have facilities for servicing and repairing motor vehicles. Some commonly sold convenience items are newspapers, coffee or other beverages, and snack items that are generally consumed in the car. This land use does not include stations with car washes. The independent variable "vehicle fueling position" is defined as the maximum number of vehicles that can be fueled simultaneously.

LAND USE: 846 - Gasoline/Service Station with Convenience Market and Car Wash

Service stations generally are located at intersections or freeway interchanges. This land use includes service stations with convenience markets and car washes where the primary business is the fueling of motor vehicles, although they may also include facilities for servicing and repairing motor vehicles. The independent variable "vehicle fueling position" is defined as the maximum number of vehicles that can be fueled simultaneously.

LAND USE: 847 - Self Service Car Wash
The facilities surveyed are manual operations where the driver parks and washes a vehicle in a stall.

LAND USE: 848 - Tire Store
The tire stores surveyed sell tires, and provide installation and possibly other automobile maintenance functions and customer services. These stores generally do not contain large storage or warehouse areas.

LAND USE: 849 - Wholesale Tire Store
Wholesale tire stores are warehouse type facilities with the primary function of selling and installing tires for automobiles and small trucks. Other services provided may include automotive maintenance functions such as wheel alignment or shock and brake service, and customer services. A tire display, customer waiting lounge and restroom facilities, staff office space, and significant storage area are also provided. General mechanical repairs and body work are usually not conducted at these facilities.

LAND USE: 850 - Supermarket
Supermarkets are typically free-standing retail stores selling a complete assortment of food, food preparation and wrapping material, and household cleaning and servicing items. Supermarkets may also contain facilities such as money machines, photo centers, pharmacies, and video rental areas.

LAND USE: 851 - Convenience Market (Open 24 hours)
Convenience markets in this classification are usually open 24 hours per day, depending on the management and possibly the location. These markets sell convenience foods, newspapers, magazines, and often beer and wine, but do not have gasoline pumps.

LAND USE: 852 - Convenience Market (Open 15-16 hours)
Convenience markets are usually open 15 to 16 hours per day. These markets sell convenience foods, newspapers, magazines, and often beer and wine, but do not have gasoline pumps.

LAND USE: 853 - Convenience Market with Gasoline Pumps
The convenience markets surveyed sell gasoline, convenience foods, newspapers, magazines, and often beer and wine. This land use includes convenience markets with gasoline pumps where the primary business is the selling of convenience items, not the fueling of motor vehicles.

LAND USE: 854 - Discount Supermarket

Discount supermarkets are typically free-standing retail stores selling a complete assortment of food (often in bulk), food preparation and wrapping materials, and household cleaning and servicing items, at discounted prices.

LAND USE: 860 - Wholesale Market

Wholesale markets generally include large storage and distribution areas for receiving goods (such as produce) and shipping these goods to places such as grocery stores and restaurants. Generally, these markets are characterized by little drive-in business, and truck deliveries and pick-ups at all hours of the day.

LAND USE: 861 - Discount Club

A discount club is a discount store/warehouse whose shoppers pay a membership fee in order to take advantage of discounted prices on a wide variety of items including food, clothing, tires, appliances, etc. Many items are sold in bulk.

LAND USE: 862 - Home Improvement Superstore

Home improvement superstores are free-standing warehouse type facilities with off-street parking. Home improvement superstores generally offer a variety of customer services and centralized cashiering, and they specialize in the sale of home improvement merchandise. They typically maintain long store hours seven days a week. Examples of items sold in these stores include lumber, tools, paint, lighting, wallpaper and paneling, kitchen and bathroom fixtures, lawn equipment, and garden plants and accessories. The stores included in this data are often the only ones on the site, but they can also be found in mutual operation with a related or unrelated garden center. The buildings contained in this land use usually range in size from 25,000 to 150,000 square feet of gross floor area.

LAND USE: 863 - Electronics Superstore

Electronics superstores are free-standing warehouse type facilities with off-street parking. Electronics superstores generally offer a variety of customer services and centralized cashiering, and they specialize in the sale of home and vehicle electronic merchandise. They typically maintain long store hours seven days a week. Examples of items sold in these stores include televisions, compact disc and cassette tape players, compact discs and tapes, cameras, radios, videos, and general electronic accessories. Major home appliances may also be sold at these facilities. The stores included in this data may or may not be the only ones on the site.

LAND USE: 864 - Toy/Children's Superstore

Toy/children's superstores are free-standing warehouse type facilities with off-street parking. Toy/children's superstores generally offer a variety of customer services and centralized cashiering, and they specialize in the sale of child-oriented merchandise. They typically maintain long store hours seven days a week. Examples of items sold in these stores include board and video game systems, toys, bicycles/tricycles, wagons, outdoor play equipment, and school supplies. Some may also carry children's clothing. The stores included in this data may or may not be the only ones on the site.

LAND USE: 870 - Apparel Store
An apparel store is an individual store specializing in the sale of clothing.

LAND USE: 880 - Pharmacy/Drugstore without Drive-Through Window
Pharmacies/drugstores are retail facilities that primarily sell prescription and non-prescription drugs. These facilities may also sell cosmetics, toiletries, medications, stationery, personal care products, limited food products, and general merchandise. The drugstores in this category do not contain drive-through windows.

LAND USE: 881 - Pharmacy/Drugstore with Drive-Through Window
Pharmacies/drugstores are retail facilities that primarily sell prescription and non-prescription drugs. These facilities may also sell cosmetics, toiletries, medications, stationery, personal care products, limited food products, and general merchandise. The drugstores in this category contain drive-through windows.

LAND USE: 890 - Furniture Store
A furniture store specializes in the sale of furniture, and often carpeting. Furniture stores are generally large, and include storage areas. The sites surveyed include both traditional furniture stores and warehouse stores with showrooms.

LAND USE: 895 - Video Arcade
A video arcade is a building or space in which video game units are played for a fee. Arcades generally contain 20 to 100 individual game units.

LAND USE: 896 - Video Rental Store
Video rental stores are businesses specializing in the rental of home movies and video games. Movies and video games may also be available for purchase. They typically maintain long store hours and are usually open seven days a week.

LAND USE: 911 - Walk-in Bank
Walk-in banks are generally freestanding buildings with their own parking lots. These banks do not have drive-in windows.

LAND USE: 912 - Drive-in Bank
Drive-in banks provide banking facilities for the motorist while in a vehicle; many also serve patrons who walk into the building.

Source: *Trip Generation*, Sixth Edition, Institute of Transportation Engineers, 1997.

APPENDIX F
PROJECT SCREENING ANALYSIS TABLES

Appendix F contains a series of tables of land uses, by project size and year of project completion, that will exceed at least one of the reactive organic compounds (ROC) and oxides of nitrogen (NOx) significance thresholds described in Chapter 3, Air Quality Significance Thresholds (see also Section 5.3.1, "Project Screening Analysis Tables"). Projects smaller than the applicable threshold values in Appendix F will not have a significant adverse impact on air quality with respect to ROC and/or NOx emissions. Although a project may fall below the applicable ROC or NOx threshold values in Appendix F, the project should still be assessed for other potential significant air quality impacts, such as fugitive dust, odors, toxic air contaminants, and consistency with the *Ventura County Air Quality Management Plan*.

If a project is a single land use type (e.g., single family detached housing), Appendix F can be used to determine whether the project is likely to exceed the significance thresholds. If the project size is near the size necessary to exceed the significance thresholds, the URBEMIS program should be run, using either the screening analysis mode (see Section 5.3.2, "URBEMIS Computer Program -Screening Analysis Mode"), or a detailed run (see Section 5.3.3, "URBEMIS Computer Program - Detailed Run"). Also, if there are unique conditions about a project that deviate from the Ventura County default values (see Section 5.3.3.1), the screening analysis tables are not appropriate, and either an URBEMIS screening analysis run or detailed run should be performed.

The information presented in the following tables is based on URBEMIS2002 for Windows and EMFAC2002, since these are the most recent versions of the computer programs at the current time. APCD recommends that lead agencies use the most recent version of URBEMIS adopted by the California Air Resources Board and the corresponding version of EMFAC. Therefore, if a more current version of URBEMIS is available, the District recommends using the more current version of URBEMIS instead of these tables.

The tables in this appendix were generated using the default values for Ventura County, and the default trip generation rates in URBEMIS. These trip generation rates are from the Institute of Transportation Engineers *Trip Generation*, Sixth edition, and other sources, as documented in the User's Guide for URBEMIS. The "pass-by trip" option was selected for all land use categories. Emissions from area sources (e.g., natural gas usage, landscaping equipment, and consumer products) have also been included in the tables.

The project screening analysis mode in the URBEMIS program and the project screening analysis tables in Appendix F of this Guidelines use the default vehicle fleet mix for calculating estimated project emissions. Therefore, for projects where the fleet mix includes a greater percentage of heavy-duty vehicle trips than the default fleet mix, project emissions may be significantly underestimated in the screening analysis mode and the screening analysis tables. An example of this situation might be a warehouse facility where the vehicle trips are predominantly heavy-duty diesel trips. The District recommends that if a lead agency determines that the expected vehicle fleet mix for a project will include more heavy duty vehicles than the default fleet mix, project screening analyses are not appropriate.

APPENDIX F
PROJECT SCREEENING ANALYSIS TABLES

Analysis Year: 2003
Significance Threshold: 25 lbs/day

Code*	Land Use	Project Size That Will Exceed ROC or NOx Significance Threshold
210	Single Family Detached Housing	99 dwelling units
211	Low-Rise Apartment	127 dwelling units
230	Condominium/Townhouse, General	171 dwelling units
270	Residential Planned Unit Development	199 dwelling units
---	Nursing Home	338 dwelling units
565	Day-Care Center	25,900 sq. ft.
831	Quality Restaurant	23,800 sq. ft.
832	High Turnover (Sit-Down) Restaurant	15,800 sq. ft.
833	Fast-food Restaurant without Drive-through Window	2,900 sq. ft.
834	Fast-food Restaurant with Drive-through Window	4,200 sq. ft.
863	Electronics Superstore	46,500 sq. ft.
862	Home Improvement Superstore	61,900 sq. ft.
---	Strip Mall	52,500 sq. ft.
816	Hardware/Paint Store	40,900 sq. ft.
850	Supermarket	19,000 sq. ft.
851	Convenience Market (Open 24 hours)	2,900 sq. ft.
853	Convenience Market with Gasoline Pumps	2,520 sq. ft.
844	Service Station	13 fueling positions
710	General Office Building	123,000 sq. ft.
750	Office Park	97,900 sq. ft.
720	Medical Office Building	54,200 sq. ft.
110	General Light Industrial	201,400 sq. ft.
130	Industrial Park	148,700 sq. ft.

* Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991, and 1995 Update, and Sixth Edition, 1997.

Analysis Year: 2003
Significance Threshold: 5 lbs/day

Code*	Land Use	Project Size That Will Exceed ROC or NOx Significance Threshold
210	Single Family Detached Housing	18 dwelling units
211	Low-Rise Apartment	15 dwelling units
230	Condominium/Townhouse, General	26 dwelling units
270	Residential Planned Unit Development	35 dwelling units
---	Nursing Home	67 dwelling units
565	Day-Care Center	5,200 sq. ft.
831	Quality Restaurant	4,000 sq. ft.
832	High Turnover (Sit-Down) Restaurant	3,200 sq. ft.
833	Fast-food Restaurant without Drive-through Window	600 sq. ft.
834	Fast-food Restaurant with Drive-through Window	900 sq. ft.
863	Electronics Superstore	9,300 sq. ft.
862	Home Improvement Superstore	17,300 sq. ft.
---	Strip Mall	10,500 sq. ft.
816	Hardware/Paint Store	8,200 sq. ft.
850	Supermarket	3,800 sq. ft.
851	Convenience Market (Open 24 hours)	580 sq. ft.
853	Convenience Market with Gasoline Pumps	510 sq. ft.
844	Service Station	3 fueling positions
710	General Office Building	15,400 sq. ft.
750	Office Park	9,400 sq. ft.
720	Medical Office Building	15,000 sq. ft.
110	General Light Industrial	46,100sq. ft.
130	Industrial Park	7,900 sq. ft.

* Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991, and 1995 Update, and Sixth Edition, 1997.

APPENDIX F
PROJECT SCREEENING ANALYSIS TABLES

Analysis Year: 2004
Significance Threshold: 25 lbs/day

Code*	Land Use	Project Size That Will Exceed ROC or NOx Significance Threshold
210	Single Family Detached Housing	108 dwelling units
211	Low-Rise Apartment	144 dwelling units
230	Condominium/Townhouse, General	187 dwelling units
270	Residential Planned Unit Development	239 dwelling units
---	Nursing Home	345 dwelling units
565	Day-Care Center	28,000 sq. ft.
831	Quality Restaurant	26,000 sq. ft.
832	High Turnover (Sit-Down) Restaurant	17,100 sq. ft.
833	Fast-food Restaurant without Drive-through Window	3,130 sq. ft.
834	Fast-food Restaurant with Drive-through Window	4,510 sq. ft.
863	Electronics Superstore	50,500 sq. ft.
862	Home Improvement Superstore	66,500 sq. ft.
---	Strip Mall	56,500 sq. ft.
816	Hardware/Paint Store	44,200 sq. ft.
850	Supermarket	20,600 sq. ft.
851	Convenience Market (Open 24 hours)	3,130 sq. ft.
853	Convenience Market with Gasoline Pumps	2,730 sq. ft.
844	Service Station	14 fueling positions
710	General Office Building	137,000 sq. ft.
750	Office Park	110,000 sq. ft.
720	Medical Office Building	58,300 sq. ft.
110	General Light Industrial	218,000 sq. ft.
130	Industrial Park	175,000 sq. ft.

* Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991, and 1995 Update, and Sixth Edition, 1997.

Analysis Year: 2004
Significance Threshold: 5 lbs/day

Code*	Land Use	Project Size That Will Exceed ROC or NOx Significance Threshold
210	Single Family Detached Housing	19 dwelling units
211	Low-Rise Apartment	16 dwelling units
230	Condominium/Townhouse, General	29 dwelling units
270	Residential Planned Unit Development	37 dwelling units
---	Nursing Home	69 dwelling units
565	Day-Care Center	5,600 sq. ft.
831	Quality Restaurant	4,400 sq. ft.
832	High Turnover (Sit-Down) Restaurant	3,500 sq. ft.
833	Fast-food Restaurant without Drive-through Window	630 sq. ft.
834	Fast-food Restaurant with Drive-through Window	910 sq. ft.
863	Electronics Superstore	10,100 sq. ft.
862	Home Improvement Superstore	18,200 sq. ft.
---	Strip Mall	11,300 sq. ft.
816	Hardware/Paint Store	8,900 sq. ft.
850	Supermarket	4,100 sq. ft.
851	Convenience Market (Open 24 hours)	630 sq. ft.
853	Convenience Market with Gasoline Pumps	550 sq. ft.
844	Service Station	3 fueling positions
710	General Office Building	17,100 sq. ft.
750	Office Park	10,200 sq. ft.
720	Medical Office Building	15,800 sq. ft.
110	General Light Industrial	49,000 sq. ft.
130	Industrial Park	8,600 sq. ft.

* Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991, and 1995 Update, and Sixth Edition, 1997.

APPENDIX F
PROJECT SCREEENING ANALYSIS TABLES

Analysis Year: 2005
Significance Threshold: 25 lbs/day

Code*	Land Use	Project Size That Will Exceed ROC or NOx Significance Threshold
210	Single Family Detached Housing	117 dwelling units
211	Low-Rise Apartment	160 dwelling units
230	Condominium/Townhouse, General	203 dwelling units
270	Residential Planned Unit Development	256 dwelling units
---	Nursing Home	354 dwelling units
565	Day-Care Center	30,100 sq. ft.
831	Quality Restaurant	28,200 sq. ft.
832	High Turnover (Sit-Down) Restaurant	18,400 sq. ft.
833	Fast-food Restaurant without Drive-through Window	3,370 sq. ft.
834	Fast-food Restaurant with Drive-through Window	4,860 sq. ft.
863	Electronics Superstore	54,000 sq. ft.
862	Home Improvement Superstore	70,900 sq. ft.
---	Strip Mall	60,600 sq. ft.
816	Hardware/Paint Store	47,500 sq. ft.
850	Supermarket	22,100 sq. ft.
851	Convenience Market (Open 24 hours)	3,360 sq. ft.
853	Convenience Market with Gasoline Pumps	2,940 sq. ft.
844	Service Station	15 fueling positions
710	General Office Building	150,000 sq. ft.
750	Office Park	120,500 sq. ft.
720	Medical Office Building	62,200 sq. ft.
110	General Light Industrial	233,500 sq. ft.
130	Industrial Park	199,500 sq. ft.

* Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991, and 1995 Update, and Sixth Edition, 1997.

Analysis Year: 2005
Significance Threshold: 5 lbs/day

Code*	Land Use	Project Size That Will Exceed ROC or NOx Significance Threshold
210	Single Family Detached Housing	21 dwelling units
211	Low-Rise Apartment	17 dwelling units
230	Condominium/Townhouse, General	31 dwelling units
270	Residential Planned Unit Development	39 dwelling units
---	Nursing Home	70 dwelling units
565	Day-Care Center	6,100 sq. ft.
831	Quality Restaurant	4,800 sq. ft.
832	High Turnover (Sit-Down) Restaurant	3,700 sq. ft.
833	Fast-food Restaurant without Drive-through Window	671 sq. ft.
834	Fast-food Restaurant with Drive-through Window	970 sq. ft.
863	Electronics Superstore	10,800 sq. ft.
862	Home Improvement Superstore	19,100 sq. ft.
---	Strip Mall	12,100 sq. ft.
816	Hardware/Paint Store	9,500 sq. ft.
850	Supermarket	4,500 sq. ft.
851	Convenience Market (Open 24 hours)	680 sq. ft.
853	Convenience Market with Gasoline Pumps	590 sq. ft.
844	Service Station	3 fueling positions
710	General Office Building	18,700 sq. ft.
750	Office Park	11,000 sq. ft.
720	Medical Office Building	16,600 sq. ft.
110	General Light Industrial	52,000 sq. ft.
130	Industrial Park	9,200 sq. ft.

* Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991, and 1995 Update, and Sixth Edition, 1997.

APPENDIX F
PROJECT SCREEENING ANALYSIS TABLES

Analysis Year: 2006
Significance Threshold: 25 lbs/day

Code*	Land Use	Project Size That Will Exceed ROC or NOx Significance Threshold
210	Single Family Detached Housing	126 dwelling units
211	Low-Rise Apartment	176 dwelling units
230	Condominium/Townhouse, General	220 dwelling units
270	Residential Planned Unit Development	225 dwelling units
---	Nursing Home	358 dwelling units
565	Day-Care Center	32,300 sq. ft.
831	Quality Restaurant	30,400 sq. ft.
832	High Turnover (Sit-Down) Restaurant	19,700 sq. ft.
833	Fast-food Restaurant without Drive-through Window	3,610 sq. ft.
834	Fast-food Restaurant with Drive-through Window	5,210 sq. ft.
863	Electronics Superstore	57,900 sq. ft.
862	Home Improvement Superstore	75,400 sq. ft.
---	Strip Mall	64,900 sq. ft.
816	Hardware/Paint Store	50,900 sq. ft.
850	Supermarket	23,700 sq. ft.
851	Convenience Market (Open 24 hours)	3,610 sq. ft.
853	Convenience Market with Gasoline Pumps	3,150 sq. ft.
844	Service Station	16 fueling positions
710	General Office Building	163,000 sq. ft.
750	Office Park	131,600 sq. ft.
720	Medical Office Building	66,300 sq. ft.
110	General Light Industrial	249,500 sq. ft.
130	Industrial Park	226,000 sq. ft.

* Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991, and 1995 Update, and Sixth Edition, 1997.

Analysis Year: 2006
Significance Threshold: 5 lbs/day

Code*	Land Use	Project Size That Will Exceed ROC or NOx Significance Threshold
210	Single Family Detached Housing	22 dwelling units
211	Low-Rise Apartment	18 dwelling units
230	Condominium/Townhouse, General	34 dwelling units
270	Residential Planned Unit Development	41 dwelling units
---	Nursing Home	71 dwelling units
565	Day-Care Center	6,500 sq. ft.
831	Quality Restaurant	5,100 sq. ft.
832	High Turnover (Sit-Down) Restaurant	4,000 sq. ft.
833	Fast-food Restaurant without Drive-through Window	730 sq. ft.
834	Fast-food Restaurant with Drive-through Window	1,050 sq. ft.
863	Electronics Superstore	11,600 sq. ft.
862	Home Improvement Superstore	20,000 sq. ft.
---	Strip Mall	13,000 sq. ft.
816	Hardware/Paint Store	10,200 sq. ft.
850	Supermarket	4,800 sq. ft.
851	Convenience Market (Open 24 hours)	720 sq. ft.
853	Convenience Market with Gasoline Pumps	630 sq. ft.
844	Service Station	4 fueling positions
710	General Office Building	20,500 sq. ft.
750	Office Park	11,800 sq. ft.
720	Medical Office Building	17,400 sq. ft.
110	General Light Industrial	54,500 sq. ft.
130	Industrial Park	9,900 sq. ft.

* Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991, and 1995 Update, and Sixth Edition, 1997.

APPENDIX F
PROJECT SCREEENING ANALYSIS TABLES

Analysis Year: 2007
Significance Threshold: 25 lbs/day

Code*	Land Use	Project Size That Will Exceed ROC or NOx Significance Threshold
210	Single Family Detached Housing	134 dwelling units
211	Low-Rise Apartment	192 dwelling units
230	Condominium/Townhouse, General	222 dwelling units
270	Residential Planned Unit Development	235 dwelling units
---	Nursing Home	365 dwelling units
565	Day-Care Center	34,400 sq. ft.
831	Quality Restaurant	32,600 sq. ft.
832	High Turnover (Sit-Down) Restaurant	21,000 sq. ft.
833	Fast-food Restaurant without Drive-through Window	3,850 sq. ft.
834	Fast-food Restaurant with Drive-through Window	5,550 sq. ft.
863	Electronics Superstore	61,600 sq. ft.
862	Home Improvement Superstore	79,800 sq. ft.
---	Strip Mall	69,100 sq. ft.
816	Hardware/Paint Store	54,200 sq. ft.
850	Supermarket	25,200 sq. ft.
851	Convenience Market (Open 24 hours)	3,850 sq. ft.
853	Convenience Market with Gasoline Pumps	3,360 sq. ft.
844	Service Station	17 fueling positions
710	General Office Building	176,500 sq. ft.
750	Office Park	142,400 sq. ft.
720	Medical Office Building	70,300 sq. ft.
110	General Light Industrial	265,500 sq. ft.
130	Industrial Park	251,000 sq. ft.

* Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991, and 1995 Update, and Sixth Edition, 1997.

Analysis Year: 2007
Significance Threshold: 5 lbs/day

Code*	Land Use	Project Size That Will Exceed ROC or NOx Significance Threshold
210	Single Family Detached Housing	24 dwelling units
211	Low-Rise Apartment	19 dwelling units
230	Condominium/Townhouse, General	37 dwelling units
270	Residential Planned Unit Development	42 dwelling units
---	Nursing Home	72 dwelling units
565	Day-Care Center	6,860 sq. ft.
831	Quality Restaurant	5,500 sq. ft.
832	High Turnover (Sit-Down) Restaurant	4,200 sq. ft.
833	Fast-food Restaurant without Drive-through Window	770 sq. ft.
834	Fast-food Restaurant with Drive-through Window	1,110 sq. ft.
863	Electronics Superstore	12,300 sq. ft.
862	Home Improvement Superstore	20,900 sq. ft.
---	Strip Mall	13,800 sq. ft.
816	Hardware/Paint Store	10,850 sq. ft.
850	Supermarket	5,050 sq. ft.
851	Convenience Market (Open 24 hours)	770 sq. ft.
853	Convenience Market with Gasoline Pumps	670 sq. ft.
844	Service Station	4 fueling positions
710	General Office Building	22,200 sq. ft.
750	Office Park	12,600 sq. ft.
720	Medical Office Building	18,200 sq. ft.
110	General Light Industrial	57,500 sq. ft.
130	Industrial Park	10,600 sq. ft.

* Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991, and 1995 Update, and Sixth Edition, 1997.

APPENDIX F
PROJECT SCREEENING ANALYSIS TABLES

Analysis Year: 2008
Significance Threshold: 25 lbs/day

Code*	Land Use	Project Size That Will Exceed ROC or NOx Significance Threshold
210	Single Family Detached Housing	145 dwelling units
211	Low-Rise Apartment	211 dwelling units
230	Condominium/Townhouse, General	257 dwelling units
270	Residential Planned Unit Development	244 dwelling units
---	Nursing Home	371 dwelling units
565	Day-Care Center	37,000 sq. ft.
831	Quality Restaurant	35,500 sq. ft.
832	High Turnover (Sit-Down) Restaurant	22,700 sq. ft.
833	Fast-food Restaurant without Drive-through Window	4,150 sq. ft.
834	Fast-food Restaurant with Drive-through Window	5,990 sq. ft.
863	Electronics Superstore	66,500 sq. ft.
862	Home Improvement Superstore	85,400 sq. ft.
---	Strip Mall	74,300 sq. ft.
816	Hardware/Paint Store	58,300 sq. ft.
850	Supermarket	27,200 sq. ft.
851	Convenience Market (Open 24 hours)	4,140 sq. ft.
853	Convenience Market with Gasoline Pumps	3,620 sq. ft.
844	Service Station	19 fueling positions
710	General Office Building	194,000 sq. ft.
750	Office Park	156,500 sq. ft.
720	Medical Office Building	75,300 sq. ft.
110	General Light Industrial	285,500 sq. ft.
130	Industrial Park	282,500 sq. ft.

* Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991, and 1995 Update, and Sixth Edition, 1997.

Analysis Year: 2008
Significance Threshold: 5 lbs/day

Code*	Land Use	Project Size That Will Exceed ROC or NOx Significance Threshold
210	Single Family Detached Housing	26 dwelling units
211	Low-Rise Apartment	21 dwelling units
230	Condominium/Townhouse, General	40 dwelling units
270	Residential Planned Unit Development	44 dwelling units
---	Nursing Home	74 dwelling units
565	Day-Care Center	7,400 sq. ft.
831	Quality Restaurant	5,950 sq. ft.
832	High Turnover (Sit-Down) Restaurant	4,520 sq. ft.
833	Fast-food Restaurant without Drive-through Window	830 sq. ft.
834	Fast-food Restaurant with Drive-through Window	1,200 sq. ft.
863	Electronics Superstore	13,250 sq. ft.
862	Home Improvement Superstore	22,000 sq. ft.
---	Strip Mall	14,850 sq. ft.
816	Hardware/Paint Store	11,650 sq. ft.
850	Supermarket	5,450 sq. ft.
851	Convenience Market (Open 24 hours)	830 sq. ft.
853	Convenience Market with Gasoline Pumps	725 sq. ft.
844	Service Station	4 fueling positions
710	General Office Building	24,400 sq. ft.
750	Office Park	13,500 sq. ft.
720	Medical Office Building	19,170 sq. ft.
110	General Light Industrial	60,700 sq. ft.
130	Industrial Park	11,400 sq. ft.

* Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991, and 1995 Update, and Sixth Edition, 1997.

APPENDIX F
PROJECT SCREEENING ANALYSIS TABLES

Analysis Year: 2009
Significance Threshold: 25 lbs/day

Code*	Land Use	Project Size That Will Exceed ROC or NOx Significance Threshold
210	Single Family Detached Housing	158 dwelling units
211	Low-Rise Apartment	224 dwelling units
230	Condominium/Townhouse, General	244 dwelling units
270	Residential Planned Unit Development	252 dwelling units
---	Nursing Home	377 dwelling units
565	Day-Care Center	40,150 sq. ft.
831	Quality Restaurant	38,850 sq. ft.
832	High Turnover (Sit-Down) Restaurant	24,600 sq. ft.
833	Fast-food Restaurant without Drive-through Window	4,510 sq. ft.
834	Fast-food Restaurant with Drive-through Window	6,510 sq. ft.
863	Electronics Superstore	71,900 sq. ft.
862	Home Improvement Superstore	92,050 sq. ft.
---	Strip Mall	80,560 sq. ft.
816	Hardware/Paint Store	63,250 sq. ft.
850	Supermarket	29,500 sq. ft.
851	Convenience Market (Open 24 hours)	4,500 sq. ft.
853	Convenience Market with Gasoline Pumps	3,930 sq. ft.
844	Service Station	20 fueling positions
710	General Office Building	214,700 sq. ft.
750	Office Park	172,600 sq. ft.
720	Medical Office Building	81,250 sq. ft.
110	General Light Industrial	309,600 sq. ft.
130	Industrial Park	320,600 sq. ft.

* Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991, and 1995 Update, and Sixth Edition, 1997.

Analysis Year: 2009
Significance Threshold: 5 lbs/day

Code*	Land Use	Project Size That Will Exceed ROC or NOx Significance Threshold
210	Single Family Detached Housing	28 dwelling units
211	Low-Rise Apartment	23 dwelling units
230	Condominium/Townhouse, General	43 dwelling units
270	Residential Planned Unit Development	46 dwelling units
---	Nursing Home	75 dwelling units
565	Day-Care Center	8,020 sq. ft.
831	Quality Restaurant	6,500 sq. ft.
832	High Turnover (Sit-Down) Restaurant	4,910 sq. ft.
833	Fast-food Restaurant without Drive-through Window	910 sq. ft.
834	Fast-food Restaurant with Drive-through Window	1,300 sq. ft.
863	Electronics Superstore	14,350 sq. ft.
862	Home Improvement Superstore	23,240 sq. ft.
---	Strip Mall	16,090 sq. ft.
816	Hardware/Paint Store	12,630 sq. ft.
850	Supermarket	5,900 sq. ft.
851	Convenience Market (Open 24 hours)	900 sq. ft.
853	Convenience Market with Gasoline Pumps	785 sq. ft.
844	Service Station	4 fueling positions
710	General Office Building	27,150 sq. ft.
750	Office Park	14,700 sq. ft.
720	Medical Office Building	20,400 sq. ft.
110	General Light Industrial	64,900 sq. ft.
130	Industrial Park	12,400 sq. ft.

* Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991, and 1995 Update, and Sixth Edition, 1997.

APPENDIX F
PROJECT SCREEENING ANALYSIS TABLES

Analysis Year: 2010
Significance Threshold: 25 lbs/day

Code*	Land Use	Project Size That Will Exceed ROC or NOx Significance Threshold
210	Single Family Detached Housing	173 dwelling units
211	Low-Rise Apartment	236 dwelling units
230	Condominium/Townhouse, General	255 dwelling units
270	Residential Planned Unit Development	262 dwelling units
---	Nursing Home	383 dwelling units
565	Day-Care Center	43,900 sq. ft.
831	Quality Restaurant	42,900 sq. ft.
832	High Turnover (Sit-Down) Restaurant	26,900 sq. ft.
833	Fast-food Restaurant without Drive-through Window	4,950 sq. ft.
834	Fast-food Restaurant with Drive-through Window	7,120 sq. ft.
863	Electronics Superstore	78,500 sq. ft.
862	Home Improvement Superstore	99,900 sq. ft.
---	Strip Mall	88,000 sq. ft.
816	Hardware/Paint Store	69,100 sq. ft.
850	Supermarket	32,250 sq. ft.
851	Convenience Market (Open 24 hours)	4,930 sq. ft.
853	Convenience Market with Gasoline Pumps	4,300 sq. ft.
844	Service Station	22 fueling positions
710	General Office Building	239,600 sq. ft.
750	Office Park	191,700 sq. ft.
720	Medical Office Building	88,300 sq. ft.
110	General Light Industrial	338,000 sq. ft.
130	Industrial Park	366,500 sq. ft.

* Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991, and 1995 Update, and Sixth Edition, 1997.

Analysis Year: 2010
Significance Threshold: 5 lbs/day

Code*	Land Use	Project Size That Will Exceed ROC or NOx Significance Threshold
210	Single Family Detached Housing	31 dwelling units
211	Low-Rise Apartment	25 dwelling units
230	Condominium/Townhouse, General	45 dwelling units
270	Residential Planned Unit Development	48 dwelling units
---	Nursing Home	76 dwelling units
565	Day-Care Center	8,770 sq. ft.
831	Quality Restaurant	7,200 sq. ft.
832	High Turnover (Sit-Down) Restaurant	5,370 sq. ft.
833	Fast-food Restaurant without Drive-through Window	990 sq. ft.
834	Fast-food Restaurant with Drive-through Window	1,430 sq. ft.
863	Electronics Superstore	15,700 sq. ft.
862	Home Improvement Superstore	24,820 sq. ft.
---	Strip Mall	17,600 sq. ft.
816	Hardware/Paint Store	13,800 sq. ft.
850	Supermarket	6,450 sq. ft.
851	Convenience Market (Open 24 hours)	990 sq. ft.
853	Convenience Market with Gasoline Pumps	860 sq. ft.
844	Service Station	5 fueling positions
710	General Office Building	30,400 sq. ft.
750	Office Park	16,100 sq. ft.
720	Medical Office Building	21,800 sq. ft.
110	General Light Industrial	70,000 sq. ft.
130	Industrial Park	13,600 sq. ft.

* Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991, and 1995 Update, and Sixth Edition, 1997.

APPENDIX F
PROJECT SCREEENING ANALYSIS TABLES

Analysis Year: 2015
Significance Threshold: 25 lbs/day

Code*	Land Use	Project Size That Will Exceed ROC or NOx Significance Threshold
210	Single Family Detached Housing	247 dwelling units
211	Low-Rise Apartment	294 dwelling units
230	Condominium/Townhouse, General	310 dwelling units
270	Residential Planned Unit Development	308 dwelling units
---	Nursing Home	410 dwelling units
565	Day-Care Center	71,500 sq. ft.
831	Quality Restaurant	73,700 sq. ft.
832	High Turnover (Sit-Down) Restaurant	44,000 sq. ft.
833	Fast-food Restaurant without Drive-through Window	8,150 sq. ft.
834	Fast-food Restaurant with Drive-through Window	11,700 sq. ft.
863	Electronics Superstore	126,700 sq. ft.
862	Home Improvement Superstore	156,800 sq. ft.
---	Strip Mall	141,600 sq. ft.
816	Hardware/Paint Store	111,800 sq. ft.
850	Supermarket	52,700sq. ft.
851	Convenience Market (Open 24 hours)	8,100 sq. ft.
853	Convenience Market with Gasoline Pumps	7,070 sq. ft.
844	Service Station	36 fueling positions
710	General Office Building	429,000 sq. ft.
750	Office Park	328,500 sq. ft.
720	Medical Office Building	140,100 sq. ft.
110	General Light Industrial	551,000 sq. ft.
130	Industrial Park	704,000 sq. ft.

* Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991, and 1995 Update, and Sixth Edition, 1997.

Analysis Year: 2015
Significance Threshold: 5 lbs/day

Code*	Land Use	Project Size That Will Exceed ROC or NOx Significance Threshold
210	Single Family Detached Housing	47 dwelling units
211	Low-Rise Apartment	40 dwelling units
230	Condominium/Townhouse, General	56 dwelling units
270	Residential Planned Unit Development	57 dwelling units
---	Nursing Home	81 dwelling units
565	Day-Care Center	14,300 sq. ft.
831	Quality Restaurant	12,400 sq. ft.
832	High Turnover (Sit-Down) Restaurant	8,780 sq. ft.
833	Fast-food Restaurant without Drive-through Window	1,650 sq. ft.
834	Fast-food Restaurant with Drive-through Window	2,340 sq. ft.
863	Electronics Superstore	25,300 sq. ft.
862	Home Improvement Superstore	36,100 sq. ft.
---	Strip Mall	28,300 sq. ft.
816	Hardware/Paint Store	22,350 sq. ft.
850	Supermarket	10,600 sq. ft.
851	Convenience Market (Open 24 hours)	1,620 sq. ft.
853	Convenience Market with Gasoline Pumps	1,420 sq. ft.
844	Service Station	8 fueling positions
710	General Office Building	55,800 sq. ft.
750	Office Park	37,200 sq. ft.
720	Medical Office Building	32,100 sq. ft.
110	General Light Industrial	106,600 sq. ft.
130	Industrial Park	22,500 sq. ft.

* Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991, and 1995 Update, and Sixth Edition, 1997.

APPENDIX F
PROJECT SCREEENING ANALYSIS TABLES

Analysis Year: 2020
Significance Threshold: 25 lbs/day

Code*	Land Use	Project Size That Will Exceed ROC or NOx Significance Threshold
210	Single Family Detached Housing	284 dwelling units
211	Low-Rise Apartment	331 dwelling units
230	Condominium/Townhouse, General	345 dwelling units
270	Residential Planned Unit Development	339 dwelling units
---	Nursing Home	428 dwelling units
565	Day-Care Center	103,200 sq. ft.
831	Quality Restaurant	110,500 sq. ft.
832	High Turnover (Sit-Down) Restaurant	63,770 sq. ft.
833	Fast-food Restaurant without Drive-through Window	11,850 sq. ft.
834	Fast-food Restaurant with Drive-through Window	17,100 sq. ft.
863	Electronics Superstore	181,000 sq. ft.
862	Home Improvement Superstore	220,500 sq. ft.
---	Strip Mall	202,000 sq. ft.
816	Hardware/Paint Store	160,200 sq. ft.
850	Supermarket	76, 300sq. ft.
851	Convenience Market (Open 24 hours)	11,820 sq. ft.
853	Convenience Market with Gasoline Pumps	10,320 sq. ft.
844	Service Station	52 fueling positions
710	General Office Building	644,000 sq. ft.
750	Office Park	475,000 sq. ft.
720	Medical Office Building	199,100 sq. ft.
110	General Light Industrial	798,000 sq. ft.
130	Industrial Park	1,099,000 sq. ft.

* Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991, and 1995 Update, and Sixth Edition, 1997.

Analysis Year: 2020
Significance Threshold: 5 lbs/day

Code*	Land Use	Project Size That Will Exceed ROC or NOx Significance Threshold
210	Single Family Detached Housing	54 dwelling units
211	Low-Rise Apartment	51 dwelling units
230	Condominium/Townhouse, General	64 dwelling units
270	Residential Planned Unit Development	64 dwelling units
---	Nursing Home	85 dwelling units
565	Day-Care Center	20,600 sq. ft.
831	Quality Restaurant	18,600 sq. ft.
832	High Turnover (Sit-Down) Restaurant	12,750 sq. ft.
833	Fast-food Restaurant without Drive-through Window	2,370 sq. ft.
834	Fast-food Restaurant with Drive-through Window	3,410 sq. ft.
863	Electronics Superstore	36,200 sq. ft.
862	Home Improvement Superstore	48,700 sq. ft.
---	Strip Mall	40,300 sq. ft.
816	Hardware/Paint Store	32,000 sq. ft.
850	Supermarket	15,220 sq. ft.
851	Convenience Market (Open 24 hours)	2,360 sq. ft.
853	Convenience Market with Gasoline Pumps	2,060 sq. ft.
844	Service Station	11 fueling positions
710	General Office Building	86,200 sq. ft.
750	Office Park	67,700 sq. ft.
720	Medical Office Building	43,800 sq. ft.
110	General Light Industrial	149,500 sq. ft.
130	Industrial Park	65,400 sq. ft.

* Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991, and 1995 Update, and Sixth Edition, 1997.

APPENDIX F
PROJECT SCREEENING ANALYSIS TABLES

Analysis Year: 2025
Significance Threshold: 25 lbs/day

Code*	Land Use	Project Size That Will Exceed ROC or NOx Significance Threshold
210	Single Family Detached Housing	322 dwelling units
211	Low-Rise Apartment	367 dwelling units
230	Condominium/Townhouse, General	378 dwelling units
270	Residential Planned Unit Development	369 dwelling units
---	Nursing Home	445 dwelling units
565	Day-Care Center	150,000 sq. ft.
831	Quality Restaurant	166,600 sq. ft.
832	High Turnover (Sit-Down) Restaurant	93,400 sq. ft.
833	Fast-food Restaurant without Drive-through Window	17,520 sq. ft.
834	Fast-food Restaurant with Drive-through Window	25,200 sq. ft.
863	Electronics Superstore	259,400 sq. ft.
862	Home Improvement Superstore	311,400 sq. ft.
---	Strip Mall	288,200 sq. ft.
816	Hardware/Paint Store	230,400 sq. ft.
850	Supermarket	111,400 sq. ft.
851	Convenience Market (Open 24 hours)	17,500 sq. ft.
853	Convenience Market with Gasoline Pumps	15,260 sq. ft.
844	Service Station	77 fueling positions
710	General Office Building	944,500 sq. ft.
750	Office Park	677,000 sq. ft.
720	Medical Office Building	285,500 sq. ft.
110	General Light Industrial	1,180,000 sq. ft.
130	Industrial Park	1,705,000 sq. ft.

* Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991, and 1995 Update, and Sixth Edition, 1997.

Analysis Year: 2025
Significance Threshold: 5 lbs/day

Code*	Land Use	Project Size That Will Exceed ROC or NOx Significance Threshold
210	Single Family Detached Housing	62 dwelling units
211	Low-Rise Apartment	61 dwelling units
230	Condominium/Townhouse, General	71 dwelling units
270	Residential Planned Unit Development	70 dwelling units
---	Nursing Home	88 dwelling units
565	Day-Care Center	30,000 sq. ft.
831	Quality Restaurant	28,200 sq. ft.
832	High Turnover (Sit-Down) Restaurant	18,640 sq. ft.
833	Fast-food Restaurant without Drive-through Window	3,500 sq. ft.
834	Fast-food Restaurant with Drive-through Window	5,040 sq. ft.
863	Electronics Superstore	51,800 sq. ft.
862	Home Improvement Superstore	66,700 sq. ft.
---	Strip Mall	57,600 sq. ft.
816	Hardware/Paint Store	46,000 sq. ft.
850	Supermarket	22,250 sq. ft.
851	Convenience Market (Open 24 hours)	3,490 sq. ft.
853	Convenience Market with Gasoline Pumps	3,050 sq. ft.
844	Service Station	16 fueling positions
710	General Office Building	131,500 sq. ft.
750	Office Park	110,000 sq. ft.
720	Medical Office Building	61,000 sq. ft.
110	General Light Industrial	215,500 sq. ft.
130	Industrial Park	170,100 sq. ft.

* Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991, and 1995 Update, and Sixth Edition, 1997.

APPENDIX F
PROJECT SCREEENING ANALYSIS TABLES

Analysis Year: 2030
Significance Threshold: 25 lbs/day

Code*	Land Use	Project Size That Will Exceed ROC or NOx Significance Threshold
210	Single Family Detached Housing	343 dwelling units
211	Low-Rise Apartment	386 dwelling units
230	Condominium/Townhouse, General	397 dwelling units
270	Residential Planned Unit Development	388 dwelling units
---	Nursing Home	457 dwelling units
565	Day-Care Center	193,100 sq. ft.
831	Quality Restaurant	219,700 sq. ft.
832	High Turnover (Sit-Down) Restaurant	121,100 sq. ft.
833	Fast-food Restaurant without Drive-through Window	23,000 sq. ft.
834	Fast-food Restaurant with Drive-through Window	33,000 sq. ft.
863	Electronics Superstore	329,700 sq. ft.
862	Home Improvement Superstore	392,000 sq. ft.
---	Strip Mall	365,000 sq. ft.
816	Hardware/Paint Store	293,800 sq. ft.
850	Supermarket	144,000 sq. ft.
851	Convenience Market (Open 24 hours)	22,900 sq. ft.
853	Convenience Market with Gasoline Pumps	20,000 sq. ft.
844	Service Station	101 fueling positions
710	General Office Building	1,193,000 sq. ft.
750	Office Park	850,000 sq. ft.
720	Medical Office Building	364,500 sq. ft.
110	General Light Industrial	1,547,000 sq. ft.
130	Industrial Park	2,290,000 sq. ft.

* Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991, and 1995 Update, and Sixth Edition, 1997.

Analysis Year: 2030
Significance Threshold: 5 lbs/day

Code*	Land Use	Project Size That Will Exceed ROC or NOx Significance Threshold
210	Single Family Detached Housing	66 dwelling units
211	Low-Rise Apartment	66 dwelling units
230	Condominium/Townhouse, General	75 dwelling units
270	Residential Planned Unit Development	74 dwelling units
---	Nursing Home	90 dwelling units
565	Day-Care Center	38,600 sq. ft.
831	Quality Restaurant	37,300 sq. ft.
832	High Turnover (Sit-Down) Restaurant	24,200 sq. ft.
833	Fast-food Restaurant without Drive-through Window	4,580 sq. ft.
834	Fast-food Restaurant with Drive-through Window	6,600 sq. ft.
863	Electronics Superstore	65,900 sq. ft.
862	Home Improvement Superstore	82,600 sq. ft.
---	Strip Mall	72,900 sq. ft.
816	Hardware/Paint Store	58,700 sq. ft.
850	Supermarket	28,800 sq. ft.
851	Convenience Market (Open 24 hours)	4,600 sq. ft.
853	Convenience Market with Gasoline Pumps	3,990 sq. ft.
844	Service Station	21 fueling positions
710	General Office Building	172,000 sq. ft.
750	Office Park	146,000 sq. ft.
720	Medical Office Building	76,600 sq. ft.
110	General Light Industrial	279,000 sq. ft.
130	Industrial Park	271,500 sq. ft.

* Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991, and 1995 Update, and Sixth Edition, 1997.

APPENDIX F
PROJECT SCREEENING ANALYSIS TABLES

Analysis Year: 2035
Significance Threshold: 25 lbs/day

Code*	Land Use	Project Size That Will Exceed ROC or NOx Significance Threshold
210	Single Family Detached Housing	351 dwelling units
211	Low-Rise Apartment	395 dwelling units
230	Condominium/Townhouse, General	405 dwelling units
270	Residential Planned Unit Development	399 dwelling units
---	Nursing Home	465 dwelling units
565	Day-Care Center	226,700 sq. ft.
831	Quality Restaurant	261,600 sq. ft.
832	High Turnover (Sit-Down) Restaurant	142,900 sq. ft.
833	Fast-food Restaurant without Drive-through Window	27,300 sq. ft.
834	Fast-food Restaurant with Drive-through Window	39,200 sq. ft.
863	Electronics Superstore	383,100 sq. ft.
862	Home Improvement Superstore	452,800 sq. ft.
---	Strip Mall	423,200 sq. ft.
816	Hardware/Paint Store	342,300 sq. ft.
850	Supermarket	169,600 sq. ft.
851	Convenience Market (Open 24 hours)	27,200 sq. ft.
853	Convenience Market with Gasoline Pumps	23,800 sq. ft.
844	Service Station	121 fueling positions
710	General Office Building	1,369,000 sq. ft.
750	Office Park	976,000 sq. ft.
720	Medical Office Building	425,200 sq. ft.
110	General Light Industrial	1,844,500 sq. ft.
130	Industrial Park	2,565,000 sq. ft.

* Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991, and 1995 Update, and Sixth Edition, 1997.

Analysis Year: 2035
Significance Threshold: 5 lbs/day

Code*	Land Use	Project Size That Will Exceed ROC or NOx Significance Threshold
210	Single Family Detached Housing	68 dwelling units
211	Low-Rise Apartment	68 dwelling units
230	Condominium/Townhouse, General	77 dwelling units
270	Residential Planned Unit Development	77 dwelling units
---	Nursing Home	92 dwelling units
565	Day-Care Center	45,300 sq. ft.
831	Quality Restaurant	44,500 sq. ft.
832	High Turnover (Sit-Down) Restaurant	28,600 sq. ft.
833	Fast-food Restaurant without Drive-through Window	5,440 sq. ft.
834	Fast-food Restaurant with Drive-through Window	7,820 sq. ft.
863	Electronics Superstore	76,500 sq. ft.
862	Home Improvement Superstore	94,700 sq. ft.
---	Strip Mall	84,500 sq. ft.
816	Hardware/Paint Store	68,400 sq. ft.
850	Supermarket	33,900 sq. ft.
851	Convenience Market (Open 24 hours)	5,420 sq. ft.
853	Convenience Market with Gasoline Pumps	4,740 sq. ft.
844	Service Station	24 fueling positions
710	General Office Building	201,700 sq. ft.
750	Office Park	172,000 sq. ft.
720	Medical Office Building	88,600 sq. ft.
110	General Light Industrial	330,500 sq. ft.
130	Industrial Park	353,000 sq. ft.

* Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991, and 1995 Update, and Sixth Edition, 1997.

APPENDIX F
PROJECT SCREEENING ANALYSIS TABLES

Analysis Year: 2040
Significance Threshold: 25 lbs/day

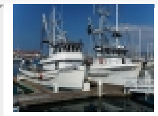
Code*	Land Use	Project Size That Will Exceed ROC or NOx Significance Threshold
210	Single Family Detached Housing	351 dwelling units
211	Low-Rise Apartment	395 dwelling units
230	Condominium/Townhouse, General	406 dwelling units
270	Residential Planned Unit Development	401 dwelling units
---	Nursing Home	467 dwelling units
565	Day-Care Center	250,600 sq. ft.
831	Quality Restaurant	291,500 sq. ft.
832	High Turnover (Sit-Down) Restaurant	158,500 sq. ft.
833	Fast-food Restaurant without Drive-through Window	29,400 sq. ft.
834	Fast-food Restaurant with Drive-through Window	42,400 sq. ft.
863	Electronics Superstore	420,500 sq. ft.
862	Home Improvement Superstore	494,900 sq. ft.
---	Strip Mall	463,700 sq. ft.
816	Hardware/Paint Store	376,500 sq. ft.
850	Supermarket	190,000 sq. ft.
851	Convenience Market (Open 24 hours)	29,150 sq. ft.
853	Convenience Market with Gasoline Pumps	25,450 sq. ft.
844	Service Station	127 fueling positions
710	General Office Building	1,483,400 sq. ft.
750	Office Park	1,061,000 sq. ft.
720	Medical Office Building	468,500 sq. ft.
110	General Light Industrial	1,877,000 sq. ft.
130	Industrial Park	2,630,000 sq. ft.

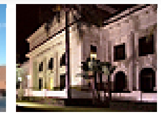
* Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991, and 1995 Update, and Sixth Edition, 1997.

Analysis Year: 2040
Significance Threshold: 5 lbs/day

Code*	Land Use	Project Size That Will Exceed ROC or NOx Significance Threshold
210	Single Family Detached Housing	68 dwelling units
211	Low-Rise Apartment	68 dwelling units
230	Condominium/Townhouse, General	77 dwelling units
270	Residential Planned Unit Development	77 dwelling units
---	Nursing Home	93 dwelling units
565	Day-Care Center	50,100 sq. ft.
831	Quality Restaurant	49,700 sq. ft.
832	High Turnover (Sit-Down) Restaurant	31,500 sq. ft.
833	Fast-food Restaurant without Drive-through Window	5,800 sq. ft.
834	Fast-food Restaurant with Drive-through Window	8,350 sq. ft.
863	Electronics Superstore	84,100 sq. ft.
862	Home Improvement Superstore	103,000 sq. ft.
---	Strip Mall	92,600 sq. ft.
816	Hardware/Paint Store	75,200 sq. ft.
850	Supermarket	37,500 sq. ft.
851	Convenience Market (Open 24 hours)	5,750 sq. ft.
853	Convenience Market with Gasoline Pumps	5,290 sq. ft.
844	Service Station	27 fueling positions
710	General Office Building	288,500 sq. ft.
750	Office Park	189,500 sq. ft.
720	Medical Office Building	97,200 sq. ft.
110	General Light Industrial	368,000 sq. ft.
130	Industrial Park	414,000 sq. ft.

* Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991, and 1995 Update, and Sixth Edition, 1997.





Air Quality Assessment for CEQA

The District's Planning and Evaluation Division assists project applicants and lead agencies to prepare environmental documents under the California Environmental Quality Act (CEQA) by providing air quality data and other needed information. Staff also reviews and comments on air quality sections of environmental documents. We also occasionally prepare air quality sections of environmental documents. District staff is available for consultation at any time in the project review process.

What is CEQA?

CEQA provides governmental decisionmakers and the public with information about the potential, significant environmental effects of proposed projects. Projects are classified as either discretionary or ministerial.

CEQA applies to all discretionary activities proposed to be carried out or approved by California public agencies, unless an exemption applies. When a public official in a governmental agency can use its judgment in deciding whether and how to carry out or approve a project, it is a discretionary project. If the public official of the governmental agency merely applies the law to the facts as presented, but uses little or no personal judgment, the project is ministerial, and exempt from CEQA.

The goals of CEQA are for California's public agencies to identify the significant environmental effects of their actions; and, either avoid those significant environmental effects, where feasible; or mitigate those significant environmental effects, where feasible. By identifying and discussing all significant impacts, CEQA allows the project applicant to change the project to mitigate adverse effects; lead agencies to be provided the information necessary to impose conditions on the project to mitigate adverse effects; the public access to information about the effects of projects; and policy boards to receive important information for determining whether the project "protects the public health, safety and welfare."

The California Environmental Quality Act statute and guidelines are available from the California Natural Resources website at: http://resources.ca.gov/ceqa/.

What are the Ventura County Air Quality Assessment Guidelines?

The Ventura County Air Quality Assessment Guideline (Guidelines) is an advisory document prepared by the District that provides lead agencies, consultants, and project applicants with a framework and uniform methods for preparing air quality impact assessments and the air quality section of environmental documents for projects that require discretionary entitlements.

Pursuant to CEQA, the Guidelines recommend specific criteria and threshold levels for determining whether a proposed project may have a significant adverse air quality impact. The Guidelines also provide mitigation measures that may be useful for mitigating the air quality impacts of proposed projects.

The District Guidelines document is available at:
http://www.vcapcd.org/pubs/Planning/VCAQGuidelines.pdf

What is CalEEMod?

CalEEMod (short for California Emissions Estimator Model) is a statewide computer emissions estimating model first released in February 2011. CalEEMod calculates criteria pollutant and greenhouse gas emissions from a variety of land uses, including residential and commercial projects. An estimate of project emissions can be accomplished with just a few inputs from the user.

The model quantifies direct emissions from construction and operation (including vehicle use), as well as indirect emissions, such as energy use, solid waste disposal, vegetation planting and/or removal, and water use. Further, the model identifies mitigation measures to reduce criteria pollutant and GHG emissions along with calculating the benefits achieved from measures chosen by the user. The GHG mitigation measures were developed and adopted by the California Air Pollution Control Officers Association (CAPCOA). District staff recommends use of the latest version of CalEEMod for estimating emissions from proposed land use development projects.

The latest version of CalEEMod is available at: http://www.caleemod.com.

What about greenhouse gases and CEQA?

As a result of revisions to the CEQA Guidelines that became effective in March 2010, lead agencies are obligated to determine whether a project’s GHG emissions significantly affect the environment and to impose feasible mitigation to eliminate or substantially lessen any such significant effects.

Guideline documents for quantifying and mitigating greenhouse gas emissions under CEQA are available from the California Air Pollution Control Officers Association website at: http://www.capcoa.org/documents/

2022 VENTURA COUNTY AIR QUALITY MANAGEMENT PLAN

Scheduled to be presented to the Ventura County Air Pollution Control Board

December 13, 2022

VENTURA COUNTY AIR POLLUTION CONTROL DISTRICT

The following Ventura County Air Pollution Control District staff contributed to this plan:

Victor Briones, Air Quality Specialist

Stephanie Lapeyre-Montrose, Air Quality Specialist

Danny McQuillan, Air Quality Engineer

Nicole Collazo, Air Quality Specialist

Phil Moyal, Air Quality Specialist

Alan Ballard, Air Quality Specialist

Ben Cacatian, Air Quality Specialist

Sam Michie, Supervising Air Quality Instrument Technician

John Henkelman, Supervising Air Quality Engineer

Tyler Harris, Planning, Rules, and Incentives Manager

Ali Ghasemi, Executive Officer

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Acronyms List

µg/m3	micrograms per cubic meter
AB	Assembly Bill
APCB	Air Pollution Control Board
APCD	Air Pollution Control District
APCO	Air Pollution Control Officer
AQMD	Air Quality Management District
AQMP	Air Quality Management Plan
ATCM	Air Toxic Control Measure
BACT	Best Available Control Technology
BARCT	Best Available Retrofit Control Technology
BMP	Best Management Practices
BTU	British thermal units
CAA	Clean Air Act
CAAA	federal Clean Air Act Amendments
CAF	Clean Air Fund
Caltrans	California Department of Transportation
CAP	Community Air Protection
CARB	California Air Resources Board
CCAA	California Clean Air Act
CE	Control Efficiency
CEFS	California Emissions Forecasting System
CEIDARS	California Emission Inventory Development and Reporting System
CEPAM	California Emission Projection Analysis Model
CEQA	California Environmental Quality Act
CF	Control Factor
CFR	Code of Federal Regulations
CH&SC	California Health and Safety Code
CNG	Compressed Natural Gas
CO	Carbon Monoxide
CTG	Control Technique Guidelines
CURB	City Urban Restriction Boundary
District	Ventura County Air Pollution Control District
DMV	California Department of Motor Vehicles
EIC	Emissions Inventory Code
EITAC	Emissions Inventory Technical Advisory Committee
EMFAC	EMission FACtors on-road vehicles model
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPP	Early Progress Plan
ERC	Emission Reduction Credit

FAA	Federal Aviation Administration
FARMER	Funding Agricultural Replacement Measures for Emissions Reductions
FAST Act	Fixing America's Surface Transportation Act
FHWA	Federal Highway Administration
FIP	Federal Implementation Plan
FR	Federal Register
FTA	Federal Transit Administration
FTIP	Federal Transportation Improvement Program
GF	Growth Factor
GHG	Greenhouse Gas
IF	Implementation Factor
ITS	Intelligent Transportation Systems
LAER	Lowest Achievable Emission Rate
LAFCo	Local Agency Formation Commission
LCFS	Low Carbon Fuel Standard
LPG	Liquefied Propane Gas
m	meters
MM	million
NAA	Nonattainment Area
NAAQS	National Ambient Air Quality Standards
NBVC	Naval Base Ventura County
NEI	National Emissions Inventory
ng/j	nanograms per joule
NH3	Ammonia
NO2	Nitrogen Dioxide
NOx	Nitrogen Oxides
NSR	New Source Review
O3	Ozone
OCS	Outer Continental Shelf
OGV	Ocean-Going Vessel
PM	Particulate Matter
PM10	Particulate Matter less than 10 micrometers in diameter (coarse particulate matter)
PM2.5	Particulate Matter less than 2.5 micrometers in diameter (fine particulate matter)
ppb	parts per billion
ppm	parts per million
PSD	Prevention of Significant Deterioration
QA	Quality Assurance
QC	Quality Control
RACM	Reasonably Available Control Measures
RACT	Reasonably Available Control Technology

REMI	Regional Economic Models, Inc.
RFP	Reasonable Further Progress
ROC	Reactive Organic Compounds
ROG	Reactive Organic Gases
RTP	Regional Transportation Plan
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCCAB	South Central Coast Air Basin
SCRAM	Support Center for Regulatory Air Models
SCS	Sustainable Communities Strategy
SIP	State Implementation Plan
SO2	Sulfur Dioxide
SOAR	Save Open Space and Agricultural Resources
State Strategy	CARB's 2022 State Implementation Plan
TCM	Transportation Control Measure
TDM	Transportation Demand Management
TOC	Total Organic Compounds
TOG	Total Organic Gases
tpd	tons per day
VC	Ventura County
VCTC	Ventura County Transportation Commission
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds
VNRM	Voluntary NOx Remediation Measure
VSR	Vessel Speed Reduction
WOE	Weight of Evidence

EXECUTIVE SUMMARY

Purpose

The mission of the Ventura County Air Pollution Control District (APCD or District) is to protect public health and agriculture from the adverse effects of air pollution by identifying air pollution problems and developing a comprehensive program to achieve and maintain state and federal air quality standards. To that end, pursuant to the federal Clean Air Act Amendments (CAAA) of 1990, the 2022 Ventura County Air Quality Management Plan (AQMP) presents Ventura County's: 1) strategy to attain the 2015 federal 8-hour ozone standard; 2) attainment demonstration for the federal 8-hour ozone standard; and, 3) reasonable further progress demonstration for the federal 8-hour ozone standard. Ventura County's air quality has come a long way since the District was first created in 1968. However, the District recognizes there is more work to do to alleviate the detrimental health effects of air pollution. This AQMP will strive to pave a path forward to ensure clean air for all its residents.

Background

The CAAA established clean air plan requirements for areas that exceed the National Ambient Air Quality Standards (NAAQS). These areas, called nonattainment areas, must develop and implement clean air plans to attain the NAAQS by specified dates. Clean air plans, also called Air Quality Management Plans, Nonattainment Plans, or State Implementation Plans (SIP), describe how an area, such as Ventura County, will attain the NAAQS.

Each state is responsible for implementing the CAAA within its jurisdiction. California state law designates the California Air Resources Board (CARB) as California's lead agency for all purposes set forth in the CAAA, including preparation of the California SIP. State law further specifies that the CARB must adopt clean air plans approved by local air districts, unless the CARB finds, after a public hearing, that a local clean air plan will not meet the requirements of the CAAA. CARB must submit SIPs and SIP revisions to the U.S. Environmental Protection Agency (EPA) for approval. The provisions and commitments in SIPs are federally enforceable.

On October 1, 2015, EPA strengthened its NAAQS for ground-level ozone, the principal component of photochemical smog, to improve public health protection. EPA revised the 8-hour "primary" ozone standard, designed to protect public health, to a level of 70 parts per billion (ppb). The previous standard, set in 2008, was 75 ppb. EPA also strengthened the secondary 8-hour ozone standard to 70 ppb making it identical to the revised primary standard. Secondary standards provide public welfare protection, including protection against decreased atmospheric visibility and damage to animals, crops, vegetation, and buildings. Current ozone air quality concentrations in many areas of the country – including some areas that meet the 2008 ozone standards – are still high enough to harm sensitive vegetation, including agricultural crops and ecosystems.

Attainment Strategy

Building on previous Ventura County AQMPs, the 2022 AQMP presents a combined local and state clean air strategy based on concurrent reactive organic gases (ROG) and nitrogen oxides (NOx) emission reductions to bring Ventura County into attainment of the 2015 federal 8-hour ozone standard. ROG and NOx emitted by both anthropogenic and natural sources react in the atmosphere with sunlight to produce photochemical smog. Ventura County was the first area in the nation to institute such a dual-emissions strategy for meeting ozone standards.

The 2022 AQMP control strategy consists of a local component implemented by the APCD and a combined state and federal component implemented by the CARB and EPA. The local strategy includes emission control measures carried forward from previous Ventura County clean air plans plus new and further study emission control measures. It also includes a transportation conformity budget that sets the maximum amount of on-road motor vehicle emissions produced while continuing to demonstrate progress towards attainment.

The new control measures are proposed new rules and revisions to existing Ventura County APCD rules that District staff has found practicable for Ventura County. The further study measures are proposals that may help Ventura County achieve the federal and state ozone standards but need additional air quality, feasibility, and environmental scrutiny before District staff can recommend them for adoption as District rules. They will become District rules and be implemented only if the District's governing board finds them to be practicable and appropriate for Ventura County. Both the new control measures and those further study measures recommended for adoption by District staff will also serve to meet the "every feasible measure" requirement of the California Clean Air Act.

Several of the local control measures from the 2016 AQMP are not in the 2022 AQMP. In each case, District staff determined that the measure is either obsolete or infeasible for Ventura County based on technological or economic considerations. Additionally, no control measures from previous AQMPs were deleted from the 2022 AQMP if deletion would slow the county's progress towards attaining either the federal 8-hour ozone standard or the state ozone standards.

The 2022 AQMP includes a new transportation conformity budget for Ventura County. Transportation Conformity is a federal Clean Air Act (CAA) regulatory process that coordinates air quality planning and transportation planning to help ensure that highway and transit projects will not cause new air quality violations, worsen existing violations, or delay timely attainment of the NAAQS. Once the 2022 AQMP's conformity budget is found adequate by EPA, it will replace the Early Progress Plan conformity budget and serve as the transportation conformity budget for future transportation conformity decisions in Ventura County. The 2022 AQMP transportation conformity budget for ROG and NOx is shown in Table 3-5.

Ventura County's strategy for attaining the 2015 federal 70 ppb ozone standard also relies on CARB's 2022 State Implementation Plan (SIP), also known as the State SIP Strategy. The 2022

State SIP Strategy includes measures and commitments to reduce emissions from State-regulated sources (mobile sources, consumer products, and pesticides) to support attainment of the 70-ppb standard in all nonattainment areas across California. The 2022 SIP is a comprehensive and far-reaching set of emission reduction programs designed to support and complement local efforts to meet the latest federal clean air standards for ozone and fine particulate matter ($PM_{2.5}$). CARB has released its Draft 2022 State SIP Strategy for public review, ending on March 4, 2022. The 2022 State SIP Strategy was adopted by CARB September 22, 2022. The 2022 State Strategy and supporting documentation are available on CARB's website at https://ww2.arb.ca.gov/resources/documents/2022-state-strategy-state-implementation-plan-2022-state-sip-strategy.

Ventura County's overall control strategy to attain the 2015 federal 8-hour ozone standard is presented in Section 3 and Appendices B, C, D, E, F, and G.

Attainment Demonstration

Photochemical modeling, which includes the photochemical modeling protocol, the photochemical modeling performance analysis, the unmonitored area analysis, as well as supporting analyses completed as part of the supplemental Weight of Evidence (WOE) evaluation, indicates that Ventura County can expect to attain the 2015 federal 8-hour ozone standard by 2027, the attainment date for serious ozone nonattainment areas. The attainment demonstration for the 2022 AQMP is presented in Section 5, *Attainment Demonstration*, and Appendices H, I, J, and K.

Reasonable Further Progress Demonstration

In addition to showing attainment of the federal 8-hour ozone standard by 2027, the 2022 AQMP also must show steady progress towards attaining the 2015 federal 8-hour ozone standard by that date. Such steady progress towards attainment is called reasonable further progress (RFP). EPA defines RFP as "annual incremental reductions in air pollutant emissions as reflected in a State Implementation Plan that EPA deems sufficient to provide for the attainment of the applicable national ambient air quality standards by the statutory deadline."

The RFP demonstration shows that Ventura County will meet RFP requirements for the serious area milestone years 2023, and 2026 (all required RFP emission reductions must be in place by the beginning of the 2027 ozone season).

Air Quality Improvement

Ventura County continues to make great progress towards meeting federal clean air standards for ozone by a steady decades-long decrease in countywide ozone levels. In 1990, Ventura County had 18 days over the now revoked federal 1-hour (120 ppb) ozone standard. However, by 2003 there were only two days over that standard, and none in 2004 and 2005. Consequently, on May 27, 2009, the EPA formally found that Ventura County had attained the federal 1-hour ozone standard by its applicable attainment date of November 15, 2005. Likewise, all areas of the county have enjoyed similar reductions in 8-hour ozone levels.

There were 70 days countywide over the 1997 federal 8-hour (80 ppb) ozone standard in 1990 but only eight in 2009, four in 2010, and two in 2011. On September 14, 2012, the EPA found that Ventura County had attained the 1997 federal ozone standard by its applicable attainment date of June 15, 2013. The EPA revoked the 1997 federal ozone standard effective April 6, 2015. Likewise, There were 117 days countywide over the 2008 federal 8-hour (0.075 ppm) ozone standard in 1990 but only two in 2019, fourteen (12 if exceptional events are excluded) in 2020, and one in 2021. On October 7, 2022, the EPA found that Ventura County had attained the 2008 federal ozone standard by its applicable attainment date of July 20, 2021.

Ventura County's air quality continues to improve towards the more stringent 2015 federal 8-hour (70 ppb) ozone standard. In 1990, the county exceeded that standard 138 times but only 22 times in 2020 and 9 times in 2021. These improvements have occurred despite a 25 percent increase in county population from 1990 through 2021 and should continue as local, state, and federal clean air programs continue to reduce air emissions responsible for ozone formation.

Important Partners

The District has not worked alone to improve Ventura County's air quality. We have benefited greatly from efforts of CARB, EPA, the South Coast Air Quality Management District and other California air districts, the Southern California Association of Governments, the County of Ventura and local cities, the Ventura County Transportation Commission, Ventura County Regional Energy Alliance, the Protecting Blue Whales and Blue Skies partnership, county businesses, regional non-profit organizations, and the public. We greatly appreciate their efforts on behalf of clean air in Ventura County and we look forward to these efforts continuing as we continue to work towards achieving the federal and state ozone standards.

SECTION 1. PURPOSE AND BACKGROUND

1.1. Purpose

The mission of the Ventura County Air Pollution Control District (APCD or District) is to protect public health and agriculture from the adverse effects of air pollution by identifying air pollution problems and developing a comprehensive program to achieve and maintain state and federal air quality standards. To that end, pursuant to the federal Clean Air Act Amendments of 1990 (CAAA), the 2022 Ventura County Air Quality Management Plan (AQMP) presents Ventura County's: 1) strategy to attain the 2015 federal 8-hour ozone standard; 2) attainment demonstration for the federal 8-hour ozone standard; and, 3) reasonable further progress demonstration for the federal 8-hour ozone standards. Ventura County's air quality has come a long way since the District was first created in 1968. However, the District recognizes there is more work to do to alleviate the detrimental health effects of air pollution. This AQMP will strive to pave a path forward to ensure clean air for all its residents.

1.2. Background

1.2.1. Health Effects of Air Pollution

Air pollution is hazardous to human health. The World Health Organization (WHO) estimates 4.2 million deaths occur every year as a result of exposure to ambient outdoor air pollution. CARB's air monitoring data indicates that over 90 percent of Californians breathe unhealthy levels of one or more air pollutants during some part of the year. Air pollution also diminishes the yield and quality of agricultural crops, reduces atmospheric visibility, degrades soils and materials, and damages native vegetation. Damage to agricultural crops from air pollution is an economic concern in Ventura County. According to the California Air Resources Board (CARB), several agricultural crops grown in Ventura County suffer from exposure to air pollution. A 1991 study concluded that ozone exposure in Ventura County caused a reduction in orange crop yield of 19 percent. As a result, federal and state ambient air quality standards are set to protect public health and welfare and minimize the effects of air pollution. These standards pertain to pollutants in ambient air – the air that people breathe outdoors. This plan focuses on one of those pollutants – ozone. Ventura County is designated a serious ozone nonattainment area for the 2015 federal ambient ozone standard.

Although the federal Clean Air Act (CAA) has significantly improved our nation's air quality, many areas still have serious air quality problems. Ozone, the main constituent of smog, is the most serious and widespread air pollution problem in the country. Ozone forms in the atmosphere by a series of chemical reactions and transformations involving Reactive Organic Gases (ROG) and Nitrogen Oxides (NOx) in the presence of sunlight. These "ozone precursor" pollutants come from a wide variety of sources such as gasoline vapors, fuel combustion, chemical solvents, and household products such as cleaners and paints.

Ozone is a pungent, pale blue, toxic gas consisting of three atoms of oxygen that can chemically burn and cause narrowing of airways, forcing the lungs and heart to work harder to provide oxygen to the body. A powerful oxidant, ozone is capable of destroying organic matter – including human lung and airway tissue. Ozone damages cells in the lungs, making the passages inflamed and swollen. Ozone also causes shortness of breath, nasal congestion, coughing, eye irritation, sore throat, headache, chest discomfort, breathing pain, throat dryness, wheezing, fatigue, and nausea. It can damage alveoli, the individual air sacs in the lungs where oxygen and carbon dioxide exchange occur. Ozone also has been associated with a decrease in resistance to infections.

People most affected by ozone include the young, elderly, and athletes. Ozone may pose the worst health threat to people who already suffer from respiratory diseases such as asthma, emphysema, and chronic bronchitis, and those with cardiovascular diseases. Ozone also damages agricultural crops, native vegetation, and various natural and manufactured materials.

1.2.2. Meteorology of Ventura County

California is divided into 15 air basins to regionally manage the state's air resources. An air basin generally has similar meteorological and geographic conditions throughout. Ventura County is in the South Central Coast Air Basin (SCCAB), along with Santa Barbara and San Luis Obispo Counties. Each county in the air basin has its own air pollution control agency. APCD is the air pollution control agency for Ventura County and, along with CARB, is charged by state law to protect the people and the environment of Ventura County from the harmful effects of air pollution.

The air above Ventura County often exhibits weak vertical and horizontal dispersion characteristics, which limit the dispersion of emissions and cause increased ambient air pollutant levels. Persistent temperature inversions prevent vertical dispersion. The inversions act as a "ceiling" that prevents pollutants from rising and dispersing. Mountain ranges act as "walls" that inhibit horizontal dispersion of air pollutants. The diurnal land/sea breeze pattern common in Ventura County recirculates air contaminants. Air pollutants are pushed toward the ocean during the early morning by the land breeze, and toward the east during the afternoon, by the sea breeze. This creates a "sloshing" effect, causing pollutants to remain in the area for several days. Residual emissions from previous days accumulate and chemically react with new emissions in the presence of sunlight, thereby increasing ambient air pollutant levels.

This pollutant "sloshing" effect happens most predominantly from May through October (smog season). Air temperatures are usually higher and sunlight more intense during the smog season. This explains why Ventura County experiences the most exceedances of the state and federal ozone standards during this six-month period. In order to record exceedances, APCD continuously monitors the air at stations in El Rio, Ojai, Piru, Simi Valley, and Thousand Oaks. Those stations are shown in Figure 1-1 as red stars. Most monitoring stations continuously sample the air for ozone and fine Particulate Matter ($PM_{2.5}$), with the station in El Rio additionally sampling for coarse Particulate Matter (PM_{10}). APCD also monitors and forecasts fire weather daily by issuing Agricultural Burn Status updates for local farmers needing to burn their agricultural waste (with approved permits from the Ventura County Fire Department). Forecasting for "Burn" or "No Burn Days" is separated into six meteorologically distinct geographical regions, called burn regions and shown in Figure 1-2. More information on the District's ambient air monitoring can be found in the District's Monitoring Division website.

Figure 1-1
APCD Monitoring Stations in Ventura County

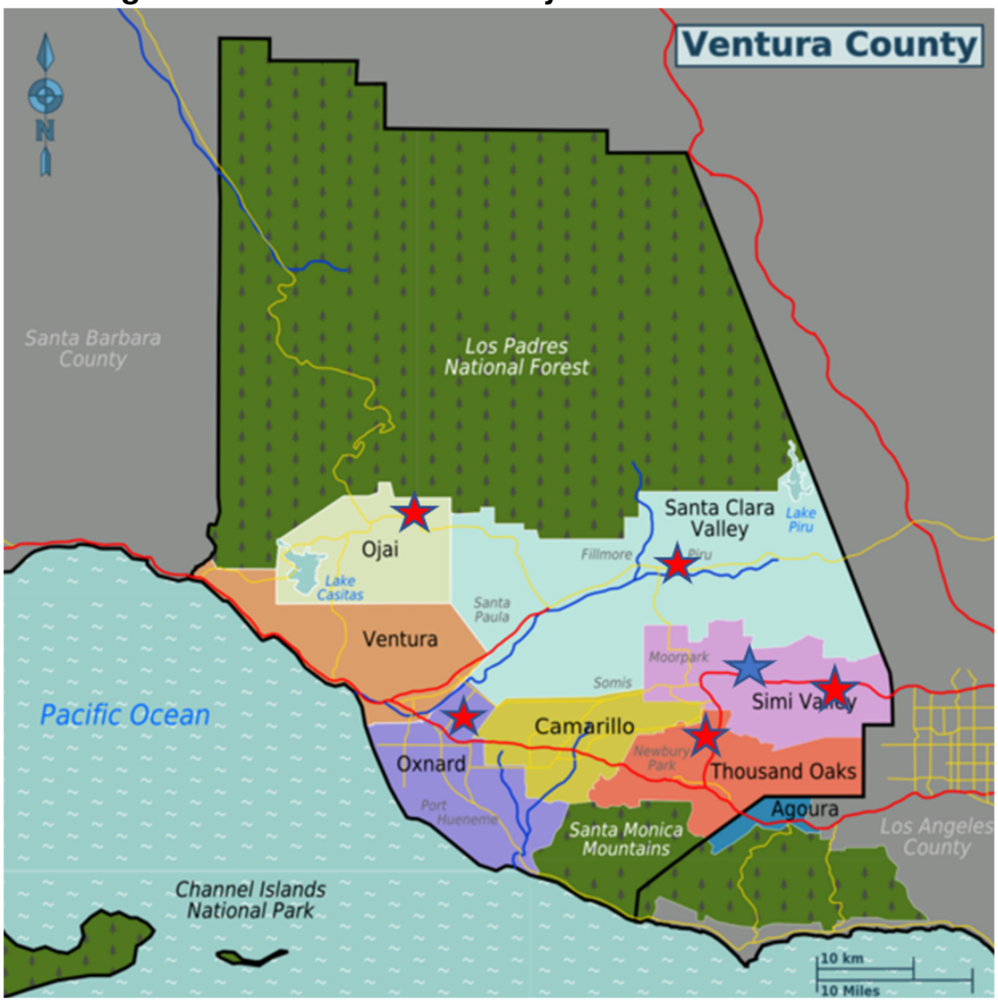
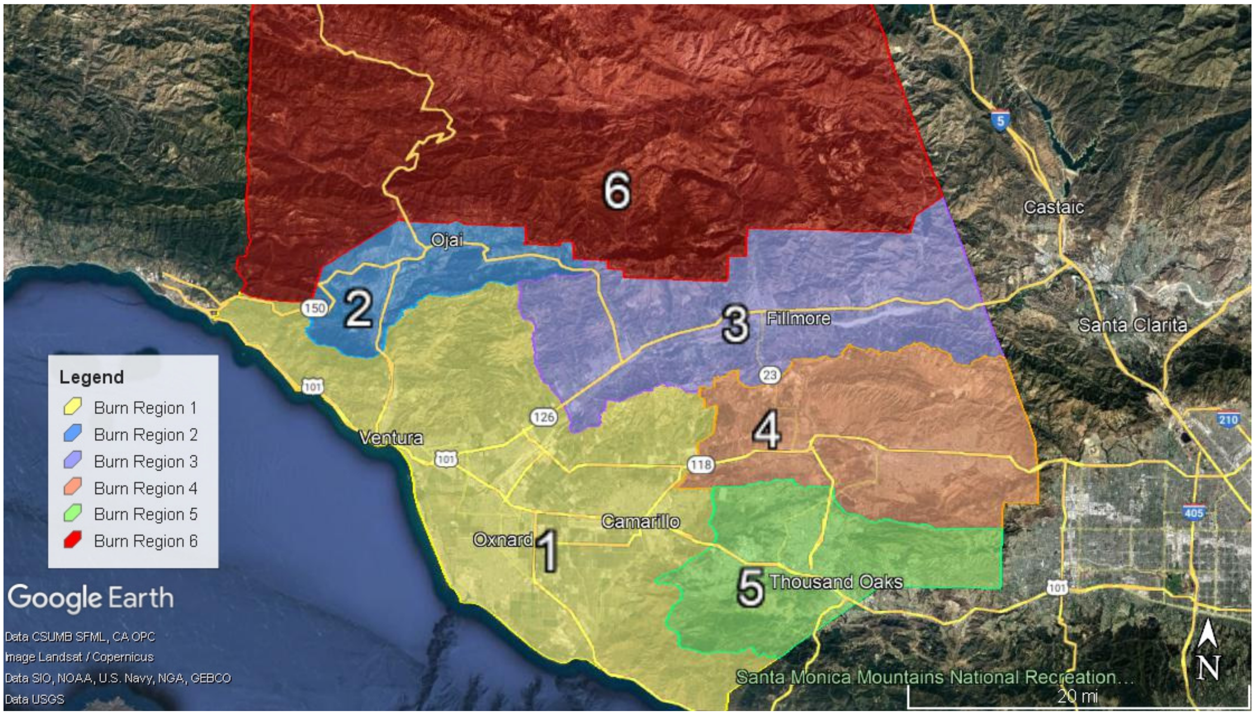


Figure 1-2
APCD Burn Regions

Geographic areas in California that exceed clean air standards are called nonattainment areas.



Ventura County is a nonattainment area for the 2015 federal 8-hour ozone standard. The Ventura County 8-hour ozone nonattainment area includes all of mainland Ventura County (including ocean areas out to three miles from the mainland shore) but excludes Anacapa and San Nicolas Islands. A map of the Ventura County 8-hour ozone nonattainment area is available in the U.S. Environmental Protection Agency (EPA) website. Ventura County is also in nonattainment for the California 1-hour and 8-hour ozone standards. In Ventura County, ozone generally reaches peak levels by mid-afternoon and, along with ozone precursors, is often blown inland by the prevailing winds. Thus, inland areas such as Simi Valley, Thousand Oaks, Ojai, Fillmore, and Piru often have higher ozone levels and more days over the federal and state ozone standards than the county's coastal areas. The smoggiest days tend to occur from May through October (smog season) when high temperatures and stable atmospheric conditions produce conditions conducive to ozone formation and buildup.

1.3. Federal Clean Air Act and Air Quality Standards

On November 15, 1990, President George H.W. Bush signed the CAAA into law. The purpose of the CAAA is to provide clean, healthful air for all people of the country. The CAAA specifies dates by which areas of the country must meet the National Ambient Air Quality Standards (NAAQS).

The EPA sets NAAQS as the maximum concentrations in the atmosphere for specific air contaminants in order to protect public health and welfare. The EPA has adopted NAAQS for Ozone (O_3), carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), fine particulate matter ($PM_{2.5}$), coarse particulate matter (PM_{10}), and sulfur dioxide (SO_2). Ventura County is designated nonattainment for the federal 2015 8-hour ozone standard and attainment of all other federal air quality standards.

The CAAA delegates primary responsibility for achieving the NAAQS to the states. The State Implementation Plan (SIP) is the principal mechanism for complying with the CAAA and meeting clean air standards. SIPs are "roadmaps" to clean air. A SIP outlines the actions, programs, and commitments each state will take to carry out its CAAA responsibilities to provide clean air for its citizens.

SIPs are not single documents; rather, they are compilations of new and previously submitted plans, programs (such as air quality monitoring and modeling, permitting, etc.), district rules, state regulations, and federal emission controls. Many California SIPs rely on the same core set of control strategies, including emission standards for motor vehicles, stationary internal combustion engines, fuel regulations, and limits on emissions from consumer products.

The provisions and commitments in SIPs are federally enforceable. Moreover, the CAAA require that EPA impose sanctions on areas that fail to submit a SIP, fail to submit an adequate SIP, or fail to implement a SIP unless the state corrects such failures. Sanctions include 2-to-1 emission offsets for new air pollution sources and a ban on most federal highway grants. An additional ban on air quality grants is discretionary. Ultimately, EPA may impose a federal clean air plan, called a federal implementation plan (FIP), if EPA finds that the state failed to submit or implement an adequate SIP.

CARB is the lead state agency for the California SIP. Local and regional air agencies, as well as other local and state agencies, such as the Southern California Association of Governments (SCAG) and the Bureau of Automotive Repair, prepare SIP elements and submit them to CARB for review and approval. CARB then forwards the SIP revisions to EPA for approval and publication in the Federal Register (FR). The Code of Federal Regulations (CFR) Title 40, Chapter I, Part 52, Subpart F, Section 52.220 lists all the items and elements included in the California SIP.

Since its formation in 1968, the District has prepared many air quality documents to satisfy federal and state clean air requirements. The most important of these are the AQMPs. These plans are not one-time documents but are periodically revised and updated in response to changes in governing law and air pollution control science and technology. The 2022 AQMP is the first Ventura County clean air plan for the 2015 federal 8-hour ozone standard.

1.3.1. 1979 Federal 1-hour Ozone Standard

In 1979, EPA established a NAAQS for ozone at 120 parts per billion (ppb) in any one-hour period. The CAAA classifies areas based on the severity of each area's respective ozone problem. These classifications are marginal, moderate, serious, severe, and extreme. Areas with more severe air quality problems have progressively greater requirements to meet under the CAAA. In addition, areas with higher nonattainment classifications also have later attainment dates. Marginal areas have the least amount of time to attain the standard; extreme areas have the most amount of time. On November 6, 1991, EPA designated Ventura County a severe nonattainment area for the 1-hour ozone standard with an attainment deadline of November 15, 2005.

Ventura County attained the 1979 federal 1-hour ozone standard in 2003 and subsequent air quality data shows that the county has remained in attainment since that time. Effective June 15, 2005, the EPA revoked the federal 1-hour ozone ambient air quality standard, including associated designations and classifications, in most areas of the country, including Ventura County. However, a court decision related to the revocation of the 1-hour ozone standard found that areas that were subject to certain planning requirements based on their 1-hour ozone nonattainment designation were still obligated to meet those requirements even though the standard had been revoked (anti-backsliding provision).

On April 15, 2009, CARB requested that EPA find that Ventura County had attained the revoked 1-hour standard. On May 27, 2009, EPA made that finding (effective July 27, 2009). In conjunction with that finding, EPA also found that Ventura County was no longer required to implement contingency measures nor required to impose CAAA Section 185 penalty fees on certain large air emission sources. However, the attainment finding was not a redesignation of Ventura County from a nonattainment area to an attainment area. Redesignation would have been a far more complex EPA action involving an ozone maintenance plan. The attainment finding only established that Ventura County had successfully fulfilled its statutory and regulatory obligations under the CAAA and corresponding federal regulations to attain the federal 1-hour ozone standard by its designated attainment deadline. Although an attainment finding under the CAA does not constitute a redesignation to attainment, under EPA's Clean Data Policy, an attainment finding allows suspension of certain SIP requirements, such as attainment and progress plans. Such a suspension applies as long as the area remains in attainment or until the area completes the requirements for redesignation to attainment.

1.3.2. 1997 Federal 8-hour Ozone Standard

Based on medical studies demonstrating that the 1-hour standard was inadequate for protecting public health, in 1997 the EPA adopted an 8-hour standard to replace the 1-hour standard. This change lowered the standard for ozone from 120 ppb, averaged over one hour, to 80 ppb, averaged over eight hours. That standard was more stringent than the 1-hour standard and better protected human health from the effects of smog.

The federal 1997 8-hour ozone rule set new planning requirements for nonattainment areas. These requirements address such topics as classification and attainment deadlines, 1-hour ozone standard to 8-hour ozone standard transition, anti-backsliding provisions, reasonably available control technology (RACT), reasonable further progress (RFP) plans for 2002 - 2008, post-2008 RFP plans, transportation control measures (TCM), including reasonably available control measures (RACM), attainment demonstrations, and transportation and general conformity.

As with the federal 1-hour ozone standard, 1997 8-hour ozone nonattainment areas have increasingly stringent requirements based on the severity of their respective 8-hour ozone attainment status. On April 30, 2004, the EPA determined that areas violated the federal 8-hour ozone standard based on their design values. These attainment status designations became effective June 15, 2004. Ventura County's 8-hour ozone design value was 95 ppb. Based on that value, EPA designated Ventura County a moderate nonattainment area for the federal 8-hour ozone standard. Moderate areas were to attain the federal 8-hour ozone standard by June 15, 2010. CAAA allows federal nonattainment areas to voluntarily reclassify ("bump-up") to higher nonattainment classifications (e.g., from moderate to serious). That provision gives areas additional time to attain if they are doing everything practicable to attain but are not able to do so by their statutory attainment dates. EPA is obligated to grant voluntary bump-ups but bumped-up areas must still attain as expeditiously as practicable and meet all CAAA requirements for their new, higher classifications.

On February 14, 2007, at the direction of the District, CARB formally requested that EPA bump-up Ventura County from its original moderate 8-hour ozone nonattainment classification to the higher serious 8-hour ozone nonattainment classification with an attainment deadline of June 15, 2013. EPA approved the request on May 20, 2008. The voluntary bump-up was necessary because the photochemical modeling conducted for the 2007 AQMP (prepared for the 1997 federal 8-hour ozone standard) indicated that Ventura County would not attain that standard until June 15, 2013, the attainment deadline for serious ozone nonattainment areas. A serious classification means that Ventura County had to meet the requirements for that classification in addition to the requirements for the lower marginal and moderate ozone nonattainment classifications.

On June 20, 2012, CARB requested that EPA find that Ventura County had attained the 1997 8-hour ozone standard. In addition, CARB also requested that EPA suspend the attainment plan and progress plan requirements as allowed by EPA's Clean Data Policy.

On September 14, 2012, EPA made that finding (effective November 13, 2012). Similar to the 1-hour attainment finding, the 8-hour attainment finding also suspended certain State Implementation Plan requirements for as long as Ventura County continues to meet the 1997-ozone standard or completes requirements for redesignation to attainment.

1.3.3. 2008 Federal 8-hour Ozone Standard

On March 12, 2008, EPA strengthened the federal 8-hour ozone standard to better protect public health and welfare. EPA revised the 8-hour primary ozone standard, designed to protect public health, to 75 ppb from 80 ppb. EPA also strengthened the secondary 8-hour ozone standard to 75 ppb making it identical to the revised primary standard.

EPA estimated that the revised ozone standards will yield health benefits valued between $2 billion and $17 billion. Those benefits include preventing bronchitis, aggravated asthma, hospital and emergency room visits, non-fatal heart attacks and premature death, among others.

On May 21, 2012, EPA finalized its first of two ozone implementation rules for the 2008 ozone NAAQS. The rule established the air quality thresholds (marginal, moderate, serious, severe, and extreme) that define the classifications assigned to all nonattainment areas for the 2008 75 ppb ozone NAAQS that were promulgated on March 12, 2008. The rule also granted reclassification for six California ozone nonattainment areas that voluntarily reclassified themselves to higher nonattainment classifications under the 1997 ozone standard. Ventura County was one of those areas. Hence, its 2008 75 ppb 8-hour ozone nonattainment classification is serious, the same as under the 1997 80 ppb 8-hour ozone standard. Lastly, the rule revoked the 1997 ozone NAAQS for transportation conformity purposes one year after the effective date of designations for the 2008 75 ppb ozone NAAQS.

On March 6, 2015, EPA published its second implementation rule for the 2008 ozone standards that were promulgated on March 12, 2008. This rule addresses additional nonattainment area state implementation plan requirements for the 2008 ozone NAAQS, including requirements pertaining to attainment demonstrations, RFP, RACT, RACM, major new source review (NSR), emission inventories, and the timing of SIP submissions and of compliance with emission control measures in the SIP. Other issues addressed in the rule include revocation of the 1997 ozone standard for all purposes, including transportation conformity, and anti-backsliding requirements that applied to the 1997 ozone standard. Anti-backsliding requirements help ensure that air quality in nonattainment areas does not get worse when a federal air quality standard is revoked.

As a serious nonattainment area for the 2008 ozone standard, Ventura County submitted its attainment plan through CARB to EPA on April 11, 2017. The plan shows how Ventura County would meet the 2008 ozone standard by the July 20, 2021 statutory deadline. However, a December 23, 2014 D.C. Circuit Court decision vacated the portion of the Classifications Rule that established December 31 of the applicable year as the maximum attainment date for each ozone nonattainment classification. Pursuant to the ruling, moderate and above area attainment demonstrations must ensure emissions controls are implemented no later than the beginning of the ozone season prior to the attainment date (e.g., beginning of the 2020 ozone season for serious areas). This effectively shortens the maximum allowable attainment date for all classifications by one ozone season.

1.3.4. 2015 Federal 8-hour Ozone Standard

On October 26, 2015, EPA again strengthened the federal 8-hour ozone standard to better protect public health and welfare (80 FR 65292). EPA revised the 8-hour primary ozone standard, designed to protect public health, to 70 ppb from 75 ppb. EPA also strengthened the secondary 8-hour ozone standard to 70 ppb making it identical to the revised primary standard.

EPA estimates that the revised ozone standards will yield health benefits valued between $2.9 billion and $5.9 billion. Those benefits include preventing bronchitis, aggravated asthma, hospital and emergency room visits, non-fatal heart attacks and premature death, among others.

On June 4, 2018, EPA published the final rule Additional Air Quality Designations for the 2015 Ozone National Ambient Air Quality Standards with an effective date August 3, 2018. Ventura County is classified as a serious nonattainment area for the 2015 70 ppb 8-hour ozone standard, which is the same classification under the 2008 and 1997 Ozone standards. As a serious nonattainment area for the 2015 ozone standard, Ventura County must submit an air quality plan (attainment plan) by August 3, 2022 (four years from the effective date of designation on August 3, 2018) that shows how Ventura County will meet the 2015 ozone standard by the August 3, 2027 (2026 ozone season).

The EPA final rule Implementation of the 2015 National Ambient Air Quality Standards for Ozone: Nonattainment Area State Implementation Plan Requirements (Implementation Rule) for the 2015 ozone NAAQS was published in the Federal Register on December 6, 2018 with an effective date of February 4, 2019. This rule addresses nonattainment area state implementation plan requirements for the 2015 ozone NAAQS, including requirements pertaining to attainment demonstrations, RFP, RACT, RACM, major new source review (NSR), emission inventories, and the timing of SIP submissions and of compliance with emission control measures in the SIP. The Implementation Rule retained many of the same requirements that were promulgated for the 2008 ozone NAAQS, updated with appropriate dates and ambient ozone concentrations.

Another primary requirement that Ventura County has to meet for the 2015 ozone standard is an RFP plan showing 15 percent ROG and/or NOx reductions over the initial six-year period (2017-2023) and three percent per year thereafter to 2026 (attainment year). The RFP plan is also due August 3, 2022 and has been incorporated into the 2022 attainment plan.

Effective December 31, 2020, EPA determined it would retain the 2015 ozone NAAQS without revision after completion of its review of the standard. However, on October 28, 2021 EPA announced it would reconsider the decision to retain 2015 standards, based on the existing scientific record. EPA is targeting the end of 2023 to complete this reconsideration.

1.4. Progress in Improving Ventura County Air Quality

1.4.1. Reduction in Ozone Levels

Since 1990, all areas of the county have enjoyed significant reductions in ozone levels. Figure 1-3 shows that, despite a population increase of 25 percent, there were 138 days countywide over the current federal 8-hour ozone standard of 70 ppb in 1990, but only 22 in 2020 and 9 in 2021. Over the same time period, the county's 8-hour ozone values (called "design values") used to determine compliance with the federal 8-hour ozone standard fell dramatically as well. More significantly, the 8-hour ozone design values at all of the county's APCD air quality monitoring stations are approaching or are now lower than the 2015 federal 8-hour ozone standard. An exceedance of a standard is not necessarily related to a violation of the standard. However, the federal 8-hour standard is violated when the average of the three annual fourth highest 8-hour averages over three years is greater than 70 ppb.

As shown in Figure 1-4, the countywide 8-hour ozone design value dropped from 130 ppb in 1990 to 75 ppb in 2021 Moreover, as shown in Figures 1-5 through 1-7, the design values at each of the County's monitoring stations are near (Simi) or below (Ojai Valleys, Piru, Thousand Oaks, Ventura, and El Rio) the current federal 8-hour ozone standard (70 ppb).

Figure 1-3
Days Over Federal Ozone Standard vs. County Population Growth

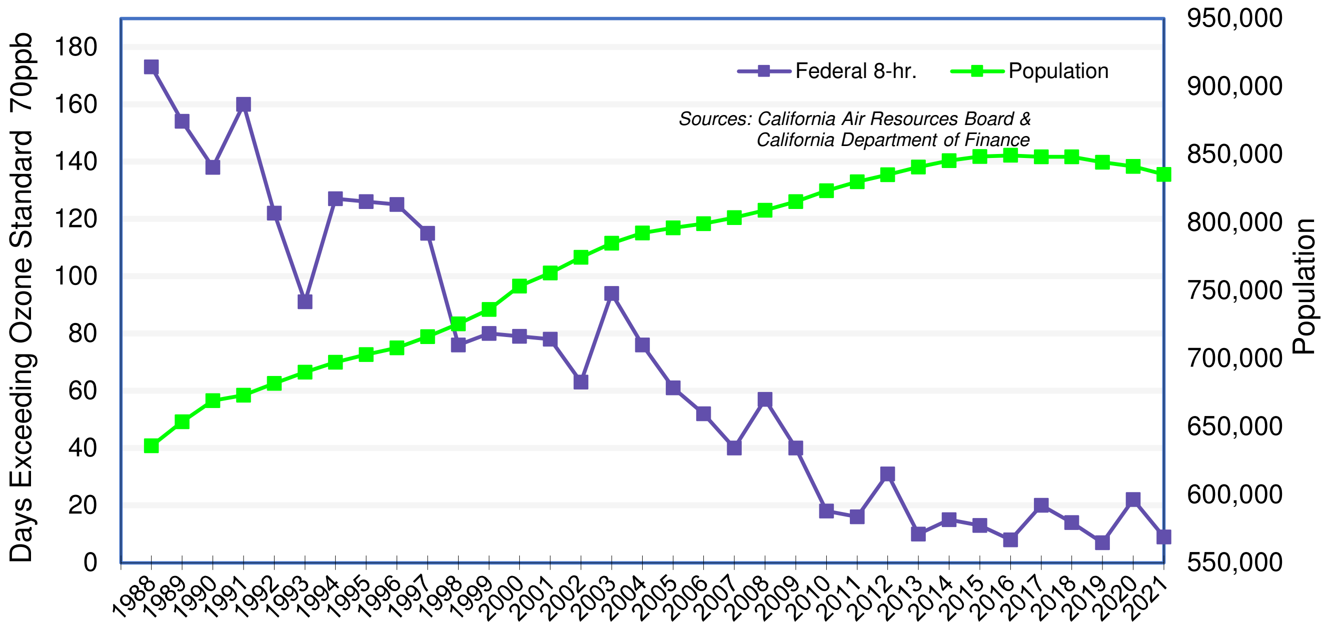


Figure 1-4
Countywide 8-Hour Ozone Design Values

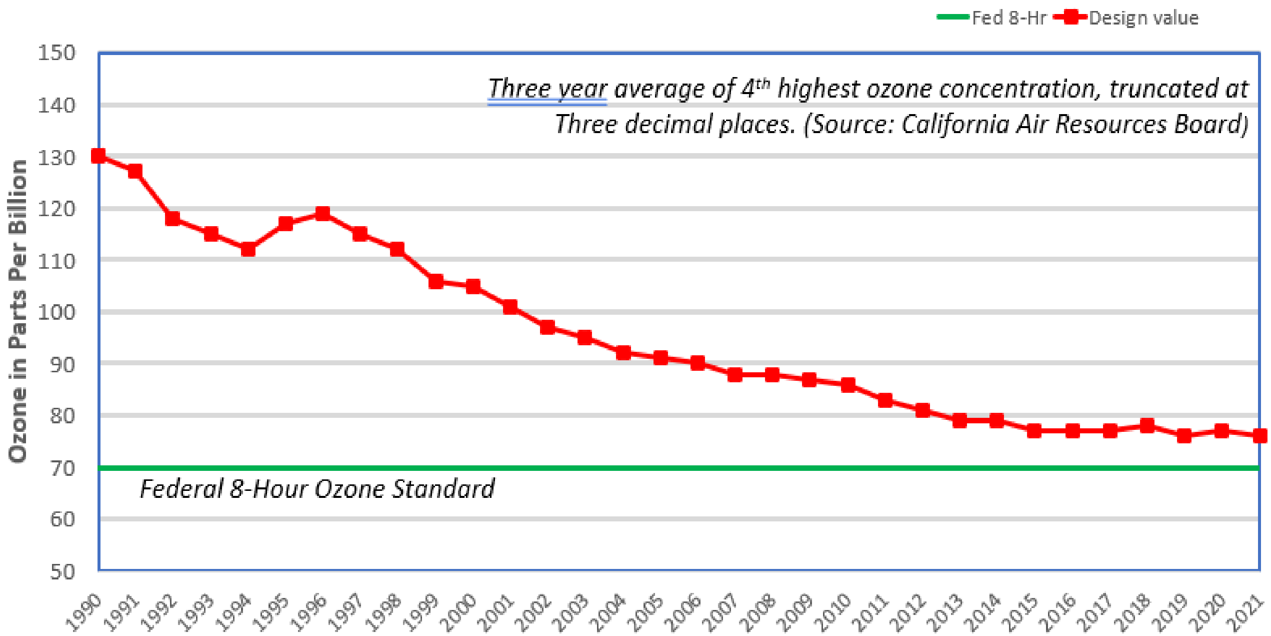


Figure 1-5
8-Hour Ozone Design Values for Simi Valley & Piru

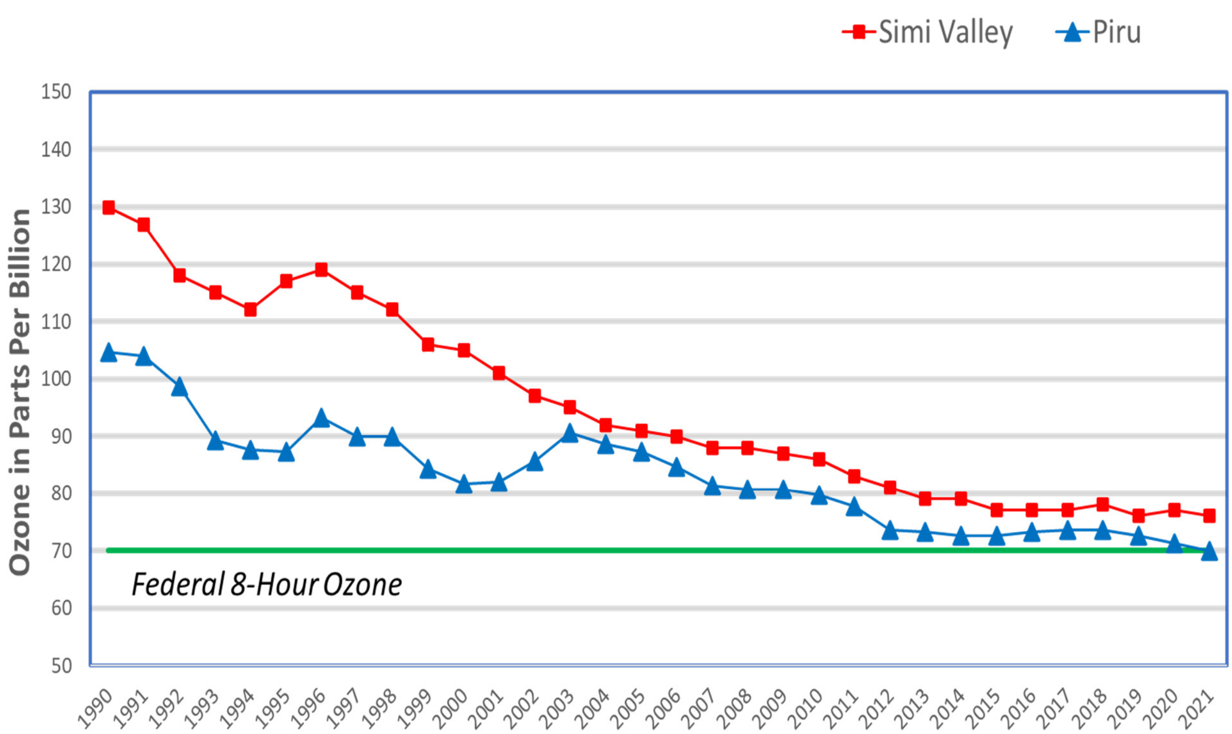


Figure 1-6
8-Hour Ozone Values for Thousand Oaks & Ojai Valley

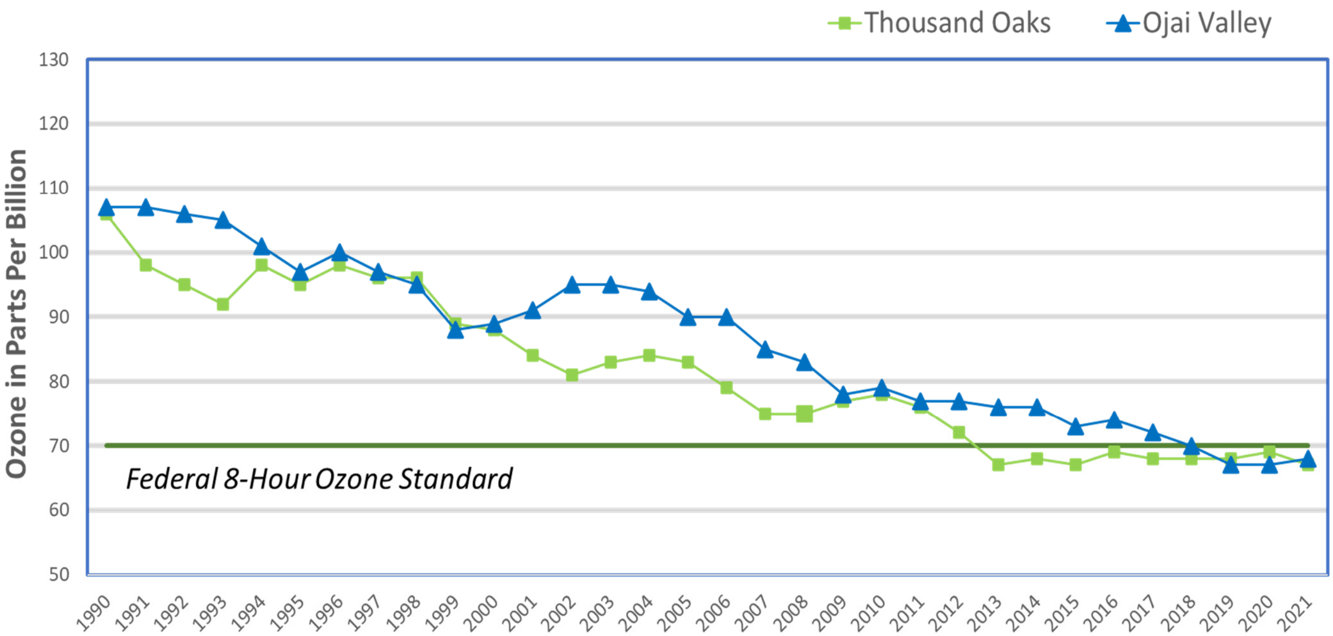
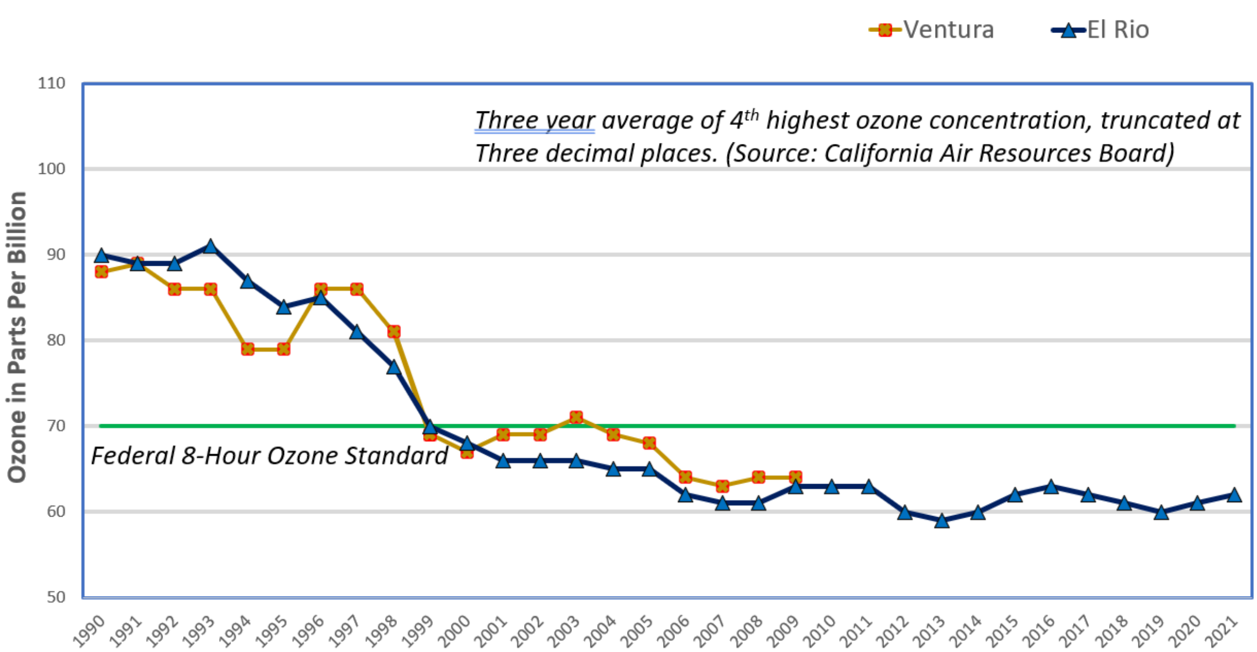


Figure 1-7
8-Hour Ozone Values for Ventura & El Rio



SECTION 2. 2018 BASELINE EMISSIONS INVENTORY

An emissions inventory is a large dataset that describes emission sources and quantifies pollutants released into the atmosphere from a large variety of sources. Ozone nonattainment areas, such as Ventura County, must develop and continually update their baseline emissions inventories to evaluate federal, state, and local control programs and report emission reduction progress.

A baseline year or base year is a specific year used to gauge and evaluate past and future emissions estimates. The 2018 emissions inventory is the current baseline year for forecasting future year emissions and from which the SIP inventories are derived. The District chose 2018 as the base year inventory for this 70 ppb 8-hour Ozone SIP because it was the most recent year for which comprehensive emission estimates were available and representative of typical meteorology and climate.

This section summarizes the 2018 baseline ROG and NOx 8-hour ozone SIP emissions inventory for Ventura County. Appendix A, *Ventura County Emissions Inventory Documentation*, provides further information and documentation of the emissions inventory for the 2022 AQMP.

ROG and NOx are the most important pollutants in the air chemistry of ozone formation because they chemically react in the presence of ultraviolet light from the sun to form ozone, the primary constituent of smog. ROG is the photochemically reactive fraction of Total Organic Compounds (TOC) involved in the creation of ozone. ROG excludes methane and other compounds with inconsequential effects on ozone photochemical reactivity. For a list of negligibly reactive or low reactive compounds with respect to ambient ozone formation, refer to Exempt Organic Compounds in District Rule 2, Definitions. Even though the technical definition of ROG defined by CARB differs from the EPA definition of volatile organic compounds (VOC) and the District's definition of ROC, for the purpose of this document, the definition of ROG is equivalent to "reactive organic compounds" (ROC) used in District rules and operating permits, and "VOC" used by EPA. Going forward, the term "ROG" will be used throughout this document.

ROG and NOx emissions are reported in the emissions inventory in tons per day (tpd), calculated for the summer season (May - October) when the potential for ozone formation potential is greatest. Hence, May through October is considered ozone season in Ventura County. Ozone season summer day emissions also are referred to as "planning day emissions" and represent anthropogenic (man-made) emission sources only.

The planning day emissions inventory excludes non-anthropogenic "Natural Sources" emissions such as biogenics, geogenics, and wildfires. Although Natural Sources emissions are not subject to regulatory authority or control by the District or CARB, they are pertinent to ozone formation and are included in the Attainment Demonstration photochemical modeling emission inventory described in Section 5.

Emissions data are compiled into major source categories developed by CARB. Ventura County emissions are also distinguished by onshore and offshore geographic areas. The onshore area includes all of Ventura County out to the 3-mile State Tidelands Boundary area. This onshore and tidal area is the nonattainment area for Ventura County for the 70 ppb 8-hour ozone standard. This area is also referred to in this document as the Ventura County portion of the South Central Coast Air Basin, or SCCAB. The SCCAB comprises of Ventura, Santa Barbara, and San Luis Obispo Counties.

The offshore area beyond the State Tidelands out to 100 miles from shore is known as the Outer Continental Shelf and is divided into the Outer Continental Shelf-24 Miles (OC1) Air Basin, which is the offshore area beyond the State Tidelands out to 24 miles from shore, and the Outer Continental Shelf-100 Miles (OC2) Air Basin, which is the offshore area from 24 miles to 100 miles from shore. The OC1 and OC2 emissions are significant and are included in the photochemical modeling used to demonstrate attainment of the 8-hour ozone standard. These geographic areas distinguish the emissions in both this section and Section 4, *Emissions Inventory Forecasts*. Historically, OC1 and OC2 were grouped together as a single air basin and were referred to as the Outer Continental Shelf (OCS) air basin, but CARB recently divided the OCS area into the current OC1 and OC2 areas for reporting purposes.

2.1. Emissions Inventory Reporting Requirements

This document complies with both state and federal emissions inventory reporting requirements for the 2018 base year actual emissions and future year emission inventory forecast methodology in Section 4. Guidance on how to develop emission inventories to meet 8-hour ozone SIP requirements is in EPA document, *Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations*. In addition, the California Health and Safety Code (CH&SC) Sections 40913(4)(5), 40914(c), 40918(a), 40924(b), and 40925 require emission inventory review, correction, and incorporation of the most current emission factors, growth and control data, and future year forecast estimates.

2.2. Clean Air Act Emissions Statement Requirements

Federal CAA section 182(a)(3)(B) Emissions statements defines Emissions Statement requirements for ozone nonattainment areas classified as marginal and above. CAA 182(a)(3)(B) subsection (i) requires states to have an Emissions Statement program (i.e., a rule) requiring stationary sources to report and certify the accuracy of NOx and ROG emissions, beginning in 1993 and annually thereafter.

Subsection (ii) has waiver provisions for subsection (i) for stationary sources emitting less than 25 tons/year NOx or ROG if the State provides an inventory of emissions from such class or category of sources, based on the use of the emission factors established by the EPA or other methods acceptable to the EPA, under CAA 182(a) subparagraph (1) (the nonattainment plan actual emission inventory due for submittal to EPA in 1992) or subparagraph (3)(A) (the periodic triennial inventory CARB submits to EPA on behalf of all the nonattainment areas in California). The Emissions Statement requirements for the 2015 8-hour ozone standard are described in the Ozone SIP Requirements Rule, FR Volume 83, December 6, 2018, Implementation of the 2015 National Ambient Air Quality Standards for Ozone: Nonattainment Area State Implementation Plan Requirements; Final Rule (83 FR62998, December 6, 2018). If a nonattainment area has a previously approved emission statement rule in force for a previous ozone standard covering all portions of the nonattainment area for the 2015 8-hour ozone standard, the existing rule may be sufficient for the 2015 8-hour ozone standard. If the existing rule does not meet CAA 182(a)(3)(B) requirements, a revised or new rule would have to be submitted as part of the 2022 8-hour ozone SIP.

District Rule 24, *Source Recordkeeping, Reporting and Emission Statements*, Section C, *Emission Statements*, addresses CAA 182(a)(3)(B) Emissions Statement requirements. District Rule 24 was last revised in September 1992, submitted to EPA in November 1992 and adopted by EPA into the 2012 SIP on December 7, 2000 (65 FR 76567).

The first paragraph of Rule 24C deals with the reporting, certification, and reporting schedule requirements of CAA 182(a)(3)(B)(i). The owner or operator of any stationary source emitting NOx or ROG must provide the Air Pollution Control Officer (APCO) with a written statement showing actual NOx and ROG emissions from that source. Information in the emission statement shall be certified as accurate by a company or agency official. Emissions statements must be submitted annually thereafter.

The third paragraph of Rule 24C concerns the waiver requirements of CAA 182(a)(3)(B)(ii). The APCO may waive Rule 24 Section C requirements for any class or category of stationary sources which emit less than 25 tons/year of NOx and less than 25 tons/year of ROG if the District provides the CARB with an inventory of sources emitting more than 10 tons/year of either NOx or ROG based on the use of emission factors acceptable to the CARB.

The District updates emissions for stationary source facilities with 10 tons/year permitted NOx or ROG each year and reports the emissions to CARB's statewide emissions inventory. CARB in turn reports the process and emissions data to EPA in their triennial National Emissions Inventory (NEI) submittal. This satisfies the CAA 182(a)(3)(B)(ii) waiver provisions.

Since the Ventura County nonattainment area for the 2008 and 2015 8-hour ozone standards is the same as for the revoked Ventura County 1-hour ozone standard nonattainment area, it is the District's determination that the existing provisions of Rule 24C adequately meet the Emissions Statement program requirements of CAA 182(a)(3)(B) for the purposes of the 2015 8-hour ozone standard, as shown in Table 2-1, and no revision of the rule is required. The District submitted an Emission Statement Certification indicating that the existing rule met the requirements of the CAA in June 2020.

Table 2-1
CAA 182(a)(3)(B) Requirements and Provisions of District Rule 24 C

CAA 182(a)(3)(B) Requirements	District Rule 24 C
CAA 182(a)(3)(B)(i)	
State must submit revision to SIP within 2 years of November 15, 1990 requiring the owner/operator of stationary sources to report NOx or ROG emissions.	Rule 24 submitted to EPA in November 1992 and adopted by EPA into the SIP on December 7, 2000.
Require the owner/operator of stationary sources of NOx or ROG to provide the State with statements showing the actual NOx and ROG emissions.	The owner or operator of any stationary source that emits or may emit NOx or ROG shall provide the APCO with a written statement showing actual emissions of NOx and ROG from such stationary source.
First emissions statement shall be submitted within 3 years after November 15, 1990. Subsequent statements shall be submitted at least every year thereafter.	The first emission statement shall cover the calendar year of 1992 and shall be submitted to the APCO no later than November 1, 1993. Emissions statements shall be submitted annually thereafter.
Statement shall contain a certification that the information contained in the statement is accurate to the best knowledge of the individual certifying the statement.	The emission statement shall be certified by a company or agency official of such source and shall state that the information contained in the emission statement is accurate to the best knowledge of the individual certifying the statement.
CAA 182(a)(3)(B)(ii)	
State may waive the application of clause (i) to any class or category of stationary sources emitting less than 25 tons per year of ROG or NOx. State provides an inventory of emissions from such class or category of sources in its submissions under CAA 182(a) subparagraph 1 or CAA 182(a) subparagraph (3)(A).	The APCO may waive the requirements of this Section for any class or category of stationary sources which emit less than 25 tons per year of NOx and less than 25 tons per year of ROG if the District provides the CARB with an inventory of sources emitting 10 tons or more per year of either nitrogen oxides or reactive organic gases based on the use of emission factors acceptable to the CARB.

2.3. Emissions Inventory Major Categories

The 2018 base year emissions inventory is an aggregate of two general emission source types: 1) stationary and area-wide sources, and 2) mobile sources. Mobile sources include on-road motor vehicles and other mobile (off-road) sources. Stationary sources are those that have a fixed geographic location, such as power plants, industrial engines, and oil storage tanks. Area-wide sources are emission sources occurring over a wide geographic area such as consumer products and architectural coatings. Mobile sources are mobile in nature, such as motor vehicles, boats, and aircraft.

CARB maintains the California Emission Inventory Development and Reporting System (CEIDARS), the comprehensive statewide emissions inventory database. The state's local air pollution control districts, including Ventura County, provide updates to CEIDARS every year using local data. Table 2-2 presents a summary of Ventura County's 2018 baseline summer planning day emissions for ROG and NOx for the combined SCCAB, OC1, and OC2 air basin. Figure 2-1 displays the pollutant distribution in the major categories.

Table 2-2
2018 Baseline Summer Planning Day Emissions

Both SCC and OCS Air Basins	(tons/summer day) ROG	NOx
Total Stationary and Areawide Sources	17.66	2.62
Total On-road Vehicle Sources	4.28	7.03
Total Other Mobile Sources	9.39	22.16
Total Emissions	**31.32**	**31.82**

Notes:
Source: California Emission Projection Analysis Model (CEPAM) v1.01 (March 2022).
Includes OC1 and OC2 Air Basin emissions.
Data rounding may affect totals.

2.3.1. Stationary Sources

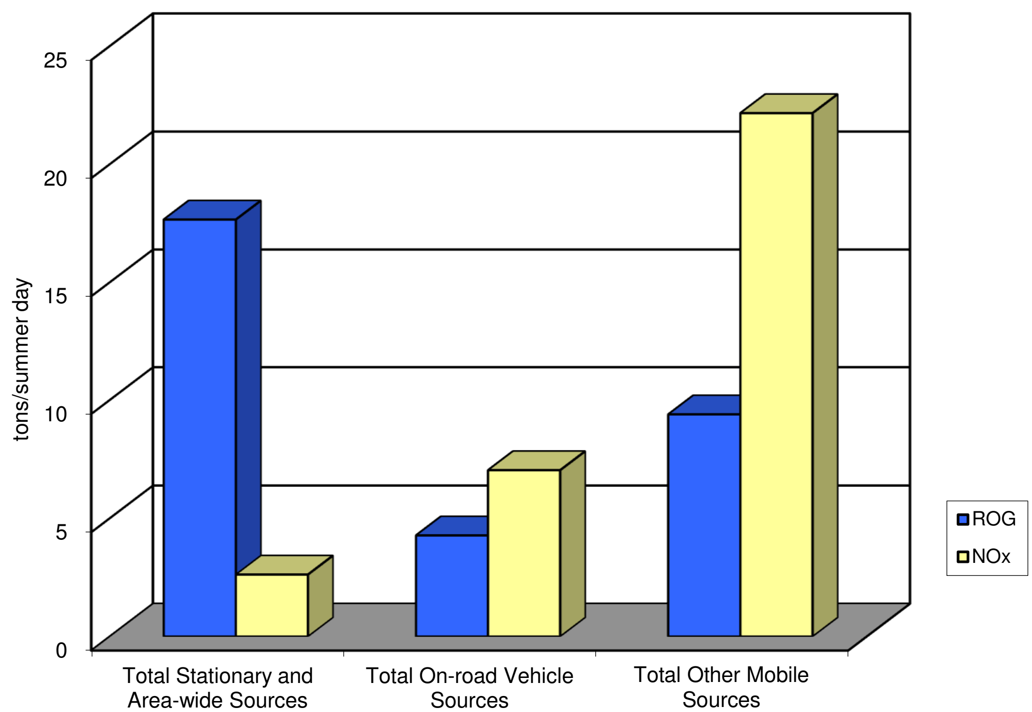
Stationary Sources are comprised of two major emission source types, point sources and area sources. Point sources are single, fixed sources of air pollution. Examples of point sources include electrical power generating plants, petroleum production facilities, and industrial engines. Initially, point sources are identified through the District's Permit to Operate evaluation or during the rule development process.

Permitted stationary sources are inspected by District staff annually and are subject to air pollution rules applicable to specific facility operations and equipment. In addition, the District surveys point source facilities annually to document changes to equipment and gather activity data used to calculate and update annual emissions.

Point sources that emit 25 tons or more per year of either ROG or NOx are considered major sources under CAAA Section 182(d). There were four ROG point sources emitting greater than 25 tons per year and four NOx point sources emitting greater than 25 tons per year in 2018. All of the major stationary sources are in the point source inventory along with 266 other permitted facilities for 2018.

Smaller permitted sources are accounted for in area source categories. Area source categories are groups of similar emission sources that do not individually emit large amounts of pollutants, but when aggregated on a countywide basis can contribute significant air emissions. Examples of permitted area sources include gasoline stations and dry cleaners. The District has approximately 1,800 permitted sources in its 2018 baseline emissions inventory, accounted for as either point or area sources.

Figure 2-1
2018 Baseline Summer Planning Day Emissions
Pollutant Distribution



Other area source categories also include sources not under district permit. Examples of unpermitted area sources include organic material composting, small combustion sources such as engines and boilers, and fugitive ROG losses from natural gas transmission.

Emissions from area sources are determined in a variety of ways. One accepted estimation method, generally referred to as the "bottom-up" method, surveys local emission sources, such as organic composting operations, to obtain specific countywide data. Another method is referred to as the "top-down" approach. National or statewide data such as metal parts coating and architectural coating usage are gathered and apportioned down to the county level based on distribution factors representative of Ventura County.

Area source category emissions estimates are developed by both the District and the CARB. Area source methodologies are described in Appendix A and summaries of the area source methodologies are posted on the CARB's Index of Methodologies website.

Every year District staff evaluates the data and methods used in order to improve and update the emissions inventory. CARB and District staff coordinate the update process through the state's Emissions Inventory Technical Advisory Committee (EITAC). The refinement of the emissions categories is ongoing and necessary to better classify and quantify the emissions, and to evaluate feasibility of new control technologies and cost-effectiveness of controls when developing state or local rules.

2.3.2. Mobile Sources

There are two major source categories for mobile sources: On-Road Motor Vehicles and Other Mobile Sources. Mobile sources contribute the largest amount of criteria air pollutants into the air statewide. CARB calculates mobile source emissions with input from detailed mobile source emission models. Complete documentation for mobile source category emissions and models is available at CARB's website: https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory. Appendix A of the 2022 AQMP includes a general description of the mobile source emissions for Ventura County.

2.3.2.1. On-Road Motor Vehicles

CARB developed the EMission FACtors (EMFAC) model to assess state-wide and regional emissions from On-Road Motor Vehicles, including passenger cars, heavy-duty trucks, and buses operating on highways, freeways, and local roads in California, and to support CARB's regulatory and air quality planning efforts to meet the Federal Highway Administration's transportation planning requirements.

EPA approves EMFAC for use in SIPs and transportation conformity analyses. EMFAC uses regional transportation model outputs and motor vehicle-related data from the California Department of Transportation (Caltrans) and the California Department of Motor Vehicles (DMV) to calculate on-road vehicle emissions.

EMFAC2017 is the latest version of the model and represents CARB's current understanding of motor vehicle travel activities and their associated emission levels. The 2018 base year and future year On-Road Motor Vehicles emissions for Ventura County are calculated using EMFAC2017. Current transportation and socioeconomic data in the SCAG 2020 Connect SoCal Regional Transportation Plan (RTP) were calculated using EMFAC2014, which was the current version of the model when SCAG began its analysis and was an acceptable model at the time the RTP was adopted. The Final 2020 RTP was adopted by SCAG's governing board on September 3, 2020. On-road motor vehicle emissions for Ventura County are based on CARB's EMFAC2017 (v1.0.3) model runs.

2.3.2.2. Other Mobile Sources

Other Mobile Sources encompass a wide variety of off-road equipment. The major categories include aircraft; locomotives; commercial and recreational marine vessels; agricultural, construction and lawn and garden equipment; off-road recreation vehicles, and a wide variety of equipment from hedge trimmers to cranes.

CARB estimates the majority of off-road emissions using a suite of emission estimation models and methods. The OFFROAD model is an integrated statewide mobile source emissions model that estimates population, activity, and emissions for specific categories of equipment and fuel types at the county level. OFFROAD is used to generate base year emissions and to project changes in future inventories of Other Mobile Sources emissions.

For some off-road equipment, the OFFROAD model is being replaced by category-specific methods and inventory models developed by CARB for specific regulatory projects, such as Off-Road Equipment (Construction, Industrial, Ground Support and Oil Drilling), Cargo Handling Equipment, Transport Refrigeration Units, Commercial Harbor Craft, Ocean-going Vessels and Locomotives.

Additional information on CARB's Off-Road Emissions Inventory Program and the OFFROAD and other emission inventory models is available on CARB's website at: https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory and in Appendix A of the 2022 AQMP.

In addition to the Other Mobile Sources categories estimated by CARB, the District estimates emissions from civil and commercial aircraft and military aircraft and vessels.

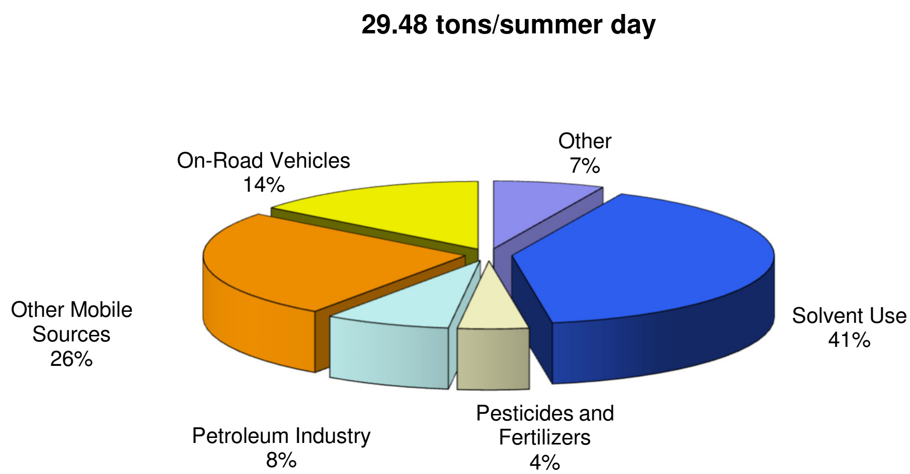
Table 2-3 presents 2018 baseline planning day emissions by major source category for the Ventura County portion of the SCCAB. A more detailed summary of ROG and NOx emissions can be found in Appendix A. Figure 2-2 and Figure 2-3 exhibit those emissions in percentages of ROG and NOx by major source category in the nonattainment area.

Table 2-3
2018 Baseline Planning Day Emissions
by Major Source Category

Ventura County South Central Coast Air Basin (SSCAB) Major Source Category Name	(tons/summer day) ROG	 NOx
Stationary Sources		
Fuel Combustion	**0.12**	**1.57**
Waste Disposal	**0.79**	**0.07**
Cleaning And Surface Coatings	**4.18**	**0.00**
Petroleum Production And Marketing	**2.28**	**0.10**
Industrial Processes	**0.54**	**0.06**
Total Stationary Sources	**7.91**	**1.79**
Area-wide Sources		
Solvent Evaporation	**9.10**	**0.00**
Miscellaneous Processes	**0.59**	**0.58**
Total Area-wide Sources	**9.69**	**0.58**
Mobile Sources		
On-Road Motor Vehicles	**4.28**	**7.03**
Other Mobile Sources	**7.60**	**8.66**
Total Mobile Sources	**11.88**	**15.69**
Total SCCAB	**29.48**	**18.07**

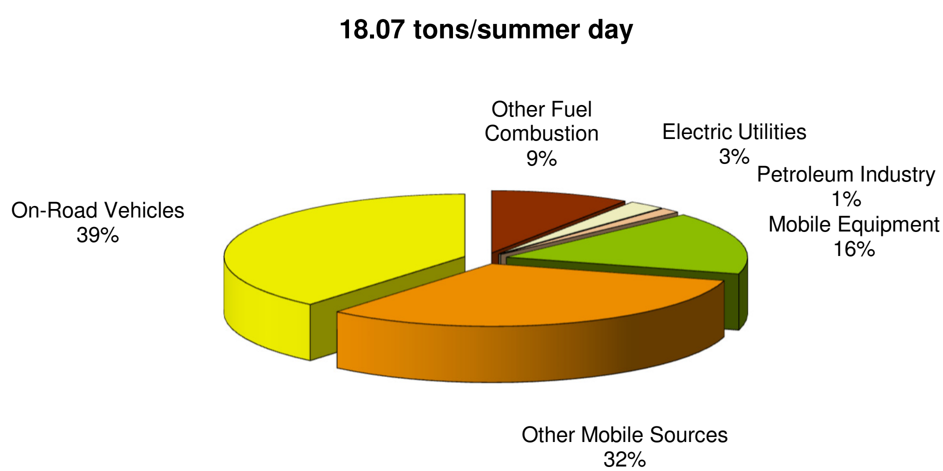
Notes:
Source: CEPAM v1.01 (March 2022).
Excludes OC1, OC2, and Natural Sources.
Data rounding may affect totals.

Figure 2-2
Ventura County 2018 Planning Day
ROG Emissions Inventory



Reference:
CARB CEPAM v1.01 (March 2022).
Natural sources, OC1, and OC2 excluded.

Figure 2-3
Ventura County 2018 Planning Day
NOx Emissions Inventory



Reference:
CARB CEPAM v1.01 (March 2022).
Natural sources, OC1, and OC2 excluded.

2.4. Ventura County Marine Emissions Inventory

Marine emission sources include those in both the State Tidelines region of Ventura County and those in the OC1 and OC2 Air Basins. Examples of marine-related activities include ocean-going vessels, commercial harbor craft, and recreational boats. Also included are military aircraft operating out of Naval Base Ventura County (NBVC) and onshore cargo handling equipment at the Port of Hueneme.

Emission sources related to marine activities are a significant part of the overall base year emissions inventory for Ventura County. CARB undertook an extensive process to develop a new statewide emissions inventory for several important categories of marine emission sources used for the 8-hour Ozone SIP and ozone attainment modeling. CARB staff, in cooperation with local air districts, developed a consistent statewide emissions estimation methodology for Ocean-going Vessels, Commercial Harbor Craft, and Cargo Handling Equipment operating in California coastal waters, ports and inland waterways. The methodologies reflect updated vessel population and operational data, engine characteristics and emission factors.

2.4.1. Ventura County Marine Emissions in the SCCAB

Coastal emission sources (i.e., within three miles of the shoreline) in the Ventura County portion of the SCCAB in Table 2-3 are represented in Other Mobile Sources emission categories, including Ocean-going Vessels, Commercial Harbor Craft, Recreational Boats, Aircraft and Cargo Handling Equipment in the Off-Road Equipment category. Coastal marine emissions are shown in Table 2-4. Cumulatively these categories accounted for 3.67 tons/day of ROG and 3.39 tons/day of NOx in 2018, 12 percent of the total ROG and 19 percent of total NOx in the SCCAB.

Table 2-4
2018 SCCAB
Marine Planning Day Emissions

Ventura County	(tons/summer day)	
Emission Category	**ROG**	**NOx**
Ocean-going Vessels	0.05	1.31
Commercial Harbor Craft	0.10	1.14
Recreational Boats	3.04	0.52
Aircraft	0.48	0.39
Cargo Handling Equipment	0.00	0.03
Total SCCAB Marine Emissions	**3.67**	**3.39**

Notes:
CEPAM2022 v1.01 (March 2022).

Ocean-going vessels include large commercial vessels calling on Port Hueneme (auto carriers, bulk cargo carriers, container vessels, passenger vessels, roll-on/roll off vehicle carriers, refrigerated cargo vessels, and tankers) and military vessel operations occurring at the U.S. Naval facilities at the Port of Hueneme, as well as some non-military vessels utilizing Ventura County Naval facilities. Ocean-going vessels generated 1.31 tons/day NOx in 2018 in coastal waters, 39 percent of total coastal NOx in 2018, with over 75 percent from commercial marine vessels. The majority of the commercial marine vessels are auto carriers, container vessels, and refrigerated produce vessels. Some container vessels may carry refrigerated cargo.

Commercial harbor craft include commercial and charter fishing vessels, excursion boats, tug and towboats, barges and dredges, crew and supply boats associated with the four offshore oil and gas production platforms, and military support and operations vessels, tugboats and other vessels utilizing U.S. Naval facilities at the Port of Hueneme. Commercial harbor craft (including military) contributed over 33 percent of coastal NOx in 2018, 1.14 tons/day. Non-military commercial harbor craft were responsible for 54 percent of commercial harbor craft NOx emissions in 2018. Most of the commercial boats in Ventura County are commercial fishing boats or charter fishing boats.

Recreational boats operate at the three ports, marinas, and lakes in Ventura County, and include vessels with outboard, inboard, and stern-drive engines, sailboat auxiliary engines, and personal watercraft. Recreational vessels accounted for 15 percent or 0.52 tons/day of the coastal NOx emissions in 2018 and 3.04 tons/day or 82 percent of the coastal ROG emissions.

Aircraft emissions are associated with military aircraft operations at the U.S. Naval facility at Point Mugu, including transports, jet aircraft, helicopters, and missile launches. Military aircraft activities were responsible for about 0.43 tons/day of coastal ROG emissions and 0.37 tons/day of NOx in 2018.

Cargo Handling Equipment in the coastal waters include port operations/cargo handling equipment operating in association with large commercial vessels calling at the Port of Hueneme, such as yard tractors, forklifts, cranes, loaders, and other material handling equipment. Although Cargo Handling Equipment contributed one quarter of coastal NOx in 2002, this emission source became subject to CARB's Cargo Handling Equipment Regulation in 2007 and contributed less than 1% of total coastal NOx emissions in 2018.

2.4.2. Outer Continental Shelf Air Basin Marine Emissions (OC1 and OC2)

Marine activities are the most significant emission sources in the OC1 and OC2 Air Basins (beyond three miles of the shoreline). Some stationary sources are present in the OC1 and OC2 basins due to the presence of four oil and gas platforms and the U.S. naval base on San Nicolas Island. As presented in Table 2-5, Figure 2-4, and Figure 2-5, emissions from other mobile sources emission categories, including ocean-going vessels and commercial harbor craft, comprised the vast majority of emissions in the OC1 and OC2 Air Basins, 13.5 tons/day or 98% of total NOx, and 97% of total ROG in 2018.

Ocean-going vessels encompass large commercial vessels operating in the Santa Barbara Channel shipping lanes offshore of Ventura County, including vessels calling on Port Hueneme or the ports of Los Angeles/Long Beach and transiting vessels passing through southern California waters but without calling at either port, and military vessels operating offshore and in the approach corridors to the Port of Hueneme and San Nicolas Island. Ocean-going vessels emitted 13.0 tons/day of NOx in 2018, 94% of total NOx in OC1 and OC2, as well as nearly 33% of total ROG. Virtually all emissions are from commercial vessels.

Commercial harbor craft include commercial fishing and charter vessels, excursion boats, tug and towboats, crew and supply boats affiliated with the offshore oil and gas production platforms, military support and operations vessels, and other vessels operating offshore and in the approach corridors to Port Hueneme and San Nicolas Island. Commercial harbor craft contributed 63% of offshore ROG and 3.8% of NOx in 2018. Commercial (non-military) vessels were responsible for 93% of NOx and 35% of ROG from commercial harbor craft and ocean-going vessels.

Aircraft emissions are associated with military aircraft operations at the U.S. Naval facility on San Nicolas Island, including transports, jet aircraft, and helicopters. Military aircraft activities were responsible for less than 1% of offshore ROG and NOx emissions in 2018.

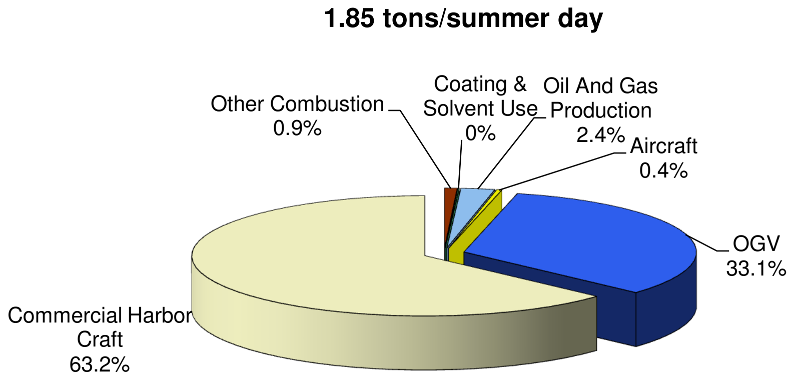
Stationary sources on the oil and gas platforms and the U.S naval base on San Nicolas Island were responsible for considerably less offshore emissions in 2018 than mobile sources, contributing 3% of total offshore ROG and 2% of NOx. Offshore emission sources contributing less than 3% of total offshore ROG or NOx include fuel combustion sources such as electric generating types of equipment, coatings and solvents ROG emissions from routine maintenance operations for the offshore oil and gas production platforms and the U.S. Naval facility on San Nicolas Island, and oil and gas production, all of which are associated with permitted point sources.

Table 2-5
2018 OC1 and 2 Baseline Planning Day Emissions
by Emissions Summary Category

Ventura County Outer Continental Shelf Air Basins (OC1 and OC2) Summary Category Name	ROG (tpd)	NOx (tpd)
Stationary Sources		
Fuel Combustion		
Oil And Gas Production (Combustion)	0.00	0.01
Service And Commercial	0.02	0.23
Total Fuel Combustion	**0.02**	**0.24**
Cleaning And Surface Coatings		
Coatings And Related Process Solvents	0.00	0.00
Total Cleaning And Surface Coatings	**0.00**	**0.00**
Petroleum Production And Marketing		
Oil And Gas Production	0.04	0.00
Petroleum Marketing	0.00	0.00
Total Petroleum Production And Marketing	**0.04**	**0.00**
Total Stationary Sources	**0.06**	**0.25**
Mobile Sources		
Other Mobile Sources		
Aircraft	0.01	0.03
Ocean-going Vessels	0.61	12.95
Commercial Harbor Craft	1.17	0.52
Total Mobile Sources	**1.79**	**13.50**
Total OC1 and OC2 Air Basins	**1.85**	**13.75**

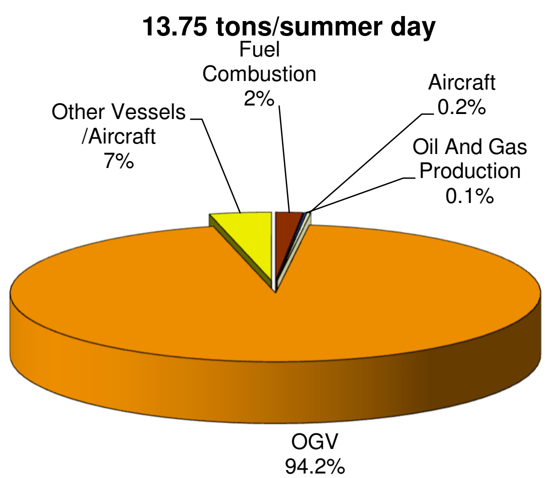
Notes:
Source: CEPAM2022 v1.01 (March 2022).
Excludes Natural Sources.
Data rounding may affect totals.

Figure 2-4
Ventura County 2018 Planning Day
ROG Emissions Inventory (OC1 and OC2 Air Basins)



Reference:
CARB CEPAM v1.01 (March 2022).
3 – 100 miles offshore. Includes both OC1 and OC2

Figure 2-5
Ventura County 2018 Planning Day
NOx Emissions Inventory (OC1 and OC2 Air Basins)



Reference:
CARB CEPAM v1.01 (March 2022).
3 – 100 miles offshore. Includes both OC1 and OC2

SECTION 3. CONTROL STRATEGY

This section presents the control strategy for the 2022 AQMP to achieve the 2015 federal 8-hour ozone standard. Since 1979, Ventura County's ozone strategy has been to use concurrent ROG and NOx emission reductions from stationary and mobile sources. Ventura County was the first area in the nation to institute a dual ROG/NOx strategy for meeting state and federal clean air standards for ozone.

The 2022 AQMP control strategy consists of a local component implemented by the District and a combined state and federal component implemented by CARB and EPA. The District has primary responsibility for regulating stationary sources, including some area sources, within Ventura County. CARB regulates on-road motor vehicles, some off-road mobile sources, and consumer products, and sets motor vehicle fuel specifications in California. EPA regulates emissions from locomotives, aircraft, heavy-duty trucks used in interstate commerce, and some off-road engines exempt from state authority or best regulated at the national level. State and federal laws prohibit local air districts from regulating mobile sources.

The District's component of the 2022 AQMP control strategy consists of cost-effective stationary source control measures, TCMs, and the District's voluntary mobile source incentive programs. Most of these local control program elements were in previous Ventura County clean air plans. California air agencies, including this air district, have aggressively pursued measures to meet state and federal clean air standards and have developed many of the most innovative and effective clean air strategies in the world.

Ventura County, along with other California air agencies, long ago implemented clean air measures that other parts of the country are just now considering. By 2002, the District fully implemented most of the local control measures in earlier Ventura County AQMPs, and most stationary sources in the county are now subject to stringent clean air regulations. Consequently, new local emission reductions are becoming ever smaller and often not economically or technologically feasible for sources in Ventura County.

CARB's component of the 2022 AQMP control strategy consists of its new 2022 State Strategy for the State Implementation Plan (State SIP Strategy), a comprehensive clean air strategy designed to achieve federal air quality standards through a combination of technologically feasible, cost-effective, and far-reaching measures. It describes the scope of California's ozone and fine particulate matter ($PM_{2.5}$) nonattainment problems and presents CARB staff's recommendations on how California can comply with federal clean air standards. The 2022 SIP Strategy was adopted by CARB September 22, 2022.

As elsewhere in California, Ventura County's ongoing progress towards clean air depends largely on current and proposed mobile source strategies under state and federal jurisdiction. District efforts will nonetheless remain crucial for Ventura County to attain and maintain state and federal clean air standards.

3.1. Stationary Source Control Measures

Stationary source control measures are comprised of equipment and techniques for reducing air pollutant emissions from stationary sources. Examples of stationary source control measures include vapor collection systems on gasoline and oil storage tanks, landfill gas recovery systems, low NOx burners on boilers, and replacing existing internal combustion engines with electric motors or cleaner engines, when feasible. Control measures provide the framework for District clean air rules that reduce ROG and NOx emissions. The Ventura County APCD List of Current Rules website lists all District rules referenced in this and other sections of the 2022 AQMP.

For the development of 2022 AQMP, APCD has used different years as baseline year inventory for the purpose of forecasting and regulatory decision making. Ventura County APCD and other federal 8-hour ozone nonattainment air quality agencies in southern California have used the 2018 as the base year for the emissions forecasting utilized in photochemical modeling. However, the 2017 is used as the base year for regulatory purposes such as Reasonable Further Progress (RFP) and Contingency Measure emission reduction requirements, as allowed by EPA.

Previous AQMPs include descriptions of control measures which have been incorporated into District rules. Those control measures which have been fully implemented before the 2018 base year are considered part of the baseline emissions for the 2022 AQMP. The District will continue to implement these measures as part of the EPA-approved SIP.

3.1.1. Control Measures with Emission Reductions Beyond the Base Year

This section presents ROG and NOx control measures already adopted as APCD rules but not fully implemented by the end of 2018, the base year for the 2022 AQMP. Table 3-1 presents these measures with expected emission reductions expressed in tons per day. The District will continue to implement these measures.

Table 3-1
Stationary Source Control Measures - Local Measures Only

Control Measure Number	Control Measure Name	District Rule	Year Adopted/ Amended	Year Fully Impl'd	Summer Planning Day Emissions Reductions (tons per summer day)		
					2018	2026	2040
ROG Control Measures							
R-433	Liquefied Petroleum Gas Transfer and Dispensing	74.33	2015	2020	0	0.0068	0.0066
R-314-2018	Adhesives and Sealants	74.20	2018	2023	0	0.0442	0.0438
R-303-2020	Architectural Coatings	74.2	2020	2021	0	0.0406	0.0428
R-330	Surface Cleaning and Degreasing	74.6	2020	2022	0	0.0152	0.0157
R-414-2021	Transfer of Reactive Organic Compound Liquids	71.3	2021	2022	0	0.0137	0.0206
Total ROG Control Measure Emissions Reductions						0.1205	0.1295
NOx Control Measures							
N-102-2012	Boilers, Steam Gen., Heaters <1MMBTU	74.11.1	2012	2023	0	0.0068	0.0062
N-105-2012	Boilers, Steam Generators, Heaters 1-2 MMBTU (2012)	74.15.1	2012	2022	0	0.0001	0.0001
N-105-2015	Boilers, Steam Generators and Process Heaters 2-5 MMBTU	74.15.1	2015	2025	0	0.0022	0.0023
N-113	Natural Gas-Fired Water Heaters <75,000 BTU/hr	74.11	2010	2020	0	0.0459	0.0491
N-114	NOx Reductions from Miscellaneous Sources	74.34	2016	2020	0	0.0491	0.0491
N-101-2019	Stationary Gas Turbines	74.23	2019	2024	0	0.1898	0.1250
N-115	Boilers, Steam Generators and Process Heaters	74.15	2020	2027	0	0.0172	0.0255
Total NOx Control Measure Emissions Reductions					0	0.3111	0.2573

Notes:
Data rounding may affect displayed values and totals.
This table does not list control measures fully implemented before 2018.
Emission reductions shown are relative to 2018 baseline inventory.

3.1.2. Further Study Control Measures

Further study measures are emission control methods that are not proposed for adoption as District rules at this time, due to inconclusive information about their technical feasibility, economic feasibility, or appropriateness for Ventura County. District staff will evaluate these measures and will adopt them as District rules using the normal rule adoption process if they prove feasible and appropriate for Ventura County.

CH&SC 40914 requires that the District's clean air plan for the California ambient ozone standards include expeditious implementation of "every feasible measure" to reduce ozone precursor emissions, ROG and NOx. Measures that help Ventura County attain the state ozone standard also help the county attain the federal 8-hour ozone standard.

District staff reviewed the District's rules for its periodic rule evaluation for the California Clean Air Act. This review determined that the existing rules listed in Table 3-2, Further Study Control Measures, have potential for enhancement, thereby realizing additional emission reductions for both the federal and state ozone standards. In addition, staff identified potential new rules to control emissions from vacuum truck operations and minimize the use of industrial flares. Consequently, the further study control measures listed in Table 3-2 will serve a dual purpose.

They will serve as potential measures for the District's federal 8-hour ozone plan and to meet the "every feasible measure" requirement for the state ozone standard. The emission reduction potential of these measures is unknown at this time but is potentially significant in total. The District commits to evaluate the feasibility of each of the measures listed in Table 3-2 for Ventura County. For measures found feasible, District staff will provide emission reduction estimates prior to rule adoption.

Table 3-2
Further Study Control Measures

District Rule	Control Measure Name or Rule Title	Control Measure Description
74.35	Flare Minimization	**N-608, R-608**: Reduce ROG and NOx emissions from flares at landfills, wastewater treatment plants, oil and gas facilities and facilities that handle ROG containing liquids
74.22	Fan-Type Central Furnaces	**N-110-2016:** This control measure would reduce NOx emissions from fan-type central furnaces rated at less than 175,000 BTU per hour heat input capacity

District Rule	Control Measure Name or Rule Title	Control Measure Description
74.32	Composting and Organic Material Conversion Operations	**R-607:** Minimize ROG emissions through inadvertent decomposition during chipping and grinding activities and during greenwaste composting operations
74.36	Oil Well Degassing	**R-432:** Minimize ROG emissions from rod pump oil well degassing
70	Storage and Transfer of Gasoline	**R-431**: Consider semi-annual testing for high volume stations, operation and maintenance manuals, and 98% control efficiency for Phase I (ROG)
70	Storage and Transfer of Gasoline	As suggested in Technical Support Document for the 2014 RACT SIP, consider reducing emission limit for gasoline transfer from bulk tank to delivery trucks similar to Bay Area AQMD Rule 8-33, *Gasoline Bulk Terminals and Gasoline Cargo Tanks* (ROG)
71	Crude Oil and Reactive Organic Compound Liquids	Revise rule to set lower leak definition thresholds similar to SCAQMD Rule 463, *Storage of Organic Liquids* (ROG)
71.1	Crude Oil Production and Separation	Revise rule to meet requirements in 2016 Control Techniques Guidelines (CTG) for the Oil and Natural Gas Industry ("2016 Oil and Gas CTG") (EPA-453/B-16-001) if determined to be required
71.2	Organic Liquid Storage and Transfer	Revise rule to meet requirements in 2016 Oil and Gas CTG (EPA-453/B-16-001) if determined to be required
74.6.1	Batch Loaded Vapor Degreasers	**R-331**: Revise rule to limit vapor degreaser solvent to 25 grams ROG per gallon (ROG)
74.9	Stationary Internal Combustion Engines	**N-108-2024**: Revise rule to set new NOx emission limits consistent with SJVUAPCD Rule 4702, *Internal Combustion Engines* (NOx)
74.13	Aerospace Assembly and Component Manufacturing Operations	Revise rule to reduce ROG emissions from coatings used on aerospace components by establishing ROG limits for certain new coating categories and reducing the allowable ROG content for several existing coating categories similar to SCAQMD Rule 1124, *Aerospace Assembly and Component Manufacturing Operations*, and SJVAPCD Rule 4605, *Aerospace Assembly and Component Manufacturing Operations* (ROG)

District Rule	Control Measure Name or Rule Title	Control Measure Description
74.14	Polyester Resin Operations	Revise rule to include a small source exemption limit of 50 gallons per year, consistent with Santa Barbara County APCD Rule 349, *Polyester Resin Operations* (ROG)
74.19.1	Screen Printing Operations	Revise rule to limit screen printing cleaners to 100 grams per liter consistent with SCAQMD Rule 1171, *Solvent Cleaning Operations* (ROG)
74.20	Adhesives and Sealants	Revise rule to align ROG content limits with proposed revisions to SCAQMD Rule 1168, *Adhesive and Sealant Operations* (ROG)
74.21	Semiconductor Manufacturing	Revise rule to reduce allowable ROG content of solvents used in regulated operations so the limits are similar to SCAQMD Rule 1164, *Semiconductor Manufacturing* (ROG)
74.25	Restaurant Cooking Operations	Revise rule to limit NOx from commercial food preparation ovens similar to SCAQMD Rule 1153.1, *Emissions of Oxides of Nitrogen From Commercial Food Ovens* (NOx)
74.26 & 74.27	Storage Tank Degassing Operations	Revise both rules to establish new limits and expand applicability to smaller tanks, pipelines and cleaning equipment consistent with SCAQMD Rule 1149, *Storage Tank and Pipeline Cleaning and Degassing* (ROG)
TBD [a]	Wastewater Treatment Plants	**R-605**: New rule to reduce ROG emissions from wastewater aeration by requiring steam stripping at the point of generation or capturing and controlling ROG emissions at wastewater treatment plants (ROG)
TBD[a]	Vacuum Truck Operations	Adopt a new rule to limit ROG emissions from vacuum truck operations similar to Bay Area AQMD Rule 8-53, *Vacuum Truck Operations* (ROG)

Note: [a] To be determined.

The District has completed the preliminary evaluation of four of these further study measures (N-608/R-608, N-110-2016, R-607, and R-432) and is in the process of either a more comprehensive evaluation or rulemaking. The new measures are either a revision to an existing District rule or a new rule applicable to a previously unregulated source category. The emission forecasts do not reflect emission reductions from these measures.

N-608 and R-608, Flare Minimization: This control measure is a new rule to reduce ROG and NOx emissions from flares at landfills, wastewater treatment plants, oil and gas facilities and facilities that handle ROG containing liquids. The emission standards are similar to South Coast Air Quality Management District (SCAQMD) Rule 1118.1, *Control of Emissions from Non-Refinery Flares* and San Joaquin Valley APCD (SJVAPCD) Rule 4311, *Flares*. The applicability is based on the equipment's annual fuel throughput meeting specific thresholds. Restricting the applicability of the emission limits to sources with greater utilization improves the cost-effectiveness of the proposed rule.

Rule 1118.1 was adopted January 4, 2019 and restricted the NOx and ROG emissions from flaring equipment. Out of the 288 flares located at 146 facilities in SCAQMD jurisdiction, the adoption of Rule 1118.1 required 28 flares to be upgraded, reducing NOx emissions by 0.28 tpd. Cost effectiveness for this rule was estimated between $30,179 and $50,338 per ton of NOx reduced.

In Ventura County there are 63 permitted flares of which 4 would be exempt due to their small size and 49 would not be required to reduce emission concentrations due to either meeting proposed standards or the annual throughput would not exceed cost-effectiveness thresholds. Preliminary calculations for this source category in APCD jurisdiction indicate a possible NOx emission reduction of 0.020 tons per day, and a possible ROG emission reduction of 0.018 tons per day.

The District is required to review this rule as part of an expedited BARCT process due to requirements in California state Assembly Bill 617 (AB617).

Proposed District Rule: 74.35
Proposed Rule Adoption Date: 2022
Proposed Rule Implementation Date: 2024
Required Board Action: Adoption of a new rule
Cost-effectiveness: $30,000 per ton NOx reduced
Estimated Control Efficiency: 5%
Estimated Emission Reductions: 0.02 tons NOx per day, 0.018 tons ROG per day

N-110-2016, Fan-Type Central Furnaces: This control measure would reduce NOx emissions from fan-type central furnaces rated at less than 175,000 BTU per hour heat input rate through revisions to District Rule 74.22, *Natural Gas Fan-Type Central Furnaces.* SCAQMD revised its Rule 1111, *NOx Emissions from Natural Gas-Fired, Fan-Type Central Furnaces,* applicable to similar source equipment, on November 6, 2009, reducing the NOx limit from 40 nanograms per joule (ng/j) to 14 ng/j.

This control measure was included in the APCD 2016 AQMP, but adoption was delayed while determining whether the technology forcing amendments to SCAQMD Rule 1111 were achievable. Due to uncertainties in technical feasibility, APCD will not adopt the rule until all limits in revised SCAQMD Rule 1111 are achieved in practice. Implementation of the new SCAQMD limits began on April 1, 2015 and ends on October 1, 2023.

This control measure affects new or replacement units through a sales prohibition and certification requirements. Due to the lifespan of regulated equipment of 20-25 years, the low-emission units will not achieve saturation of the in-use sources until 2045 or later.

District Rule: 74.22
Rule Adoption Date: 2022
Rule Implementation Date: 2023
Required Board Action: Adoption of a rule revision
Cost-effectiveness: Between $10,000 and $16,000 per ton of NOx reduced
Estimated Control Efficiency: 65% (overall)
Estimated Emission Reductions: 0.41 tons per day (overall, full saturation), NOx

R-607, Composting and Organic Material Conversion Operations: This control measure was included in the 2016 AQMP to implement new District Rule 74.32, *Composting and Organic Material Conversion Operations*, to incorporate requirements similar to SCAQMD) Rules 1133.1, *Chipping and Grinding Activities*, and 1133.3, *Emission Reductions from Greenwaste Composting Operations*. Since it has been last included in the previous 2016 AQMP, concerns about meeting state organic waste diversion targets in addition to an evolving landscape of data have delayed implementation of this control measure. The purpose of this control measure is to minimize ROG emissions through inadvertent decomposition during chipping and grinding activities (as Rule 1133.1) and during greenwaste composting operations (as Rule 1133.3).

Rule 1133.1 was revised July 8, 2011 to establish Best Management Practices (BMP) for chipping and grinding of greenwaste to produce materials other than compost material, and to better manage stockpile operations associated with chipping and grinding activities, consistent with greenwaste processing requirements established in the state regulation Title 14 of the California Code of Regulations. Rule 1133.1 covers 70 facilities in the SCAQMD. Emission reductions were not quantified for the rule revisions.

Rule 1133.3 was adopted as a new rule on July 8, 2011, to establish operational BMP for greenwaste composting operations that produce compost material and applies to greenwaste composting operations involving greenwaste, wood waste, manure, or food waste. Rule 1133.3 affects 17 facilities in that region and is estimated to reduce 0.9 tons of ROG per day from greenwaste composting operations. Cost-effectiveness was estimated to be $1,340 per ton of ROG reduced.

Greenwaste composting is an increasing source of ROG emissions in California. Ventura County has several greenwaste composting facilities to which this new rule could apply. However, the

District does not currently require air permits for such facilities and none of the existing facilities are in the District's emission inventory system. If this new rule were adopted, District permit rules would have to be amended to require that composting facilities obtain District air permits. Air emissions associated with the facilities are included District's emission inventory.

Concerns remain about meeting state organic material diversion targets, organic material decomposition emissions calculations and offsets which may be required by the permitting of subjected facilities. This new rule will be adopted only if subsequent analysis demonstrates it to be appropriate and cost-effective in Ventura County.

Proposed District Rule: 74.32
Proposed Rule Adoption Date: 2023
Proposed Rule Implementation Date: 2024
Required Board Action: Adoption of a new rule
Cost-effectiveness: $1,340 per ton of ROG reduced (overall)
Estimated Control Efficiency: 41%
Estimated Emission Reductions: 0.28 tons per day, ROG

R-432 Oil Well Degassing: This control measure is a new rule to minimize ROG emissions from rod pump oil well degassing. The emission standards are based on SCAQMD Rule 1148.1, *Oil and Gas Production Wells*.

Rule 1148.1 was originally adopted on March 5, 2004, and it requires the control of emissions from petroleum well degassing with at least 95% control efficiency. Conversations with SCAQMD staff confirm this is achieved through the routing of well gas to portable combustion equipment or through carbon adsorption systems.

There are approximately 1,692 active rod pump oil wells in Ventura County, each of which can be expected to degas once every 3 years for routine maintenance. Due to the frequency and the large volumes vented to the atmosphere, the preliminary estimates for this rule are estimated to reduce emissions by up to 47.3 tons of ROG per year. Due to regionally specific considerations for this source category, this regulation would only be adopted if considered technologically feasible and cost effective.

New District Rule: 74.36
New Rule Adoption Date: 2025
New Rule Implementation Date: 2027
Board Action: Adoption of a new rule
Cost-effectiveness: $22,000 per ton of ROG reduced
Estimated Control Efficiency: 95%
Estimated Emission Reductions: 0.13 tons per day (ROG)

3.1.3. Reasonably Available Control Technology

CAAA sections 182(b)(2) and 182(f) (42 U.S.C. §7511a) require ozone nonattainment areas to implement Reasonably Available Control Technology (RACT) for sources that are subject to CTGs and for "major sources" of ROG and NOx, which are ozone precursors. RACT is the lowest emissions limitation that a particular source is capable of meeting by application of control technology that is reasonably available considering technological and economic feasibility (44 FR 53762; September 17, 1979).

RACT requirements are included in the CAAA to ensure that significant source categories at major sources of ozone precursor emissions are controlled to a "reasonable" extent, but not necessarily to the more stringent best available control technology (BACT), best available retrofit control technology (BARCT), or lowest achievable emission rate (LAER) levels, expected for new or modified existing major stationary sources. CTGs are EPA documents that define RACT for existing sources of air pollution. Emission sources covered by CTGs are termed CTG sources.

3.1.4. 2020 RACT SIP

According to the EPA's *Final Rule to Implement the 8-Hour Ozone NAAQS* (83 FR 62998; December 6, 2018), areas classified as moderate nonattainment or higher must submit a demonstration that their current rules fulfill 8-hour ozone RACT for all CTG categories and all major, non-CTG sources as a revision to their SIPs. RACT SIP submittals are in addition to the 8-hour ozone attainment plans. The RACT SIPs were due to EPA by August 3, 2020.

The District approved its RACT SIP on July 14, 2020 and sent it to CARB for submittal to EPA. CARB submitted the District's RACT SIP to EPA on July 28, 2020 and EPA has yet to take action to approve it. The RACT SIP found that all District rules subject to RACT review fulfill RACT requirements for the 8-hour ozone NAAQS.

The rules meet RACT, or more commonly, exceed RACT because they comply with more current and stringent control requirements of the California Clean Air Act. The 2020 RACT SIP also found that all CTG sources and major non-CTG sources within District boundaries meet or exceed RACT. These findings are not surprising since Ventura County has had a very aggressive clean air program for many years.

3.1.5. Updated CTGs

The CAAA requires the EPA to revise RACT, update existing CTG documents, or develop new documents on a frequent basis to provide states and local clean air agencies with the most current technical information and assist them in determining RACT.

District staff evaluated the CTGs updated since the last RACT analysis was performed in 2014, during the 2020 RACT SIP development process. During this evaluation District staff determined the only CTG updated in 2016, which applies to sources in the District, is the CTG for the Oil and

Natural Gas Industry in October 2016. In order to avoid the need for individual air districts to submit individual RACT SIP revisions, CARB submitted the state Oil and Gas Methane Regulation as a statewide SIP revision. The statewide SIP revision, in combination with District rules and a Memorandum of Agreement between CARB and the District to implement and enforce GHG emission standards within Ventura County, were determined to satisfy the RACT requirement for this source category for Ventura County during development of the 2020 RACT SIP.

On September 30, 2022, EPA published a final rule in the Federal Register, 87 FR 59314, enacting a limited approval and limited disapproval of California Code of Regulations, Title 17, Division 3, Chapter 1, Subchapter 10 Climate Change, Article 4, Subarticle 13: Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities (Oil and Gas Methane Rule) into the California State Implementation Plan (SIP). These revisions concern emissions of volatile organic compounds (VOCs) from crude oil and natural gas facilities. Under the authority of the Clean Air Act (CAA or the Act), this action simultaneously approves a state rule that regulates these emission sources and identifies deficiencies with the rule that must be corrected for the EPA to grant full approval of the rule.

EPA also finalized disapprovals of the RACT demonstrations for the 2008 and 2015 ozone NAAQS for sources covered by the EPA's 2016 Control Techniques Guidelines for the Oil and Natural Gas Industry for the Sacramento Metropolitan Air Quality Management District (SMAQMD), San Joaquin Valley Air Pollution Control District (SJVAPCD), South Coast Air Quality Management District (SCAQMD), Ventura County Air Pollution Control District (VCAPCD), and the Yolo-Solano Air Quality Management District (YSAQMD). The EPA rule was effective October 31, 2022.

District staff are working with CARB to determine if any changes are needed to District Rule 71.1 and Rule 71.2 to meet RACT requirements. Any needed amendments will be adopted expeditiously to ensure District rules meet RACT.

3.1.6. New Source Review

NSR is a permitting program required by the CAAA to help ensure that new or modified equipment and facilities (e.g., boilers, turbines, crude oil storage tanks, power plants, and factories) do not significantly degrade air quality or slow progress towards clean air. NSR permits are legally binding documents that specify what can be constructed, what emission limits must be met, and how emission sources must be operated. The primary components of NSR are BACT and emission offsets. The District's Engineering Division administers the District's NSR program. Further information regarding NSR is available on EPA's NSR website. Further information about the District's air permitting program is available on the District's Engineering Division website.

BACT is an emission limitation based on the maximum degree of reduction for each regulated air pollutant emitted from, or resulting from, any new or modified stationary source. It is generally determined on a case-by-case basis, taking into account energy, environmental and economic impacts, and other costs. Emission reduction credits (ERC) are banked emission reductions available to offset emission growth from new, replacement, modified or relocated emissions units.

The District implements NSR through District Rule 26, *New Source Review*. Rule 26, which includes Rule 26 through 26.13, applies to new sources of air pollution and to modifications, replacements, and relocations of existing sources. The provisions of Rule 26 are applicable on a pollutant-by-pollutant and an emissions-unit-by-emissions-unit basis. Rule 26 requires that source owners and operators apply BACT to minimize air emissions from these sources. BACT is determined on a case-by-case basis by District staff during the permit approval process. Rule 26 also requires that certain emission increases be offset with emission decreases. However, it allows banking of certain emission decreases as ERCs for later use as offsets.

3.1.7. Control Measures Not Retained in the 2022 AQMP

Previous AQMPs contained stationary source control measures to help attain the federal and state 1-hour and 8-hour ozone standards. This section presents stationary source control measures identified in previous AQMPs but not retained in the 2022 AQMP. Table 3-3 lists these measures. In each case, the District has not adopted the measure as a District rule because the measure became obsolete or infeasible for Ventura County based on technological or economic considerations. Additionally, for the reasons given with each measure, no emission reductions would be lost by not retaining it in the 2022 AQMP. The following discussion includes a brief description of each measure and the reason for not retaining it in the 2022 AQMP.

N-27 Boilers, Steam Generators, and Process Heaters: This control measure was originally included as Control Measure N-27 (Boilers, Steam Generators and Process Heaters) in the District's 1987 AQMP. The adoption of Rule 74.15 exceeded N-27 requirements by implementing portions of two additional further-study control measures, N-2 (Thermally Enhanced Oil Recovery Steam Generators), and N-23 (External Combustion NOx Control) and established a NOx emissions limit of 40 ppm for affected equipment. A potential Boiler, steam generator, and process heater rule was included as a "further study" measure in the District's 2016 AQMP

The District adopted control measure N-115 as an amendment to Rule 74.15, *Boilers, Steam Generators and Process Heaters*, on November 10, 2020. During the rulemaking process it was determined retrofit of the regulated equipment was cost effective if implementation was required at the time of next burner replacement. The adopted rule revisions limit NOx from affected modified natural gas equipment to 12 ppm or less. Analysis indicates all emission reductions will be achieved by 2027 so no emission reductions will be lost by not retaining control measure N-27.

Table 3-3
Control Measures Not Retained in the 2016 AQMP

Control Measure Number	Control Measure Name	Reason
N-27	Boilers, Steam Generators, and Process Heaters	Accomplished by implementation of control measure N-105

3.2. Transportation Control Measures

Transportation Control Measures (TCMs) are strategies that reduce motor vehicle emissions by reducing vehicle trips, vehicle use, vehicle miles traveled (VMT), vehicle idling, and traffic congestion. The Clean Air Act (CAA) requires TCMs to meet milestones and help demonstrate attainment of the National Ambient Air Quality Standards (NAAQS). TCMs are based on the Southern California Association of Government's (SCAG) adopted Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) and Federal Transportation Improvement Program (FTIP).

The following strategies include some of the most common TCMs that can reduce emissions from transportation sources. These strategies were also included in the 2007 and 2016 AQMPs.

Trip Elimination: This strategy reduces vehicle emissions by eliminating vehicle trips. The primary emissions eliminated are the cold-start emissions that occur when vehicle engines have been at rest for a period and then restarted. Cold-start emissions occur after engine startup but before the engines are warm enough for the emission control systems to work effectively. Cold-start emissions are a large percentage of total vehicle emissions and thus a major source of ozone precursors. Telecommuting, carpooling, combining trips, flexible work schedules, and land use policies that provide housing near jobs and shopping centers are measures that eliminate vehicle trips.

Vehicle Substitution: This strategy reduces emissions associated with motor vehicle use by using non-motorized transportation modes that do not produce air emissions. Walking, biking, and telecommuting measures are all examples of vehicle substitution. Adopting trip reduction ordinances to encourage installation of walking and biking facilities and discourage motor vehicle use in highly congested areas are measures to reduce air pollutants.

Vehicle Miles Traveled Reduction: This strategy reduces motor vehicle emissions because vehicles traveling fewer miles produce fewer emissions. This strategy does not reduce cold-start emissions. However, park-and-ride lots, carpooling, and land-use measures are all ways to reduce trip distances and, therefore, vehicle miles traveled and vehicle emissions.

Vehicle Occupancy: Increasing the number of passengers per vehicle can reduce all emissions associated with motor vehicle use. Transit, carpools, and vanpools are all measures to implement this strategy. Other measures include providing ride-match services to establish carpools and vanpools, restricting roads for high occupancy vehicles and passenger buses, establishing employer-based transportation management programs that encourage carpooling, vanpooling and transit use among employees.

Technological Improvements: This strategy reduces emissions through technological improvements to the operation of motor vehicles and the technologies used to improve the performance of transportation systems. Technological improvements such as clean-fuel/electric vehicles, vehicle emission controls, and global positioning system tracking devices used in vehicles that reduce trips and VMT multiply the emission reduction benefits. In addition, Intelligent Transportation Systems (ITS), signal synchronization and freeway management systems, and programs to control the extended idling of vehicles are technological measures to improve the performance of transportation systems and reduce emissions as well.

3.2.1. Transportation Control Measures Project Categories

This section presents the TCMs in the 2022 AQMP. The TCMs are grouped by project categories under the District's "umbrella" control measure R-700/N-700, Transportation Control Measures, retained from the 1994, 2007, 2016 AQMPs. To be included in the AQMP, potential TCM projects must be in SCAG's Regional Transportation Plan/Sustainable Communities Strategies (RTP/SCS) and Federal Transportation Improvement Program (FTIP).

Candidate projects are first screened by the District, Ventura County Transportation Commission (VCTC), and SCAG staff to determine if they are TCMs as defined by the project categories listed in Table 3-4 and SCAG's FTIP Guidelines. SCAG's Transportation Conformity Working Group, the local agency group responsible for interagency consultation confirms the projects as TCMs and the TCMs are subsequently programmed into the FTIP.

The interagency consultation process is part of the federal transportation conformity regulation that requires procedures for federal, state, and local air districts and transportation agencies to consult with each other on transportation plans, programs, and projects. Transportation conformity is a regulatory process to help ensure that transportation plans, programs, and projects are consistent with air quality goals of the AQMP. District Rule 221, *Transportation Conformity*, contains a memorandum of understanding that outlines the interagency consultation process. Further information regarding transportation conformity is presented later under the Conformity section.

Table 3-4
TCM Project Categories Included in R-700/N-700

Project Category
A. Ridesharing Measures Carpooling, Vanpooling, Park and Ride Lots, Ride Matching Services, Incentive Programs, Guaranteed Ride Home Programs, Station Cars, Onsite Services
B. Non-Motorized Measures Bicycle Paths/Facilities, Pedestrian Paths/Facilities, Telecommuting, Flexible Work Schedules, Bicycle and Pedestrian Programs, Satellite Work Centers
C. Traffic Flow Improvement Measures Signal Synchronization, Intersection Improvements, Incentive/Disincentive Programs, High Occupancy Vehicle Lanes, Intelligent Transportation Systems, Ramp Metering
D. Land Use Measures Transportation Demand Management (TDM) Ordinances, Smart Growth/Sustainable Community Projects, Mixed Use Development, Parking Management and Standards, Congestion Management Plan, TDM Strategies
E. Transit Measures Bus Fleet Expansion, Shuttles and Paratransit Vehicles Expansion, Transit Stations and Facilities, Express Busways, Passenger Rail Service, Rail Stations and Facilities, Real-Time Transit Information Systems, Transit Subsidies

3.2.2. The RTP/SCS and FTIP

The Regional Transportation Plan (RTP) is a long-range (2020-2045) transportation plan, covering a period of 25 years that provides a blueprint for future transportation improvements and investments based on specific transportation goals, objectives, policies, and strategies. The RTP, which is based on federal transportation law, identifies the strategies needed to meet mobility, financial, and air quality requirements in the SCAG region.

The Sustainable Communities Strategy (SCS) was introduced as part of the 2012 RTP. The SCS supports the State's required greenhouse gas (GHG) emission reduction targets for the region that is set by CARB. SCAG develops the transportation and land-use planning patterns and goals through the RTP and SCS and coordinates among various committees and local governments to allow the region to meet its GHG reduction targets. Once the SCS is adopted by SCAG, as part of the RTP/SCS approval process, CARB reviews the adopted SCS and determines whether its implementation will meet the regional GHG emission reduction targets.

The recently adopted 2020 RTP/SCS (also known as Connect SoCal) is the prevailing multi-modal plan outlining a better regional transportation system, integrated with the best possible growth pattern for the region out to year 2045. The plan provides the basic policy and program framework for long-term investment in the region's vast transportation system in a coordinated, cooperative, and continuous manner.

Transportation investments in the SCAG region that receive state or federal transportation funds must be consistent with the RTP/SCS and must be included in the SCAG FTIP when ready for funding. SCAG's 2020 RTP/SCS provides the basis for the transportation control strategy of the 2022 AQMP and includes the total regional emissions forecasts from transportation projects in Ventura County. SCAG is the Metropolitan Planning Organization responsible for updating the RTP/SCS every four years.

The FTIP is the short-term transportation program, with a six-year planning horizon, that identifies specific transportation projects that will implement the overall goals of the RTP/SCS. All transportation projects that receive approval and funding must be listed and programmed in the FTIP. TCMs are also listed and programmed in the SCAG FTIP.

3.2.3. TCM Commitments

The AQMP enforceable commitments for TCMs (called TCM Commitments) are the TCM projects scheduled in the first two years of the current six-year FTIP.

EPA's conformity regulation requires that all TCM commitments undergo a timely implementation analysis at each FTIP update. The timely implementation requirement assures that TCMs are implemented on schedule. The timely implementation report tracks each committed TCM and demonstrates their timely implementation and completion.

Appendix B, *Ventura County TCM Commitments*, presents the projects identified by SCAG and the District as the current TCM Commitments for Ventura County and thus, subject to the timely implementation requirement of Transportation Conformity (discussed below).

3.2.4. TCM Rollover and Substitution

SCAG is responsible for updating the FTIP every two years. At each FTIP update, a new list of TCM commitments comprising of new TCMs (only TCMs in the first two years of the update), plus ongoing TCM commitments from the previous FTIP, are rolled over to automatically update the State Implementation Plan (SIP) upon approval by CARB and EPA. This "rollover" list, consisting of new and ongoing TCM projects, becomes the committed TCMs for tracking timely implementation.

TCM commitments are monitored for compliance according to the scheduled completion date established in the new FTIP. Once a TCM project is completed, it is reported in the next FTIP update as completed and removed from future FTIPs. FTIP updates can occur more frequently than the required biennial update in the form of amendments. However, the rollover process applies when the FTIP update requires a conformity analysis and finding, typically every two years.

A TCM substitution is required when a committed TCM project cannot be completed or will be significantly delayed. The VCTC and/or the project sponsor must notify SCAG of the problem and propose a substitute TCM project or group of projects. The TCM substitution must follow the process set forth in the CAA section 176(c) and the Federal Conformity Regulation. The substitute project(s) may not come from the current list of committed TCMs because a committed TCM cannot substitute another committed TCM.

Usually, SCAG, VCTC, and the project sponsor will identify a replacement TCM project(s) and formally present the changes to the interagency consultation group, the Transportation Conformity Working Group (SCAG group). If there are no air quality concerns identified during the replacement process, and the substitute TCM provides equivalent or greater emissions reductions, the new TCM is adopted without requiring a new conformity finding or formal SIP revision. Both the TCM rollover and substitution process are detailed in SCAG's FTIP guidelines.

3.3. Conformity

Conformity is a federal regulatory process required in nonattainment areas by the CAA Section 176(c) to ensure that federal funding and approvals will not cause new air quality violations, worsen existing violations, or delay timely attainment of the NAAQS. Section 176(c) prohibits federal agencies, departments, or instrumentalities from engaging in, supporting, providing financial assistance for, licensing, permitting, or approving any action which does not conform to an approved state or federal clean air implementation plan. It is called conformity because federal agencies, such as the Federal Highway Administration (FHWA), Federal Transit Administration (FTA), and Federal Aviation Administration (FAA), must show that their actions "conform with" (i.e., do not undermine or hinder) approved, applicable SIPs.

A conformity determination is a formal demonstration that the subject federal action is consistent with the applicable SIP. Federal agencies make such demonstrations by performing a conformity analysis of their proposed federal actions. The conformity analysis evaluates and documents project-related air pollutant emissions, local air quality impacts, and the potential need for emissions mitigation.

In 1993, EPA promulgated two sets of conformity regulations to implement Section 176(c): 1) transportation conformity and 2) general conformity. Transportation conformity is applicable to highway and mass transit projects and to transportation plans, programs, and projects funded under the Federal Highway and Transit Act. General conformity is applicable to other non on-road federal actions and approvals such as, airport expansion projects or new water treatment facilities. The District currently has two conformity rules, Rule 221, *Transportation Conformity*; and, Rule 220, *General Conformity*.

3.3.1. Transportation Conformity

Transportation conformity is a CAA and Infrastructure Investment Jobs Act (IIJA) regulatory process that coordinates air quality planning and transportation planning to help ensure that highway and transit projects will not cause new air quality violations, worsen existing violations, or delay timely attainment of the NAAQS. Conformity applies to transportation plans, transportation improvement programs, and highway and transit projects funded or approved by the FHWA and FTA. Both the RTP/SCS and FTIP must demonstrate conformity with the clean air plans covering the SCAG region, including Ventura County.

Metropolitan planning organizations, such as SCAG, make initial conformity determinations in metropolitan areas, while state departments of transportation (i.e., Caltrans) usually do so in areas outside the metropolitan areas. The major requirements of transportation conformity are:

- Comparison of the SCAG regional emission forecasts to the SIP conformity budget, and use of the latest planning assumptions and emissions models.
- Implementation of TCMs on a timely basis and conduct interagency consultations on regional transportation issues.
- Final conformity determinations are made by the FWHA and FTA.
- Availability of information covering transportation conformity on FHWA and FTA websites.

3.3.2. Motor Vehicle Emissions Budget

The 2022 AQMP includes a motor vehicle emissions budget (MVEB) for the Ventura County portion of the SCCAB. The MVEB has been developed in consultation with CARB, SCAG, and EPA. The emissions budget presented in Table 3-5, *Motor Vehicle Emissions Budget*, used EMFAC with SCAG's modeled VMT and speed distributions (activity data) from the 2020 RTP/SCS (Connect SoCal) adopted by SCAG on September 12, 2020. The Air Resources Board released EMFAC2017 that updated the emission rates and planning assumptions used in calculating motor vehicle emissions budgets. EMFAC2017 was approved by U.S. EPA on August 15, 2019. In addition, the emissions output from the EMFAC2017 model was adjusted to account for the impacts of recently adopted regulations and regulations currently under development that are not reflected in the EMFAC2017 model using off-model adjustments.

The difference between the MVEB values shown in Table 3-5 and the emissions shown in the emission inventory is primarily due to differences in the heavy-duty inspection and maintenance adjustment factors between CEPAM and the MVEB, based on the final regulation. SCAG has validated the values shown in Table 3-5 for purposes of the MVEB.

The federal conformity rule allows a SIP to create a safety margin in an emissions budget (40 CFR 93.101, 93.118(e)(4)(vi)). A "safety margin" is the amount by which the total projected emissions from all sources of a given pollutant are less than the total emissions that would satisfy the applicable requirement for reasonable further progress, attainment, or maintenance. CARB has decided not to include a safety margin in the emissions budget for this AQMP.

Table 3-5
Motor Vehicle Emissions Budget
(tons per day)

	2023		2026	
	ROG	NOx	ROG	NOx
Baseline Emissions	3.01	3.88	2.55	3.36
Reductions from recently adopted regulations with off-model adjustments	0	0.02	0	0.55
Reductions from developing regulations using off-model adjustments	-	-	0	0.03
Total	3.01	3.86	2.55	2.78
MVEB	**3.1**	**3.9**	**2.6**	**2.8**

Note: Based on EMFAC2017 (v1.03).
MVEB totals are rounded up for ROG & NOx to the nearest tenth ton.

3.3.3. Transportation Conformity Budget

Central to transportation conformity is the conformity budget. When the AQMP is submitted to EPA as part of the SIP, EPA will review the MVEB. An approval, disapproval, or adequacy finding of the MVEB will be determined by EPA. An approval or adequacy finding of the MVEB by EPA will establish the conformity budget that sets the maximum amount of on-road mobile source emissions that a nonattainment area can produce while continuing to demonstrate progress toward attainment of the required NAAQS.

All future RTPs and FTIPs in the SCAG region must conform to the conformity budget. In other words, the vehicle emissions forecasts of the RTP/SCS (Connect SoCal) and FTIP must be equal to or less than the conformity budget approved or found adequate by EPA for SIP and conformity purposes. A conformity budget therefore acts as a "ceiling" for future total on-road mobile source emissions. Exceedances of a conformity budget indicate an inconsistency with the applicable AQMP/SIP. The continued federal funding for transportation projects in the Ventura County portion of the SCCAB depends on a positive conformity determination of the RTP/SCS and FTIP.

3.3.4. General Conformity

General conformity is a CAA regulatory process that applies to most federal actions other than transportation actions (see transportation conformity). Examples of federal actions subject to general conformity include issuance of Army Corps of Engineers permits, water and wastewater projects funded by EPA, and other federal projects impacting harbors, airports, and reservoirs. Certain federal projects are exempt from general conformity. Those include projects whose air pollutant emissions would be below specified de minimis emission levels (based on the area's nonattainment classifications) and certain projects presumed to conform, such routine maintenance activities, activities at Superfund sites, and activities conducted in response to national emergencies.

Activities in an attainment area are generally not subject to general conformity, unless the area was formally a nonattainment area and is now under a federal clean air maintenance plan. The federal agency that approves or funds a project or activity, that may be subject to the general conformity, is responsible for the making a conformity determination. Environmental documents required under the National Policy Act (NEPA) and California Environmental Quality Act (CEQA) may provide a statement about a project's general conformity status. General conformity requirements are covered under the District's Rule 220, *General Conformit*y. EPA's General Conformity website contains additional information about the federal regulation.

3.4. State Mobile Source Strategy

Appendix C, *Key Mobile Source Regulations and Programs Providing Emission Reductions*, presents an overview of key California mobile source regulations and programs.

3.5. Reasonably Available Control Measures Analyses

Federal Clean Air Act Sections 172(c)(1) and (c)(2) require the District to demonstrate that it has adopted all control measures necessary to attain the 2015 federal 8-hour ozone standard as expeditiously as practicable and to meet Reasonable Further Progress (RFP) requirements. Reasonably Available Control Measures (RACM) applies to stationary source control measures, Transportation Control Measures, and mobile source control measures.

A potential control measure is considered "reasonably available" and must be implemented if it would advance attainment by at least one year, either alone or in combination with other reasonably available control measures. This means the combined emission reductions from RACM must be sufficient to reduce the emissions inventory projected for 2025 (or earlier) to that currently projected for 2026, the attainment year. If such emission reductions can be demonstrated, the combined RACM must be implemented.

The projected NOx, and ROG emissions are 27.4 and 30.1 tons per day, respectively, in the attainment year 2026. The projected 2025 NOx and ROG emissions are 27.6 and 30.3 tons per day respectively. Therefore, in order to be considered RACM, the combined control measures must reduce NOx emissions by 0.2 tons per day.

Since the ROG inventory relatively remains stable for the several years prior to the District's modeled attainment, it is unclear how much ROG emissions reductions would be required to advance the attainment date. However, District staff believes reducing ROG emissions less than 2% of the county's anthropogenic emissions inventory is insufficient to advance the attainment date.

3.5.1. Stationary Source RACM

District stationary source ROG and/or NOx prohibitory rules that were not fully addressed in the District's 2020 RACT SIP were evaluated for potential RACM emission reductions for the 2022 AQMP. Staff compared District rules to rules adopted by other air districts with higher or "worse" nonattainment classifications, namely the SCAQMD and the San Joaquin Valley Air Pollution Control District (SJVAPCD). Staff also reviewed rules from other air districts such as the Bay Area Air Quality Management District (BAAQMD).

District staff also identified a few rules from other air districts that apply to unregulated source categories in Ventura County. District staff conducted preliminary evaluations of the potential emission reductions, including the cost effectiveness and timing of the potential reductions.

A very conservative estimate of the total emission reductions achievable through potential RACM new and amended rules are as follows:

NOx: 0.013 tons per day
ROG: 0.436 tons per day

As noted above, in order to advance attainment by one year, emission reductions of at least 0.2 tons of NOx per day must be achieved. The potential RACM identified by the District are a tiny fraction of the required NOx reductions.

Appendix D, *Stationary Source Reasonably Available Control Measure Assessment*, provides the details of the stationary source RACM evaluations.

3.5.2. Transportation Control Measure RACM

The Clean Air Act requires a review of RACM for TCMs during AQMP development. Review of RACM provides an analysis of all potential TCMs that can be included as part of the control strategy in the AQMP. TCMs must be both technologically and economically feasible and must advance the projected attainment date of the air quality standard by at least one year to be considered RACM.

Appendix E, *Ventura County Transportation Control Measure Reasonably Available Control Measure Assessment*, lists the TCM RACM assessments conducted for the 2022 AQMP.

3.5.3. State Source RACM

Appendix F, *Ozone Reasonable Available Control Measures Assessment – State Sources*, presents California's emission standards, fuel specifications, and incentive programs for heavy-duty vehicles that are technologically and economically feasible in California, including Ventura County. It also includes the RACM evolutions for non-mobile sources regulated primarily at the state level, including consumer products, and pesticides.

3.5.4. Ocean Going Vessel Speed Reduction

A vessel speed reduction (VSR) regulation requiring all ocean-going vessels (OGV) to travel at less than 10 knots in California-regulated waters or federally-regulated waters off California would provide NOx emission in Ventura County. However, the District does not have authority to implement such regulations because OGV are primarily regulated at state and federal levels. The District has implemented and encouraged participation in a voluntary VSR incentive program, but not all shipping companies participate in the program, and the companies that do participate in the program do not have complete compliance. CARB is scheduled to pursue evaluating future regulatory measures for OGVs, including VSR, as stated in the 2022 State Strategy for the State Implementation Plan. The District urges CARB take this action sooner than scheduled to evaluate a potential VSR regulation. None of the potential additional local control measures are reasonably available, and therefore, none are required for adoption for the 2022 AQMP.

3.5.5. RACM Conclusion

The combination of feasible state and local RACM measures (stationary source, mobile source, transportation control measures, consumer products, and pesticides) not already implemented in Ventura County would provide only about one tenth of the 0.2 tons NOx per day reductions needed to advance the county's attainment date by at least one year.

3.6. Incentive Programs

The District participates in several clean air incentive programs to help Ventura County meet state and federal clean air standards: the Carl Moyer Memorial Air Quality Standards Attainment Program (Carl Moyer Program), the Lower Emissions School Bus Program, Clean Air Fund, the Voluntary NOx Remediation Measure (VNRM), the Funding Agricultural Replacement Measures for Emissions Reductions (FARMER) Program, the Community Air Protection (CAP) Incentive Program, and the Protecting Blue Whales and Blue Skies vessel speed reduction incentive program (VSR Program). Below are summaries of these programs. Further information regarding the District's clean air incentive programs is available on the District's Grants/Incentive Programs website.

3.6.1. Carl Moyer Memorial Air Quality Standards Attainment Program

The California State Legislature created the Carl Moyer Program in 1998, named after the late Dr. Carl Moyer to recognize his work in the air quality field and his efforts to develop this important program. The Carl Moyer Program provides grants to owners of heavy-duty diesel vehicles, vessels, locomotives, and/or stationary agricultural pumps to replace, repower, or retrofit heavy-duty diesel engines to reduce NOx, ROG, and PM. The Carl Moyer Program complements California's regulatory clean air program by obtaining extra emission reductions to help meet state and federal clean air standards. Carl Moyer Program grants are available to both private companies and public agencies.

The Carl Moyer Program is a cooperative effort of CARB and local air pollution agencies. Each year, CARB awards grants to local air agencies that apply for funds for local Carl Moyer Programs. In turn, air districts, following guidelines adopted by CARB, provide grants to public and private entities for cleaner-than-required engines and equipment. CARB's Carl Moyer Program requires, in part, that funded projects in Ventura County operate for at least three years and 75 percent of their use be within the county. In addition, to qualify for funding, projects must meet cost-effectiveness requirements.

The District has operated its Carl Moyer Program since 1999. To date, over $52 million in Carl Moyer Program funding has been awarded to help replace 1,285 high-polluting diesel engines with new, much cleaner engines in Ventura County. The District's Carl Moyer Program has funded new, cleaner mobile agricultural equipment, marine vessel engines, construction equipment engines, alternative fuel heavy-duty trucks, agricultural irrigation pump engines, and publicly-accessible electric vehicle charging stations. The total emission reductions from those engine replacements were 113.8 tons per year of ROG, 886.3 tons per year of NOx, and 51.4 tons per year of PM.

3.6.2. Lower-Emission School Bus Program

The CARB adopted the Lower-Emission School Bus Program in December 2000. This program provides grants to school districts for new, lower emission school buses to reduce schoolchildren's exposure to both toxic particulate emissions and smog-forming NOx emissions. The program has two components: the Lower-Emission School Bus Replacement Program, and the School Bus Retrofit Program.

The Lower-Emission School Bus Replacement Program originally replaced older, in-use, high-polluting diesel school buses with new lower-emission buses. The School Bus Retrofit Program reduced diesel particulate matter emissions from diesel school buses by retrofitting the bus engines with particulate filters. The District participated in both programs. These programs offered the District a unique opportunity to work with the school districts in the county to reduce children's exposure to diesel exhaust, which is a toxic air contaminant and a human carcinogen.

The Lower-Emission School Bus Replacement Program enabled local school districts to replace pre-1987 model year school buses with either new cleaner compressed natural gas (CNG) buses or new lower-emission diesel buses. Eligible school districts contributed $25,000 (reduced to $10,000 in 2008) to replace in-use, 1977 through 1986 model year school buses. The program paid the remainder. Co-funding was not required of school districts for pre-1977 school bus replacements, school bus retrofits, or alternative-fueled school buses meeting 2010 emission standards. Moreover, school districts that purchased CNG buses could obtain an additional 10 percent of their grant for CNG refueling facilities. Replaced buses were destroyed so that they could no longer operate in the county or elsewhere.

Recent amendments to the state guidelines now allow air districts to fund the replacement of 1987 or newer model year school buses having two-stroke diesel engines. Funding for these replacements may be available from AB 923 $2 DMV fees. Besides CNG and clean diesel-powered buses, propane-powered school buses and electric school buses are both potential replacements for existing eligible school buses. AB 923 funds may also be used to replace CNG fuel tanks on existing eligible CNG-powered school buses. To date, 20 CNG school buses and nine lower-emission diesel school buses have replaced 29 pre-1987 school buses in Ventura County.

3.6.3. Clean Air Fund

The Clean Air Fund provides grants for air quality improvement projects in Ventura County. The 3M Company created the Clean Air Fund in 1991 with a $1.5 million donation. Three hundred thousand dollars of that amount was set aside as a permanent endowment, which is now more than $689,768 (as of December 15, 2021). The nonprofit Ventura County Community Foundation holds the funds in a trust. The Ventura County Air Pollution Control Board oversees the Clean Air Fund and authorizes project funding. The Clean Air Fund Advisory Committee (Committee) reviews all grant proposals and makes recommendations for funding to the Air Pollution Control Board. The Committee is comprised of representatives from transportation, environmental, business, and citizen interest groups.

Since its inception, the Clean Air Fund has allocated over $2 million for 60 clean air projects of various types. Examples of funded projects include clean air educational programs, solar pool heaters for local schools, cleaner boat engines, a lawn mower exchange program, electric bikes for law enforcement, a gasoline-powered leaf blower exchange program, a pesticide emissions reduction research program, publicly accessible level 2 and DCFC electric vehicle charging stations, electrification of a multiple agencies landscaping equipment, fuel-efficient tire voucher program, plug-in electric vehicle voucher program, and compressed natural gas transit buses and trash trucks.

3.6.4. VNRM Program

In 2007, CARB approved the Low Carbon Fuel Standard (LCFS) as a Discrete Early Action Measure to reduce greenhouse gas emissions from transportation fuels in California. The Fresno County Superior Court issued a modified writ of mandate in *POET, LLC* v. *California Air Resources Board* on October 18, 2017 related to CARB's CEQA analysis for the LCFS. In response to this modified writ of mandate, CARB is taking specified actions relating to the issue of potential NOx emissions from biodiesel.

On March 6, 2018 CARB publicly released a Draft Supplemental Disclosure Discussion of Oxides of Nitrogen Potentially Caused by the Low Carbon Fuel Standard Regulation (Draft Disclosure Discussion) identifying potential NOx emissions that may have been caused in the past and could be caused in the future by the LCFS regulation. The Draft Disclosure Discussion outlined a CARB commitment, "consistent with CARB's mission to promote and protect public health and welfare through the effective and efficient reduction of air pollutants," to remediate potential historical

LCFS NOx emissions by seeking additional reductions of NOx emissions. CARB adopted Resolution 18-22 *Voluntary NOx Remediation Measure (VNRM) Funding* on April 27, 2018 to fulfill this commitment.

The VNRM program is implemented through a partnership between CARB and local air districts. CARB distributes funds and develops and revises the Guidelines for District Grants to Remediate Potential Historic Biodiesel NOx Emissions Conservatively Attributable to the LCFS (Guidelines for Remediation). Local air districts conduct outreach, solicit, evaluate, select, fund, and monitor specific remediation projects in their jurisdictions. To facilitate the most timely and efficient achievement of the targeted remedial NOx emissions reductions, the funding grants issued to the districts pursuant to this plan were administered and tracked analogously to incentive funds distributed through the Carl Moyer Program, pursuant to the 2017 CMP Guidelines.

CARB awarded the District with a single grant through the VNRM. The District awarded two grants to replace agricultural tractors with total grant funding of $158,529. The total emission reductions from the equipment replacements funded by the VNRM were 0.3 tons per year of ROG, 2.1 tons per year of NOx, and 0.2 tons per year of PM.

3.6.5. FARMER Program

Initiated in 2018, the Funding Agricultural Replacement Measures for Emission Reductions (FARMER) Program is a grant program developed by CARB to implement legislative direction to reduce criteria, toxic, and GHG emissions from the agricultural sector. The Legislature directed CARB to "reduce agricultural sector emissions by providing grants, rebates, and other financial incentives for agricultural harvesting equipment, heavy-duty trucks, agricultural pump engines, tractors, and other equipment used in agricultural operations." In addition, the FARMER Program targets funding for priority populations by including minimum percentages of funding for projects benefiting disadvantaged and low-income communities.

The FARMER Program is implemented through a partnership between CARB and local air districts. CARB manages program funds and develops and revises the FARMER Program Guidelines, protocols, and criteria for covered vehicle and equipment projects and determines the methodologies used for evaluating project cost-effectiveness. Local air districts conduct outreach, solicit, evaluate, select, fund, and monitor specific FARMER Program projects in their jurisdictions.

The FARMER Program is similar to the Carl Moyer Program and although it is limited to agricultural equipment, the guidelines allow for funding additional types of equipment not eligible for funding from the Carl Moyer Program. To date, over $4.6 million in FARMER Program funding has been awarded to help replace 93 high-polluting diesel engines with new, much cleaner engines in Ventura County. The total emission reductions from those engine replacements were 54.9 tons per year of ozone precursors, and 3.7 tons per year of PM.

3.6.6. CAP Program

Initiated in 2018, the Community Air Protection (CAP) Program is a grant program developed by CARB to implement legislative direction to reduce criteria, toxic, and GHG emissions from the agricultural sector. The Legislature directed CARB to reduce pollution exposure in communities most impacted by air pollution. To achieve that goal, the CAP Program targets funding for priority populations by including minimum percentages of funding for projects benefiting disadvantaged and low-income communities.

The CAP Program is implemented through a partnership between CARB and local air districts. CARB manages program funds and develops and revises the CAP Program Guidelines, protocols, and criteria for projects and determines the methodologies used for evaluating project cost-effectiveness. Local air districts conduct outreach, solicit, evaluate, select, fund, and monitor specific CAP Program projects in their jurisdictions.

The CAP Program is very similar to the Carl Moyer Program but the guidelines allow for funding additional types of equipment not eligible for funding from the Carl Moyer Program. In addition, maximum funding percentages are increased for some projects benefiting priority populations. To date, over $4.0 million in CAP Program funding has been awarded to help replace 37 high-polluting diesel engines with new, much cleaner engines and install electric school bus chargers in Ventura County. The total emission reductions from those engine replacements were 15.25 tons per year of ozone precursors, and 1.01 tons per year of PM.

3.6.7. VSR Program

The District is a founding partner in the Protecting Blue Whales and Blue Skies Program, a voluntary Vessel Speed Reduction (VSR) Program along the coast of California. The VSR Program has become a highly successful program both in the Santa Barbara Channel region and the San Francisco Bay Area since its launch in 2014. The VSR Program incentivizes large marine cargo ships to reduce their speeds, typically ranging between 12 and 18 knots, to less than 10 knots in order to reduce the risk of lethal whale strikes, reduce ocean noise pollution, and reduce air pollution from these vessels. These ships are a significant source of air pollution. Air emissions from ocean-going vessels traversing the Channel Islands region constitute approximately 40 percent of the NOx emissions in Ventura County’s jurisdiction. In addition to NOx emissions, ships are a significant source of other air pollutants such as sulfur dioxide, GHG, and diesel particulate matter.

The VSR Program has evolved since its launch in 2014 as a pilot program targeting individual ships. It now provides incentives based on the percentage of fleet miles transiting VSR zones at 10 knots or less, with some companies achieving over 90% cooperation rate. In 2020, the VSR Program achieved 748 tons of NOx reductions during the period from May 15, 2020 through November 15, 2020. Since 2014 the VSR program has reduced NOx emissions from ocean-going vessels by over 1,600 tons. However, these reductions are not permanent since this is a program based on behavioral changes, not replacing high-emissions equipment with cleaner equipment.

The Protecting Blue Whales and Blue Skies partners have secured funding to manage the program through the 2022 ozone season. The partners are seeking additional funds to sustain the program for future years.

3.7. Ventura County Smart Growth Policies and Programs

Ventura County has been a leader in controlling urban growth and sprawl for decades. As a result, Ventura County cities are geographically distinct from each other, with greenbelt buffers and agricultural land separating the urbanized areas of the county. Moreover, nearly 90 percent of the county's population live within the county's ten cities. Ventura County has successfully accommodated growth while remaining a leading agricultural area in California. Some of the notable urban growth guidelines, policies, and programs in Ventura County are summarized below for informational purposes.

3.7.1. Guidelines for Orderly Development

Adopted by the County Board of Supervisors, all City Councils, and the Local Agency Formation Commission (LAFCo), the *Guidelines for Orderly Development* help facilitate orderly development in Ventura County by directing urban development to the cities rather than to the county's unincorporated areas. The *Guidelines for Orderly Development's* primary policy states: "Urban development should occur, whenever and wherever practical, within incorporated cities which exist to provide a full range of municipal services and are responsible for urban land use planning." The LAFCo administers the *Guidelines for Orderly Development*. LAFCo is a regulatory commission that coordinates changes in the county's city boundaries; conduct special studies which review ways to streamline government structure; and prepare Spheres of Influence for each city and special district.

The County of Ventura, all ten cities in the county, and the LAFCo have adopted the Guidelines for Orderly Development as policy. The *Guidelines for Orderly Development* were first adopted in 1969 and later amended in 1996. The *Guidelines for Orderly Development*:

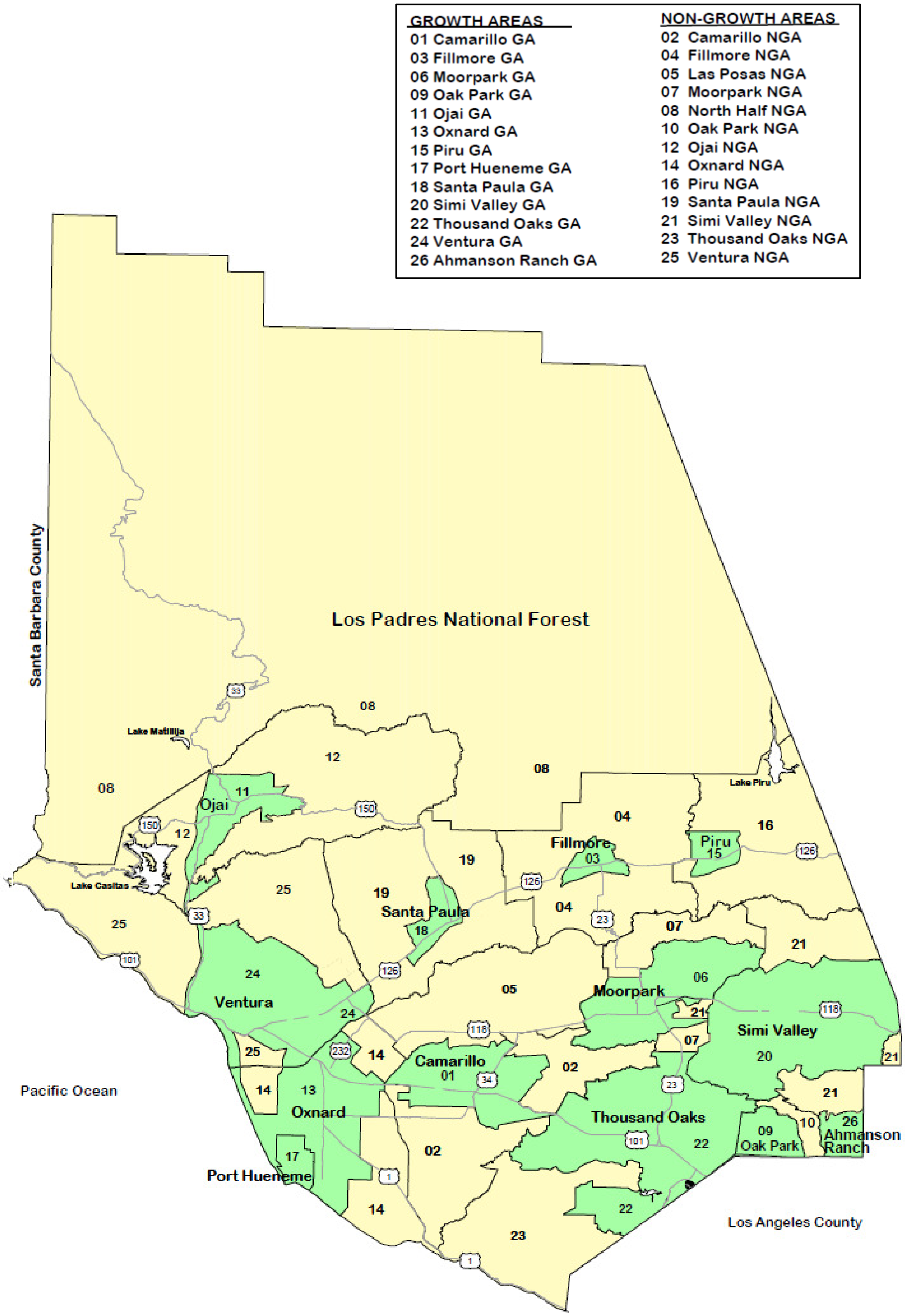
- Provide a framework for cooperative intergovernmental relations.
- Allow for urbanization in a manner that will accommodate the development goals of the individual communities while conserving the resources of the County.
- Promote efficient and effective delivery of community services for existing and future residents.
- Identify in a manner understandable to the public the planning and service responsibilities of local governments providing urban services.

3.7.2. Growth and Non-Growth Areas

Growth and Non-Growth Areas, otherwise known as GAs and NGAs, are based on a network of analysis zones created by the State Department of Transportation and the Ventura County Public Works Agency. The Growth and Non-Growth Areas are comprised of aggregated analysis zones.

Figure 3-1 shows the growth and non-growth areas in the county. The entire present and projected boundary area of each of the ten cities in the county is within a respective growth area. In addition to the ten growth areas, there are three unincorporated growth areas. The unincorporated growth areas include urbanized development that has already occurred or is expected to occur under the Ventura County General Plan. An example is the Piru Growth Area. These areas are not expected to receive significant urban development. All of the GA and NGAs are used in the environmental review process for assessing a project's consistency with the AQMP using SCAG's RTP population forecasts for that respective geographical subarea.

Figure 3-1
Growth and Non-Growth Areas in Ventura County



3.7.3. Greenbelt Agreements

Greenbelt Agreements (Agreements) are voluntary policy statements adopted by resolution or ordinance between the County of Ventura and one or more of the county's ten cities. Greenbelts in Ventura County are areas where cities have agreed not to annex areas and the County of Ventura has pledged to permit only open space or agricultural uses. The Agreements protect property owners, open space, and agricultural lands from urbanization by preventing premature conversion to agriculturally incompatible uses. The Agreements also help ensure that the cities do not sprawl into each other. However, greenbelt boundaries may be amended, and proposals may be brought forth by the cities or county which must undergo a review process prior to being considered by the city or county decision-making bodies.

Although not a party to the Agreements, the Ventura County LAFCo will not approve a development that conflicts with any greenbelt agreement unless exceptional circumstances exist. City and County elected officials in Ventura County were pioneers in designing and adopting greenbelts.

There are seven greenbelt agreements in Ventura County:

- Ventura-Santa Paula Greenbelt
- Santa Paula-Fillmore Greenbelt
- Camarillo-Oxnard Greenbelt
- Santa Rosa Valley Greenbelt
- Tierra Rejada Greenbelt
- Ventura-Oxnard Greenbelt
- Fillmore-Piru Greenbelt

3.7.4. SOAR and CURB

The Save Open Space and Agricultural Resources (SOAR) and City Urban Restriction Boundary (CURB) resulted from voter-approved ballot initiatives in the unincorporated areas of Ventura County and eight of the county's ten cities. The SOAR initiatives require voter approval in the affected jurisdictions before specified General Plan land use designations, such as agriculture and open space, can be rezoned for development. The CURB initiatives define a boundary around the affected jurisdictions and require voter approval before urban development can occur outside the CURB lines.

The SOAR and CURB measures work together to direct urban growth to within existing city boundaries, thereby restricting urban sprawl, encouraging infill and higher density development, and protecting agricultural, open space, and natural lands in Ventura County. The city SOARs established CURBs around each city. With limited exceptions, development beyond a city's CURB cannot occur unless the city voters approve an extension of the CURB. The city CURBs complement the County SOAR by preventing annexations of adjacent unincorporated areas into the cities for development unless the voters approve such annexations. The following are the Ventura County jurisdictions covered by SOAR initiatives:

- County of Ventura
- City of Ventura
- City of Camarillo
- City of Thousand Oaks
- City of Simi Valley
- City of Oxnard
- City of Moorpark
- City of Santa Paula
- City of Fillmore

A map of the SOAR and CURB boundaries is available on the County of Ventura's Resource Management Agency's website at: https://venturacountydatadownloads-vcitsgis.hub.arcgis.com/ . The SOAR initiative was extended by voter approval in November 2016 with a sunset date of December 31, 2050.

3.7.5. Ventura County Air Quality Assessment Guidelines

The Ventura County Air Quality Assessment Guidelines (AQAG) is a District document that provides District staff, lead agencies, consultants, and project applicants with uniform procedures for preparing the air quality sections of environmental documents pursuant to the California Environmental Quality Act (CEQA). CEQA applies to all discretionary development projects, unless an exemption applies, and requires that any significant environmental effects of such projects be mitigated to the extent feasible. CEQA thereby provides a mechanism to help minimize air emissions associated with urban growth.

The AQAG recommend specific criteria and threshold levels for determining whether a proposed project may have a significant adverse impact on air quality. The criteria follow the State CEQA Guidelines criteria for evaluating air quality impacts, such as whether a project will interfere with the applicable air quality plan, expose sensitive receptors to toxic or substantial air pollutants, contribute an odor impact, and result in a cumulatively considerable net increase of a criteria pollutant that is in nonattainment by comparing a project's emissions to adopted numerical thresholds. The AQAG also provides for mitigation measures to lessen or eliminate air quality impacts of development projects found to be significant and includes methodologies for each air quality criteria to be evaluated.

The District does not require that lead agencies use the AQAG; however, most lead agencies in the county, including the ten cities and the County of Ventura, do so and have adopted the AQAG as part of their environmental review process for air quality. Additionally, District staff routinely review and comment on the air quality sections of environmental documents prepared by local, state, and federal lead agencies for projects occurring in Ventura County.

SECTION 4. EMISSIONS INVENTORY FORECASTS

This section summarizes the ROG and NOx planning emissions inventory for future years. Although the forecast contains other air pollutants, only ROG and NOx are pertinent to ozone formation and emission forecast reporting requirements. Appendix A, *Ventura County Emissions Inventory Documentation*, provides further information and documentation of the emissions forecasts for the 2022 AQMP.

The 2022 AQMP incorporates all anthropogenic emission categories using the latest emissions estimates and control implementation schedule. Emissions forecasts are calculated using the actual 2018 base year emissions inventory presented in Section 2, *2018 Baseline Emissions Inventory*, and control measure data in Section 3, *Control Strategy*.

4.1. Forecast Methodology

The 8-hour Ozone SIP base year emissions inventory and future year emissions forecast are a joint effort by the District and the CARB. The CARB's California Emission Projection Analysis Model (CEPAM) is a computer model that uses pollutant-specific algorithms to calculate future year emissions for all areas throughout the state. The District relies on this model to produce future-year and historical-year emissions in accordance with EPA's 8-hour Ozone SIP and the CCAA of 1988 emissions inventory reporting requirements.

Forecasted emissions are a product of two principal components: growth factors and control factors. The forecast methodology involves applying growth and control factors to 2018 base year emissions by pollutant-emitting process category. Growth and control factors are calculated by analyzing the 2018 actual emissions, future socioeconomic assumptions, and the future impact of district, state, and federal control strategies.

The CEPAM forecast model generated the summer planning day ROG and NOx emissions specific to Ventura County for 2018, 2024, 2026, 2030, 2035, and 2040 (CEPAM emission projection v1.01, March 2022). 2018 is the baseline emission year, 2024 is a Rate-of-Progress milestone year and 2026 is Ventura County's 8-hour ozone standard attainment year.

Forecasted emissions after the 2026 attainment year are included out to 2040 for emission trend analysis and are not intended for the regulatory purposes of the 8-hour Ozone SIP and should be considered for informational purposes only.

The algorithm used in CARB's CEPAM emission forecasting model is:

$$FY_t = BY*GF_t*CF_t$$

Where:

FY_t = controlled planning day emissions for the forecast year (t)

BY = base year (2018) planning day emissions per process
GF_t = growth factor for forecast year (t)
CF_t = control factor for forecast year (t).

Growth factors (GF) account for changes in future year socioeconomic conditions relative to the 2018 base year using a variety of activity indicators. Activity indicators are collected from a number of sources to track the economic status or social trends of the surrounding area. Examples include economic output and employment by industry, population, housing, natural gas usage, agricultural-related activity, military aircraft and vessel activity, and activity for specialized types of facilities such as landfills and civilian airports.

District and CARB staff assign activity indicators to emissions categories that best characterize the source activity. The District updates the socioeconomic data used in the CEPAM model for every SIP planning cycle and as an ongoing process for rule development analyses. CARB's CEPAM calculates the growth factors, which reflect the change in future year ROG and NOx emissions relative to the base year before controls from rules and regulations are applied. The forecast activity indicators, growth factors and data sources used in the CEPAM2022 v1.01 emissions projections are presented in Table 4-1.

Control factors (CF) represent the overall expected effectiveness of each control measure or rule to reduce emissions in a given future year. All emission categories in a base year are reviewed for potential assignment to control measures, and control factors are updated for every planning cycle. District staff calculates control measure effectiveness estimates based on the best data available, knowledge of local sources already under control, and future control technologies. Control factors may change in the future as better information becomes available during the rule development process.

A control factor is a composite of the following four multipliers:

1) technological control efficiency (CE) of the control technology, equipment or strategy requirements of the control measure;
2) compliance efficiency, or rule effectiveness (RE) of the control measure, reflecting the actual "real world" ability of a control measure to achieve expected emission reductions;
3) rule penetration (RP), or impact factor, representing the relative amount of emissions in a source category subject to a control measure, accounting for exemptions and other control measures; and,
4) implementation factor (IP), or relative amount of total control occurring in a given year, for control measures having phased implementation or control requirements occurring in tiers (i.e. increasing levels of control stringency over a period of years).

Control factors are applied to future year emissions projected from base year emissions using growth factors, resulting in the emissions remaining in a source category after control is applied, represented by the following equation: $CF = 1-(CE*RE*RP*IP)$.

Table 4-1
Future Year Growth Factor Summary

Ventura County 2018 Base Year Forecast Activity Indicator	2024 GF	2026 GF	2030 GF	2035 GF	2040 GF	Data Source
Accommodation and Food Services	1.090	1.120	1.170	1.210	1.250	SCAG
Administrative & Building Services, Waste Mgmt. Employment	1.040	1.050	1.070	1.090	1.110	SCAG
Agricultural Aircraft	0.820	0.760	0.660	0.660	0.660	CARB/EI SUB
Agricultural Harvest Acres	0.990	0.990	0.980	0.970	0.970	FMMP
Agriculture, Forestry, Fishing & Hunting Economic Output	1.120	1.160	1.210	1.240	1.270	SCAG
Arts, Entertainment & Recreation Economic Output	1.140	1.190	1.260	1.320	1.380	SCAG
Beverage & Tobacco Products Economic Output	0.960	0.947	0.938	0.912	0.829	SCAG
Beverage Manufacturing	1.030	1.070	1.140	1.260	1.400	REMI
Chemical Manufacturing Economic Output	1.090	1.130	1.150	1.150	1.150	SCAG
Civilian Airport Operations	1.020	1.030	1.050	1.070	1.100	FAA-TAF
Computer & Electronic Products Economic Output	1.170	1.230	1.310	1.340	1.370	SCAG
Construction Employment	1.050	1.070	1.090	1.120	1.150	SCAG
Consumer Product Use - Aerosol Coatings	1.000	1.000	1.000	1.000	1.000	DOF
Disposable Personal Income	1.090	1.120	1.210	1.340	1.470	REMI
Drycleaning PERC Use	0	0	0	0	0	District
Dwelling Units	1.030	1.040	1.060	1.080	1.100	SCAG
Electric Generating Unit (Power Plant) Natural Gas Usage	2.620	2.900	2.240	2.070	1.910	CEC
Electrical Equipment & Components Economic Output	1.100	1.130	1.160	1.160	1.160	SCAG
Fabricated Metal Products Economic Output	1.080	1.100	1.120	1.110	1.100	SCAG
Federal Military Employment	1.100	1.090	1.080	1.070	1.060	REMI
Food & Agriculture	0.990	1.040	1.110	1.220	1.350	REMI
Food Manufacturing Economic Output	1.080	1.110	1.130	1.130	1.130	SCAG
Furniture & Related Products Economic Output	1.130	1.180	1.230	1.250	1.260	SCAG
Information Industries Economic Output	1.200	1.270	1.370	1.470	1.570	SCAG
Landfill Gas Emission	1.110	1.140	1.210	1.300	1.110	LandGEM
Laundering and Drycleaning (non-PERC)	1.040	1.050	1.070	1.090	1.110	SCAG
Machinery Manufacturing Economic Output	1.100	1.140	1.170	1.170	1.170	SCAG
Manufacturing and Industrial Residual Oil Use	1.050	1.060	1.070	1.060	1.050	SCAG
Merchant Wholesalers, Durable Goods Employment	1.030	1.030	1.040	1.060	1.070	SCAG
Military Coastal OGV	1.220	1.320	1.530	1.860	2.250	NBVC
Military Jets in OC1	1.265	1.368	1.600	1.947	2.368	NBVC

Ventura County 2018 Base Year Forecast Activity Indicator	2024 GF	2026 GF	2030 GF	2035 GF	2040 GF	Data Source
Military Jets in OC2	1.270	1.370	1.607	1.953	2.374	NBVC
Military Jets in SCC	1.342	1.496	1.759	2.059	2.572	NBVC
Military Piston Aircraft in SCC	1.270	1.372	1.608	1.953	2.378	NBVC
Military Vessels - Outer Continental Shelf 24-100 miles	1.230	1.330	1.550	1.890	2.300	NBVC
Military Vessels - Outer Continental Shelf 3-24 miles	1.270	1.370	1.600	1.950	2.370	NBVC
Military Vessels - Outer Continental Shelf 3-24 miles	1.270	1.370	1.600	1.950	2.370	NBVC
Miscellaneous Manufacturing Economic Output	1.120	1.170	1.210	1.220	1.220	SCAG
Motor Vehicle Gasoline Consumption	0.850	0.800	0.740	0.690	0.680	EMFAC2017
Natural Gas Combustion Commercial Space Heating	0.970	0.930	0.870	0.820	0.760	SocalGas
Natural Gas Combustion Commercial Unspecified	0.950	0.900	0.830	0.770	0.700	SocalGas
Natural Gas Combustion Commercial Water Heating	0.950	0.910	0.850	0.790	0.720	SocalGas
Natural Gas Combustion Industrial	0.910	0.900	0.880	0.850	0.830	SocalGas
Natural Gas Combustion Residential Space Heating	1.070	1.040	0.970	0.970	0.950	SocalGas
Natural Gas Combustion Residential Unspecified	1.090	1.070	1.030	1.040	1.050	SocalGas
Natural Gas Combustion Residential Water Heating	1.060	1.030	0.970	0.960	0.940	SocalGas
No Growth (Unity)	1.000	1.000	1.000	1.000	1.000	District
Nonmetallic Mineral Mining & Quarrying Economic Output	1.030	1.040	1.050	1.040	1.030	SCAG
Nonmetallic Mineral Products Economic Output	1.070	1.090	1.110	1.100	1.090	SCAG
Oil & Gas Extraction Economic Output	1.370	1.520	1.770	2.020	2.290	SCAG
Oil & Gas Extraction Economic Output - OCS	1.370	1.520	1.770	2.020	2.290	SCAG
Other Services, Except Public Administration Employment	1.030	1.040	1.050	1.070	1.090	SCAG
Paper Manufacturing Economic Output	1.080	1.100	1.130	1.120	1.120	SCAG
Petroleum & Coal Products Manufacturing Economic Output	1.150	1.210	1.270	1.290	1.310	SCAG
Pipeline Transportation Economic Output	1.160	1.210	1.300	1.360	1.430	SCAG
Plastics & Rubber Products Manufacturing Economic Output	1.040	1.050	1.050	1.040	1.020	SCAG
Population	1.030	1.040	1.050	1.070	1.090	SCAG
Population 0-4, 65-up (Hospitals)	1.160	1.200	1.270	1.330	1.390	SCAG
Primary Metal Manufacturing Economic Output	1.160	1.220	1.280	1.300	1.320	SCAG
Printing & Related Support Activities Economic Output	1.170	1.230	1.300	1.320	1.350	SCAG
Professional, Scientific & Technical Services Employment	1.040	1.050	1.070	1.090	1.110	SCAG
Public Administration Employment	1.030	1.040	1.050	1.060	1.080	SCAG
Service and Commercial LPG Use	1.090	1.120	1.170	1.210	1.250	SCAG

Ventura County 2018 Base Year Forecast Activity Indicator	2024 GF	2026 GF	2030 GF	2035 GF	2040 GF	Data Source
Total Employment	1.040	1.050	1.070	1.090	1.110	SCAG
Transit & Ground Passenger Transportation Economic Output	1.170	1.230	1.330	1.420	1.520	SCAG
Transportation Equipment Economic Output	1.100	1.140	1.170	1.180	1.190	SCAG
Water Transportation Economic Output	1.270	1.360	1.520	1.640	1.770	SCAG
Wholesale Warehousing Employment	1.020	1.000	0.970	0.960	0.980	REMI
Primary Metal Manufacturing Economic Output	1.160	1.220	1.280	1.300	1.320	SCAG

FMMP = Farmland Mapping and Monitoring Program

REMI = Regional Economic Models, Inc.

FAA-TAF – Federal Aviation Administration Terminal Area Forecast

DOF = Department of Finance

CEC = California Energy Commission

LandGEM = Landfill Generation Emission model

Each customized control factor is specific to an emission source category and reflects a future year's anticipated emission control relative to the level of control in the 2018 base year for adopted rules and regulations. Table 3-2 in Section 3 includes a summary table showing potential district control measures. Section 3.1 describes potential control measures and expected future year emissions reductions.

Table 4-1 shows the assignment of growth factors and sources of those factors for emission source categories. Table A-1 and lists adopted district rules reflected in the base year and forecast emissions in this AQMP.

The CARB Air Quality Planning and Science Division has the primary responsibility for developing on-road and off-road mobile source emission forecasts in California. CEPAM integrates the emissions estimates from the EMFAC on-road motor vehicles model and the OFFROAD and other models for off-road other mobile sources into the future year emissions projections.

Growth assumptions for these mobile source categories are a product of collaboration among transportation agencies, local planning agencies, CARB, and SCAG. Appendix A contains a discussion of data and methods used by CARB to forecast future year mobile source emissions. This Plan uses the most current version of those emissions estimates modeled by the SCAG regional transportation model and the CARB EMFAC and other mobile source models.

Table 4-2 shows important motor vehicle growth indicators from the CARB EMFAC2017 v1.0.3 on-road vehicle model and the SCAG 2020 RTP. On-road motor vehicle planning day emissions for the base year and forecast years specific to Ventura County are shown in Table 3-6.

Table 4-2
Motor Vehicle Growth Trends

Ventura County Totals	Indicator	2018	2024	2026	2030	2035	2040
Population	Residents	861,000	889,000	895,000	906,000	920,000	934,000
All vehicle categories	Vehicles	511,800	520,831	525,016	534,741	548,906	568,591
Vehicle miles traveled (x 1000)	VMT/ 1000	19,238	19,418	19,435	19,525	19,647	19,928
All vehicle trips	Trip	2,472,493	2,527,501	2,551,400	2,605,490	2,685,216	2,789,371
Fuel Consumption (1000 gallons)	Gasoline	747	614	571	512	471	456
	Diesel	88.3	95.3	95.9	96.5	98.8	102.9

Notes:
EMFAC2017 v1.0.3.
Population Derived from SCAG Connect SoCal 2020 Report, rounded to the nearest thousand.

4.1.1. External Adjustments to CEPAM2022 v1.01

For the 2022 AQMP, all emission inventory adjustments developed by CARB were made using the CARB CEPAM2022 v1.01 data processing. No external adjustments to the CEPAM2022 v1.01 data were required, so the District has not incorporated data changes to the emissions inventory developed by CARB.

4.1.2. Emission Reduction Credits

District New Source Review permitting Rules 26-26.13 require any facility that has the potential to emit five tons/year or more ROG or NOx from new, replacement, modified or relocated emissions sources to provide emission offsets for the emissions increase. ERCs represent emission reductions that already have occurred and can be used to offset emissions growth from a new or modified permitted facility. EPA policy, the federal CAA sections 172(c)(5) and 173 and the CFR (40 CFR 51.165(a)(3)(ii)(C)(1)) require ERCs from emission reductions occurring before a nonattainment plan base year to be treated as potential growth in forecast years in order for them to be used as offsets.

Unless pre-base year ERCs are included in future year growth factors, future year forecasted inventories must be adjusted to account for pre-base year inventory ERCs. Total available ERC balances as of January 2018 were 1.59 tons/day ROG and 0.87 tons/day NOx.

The projected emission growth for stationary sources from 2018 to 2026 is 1.05 tons/day ROG and 0.96 tons/day NOx. All of the pre-base year banked NOx ERCs, and a majority of the pre-base year banked ROG ERCs, are accounted for in the growth projections in the CEPAM inventory. The projected growth of NOx emissions is greater than the available pre-base year NOx ERC balance; therefore, the growth is sufficient to account for the maximum possible NOx ERC use. However, the pre-base ROG ERCs exceed the projected growth of ROG emissions from stationary sources. To prevent the usage of ROG ERCs to offset new emissions that exceed the projected emission growth from stationary sources, the District will limit the use of pre-base year ROG ERCs to no more than 1.05 tons/day (383.25 tons/year) through its permitting process. New emissions requiring ERCs that would result in the use of more than a cumulative use of 1.05 tons/day of ROG ERCs from the pre-2018 base year will not be permitted by the District. The District intends this commitment to be federally enforceable upon approval by the EPA of the AQMP into the California SIP. The District will track and report usage of pre-base year ERCs to EPA by including a statement about the use of pre-base year ERCs in its annual ERC reports to EPA. The District will revise the AQMP and submit the revision to EPA for inclusion in the California SIP if a situation arises where ROG ERCs are expected to be needed in excess of the projected ROG growth of 1.05 tons/day before attaining the 2015 ozone standard. A list of pre-2018 ERCs is shown in Appendix G.

4.2. Emissions Forecast Summary

ROG and NOx summer planning day emissions in the SCCAB (onshore Ventura County and within three miles of the coastline) for the 2018 base year and forecast years 2024, 2026, 2030, 2035 and 2040 are presented in the figures and tables below. Forecast emissions represent the effects of future socioeconomic changes and implementation of adopted local, state, and federal control measures but do not include emission reductions from proposed local control measures or CARB's 2022 State SIP Strategy.

Figure 4-1 and Figure 4-2 graphically present anticipated ROG and NOx emission trends from the 2018 base year through the interval of forecast years by emission category. Table 4-3 and Table 4-4 numerically summarize those emissions by major emission category for years 2018 through 2040.

Figure 4-1 and Table 4-3 show that summer planning day ROG emissions should decrease by 1.7 tons/day or 5.8% by 2026 and 2.6 tons/day or 8.9% by 2040. Quantities and percentages of the change in ROG emissions reductions are described below.

- Mobile Sources: 3.2 tons/day (27%) decrease by 2026, 6.1 tons/day (52%) decrease by 2040
  - On-Road Vehicles: 1.7 tons/day (40%) decrease by 2026, 2.8 tons/day (66%) decrease by 2040

    On-road vehicles represent the third largest emission category in the base year, responsible for 26% of ROG emissions, this category accounts for 9.2% of the total by 2026 and becomes the fourth largest category. By 2040, on-road mobile sources account for and 5.5% of the total ROG emissions and are the fifth largest source of ROG.
  - Other Mobile Sources: 1.5 tons/day (19%) decrease by 2026, 3.3 tons/day (44%) decrease by 2040

    This category contributed about 26% of ROG in 2018, the second leading emission category in the base year. Other mobile sources will continue to be the second largest source of ROG through 2040.
- Stationary Sources: 1.5 tons/day (8%) increase by 2026, 3.5 tons/day (20%) increase by 2040
  - Solvent Use: 0.7 tons/day (6%) increase by 2026, 1.8 tons/day increase (15%) by 2040

    Solvent use includes evaporative emissions from consumer products, architectural coatings, surface coatings, and cleaning solvent use. Solvent use accounted for 41% of total ROG emissions in 2018 as the largest emission category. Solvent use is responsible for 46% of ROG emissions by 2026 and 52% by 2040, by far the largest ROG emission category.

- Pesticide Application: .1 tons/day (7.5%) increase by 2026, 0.07 tons/day (5.5%) increase by 2040

  Pesticide Application is almost entirely attributable to agricultural pesticides (non-methyl bromide use) and contributed 4.4% of total ROG in 2018. Pesticide Application becomes about 5% of the total ROG emissions in 2026 and 2040.

- Petroleum Industry and Other Sources. 0.7 tons/day increase (16%) by 2026, 1.6 tons/day increase (37%) by 2040

  The petroleum industry includes oil and gas production and related combustion activities, and petroleum product marketing such as gasoline dispensing. Other sources such as stationary and residential fuel combustion, agricultural burning, industrial processes related to manufacturing, and waste disposal are relatively small emission categories individually. Together the petroleum industry and other sources accounted for about 15% of ROG in 2018, 18% in 2026 and 22% in 2040.

Figure 4-1
ROG Major Emission Category Trends

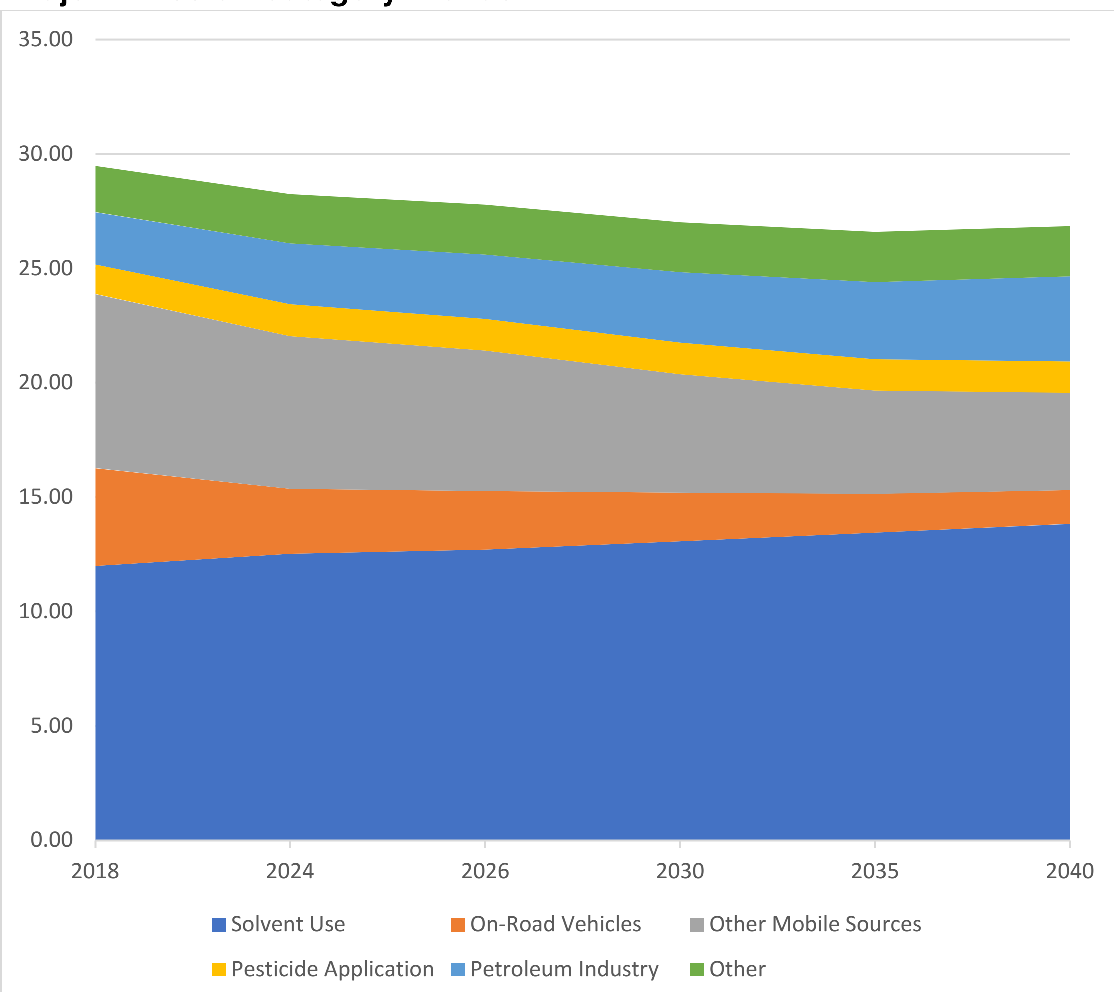


Table 4-3
Summer Planning Day ROG Emissions

Major Emission Category	ROG (tons/summer day) 2018	2024	2026	2030	2035	2040
Solvent Use	11.99	12.52	12.71	13.07	13.45	13.83
On-Road Vehicles	4.28	2.83	2.56	2.13	1.70	1.47
Other Mobile Sources	7.60	6.68	6.13	5.17	4.50	4.26
Pesticide Application	1.29	1.39	1.39	1.38	1.37	1.36
Petroleum Industry	2.29	2.66	2.81	3.09	3.38	3.72
Other	2.02	2.15	2.18	2.17	2.18	2.20
ROG Total Emissions	**29.48**	**28.24**	**27.78**	**27.00**	**26.58**	**26.84**

Notes:
Based on CARB CEPAM2022 v1.01 (March 2022).
Data rounding may affect displayed values and totals.
OC1 and OC2 not included

Figure 4-2 and Table 4-4 show that total summer planning day NOx emissions decrease by 5.2 tons/day or 29% by 2026, and by 7.3 tons/day or 40 percent by 2040. The vast majority of emissions reductions are attributable to Mobile Sources. Amounts and percentages of emissions changes are shown below.

- Mobile Sources: 5.8 tons/day (37%) decrease by 2026, 7.7 tons/day (49%) decrease by 2040

  - On-Road Vehicles: 4.2 tons/day (60%) decrease by 2026, 5.6 tons/day (80%) decrease by 2040

    On-Road Vehicles are the largest NOx emission category in 2018, responsible for 39% of NOx emissions. By 2026, on-road vehicles contribute 25% of total NOx and are the second largest emission category behind other mobile sources.

  - Other Mobile Sources: 0.4 tons/day decrease (7%) by 2026, 0.2 tons/day decrease (3.0%) by 2040

    Other Mobile Sources include aircraft, train locomotives, ships and commercial boats, recreational boats, off-road recreational vehicles, and farm equipment. Other Mobile Sources accounted for 32% of NOx in 2018 and are the second largest NOx emission category. Other mobile sources account for 39% of NOx emissions in 2026 and are the largest NOx emission category. By 2040 other mobile sources represent 41% of total NOx emissions, and remain the largest emission category.

  - Mobile Equipment: 1.2 tons/day (40%) decrease by 2026, 1.9 tons/day (65%) decrease by 2040

    Mobile equipment categories include industrial equipment such as forklifts, construction and mining equipment, commercial and residential lawn and garden equipment, airport ground support equipment and transport refrigeration units. Mobile equipment represented 16% of NOx emissions in 2018, 15% by 2026 and 14% by 2040.

- Stationary Sources: 0.6 tons/day increase (26%) by 2020, 0.4 tons/day increase (18%) by 2040
  - Other Fuel Combustion: 0.12 tons/day (7%) decrease by 2026, 0.14 tons/day (8%) decrease by 2040

    Other Fuel Combustion includes stationary industrial and commercial sources (excluding electric utilities and oil and gas production), agricultural irrigation engines, landfill gas flaring, residential uses, and agricultural burning. Other Fuel Combustion sources contributed approximately 9% of NOx in 2018, 12% in 2026 and 12% by 2040.
  - Electric Utilities and the Petroleum Industry: 0.6 tons/day (142%) increase by 2026, 0.3 tons/day (61%) increase by 2040.

    Emissions from these sources are not expected to change significantly from the base year. They contributed 1% of NOx emissions in 2018, 2% by 2026 and 3% by 2040.

Summaries of forecast ROG and NOx emissions by Major Source Category and air basin follow in Table 4-5 and Table 4-6 for 2018, 2024, 2026, 2030, 2035, and 2040. The relative contributions by major emission category appear in Figure 4-3 and Figure 4-4 for ROG and NOx planning day emissions in 2026 and Figure 4-5 and Figure 4-6 for 2040.

Figure 4-2
NOx Major Emission Category Trends

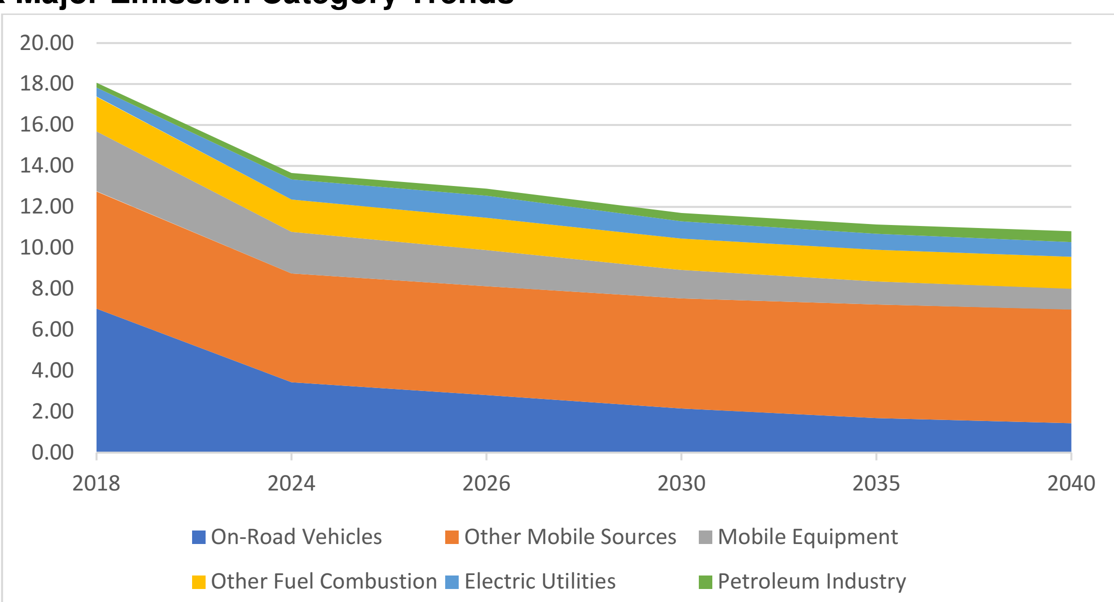


Table 4-4
Summer Planning Day NOx Emissions

Major Emission Category	NOx (tons/summer day) 2018	2024	2026	2030	2035	2040
On-Road Vehicles	7.03	3.43	2.82	2.16	1.69	1.44
Other Mobile Sources	5.73	5.31	5.30	5.37	5.55	5.56
Mobile Equipment	2.93	2.03	1.77	1.38	1.12	1.01
Other Fuel Combustion	1.69	1.59	1.57	1.54	1.55	1.55
Electric Utilities	0.45	0.98	1.08	0.84	0.78	0.72
Petroleum Industry	0.24	0.32	0.35	0.40	0.46	0.52
NOx Total Emissions	**18.07**	**13.66**	**12.90**	**11.70**	**11.14**	**10.81**

Notes:
Based on CARB CEPAM2022 v1.01 (March 2022).
Data rounding may affect displayed values and totals.
OCS not included.

Table 4-5
ROG Planning Emissions Forecast by Major Source Category

Ventura County	ROG (tons/summer day)					
Major Source Category Name	**2018**	**2024**	**2026**	**2030**	**2035**	**2040**
SCC AIR BASIN						
Stationary Sources						
Fuel Combustion	0.12	0.20	0.21	0.19	0.18	0.18
Waste Disposal	0.79	0.81	0.82	0.83	0.84	0.85
Cleaning And Surface Coatings	4.18	4.36	4.43	4.49	4.47	4.45
Petroleum Production And Marketing	2.28	2.64	2.79	3.06	3.35	3.69
Industrial Processes	0.54	0.57	0.57	0.58	0.59	0.59
Total Stationary Sources	**7.91**	**8.58**	**8.83**	**9.14**	**9.43**	**9.76**
Areawide Sources						
Solvent Evaporation	9.10	9.55	9.67	9.96	10.35	10.74
Miscellaneous Processes	0.59	0.60	0.60	0.60	0.60	0.60
Total Areawide Sources	**9.69**	**10.15**	**10.26**	**10.56**	**10.95**	**11.35**
Mobile Sources						
On-Road Motor Vehicles	4.28	2.83	2.56	2.13	1.70	1.47
Other Mobile Sources	7.60	6.68	6.13	5.17	4.50	4.26
Total Mobile Sources	**11.88**	**9.51**	**8.69**	**7.30**	**6.21**	**5.73**
TOTAL SCC AIR BASIN	**29.48**	**28.24**	**27.78**	**27.00**	**26.58**	**26.84**
OC1 AIR BASIN						
Stationary Sources						
Fuel Combustion	0.00	0.00	0.00	0.00	0.00	0.00
Cleaning And Surface Coatings	0.00	0.00	0.00	0.00	0.00	0.00
Petroleum Production And Marketing	0.04	0.06	0.06	0.07	0.08	0.09
Total Stationary Sources	**0.04**	**0.06**	**0.06**	**0.08**	**0.09**	**0.10**
Mobile Sources						
Aircraft	0.00	0.00	0.00	0.01	0.01	0.01
Ocean Going Vessels	0.41	0.44	0.45	0.48	0.52	0.57
Commercial Harbor Craft	1.16	1.47	1.58	1.85	2.25	2.73
Total Mobile Sources	**1.58**	**1.91**	**2.04**	**2.34**	**2.77**	**3.30**
TOTAL OC1 AIR BASIN	**1.62**	**1.97**	**2.11**	**2.41**	**2.86**	**3.40**
OC2 AIR BASIN						
Stationary Sources						
Fuel Combustion	0.02	0.02	0.02	0.02	0.02	0.02
Cleaning And Surface Coatings	0.00	0.00	0.00	0.00	0.00	0.00
Petroleum Production And Marketing	0.00	0.00	0.00	0.00	0.00	0.00
Total Stationary Sources	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**
Mobile Sources						
Aircraft	0.00	0.00	0.00	0.00	0.01	0.01
Ocean Going Vessels	0.20	0.22	0.22	0.23	0.24	0.25
Commercial Harbor Craft	0.00	0.00	0.00	0.00	0.00	0.00
Total Mobile Sources	**0.21**	**0.22**	**0.23**	**0.24**	**0.25**	**0.26**
TOTAL OC2 AIR BASIN	**0.23**	**0.24**	**0.25**	**0.26**	**0.27**	**0.28**
TOTAL VENTURA COUNTY	**31.32**	**32.04**	**31.73**	**31.26**	**31.30**	**32.11**

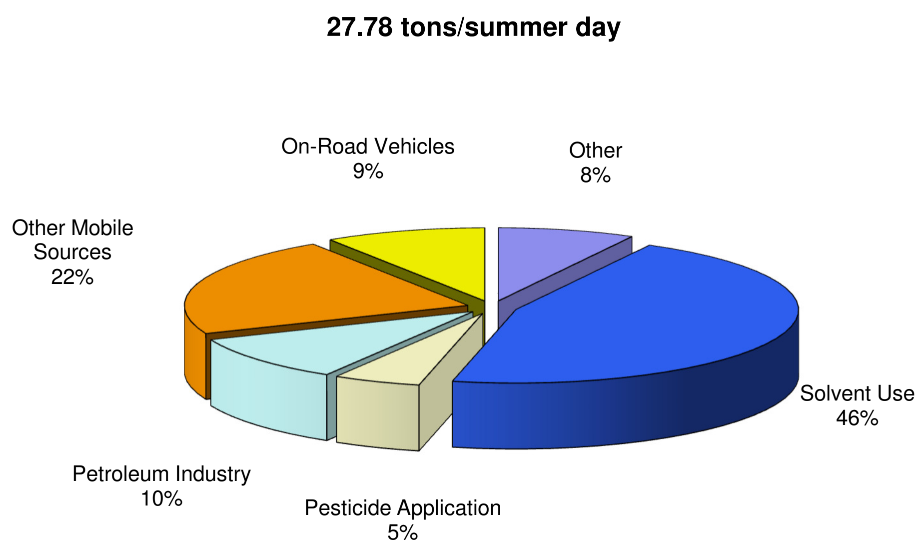
Notes:
Source: CEPAM2022 v1.01 (March 2022).
Data rounding may affect totals.

Table 4-6
NOx Planning Emissions Forecast by Major Source Category

Ventura County	NOx (tons/summer day)					
Major Source Category Name	**2018**	**2024**	**2026**	**2030**	**2035**	**2040**
SCC AIR BASIN						
Stationary Sources						
Fuel Combustion	1.57	2.04	2.15	1.93	1.90	1.89
Waste Disposal	0.07	0.08	0.08	0.09	0.09	0.10
Cleaning And Surface Coatings	0.00	0.00	0.00	0.00	0.00	0.00
Petroleum Production And Marketing	0.10	0.13	0.15	0.17	0.20	0.22
Industrial Processes	0.06	0.06	0.06	0.06	0.06	0.06
Total Stationary Sources	**1.79**	**2.31**	**2.44**	**2.25**	**2.25**	**2.27**
Areawide Sources						
Solvent Evaporation	0	0	0	0	0	0
Miscellaneous Processes	0.58	0.57	0.56	0.53	0.53	0.52
Total Areawide Sources	**0.58**	**0.57**	**0.56**	**0.53**	**0.53**	**0.52**
Mobile Sources						
On-Road Motor Vehicles	7.03	3.43	2.82	2.16	1.69	1.44
Other Mobile Sources	8.66	7.34	7.07	6.75	6.67	6.57
Total Mobile Sources	**15.69**	**10.78**	**9.90**	**8.92**	**8.36**	**8.01**
TOTAL SCC AIR BASIN	**18.07**	**13.66**	**12.90**	**11.70**	**11.14**	**10.81**
OC1 AIR BASIN						
Stationary Sources						
Fuel Combustion	0.00	0.00	0.00	0.00	0.00	0.00
Cleaning And Surface Coatings	0.00	0.00	0.00	0.00	0.00	0.00
Petroleum Production And Marketing	0.02	0.02	0.03	0.03	0.04	0.04
Total Stationary Sources	**0.02**	**0.02**	**0.03**	**0.03**	**0.04**	**0.04**
Mobile Sources						
Aircraft	0.03	0.03	0.04	0.04	0.05	0.06
Ocean Going Vessels	9.04	9.38	9.60	10.12	10.98	9.12
Commercial Harbor Craft	0.47	0.52	0.54	0.58	0.65	0.73
Total Mobile Sources	**9.53**	**9.93**	**10.18**	**10.75**	**11.68**	**9.91**
TOTAL OC1 AIR BASIN	**1.62**	**1.97**	**9.55**	**9.96**	**10.21**	**10.78**
OC2 AIR BASIN						
Stationary Sources						
Fuel Combustion	0.23	0.25	0.25	0.25	0.25	0.24
Cleaning And Surface Coatings	0.00	0.00	0.00	0.00	0.00	0.00
Petroleum Production And Marketing	0.00	0.00	0.00	0.00	0.00	0.00
Total Stationary Sources	**0.23**	**0.25**	**0.25**	**0.25**	**0.25**	**0.24**
Mobile Sources						
Aircraft	0.01	0.01	0.01	0.01	0.01	0.01
Ocean Going Vessels	3.91	3.93	3.97	4.01	4.12	3.07
Commercial Harbor Craft	0.05	0.05	0.05	0.05	0.05	0.05
Total Mobile Sources	**3.97**	**3.99**	**4.03**	**4.07**	**4.19**	**3.14**
TOTAL OC2 AIR BASIN	**0.23**	**0.24**	**4.20**	**4.24**	**4.28**	**4.32**
TOTAL VENTURA COUNTY	**31.82**	**28.73**	**28.25**	**27.67**	**28.16**	**25.02**

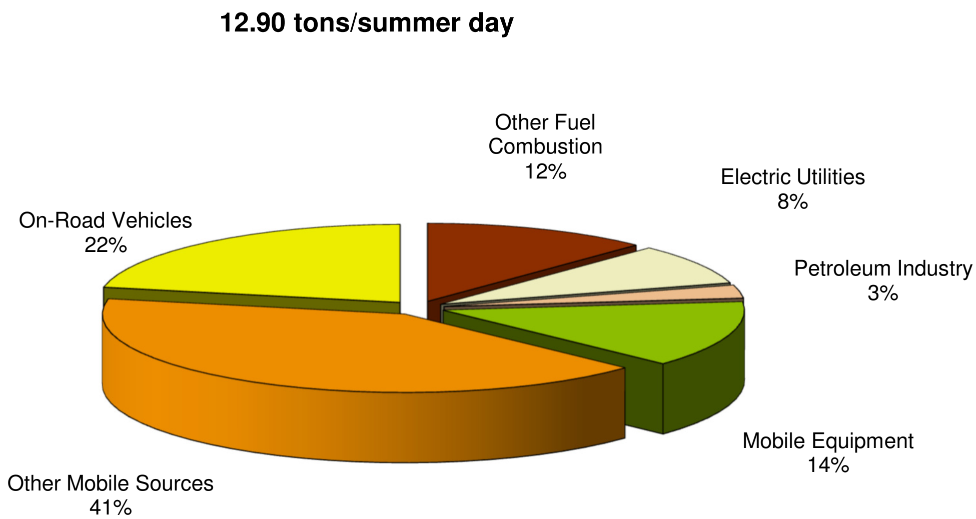
Notes:
Source: CEPAM2022 v1.01 (March 2022).
Data rounding may affect totals.

Figure 4-3
Ventura County 2026 Planning Day
ROG Emissions Inventory



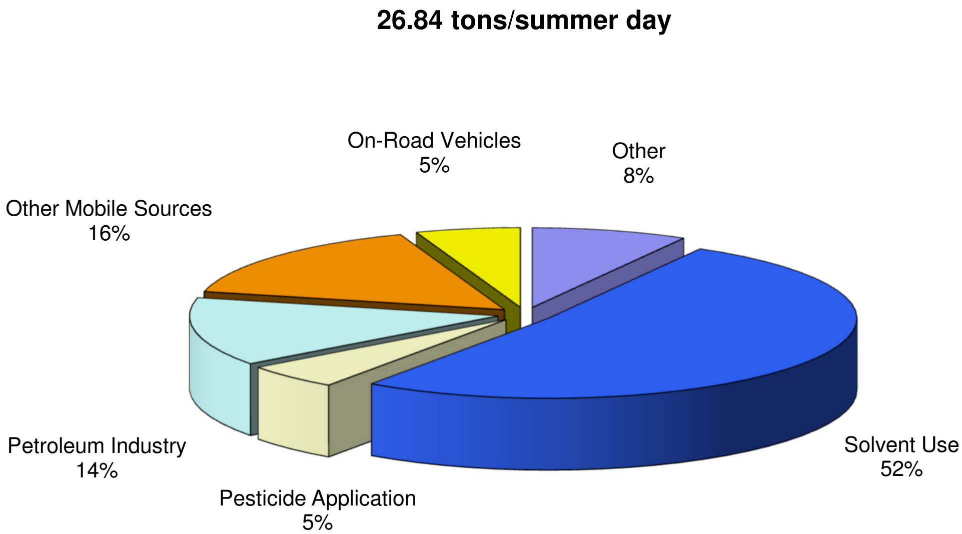
Reference:
CARB CEPAM2022 v1.01 (March 2022)
Excludes OC1, OC2, and Natural Sources

Figure 4-4
Ventura County 2026 Planning Day
NOx Emissions Inventory



Reference:
CARB CEPAM2022 v1.01 (March 2022)
Excludes OC1, OC2, and Natural Sources

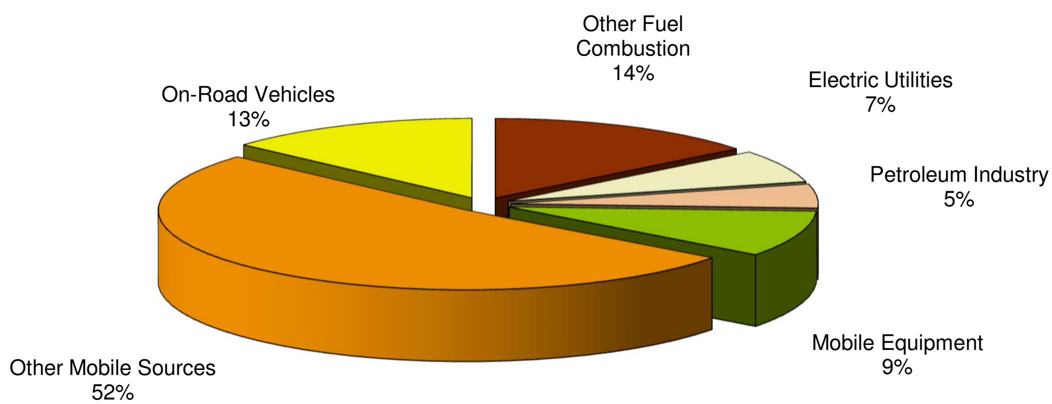
Figure 4-5
Ventura County 2040 Planning Day
ROG Emissions Inventory



Reference:
CARB CEPAM2022 v1.01 (March 2022)
Excludes OC1, OC2, and Natural Sources

Figure 4-6
Ventura County 2040 Planning Day
NOx Emissions Inventory

10.81 tons/summer day



Reference:
CARB CEPAM2022 v1.01 (March 2022)
Excludes OC1, OC2, and Natural Sources

4.3. Ventura County Marine-Related Emissions Forecast

As discussed in Section 2, *2018 Baseline Emissions Inventory*, coastal and offshore marine emissions sources are important segments of Ventura County's overall emissions inventory. A substantial effort has been made to improve and refine emissions estimates for these sources, described in detail in Section 2.

4.3.1. SCCAB Marine-Related Emissions

Coastal marine emission sources are located in the State Tidelands within three miles of the Ventura County coastline in the SCCAB, which also incorporates the onshore portion of Ventura County, including the Port of Hueneme and its approach corridors.

As shown in Table 4-7, coastal marine emission sources include ocean-going vessels, commercial harbor craft, recreational boats, aircraft, and cargo handling equipment. Cumulatively these categories accounted for 3.69 tons/day each of ROG and 3.40 tons/day of NOx in 2018. ROG emissions from these categories will decrease by 17% by 2026, and NOx emissions from these categories will increase by 12% by 2026. Total ROG emissions decrease by about 24% and NOx emissions increase by 30% by 2040. The most important ROG and NOx emission sources and their relative contributions to total coastal emissions in 2026 and 2040 are described below.

- Ocean-Going Vessels: 1.42 tons/day NOx by 2026 (37%), 1.54 tons/day by 2040 (33%)

  Ocean-going vessels include large commercial vessels calling on Port Hueneme (auto carriers, bulk cargo carriers, container vessels, passenger vessels, roll-on/roll off vehicle carriers, refrigerated cargo vessels and tankers) and military vessel operations occurring at the U.S. Navy facilities at the Port of Hueneme, as well as some non-military vessels utilizing Navy facilities. Ocean-going vessels comprised 39% of total coastal NOx in 2018, with 78% from commercial (i.e., non-military) vessels. Coastal emissions of NOx from Ocean going vessels will increase 8% (0.11 tons/day) in 2026 and 18% (0.23 tons/day).By 2040 NOx emissions from military ocean-going vessels exceeds the NOx emissions from commercial vessels and accounts for 70% of NOx emissions from coastal ocean-going vessels.

- Commercial Harbor Craft: 1.30 tons/day NOx by 2026 (34%), 1.78 tons/day by 2040 (37%)

  Commercial harbor craft include commercial and charter fishing vessels, excursion boats, tug and towboats, barges and dredges, crew and supply boats associated with the four offshore oil and gas production platforms, and military support and operations vessels, tugboats and other vessels utilizing U.S. Navy facilities at the Port of Hueneme. Commercial harbor craft contributed 33% of coastal NOx in 2018. Emissions from all commercial harbor craft are expected to increase by 14% (0.16 tons/day) by 2026 and 56% (0.64 tons/day) by 2040. Military commercial harbor craft were responsible for 45% of NOx emissions from commercial harbor craft in 2018, and they will account for 69% of NOx emissions from commercial harbor craft.

- Recreational Boats: 2.17 tons/day ROG by 2026 (71%), 1.37 tons/day by 2040 (49%) and 0.48 tons/day NOx by 2026 (13%), 0.45 tons/day by 2040 (9%)

  Recreational Boats operate at the ports, marinas, and lakes in Ventura County, and include vessels with outboard, inboard and stern-drive engines, sailboat auxiliary engines, and personal watercraft. Recreational vessels accounted for 82% of coastal ROG emissions in 2018 and decrease by 29% (0.87 tons/day) by 2026 and 55% (1.67 tons/day) by 2040. Recreational boats are responsible for 13% of coastal NOx emissions in 2026. Those emissions are expected to decrease by 8% (0.04 tons/day) by 2026 and 14% (0.07 tons/day) by 2040.

- Aircraft: 0.70 tons/day ROG by 2026 (23%), 1.17 tons/day ROG increase by 2040 (42%) and 0.58 tons/day NOx by 2026 (15%), 0.98 tons/day NOx by 2040 (21%)

  Aircraft emissions are associated with military aircraft operations at the U.S. Naval facility at Point Mugu, including transports, jet aircraft, helicopters, and missile launches. Military aircraft activities were responsible for 88% of coastal ROG emissions from aircraft and 95% of coastal NOx from aircraft in 2018. ROG and NOx emissions are expected to increase by almost 50% by 2026 and almost one and one-half times by 2040.

- Cargo Handling Equipment: Less than 0.1 ton/day by 2026 and 2040 (1%)

  Cargo handling equipment includes port operations/cargo handling equipment operating in association with large commercial vessels calling on Port Hueneme, such as yard tractors, forklifts, cranes, loaders, and other material handling equipment. Although Cargo Handling Equipment contributed one quarter of coastal NOx in 2002 in the 2007 AQMP, this emission source became subject to CARB's Cargo Handling Equipment Regulation in 2007 and contributed less than 1% of total coastal NOx emissions in 2018. Emissions continue to decline in 2026 and 2040 but the relatively small amount of emissions results in a negligible benefit from this decrease.

Table 4-7
SCC Air Basin Coastal Marine Emissions Categories 2018 – 2040

Ventura County Emission Category	ROG Planning Day Emissions (tons/summer day) 2018	2024	2026	2030	2035	2040
Ocean-Going Vessels	0.05	0.06	0.06	0.07	0.07	0.08
Commercial Harbor Craft	0.10	0.12	0.13	0.14	0.16	0.18
Recreational Boats	3.04	2.35	2.17	1.87	1.58	1.37
Aircraft	0.48	0.64	0.70	0.82	0.95	1.17
Cargo Handling Equipment	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total SSCAB Coastal ROG	**3.685**	**3.17**	**3.06**	**2.89**	**2.76**	**2.81**

Ventura County Emission Category	NOx Planning Day Emissions (tons/summer day) 2018	2024	2026	2030	2035	2040
Ocean-going Vessels	1.31	1.38	1.42	1.55	1.74	1.54
Commercial Harbor Craft	1.14	1.25	1.30	1.42	1.58	1.78
Recreational Boats	0.52	0.49	0.48	0.47	0.46	0.45
Aircraft	0.39	0.52	0.58	0.68	0.79	0.98
Cargo Handling Equipment	0.03	0.02	0.02	0.01	0.00	0.00
Total SSCAB Coastal NOx	**3.40**	**3.66**	**3.80**	**4.11**	**4.56**	**4.75**

Notes:
CEPAM2022 v1.01 (March 2022).
No CARB Adjustments.

4.3.2. OC1 and OC2 Air Basin Marine-Related Emissions

Offshore emissions marine sources shown in Table 4-8 and Figures 4-7 through 4-10 occur in the region beyond three miles of the coastline in the OC1 and OC2 Air Basins, San Nicolas Island, and the offshore shipping lanes in the Santa Barbara Channel. OC1 and OC2 emissions sources accounted for 13.75 tons/day of NOx and 1.85 tons/day ROG in 2018. Total OC1 and OC2 NOx emissions increase by 5% by 2026 but decrease by 3% to 13.34 tons/day by 2040. ROG emissions increase by over 27% by 2026 and almost double by 2040. The most important ROG and NOx emission sources and their change in contributions to total OC1 and OC2 emissions in 2026 and 2040 are described below.

- Ocean-Going Vessels: 0.67 tons/day ROG by 2026 (29%), 0.82 tons/day by 2040 (22%) and 13.57 tons/day NOx by 2026 (94%), 12.20 tons/day by 2040 (91%)

  This category pertains to large commercial vessels traversing the Santa Barbara Channel shipping lanes offshore of Ventura County, including vessels calling on Port Hueneme or the ports of Los Angeles/Long Beach and transiting vessels passing through southern California waters but without calling at either port, and large military vessels operating offshore and in the approach corridors to Port Hueneme and San Nicolas Island. Ocean-going vessels accounted for 94% of NOx and 33% of ROG emissions in the OC1 and OC2 Air Basins in 2018. Emissions of NOx should increase 5% by 2026 but decrease by 6% from the baseline by 2040 due largely to state and federal commercial vessel control measures. ROG emissions are expected to increase by 10% by 2026 and 33% by 2040. Virtually all ROG emissions are from commercial vessels. Commercial vessels will account for 93% of NOx emissions from marine-related ocean-going vessels in 2026, and 87% of NOx emissions from marine-related ocean-going vessels in 2040.

- Commercial Harbor Craft: ROG by 2026 (67%), 2.73 tons/day by 2040 (74%) and 0.59 tons/day NOx by 2026 (4%), 0.78 tons/day by 2040 (6%) and 1.59 tons/day

  Commercial harbor craft include commercial and charter fishing vessels, excursion boats, tug and towboats, crew and supply boats affiliated with the offshore oil and gas production platforms, military support and operations vessels, tugboats and other vessels operating offshore and in the approach corridors to Port Hueneme and San Nicolas Island. Commercial harbor craft contributed nearly 63% of offshore ROG and about 4% of NOx in 2018. ROG emissions should increase by 36% by 2026 and 134% by 2040, while NOx emissions will increase by 14% by 2026 and 51% by 2040. From 2018 to 2040, the proportion of the commercial harbor craft emissions from military sources will increase from 82% of ROG to 90% of ROG and from 4% of NOx to 12% of NOx.

- Aircraft: 0.01 tons/day ROG by 2026 (1%), 0.02 tons/day by 2040 (1%)

  Aircraft emissions are associated with military aircraft operations at the U.S. Naval facility on San Nicolas Island, including transports, jet aircraft, helicopters, and missiles. Aircraft activities will remain a small contributor to offshore emissions until 2040.

- Stationary Sources: 0.09 tons/day ROG by 2026 (4%), 0.12 tons/day by 2040 (3%), and 0.28 tons/day NOx by 2026 (2%), 0.28 ton/day by 2040 (2%)

  Stationary Sources include oil & gas production, fuel combustion and coatings & solvents emissions categories. Oil & gas production ROG emissions are fugitive hydrocarbon losses from oil and gas production components and production and processing equipment on the offshore oil and gas production platforms; natural gas flaring is responsible for ROG and NOx emissions. Fuel combustion sources primarily are related to electric generating types of equipment. Coatings & solvents ROG emissions are from routine maintenance surface coating and cleaning operations for the offshore oil and gas production platforms and the U.S. Naval facility on San Nicolas Island. Stationary Sources contributed 3% of ROG emissions and 2% of NOx in the OC1 and OC2 air basins 2018. Emissions from stationary sources in the OC1 and OC2 air basins remain relatively low through 2040.

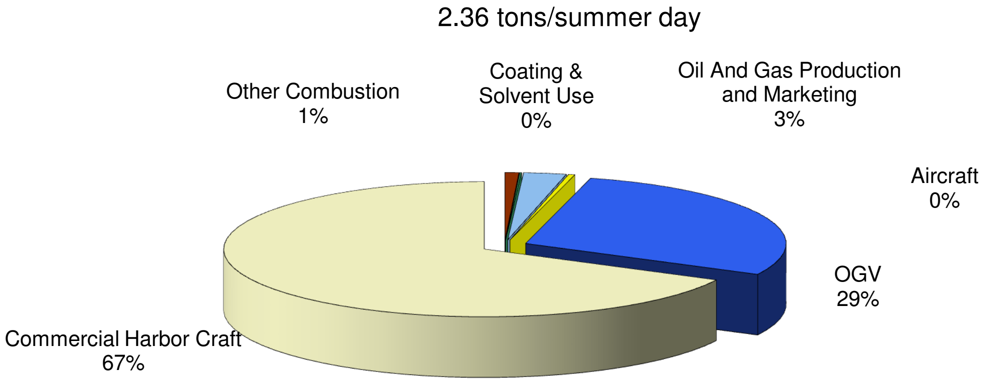
Table 4-8
OC1 and OC2 Air Basin Marine Emissions Categories 2018 – 2040

Ventura County Emission Category	ROG Planning Day Emissions (tons/summer day) 2018	2024	2026	2030	2035	2040
Other Combustion	0.02	0.02	0.02	0.02	0.02	0.02
Coating/Solvent Use	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Oil And Gas Production and Marketing	0.04	0.06	0.06	0.07	0.08	0.09
Aircraft	0.01	0.01	0.01	0.01	0.01	0.02
OGV	0.61	0.66	0.67	0.71	0.76	0.82
Commercial Harbor Craft	1.17	1.47	1.59	1.85	2.25	2.73
Total OCS Air Basin ROG	**1.85**	**2.21**	**2.36**	**2.67**	**3.13**	**3.68**

Ventura County Emission Category	NOx Planning Day Emissions (tons/summer day) 2018	2024	2026	2030	2035	2040
Oil And Gas Production	0.02	0.02	0.03	0.03	0.04	0.04
Aircraft	0.03	0.04	0.04	0.05	0.06	0.08
OGV	12.95	13.31	13.57	14.13	15.11	12.20
Commercial Harbor Craft	0.52	0.57	0.59	0.64	0.70	0.78
Other Combustion	0.23	0.25	0.25	0.25	0.25	0.24
Total OCS Air Basin NOx	**13.75**	**14.20**	**14.48**	**15.10**	**16.15**	**13.34**

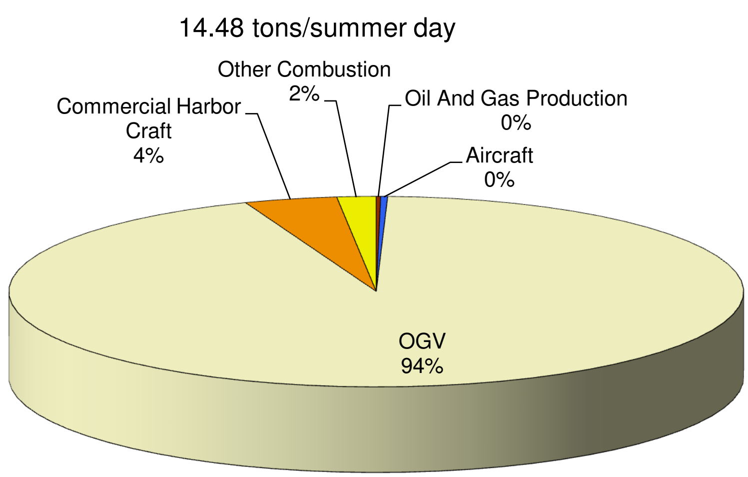
Notes:
CEPAM2022 v1.01 (March 2022).
No CARB Adjustments.

Figure 4-7
Ventura County 2026 Planning Day
ROG Emissions Inventory (OC1 and OC2 Air Basins)



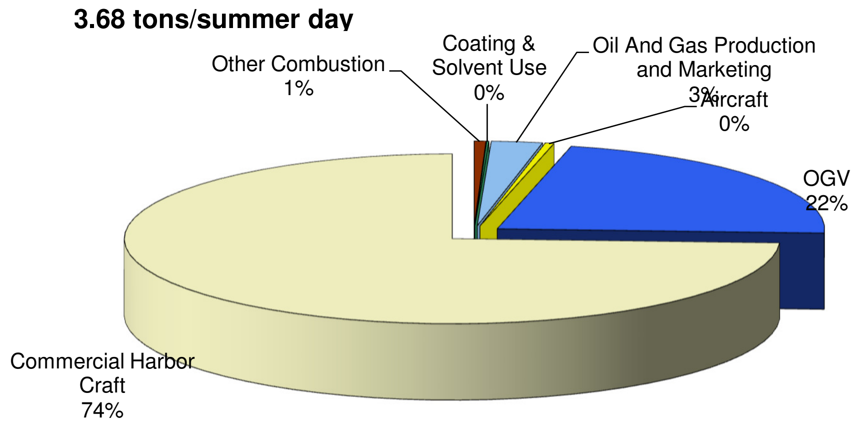
Reference:
CARB CEPAM2022 v1.01 (March 2022).
OC1 is 3 – 24 miles offshore. OC2 is 24-100 miles offshore

Figure 4-8
Ventura County 2026 Planning Day
NOx Emissions Inventory (OC1 and OC2 Air Basins)



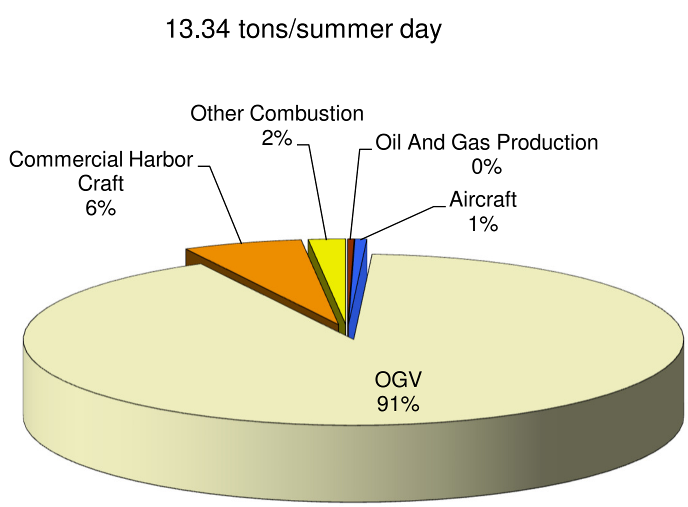
Reference:
CARB CEPAM2022 v1.01 (March 2022).
OC1 is 3 – 24 miles offshore. OC2 is 24-100 miles offshore

Figure 4-9
Ventura County 2040 Planning Day
ROG Emissions Inventory (OC1 and OC2 Air Basins)



Reference:
CARB CEPAM2022 v1.01 (March 2022).
OC1 is 3 – 24 miles offshore. OC2 is 24-100 miles offshore

Figure 4-10
Ventura County 2040 Planning Day
NOx Emissions Inventory (OC1 and OC2 Air Basins)



Reference:
CARB CEPAM2022 v1.01 (March 2022).
OC1 is 3 – 24 miles offshore. OC2 is 24-100 miles offshore

4.4. Naval Base Ventura County Emission Forecasts

EPA's General Conformity Rule discussed in Section 3, *Control Strategy*, ensures federal actions or projects do not interfere with a nonattainment area's ability to attain and maintain national air quality standards by requiring emissions associated with the federal action or project to be accounted for in the attainment demonstration of the applicable State Implementation Plan.

The 2022 AQMP includes emissions associated with potential growth or change in activity at NBVC. The baseline and projected emissions are from aircraft and missile operations associated with NBVC Point Mugu and ship operations at Port Hueneme occurring within the Ventura County nonattainment area (the SCCAB, including the mainland and three nautical miles offshore) and are included in the AQMP's base year inventory and emissions forecasts. Baseline and emissions projections were provided to the District by NBVC in February 2021. Increases in motor vehicle activity at NBVC are part of SCAG's regional transportation model and are not included in NBVC's baseline emissions or projections.

Table 4-9 summarizes the 2018 emissions, estimated future year emissions from potential projects, and an additional 4% annual growth allowance[1] for NBVC through year 2026 within the Ventura County nonattainment area. The 4% annual growth allowance is intended to account for uncertainties in potential projects resulting from future actions and unknown projects in response to national security and possible mission requirements. This additional growth would result in a base-wide emissions budget for NBVC of 241.4 tons per year of ROG and 597.21 tons per year of NOx by the 2026 attainment year.

Table 4-9
Naval Base Ventura County Emissions Budget
(tons per year)

Pollutant	2018	2021	2022	2023	2024	2025	2026
ROG	175.69	197.93	206.42	214.04	223.22	234.57	241.40
NOx	429.59	480.06	505.38	521.14	547.08	581.88	597.21

Notes:
Source: Revised Final 2 Naval Base Ventura County Mobile Source Emissions 2017 Baseline emissions and Future Emission Projection for 8-Hour Ozone SIP Planning (February 2021).

4.5. Emissions by Jurisdiction

The District has reviewed emission sources by the agency primarily responsible for regulating those sources. Those source categories and the agency responsible for regulating them is shown in Table 4-10. The District is committed to achieving the 2015 70-ppb ozone air quality standard and has implemented some of the strictest emission standards for ozone precursors for sources under District jurisdiction. However, the District only has jurisdiction over 8% of NOx emitted in its

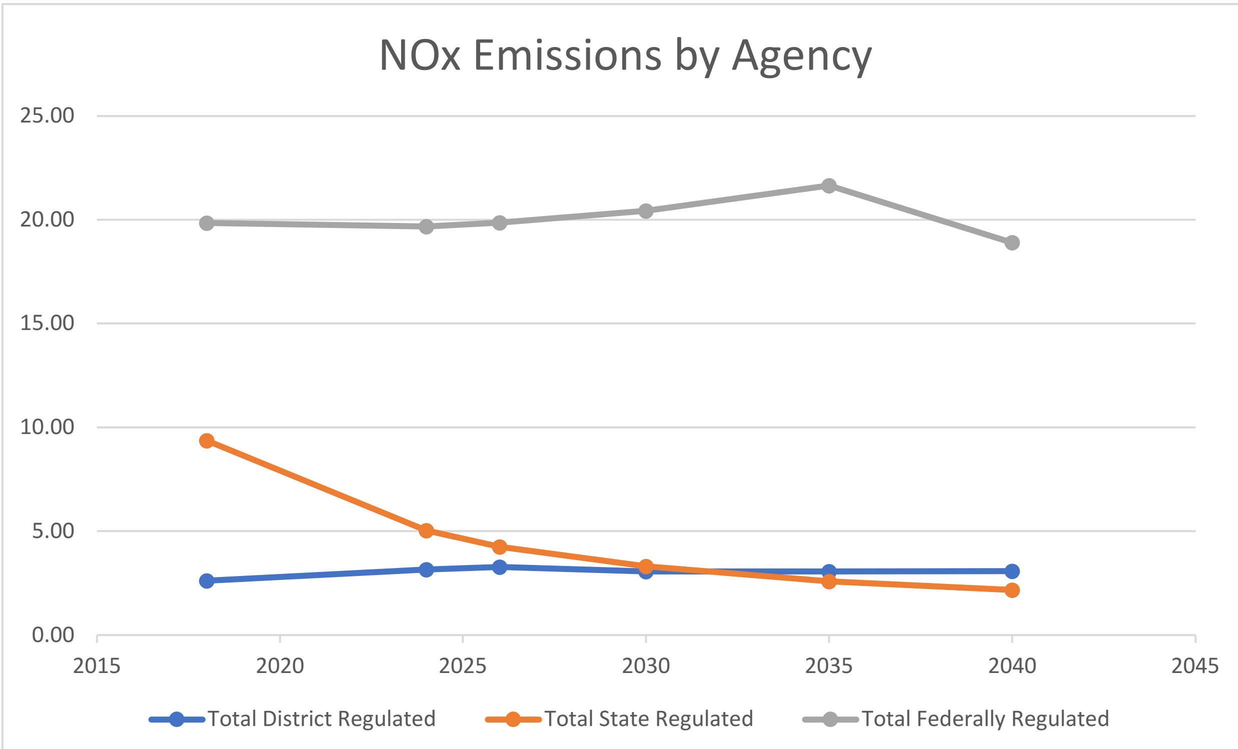
[1] 4% growth for all sources except a 2% growth rate assumed for cargo vessels at NBVC Berth N3.

jurisdiction for the 2018 baseline, and the District will only have primary regulatory authority over 12% of NOx emissions in 2026. Figure 4-11 shows NOx emissions by primary jurisdiction over time. The EPA is the primary regulatory agency over 62% of NOx emissions in 2018 and will be the primary regulatory agency over 73% of emissions in 2026. The greatest potential for NOx reductions is from sources not controlled by the District.

Table 4-10
Source Categories by Primary Regulatory Agency

Regulatory Jurisdiction	Source Category
District	Fuel combustion Waste management Cleaning and surface coating Petroleum production and marketing Industrial processes Architectural coating Asphalt paving/roofing Residential fuel combustion Construction and demolition Dust Fires Managed burning and disposal Cooking Other
State	Consumer products Pesticides On-road motor vehicles Off-road portable equipment (PERP) Off-road mobile equipment Farm equipment Commercial harbor craft Fuel storage and handling
Federal	Aircraft Trains Ocean going vessels Recreational boats Off-road recreational vehicles

Figure 4-11
Ventura County NOx Emissions by Jurisdiction



SECTION 5. ATTAINMENT DEMONSTRATION

5.1. Introduction

This section presents the attainment demonstration to show that the proposed control strategy for the 2022 AQMP will provide sufficient emission reductions for Ventura County to attain the 2015 federal 8-hour ozone standard by no later than 2026, the county's mandated ozone attainment year under the federal CAAA. The attainment demonstration consists of two primary components: photochemical modeling and Weight of Evidence (WOE) assessment.

The SCAQMD conducted the photochemical modeling for the 2022 AQMP. The SCAQMD also conducted the photochemical modeling for the South Coast, San Diego County, Imperial County, Coachella Valley, and Western Mojave Desert ozone nonattainment areas. CARB prepared the WOE for the 2022 AQMP, presented in Appendix H.

5.1.1. Photochemical Modeling

Section 181(a)(1) of the federal CAAA requires that ozone nonattainment areas attain the federal 8-hour ozone standard as expeditiously as practicable but no later than by specific dates based on their ozone nonattainment area classifications – marginal, moderate, serious, severe, and extreme. Moreover, Section 182(c)(2)(A) of the federal CAAA requires that serious and above ozone nonattainment areas, including Ventura County, use a photochemical grid model to show attainment.

Photochemical grid models are computer programs that mathematically simulate each of the physical and chemical processes that govern air pollution in the lower atmosphere. Such processes include air pollutant release into the air, air pollutant transport and diffusion by the wind, air pollutant creation and destruction in the air through chemical reactions, and deposition of pollutants onto the ground. Further information regarding air quality models, including photochemical grid models of the type used for the 2022 AQMP, can be found on EPA's website at https://www.epa.gov/scram/photochemical-air-quality-modeling.

The region analyzed by a photochemical air pollution model is termed the modeling region or modeling domain and is a geographical area divided into a three-dimensional array of grid cells. The model calculates air pollutant concentrations in each grid cell for each hour of the modeling period and often displays the results graphically.

EPA modeling guidance, *Modeling Guidance for Demonstrating Air Quality Goals for Ozone, PM2.5, and Regional Haze*, recommends that nonattainment areas supplement their photochemical modeling results with a WOE assessment to address the uncertainties inherent to photochemical modeling assessments. Further, EPA guidance indicates that as an area approaches the target attainment date, ambient air quality and emissions data become an increasingly important element in demonstrating progress toward air quality goals.

The photochemical modeling for the 2022 AQMP contains three principal components.

The first, presented in Appendix G, is the *Protocol for Photochemical Modeling of Ozone for Ventura County*, which is excerpted from Appendix V of the 2022 SCAQMD AQMP. The Protocol defines the scope of the regional modeling analyses including the attainment demonstration methodology and chemical transport platforms, gridded and speciated emission inventories, and geographical characteristics of the modeling domains. The Protocol also defines the methodology to assess model performance and the selection of the simulation periods.

The second, presented in Appendix H, is the *Model Performance Analysis*. This analysis evaluated how well the photochemical model for the 2022 AQMP was able to predict 8-hour ozone concentrations at each monitoring site in the county compared to observed 8-hour ozone concentrations at those same monitoring sites.

The third, presented in Appendix I, is the *Ventura County Unmonitored Area Analysis*. This analysis estimated 8-hour ozone design values in areas of Ventura County that do not have ambient ozone monitors, such as the Los Padres National Forest region of the county. It is required by EPA modeling guidance to show that all grid cells in a modeling domain will attain the federal ozone standard.

5.1.2. Weight of Evidence Assessment

A Weight of Evidence (WOE) assessment is a set of analyses intended to verify modeled predictions of future air quality, especially at levels near the federal standards. These analyses can include air quality trends, emission trends, meteorological data, evaluation of other air quality indicators, and additional air quality modeling.

Because all analysis methods have strengths and weaknesses, examining an air quality problem using various analysis methods helps offset the limitations and uncertainty inherent in all air quality modeling methods. The scope of a WOE analysis is different for each nonattainment area. The level of detail appropriate for an area depends upon the complexity of the air quality problem in the area, how far into the future the attainment deadline is, and the amount of data and modeling available.

To complement regional photochemical modeling analyses included in the 2022 AQMP, the WOE assessment for Ventura County includes detailed analyses of county ambient ozone data, ozone precursor emission trends, population exposure trends, and a discussion of conditions that contribute to exceedances of the 70-ppb federal ozone standard in Ventura County. Further, the rate of progress toward air quality goals was evaluated by considering trends in the county's ozone design values, precursor emission reductions, and the relationship between ozone air quality and past emission reductions.

The WOE assessment for Ventura County evaluated ambient air quality and emission trends to complement the regional photochemical modeling analyses conducted to evaluate Ventura County's progress toward meeting its 2026 ozone attainment date. Control measures implemented in the county through federal, state, and local programs have led to a substantial decline in emissions of ozone precursors and a substantial improvement in ozone air quality countywide.

Between 2000 and 2021, total NOx emissions in Ventura County declined by 50 percent and total ROG emissions declined by 45.5 percent. Moreover, between 2000 and 2021, the number of exceedance days in the County declined by 95 percent and the design value decreased by over 27 percent, from 105 ppb to 75 ppb (Simi Valley). In 2021, four out of five monitoring sites in the County met the standard.

Ventura County is classified as a serious nonattainment area with a 2026 ozone attainment date. Regression trends derived from ozone design values, as well as the association between NOx emissions and the fourth highest 8-hour ozone concentration, indicate that Ventura County is on track to attain the 70-ppb standard by 2026, which is consistent with design value projections derived from the regional photochemical modeling assessment conducted by the SCAQMD for Ventura County.

Appendix J, *Ventura County Weight of Evidence Assessment*, contains the WOE for the 2022 AQMP. Appendix K, *Ventura County Unmonitored Area Analysis*, contains additional information about modeling for unmonitored areas.

5.2. Attainment Demonstration Summary

Based on photochemical modeling design value projections presented in Table 5-1, as well as the supporting WOE assessment, Ventura County can expect to attain the federal 70 ppb 8-hour ozone standard by no later than August 3, 2027, the attainment date for serious ozone nonattainment areas.

Table 5-1
Regional Modeling Design Value Projections (ppb)

Site	2018 Design Value	2026 Baseline Design Value	2026 Control Design Value
Thousand Oaks	68.3	65.8	65.1
Piru	71.3	67.6	66.5
Ojai	68.0	65.5	64.8
Simi Valley	75.7	71.7	70.3
El Rio	60.7	59.4	58.9

5.3. 2026 Target Attainment Date

The photochemical modeling and accompanying WOE assessment project the earliest date that a nonattainment area could meet the standard. The photochemical modeling and WOE show Ventura County will meet the federal 8-hour ozone standard in 2026. Neither analysis indicated a likelihood the area could meet the standard earlier than the statutory attainment date.

Annual variations in air quality make it difficult to pinpoint a specific year that an area will first achieve clean data and thus meet the standard. Therefore, Ventura County has identified 2026 as its attainment year, the attainment year for serious nonattainment areas, for this and the following reason.

EPA's *Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5, and Regional Haze,* dated April 2007, acknowledges the variability in year-to-year weather patterns, among other factors, when compared to photochemical modeling results by stating,

> "Past modeling analyses have shown that future design value uncertainties of 2-4 ppb for ozone, can result from use of alternate, yet equally appropriate, emissions inputs, chemical mechanisms, and meteorological inputs (Jones, 2005; Sistla, 2004)[1]."

The photochemical modeling and WOE analysis in this plan demonstrate a design value of 70 ppb in 2026. The modeling uncertainty of 2-4 ppb referenced in the previous EPA modeling guidance indicates this modeled result is not an absolute predictor of future attainment. The supplemental information in the WOE indicates attainment is achievable by the statutory attainment deadline but it is unlikely the area would attain the standard prior to that date.

Additionally, NOx and ROG emissions contribute significantly to ozone formation in Ventura County and likewise, reductions in NOx and ROG emissions will reduce ozone concentrations. In Ventura County, mobile sources contribute to over 90 percent of NOx emissions. Achieving NOx reductions leading up to the 2026 attainment year is reliant upon current CARB mobile source programs. While continuation of the existing mobile source program will achieve reductions between now and 2026, those reductions are represented in the model and there are no additional mobile source programs that will begin implementation in this period to further accelerate emission reductions in Ventura County.

[1] Pg. 105,https://www.epa.gov/scram/sip-modeling-guidance-documents

SECTION 6. REASONABLE FURTHER PROGRESS

6.1. RFP Requirements

Sections 172(c)(2) and 182(b)(1) of the Clean Air Act (Act) require ozone attainment plans to provide for Reasonable Further Progress (RFP). RFP is defined in section 171(1) of the Act as "…such annual incremental reductions in emissions of the relevant air pollutant as are required…for the purpose of ensuring attainment of the applicable national ambient air quality standard by the applicable date." This requirement to demonstrate steady progress in emission reductions between the baseline year and attainment date ensures that areas will begin lowering air pollution in a timely manner and not delay implementation of control programs until immediately before the attainment deadline.

There are two separate RFP requirements for ozone nonattainment areas depending upon their classification. For ozone nonattainment areas classified as Moderate or above, there is a one-time requirement for a 15 percent reduction in reactive organic gases (ROG) emissions over the first six years of the planning period (section 182(b)(1)). For ozone nonattainment areas classified as Serious or higher, section 182(c)(2)(B) of the Act has an additional requirement to demonstrate 3 percent per year cumulative reduction of ozone precursors averaged over each consecutive three-year period until attainment.

In 1997, U.S. EPA approved a 15 percent ROG-only rate of progress demonstration for the Ventura County for the 1-hour ozone standard covering the entire nonattainment area for the 70 ppb 8-hour ozone standard.1 As such, the requirement under section 182(b)(1) of the Act in the first 6 years of the attainment planning period has been met for the Ventura County ozone nonattainment area.

For the 182(c)(2)(B) RFP requirement for Serious and higher areas, U.S. EPA guidance allows for oxides of nitrogen (NOx) substitution to demonstrate the annual 3 percent reductions of ozone precursors if it can be demonstrated that substitution of NOx emission reductions (for ROG reductions) yields equivalent ozone reductions.2 Additional U.S. EPA guidance states that certain conditions are needed to use NOx substitution in an RFP demonstration.3 First, an equivalency demonstration must show that cumulative RFP emission reductions are consistent with the NOx and ROG emission reductions determined in the ozone attainment demonstration. Second, the reductions in NOx and ROG emissions should be consistent with the continuous RFP emission reduction requirement. The guidance states that "Any combination of VOC (ROG) and NOx emission reductions which totals 3 percent per year and meet other SIP consistency requirements described in this document are allowed."

[1] 62 FR 1150 https://www.gpo.gov/fdsys/pkg/FR-1997-01-08/pdf/97-144.pdf

[2] P1001E8Z.PDF (epa.gov)

[3] https://www3.epa.gov/ttn/naaqs/aqmguide/collection/cp2/19931201_oaqps_nox_substitution_guidance.pdf

6.1. RFP Demonstration

Table 6-1 demonstrates that the cumulative ROG and NOx emission reductions in Ventura County meets the RFP targets in the 2023 milestone year and the attainment year, 2026. In accordance with U.S. EPA guidance for implementation of the 70 ppb 8-hour ozone standard attainment plans, *Implementation of the 2015 National Ambient Air Quality Standards for Ozone: Nonattainment Area State Implementation Plan Requirements*, the emissions reductions in the RFP demonstration occur inside the nonattainment area, are achieved through existing control regulations, and start from a baseline year of 2017.[4]

The Ventura County 70 ppb 8-hour ozone RFP demonstration was developed using CARB's California Emissions Projection Analysis Model (CEPAM), 2022 Emission Projections, Version 1.01 (see Appendix A for more information on the planning emissions inventory). In order to demonstrate consistency between the RFP demonstration and the motor vehicle emissions budgets (MVEB), a line item adjustment is made in the RFP demonstration to account for the differences in the on-road mobile source emissions projections in the CEPAM inventory and the MVEB which is rounded up to the nearest tenth of a ton (see Chapter 3.3.2).

Emissions Reductions Credits (ERCs) banked prior to the RFP baseline year of 2017 must be accounted for in RFP demonstrations for the 70 ppb 8-hour ozone standard. For Ventura County, all of the pre-baseline year banked NOx ERCs, and a majority of the pre-baseline year banked ROG ERCs, are accounted for in the growth projections in the CEPAM inventory.

The projected emission growth for stationary sources from 2018 to 2026 is 1.05 tons/day ROG and 0.96 tons/day NOx. The projected growth of NOx emissions is greater than the available pre-base year NOx ERC balance; therefore, the growth is sufficient to account for the maximum possible ERC use. However, the pre-baseline ROG ERCs exceed the projected growth of ROG emissions from stationary sources. In order to ensure that pre-baseline year banked ROG ERCs in excess of amount accounted for in the CEPAM inventory are not used, the District is proposing a cap on the use of pre-baseline year banked ROG ERCs through the 2026 attainment year that is equal to the amount accounted for in the CEPAM inventory, 1.05 tpd (see Appendix L for a listing of ERCs).

New emissions requiring ROC ERCs that would result in the use of more than a cumulative use of 1.05 tons/day of ROG ERCs from the pre-2017 baseline will not be permitted by the District. The District intends this commitment to be federally enforceable as part of the adopted SIP. The District will also include a statement about the use of pre-baseline ROC ERCs in its annual ERC reports to the EPA.

[4] 83 FR 62998, 2018-25424.pdf (govinfo.gov)

Table 6-1: Ventura County RFP demonstration for the 70 ppb 8-hour ozone standard

Year	2017	2023	2026
ROG emissions	29.96	28.35	27.78
MVEB Rounding Margin		0.10	0.05
Maximum ROG Emissions	29.96	28.45	27.82
Required % change since 2017		18%	27%
Target ROG Level		24.56	21.87
Shortfall (-)/ Surplus (+) in ROG		-3.88	-5.96
Shortfall (-)/ Surplus (+) in ROG, %		-13.0%	-19.9%
Year	2017	2023	2026
NOx emissions, tpd	19.61	14.48	12.90
MVEB Rounding Margin, tpd		0.04	0.01
Maximum NOx Emissions	19.61	14.52	12.91
Change in NOx since 2017, tpd		5.09	6.70
Change in NOx since 2017, %		25.9%	34.2%
NOx reductions since 2017 used for ROG substitution in this milestone year, %		13.0%	19.9%
Shortfall (-)/ Surplus (+), %		13.0%	14.3%
RFP shortfall (-), if any		0%	0%
RFP Met?		YES	YES

SECTION 7. CONTINGENCY MEASURES

7.1. Contingency Measures Introduction

Contingency measures are required by the Clean Air Act to be implemented should an area fail to make reasonable further progress or attain the NAAQS by the required date. Over the last few years, multiple court decisions in the 9th circuit and nation-wide have effectively disallowed the SIP-approved approach which CARB and the districts have historically used to meet contingency measure requirements. CARB continues to strive to meet the requirements, but U.S. EPA has not yet released comprehensive and updated guidance encompassing the full scope of contingency measure requirements, in light of the results of the varying court decisions. Guidance is needed for CARB, and other air agencies across California and the U.S., to ensure that any resources devoted to creating, adopting, and implementing a measure will result in one that meets the requirements and be approved into the SIP.

Additionally, California faces the most difficult air quality challenges in the nation and, accordingly, leads the country with the most stringent air pollution control programs. Historically, U.S. EPA guidance required contingency measures to achieve approximately one year's worth of emission reductions. CARB's control programs are advanced, and primarily-federally regulated sources contribute over half of the emissions. Thus, opportunities for a triggered contingency measure that can be implemented by the State and result in one year's worth of emission reductions in the required time frame are not readily available. Further, if any measure that could achieve this level of emission reductions existed, it would be adopted to improve air quality and support attainment of NAAQS and would not be withheld for contingency purposes. Even with recent court decisions, U.S. EPA has the opportunity to justify a revised approach for contingency measures recognizing the maturity of control programs or allow states to provide a reasoned justification for achieving less than the required amount. California continues to work towards meeting contingency measure requirements, but U.S. EPA must issue guidance to provide clarity and direction for states to move forward and pursue contingency measures that will meet the requirements.

7.2. Background

The Clean Air Act specifies that SIPs must provide for contingency measures, defined in section 172(c)(9) as "specific measures to be undertaken if the area fails to make reasonable further progress, or to attain the national primary ambient air quality standard by the attainment date…." The Clean Air Act is silent though on the specific level of emission reductions that must flow from contingency measures. In the absence of specific requirements for the amount of emission reductions required, in 1992, U.S. EPA conveyed that the contingency measures should, at a minimum, ensure that an appropriate level of emissions reduction progress continues to be made if attainment of RFP is not achieved and additional planning by the State is needed (57 Federal

Register 13510, 13512 (April 16, 1992)). Further, U.S. EPA ozone guidance states that "contingency measures should represent one year's worth of progress amounting to reductions of 3 percent of the baseline emissions inventory for the nonattainment area". U.S. EPA, though, has accepted contingency measures that equal less than a year's worth of progress when the circumstances fit under "U.S. EPA's long-standing recommendation that states should consider 'the potential nature and extent of any attainment shortfall for the area' and that contingency measures 'should represent a portion of the actual emissions reductions necessary to bring about attainment in the area.'"[1]

Historically, U.S. EPA allowed contingency measure requirements to be met via excess emission reductions from ongoing implementation of adopted emission reduction programs, a method that CARB has used for a contingency measure and U.S. EPA has approved in the past. In 2016, in *Bahr v. U.S. Environmental Protection Agency*[2] *(Bahr),* the 9th Circuit Court of Appeals determined U.S. EPA erred in approving a contingency measure that relied on an already-implemented measure for a nonattainment area in Arizona, thereby rejecting U.S. EPA's longstanding interpretation of section 172(c)(9). U.S. EPA staff interpreted this decision to mean that contingency measures must include a future action triggered by a failure to attain or failure to make reasonable further progress. This decision was applicable to the states covered by the 9th Circuit Court. In the rest of the country, U.S. EPA was still approving contingency measures using their pre-Bahr stance. In January 2021, in *Sierra Club v. Environmental Protection Agency*[3], the United States Court of Appeals for the D.C. Circuit, ruled that already implemented measures do not qualify as contingency measures for the rest of the country (*Sierra Club*).

In response to *Bahr* and as part of the 75 ppb 8-hour ozone SIPs due in 2016, CARB developed the statewide Enhanced Enforcement Contingency Measure (Enforcement Contingency Measure) as a part of the *2018 Updates to the California State Implementation Plan* to address the need for a triggered action as a part of the contingency measure requirement. CARB worked closely with U.S. EPA regional staff in developing the contingency measure package that included the triggered Enforcement Contingency Measure, a district triggered measure and emission reductions from implementation of CARB's mobile source emissions program. However, as part of the *San Joaquin Valley 2016 Ozone Plan for 2008 8-hour Ozone Standard* SIP action, U.S. EPA wrote in their final approval that the Enforcement Contingency Measures did not satisfy requirements to be approved as a "standalone contingency measure" and approved it only as a "SIP strengthening" measure. U.S. EPA did approve the district triggered measure and the implementation of the mobile reductions along with a CARB emission reduction commitment as meeting the contingency measure requirement for this SIP.

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[1] See, e.g. 78 Fed.Reg. 37741, 37750 (Jun. 24, 2013), approval finalized with 78 Fed.Reg. 64402 (Oct. 29, 2013).

[2] *Bahr v. U.S. Environmental Protection Agency,* (9th Cir. 2016) 836 F.3d 1218.

[3] *Sierra Club v. Environmental Protection Agency,* (D.C. Cir. 2021) 985 F.3d 1055.

Subsequently, the Association of Irritated Residents filed a lawsuit against the U.S. EPA for their approval of various elements within the *San Joaquin Valley 2016 Ozone Plan for 2008 8-hour Ozone Standard*, including the contingency measure. The 9th Circuit Court of Appeals issued its decision in *Association of Irritated Residents v. EPA*[4] (*AIR*) that U.S. EPA's approval of the contingency element was arbitrary and capricious and rejected the triggered contingency measure that achieves much less than one year's worth of emission reductions. Most importantly, the 9th Circuit Court said that, in line with U.S. EPA's longstanding interpretation of what is required of a contingency measure and the purpose it serves, together with *Bahr*, all reductions needed to satisfy the Clean Air Act's contingency measure requirements need to come from the contingency measure itself and the amount of reductions needed for contingency should not be reduced by the fact of surplus emission reductions from ongoing programs absent U.S. EPA formally changing its historic stance on the amount of reductions required. U.S. EPA staff has interpreted AIR to mean that triggered contingency measures must achieve the entirety of the required one year's worth of emission reductions on their own. In addition, surplus emission reductions from ongoing programs cannot reduce the amount of reductions needed for contingency.

In response to *Bahr* and *Sierra Club*, in 2021, U.S. EPA convened a nation-wide internal task force to develop guidance to support states in their development of contingency measures. That task force is now also considering the impact of *AIR*. U.S. EPA has indicated that the contingency measure guidance may be released fall 2022. The SIPs for the 70 ppb 8-hour ozone standard are due to U.S. EPA August 3, 2022. In their updated guidance, U.S. EPA needs to recognize that many state control programs are mature and opportunities to withhold measures for contingency are scarce.

Since *Bahr*, CARB has worked closely with our U.S. EPA regional office in developing contingency measures with little success. CARB is committed to meeting the Clean Air Act requirements for contingency measures, but without finalized national guidance on this complex issue, it is not a good use of resources to pursue contingency measures that may not ultimately coincide with the upcoming new guidance.

7.3. CARB's Opportunities for Contingency Measures

Much has changed since U.S. EPA's 1992 guidance on contingency measures. Control programs across the country have matured as have the health-based standards. Ozone standards have strengthened in 2008 and 2015 with attainment dates out to 2037. California has the only two extreme areas in the country. Control measures identified for these areas must be implemented for meeting the standard and not held in reserve.

[4] *Association of Irritated Residents v. U.S. Environmental Protection Agency*, (9th Cir. 2021) 10 F.4th 937

To address contingency measure requirements given the courts' decisions and current U.S. EPA guidance, CARB and local air districts would need to develop a measure or measures that, when triggered by a failure to attain or failure to meet RFP, will achieve one year's worth of emissions reductions for the given nonattainment area, or approximately 3 percent of total baseline emissions.

Given CARB's wide array of mobile source control programs, the relatively limited portion of emissions primarily regulated by the local air district, and the fact that primarily-federally regulated sources are expected to account for approximately 46 percent of statewide NOx emissions by 2026[5], finding a single triggered measure that will achieve the required reductions would be nearly impossible. That said, even discounting the amount to reflect the proportion that is primarily-federally regulated, approximately 1.3 percent of total baseline emissions would still be needed. Even targeting a lower percentage, additional control measures that can be identified by CARB are scarce or nonexistent that would achieve the require emissions reductions needed for a contingency measure.

Adding to the difficulty of identifying available control measures, not only does the suite of contingency measures need to achieve a large amount of reductions, but they will also need to achieve these reductions in the year following the year in which the failure to attain or meet RFP has been identified. Control measures achieving the level of reductions required may take years to implement and will likely not result in immediate reductions. In the 2022 State SIP Strategy, CARB's three largest NOx reduction measures, In-Use Locomotive Regulation, Zero -Emission Standards for Space and Water Heaters and Advanced Clean Fleets, rely on accelerated turnover of older engines/trucks. Buildup of infrastructure and equipment options limits the availability to have significant emission reductions in a short amount of time. Unless U.S. EPA changes its historic stance or finds a reasoned justification for requiring less than the stated amount, adopting a single triggered measure that can be implemented and achieve the necessary reductions in the time frame required is scarce in California and may not be possible.

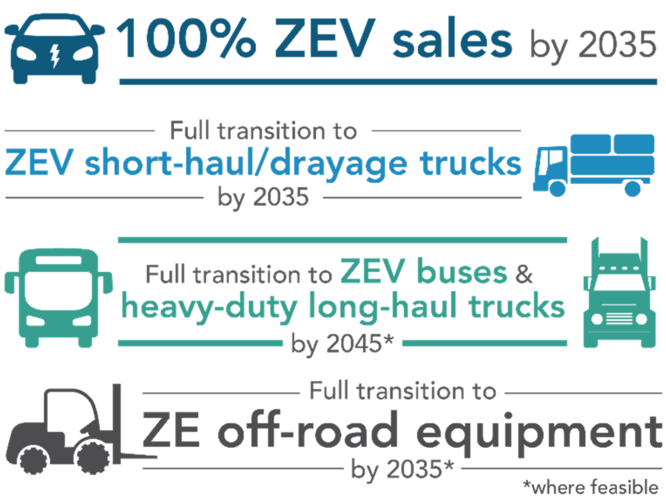
CARB has over 50 years of experience reducing emissions from mobile and other sources of pollution under State authority. The Reasonably Available Control Measures for State Sources analysis illustrates the reach of CARB's current programs and regulations, many of which set the standard nationally for other states to follow. Few sources CARB has primary regulatory authority over remain without a control measure, and all control measures that are in place support the attainment of the NAAQS. There is a lack of additional control measures that would be able to achieve the necessary reductions for a contingency measure. Due to the unique air quality challenges California faces, should such additional measures exist, CARB would pursue those measures to support expeditious attainment of the NAAQS and would not reserve such measures

[5] Source: CARB 2022 CEPAM v1.01; based on 2026 emissions totals.

for contingency purposes. Nonetheless, CARB continues to explore options for potential statewide contingency measures utilizing its authorities in anticipation of U.S. EPA's written guidance. CARB anticipates that U.S. EPA's guidance will allow an assessment of viability of such a state-wide measure.

A central issue in considering a statewide contingency measure under CARB's authority, is that CARB is already fully committed to the "drive to zero" effort. In 2020, Governor Newsom signed Executive Order N-79-20 (Figure 1) that established a first-in-the-nation goal for 100 percent of California sales of new passenger cars and trucks to be zero-emission by 2035. The Governor's order set a goal to transition 100 percent of the drayage truck fleet to zero-emission by 2035, all off-road equipment where feasible to zero-emission by 2035, and the remainder of the medium- and heavy-duty vehicles to zero-emission where feasible by 2045.

Figure 7-1. Governor Newson Executive Order N-79-20



CARB is committed to achieving these goals. Thus, CARB's programs not only go beyond emissions standards and programs set at the federal level, but many include zero-emissions requirements or otherwise, through incentives and voluntary programs, drive mobile sources to zero-emissions, as listed in Table 7-2 below. CARB is also exploring and developing a variety of new measures to drive more source categories to zero-emissions and reduce emissions even further, as detailed in the 2022 State Strategy for the State Implementation Plan. With most source categories being driven to zero-emissions, opportunities for which a triggered measure that could reduce emissions by the amount required for contingency measures are scarce.

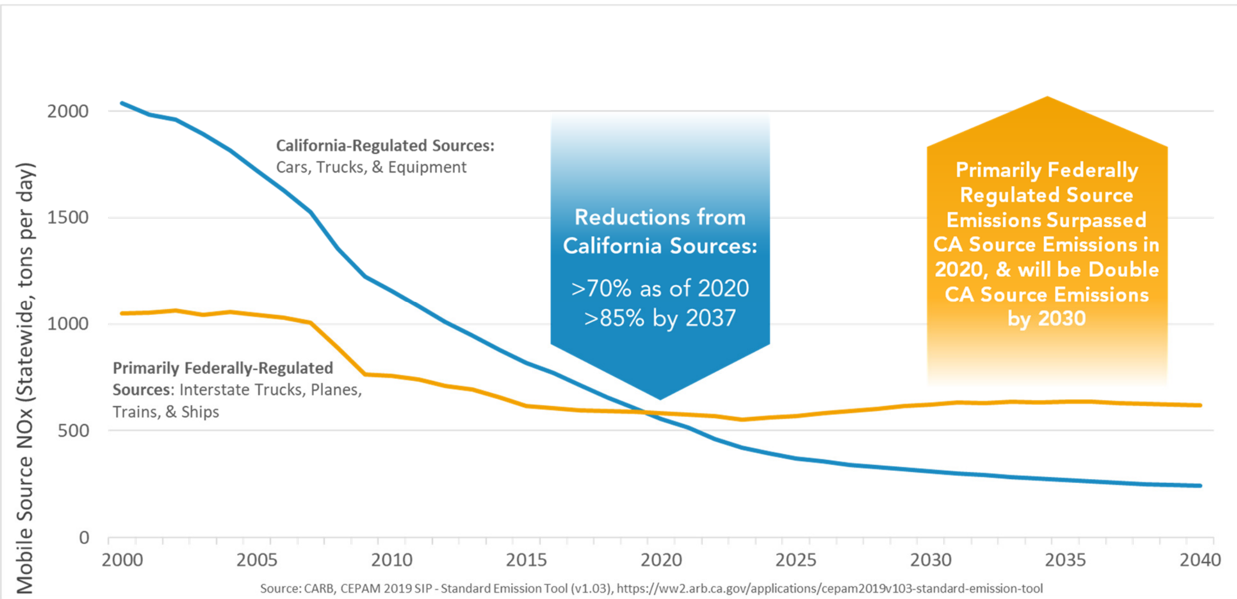
Table 7-1 - Emissions Sources and Respective CARB Programs with a Zero-Emissions Requirement/Component

Emission Source	Regulatory Programs
Light-Duty Passenger Vehicles and Light-Duty Trucks	• Advanced Clean Cars Program (I and II*), including the Zero Emission Vehicle Regulation • Clean Miles Standard *
Motorcycles	• On-Road Motorcycle Regulation*
Medium Duty-Trucks	• Advanced Clean Cars Program (I and II*), including the Zero Emission Vehicle Regulation • Zero-Emission Powertrain Certification Regulation • Advanced Clean Trucks Regulation • Advanced Clean Fleets Regulation*
Heavy-Duty Trucks	• Zero-Emission Powertrain Certification Regulation • Advanced Clean Trucks Regulation • Advanced Clean Fleets Regulation*
Heavy-Duty Urban Buses	• Innovative Clean Transit • Advanced Clean Fleets Regulation*
Other Buses, Other Buses – Motor Coach	• Zero-Emission Airport Shuttle Regulation • Advanced Clean Fleets Regulation*
Commercial Harbor Craft	• Commercial Harbor Craft Regulation
Recreational Boats	• Spark-Ignition Marine Engine Standards*
Transport Refrigeration Units	• Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (Parts I and II*)
Industrial Equipment	• Zero-Emission Forklifts* • Off-Road Zero-Emission Targeted Manufacturer Rule*
Construction and Mining	• Off-Road Zero-Emission Targeted Manufacturer Rule*
Airport Ground Support Equipment	• Zero-Emission Forklifts*
Port Operations and Rail Operations	• Cargo Handling Equipment Regulation • Off-Road Zero-Emission Targeted Manufacturer Rule*
Lawn and Garden	• Small Off-Road Engine Regulation • Off-Road Zero-Emission Targeted Manufacturer Rule*
Ocean-Going Vessels	• At Berth Regulation
Locomotives	• In-Use Locomotive Regulation*

*Indicates program or regulation is in development

There are few sources remaining without a control measure implemented by CARB, and those that do remain are primarily-federally regulated sources, including interstate trucks, ships, locomotives, aircraft, and certain categories of off-road equipment, constituting a large source of potential emissions reductions. Figure 7-2 shows how primarily California-regulated source emissions compare to primarily federally regulated source emissions from 2000 to 2040. Since these are primarily regulated at the federal and, in some cases, international level, options to implement a contingency measure with reductions approximately equivalent to one year's worth of emission reductions are limited.

Figure 7-2. Federal and State Regulated Emissions



7.4. Vessel Speed Reduction

The District believes that the only potential regulatory measure that could result in the reduction of one year of emissions is making the current voluntary VSR program mandatory. The District does not have the jurisdiction to require VSR from OGV, but it believes that CARB and the EPA have the jurisdiction to require VSR within state waters.

The current voluntary VSR program resulted in the reduction of 748 tons of NOx reductions during ozone season of 2020, approximately 4.1 tons per day, as reported on the Protecting Blue Whales and Blue Skies website www.bluewhalesblueskies.org[6]. Not all shipping companies participate in the voluntary VSR program, and compliance with speed reductions is not 100% for any participating shipping company. These NOx emission reductions exceed the total NOx emissions from sources primarily regulated by the District.

[6] These emission reductions estimates are not modeled in CARB's CEPAM model and have not been verified by CARB

VSR is a regulation that will have immediate emission reductions if implemented and enforced. Mandating a speed limit within the coastal waters off Ventura County does not require an extended equipment replacement period, and it would have immediate impact on the emissions off the coast of Ventura County.

The District believes that CARB and the EPA should evaluate mandatory VSR as a potential contingency measure for the Ventura County 2022 SIP.

7.5. Summary

At this time, CARB is including a zero-emission component in most of our regulations, both those already adopted and those that are in development, and the vast majority of these regulations are statewide. Beyond the wide array of sources CARB has been regulating over the last few decades, and especially considering those we are driving to zero-emission, there are few sources of emissions left for CARB to implement additional controls upon under its authorities. The few source categories that do not have control measures are primarily-federally and internationally regulated.

Given the courts' decisions over the last few years, CARB and local air districts will need to implement contingency measures that, when triggered, would achieve one year's worth of emissions reductions, or at least the relevant portion equivalent to the contribution of sources primarily regulated at the State and local level, unless a reasoned rationale for achieving less emission reductions can be provided. Considering the air quality challenges California and local air districts face, CARB would implement the measure to support expeditious attainment of the NAAQS as the Clean Air Act requires rather than withhold it for contingency measure purposes. Should there be a measure achieving the required emission reductions, the measure would likely take more than one year to reduce the necessary emissions.

CARB fully intends to meet the contingency requirement as required by the Clean Air Act, but written U.S. EPA guidance that addresses the dilemma California faces is needed to provide direction and clarity for CARB and local air districts to develop and adopt approvable contingency measures. CARB continues to explore potential contingency measures while awaiting U.S. EPA's written guidance. Further, since it's been about 30 years, since U.S. EPA developed the guidance, this may be the time for U.S. EPA to update the guidance by formally changing its historic stance on the amount of reductions required to meet the contingency measure requirement and allowing states with mature control programs to demonstrate that contingency measure opportunities are scarce.

GLOSSARY

Activity Indicator: A measure of socioeconomic conditions relative to a base year, such as population, housing, and employment data, used to project future year emissions by the relationship of the related activity. Example: Natural gas use per household.

Aerosols: Very small particles of solid or liquid matter suspended in the air.

Air Basin: An area of the state designated by the California Air Resources Board pursuant to Subdivision (a) of Section 39606 of the CH&SC that has similar meteorological and geographic conditions.

Air Contaminant: Any discharge, release, or other propagation into the atmosphere and includes but is not limited to, smoke, charred paper, dust, soot, grime, carbon, fumes, gases, odors, particulate matter, acids, or any combination thereof.

Air Monitoring: The periodic or continuous sampling and analysis of air pollutants in ambient air or from individual air pollutant sources.

Air Pollutants: Substances that are foreign to the atmosphere or are present in the natural atmosphere to the extent that they may result in adverse effects on humans, animals, vegetation, and/or materials.

Air Pollution Control Board (APCB): The governing body for an air pollution control district.

Air Pollution Control District (APCD): A county agency with authority to regulate sources of air pollution (other than emissions from mobile sources) such as refineries, manufacturing facilities, gasoline stations, dry cleaners, and power plants within a given county, and governed by a district APCB composed of elected city and county officials.

Air Pollution Control Officer (APCO): A person appointed by the APCB and given the authority to appoint district personnel for the purpose of observing and enforcing the provisions of Part 4, Division 26 of the CH&SC.

Air Quality Management District (AQMD): A group or portions of counties, or an individual county specified in law with authority to regulate stationary, indirect, and area sources of air pollution with the region and governed by a regional air pollution control board comprised mostly of elected officials within the region.

Air Quality Management Plan (AQMP): A plan prepared by an APCD for a county or region designated nonattainment for one or more federal or state air pollutants, for the purpose of bringing the area into compliance with the requirements of the federal and/or California ambient air quality standards. AQMPs are incorporated into the SIP.

Air Quality Standards: Those ambient air quality standards as promulgated by State or Federal pollution control agencies.

Ambient Air: Air occurring at a particular time and place outside of structures. Often used interchangeably with outdoor air.

Anthropogenic: Of, relating to, or influenced by the impact of humans on nature; man-made.

Area-wide Sources: Also known as "area" sources; are those sources which are not large enough to be tracked individually, but when added together can represent a large quantity of pollution. Examples of such sources include water heaters, gas furnaces, fireplaces, gas stations, dry cleaners, and woodstoves. Area sources of pollution are identified by Category of Emission Source codes.

Attainment: Achieving and maintaining one or more of the and/or California Ambient Air Quality Standards.

Atmosphere: The air that surrounds the earth but does not include the general volume of gases contained in any bona fide building.

Attainment Area: A geographic area that complies with one or more of the NAAQS or CAAQS.

Base Year: The year used in a predictive air pollution model that includes the known economic conditions, population, and air emissions. The base year, current or past, is used to predict the forecast year in a predictive model.

Best Available Control Technology (BACT): The most up-to-date methods, systems, techniques, and production processes available to achieve the greatest feasible emission reductions for given regulated air pollutants and processes. BACT is a requirement of NSR and Prevention of Significant Deterioration (PSD).

Best Available Retrofit Control Technology (BARCT): An emission limitation that is based on the maximum degree of reduction achievable, taking into account environmental, energy, and economic impacts by each air pollutant source class or category (Section 40406 CH&SC).

Bike Lanes: The California Streets and Highway Code Section 890.4 defines a "Bikeway" (herein referred to as a "bike lane") as a facility that is provided primarily for bicycle travel. A Class I bikeway (or bike path) provides a completely separated right of way for the exclusive use of bicycles and pedestrians with crossflow by motorists minimized. A Class II bikeway (or bike lane) provides a striped lane for one-way bike travel on a street or highway. A Class III bikeway (or bike route) provides for shared use with pedestrian or motor vehicle traffic.

Biogenic: Produced by living organisms. Biogenic air pollutant emissions are of great interest because of the predominance of agriculture and natural vegetation in Ventura County. However, the District has no authority to regulate biogenic emissions. Preliminary studies indicate that biogenic emissions may be at least two times the total hydrocarbon emissions already quantified in the emissions inventory for the AQMP.

California Air Resources Board (CARB): The State's lead air quality agency consisting of an eleven-member Governor-appointed board and supporting staff fully responsible for motor vehicle pollution control, and having oversight authority over California's air pollution management program.

California Clean Air Act (CCAA): A California law passed in 1988 that provides the basis for air quality planning and regulation independent of federal regulations, and which establishes new authority for attaining and maintaining California's air quality standards by the earliest practicable date. A major element of the Act is the requirement that local air districts in violation of the California clean air standards must prepare attainment plans that identify air quality problems, causes, trends, and actions to be taken for attainment.

California Department of Transportation (Caltrans): A California state agency that oversees the state's transportation infrastructure.

California Emissions Inventory Development and Reporting System (CEIDARS): The state's emissions inventory data base system.

California Emission Forecasting System (CEFS): CARB's model to forecast air pollutant emissions. A major feature of the model is its ability to track the effects of emission control rules and growth activity for stationary and other mobile sources by linking these factors directly to the emission categories.

California Environmental Quality Act (CEQA): A California law that sets forth a process for public agencies to make informed decisions on discretionary projects such land use entitlements. The process aids decision makers to determine whether any environmental impacts are associated with a proposed project. It requires elimination or reduction of environmental impacts associated with a proposed project and the implementation of mitigation measures to reduce or remove those impacts.

California Health and Safety Code (CH&SC): The California Health and Safety Code is the collection of state laws that govern, among other things, the handling of air pollution, hazardous waste, corrective action and permitted facilities.

Carbon Monoxide (CO): A colorless, odorless gas resulting from the incomplete combustion of fossil fuels. Over 80 percent of the CO emitted in urban areas is contributed by motor vehicles. CO is a criteria pollutant and interferes with the blood's ability to carry oxygen to the body's tissues and results in numerous adverse health effects.

Cargo Handling Equipment: Cargo handling equipment is equipment used at ports to transfer goods or perform maintenance and repair activities, including but not limited to equipment such as yard trucks (hostlers), rubber-tired gantry cranes, top handlers, side handlers, forklifts, and loaders, etc.

Carl Moyer Program: The Carl Moyer Memorial Air Quality Standards Attainment Program (Carl Moyer Program) is an incentive program offered jointly by the California Air Resources Board and California's local air districts that provides grants for cleaner-than-required engines and equipment to help improve air quality in California. The grants are administered by the local air districts.

City Urban Restriction Boundary (CURB): A regional boundary set in an attempt to control urbanization by designating the area inside the boundary for higher density urban development and the area outside for lower density rural development.

Clean Air Act Amendments (CAAA): Amendments passed in 1977 and 1990 to the federal Clean Air Act of 1970 and which form the basis for the current national air pollution control effort. Basic elements of the amended act include national ambient air quality standards for major air pollutants, air toxics standards, acid rain control measures, and enforcement provisions.

Commercial Harbor Craft: Commercial harbor craft include ferries, excursion vessels, tugboats, towboats, crew and supply vessels, work boats, commercial and charter fishing boats, and barge and dredge vessels. In 2010, CARB staff estimated there are approximately 4,300 commercial harbor craft vessels with 8,700 diesel-fueled engines operating in California coastal waters.

Compressed Natural Gas (CNG): An alternative fuel that is cleaner burning and helps to meet CARB's mobile and stationary emission standards. CNG may be used in place of less clean fuels for powering motor vehicles.

Conformity: A formal demonstration of whether a federally-supported activity is consistent with the SIP – per section 176(c) of the federal CAA. Transportation conformity refers to plans, programs, and projects approved or funded by the Federal Highway Administration or the Federal Transit Administration. General conformity refers to non-transportation projects approved or funded by other federal agencies.

Consumer Products: Products such as detergents, cleaning compounds, polishes, personal care products, and automotive specialty products that are part of our everyday lives and, through consumer use, may contribute to air pollution.

Contingency Measure: Requires back-up air pollution control measures to be implemented in the event of specific conditions, such as failure to meet interim milestone emission reduction targets or failure to attain an applicable air quality standard by the statutory attainment date. Both the state and federal clean air acts require that District clean air plans include contingency measures.

Control Efficiency (CE): A variable that estimates the technological efficiency of an air pollutant control strategy. Control efficiency is one of the variables used to develop a control factor.

Control Factor (CF): Data derived from adopted State and Federal regulations and local district rules that impose emission reductions or a technological change on a particular emission process. Control factors are closely linked to the type of emission process and type of industry. They also account for three types of variables which include control efficiency, rule effectiveness, and rule penetration.

Control Measure: A single measure in an air quality plan to maintain or reduce the emissions of criteria pollutants. Control measures are enforceable commitments in the air quality plan.

Control Strategy: A combination of control measures designed to reduce air contaminant emissions to attain and maintain ambient air quality standards.

Control Techniques Guidelines (CTG): Guidance documents issued by EPA designed to assist state and local pollution authorities to achieve and maintain air quality standards for certain air pollutant sources (e.g., organic emissions from solvent metal cleaning known as degreasing) through RACT. CTGs contain information on the economic and technological feasibility of available emission control techniques.

Criteria Air Pollutant: An air pollutant for which acceptable levels of exposure can be determined and for which a federal or state ambient air quality standard has been set to protect public health and welfare. Examples include ozone, carbon monoxide, lead, nitrogen dioxide, sulfur dioxide, and fine particulates.

Department of Motor Vehicles (DMV): The California state agency responsible for registering motor vehicle drivers and motor vehicles and collecting state and local motor vehicle fees.

Design Value: The pollutant concentration used by air quality managers as the basis for determining attainment of an air quality standard, generally by using an air quality model. The design value may or may not be the same as the designation value.

District: A local air pollution control agency as defined by the CH&SC Section 40150. The Ventura County Air Pollution Control District is the local air pollution control agency for Ventura County, California.

EMFAC: The EMission FACtor computer model used by CARB to estimate on-road mobile vehicle emissions. This model is part of CARB's overall on-road mobile source Mobile Vehicle Emission Inventory model.

Early Progress Plan (EPP): An air quality planning document that shows progress towards attaining the federal ozone standards and establishes transportation conformity budgets.

Emissions Data: Measured or calculated concentrations or weights of air contaminants emitted into the ambient air. Data used to calculate emissions data are not emissions data.

Emission Factor: For stationary sources, the relationship between the amount of pollution produced and the amount of raw material processed or burned. For mobile sources, the relationship between the amount of pollution produced and the number of vehicle miles traveled. By using the emission factor of a pollutant and specific data regarding quantities of material used by a given source, it is possible to compute emissions for the source.

Emission Offsets: Actual enforceable emission reductions from existing sources sufficient to offset anticipated emission increases associated with new or modified stationary sources. A rule-making concept, whereby approval of a new stationary source of air pollution, or an increase of emissions from an existing source of air pollution, is conditional on the equal or greater reduction of emissions from other existing stationary sources of air pollution. This concept is utilized in addition to reduction in emissions by employing BACT.

Emission Reduction Credit (ERC): Credits given for actual emission reductions that are real, enforceable, permanent, quantifiable, and surplus (beyond any required reductions). An actual credit is certified via a District-issued document that specifies the date of issuance, expiration date of credit, type of pollutant, and legal owner of emission reduction credits. In some cases, ERCs can be transferred to another owner or saved for future use.

Emission Standard: The maximum amount or rate of a pollutant permitted from a polluting source such as an automobile or smoke stack.

Emissions Inventory: An emissions inventory is a large dataset that, as a whole, describes emission sources and quantifies pollutants released into the atmosphere. Considerations that go into the inventory include type and location of emission sources, the processes involved, and the level of activity (day, month) and year of activity.

Emissions Inventory Category: A group of similar air pollutant sources. Examples include oil and gas production, dry cleaning, and pesticide application.

Emissions Inventory Code (EIC): State computer coding scheme (14 digits) used to categorize emissions in the CEIDARS database.

Equipment: Any operation, article, machine, equipment, or contrivance that may emit or reduce the emissions of any air contaminant or affected air pollutant.

Exceedance: Measured concentration of an air pollutant in ambient air is higher than the state and/or federal ambient air quality standard for that pollutant.

Federal Aviation Administration (FAA): An agency of the United States Department of Transportation with authority to regulate and oversee all aspects of civil aviation in the U.S.

Federal Clean Air Act (CAA): A federal law passed in 1970 and significantly amended in 1977 and 1990 that forms the basis for the national air pollution control efforts. Basic elements of the Act include national ambient air quality standards for major air pollutants, air toxics standards, acid rain control measures, and enforcement provisions.

Federal Highway Administration (FHWA): A division of the United States Department of Transportation that specializes in highway transportation. The agency's major activities are grouped into two programs, The Federal-aid Highway Program, and the Federal Lands Highway Program.

Federal Implementation Plan (FIP): A plan prepared and enforced by the EPA that provides measures nonattainment areas must take to meet the requirements of the federal CAA. The EPA implements FIPs when states are unable or unwilling to adopt and implement adequate SIPs.

Federal Transit Administration (FTA): An agency within the United States Department of Transportation that provides financial and technical assistance to local public transit systems.

Federal Transportation Improvement Plan (FTIP): A staged, multiyear, intermodal program of transportation projects covering a metropolitan planning area, consistent with the metropolitan transportation plan, and developed pursuant to 23 CFR Part 450.

Forecast Year: The future year of interest in a predictive air pollution or emissions model. The predictivie model results produce future year emissions based on expectations of future land use, transportation changes, econmic conditions, population growth, and emission controls.

Greenhouse Gas (GHG): Gaseous components of the atmosphere that contribute to the greenhouse effect. Greenhouse gases include, in order of relative abundance: water vapor, carbon dioxide, methane, nitrous oxide, ozone and chlorofluorocarbons.

Growth Factor (GF): Data derived from county-specific economic activity profiles, population forecasts, and other socio-demographic activity.

Hydrocarbon: Any of a large number of compounds containing various combinations of hydrogen and carbon atoms. They may be emitted into the air as a result of fossil fuel combustion and fuel volatilization and are a major contributor to smog.

Hydrofluorocarbons: A group of chemical compounds, consisting of alkanes, such as methane or ethane, with one or more halogens linked, such as chlorine or fluorine, making them a type of organic halide.

Implementation Factor (IF): A variable used to develop control factors, indicating the relative amount of total control from a control measure occurring in a given year to account for phased implementation or control requirements occurring in tiers.

Indirect Source: Any facility, building, structure, or installation, or combination thereof, which generates or attracts motor vehicle activity resulting in emissions of any pollutant (or precursor) for which there is a state or federal ambient air quality standard. Examples of indirect sources include employment sites, shopping centers, sports facilities, housing developments, airports, educational institutions, commercial and industrial developments, and parking lots and garages.

Internal Combustion Engine: A heat engine in which the combustion generates the heat inside the engine proper instead of in a furnace. An example of an IC engine is an automobile engine.

Inversion: A layer of warm air in the atmosphere that lies over a layer of cooler air, trapping pollutants beneath it.

Lead: A gray-white metal that is soft, malleable, ductile, and resistant to corrosion. Sources of lead resulting in concentrations in the air include industrial sources and crustal weathering of soils followed by fugitive dust emissions. Health effects from exposure to lead include brain and kidney damage and learning disabilities. Lead is the only substance currently listed as both a criteria air pollutant and a toxic air contaminant.

Local Agency Formation Commission (LAFCo): A decision making government entity in California with the responsibility to decide boundary issues pertaining to city and county (non-incorporated) lands, including spheres of influence, and issues about the annexation of county lands into a city or special district.

Local Sources: Air pollution sources for which local governments (cities, counties, air agencies) have primary regulatory authority.

Maintenance Plan: A plan that details the actions needed to maintain air quality at or below federal standards. The federal CAA requires maintenance plans for areas that have been re-designated attainment areas.

Major Source Category: A general, broad category of similar emission sources. Examples are Fuel Combustion, Waste Disposal, Solvent Evaporation, are broad category classifications which are made up of many sub-categories.

"Major" Sources under CAAA: A source with a potential to emit more than a specific threshold of emissions annually, determined by the nonattainment designation of an air quality district.

Memorandum of Understanding (MOU): A formal agreement made among agencies for the purposes of jointly accomplishing a goal, program, etc. The governing boards of the involved agencies must ratify the agreement.

Metropolitan Planning Organization (MPO): The organization designated as being responsible, together with the State, for conducting the continuing, cooperative, and comprehensive planning process under 23 U.S.C. 134 and 49 U.S.C. 1607. It is the forum for cooperative transportation decision-making.

Mobile Sources: Sources of air pollution such as automobiles, motorcycles, trucks, off-road vehicles, boats, and airplanes.

Motor Vehicle: A self-propelled vehicle as defined in the California Vehicle Code, Division I, Section 415.

National Ambient Air Quality Standards (NAAQS): Standards set by the EPA for the maximum levels of certain air pollutants in outdoor air without unacceptable effects on human health or public welfare. There are NAAQS for ozone, particulates, carbon monoxide, nitrogen dioxide, lead, and sulfur dioxide.

Naval Base Ventura County: A major U.S. military facility in Ventura County, California.

New Source Review (NSR): The mechanism to ensure that new and modified stationary sources of air pollution will not interfere with the attainment or maintenance of any ambient air quality standard or prevent reasonable further progress towards the attainment or maintenance of any ambient air quality standard. A program used in a nonattainment area to permit or site new industrial facilities or modifications to existing industrial facilities that emit nonattainment criteria air pollutants. The two major requirements of NSR are Best Available Control Technology and Emission Offsets.

Nitrogen Dioxide (NO_2): A reddish-brown gas with a characteristic sharp, biting odor. Nitrogen dioxide is one of the most prominent air pollutants and a poison by inhalation.

Nonattainment Area: An area identified by the EPA and/or CARB as not meeting either federal or state clean air standards for a given criteria air pollutant.

Ocean-going Vessel: An ocean-going vessel (OGV) is a commercial ship greater than or equal to 400 feet in length or 10,000 gross tons; or propelled by a marine compression ignition engine with a displacement of greater than or equal to 30 liters per cylinder. The emissions inventory includes all OGV emissions occurring within 100 nautical miles of the California coastline.

OFFROAD Emissions Model: California Air Resources Board model that estimates population, activity, and emissions for specific categories of off-road (non-highway) equipment by fuel types at the county level.

Other Mobile Sources: A broad emissions category for mobile off-road equipment, including aircraft, locomotives, marine vessels, agricultural and construction equipment and more.

Organic Solvents: Liquids containing organic compounds which are used as dissolvers, viscosity reducers, or cleaning agents. These liquids are principally derived from petroleum and include petroleum distillates, chlorinated hydrocarbons, chlorofluorocarbons, ketones, and alcohols. Solutions, emulsions, and dispersions of water and soap, or water and detergent are not organic solvents. Soaps and detergents are water-based surfactants.

Outer Continental Shelf (OCS): All submerged lands lying seaward of state coastal waters (beyond 3 miles offshore) which are under U.S. jurisdiction as defined by the Outer Continental Shelf Lands Act of 1953.

Oxides of Nitrogen (NOx): A general term pertaining to compounds of nitric oxide (NO), nitrogen dioxide (NO_2), and other oxides of nitrogen. Nitrogen oxides are created during combustion processes and are major contributors to smog formation and acid deposition. NO_2 is a criteria pollutant and may result in numerous adverse human health effects.

Ozone: A reactive gas consisting of three oxygen atoms found in two layers of the atmosphere, the stratosphere, and the troposphere. In the stratosphere (the atmospheric layer 7 to 10 miles or more above the earth's surface), ozone is a natural form of oxygen that provides a protective layer shielding the earth from ultraviolet radiation.

In the troposphere (the layer extending up 7 to 10 miles from the earth's surface), ozone is a chemical oxidant and major component of photochemical smog. It can seriously impair the respiratory system and is one of the most widespread of all the criteria pollutants for which the federal Clean Air Act required EPA to set standards. Ozone in the troposphere is produced through complex photochemical reactions of nitrogen oxides, which are among the primary pollutants emitted by combustion sources; hydrocarbons, released into the atmosphere through the combustion, handling and processing of petroleum products; and sunlight.

Ozone Precursors: Chemicals such as volatile organic compounds and nitrogen oxides, occurring either naturally or as a result of human activities, which contribute to the formation of ozone, a major component of smog.

Ozone Summer Season: May – October months, when ozone formation potential is the greatest.

Particulate Matter (PM): Any material, except pure water, that exists in the solid or liquid state in the atmosphere. The size of particulate matter can vary from coarse, wind-blown dust particles, to fine particle combustion products.

Particulate Matter - Fine ($PM_{2.5}$): A mixture of very small atmospheric particles with an aerodynamic diameter equal to or less than 2.5 microns. $PM_{2.5}$ consists of particles directly emitted into the air and particles formed in the air from the chemical transformation of gaseous pollutants. $PM_{2.5}$ particles result from activities such as industrial and residential combustion, and from vehicle exhaust. Particles 2.5 microns or smaller infiltrate the deepest portions of lungs, increasing the risks of long-term disease, including chronic respiratory disease, cancer, and increased and premature death.

Particulate Matter (PM_{10}): A major air pollutant consisting of tiny solid or liquid particles of soot, dust, smoke, fumes, and mists. The size of the particles (10 microns or smaller, about 0.0004 inches or less) allows them to easily enter the air sacs deep in the lungs where they may be deposited to result in adverse health effects. PM_{10} also causes visibility reduction and is a criteria air pollutant.

Parts per million (ppm): Standard measurement of concentration by which ozone or other atmospheric gases are measured. 1 ppm is equivalent to 1,000 parts per billion (ppb).

Perfluorocarbons: Compounds derived from hydrocarbons by replacement of hydrogen atoms by fluorine atoms and made up of carbon and fluorine atoms only, such as octafluoropropane, perfluorohexane, and perfluorodecalin.

Photochemical Reaction: A term referring to chemical reactions brought about by the light energy of the sun. Photochemical reactions in the atmosphere create harmful air pollutants such as ozone.

Point Source: Stationary emission sources having a district permit to operate identified on an individual basis due to the quantity or nature of their emissions. Examples of point sources include electrical power generating plants or large surface coating operations.

Rate of Progress: Section 182(c)(2) of the federal CAA Amendments requires ozone nonattainment areas designated serious or above to demonstrate post-1996 volatile organic compound emission reductions of three percent per year, averaged over a three- year period. The U.S. Environmental Protection Agency refers to these reductions as the rate-of-progress requirement.

Reactive Fraction: The relative amount of TOG compounds which is photochemically reactive and participates in ozone formation, excluding methane and other compounds with inconsequential effects on ozone photochemical reactivity.

Reactive Organic Gas (ROG): A reactive chemical gas composed of hydrocarbon compounds that may contribute to the formation of smog by their involvement in atmospheric chemical reactions. Also, sometimes referred to as non-methane organic compounds (NMOCs). VOC emissions are a subset of ROG emissions.

Reasonably Available Control Measures (RACM): A broadly defined term referring to technologies and measures to control air pollution.

Reasonably Available Control Technology (RACT): A set of air pollution control technologies defined in the CFR 57 FR 55620, as "the lowest emission limitation that a unit is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility".

Reasonable Further Progress (RFP): A requirement for a State Implementation Plan showing increments of progress (emission reductions) from the date of designation of nonattainment for federal ozone standards to the attainment dates - applicable for both Subpart 1 and Subpart 2 ozone nonattainment areas.

Recreational Boats: Recreational boats include pleasure boats with inboard or outboard engines, and personal watercraft, etc.

Regional Transportation Plan (RTP): The official intermodal metropolitan transportation plan developed through the metropolitan planning process for the metropolitan planning area and developed pursuant to 23 CFR Part 450.

Rule Effectiveness: An estimate of how well an air pollution rule or control strategy works in "real-world" application. Rule effectiveness is one of the variables used to develop a control factor.

Rule Penetration: An estimate of the degree an air pollution control strategy will penetrate a certain regulated sector taking into account such things as equipment exemptions.

Save Open-Space and Agricultural Resources (SOAR): A local nonprofit citizen organization in Ventura County dedicated to making Ventura County a better place to live by limiting urban sprawl, protecting open space and agricultural lands, and promoting livable and sustainable communities in Ventura County.

South Central Coast Air Basin (SCCAB): An air basin established by CARB that has similar meteorological and geographical conditions that consists of San Luis Obispo, Santa Barbara, and Ventura Counties.

South Coast Air Quality Management District (SCAQMD): South Coast Air Quality Management District. A regional air quality control district encompassing four counties in Southern California (Los Angeles, Orange, Riverside and San Bernardino).

Southern California Association of Governments (SCAG): The organization, known in federal law as the Council of Governments and Metropolitan Planning Organization, representing Los Angeles, Ventura, San Bernardino, Riverside, Orange, and Imperial Counties, and the cities within those six counties. As the designated Metropolitan Planning Organization for the designated areas, the Association of Governments is mandated by the federal government to research and formulate plans for transportation, growth management, hazardous waste management, and air quality. Additional mandates exist at the state level.

Smog: A combination of smoke, ozone, hydrocarbons, nitrogen oxides, and other chemically reactive compounds, which, under various conditions of weather and sunlight, may result in a murky brown haze that causes adverse health effects and human welfare effects. A primary source of smog is motor vehicles.

Smog Check Program: A motor vehicle inspection program implemented by the California Bureau of Automotive Repair. It is designed to ensure the effectiveness of automobile emission control systems on a biennial basis. The program was enacted in 1979 and strengthened in 1990. Also known as the Inspection and Maintenance Program (I & M).

State Implementation Plan (SIP): A document prepared by each state describing existing air quality conditions and measures that it will take to attain and maintain national ambient air quality standards. The provisions and commitments in SIPs are federally enforceable.

State Tidelands: The offshore region three miles from the shoreline.

Stationary Sources: Non-mobile sources such as power plants, refineries, and manufacturing facilities, and turbines that emit air pollutants.

Sulfur Dioxide (SO_2): A colorless, extremely irritating gas or liquid of sulfur and oxygen and whose chemical formula is SO_2. Sulfur dioxide mainly enters the atmosphere as a pollutant through burning high sulfur-content fuel oils and coal, and from chemical processes occurring at chemical plants and refineries. SO_2 is a criteria air pollutant.

Summer Planning Day Emissions: Emissions occurring during a typical summer day during the months of May – October. This term is interchangeable term with “ozone season” day emissions.

Tons per day (tpd): A unit of measurement often used in air pollutant emission inventories.

Total Organic Compounds (TOC): Organic compounds of carbon including methane emitted to the atmosphere. TOCs exclude carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates and ammonium carbonate.

Total Organic Gases (TOG): Total organic gases mean "compounds of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate." TOG includes all organic gas compounds emitted to the atmosphere, including the low reactivity, or "exempt VOC", compounds (e.g., methane, ethane, various chlorinated fluorocarbons, acetone, perchloroethylene, volatile methyl siloxanes, etc.).

TOG also includes low volatility or "low vapor pressure" organic compounds (e.g., some petroleum distillate mixtures). TOG includes all organic compounds that can become airborne (through evaporation, sublimation, as aerosols, etc.), excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate.

Transportation Control Measure (TCM): Any control measure or strategy to reduce vehicle trips, vehicle use, vehicle miles traveled, vehicle idling, or traffic congestion for the purpose of reducing motor vehicle emissions. TCMs include encouraging the use of carpools mass transit, walking, and bicycling.

United States Environmental Protection Agency (EPA): The United States agency charged with setting policy, guidelines, and carrying out legal mandates for the protection of national interests in environmental resources.

Vehicle Miles Traveled (VMT): A measure of both the volume and extent of motor vehicle operation; the total number of vehicle miles traveled within a specified geographical area over a given period of time.

Ventura County Transportation Commission (VCTC): Agency responsible for planning and funding transportation and transit improvements in Ventura County. VCTC develops and implements transportation policies, projects, and funding priorities for a wide variety of transportation projects.

Visibility: The distance that atmospheric conditions allow a person to see at a given time and location. Visibility reduction from air pollution is often due to the presence of sulfur and nitrogen oxides, as well as particulate matter, including aerosols.

Volatile Organic Compounds (VOC): Hydrocarbon compounds that exist in the ambient air. VOCs contribute to the formation of smog and/or may themselves be toxic. VOCs often have an odor, and examples include gasoline, alcohol, and paint solvents.

Weight of Evidence (WOE): A supplementary set of analyses intended to verify modeled predictions of future air quality, especially at levels near the federal standards. These analyses can include air quality trends, emission trends, meteorological data, evaluation of other air quality indicators, and additional air quality modeling.

APPENDIX A

VENTURA COUNTY

EMISSIONS INVENTORY DOCUMENTATION

CARB VENTURA COUNTY 70 PPB 8-HOUR OZONE NAAQS EMISSIONS INVENTORY WRITE-UP CEPAM 2022 V1.01

(AUGUST 2022)

CONTENTS

EMISSIONS INVENTORY BACKGROUND

Emissions inventories are required by the Clean Air Act (CAA) and the Ozone SIP Requirements Rule for the 2015 ozone National Ambient Air Quality Standards (NAAQS), also called the Ozone Implementation Rule.[1] Specifically, they are required for those areas that exceed the health-based NAAQS. These areas are designated as nonattainment based on monitored exceedances of these standards. These nonattainment areas must develop an emissions inventory as the basis of a State Implementation Plan (SIP) that demonstrates how they will attain the standards by specified dates. This document describes the emissions inventory included in the Ventura County 70 ppb 8-Hour Ozone SIP, which encompasses ocean going vessel and commercial harbor craft emissions out to 100 nautical miles.

EMISSIONS INVENTORY OVERVIEW

Emissions inventories are estimates of the amount and type of pollutants emitted into the atmosphere by facilities, mobile sources, and areawide sources. They are fundamental components of an air quality plan and serve critical functions such as:

1. the primary input to air quality modeling used in attainment demonstrations;
2. the emissions data used for developing control strategies; and
3. a means to track progress in meeting the emission reduction commitments.

The California Air Resources Board (CARB) and the Ventura County Air Pollution Control District (District) have developed a comprehensive current emissions inventory consistent with the requirements set forth in Section 182(a)-(f) of the federal Clean Air Act[2]. CARB and District staff conducted a thorough review of the inventory to ensure that the emission estimates reflect accurate emissions reports for point sources and that estimates for mobile and areawide sources are based on the most recent approved models and methodologies.

CARB also reviewed the growth profiles for point and areawide source categories and worked with District staff to update them as necessary to ensure that the emission projections are based on data that reflect historical trends, current conditions, and recent economic and demographic forecasts.

The United States Environmental Protection Agency (U.S. EPA) regulations require that the emissions inventory for an Ozone SIP contain emissions data for the two precursors to ozone formation: oxides of nitrogen (NOx) and volatile organic compounds (VOC)[3]. The inventory included in this plan substitutes VOC with reactive organic gases (ROG), which, in general, represent a slightly broader group of compounds than those in U.S. EPA's list of VOCs.

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[1] Implementation of the 2008 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements; (40 CFR part 51 Subpart AA; see also *https://www.epa.gov/ground-level-ozone-pollution/implementation-2008-national-ambient-air-quality-standards-naaqs-ozone*).

[2] Section 182(a)-(f) of the Act. *https://www.govinfo.gov/content/pkg/USCODE-2013-title42/html/USCODE-2013-title42-chap85-subchapI-partD-subpart2-sec7511a.htm*

[3] Section 182(a)(1) of the Act. *https://www.govinfo.gov/content/pkg/USCODE-2013-title42/html/USCODE-2013-title42-chap85-subchapI-partD-subpart2-sec7511a.htm*

Agency Responsibilities

CARB and District staff worked jointly to develop the emissions inventory for the Ventura County 8-hour ozone nonattainment area. The District worked closely with operators of major stationary facilities in their jurisdiction to develop the point source emissions estimates. CARB staff developed the emissions inventory for mobile sources, both on-road and off-road. The District and CARB shared responsibility for developing estimates for the nonpoint (areawide) sources such as architectural coatings and agricultural burning. CARB and the District worked with several State and local agencies such as the Department of Transportation (Caltrans), the Department of Motor Vehicles (DMV), the Department of Pesticide Regulation (DPR), the California Energy Commission (CEC), and the Southern California Association of Governments (SCAG) to assemble activity information necessary to develop the mobile and areawide source emissions estimates.

Inventory Base Year

The District selected the base year 2018 for the purposes of the modeling emission inventory since that was the year U.S. EPA designated Ventura County as nonattainment for the 70 ppb 8-Hour Ozone NAAQS[4]. The baseline year of 2018 is the most complete and representative emission year for purposes of inventory and emission modeling and is consistent with the baseline year of 2018 selected by the adjacent South Coast Air Quality Management District (SCAQMD). SCAQMD also performed the photochemical modeling for the attainment demonstration.

40 CFR 51.1315(a) requires that the inventory year be selected consistent with the baseline year for the reasonable further progress (RFP) plan as required by 40 CFR 51.1310(b)[5], which states that the base year emissions inventory shall be the emissions inventory for the most recent calendar year of which a complete triennial inventory is required to be submitted to EPA under the provisions of subpart A of 40 CFR part 51, Air Emissions Reporting Requirements, 40 CFR 51.1–50. States may also use an alternative baseline emissions inventory provided that the year selected corresponds with the year of the effective date of designation as nonattainment for that NAAQS[6]. The District is using 2017 as the baseline year for the purposes of the RFP calculation only.

Forecasted Inventories

In addition to base year emissions, emissions projections are needed for a variety of reasons, including redesignation maintenance plans, the attainment projected inventory for a nonattainment area (NAA), and air quality modeling for attainment plans[7].

For stationary and area sources, forecasted inventories are a projection of the base year inventory that reflects expected growth trends for each source category and emissions

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[4] *https://www.epa.gov/green-book/green-book-8-hour-ozone-2015-area-information*.

[5] 40 CFR 51.1315(a). *https://www.govinfo.gov/content/pkg/CFR-2021-title40-vol2/pdf/CFR-2021-title40-vol2-sec51-1315.pdf*.

[6] 40 CFR 51.1310(b). *https://www.govinfo.gov/content/pkg/CFR-2020-title40-vol2/pdf/CFR-2020-title40-vol2-sec51-1310.pdf*.

[7] 40 CFR 51.114. *https://www.govinfo.gov/content/pkg/CFR-2000-title40-vol2/pdf/CFR-2000-title40-vol2-sec51-114.pdf*.

reductions due to adopted control measures. CARB develops emission forecasts by applying growth and control profiles to the base year inventory. The stationary and area source emissions inventory for the Ventura County 70 ppb Ozone SIP is modeled by the California Emission Projection Analysis Model (CEPAM), 2022 Emission Projections, Version 1.01. Emission years presented in this AQMP are the modeling baseline year (2018), the milestone year (2024), the required attainment year (2026), and future years to show continuing emission changes (2030, 2035, and 2040).

Growth profiles for point and areawide sources are derived from surrogates, such as economic activity, fuel usage, population, and housing units, that best reflect the expected growth trends for each specific source category. Growth projections were obtained primarily from government entities with expertise in developing forecasts for specific sectors, or, in some cases, from econometric models. Control profiles, which account for emission reductions resulting from adopted rules and regulations, are derived from data provided by the regulatory agencies responsible for the affected emission categories. Emission reductions from adopted control measures are presented in Chapter 3 of the AQMP.

Projections for on-road mobile source emissions are generated by CARB's EMFAC2017 model, which predicts activity rates and vehicle fleet turnover by vehicle model year, along with activity inputs from the metropolitan planning organization (MPO). Off-road mobile sources are forecasted with category-specific model or, where not available, CARB's OFFROAD2007. CEPAM integrates the emission projections with emission projections from stationary and area source categories derived from these mobile source models to develop a comprehensive forecasted emission inventory. As with stationary sources, the mobile source models include control algorithms that account for adopted regulatory actions.

Temporal Resolution

40 CFR 51.1315(c) requires emissions values included in the base year inventory to be actual ozone season day emissions as defined by 40 CFR 51.1300(q)[8]. Since ozone concentrations tend to be highest during the summer months, the emissions inventory used in the SIP is based on the summer season (May through October).

Geographical Scope

The inventories presented in this Plan consist of emissions for the county of Ventura, including offshore emissions out to 100 nautical miles. Only the South Central Coast Air Basin (SCCAB) is designated as a non-attainment area. The SCCAB includes all emissions from sources on land and out to 3 nautical miles from the coast. The offshore air basins, OC1 and OC2, include emissions from sources from three to 24 miles from the coast and 24 to 100 miles from the coast, respectively.

[8] 40 CFR 51.1315(c). *https://www.govinfo.gov/content/pkg/CFR-2021-title40-vol2/pdf/CFR-2021-title40-vol2-sec51-1315.pdf*.

Quality Assurance and Quality Control

CARB has established a quality assurance and quality control (QA/QC) process to ensure the integrity and accuracy of the emission inventories used in the development of air quality plans. QA/QC occurs at the various stages of SIP emission inventory development. Base year emissions are assembled and maintained in the California Emission Inventory Development and Reporting System (CEIDARS). CARB inventory staff works with air districts, which are responsible for developing and reporting point source emission estimates, to verify these data are accurate. The locations of point sources, including stacks, are checked to ensure they are valid. Area-wide source emissions estimates are developed by both CARB and District staff, and the methodologies are reviewed by both agencies before their inclusion in the emissions inventory. Mobile categories are verified with CARB mobile source staff for consistency with the on-road and off-road emission models. Additionally, CEIDARS is designed with automatic system checks to prevent errors, such as double counting of emission sources. At the final stage, CEPAM is thoroughly reviewed to validate the accuracy of growth and control application, and the output emissions are compared against prior approved versions of CEPAM to identify data anomalies.

EMISSION INVENTORY COMPONENTS

A summary of the components that make up Ventura County's 70 ppb Ozone SIP emissions inventory is presented in the following sections. These include mobile (on- and off-road) sources, stationary point and area sources, and areawide sources. Natural sources are not included.

Mobile Source Emissions

CARB develops the emission inventory for the mobile sources using various modeling methods. These models account for the effects of various adopted regulations, technology types, fleet turnover, and seasonal conditions on emissions. Mobile sources in the emission inventory are composed of both on-road and off-road sources, described in the sections below.

On-Road Mobile Source Emissions

Emissions from on-road mobile sources, which include passenger vehicles, buses, and trucks, were estimated using outputs from CARB's EMFAC2017 model. The on-road emissions were calculated by applying EMFAC2017 emission factors to the transportation activity data provided by the Southern California Association of Governments (SCAG), the local MPO.

EMFAC2017 includes data on California's car and truck fleets and travel activity. Light-duty motor vehicle fleet age, vehicle type, and vehicle population were updated based on 2016 DMV data. The model also reflects the emissions benefits of CARB's recent rulemakings such as the Pavley Standards and Advanced Clean Cars Program and includes the emissions benefits of CARB's Truck and Bus Rule and previously adopted rules for other on-road diesel fleets.

EMFAC2017 utilizes a socio-econometric regression modeling approach to forecast new vehicle sales and to estimate future fleet mix. Light-duty passenger vehicle population includes 2016 DMV registration data along with updates to mileage accrual using Smog Check data. Updates to heavy-duty trucks include model year specific emission factors based on new test data, and population estimates using DMV data for in-state trucks and International Registration Plan (IRP) data for out-of-state trucks.

Additional information and documentation on the EMFAC2017 model is available at: *https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-road-documentation*

EMFAC2017 SAFE Vehicles Rules Off-Model Adjustment Removal

On September 27, 2019, U.S. EPA and National Highway Traffic Safety Administration (NHTSA) published the "Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule Part One: One National Program" (SAFE-1).[9] SAFE-1 revoked California's authority to set its own greenhouse gas emissions standards and set zero-emission vehicle mandates in California. On April 28, 2021, U.S. EPA reconsidered the 2019 SAFE-1 by finding that the actions taken as a part of SAFE-1 were decided in error and are now entirely rescinded[10].

Therefore, any previously applied off-model adjustments as a result of SAFE-1 were removed in this inventory, resulting in a minor reduction in emissions.

EMFAC2017 ACT Off-Model Adjustment

The Advanced Clean Trucks (ACT) regulation was approved on June 25, 2020 and has two main components, a manufacturers zero-emission vehicle (ZEV) sales requirement and a one-time reporting requirement for large entities and fleets. The first component requires manufacturers to sell ZEVs as a percentage of annual truck and bus sales in California for vehicle model years 2024 and newer.

The ACT regulation impacts some of the underlying assumptions in CARB's EMFAC2017 model, which was used to assess emissions from on-road mobile sources. Therefore, CARB developed off-model adjustment factors in order to reflect the regulation. Adjustment factors were based on calculations in *EMFAC2021*, which models a percentage of California-certified ZEV sales for each EMFAC category and model year. More information on inventory modelling methods can be found in the ACT Initial Statement of Reasons (ISOR) *Appendix F*. These adjustment factors were calculated based on emission estimates using *EMFAC2021* under two scenarios: (1) controlled scenario-estimated emissions with adopted regulations (EMFAC2021 default) and (2) uncontrolled scenario - estimated emissions without accounting for the benefits of adopted regulations, including ACT and other regulations such as Heavy-Duty Omnibus, Opacity, and ICT (described below). These adjustments, provided in the form of multipliers, were applied to emissions outputs from the EMFAC2017 model by the CEPAM external adjustment module to account for the impact of the ACT regulation. The ACT off-model adjustment factors were only applied to the medium-and heavy-duty truck sectors.

Additional information on ACT is available at:
https://ww2.arb.ca.gov/our-work/programs/advanced-clean-trucks

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[9] 84 FR 51310. *https://www.govinfo.gov/content/pkg/FR-2019-09-27/pdf/2019-20672.pdf*.
[10] 87 FR 14332. *https://www.govinfo.gov/content/pkg/FR-2022-03-14/pdf/2022-05227.pdf*.

Additional information on EMFAC2021's technical details is available at:
https://ww2.arb.ca.gov/sites/default/files/2021-08/emfac2021_technical_documentation_april2021.pdf

EMFAC2017 Heavy-Duty Omnibus Off-Model Adjustment

On August 27, 2020, CARB adopted the Heavy-Duty (HD) Omnibus regulation, which would establish NOx engine emission standards 90 percent lower than today's technology. The Omnibus Regulation will dramatically reduce NOx emissions by comprehensively overhauling exhaust emission standards, test procedures, and other emissions-related requirements for California-certified heavy-duty engines with engine model years 2024 and newer.

The HD Omnibus regulation impacts some of the underlying assumptions in CARB's EMFAC2017 model, which was used to assess emissions from on-road mobile sources. Therefore, CARB developed off-model adjustment factors based on EMFAC2021 (described above) in order to reflect the regulation. These adjustments, provided in the form of multipliers, were applied to emissions outputs from the EMFAC2017 model by the CEPAM external adjustment module to account for the impact of the HD Omnibus regulation. The adjustment factors reflect the impact of all components of the HD Omnibus regulation on in-use (i.e. real-world) NOx emissions and deterioration-related emissions. More details on the inventory analysis for this regulation can be found in *Appendix D* of the HD Omnibus staff report.

The HD Omnibus off-model adjustment factors were only applied to on-road heavy-duty vehicles.

Additional information on the HD Omnibus regulation is available at:
https://ww2.arb.ca.gov/our-work/programs/heavy-duty-low-nox

EMFAC2017 Innovative Clean Transit Off-Model Adjustment

The Innovative Clean Transit (ICT) regulation was adopted by CARB in 2019 and targets reductions in transit fleets by requiring transit agencies to gradually transition their buses to zero-emission technologies. ICT has helped to advance heavy-duty ZEV deployment, with buses acting as a beachhead in the heavy-duty sector. Based on the size of the transit agencies, they are categorized as small and large agencies. Starting calendar year 2023, large agencies follow the phase-in schedule to have a certain percentage of their new purchases as zero emission buses (ZEB). For the small agencies, the start calendar year will be 2025. By 2030, all the agencies need to have 100% of their new purchases as ZEB.

The ICT regulation impacts some of the underlying assumptions in CARB's EMFAC2017 model, which was used to assess emissions from on-road mobile sources. Therefore, in order to reflect the regulation, CARB developed off-model adjustment factors based on EMFAC2021 (described above). These adjustments, provided in the form of multipliers, were applied to emission outputs from the EMFAC2017 model by the CEPAM external adjustment module to account for the impact of ICT. More details on the inventory analysis for this regulation can be found in *Appendix L* of the ICT staff report. The ICT off-model adjustment factors were only applied to the urban buses (UBUS) category.

Additional information on the ICT regulation is available at:
https://ww2.arb.ca.gov/our-work/programs/innovative-clean-transit/ict-regulation

EMFAC2017 Heavy-Duty Inspection and Maintenance Off-Model Adjustment

On Dec. 9th, 2021, California Air Resources Board adopted Heavy-Duty Inspection and Maintenance (HD I/M) program, which controls emissions effectively from non-gasoline on-road heavy-duty vehicles with a gross vehicle weight rating (GVWR) greater than 14,000 pounds. Starting from calendar year 2023, the program drastically reduces NOx and PM 2.5 emissions by enforcing periodic testing and inspections for heavy-duty trucks operating in California.

The HD I/M regulation impacts some of the underlying assumptions in CARB's EMFAC2017 model, which was used to assess emissions from on-road mobile sources. Therefore, in order to reflect the regulation, CARB developed off-model adjustment factors based on off-model analysis with EMFAC2021. More information on this analysis is provided in *Appendix D* of the HD I/M staff report. Since this regulation was adopted after the release of EMFAC2021, these adjustment factors were calculated based on emission estimates under two scenarios: (1) EMFAC2021 with HD I/M analysis incorporated and (2) EMFAC2021 default, which does not include HD I/M. These adjustments, provided in the form of multipliers, were applied to emissions outputs from the EMFAC2017 model by the CEPAM external adjustment module to account for the impact of HD I/M. These off-model adjustment factors were applied to all diesel heavy-duty diesel categories.

Off-Road Mobile Source Emissions

Emissions from off-road sources are estimated using a suite of category-specific models or, where a new model was not available, the OFFROAD2007 model. Many of the newer models are developed to support recent regulations. The sections below summarize the updates made by CARB to specific off-road categories.

Recreational Marine Vessels

Pleasure craft or recreational marine vessel (RMV) is a broad category of marine vessels that includes gasoline-powered spark-ignition marine watercraft (SIMW) and diesel-powered marine watercraft. It includes outboards, sterndrives, personal watercraft, jet boats, and sailboats with auxiliary engines. This emissions inventory was last updated in 2014 to support the evaporative control measures. The population, activity, and emission factors were revised using new surveys, DMV registration information, and emissions testing.

Staff used economic data from a 2014 UCLA Economic Forecast to estimate the near-term annual sales of RMV (2014 to 2019). To forecast long-term annual sales (2020 and later), staff used an estimate of California's annual population growth as a surrogate.

Additional information is available at:
https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-offroad

Recreational Vehicles

Off-highway recreational vehicles include off-highway motorcycles (OHMC), all-terrain vehicles (ATV), off-road sport vehicles, off-road utility vehicles, sand cars, golf carts, and snowmobiles. A new model was developed in 2018 to update emissions from recreational vehicles. Input factors such as population, activity, and emission factors were re-assessed using new surveys, DMV registration information, and emissions testing. OHMC population growth is determined from two factors: incoming population as estimated by future annual sales and the scrapped vehicle population as estimated by the survival rate.

Additional information is available at:
https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-offroad

Fuel Storage and Handling

Emissions from portable fuel containers (gas cans) were estimated based on past surveys and CARB in-house testing. This inventory uses a composite growth rate that depends on occupied household (or business units), percent of households (or businesses) with gas cans, and average number of gas cans per household (or business) units.

Additional information is available at:
https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-offroad

Small Off-Road Engines (SORE)

Small off-road engines (SORE) are spark-ignition engines rated at or below 19 kilowatts (i.e., 25 horsepower). Typical engines in this category are used in lawn and garden equipment as well as other outdoor power equipment and cover a broad range of equipment. The majority of this equipment belongs to the Lawn & Garden (e.g., lawnmower, leaf blower, trimmer) and Light Commercial (e.g., compressor, pressure washer, generator) categories of CARB's SORE emissions inventory model.

The newly developed, stand-alone SORE2020 Model reflects the recovering California economy from the 2008 economic recession and incorporates emission results from CARB's recent in-house testing as well as CARB's most recent Certification Database. CARB also has conducted an extensive survey of SORE operating within California through the Social Science Research Center (SSRC) at the California State University, Fullerton (CSUF). Data collected through this survey provides the most up-to-date information regarding the population and activity of SORE equipment in California. The final SORE emissions included the adopted SORE rule in December 2021 as well as the 15-day changes after the Board hearing which allowed the pressure washers (greater than 5 hp) extra time for meeting the regulation. The SORE annual sales were forecasted using historic growth of the number of California households (DOF household forecasts, 2000 – 2008 and 2009 - 2018).

Additional information on SORE baseline emissions (without the adopted rule and 15-day changes) is available at:
https://ww2.arb.ca.gov/sites/default/files/2020-09/SORE2020_Technical_Documentation_2020_09_09_Final_Cleaned_ADA.pdf

Ocean Going Vessels

Ocean going vessels (OGVs) were updated in 2021 based on AIS (transponder) data. These data, along with vessel information supplied by IHS Fairplay provides vessel visit counts, speed, engine size, and other vessel characteristics. The inventory adopts US EPA's methodology for emissions based on vessel speed, engine model year and horsepower. The inventory includes transit, maneuvering, anchorage and at-berth emissions, updating the 2019 at-berth-only inventory. The comprehensive national model Freight Analysis Framework (FAF) was used to develop growth rates for forecasting.

Additional information on CARB's general OGV update is available at:
https://ww2.arb.ca.gov/sites/default/files/2022-03/CARB_2021_OGV_Documentation_ADA.pdf

Commercial Harbor Craft

Commercial Harbor Crafts (CHC) are grouped into 18 vessel types: articulated tug barge (ATB), bunker barge, towed petrochemical barge, other barge, dredge, commercial passenger fishing, commercial fishing, crew and supply, catamaran ferry, monohull ferry, short run ferry, excursion, ATB tug, push and tow tug, escort/ship assist tug, pilot boat, research boat, and work boat.

The CHC inventory was updated in 2021 and includes vessels used around harbors such as tug and tow boats, fishing vessels, research vessels, barges, and similar. The inventory was updated based on CARB's reporting data required by the CHC regulation for these vessels, as well as inventories from the Ports of Los Angeles and Long Beach and Oakland and Richmond. This supplied vessel characteristics, and the population was scaled up to match U.S. Coast Guard data on the annual number of vessels in California waters. Activity and load factors were based on a mix of reporting data and port-specific inventories. Emission factors were based on certification data for harbor craft engines. Population and activity growth factors were estimated based on historical trends in the past decade.

Additional information on this methodology is available at:
https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2021/chc2021/apph.pdf

Locomotives

All locomotive inventories were updated in 2020 and include linehaul (large national companies), switchers (used in railyards), passenger, and Class 3 locomotives (smaller regional companies). Data for each sector was supplied by rail operations, including Union Pacific and Burlington Northern, and Santa Fe Railway (BNSF) for linehaul and switcher operations. Data for other categories was supplied by the locomotive owners. Emission factors for all categories were based on U.S. EPA emission factors for locomotives. The inventory reflects the 2005 memorandum of understanding (MOU) between CARB, Union Pacific, and BNSF. Growth rates were primarily developed from the FAF.

More information is available at:
https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-road

Diesel Agricultural Equipment

The agricultural equipment inventory covers all off-road vehicles of all fuel types used on farms or first processing facilities. It was updated in 2021 using a 2019 survey of California farmers and rental facilities, and the 2017 U.S. Department of Agriculture (USDA) agricultural census. Emission factors are based on the 2017 off-road diesel emission factor update. The inventory reflects incentive programs for agricultural equipment that were implemented earlier than August

2019. Agricultural growth rates were developed using historical data from the County Agricultural Commissioners' reports.

Additional information is available at:
https://ww2.arb.ca.gov/sites/default/files/2021-08/AG2021_Technical_Documentation_0.pdf

In-Use Off-Road Equipment

This category covers off-road diesel vehicles over 25 horsepower in construction, mining, industrial, and oiling drilling categories. The inventory was updated in 2022 based on the DOORS registration program required by the offroad equipment regulation. Activity was updated based on a 2021 survey of registered equipment owners, and emission factors were based on the 2017 off-road diesel emission factor update. The inventory reflects the In-Use Off-Road Equipment Regulations, as amended in 2011.

The updated methodology is currently in the process of being posted online. When it is completed, the methodology will be available at:
https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-road

Cargo Handling Equipment

The Cargo Handling Equipment (CHE) inventory covers equipment of all fuels used at California ports and intermodal railyards, such as cranes, forklifts, container handling equipment, and more. The inventory population and activity were updated in 2021 based on the port inventories for the Ports of Los Angeles and Long Beach and Richmond, and the CARB reporting data for other ports and railyards, which had a more comprehensive inventory than available through reporting. Load factors were based on the previous inventory in 2007, and emission factors were based on the 2017 off-road diesel emission factor update. The inventory reflects the CHE Airborne Toxic Control Measures (ATCM), adopted in 2005 and completed in 2017.

The updated methodology is currently in the process of being posted online. When it is completed, the methodology will be available at:
https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-road

Transportation Refrigeration Units - Diesel

The Transportation Refrigeration Units (TRU) inventory was updated in 2020 based on the TRU reporting program at CARB. The activity was developed based on 2010 surveys of facilities served by TRUs and 2017 to 2019 telematics data purchased from TRU manufacturers. Emission factors were developed specifically for TRUs based on TRU engine certification data reported to U.S. EPA as of 2018. The inventory reflects the TRU ATCM and 2021 amendments. Forecasting was based on IBISWorld reports forecast for related industries, and turnover forecasting was based on the past 20 years equipment population trends.

Additional information is available at:
https://ww2.arb.ca.gov/sites/default/files/barcu/board/rulemaking/tru2021/apph.pdf

Portable Equipment

Portable equipment inventory includes non-mobile diesel, such as generators, pumps, air compressors, chippers, and other miscellaneous equipment over 50 horsepower. This inventory was developed in 2017 based on CARB's registration program, 2017 survey of registered owners for activity and fuel, and the 2017 off-road diesel emission factor update. The inventory also reflects the Portable ATCM and 2017 amendments.

Because registration in the Portable Equipment Registration Program (PERP) is voluntary, the PERP registration data was used as the basis for equipment population, with an adjustment factor used to represent the remaining portable equipment in the state. Estimates of future emissions beyond the base year were made by adjusting base year estimates for population growth, activity growth, and the purchases of new equipment (i.e. natural and accelerated turnover).

Additional information is available at:
https://ww3.arb.ca.gov/msei/ordiesel/perp2017report.pdf

Large Spark Ignition/Forklifts

The large spark ignition (LSI) inventory includes gasoline and propane forklifts, sweeper/scrubbers, and tow tractors. The inventory was updated in 2020 based on the LSI/forklift registration in the DOORS reporting system at CARB, and the sales data was provided by the Industrial Truck Association (ITA). Activity was based on a survey of equipment owners in the DOORS system, and emission factors were based on U.S. EPA's latest guidance for gasoline and propane engines. The inventory reflects the LSI regulation requirements and 2016 amendments.

The updated methodology is currently in the process of being posted online. When it is completed, the methodology will be available at:
https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-road

Civil and Commercial Aircraft

The District used the Federal Aviation Administration (FAA) Emissions and Dispersion Modeling System (EDMS) model version 5.1.2 and airport-specific aircraft operations and time-in-mode operating profiles based on local airport operational characteristics and the local mixing height to estimate 2008 criteria emissions and fuel consumption by aircraft operating mode for civil and commercial aircraft at civilian airport facilities operating in Ventura County. Civil and commercial aircraft include single and twin-engine piston aircraft, turbine engine and jet powered aircraft and helicopters.

Sources of aircraft activity data include the FAA Air Traffic Activity Data System (ATADS) database and a Caltrans noise study in 1997 for the three largest airports and an EPA methodology for estimating aircraft operations at small facilities that do not report operations data to the FAA for one small private civilian airport and 14 heliports (*Environmental Protection Agency, Calculating Aviation Gasoline Lead Emissions in the 2008 NEI, (March 2009)*. 2008 emissions were projected to 2018 using the ratio of 2018 to 2008 ATADS operations for the two largest airports responsible for over 76% of county-wide aircraft operation. The District's growth profile is based on the 2020 FAA Terminal Area Forecast for the two largest airports.

Military Aircraft and Vessels

Emissions are associated with military aircraft operations at the U.S. Navy facility Naval Base Ventura County (NBVC) at Point Mugu on the Ventura County mainland and the facility on San Nicolas Island in the outer continental shelf from 24 to 100 nautical miles (OC2) air basin, and with military vessel operations occurring at the U.S. Navy facilities at the Port of Hueneme in Ventura County and large military vessels operating offshore and in the approach corridors to Port Hueneme and San Nicolas Island in the OC2 air basin.

NBVC provided 2017 baseline emissions estimates for military aircraft and vessel activities in the Ventura County attainment area (mainland and three nautical miles offshore), the outer continental shelf from 3 to 24 nautical miles air basin (OC1), and the OC2 air basin (Naval Base Ventura County Mobile Source Emissions 2017 Baseline Emissions and Future Emission Projection for 8-Hour Ozone SIP Planning (February 2021)). Aircraft include transports, piston and jet aircraft, helicopters, and missile launches. Emissions are from landings and takeoffs, touch and go aircraft operations and ground maintenance operations. Military vessels include large military ships, support and operations vessels, tugboats and some non-military vessels utilizing Navy facilities at Port Hueneme. Emissions occur from main propulsion and auxiliary engines during in-port at-berth and maneuvering operations and underway operations.

NBVC provided future year emissions estimates for military aircraft and vessels from planned projects and an additional 4% annual growth allowance through year 2026 within the Ventura County nonattainment area. The 4% annual growth allowance is intended to account for uncertainties in potential projects resulting from future actions and unknown projects. Beyond 2026 through 2040, emissions in the nonattainment area and the OC1 and OC2 basins were assumed to grow at a rate of 4% per year, compounded annually. The only source in the NBVC mobile source emission inventory which was not projected to grow at 4% is the Port Hueneme Vessel Cargo emissions at Berth N3, which are assumed to grow at 2% for all years covered by this emission inventory.

Stationary Point and Area Sources

The stationary source inventory is composed of point sources and area-wide sources. The data elements in the inventory are consistent with the data elements required by the (Air Emissions Reporting Requirements Rule) AERR. The inventory reflects actual emissions from industrial point sources reported to the District by the facility operators through calendar year 2020.

More information regarding the District's facility point source inventory is available at:
http://www.vcapcd.org/emissions_inventory.htm

Stationary point sources also include smaller point sources, such as gasoline dispensing facilities and laundering, that are not inventoried individually, but are estimated as a group and reported as a single source category. Emissions from these sources are estimated by both CARB and the District using various models and methodologies. Estimation methods typically use emission factors from permits or literature, but can incorporate data from source testing, direct measurement by continuous emissions monitoring systems, or engineering calculations. Emissions for these categories are estimated by both CARB and the District.

Emission estimates for the categories below were developed by CARB and the District and have been reviewed by CARB and District staff to reflect the most up-to-date information and methods.

Fuel Combustion

Fuel Combustion includes stationary sources that burn combustible material fuel for heat or energy. The District categorizes fuel combustion emission sources by the type of fuel combusted and the type of facility that is using the fuel.

Natural Gas Combustion

Industrial and commercial natural gas combustion emissions estimates were revised by the District for 2018. Emissions were estimated based on the natural gas consumed by various industrial and commercial sectors (space heating, water heating, and other unspecified). Industrial and commercial natural gas usage reported by the gas utilities to the District for 2018 was distributed to the sectors using allocation factors from Southern California Gas Company. Emission factors were from EPA AP-42 Section 1.4 "Natural Gas Combustion" (July 1998). The growth profile is based on the natural gas usage demand forecasts developed by Southern California Gas Company for Ventura County and considers energy savings benefits from statewide energy efficiency programs and standards.

Stationary Nonagricultural Diesel Engines

This category includes emissions from backup and prime generators and pumps, air compressors, and other miscellaneous stationary diesel engines that are widely used throughout the industrial, service, institutional, and commercial sectors. The emission estimates, including emission forecasts, are based on a 2003 CARB methodology derived from the OFFROAD2007 model.

Additional information on this methodology is available at:
https://ww3.arb.ca.gov/ei/areasrc/arbfuelcombother.htm

Stationary Agricultural Natural Gas Engines

The District updated emissions for 2010 based on fuel use and emission factor data from Emission Reduction Credits (ERC) applications submitted to the District for unpermitted agricultural well pump natural gas engines. Emissions were adjusted by the ratio of known engine fuel use and countywide natural gas fuel use data from the California Energy Commission (CEC) for - 'Ag & Water Pump' NAICS 221311 (Water Supply) - to account for unknown engines. The growth profile for natural gas irrigation pumps was developed by ARB/Pechan.

Agricultural Diesel Irrigation Pumps

This category includes emissions from the operation of diesel-fueled stationary and mobile agricultural irrigation pumps. The emission estimates are based on a 2003 CARB methodology updated in 2018 using statewide population and include replacements due to the Carl Moyer Program.

Additional information on this category is available at:
https://ww3.arb.ca.gov/ei/areasrc/fullpdf/full1-1.pdf

Other Liquid Fuel Combustion

Industrial and commercial liquid fuel combustion emissions were projected by the District for 2018 from 2010. State-wide distillate oil, residual oil and liquefied petroleum gas fuel consumption from the U.S. Dept. of Energy Information Administration (EIA) from 2009 was projected to 2010 using the 2010/2009 statewide ratio of either industrial or commercial employment from California Employment Development Department Labor Management Information (LMI) data, then allocated to the county level on the basis of the county/state ratio. Point source fuel use was then subtracted out. Distillate and residual fuel oil categories are subject to ARB's state-wide Diesel Fuel regulations and sulfur content is assumed to be 0.0015%. Emission factors are from EPA AP-42 Section 1.3 "Fuel Oil Combustion" and Section 1.5 "Liquefied Petroleum Gas Combustion". The growth profile is based on industry sector growth rates from SCAG.

Waste Disposal

Composting

The District developed a new methodology for 2018 to estimate ROG and NH_3 emissions from organic material composting operations in support of a proposed District rule to regulate ROG emissions from these sources. Annual 2018 composting, co-composting and chip-and-grind throughput was obtained from an annual survey of composting facilities in Ventura County. ROG and NH3 emission factors are from the ARB Composting Regulatory Workgroup, ARB Emissions Inventory Methodology for Composting Facilities (March 2015) Table III-1 and III-2. The growth profile is based on population projections from SCAG.

Landfills

The District developed a new point source category methodology for 2018 to estimate the ROG emissions from landfill gas escaping from the landfill surface. The District used the EPA's Landfill Gas Emission Model (LandGEM) to model ROG generation, then used that projection and the quantity of landfill gas collected as reported in surveys to project ROG emissions.

Cleaning and Surface Coatings

Cleaning and surface coatings are generally tracked by the District as an aggregate group and not at the facility level. Some large facilities report cleaning solution and surface coating use to the District.

Laundering

The District updated emissions from dry cleaning establishments using petroleum solvent or perchloroethylene for 2010. Emissions are based on solvent use and type of dry cleaning equipment used at dry cleaning facilities under District permit. Emissions from petroleum solvent were calculated using the solvent density. Because of its toxic effects, perchloroethylene use has been prohibited in California by the state-wide Dry Cleaning Air Toxic Control Measure (*ATCM*). The growth profile for petroleum solvent is based on industry projections from SCAG. Perchloroethylene use for dry cleaning has been eliminated in the District.

Degreasing

This category includes emissions from the use of solvents in degreasing operations (cold cleaning, vapor degreasing and handwipe cleaning) in the manufacturing and maintenance industries. ARB estimated 1993 emissions for this source category based on a 1996 study by E.H. Pechan and Associates, Inc. (Pechan) entitled, Solvent Cleaning/Degreasing Source Category Emission Inventory. To estimate degreasing emissions, Pechan collected activity data by surveying solvent users in two major groups: manufacturing and maintenance.

Emissions were estimated for 32 equipment and solvent pairs using employment in the nine industry groups and three emission variables: an activity factor (AF), which is the net solvent loss per employee accounting for recycled solvent; an emission factor (EF), which is the solvent density; and a user fraction (UF), which is the fraction of employees using a particular equipment/solvent. For the manufacturer's survey, the emission factor for pure solvents is the density of the particular solvent. The emission factor for solvent blends is the density of the solvent multiplied by the total organic gas (TOG) content of the solvent. Exhaust controls were taken into account if used. For the maintenance survey, the emission factors are the density of the solvent with no exhaust controls.

The District revised the Pechan Report methodology for 2010, using 2010 employment data from the U.S Department of Labor *Bureau of Labor Statistics* database, the three Pechan Report variables, an additional variable to account for spray gun cleaning equipment not subject to District Rule 74.6 “Surface Cleaning and Degreasing” and revised control factors to account for exempt emissions. The growth profile is based on total industry output projections from SCAG.

Coatings and Process Solvents

The District updated 2010 ROG emissions in four Coatings & Process Solvent categories: Metal Parts and Products, Wood Furniture Coatings, Thinning and Cleaning Solvent, and Industrial Coatings (unspecified). 2010 national coating and solvent product data from the U.S. Census Bureau publication Current Industrial Reports, Paint & Allied Products: 2010 (July 2011) were allocated to the county level based on the county/national employment ratio using 2010 U.S. Department of Labor Bureau of Labor Statistics employment data. Thinning and clean-up solvent usage was adjusted for solvent usage already accounted for in Architectural Coatings area source categories. Coating and process solvent ROG emissions were determined using the composite emission factors from the corresponding point source emission categories reconciling with each area source category. The composite point source emission factors represent control from applicable district rules. Growth profiles are SCAG industry-specific economic output or total employment projections.

Printing

The District updated 2013 ROG emissions from printing operations. The 2018 emissions have been projected from that 2013 update. ROG emissions from printing facilities with permits were calculated using data from surveys and inspections available to the District. When data from surveys and inspections was not sufficient, the emissions from permitted facilities was scaled based on permitted ROG emissions and the emissions from permitted facilities and enough data to calculate emissions.

The number of permit-exempt printing facilities was estimated using data from a 2002 source category update and then estimating industry declines from 2002 to 2012. Emissions from permit-exempt facilities were assumed to be equal to the District permit exemption level of 200 pounds per year of ROG.

Petroleum Production and Marketing

Petroleum production and marketing includes emissions from the extraction, transportation, and transfer of oil and gas. It also includes the emissions from the transportation and transfer of finished fuels such as gasoline and diesel fuel. Emissions from fuel combustion as part of the petroleum extraction and marketing process is included as part of the fuel combustion category.

Gasoline Dispensing Facilities

This category uses a 2015 CARB methodology to estimate emissions from fuel transfer and storage operations at gasoline dispensing facilities (GDFs). The methodology addresses emissions from underground storage tanks, vapor displacement during vehicle refueling, customer spillage, and hose permeation. The updated methodology uses emission factors developed by CARB staff that reflect more current in-use test data and accounts for the emission reduction benefits of onboard refueling vapor recovery (ORVR) systems. The emission estimates are based on 2012 statewide gasoline sales data from the California Board of Equalization that were apportioned to the county level using fuel consumption estimates from EMFAC 2014. Emissions were grown based on EMFAC2017.

Additional information on this category is available at:
https://ww2.arb.ca.gov/arb-petroleum-production-and-marketing-methodologies-petroleum-marketing

Gasoline Cargo Tanks

This category uses a 2002 CARB methodology to estimate emissions from gasoline cargo tanks. These emissions do not include the emissions from loading and unloading of gasoline cargo tank product; they are included in the gasoline terminal inventory and gasoline service station inventory. Pressure-related fugitive emissions are volatile organic vapors leaking from three points: fittings, valves, and other connecting points in the vapor collection system on a cargo tank. 1997 total gasoline sales were obtained from the California Department of Transportation. The emission factors are derived from the data in the report, "Emissions from Gasoline Cargo Tanks, First Edition," published by the Air and Waste Management Association in 2002.

The initial emission estimates for 1997 were grown to 2012 using a growth parameter developed by Pechan based on gasoline and oil expenditures data. Emissions were grown for subsequent years according to fuel consumption from CARB's EMFAC 2017 mobile sources emission factors model.

Additional information on this methodology is available at:
https://ww2.arb.ca.gov/arb-petroleum-production-and-marketing-methodologies-petroleum-marketing

Oil and Gas Production

Most emissions from the oil and natural gas production inventory are based on facility surveys. This category is related to fugitive emissions from production-related fuel consumption, fugitive losses (sumps, pits, pumps, compressors, well heads, separators), vapor recovery and flares, tank and truck working and breathing losses, wastewater treatment, tertiary production, and wet and dry gas stripping. Emissions were calculated using emission factors developed during facility permitting. These factors were developed for classes of equipment using emission models such as GlyCalc and TANKS or obtained from emission factor references such as the Compilation of Air Emission Factors (AP-42).

The District updated 2010 ROG emissions for three Oil and Gas Production categories: Tertiary Oil Wells, Gas Stripping and Oil Production Fugitive Losses Well Heads.

ROG emissions in the Tertiary Oil Wells category are from thermally enhanced oil recovery (TEOR) steam drive and cyclic steam well casing vents. Emissions are calculated using the number of TEOR wells from the California Geologic Energy Management Division (*CalGEM*), 2009 Annual Report of the State Oil & Gas Supervisor, Injection 2009 Table (November 2011) and ROG emission factors developed by Radian Corporation in Assessment of VOC Emissions from Well Vents Associated with Thermally Enhanced Oil Recovery Report No. EPA 909/9-81-003 (September 1981). The controlled ROG emission factor assumes 90% control from vapor recovery systems.

Gas Stripping ROG emissions are from gas plant valves and fittings. Emissions are calculated using the annual million cubic feet of gas processed obtained from the CalGEM 2010 Annual Report of the State Oil & Gas Supervisor, Oil and Gas Production by County Table (January 2012) and fugitive gas emission factors developed in a study conducted by KVB entitled Emission Characteristics of Crude Oil Production Operations in California - Final Report No. KVB72 5810-1309 (January 1983). The controlled emission factor assumes 80% control from District Rule 74.10 “Components at Crude Oil and Natural Gas Production and Processing Facilities.”

Oil Production Fugitive Losses Well Heads ROG emissions are from oil production well head maintenance. Well head maintenance refers to opening a producing well to replace or repair rod pumps, sucker rods or tubing, or to perform other well servicing operations, allowing the pressurized gas to escape or vent to the atmosphere. The 2010 methodology was revised to incorporate assumptions in CARB’s, *2007 Oil & Gas Industry Survey Results Draft Report* released in August 2011. Emissions per maintenance event are estimated by determining the volume of well gas released during maintenance operations, which depends on well depth, casing diameter, tubing diameter, well gas pressure and gas temperature. Total annual emissions are determined from emissions per maintenance event, the number of operating wells obtained from the CalGEM 2010 Annual Report of the State Oil & Gas Supervisor, January 2012, and well maintenance operations per year from the 2007 ARB Oil & Gas Industry Survey.

The growth profile for the three categories is based on the SCAG industry-specific economic output for oil & gas extraction.

ARB staff updated the statewide emissions inventory for oil and natural gas production, which included the revision of emissions estimates and the addition of emission categories that previously were not estimated. For Ventura County, these categories included fugitive emissions from mud degassing (the practice of extracting entrained gas from drilling mud once it is outside the wellbore and venting the gas to the atmosphere), and pneumatic devices powered by high pressure produced gas for Ventura County. Emissions were calculated with a software tool developed by EPA that generates county-level emissions for upstream oil and gas activity.

This tool uses 2011 as the base year, with activity data taken from CalGEM, an industry database, and default emission factors provided in an associated report. Staff incorporated data from ARB's 2007 Oil and Gas Industry Survey (e.g., typical component counts) and feedback from individual air districts (e.g., minimum controls required to operate in a certain district, with associated control factors) to improve these parameters and further adjust the tool's output. Emissions estimates for 2012 and other years were forecasted using the historical trend in statewide oil production from CalGEM, which assumes a 2.2 percent annual decline.

Additional information on this methodology is available at:
https://ww2.arb.ca.gov/resources/documents/oil-and-gas-industry-survey
https://ww3.arb.ca.gov/ei/areasrc/oilandgaseifinalreport.pdf

Gasoline Bulk Plants

The District estimated 2012 ROG emissions from gasoline bulk loading facilities not captured in the point source inventory, including aviation gasoline bulk plants located at airports. Emissions are associated with tank breathing and working loss. Working loss emissions are a composite of several processes associated with loading/unloading gasoline into or from the storage tanks. Throughput and emission factors were obtained from the District permits for the facilities. The growth profile for GDFs and Bulk Plants is based on projections of gasoline consumption from ARB's EMFAC model.

LPG Transfer and Dispensing Losses

The District developed a new emission estimation methodology for fugitive ROG emissions from transfer and dispensing of liquefied petroleum gas (LPG) for 2012, based on the South Coast Air Quality Management District emission estimation methodology described in Final Staff Report for Proposed Rule 1177 'Liquefied Petroleum Gas Transfer and Dispensing' Appendix B 'Emission Inventory Calculations' (June 2012). LPG fugitive ROG emissions result from (1) venting of LPG through fixed liquid level gauges (FLLG) used as overfill safety devices on pressurized receiving containers, tanks, and cylinders and (2) volatilization of entrapped LPG when transfer lines are disconnected.

FLLG venting emissions depend on the number of filling events, container filling time and whether gravity or pump assisted pressure filling is used to fill the receiving containers. Disconnect emissions depend on the number of disconnect events and the entrapment volume for a connector type. The number of container filling and disconnect events depends on annual LPG usage and average tank fill volume. LPG usage was estimated for seven different end-use sectors: residential, commercial, sales to retail, internal combustion engines, industrial, agricultural and chemical. Statewide LPG sales by market/end-use sector for 2009 from the American Petroleum Institute were allocated to Ventura County using allocation surrogates specific to each market sector. Each end-use sector has particular container configurations, fill times, fill volumes and product transfer methods which are used to derive FLLG and connector emission factors in pounds ROG/thousand gallons LPG. The growth profile for this category is based on industry-specific employment projections developed by ARB/REMI.

Industrial Processes

Industrial processes include lubricants and miscellaneous industrial emission sources that are not classified as fuel combustion, waste disposal, cleaning or surface coating, or petroleum production and marketing.

Industrial Lubricants

The District developed a new emission estimation methodology for estimating ROG emissions from industrial lubricants for 2012, based on South Coast Air Quality Management District's emission estimation methodology described in Final Staff Report for Proposed Amended Rule 1144 'Metalworking Fluids and Direct-Contact Lubricants' (May 2010). ROG emissions result from metalworking fluids and direct-contact lubricants such as vanishing oils, lubricants and rust inhibitors used during metalworking and/or metal forming operations in four industrial sectors: petroleum and coal products manufacturing, fabricated metal product manufacturing, machinery manufacturing and transportation equipment manufacturing. The Rule 1144 Staff Report contains an estimate of the baseline metalworking fluids emissions inventory based on a 2006 survey of local manufacturers, distributors and end-users of metalworking fluids and direct-contact lubricants.

Baseline emissions were calculated for individual metalworking fluid types using volume of fluid used (thousand gallons) and sales-weighted average ROG content. The quantity of metalworking fluids and direct contact lubricants in 2006 is assumed to be related to employment in the four industrial sectors. South Coast Air Quality Management District metalworking fluid use was projected to 2011 using the ratio of 2011 to 2006 U.S. Census Bureau County Business Patterns (*CBP*) employment in the four industrial sectors. Then the ratio of 2011 employment in the four sectors between Ventura County and South Coast Air Quality Management District was used to estimate 2011 industrial lubricant use for Ventura County, which was then projected to 2012 using growth in the four industrial sectors from 2011 to 2012. ROG emissions for 2012 were determined using volume of industrial lubricant usage and the average emission factor for all four industrial sectors from the South Coast Air Quality Management District Staff Report. The growth profile is based on total employment projections from SCAG.

Area-Wide Sources

Area-wide sources include categories where emissions take place over a wide geographic area, such as consumer products, architectural coatings, residential fuel combustion, and prescribed burning. Emissions for these categories are estimated by both CARB and the District using various models and methodologies.

Estimates for the categories below were developed by CARB and has been reviewed by CARB staff to reflect the most up-to-date information.

Solvent Evaporation

Consumer Products and Aerosol Coatings

The Consumer Product emission estimates utilized sales and formulation data from the CARB's mandatory survey of all consumer products sold in California for calendar years 2013 through 2015 (2015 Consumer Product Survey). The aerosol coatings estimates utilized sales and formulation data from a survey conducted by CARB in 2010. Based on the survey data, CARB staff determined the total product sales and total ROG emissions for the various product categories. Growth for personal care products is based on real disposable personal income projections per REMI version 2.4.3. No growth is assumed for aerosol coatings. Growth for all other consumer products is based on SCAG population projections.

Additional information on CARB's consumer products surveys is available at:
https://ww2.arb.ca.gov/our-work/programs/consumer-products-program/consumer-commercial-product-surveys

Architectural Coatings

Architectural coatings are coatings applied to stationary structures and their accessories. They include house paints, stains, industrial maintenance coatings, traffic coatings, and many other products. Industrial maintenance coatings are high performance architectural coatings formulated for application to substrates, including floors and surfaces, exposed to extreme environmental conditions (e.g., immersion in water, chronic exposure to corrosive agents, frequent exposure to temperatures above 121°C, repeated heavy abrasion). The architectural coatings category reflects emission estimates based on a 2014 comprehensive CARB survey for the 2013 calendar year. The emission estimates include benefits of the 2019 CARB Suggested Control Measure. These SCM were largely adopted by the District as Rule 74.2, Architectural Coatings. These emissions are grown based on SCAG households forecast, 2020.

Additional information about CARB's architectural coatings program is available at:
https://ww2.arb.ca.gov/carb-solvent-evaporation-methodologies-architectural-coatings-and-cleaningthinning-solvents

Pesticides

The California Department of Pesticide Regulation (DPR) develops month-specific emission estimates for agricultural and structural pesticides. Each calendar year, DPR updates the inventory based on the Pesticides Use Report, which provides updated information from 1990 through the 2018 calendar year. Agricultural pesticide emission forecasts for years 2019 and beyond are based on the average of the most recent five years. Growth for agricultural pesticides is based on CARB projections of farmland acres per Farmland Mapping and Monitoring Program (FMMP), 2016. Growth for structural pesticides is based on SCAG household projections, 2020.

Additional information about CARB's pesticides program is available at:
https://ww2.arb.ca.gov/carb-solvent-evaporation-methodologies-agricultural-and-non-agricultural-pesticides

Asphalt Paving/Roofing

Asphalt paving and roofing emissions were grown from a 1995 estimate developed by the District. ROG emissions are estimated based on tons of asphalt applied in the county and a default emission factor for each type of asphalt operation from an ARB area source methodology document Methods for Assessing Area Source Emissions in California (December 1982). The growth profile for both categories is based on construction employment forecasts from SCAG.

Miscellaneous Area Source Processes

Residential Wood Combustion

Residential Wood Combustion estimates are based on a 2011 CARB methodology. It reflects survey data on types of wood burning devices and wood consumption rates, updates to the 2002 U.S. EPA National Emission Inventory (NEI) emission factors, and improved calculation approaches.

CARB assumes no growth for this category based on the relatively stagnant residential wood fuel use over the past decade according to the American Community Survey and US Energy Information Administration.

Additional information on this methodology is available at:
https://ww2.arb.ca.gov/carb-miscellaneous-process-methodologies-residential-fuel-combustion

Residential Natural Gas Combustion

The inventory for residential natural gas combustion emissions reflects estimates updated by the District for 2018. Emissions are estimated based on the natural gas consumed by various residential uses (space heating, water heating, cooking, other). Natural gas usage provided to the District by SoCalGas in 2018. Emission factors were from EPA AP-42 Section 1.4 “Natural Gas Combustion” (July 1998). The growth profile is based on the housing units forecast from SCAG.

Farming Operations

The livestock emissions estimates reflect animal population data from the *U.S. Department of Agriculture’s (USDA) 2002 Census of Agriculture* and the Ventura County Agriculture Commissioner. The emissions reflect a no-growth assumption based on an analysis of livestock population trends that found no significant growth. CARB updated non-cattle livestock categories for 2017 using more recent activity data.

Unplanned Fires

Emissions from structural and automobile fires were updated for 2018 by the District. Structural fire emissions estimates are based on the number of structural fires, rates of structural and content material loss per fire, average combustible content, and an emission factor per ton of material burned. Automobile fire emissions are based the number of vehicle fires per year and a composite emission factor from EPA’s AP-42 Section 2.5 “Open Burning”, Table 2.5-1 and Section 2.6 “Automobile Body Incineration”, Table 2.6-1 (October 1992). For the 2010 update, the number of structure and automobile fires was obtained from the California Office of the State Fire Marshall, California All Incident Reporting System/National Fire Incident Reporting System

(CAIRS/NFIRS) database, December 2011. The growth profile assumes there will be no growth in fire emissions.

Managed Burning and Disposal

The managed burning and disposal category is based on emissions data reported by the District for 2018. Emissions are calculated using crop-specific tons burned, fuel loadings and emission factors. Total 2018 tonnage burned for each agricultural debris and weed abatement crop type was obtained from the County of Ventura, Fire Protection District, Bureau of Planning and Fire Prevention, Activated Burn Permit Program. Total 2018 burn data for each range improvement and forest management crop type were obtained from the County of Ventura, Fire Department Wildland Fire and Aviation Division, and the U.S. Forest Service (USFS) for prescribed burning in the Los Padres National Forest.

ARB's managed burn emission factor table was used for all agricultural burn and prescribed burn crop categories, except for forest management crop categories “chaparral (piles)” and “pine”, for which the USFS Fire and Environmental Research Applications (FERA) Team Piled Fuels Biomass and Emissions Calculator and ARB's Emission Estimation System (EES) emission factors were used. The growth profile for agricultural burning and weed abatement is based on ARB’s projection of agricultural harvest acres. A no-growth assumption was used for forest management and range improvement emissions based on analyses of District reported data that don’t show a discernible trend.

Commercial Cooking

Commercial cooking emissions estimates were grown from 2002 estimates provided by the District. The original estimates were developed from the number of restaurants and types of cooking equipment data obtained from the County of Ventura, Resource Management Agency. Process rates were derived using the 1999 Pacific Environmental Services (PES) study, A Detailed Survey of Restaurant Operations in the South Coast Air Basin, Final Report. Emissions were calculated using emission factors from the 1997 South Coast Air Quality Management District Staff Report for the Proposed Rule 1138 ‘Control of Emissions From Restaurant Operations’, and EPA Methods for Developing a National Emission Inventory for Commercial Cooking Processes (2003). The growth profile is based on the SCAG total population forecast.

Point and Areawide Source Emissions Forecasting and Control Rules

Emission forecasts for 2019 and subsequent years are based on growth profiles that in many cases incorporate historical trends up to the base year or beyond. The growth surrogates used to forecast the emissions from these categories were largely based on SCAG data growth factors shown in Table 4-1. The emissions inventory also reflects emission reductions from point and areawide sources subject to District rules and CARB regulations. The rules and regulations reflected in the inventory are listed below in Table A-1.

Table A-1: District and CARB Control Rules and Regulations Included in the Inventory

Agency	Rule/Reg No.	Rule Title	Source Categories Impacted
VEN_APCD	74.11.1	Large Water Heaters and Small Boilers	Fuel combustion / boilers, process heaters, and steam generators
VEN_APCD	74.15.1	Boilers, Steam Generators and Process Heaters (1 to 5 MMBTUs)	Fuel combustion / boilers, process heaters, and steam generators
VEN_APCD	74.22	Natural Gas-Fired, Fan-Type Central Furnaces	Fuel combustion / space heating
VEN_APCD	74.11	Natural Gas-Fired Water Heaters	Fuel combustion / water heaters
VEN_APCD	74.2	Architectural Coatings	Architectural Coatings
VEN_APCD	74.30	Wood Products Coatings	Coatings and related process solvents, Degreasing
VEN_APCD	74.18	Motor Vehicle and Mobile Equipment Coating Operations	Coatings and related process solvents
VEN_APCD	74.20	Adhesives and Sealants	Adhesives and Sealants
VEN_APCD	74.19	Graphic Arts	Printing operations
VEN_APCD	74.24	Marine Coating Operations	Coatings and related process solvents
VEN_APCD	74.6	Surface Cleaning and Degreasing	Surface cleaning and degreasing
VEN_APCD	74.12	Surface Coating of Metal Parts and Products	Coatings and related process solvents, Degreasing
VEN_APCD	74.13	Aerospace Assembly and Component Manufacturing Operations	Coatings and related process solvents, Degreasing

Agency	Rule/Reg No.	Rule Title	Source Categories Impacted
VEN_APCD	74.31	Metalworking Fluids and Direct-Contact Lubricants	Other processes / multi-purpose lubricants
VEN_APCD	74.33	Liquefied Petroleum Gas Transfer or Dispensing	Petroleum marketing
VEN_APCD	74.14	Polyester Resin Material Operations	Chemical / fiberglass manufacturing
VEN_APCD	74.25	Restaurant Cooking Operations	Cooking
VEN_APCD	74.29	Soil Decontamination Operations	Industrial processes / other
ARB	ARCH_SCM	2000 Suggested Control Measures (SCM) for Architectural Coatings	Architectural coatings
ARB	AC_SCM2007	2007 Suggested Control Measures (SCM) for Architectural Coatings	Architectural coatings
ARB	AC_SCM2019	2019 Suggested Control Measure (SCM) for Architectural Coatings	Architectural Coatings
ARB	ARB_R003 & ARB_R003_A	Consumer Product Regulations & Amendments	Consumer products
ARB	ARB_R007	Aerosol Coating Regulations	Consumer products / Aerosol coatings
ARB	GDF_HOSREG	Gasoline Dispensing Facility (GDF) Hose Emission Regulation	Petroleum marketing
ARB	ORVR	Fueling emissions from ORVR vehicles	Petroleum marketing

Agency	Rule/Reg No.	Rule Title	Source Categories Impacted
ARB	AG_IC_ENG	Ag IC Engine Emission Scalers	Agricultural irrigation internal combustion engines
ARB	NONAGICENG	Non-Ag IC Engine Scalers	Non-agricultural internal combustion reciprocating engines

External Adjustments

External adjustments were made in CEPAM to account for additional recent regulatory actions. The external adjustments reflected in the CEPAM2022v1.01 Ventura County SIP inventory are listed below in Table 2.

Table 2: External Adjustment IDs and Descriptions

Adjustment ID	Adjustment Description
HD_I/M	HD I/M Regulation adopted by CARB Dec 2021
NonAg_ICE	Update non-ag internal comb. engines to reflect 2003 ATCM and 2010 rule amend
TRUCK_REGS	Advanced clean trucks Omnibus Low NOx_Opacity ICT_UBUS adjustments

APPENDIX B

VENTURA COUNTY

TRANSPORTATION CONTROL MEASURE COMMITMENT

Introduction

Transportation Control Measures (TCMs) are projects that reduce air pollutants from transportation sources by reducing vehicle use, traffic congestion, or vehicle miles traveled. TCM projects may be voluntary, incentive-based, market-based, or regulatory programs. Projects that use technology to reduce emissions, such as innovations in fuel technologies or low-emission vehicles, are not considered TCMs. Projects to enhance roadway capacity are also not typically TCMs. Project categories listed in Table 3-4 of the 2022 Air Quality Management Plan (AQMP) show examples of measures that are considered TCMs.

The federal Transportation Conformity regulation is a process designed to ensure timely implementation of TCMs, thus reinforcing the link between air quality and transportation planning. The Southern California Association of Governments (SCAG) is responsible for identifying committed TCM projects in Ventura County and assuring their timely implementation and completion as prescribed in the conformity regulation. Projects identified as TCMs become committed when:

1) The United States Environmental Protection Agency (EPA) approves the AQMP as part of the State Implementation Plan (SIP).
2) Projects are financially committed for right-of-way or construction in the first two years of the Federal Transportation Improvement Program (FTIP).
3) The FTIP is approved by SCAG, the California Department of Transportation, and the Federal Highway Administration.

The SCAG FTIP Guidelines provide extensive information about TCMs and TCM commitments.

This appendix includes the current projects in Table B-1 identified by SCAG and the District as the committed TCMs and thus, subject to the timely implementation requirement of transportation conformity. The process for tracking the implementation and completion of these committed TCMs begins with the Ventura County Transportation Commission (VCTC) and their required reporting of all ongoing transportation and transit projects in Ventura County.

If a project sponsor or the VCTC identifies a committed TCM that cannot be completed or must be significantly delayed, then a substitution process is used to substitute a new TCM or enhance another committed TCM to make up for the emissions reduction shortfall. The SCAG Transportation Conformity Working Group is the interagency consultation committee for all regional conformity discussion and guidance, including issues involving TCMs.

TCMs are programmed and updated through the FTIP process. The FTIP is updated by SCAG every two years. All uncompleted TCM projects roll forward and their enforceable commitments are automatically revised without the need for a SIP revision. The completed TCMs are reported as complete and removed from subsequent FTIP updates. Also, new committed TCMs are added to the FTIP, along with the "rollover" committed TCMs, for future timely implementation reports in subsequent FTIP updates.

Table B-1
Ventura County Transportation Control Measure Commitments

Lead Agency	Project ID	Description	2021 FTIP Completion Date
Camarillo	VEN160103	PLEASANT VALLEY ROAD CLASS 2 BIKE LANES PROJECT FROM 5TH STREET TO LAS POSAS ROAD (APPROX 8,700 FEET).	2022
Camarillo	VEN190114	IN CAMARILLO, SPRINGVILLE DRIVE BIKE TRAIL - EXTENS CLASS I BIKE TRAIL FROM LAS POSAS ROAD TO CENTRAL AVENUE APPROXIMATELY 2.2 MILES.	2023
Moorpark	VEN181001	IN MOORPARK, EXPAND NORTH RAIL STATION PARKING BY 30 SPACES.	2021
Oxnard	VEN130101	IN THE NORTHEAST COMMUNITY OF THE CITY OF OXNARD, NORTHEAST OF OXNARD TRANSPORTATION CENTER. INSTALL 1.9 MI CLASS II BIKE LANES, 6.3 MI CLASS III BIKE LANES AND IMPROVEMENTS TO 3.69 MI OF EXISTING BIKE LANES. BICYCLE BOULEVARDS AND PEDESTRIAN IMPROVEMENTS AT RAMONA, CHAVEZ, AND LEMONWOOD ELEMENTARY SCHOOLS, AND BICYCLE AND PEDESTRIAN IMPROVEMENTS ON CLOYNE STREET.	2020
Oxnard	VEN130102	ON C STREET FROM VINEYARD AVE TO CHANNEL ISLANDS BLVD, CONSTRUCT 4.9 MI OF CLASS II BIKE LANES. CONSTRUCT CLASS III BIKE LANES ON GUAVA ST/HEMLOCK AVE AND ALONG HILL ST 12/30/20.	2020
Oxnard	VEN150907	OXNARD BLVD. BICYCLE & PEDESTRIAN FACILITIES FROM 101 FREEWAY TO GONZALES ROAD APPROXIMATELY 14,800 FEET.	2021
Ventura County	VEN190703	IN VENTURA COUNTY, ON POTRERO ROAD CONSTRUCT APPROXIMATELY 3.2 MILES OF CLASS II BIKE LANES FROM HIDDEN VALLEY ROAD TO BRIDGE 231, IN UNINCORPORATED VENTURA COUNTY.	2020
Ventura County	VEN171007	IN VENTURA COUNTY AND THE CITY OF THOUSAND OAKS ON POTRERO ROAD CONSTRUCT 2.8 MILES OF CLASS II BIKE LANES IN THE COUNTY AND 500 FEET IN THE CITY OF THOUSAND OAKS FROM BRIDGE #231 TO .11 MILES EAST OF TRENTWOOD DRIVE.	2020

Lead Agency	Project ID	Description	2021 FTIP Completion Date
Ventura County Transportation Commission	VEN040405	AUTOMATIC VEHICLE LOCATOR SYSTEM UPGRADE FOR REAL-TIME BUS STOP SIGNAGE (ASSOCIATED TRANSIT IMPROVEMENT)	2021
Ventura County Transportation Commission	VEN93017	REGIONAL RIDESHARE PROGRAM FOR 18/19, 19/20, 20/21 AND 21/22. TOLL CREDITS IN THE AMOUNT OF $51 PER YEAR FOR 18/19, 19/20, 20/21, AND 21/22	2025

Source: *Adopted 2021 Federal Transportation Improvement Program Technical Appendix II of III, Table III-5.2*, SCAG.

APPENDIX C

VENTURA COUNTY

KEY CARB MOBILE SOURCE REGULATIONS AND PROGRAMS PROVIDING EMISSION REDUCITONS

I. Key Mobile Source Regulations and Programs Providing Emission Reductions

Given the severity of California's air quality challenges and the need for ongoing emission reductions, the California Air Resources Board (CARB or Board) has implemented the most comprehensive mobile source emissions control program in the nation. CARB's comprehensive program relies on four fundamental approaches:

- Stringent emissions standards that minimize emissions from new vehicles and equipment;
- In-use programs that target the existing fleet and require the use of the cleanest vehicles and emissions control technologies;
- Cleaner fuels that minimize emissions during combustion; and,
- Incentive programs that remove older, dirtier vehicles and equipment and replace those vehicles with the cleanest technologies.

This multi-faceted approach has spurred the development of increasingly cleaner technologies and fuels and achieved significant emission reductions across all mobile source sectors that go far beyond national programs or programs in other states. These efforts extend back to the first mobile source regulations adopted in the 1960s, and pre-date the federal Clean Air Act Amendments (Act) of 1970, which established the basic national framework for controlling air pollution. In recognition of the pioneering nature of CARB's efforts, the Act provides California unique authority to regulate mobile sources more stringently than the federal government by providing a waiver of preemption for its new vehicle emission standards under Section 209(b). This waiver provision preserves a pivotal role for California in the control of emissions from new motor vehicles, recognizing that California serves as a laboratory for setting motor vehicle emission standards. Since then, CARB has consistently sought and obtained waivers and authorizations for its new motor vehicle regulations. CARB's history of progressively strengthening standards as technology advances, coupled with the waiver process requirements, ensures that California's regulations remain the most stringent in the nation.

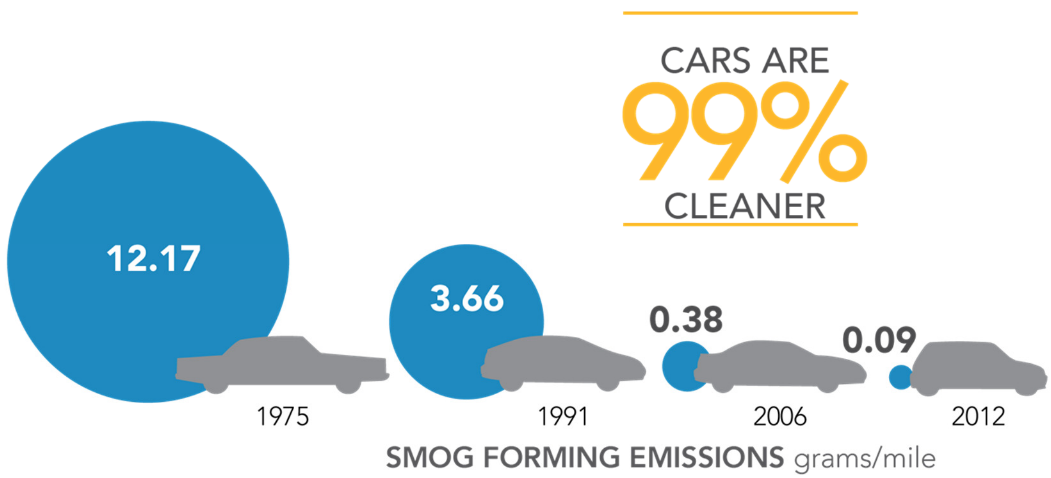
In 1998, CARB identified diesel particulate matter as a toxic air contaminant. Since then, CARB adopted numerous regulations aimed at reducing exposure to diesel particulate matter while concurrently providing reductions in oxides of nitrogen (NOx) from freight transport sources like heavy-duty diesel trucks, transportation sources like passenger cars and buses, and off-road sources like large construction equipment. Phased implementation of these regulations will continue to produce emission reduction benefits through 2037 and beyond, as the regulated fleets are retrofitted, and as older and dirtier portions of the fleets are replaced with newer and cleaner models at an accelerated pace.

Further, CARB and District staff work closely on identifying and distributing incentive funds to accelerate cleanup of vehicles and engines. Key incentive programs include: Low Carbon Transportation, Air Quality Improvement Program, VW Mitigation Trust, Community Air Protection, Carl Moyer Program, Goods Movement Program, Clean Off-Road Equipment (CORE) and Funding Agricultural Replacement Measures for Emission Reductions (FARMER). These incentive-based programs work in tandem with regulations to accelerate deployment of cleaner technology.

A. Light-Duty Vehicles

Figure 1 illustrates the trend in CARB smog forming emission standards for light-duty vehicles. Cars are 99 percent cleaner than they were in 1975 due to CARB's longstanding light-duty mobile source program. Since setting the nation's first motor vehicle exhaust emission standards in 1966 that led to the first pollution controls, California has dramatically tightened emission standards for light-duty vehicles. In 1970, CARB required auto manufacturers to meet the first standards to control NOx emissions along with hydrocarbon emissions. The simultaneous control of emissions from motor vehicles and fuels led to the use of cleaner-burning reformulated gasoline (RFG) that has removed the emissions equivalent of 3.5 million vehicles from California's roads. Since CARB first adopted it in 1990, the Low Emission Vehicle Program (LEV and LEV II) and Zero-Emission Vehicle (ZEV) Program have resulted in the production and sales of hundreds of thousands of zero-emission vehicles (ZEVs) in California.

Figure 1: Light-Duty Emission Standards



As a result of these efforts, light-duty vehicle emissions in Ventura County have been reduced significantly since 1990 and will continue to go down through 2026. From today, light-duty vehicle NOx emissions are projected to decrease by over 55 percent in 2026. Key light-duty programs include Advanced Clean Cars (ACC), On-Board Diagnostics, Reformulated Gasoline, Incentive Programs, and the Enhanced Smog Check Program.

1. Advanced Clean Cars

CARB's groundbreaking ACC program is now providing the next generation of emission reductions in California and ushering in a new zero emission passenger transportation system. The success of this program is evident: California is the world's largest market for Zero Emission Vehicles (ZEVs), with over 87 models available today, including battery-electric, plug-in hybrid electric, and fuel cell electric vehicles. A wide variety are now available at lower price points, attracting new consumers. As of February 2022, Californians, who drive only 10 percent of the nation's cars, now account for over 40 percent of all zero-emission cars in the country. The U.S. makes up about half of the world market. This movement towards commercialization of advanced clean cars has occurred due to CARB's ZEV requirements, part of ACC, which affects passenger cars and light-duty trucks.

CARB's ACC Program, approved in January 2012, is a pioneering approach of a 'package' of regulations that - although separate in construction - are related in terms of the synergy developed to address both ambient air quality needs and climate change. The ACC program combines the control of smog, soot causing pollutants and greenhouse gas (GHG) emissions into a single coordinated package of requirements for model years 2015 through 2025. The program assures the development of environmentally superior cars that will continue to deliver the performance**,** utility, and safety vehicle owners have come to expect.

The ACC Program also included amendments affecting the current ZEV requirements through the 2017 model year in order to enable manufacturers to successfully meet 2018 and subsequent model year requirements. These ZEV amendments are intended to achieve commercialization through simplifying the regulation and pushing technology to higher volume production in order to achieve cost reductions. The ACC Program will continue to achieve benefits into the future as new cleaner cars enter the fleet and displace older and dirtier vehicles.

Going beyond these regulations, California will be transitioning to zero emissions. In support of California's transition to zero-emission vehicles, in 2020, Governor Newsom signed Executive Order N-79-20[1] which established a goal that 100 percent of California sales of new passenger cars and trucks be zero-emission by 2035. Advanced Clean Cars II (ACC II), a measure in the 2016 State SIP Strategy, is a significant effort critical to meeting air quality standards and was recently adopted by the CARB Board in August. ACC II is consistent with the Governor Newson's Executive Order and has the goal of cutting emissions from new combustion vehicles while taking all new vehicle sales to 100 percent zero-emission no later than 2035.

With this order and many other recent actions, Governor Newsom has recognized that air pollution remains a challenge for California that requires bold action. Zero-emission vehicle commercialization in the light-duty sector is well underway. Longer-range battery electric vehicles are coming to market that are cost-competitive with gasoline fueled vehicles and hydrogen fuel cell vehicles are now also seeing significant sales. Autonomous and connected vehicle technologies are being installed on an increasing number of new car models. A growing network of retail hydrogen stations is now available, along with a rapidly growing battery charger network.

2. On Board Diagnostics (OBD)

OBD systems serve an important role in helping to ensure that engines and vehicles maintain low emissions throughout their full life. OBD systems are designed to identify when a vehicle's emission control systems or other emission-related computer-controlled components are malfunctioning, causing emissions to be elevated above the vehicle manufacturer's specifications.

[1] Executive Order N-79-20 https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf

Many states currently use the OBD system as the basis for passing and failing vehicles in their inspection and maintenance programs, as is exemplified by California's Smog Check program.

California's first OBD regulation required manufacturers to monitor some of the emission control components on vehicles starting with the 1988 model year. In 1989, CARB adopted OBD II, which required 1996 and subsequent model year passenger cars, light duty trucks, and medium duty vehicles and engines to be equipped with second generation OBD systems. The Board has modified the OBD II regulation in regular updates since initial adoption to address manufacturers' implementation concerns and, where needed, to strengthen specific monitoring requirements. Most recently, the Board amended the regulation in 2021 to require manufacturers to implement Unified Diagnostic Services (UDS) for OBD communications, which will provide more information related to emissions-related malfunctions that are detected by OBD systems, improve the usefulness of the generic scan tool to repair vehicles, and provide needed information on in-use monitoring performance. UDS implementation would be required for all 2027 and subsequent model year light- and medium-duty vehicles and engines, as well as some heavy-duty vehicles and engines.

3. California Enhanced Smog Check Program

The Bureau of Automotive Repair (BAR) is the State agency charged with administration and implementation of the Smog Check Program. The Smog Check Program is designed to reduce air pollution from California registered vehicles by requiring periodic inspections for emission-control system problems, and by requiring repairs for any problems found. In 1998, the Enhanced Smog Check program began in which Smog Check stations relied on the BAR-97 Emissions Inspection System (EIS) to test tailpipe emissions with either a Two-Speed Idle (TSI) or Acceleration Simulation Mode (ASM) test depending on where the vehicle was registered. For instance, vehicles registered in urbanized areas received an ASM test, while vehicles in rural areas received a TSI test.

In 2009, the following requirements were added in to improve and enhance the Smog Check Program, making it more inclusive of motor vehicles and effective on smog reductions:

- Low pressure evaporative test;
- More stringent pass/fail cutpoints;
- Visible smoke test; and
- Inspection of light- and medium-duty diesel vehicles.

The next major change in the Program was due to AB 2289, adopted in October 2010, a new law restructuring California's Smog Check Program, streamlining and strengthening inspections, increasing penalties for misconduct, and reducing costs to motorists. This new law, supported by CARB and BAR, promised faster and less expensive Smog Check inspections by talking advantage of the second generation of OBD software installed on all vehicles. The new law also directs vehicles without this equipment to high-performing stations, helping to ensure that these cars comply with current emission standards. This program will reduce consumer costs by having stations take advantage of diagnostic software that monitors pollution-reduction components and tailpipe emissions. Beginning mid-2013, testing of passenger vehicles using OBD was required on all vehicles model years 2000 or newer.

4. Reformulated Gasoline (CaRFG)

Since 1992, CARB has been regulating the formulation of gasoline through the California Reformulated Gasoline program (CaRFG). The CaRFG program has been implemented in three phases and has resulted in California gasoline being the cleanest in the world. California's cleaner-burning gasoline regulation is one of the cornerstones of the State's efforts to reduce air pollution and cancer risk. Reformulated gasoline is fuel that meets specifications and requirements established by CARB, which reduced motor vehicle toxics by about 40 percent and reactive organic gases by about 15 percent. The results from cleaning up fuel can have an immediate impact as soon as it is sold in the State. Vehicle manufacturers design low-emission emission vehicles to take full advantage of cleaner-burning gasoline properties.

5. Incentive Programs

There are many different incentive programs focusing on light-duty vehicles that produce extra emission reductions beyond traditional regulations. Incentive programs encourage both the early retirement of dirty, older cars and the purchase of newer, lower-emitting vehicle engines and technologies. Several State and local incentive funding pools have been used historically -- and remain available -- to fund the accelerated turnover of on-road heavy-duty vehicles.

The State, in partnership with the local air districts, has a well-established history of using incentive programs to advance technology development and deployment, and to achieve early emission reductions. Since 1998, CARB and California's local air districts have been administering incentive funding to accelerate the deployment and turnover to cleaner vehicles, starting with the Moyer Program. In recognition of the key role that incentives play in complementing State and local air quality regulations to reduce emissions, the scope and scale of California's air quality incentive programs has since greatly expanded. Each of CARB's incentive programs has its own statutory requirements, goals, and categories of eligible projects that collectively provide for a diverse and complex incentives portfolio. CARB uses this portfolio approach to incentives to accelerate development and early commercial deployment of the cleanest mobile source technologies and to improve access to clean transportation.

The Fiscal Year (FY) 2021-22 State Budget included an unprecedented level of investment in ZEVs, with $2.3 billion allocated for CARB over the next three years, specifically dedicated to incentive-based turnover of mobile source vehicles and equipment, as part of a $3.9 billion comprehensive, multi-agency package to accelerate progress toward the State's zero-emission vehicle goals established under Executive Order N-79-20. With the 2022-23 State Budget, Governor Newsom is further reinforcing California's commitment to transitioning away from combustion vehicles with an additional $6.1 billion in ZEV investments over the next 5 years.

a) Low Carbon Transportation Investments and Air Quality Improvement Program (Clean Transportation Incentives)

California's Low Carbon Transportation Investments and the Air Quality Improvement Program form CARB's major incentive funding program, which works in concert with the State's larger portfolio of clean transportation investments. Together, the Low Carbon Transportation

Investments and Air Quality Improvement Program are known as the Clean Transportation Incentives program; they provide mobile source incentives to reduce greenhouse gas, criteria pollutant, and toxic air contaminant emissions through the deployment of advanced technology and clean transportation in the light-duty and heavy-duty sectors.

The Clean Transportation Incentives Program is part of California Climate Investments and is designed to accelerate the transition to advanced technology low carbon freight and passenger transportation, with a priority on providing health and economic benefits to California's most disadvantaged communities, and with a focus on increasing deployment of zero-emission vehicles and equipment wherever possible. Low Carbon Transportation Investments are supported by California's Cap-and-Trade auction proceeds. The Air Quality Improvement Program (AQIP) is a mobile source incentive program that focuses on reducing criteria pollutant and diesel particulate emissions with concurrent GHG reductions. AQIP is appropriated from the Air Quality Improvement Fund.

Each year, the legislature appropriates funding to CARB for the Low Carbon Transportation Investments and Air Quality Improvement Programs, and allocations are used to fund multiple programs in the passenger vehicle, on-road heavy-duty, and off-road vehicle sectors, including: the Clean Vehicle Rebate Project (CVRP); Enhanced Fleet Modernization Program and Plus-Up Pilot Project (Clean Cars 4 All); and the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP).

i. Clean Vehicle Rebate Program (CVRP)

As one of the programs funded through the Clean Transportation Incentives program, CVRP is a vehicle purchasing incentives program that provides consumer rebates to reduce the price for new ZEV purchases and is designed to offer vehicle rebates on a first-come, first-serve basis for light-duty ZEVs, plug-in hybrid electric vehicles, and zero-emission motorcycles. In FY 2021-22, CVRP was allocated $525 million.

ii. Clean Cars 4 All (CC4A)

Clean Cars 4 All (formerly known as the Enhanced Fleet Modernization Program Plus-Up Pilot Project) is another Clean Transportation Incentives program for passenger vehicles. Clean Cars 4 All provides incentives for lower-income consumers living in and near disadvantaged communities who scrap their old vehicles and purchase new or used hybrid, plug-in hybrid, or zero-emission vehicle replacement vehicles. The budget for FY 2021-22 included $75 million for the statewide expansion of CC4A.

iii. Other Clean Transportation Equity Investments

CARB also funds a suite of transportation equity pilot projects aimed at increasing access to clean transportation and mobility options for priority populations in disadvantaged and low-income communities, and for lower-income households. This includes clean vehicle ownership projects, clean mobility options, streamlining access to funding and financing opportunities, and increasing community outreach, education and exposure to clean technologies. Clean Transportation Equity pilot projects exemplify the importance of understanding the unique needs across communities and provide lessons for how we most directly address barriers to collectively achieve our equity, air quality, and climate goals. Major Clean Transportation Equity Investment programs include:

Clean Mobility Options, Clean Mobility in Schools, Financing Assistance; and Sustainable Transportation Equity Project (STEP). Clean Transportation Equity Investment projects were allocated $150 million in the FY 2021-22 budget, which includes the $75 million for CC4A mentioned above.

Financing Assistance provides eligible consumers buy-down and financing opportunities to purchase or lease a new or used clean vehicle, such as a conventional hybrid electric vehicle (HEV), plug-in hybrid (PHEV), or battery electric vehicle (BEV). Clean Mobility in Schools Projects are located within disadvantaged communities and are intended to encourage and accelerate the deployment of new zero-emission school buses, school fleet vehicles, passenger cars, lawn and garden equipment, and can incorporate alternative modes of transportation like transit vouchers, active transportation elements, and bicycle share programs. In the light-duty sector, some of the Clean Mobility Options programs that CARB funds include the Clean Mobility Options Voucher Pilot Program (CMO). CMO provides voucher-based funding for low-income, tribal, and disadvantaged communities to fund zero-emission shared and on-demand services such as carsharing, ridesharing, bike sharing, and innovative transit services. STEP is a new transportation equity pilot program that funds zero-emission carsharing, bike sharing, public transit and shared mobility subsidies, among other projects.

b) Moyer Program

The Carl Moyer Memorial Air Quality Standards Attainment Program (Moyer Program), funded by dedicated revenue from the DMV's smog abatement fee and a fee on the purchase of new tires, provides approximately $60 million in grant funding annually through local air districts for cleaner-than-required engines and equipment. Since 1998, approximately $1 billion has been allocated to date. In the light-duty sector, the Moyer Program encourages voluntarily retirement of older, more polluting passenger vehicles through a Voluntary Accelerated Vehicle Retirement Program (VAVR), which is a car scrappage or old vehicle buy-back program that encourages the accelerated removal of higher-polluting vehicles that have passed their biennial Smog Check Test inspection, to be replaced with newer, cleaner vehicles or alternative transportation options.

c) Consumer Assistance Program

California's voluntary vehicle retirement program, the Consumer Assistance Program (CAP), is administered by BAR and provides low-income consumers repair assistance including up to $1,200 in emissions-related repairs if their vehicle fails its biennial Smog Check Test inspection, and/or up to $1,500 per vehicle for retiring operational vehicles at BAR-contracted dismantler sites.

B. Medium- and Heavy-Duty On-Road Trucks

Due to the benefits of CARB's longstanding heavy-duty mobile source program, heavy-duty on-road vehicle emissions in Ventura County have been reduced significantly since 1990 and will continue to decrease through 2026. From today, medium- and heavy-duty NOx emissions are projected to decrease by over 61 percent in 2026. Key programs contributing to those reductions include new heavy-duty engine standards, cleaner diesel fuel requirements, California's Truck and Bus Regulation and incentive programs.

1. Heavy-Duty Engine Standards

Since 1990, heavy-duty engine NOx emission standards have become dramatically more stringent, dropping from 6 grams per brake horsepower-hour (g/bhp-hr) in 1990 down to the current 0.2 g/bhp-hr standard, which took effect in 2010. In addition to mandatory NOx standards, there have been several generations of optional lower NOx standards put in place over the past 15 years. Most recently in 2015, engine manufacturers were allowed to certify to three optional NOx emission standards of 0.1g/bhp-hr, 0.05 g/bhp-hr, and 0.02 g/bhp-hr (i.e., 50 percent, 75 percent, and 90 percent lower than the current mandatory standard of 0.2 g/bhp-hr). The optional standards allow local air districts and CARB to preferentially provide incentive funding to buyers of cleaner trucks, and to encourage the development of cleaner engines.

2. Optional Low-NOx Standards for Heavy-Duty Diesel Engines

In 2013, California established optional low-NOx standards for heavy-duty diesel engines (Optional Reduced Emissions Standards for Heavy-Duty Engines regulation), with the most aggressive standard being 0.02 g/bhp-hr, 90 percent below the federally required standard. The optional low-NOx standards were developed to pave the way for more stringent mandatory standards by encouraging manufacturers to develop and certify low-NOx engines and incentivizing potential customers to purchase these low-NOx engines. By 2019, a total of fifteen engines families, some using natural gas and others using liquefied petroleum gas, had been certified to the optional low-NOx standards.

3. Heavy-Duty Engine and Vehicle Omnibus Regulation

In 2021, CARB comprehensively overhauled how NOx emissions from new heavy-duty engines are regulated in California through the adoption of the Heavy-Duty Engine and Vehicle Omnibus Regulation which reduces NOx emissions from the engines in medium- and heavy-duty vehicle classes. The Omnibus Regulation includes NOx certification emission standards and in-use standards that significantly reduce tailpipe NOx emissions during most vehicle operating modes such as high-speed steady-state, transient, low load urban driving, and idling modes of operation. Additionally, revisions to the emissions warranty, useful life, emissions warranty and reporting information and corrective action procedures, and durability demonstration procedures provide additional emission benefits by encouraging more timely repairs to emission-related malfunctions and encouraging manufacturers to produce more durable emission control components, thereby reducing the rate at which engine emission controls fail and emissions increase.

4. Cleaner In-Use Heavy-Duty Trucks (Truck and Bus Regulation)

California's Truck and Bus Regulation or In-Use Heavy-Duty Truck Rule was first adopted in December 2008. This rule represents a multi-year effort to turn over the legacy fleet of heavy-duty on-road engines and replace them with the cleanest technology available. In December 2010, CARB revised specific provisions of the In-Use Heavy-duty Truck Rule, in recognition of the deep economic effects of the recession on businesses and the corresponding decline in emissions.

Starting in 2012, the Truck and Bus Regulation phases in requirements applicable to an increasingly larger percentage of California's truck and bus fleet over time, so that by 2023 nearly all older vehicles will be upgraded to have exhaust emissions meeting 2010 model year engine emissions levels. The regulation applies to nearly all diesel-fueled trucks and buses with a gross vehicle weight rating (GVWR) greater than 14,000 pounds that are privately or federally owned, including on-road and off-road agricultural yard goat trucks, and privately and publicly owned school buses. Moreover, the regulation applies to any person, business, school district, or federal government agency that owns, operates, leases or rents affected vehicles. The regulation also establishes requirements for any in-State or out-of-state motor carrier, California-based broker, or any California resident who directs or dispatches vehicles subject to the regulation. Finally, California sellers of a vehicle subject to the regulation would have to disclose the regulation's potential applicability to buyers of the vehicles. Approximately 170,000 businesses in nearly all industry sectors in California, and almost a million vehicles that operate on California roads each year are affected. Some common industry sectors that operate vehicles subject to the regulation include: for-hire transportation, construction, manufacturing, retail and wholesale trade, vehicle leasing and rental, bus lines, and agriculture.

In 2017, California passed legislation ensuring compliance with the Truck and Bus Regulation through the California Department of Motor Vehicles (DMV) vehicle registration program. Starting January 1, 2020, DMV verifies compliance to ensure that vehicles subject to the Truck and Bus Regulation meet the requirements prior to obtaining DMV vehicle registration. The law requires the DMV to deny registration for any vehicle that is non-compliant or has not reported to CARB as compliant or exempt from the Truck and Bus Regulation.

CARB compliance assistance and outreach activities that are key in support of the Truck and Bus Regulation include:

- The Truck Regulations Upload and Compliance Reporting System (TRUCRS), an online reporting tool developed and maintained by CARB staff;
- The Truck and Bus regulation's fleet calculator, a tool designed to assist fleet owners in evaluating various compliance strategies;
- Targeted training sessions all over the State; and
- Out-of-state training sessions conducted by a contractor.

CARB staff also develops regulatory assistance tools, conducts and coordinates compliance assistance and outreach activities, administers incentive programs, and actively enforces the entire suite of regulations. Accordingly, CARB's approach to ensuring compliance is based on a comprehensive outreach and education effort.

5. Heavy-Duty Inspection and Maintenance Regulation

To ensure heavy-duty trucks remain clean in-use, CARB adopted in 2021 the Heavy-Duty Inspection and Maintenance Regulation, which requires periodic demonstrations that vehicles' emissions control systems are properly functioning in order to legally operate within the State. This regulation is designed to achieve criteria emissions reductions by ensuring that malfunctioning emissions control systems are repaired in a timely fashion.

6. Heavy-Duty On-Board Diagnostics (HD OBD)

OBD systems serve an important role in helping to ensure that engines and vehicles maintain low emissions throughout their full life. OBD systems monitor virtually all emission controls on gasoline and diesel engines, including catalysts, particulate matter (PM) filters, exhaust gas recirculation systems, oxygen sensors, evaporative systems, fuel systems, and electronic powertrain components as well as other components and systems that can affect emissions when malfunctioning. The systems also provide specific diagnostic information in a standardized format through a standardized serial data link on-board the vehicles. The use and operation of OBD systems ensure reductions of in-use motor vehicle and motor vehicle engine emissions through improvements in emission system durability and performance.

The CARB originally adopted comprehensive Heavy-Duty OBD regulations in 2005 for model year 2010 and subsequent heavy-duty engines and vehicles, referred to as HD OBD. In 2009, the Board updated the HD OBD regulation, adopted specific enforcement requirements, and aligned the HD OBD with OBD requirements for medium-duty vehicles. In 2021, CARB again amended the HD OBD regulation; the 2021 amendments require manufacturers to implement Unified Diagnostic Services for OBD communications, which will provide more information related to emissions-related malfunctions that are detected by OBD systems, improve the usefulness of the generic scan tool to repair vehicles, and provide needed information on in-use monitoring performance.

7. Clean Diesel Fuel

Since 1993, CARB has required that diesel fuel have a limit on the aromatic hydrocarbon content and sulfur content of the fuel. Diesel powered vehicles account for a disproportionate amount of diesel particulate matter, which is considered a toxic air contaminant in California. In 2006, CARB required a low-sulfur diesel fuel to be used not only by on-road diesel vehicles but also for off-road engines. The diesel fuel regulation allows alternative diesel formulations as long as emission reductions are equivalent to the CARB formulation.

8. Advanced Clean Truck Regulation (ACT)

In June 2020, CARB adopted the Advanced Clean Trucks regulation, a first of its kind regulation requiring medium- and heavy-duty manufacturers to produce ZEVs as an increasing portion of their sales beginning in 2024. The Advanced Clean Trucks regulation is a manufacturers ZEV sales requirement and a one-time reporting requirement for large entities and fleets. This regulation is expected to result in roughly 100,000 heavy-duty ZEVs operating on California’s roads by 2030 and nearly 300,000 heavy-duty ZEVs by 2035. With the adoption of the Advanced Clean Trucks regulation, CARB Resolution 20-19 directs staff to return to the Board with a zero-emission fleet rule and sets the following targets for transitioning California’s heavy-duty vehicle sectors to ZEVs:

- 100 percent zero-emission drayage, last mile delivery, and government fleets by 2035;
- 100 percent zero-emission refuse trucks and local buses by 2040;
- 100 percent zero-emission-capable vehicles in utility fleets by 2040; and
- 100 percent zero-emission everywhere else, where feasible, by 2045.

As mentioned earlier, the Governor signed Executive Order N-79-20 in September 2020, which directs CARB to adopt regulations to transition the State's transportation fleet to ZEVs. This includes transitioning the State's drayage fleet to ZEVs by 2035 and transitioning the State's truck and bus fleet to ZEVs by 2045 where feasible.

9. Innovative Clean Transit (ICT) and Zero-Emission Airport Shuttle Regulation

To achieve the needed emission reductions from heavy-duty applications, CARB is driving the use of zero-emission heavy-duty vehicles in strategic applications, including urban transit buses and airport ground transportation. The Innovative Clean Transit regulation was the first of these programs. It was adopted in December 2018 and requires all public transit agencies to gradually transition to a 100 percent zero-emission bus fleet and encourages them to provide innovative first- and last-mile connectivity and improved mobility for transit riders. Beginning in 2029, 100 percent of new purchases by transit agencies must be Zero Emission Buses, with a goal for full transition by 2040. It applies to all transit agencies that own, operate, or lease buses in California with a GVWR greater than 14,000 lbs. It includes standard, articulated, over-the-road, double-decker, and cutaway buses.

The Zero-Emission Airport Shuttle Regulation, adopted in June 2019, requires airport shuttle operators in California to transition to 100 percent ZEV technologies. Airport shuttle operators must begin adding zero-emission shuttles to their fleets in 2027 and complete the transition to ZEVs by the end of 2035. The regulation applies to airport shuttle operators who own, operate, or lease vehicles at any of the 13 California airports regulated under this rule.

10. Incentive Programs

There are many different incentive programs focusing on heavy-duty vehicles that accelerate turnover to cleaner technologies, and thereby produce extra emission reductions beyond traditional regulations. Several State and local incentive funding pools have been used historically -- and remain available -- to fund the accelerated turnover of on-road heavy-duty vehicles.

a) Low Carbon Transportation Investments and Air Quality Improvement Program (Clean Transportation Incentives)

In addition to funding passenger vehicle incentive programs, the Low Carbon Transportation Investments and the Air Quality Improvement Program (Clean Transportation Incentives) also provides incentive funding for heavy-duty vehicles. This program both funds projects to accelerate fleet and engine turnover to cleaner existing technologies through the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP) and Truck Loan Assistance program, as well as funding demonstration and pilot projects.

Beyond the vehicle purchasing incentives programs (CVRP and Clean Cars 4 All) and Clean Transportation Equity Investments, an additional $873 million was allocated in the FY 2020-2021 budget for on-road heavy-duty trucks and off-road equipment. CARB provides these incentive funds following the principles of the portfolio approach, meaning that funding is provided across multiple sectors and applications – as well as across multiple technologies to support both the technologies that are providing emission reductions today, as well as those that are needed to meet future goals as the technology matures. This includes funding for demonstration and pilot projects, vouchers for advanced clean technologies, and financing and support for small fleets transitioning to cleaner technologies. Additionally, this year funding was set aside specifically for drayage trucks, transit buses, and school buses, all of which are primed to rapidly transition to zero-emission.

i. Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP)

CARB's Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP) serves as the cornerstone program in CARB's advanced technology heavy-duty incentive portfolio. HVIP has provided funding since 2010 to support the long-term transition to cleaner combustion and zero-emission vehicles in the heavy-duty market. The program helps offset the higher costs of clean vehicles, and additional incentives are available for providing disadvantaged community benefits. HVIP responds to a key market challenge by making clean vehicles more affordable for fleets through point-of-purchase price reductions. With an HVIP voucher, technology-leading vehicles can be as affordable as their traditional fossil-fueled counterparts, enabling fleets of all sizes to deploy advanced technologies that are cleaner and quieter. HVIP is the earliest model in the United States to demonstrate the function, flexibility, and effectiveness of first-come first-served incentives that reduce the incremental cost of commercial vehicles. HVIP is fleet-focused, providing a streamlined and user-friendly option to encourage purchases and leases of advanced clean trucks and buses throughout California. Approved dealers are a key part of HVIP success and are trained to facilitate the application process**.** Vocations include freight and drayage trucks, delivery vans, utility vehicles, transit, school, and shuttle buses, refuse trucks, and more. In FY 2021-22, the Legislature allocated $569.5 million for HVIP.

ii. Truck Loan Assistance Program

CARB's Truck Loan Assistance Program was created through a one-time appropriation of approximately $35 million in the 2008 State Budget to implement a heavy-duty loan program that assists on-road fleets affected by the Truck and Bus Regulation and the Heavy-Duty Tractor-Trailer Greenhouse Gas Regulation. CARB has continued to operate this program with subsequently appropriated AQIP funds of around $28 million annually to provide financing opportunities to small-business truckers who don't meet conventional lending criteria and are unable to qualify for traditional financing for cleaner trucks. As of February 2022, about $187 million in Truck Loan Assistance Program funding has been provided to small business truckers for the purchase of approximately 36,000 cleaner trucks, exhaust retrofits, and trailers. In FY 2021-22, $28.6 million was allocated for the Truck Loan Assistance Program.

iii. Demonstration and Pilot projects

In addition to funding HVIP and the Truck Loan Assistance Program, the Clean Transportation Incentives program is the only program in CARB's portfolio, and one of the only programs in the State, that funds demonstration and pilot projects to support early market deployment of nascent zero-emission technologies. The purpose of the Advanced Technology Demonstration and Pilot Projects is to help accelerate the next generation of advanced technology vehicles, equipment, or emission controls, which are not yet commercialized. As such, it provides a testing ground for innovative projects focused on improving access to clean transportation for priority communities.

In FY 2021-22, $80 million was allocated for heavy-duty advanced technology demonstration and pilot projects, which are intended to help bring to market-readiness zero emission (ZE) heavy-duty technologies that are poised to deploy commercially in the near future in both on- and off-road applications. This includes zero-emission long-haul trucks, strategic truck range extenders, and ZE applications along freight facilities/corridors.

In heavy-duty applications, the goods movement sector is a focus for incentive funding, with CARB funding multiple demonstration and pilot programs to drive zero-emission technologies in last mile delivery trucks, drayage trucks, and heavy-duty trucks and tractors. The *USPS Zero-Emission Delivery Truck Pilot Commercial Deployment Project* is deploying battery electric last-mile delivery trucks in the USPS fleet, together with the associated charging infrastructure. The project will demonstrate the practicality and economic viability of the widespread adoption of a variety of ZE medium- and heavy-duty vehicle technologies in delivery applications. The *Battery Electric Drayage Truck Demonstration* project is a $40 million Statewide demonstration of forty-four zero-emission battery electric and plug-in hybrid drayage trucks that, since 2018, have been in operation serving major California ports in five air districts (South Coast, Bay Area, San Joaquin Valley, Sacramento, and San Diego). Battery electric drayage trucks are used to transport cargo to or from California's ports and intermodal rail yards. Installation of charging infrastructure that enables safe charging of the trucks for statewide demonstration is also included as part of this project. To accelerate the deployment of zero-emission technologies in heavier freight applications, the $44.8 million *Volvo Low Impact Green Heavy Transportation Solutions* project is funding Class 8 heavy-duty battery electric trucks equipped with battery electric tractors to facilitate creation of a zero-emission goods movement system from the Ports of Long Beach and Los Angeles to four freight handling facilities in disadvantaged communities.

Clean transportation incentives have also funded demonstration and pilot projects for ZE urban transit buses. The $22.3 million *Fuel Cell Electric Bus Commercialization Consortium* in the Bay Area and Southern California is funding battery and fuel cell urban transit buses, which will better serve communities' transit needs, substantially reduce greenhouse gas emissions, eliminate criteria pollutants, and provide economic benefits.

iv. Clean Transportation Equity Investments

As mentioned earlier, Clean Mobility in Schools Projects are also encouraging and accelerating the deployment of new zero-emission heavy-duty engines and vehicles, including battery electric school buses and clean school fleet vehicles.

b) Moyer Program

In addition to funding passenger vehicle incentive programs, the Moyer Program provides monetary grants to private companies and public agencies to clean up their heavy-duty engines beyond that required by law through retrofitting, repowering or replacing their engines with newer and cleaner ones. These grants are issued locally by air districts. Projects that reduce emissions from heavy-duty on-road engines qualify, including heavy-duty trucks, drayage trucks, emergency vehicles, public agency and utility vehicles, school buses, solid waste collection vehicles, and transit fleet vehicles.

As the regulatory, technological and incentives landscape has changed significantly since the creation of the Moyer Program and to address evolving needs, the Legislature has periodically modified the program to better serve California. Most recently, Senate Bill (SB) 513 (Beall, 2015) has provided new opportunities for the Moyer Program to contribute significant emission reductions alongside implemented regulations, advance zero and near-zero technologies, and combine program funds with those of other incentive programs.

In the FY 2021-22 budget, the Legislature appropriated an additional $45 million in Moyer Program funding to support the replacement of diesel trucks with ultra-low NOx trucks certified to meet the 0.02 g/bhp-hr NOx standard or lower. Currently, only the South Coast Air Quality Management District and the San Joaquin Valley Air Pollution Control District would be eligible for these funds. In November 2021, the Board approved increases to the Moyer Program cost-effectiveness limits and funding caps for optional advanced technology and zero-emission replacement projects for on-road heavy-duty trucks. Increasing the cost-effectiveness thresholds is designed to increase funding opportunities and ensures that the Moyer Program continues to focus on developing the most advanced zero-emission and low emission technologies, consistent with encouraging further emissions reductions. These changes included increasing the threshold for on-road zero-emission vehicles, which includes zero-emission school buses, from $100,000 to $500,000 per unit.

The Moyer Program also funds CARB's On-Road Heavy-Duty Voucher Incentive Program (VIP), which provides funding opportunities for small fleet owners with 10 or fewer vehicles to quickly replace their older heavy-duty diesel or alternative fuel vehicles. Under this program, fleet owners may be eligible for funding of up to $410,000 for replacing their existing vehicle(s) to be scrapped and replaced by new trucks (zero-emission or certified to the optional 0.02 g/bhp-hr NOx standard), or up to $50,000 for replacing their existing fleet with used vehicles with 2013 model year or later engines. Air districts have the discretion to set certain local eligibility requirements based upon local priorities.

c) Goods Movement Emission Reduction Program (Prop 1B)

The Prop 1B Program was created to reduce exposure for populations living near freight corridors and facilities that were being adversely impacted by emissions from goods movement. This program provided incentives to owners of equipment used in freight movement to upgrade to cleaner technologies sooner than required by law or regulation. Voters approved $1 billion in total funding for the air quality element of the Prop 1B Program to complement $2 billion in freight infrastructure funding under the same ballot initiative.

Beginning in 2008, the Goods Movement Emission Reduction Program funded by Prop 1B has funded cleaner trucks for the region's transportation corridors; the final increment of funds implemented projects through 2020. The $1 billion program was a partnership between CARB and local agencies, air districts, and seaports to quickly reduce air pollution emissions and health risk from freight movement along California's trade corridors. While all Prop 1B Program funds have been awarded to the local air districts for implementation, the program framework exists to serve as a mechanism to award clean truck funds through newer funding programs.

d) Volkswagen (VW) Mitigation Trust

In 2015, after a CARB-led investigation, in concert with the United States Environmental Protection Agency (U.S. EPA), VW admitted to deliberately installing emission defeat devices on nearly 600,000 VW, Audi, and Porsche diesel vehicles sold in the United States, approximately 85,000 of which were sold in California. The VW California settlement agreement includes both a Mitigation Trust to mitigate the excess NOx emissions caused by the company's use of illegal defeat devices in their vehicles, as well as a ZEV Investment Commitment to help grow the State's expanding ZEV program. The Mitigation Trust includes approximately $423 million for California to be used as specified in the settlement agreement. Per the Beneficiary Mitigation Plan approved by CARB in 2018, this funding will be used to replace older heavy-duty trucks, buses, and freight vehicles and equipment with cleaner models, with a focus on zero-emission technologies where available and cleaner combustion everywhere else, as well as to fund light-duty ZEV infrastructure. In addition, there have been mitigation funds established as the result of other settlements from which funding is used to support clean technologies.

e) Community Air Protection Incentives (AB 617 | Community Air Protection Program)

Since the 2016 State SIP Strategy elucidated the need for additional legislative assistance in funding turnover programs to accelerate the deployment and adoption of cleaner technologies, the Legislature has since 2017 established a number of new incentive programs that are implemented through CARB through various budget bills. The State Legislature has provided substantial funding to achieve early emissions reductions in the communities most impacted by air pollution. In its 2018 funding allocation, the Legislature expanded the possible uses of AB 617 funds to include Moyer and Proposition 1B eligible projects with a priority on zero-emission projects, zero-emission charging infrastructure, stationary source projects, and additional projects consistent with the CERPs.

CARB and air districts partner to run the programs, with CARB developing guidelines and the districts administering funds for their regions. In most cases throughout the State, selected communities have identified mobile source emissions as a target for reductions. It is likely that a significant portion of the AB 617-allocated funding will incentivize the accelerated turnover to cleaner vehicles and equipment in and around low-income and disadvantaged communities.

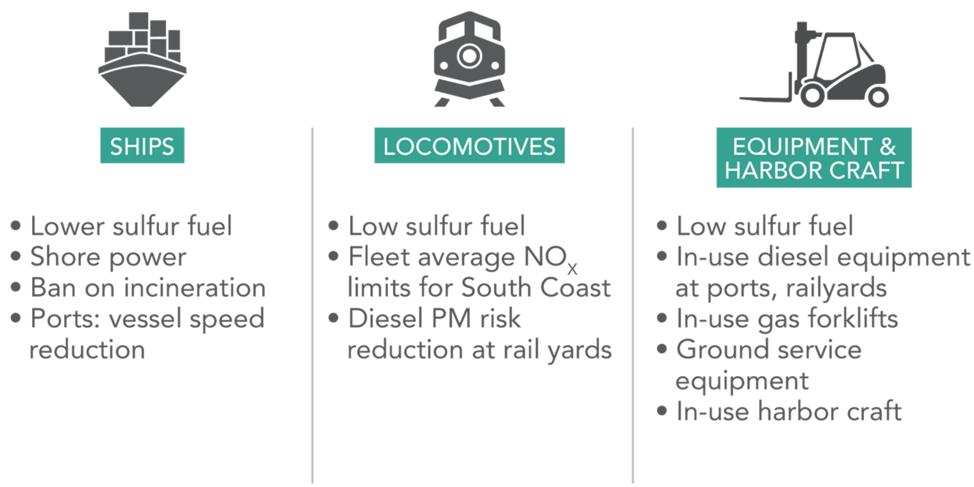
C. Off-Road Sources

Off-road sources encompass equipment powered by an engine that does not operate on the road. Sources vary from ships to lawn and garden equipment and for example, include sources like locomotives, aircraft, tractors, harbor craft, off-road recreational vehicles, construction equipment, forklifts, and cargo handling equipment.

Figure 2 illustrates the comprehensive suite of emission control measures applicable to the broad variety of engines and vehicle that fall under the Off-Road category. As a result of these emission control efforts, off-road emissions in Ventura County have been reduced significantly since 1990 and will continue to decrease through 2026. From today, NOx emissions from off-road sources that are not primarily regulated Federally are projected to decrease by over 24 percent by 2026.

Key programs in this sector include the Off-Road Engine Standards, Locomotive Engine Standards, Clean Diesel Fuel, Cleaner In-Use Off-Road Regulation and In-Use Large Spark Ignition (LSI) Fleet Regulation.

Figure 2: Off-Road Vehicle and Equipment Control Programs



1. Off-Road Engine Standards

The Clean Air Act preempts states, including California, from adopting requirements for new off-road engines less than 175 HP used in farm or construction equipment. California may adopt emission standards for in-use off-road engines pursuant to Section 209(e)(2), but must receive authorization from U.S. EPA before it may enforce the adopted standards.

CARB first approved regulations to control exhaust emissions from small off-road engines (SORE) such as lawn and garden equipment in December 1990 with amendments in 1998, 2003, 2010, 2011, 2016, and 2021. The 1990 - 2016 regulations were implemented through three tiers of progressively more stringent exhaust emission standards that were phased in between 1995 and 2008. The most recent suite of amendments (December 2021) requires most newly manufactured SORE engines be zero emission starting in 2024.

Manufacturers of forklift engines are subject to new engine standards for both diesel and Large Spark Ignition (LSI) engines. Off-road diesel engines were first subject to engine standards and durability requirements in 1996 while the most recent Tier 4 Final emission standards were phased in starting in 2013. Tier 4 emission standards are based on the use of advanced after-treatment technologies such as diesel particulate filters and selective catalytic reduction. LSI engines have been subject to new engine standards that include both criteria pollutant and durability requirements since 2001 with the cleanest requirements phased-in starting in 2010.

To control emissions from Transport Refrigeration Units (TRUs), CARB adopted in 2004 the Airborne Toxic Control Measure (ATCM) for In-Use Diesel-Fueled TRUs, TRU Generator Sets, and Facilities where TRUs Operate, which set increasingly stringent engine standards to reduce diesel particulate matter emissions from TRUs and TRU generator sets. The ATCM for TRUs was subsequently amended in 2010 and 2011, and most recently in February 2022, as the first phase of CARB's current push to develop new requirements to transition diesel-powered TRUs to zero-emission technology in two phases. The February 2022 adoption, Part 1 amendments to the existing TRU Airborne Toxic Control Measure (ATCM), requires the transition of diesel-powered truck TRUs to zero-emission. CARB plans to develop a subsequent Part 2 regulation to require zero-emission trailer TRUs, domestic shipping container TRUs, railcar TRUs, and TRU generator sets, for future Board consideration.

2. Cleaner In-Use Off-Road Equipment (Off-Road Regulation)

The Off-Road Regulation was first approved in 2007 and subsequently amended in 2010 in light of the impacts of the economic recession. Equipment affected by this regulation are used in construction, manufacturing, the rental industry, road maintenance, airport ground support and landscaping. In December 2011, the Off-Road Regulation was modified to include on-road trucks with two diesel engines.

The Off-Road Regulation will significantly reduce emissions of diesel PM and NOx from the over 150,000 in-use off-road diesel vehicles that operate in California. The Regulation affects dozens of vehicle types used in thousands of fleets by requiring owners to modernize their fleets by replacing older engines or vehicles with newer, cleaner models, retiring older vehicles or using them less often, or by applying retrofit exhaust controls.

The Off-Road Regulation imposes idling limits on off-road diesel vehicles, requires a written idling policy, and requires a disclosure when selling vehicles. The Regulation also requires that all vehicles be reported to CARB and labeled, restricts the addition of older vehicles into fleets, and requires fleets to reduce their emissions by retiring, replacing, or repowering older engines, or installing verified exhaust retrofits. The requirements and compliance dates of the Off-Road Regulation vary by fleet size.

Fleets are subject to increasingly stringent restrictions on adding older vehicles. The regulation also sets performance requirements. While the regulation has many specific provisions, in general by each compliance deadline, a fleet must demonstrate that it has either met the fleet average target for that year or has completed the Best Available Control Technology requirements. The performance requirements of the Off-Road Regulation were phased in from January 1, 2014 through January 1, 2019.

Compliance assistance and outreach activities in support of the Off-Road Regulation include:

- The Diesel Off-road On-line Reporting System, an online reporting tool developed and maintained by CARB staff;
- The Diesel Hotline (866-6DIESEL), which provides the regulated public with questions about the regulations and access to CARB staff. Staff is able to respond to questions in English, Spanish and Punjabi; and
- The Off-road Listserv, providing equipment owners and dealerships with timely announcement of regulatory changes, regulatory assistance documents, and reminders for deadlines.

3. Clean Diesel Fuel

Since 1993, CARB has required that diesel fuel have a limit on the aromatic hydrocarbon content and sulfur content of the fuel. Diesel powered vehicles account for a disproportionate amount of the diesel particulate matter which is considered a toxic air contaminant by the State of California. In 2006, CARB required a low-sulfur diesel fuel to be used not only by on-road diesel vehicles but also for off-road engines. The diesel fuel regulation allows alternative diesel formulations as long as emission reductions are equivalent to the CARB formulation.

4. Locomotive Engine Standards

The Clean Air Act and the U.S. EPA national locomotive regulations expressly preempt states and local governments from adopting or enforcing “any standard or other requirement relating to the control of emissions from new locomotives and new engines used in locomotives” (U.S. EPA interpreted new engines in locomotives to mean remanufactured engines, as well). U.S. EPA has approved two sets of national locomotive emission regulations (1998 and 2008). In 1998, U.S. EPA approved the initial set of national locomotive emission regulations. These regulations primarily emphasized NOx reductions through Tier 0, 1, and 2 emission standards. Tier 2 NOx emission standards reduced older uncontrolled locomotive NOx emissions by up to 60 percent, from 13.2 to 5.5 g/bhp-hr.

In 2008, U.S. EPA approved a second set of national locomotive regulations. Older locomotives upon remanufacture are required to meet more stringent particulate matter (PM) emission standards which are about 50 percent cleaner than Tier 0-2 PM emission standards. U.S. EPA refers to the PM locomotive remanufacture emission standards as Tier 0+, Tier 1+, and Tier 2+. The new Tier 3 PM emission standard (0.1 g/bhp-hr), for model years 2012-2014, is the same as the Tier 2+ remanufacture PM emission standard. The 2008 regulations also included new Tier 4 (2015 and later model years) locomotive NOx and PM emission standards. The U.S. EPA Tier 4 NOx and PM emission standards further reduced emissions by approximately 95 percent from uncontrolled levels.

In April 2017, CARB petitioned U.S. EPA for rulemaking, seeking the amendment of emission standards for newly built locomotives and locomotive engines and lower emission standards for remanufactured locomotives and locomotive engines. The petition asks U.S. EPA to update its standards to take effect for remanufactured locomotives in 2023 and for newly built locomotives in 2025. The new emission standards would provide critical criteria pollutant reductions, particularly in the disadvantaged communities that surround railyards. U.S. EPA has not yet responded to this petition.

5. Marine Sources and Ocean-Going Vessels (OGVs)

To reduce emissions from Ocean Going Vessels (OGV), CARB has adopted the Ocean-Going Vessel Fuel Regulation, “Fuel Sulfur and Other Operational Requirements for Ocean-Going Vessels within California Waters and 24 Nautical Miles of the California Baseline” (2008) and the Ocean-Going Vessels At Berth Regulation (2007).

The At-Berth Regulation requires container ships, passenger ships, and refrigerated-cargo ships at six California ports to meet compliance requirements for auxiliary engines while they are docked, including emission or power reduction requirements. Reduced vessel speeds also provide emission reduction benefits, and programs are operated by local air districts along the California coast to incentivize lower speeds. CARB staff received comments during the public process about including a statewide vessel speed reduction program. In the 2022 State SIP Strategy, the CARB measure for 'Future Emissions Reductions from Ocean-Going Vessels' considers options available under CARB authority to achieve further emissions reductions, including developing a statewide vessel speed reduction program.

In 2007, CARB adopted the Commercial Harbor Craft Regulation (CHC Regulation), which reduces toxic and criteria emissions. Commercial harbor craft include any private, commercial, government, or military marine vessels including, but not limited to ferries, excursion vessels, tugboats (including ocean-going tugboats), barges, and commercial and commercial passenger fishing boats. This regulation was subsequently amended in 2010 and again in March 2022 to establish expanded and more stringent in-use requirements to cover more vessel categories and mandate accelerated deployment of zero-emission and advanced technologies in vessel categories where technology feasibility has been demonstrated.

To control emissions from personal watercraft, CARB staff is also exploring development of Spark-Ignition Marine Engine Standards, as described in the 2022 State SIP Strategy. For this measure, CARB would develop and propose catalyst-based standards for outboard and personal watercraft engines greater than or equal to 40 kW in power that will gradually reduce emission standards to approximately 70 percent below current levels and consider actions that would require a percentage of outboard and personal watercraft vessels to be propelled by zero-emission technologies for certain applications.

6. Large Spark-Ignition (LSI) Engines and Forklifts

Forklift fleets are subject to in-use fleet requirements either under the LSI fleet regulation, if fueled by gasoline or propane, or under the off-road diesel fleet regulation, if fueled by diesel. Both regulations require fleets to retire, repower, or replace higher-emitting equipment in order to maintain fleet average standards.

Large spark-ignition engines, which are defined as spark-ignition (i.e., Otto-cycle) engines greater than 25 horsepower, are used in a variety of equipment, including, but not limited to, forklifts, airport ground support equipment (GSE), sweeper/scrubbers, industrial tow tractors, generator sets, and irrigation pumps. LSI equipment is found in approximately 2,000 fleets throughout the state operating at warehouses and distribution centers, seaports, airports, railyards, manufacturing plants, and many other commercial and industrial facilities.

CARB first adopted emission standards for off-road LSI engines in 1998. The original LSI regulation required engine manufacturers to certify new LSI engines to a 3.0 gram per brake horsepower-hour (g/bhp-hr) standard that, by 2004, represented a 75 percent reduction in emissions compared with uncontrolled LSI. Building on this success, in 2002, U.S. EPA subsequently harmonized the national standard with California's standard, starting with the 2004 model year and adopted a more stringent 2.0 g/bhp-hr standard for 2007 and subsequent model year engines. The federal program demonstrated that additional reductions from new engines were technically feasible and cost-effective. In the 2003 State Implementation Plan for Ozone (2003 SIP), California committed to two additional LSI measures- one for the development of more stringent new engine standards and another for the development of in-use fleet requirements.

CARB adopted these two LSI measures in a 2006 rulemaking, which harmonized California's standard with U.S. EPA's 2.0 g/bhp-hr standard starting with the 2007 model year, set forth a more stringent 0.6 g/bhp-hr California standard starting with the 2010 model year, and established in-use LSI fleet requirements. The 0.6 g/bhp-hr standard represents a 95 percent emission reduction versus uncontrolled LSI engines and is still in effect today.

The in-use element of the 2006 rulemaking, adopted as the Large Spark-Ignition Engine Fleet Requirements Regulation (LSI Fleet Regulation), which was eventually amended in 2010 and 2016, requires fleet operators with four or more LSI forklifts to meet fleet average emission standards. The 2006 LSI rulemaking and 2010 amendments required specific hydrocarbon + NOx fleet average emission level standards that became increasingly more stringent over time. The focus of the 2016 amendments was to collect data from fleet operators in order to inform the development of requirements that would support the broad-scale deployment of Zero-Emission equipment in LSI applications. The 2016 amendments also required fleet operators to report key compliance information to CARB and extended to 2023 requirements from the prior LSI Fleet Regulations that were otherwise due to sunset in 2016.

7. Cargo Handling Equipment (CHE)

Cargo handling equipment (CHE) include yard trucks (hostlers), rubber-tired gantry cranes, container handlers, forklifts, dozers, and other types. The Cargo Handling Equipment (CHE) Regulation established requirements for in-use and newly purchased diesel-powered equipment at ports and intermodal rail yards. CARB adopted the CHE in 2005, which established best available control technology (BACT) for new and in-use mobile CHE that operate at California's ports and intermodal rail yards through accelerated turnover of older equipment through retrofits and/or replacement to cleaner on- or off-road engines. Since 2006, the CHE Regulation has resulted in reductions of diesel PM and NOx at ports and intermodal rail yards throughout California.

8. Incentive Programs

There are many different incentive programs focusing on off-road mobile sources that increase the penetration of cleaner technologies into the market. The incentive programs encourage the purchase of cleaner off-road combustion engines and equipment, and zero-emission technologies. CARB is expanding incentives for zero-emission off-road equipment through targeted demonstration and pilot project categories in the off-road sector, and increased funding.

a) Low Carbon Transportation Investments and Air Quality Improvement Program (Clean Transportation Incentives)

As mentioned earlier, $873 million was allocated in the FY 2020-2021 budget for off-road equipment and on-road heavy-duty trucks under the Clean Transportation Incentives programs. In the off-road sector, major programs include the Clean Off-Road Equipment Voucher Incentive

Project (CORE), and Demonstration and Pilot Programs. Off-road equipment categories that are prioritized for funding include agricultural and construction equipment, small off-road engines (SORE) such as lawn and garden equipment, heavier cargo handling equipment (CHE), and ZE applications at railyards, marine ports, freight facilities, and along freight corridors.

i. Clean Off-Road Equipment Voucher Incentive Project

The Clean Off-Road Equipment Voucher Incentive Project (CORE) is a voucher project similar to HVIP, but for advanced technology off-road equipment. CORE is intended to accelerate deployment of advanced technology in the off-road sector by providing a streamlined way for fleets to access funding that helps offset the incremental cost of such technology. CORE targets commercial-ready products that have not yet achieved a significant market foothold. By promoting the purchase of clean technology over internal combustion options, the project is expected to reduce emissions, particularly in areas that are most impacted, help build confidence in zero-emission technology in support of CARB strategies and subsequent regulatory efforts where possible, and provide other sector-wide benefits, such as technology transferability, reductions in advanced-technology component costs, and larger infrastructure investments. CORE provides vouchers to California purchasers and lessees of zero-emission off-road equipment on a first-come, first-served basis, with increased incentives for equipment located in disadvantaged communities.

CARB launched CORE at the end of 2019 through a one-time $40 million allocation in the fiscal year 2017-18 Funding Plan to support zero-emission freight equipment through CORE. Since that time, CORE has been allocated significant additional funds, including $194.95 million from the FY 2021-22 budget. This allocation includes $30 million of dedicated funds appropriated by the Legislature in SB 170 to provide incentives for professional landscaping services in California operated by small businesses or sole proprietors to purchase zero-emission small off-road equipment.

ii. Demonstration and Pilot Projects

As mentioned earlier, in FY 2021-22, $80 million was allocated for off-road and on-road heavy-duty advanced technology demonstration and pilot projects. CARB is focusing funding on off-road demonstration and pilot projects that include heavier cargo handling equipment (CHE), clean equipment in rail, marine, and ports applications, and zero-emission equipment along freight facilities/corridors.

For the *Port of LA Multi-Source Facility Demonstration Project*, the Los Angeles Harbor Department (Port of LA) was awarded $14.5 million to operate multiple near zero- or zero-emission technologies to move goods from ships through the Green Omni Terminal. This project is demonstrating the viability of electrified CHE, forklifts, and a ships at-berth vessel emissions control system. The *Zero-Emission Freight "Shore to Store"* Project will use $41.1 million to fund electric yard tractors, hydrogen fuel cell Class 8 on-road trucks, and a large capacity hydrogen fueling station in Ontario, CA. Additional zero- and near zero-emission freight facility projects include a $5.8 million *Zero-Emission for California Ports* project at the Port of LA, which will fund hybrid fuel cell and electric yard trucks, as well as hydrogen fueling stations. Further, the San Joaquin Valley's *Net-Zero Farming and Freight Facility Demonstration Project* is funding battery electric trucks equipped with all-electric transport refrigeration units (eTRUs) to facilitate clean freight transport, and transportation of agricultural produce between packing and warehouse facilities.

b) Funding Agricultural Replacement Measures for Emission Reductions (FARMER)

California's agricultural industry consists of approximately 77,500 farms and ranches, providing over 400 different commodities, making agriculture one of the State's most diverse industries. In recognition of the strong need and this industry's dedication to reducing their emissions, the Legislature has allocated over $323 million towards the Funding Agricultural Replacement Measures for Emission Reductions (FARMER) Program since 2017. The program provides funding through local air districts for incentivizing the introduction of lower-emissions agricultural harvesting equipment, heavy-duty trucks, agricultural pump engines, tractors, and other equipment used in agricultural operations. Since October 2019, the FARMER Program also includes a project category for demonstration projects and modifications to the zero-emission agricultural utility terrain vehicle (UTV), heavy-duty agricultural truck, and off-road mobile agricultural equipment trade-up pilot project categories. As of September 30, 2021, the FARMER Program has spent $289.7 million on over 6,600 pieces of agricultural equipment and will reduce 1,120 tons of PM2.5 and 18,700 tons of NOx over the lifetime of the projects, Statewide.

c) Moyer Program

In addition to funding on-road incentives, the Moyer Program provides monetary grants to reduce emissions from off-road equipment such as construction and agricultural equipment, marine vessels and locomotives, forklifts, TRUs, and airport ground support equipment.

d) Goods Movement Emission Reduction Program (Prop 1B)

As discussed earlier, Proposition 1B was a $1 billion partnership between CARB and local agencies, air districts, and seaports to quickly reduce air pollution emissions and health risk from freight movement along California's trade corridors. Over the course of six years, the program has upgraded ships at-berth, cargo handling equipment, locomotives, TRUs, and harbor craft.

II. Conclusion

In conclusion, CARB has implemented the most comprehensive mobile source emissions control program in the nation. CARB's mobile source control program is robust and targets all sources of emissions through a four-pronged approach. First, increasingly stringent emissions standards drive the use of the cleanest available engines and equipment and minimize emissions from new vehicles and equipment. Second, to speed the turnover of older, dirtier engines and equipment to cleaner new equipment, in-use programs target emissions from the existing fleet by requiring vehicle and fleet owners to transition legacy fleets and vehicles to the cleanest vehicles and emissions control technologies. Third, incentive programs help fleet owners to replace older, dirtier vehicles and equipment with the cleanest technologies, while also facilitating the development of the next generation of clean technologies that are needed to meet future air quality targets. Finally, cleaner fuels minimize emissions from all combustion engines being used across the State.

This multi-faceted approach has not only spurred the development and use of increasingly cleaner technologies and fuels, it has also provided significant emission reductions across all mobile source sectors that go far beyond national programs or programs in other states.

APPENDIX D

VENTURA COUNTY

STATIONARY SOURCE

REASONABLY AVAILABLE CONTROL MEASURE ASSESSMENT

Background

Federal Clean Air Act (CAA)(require the Ventura County Air Pollution Control District (District) to demonstrate that it has adopted all control measures necessary to attain the 2015 federal 8-hour ozone standard as expeditiously as practicable and to meet Reasonable Further Progress (RFP) requirements. Reasonably Available Control Measures (RACM) applies to stationary source control measures, transportation control measures, and mobile source control measures. Reasonably Available Control Technology, or RACT, is a subset of stationary source RACM.

A potential control measure is considered “reasonably available” and must be implemented if it would advance attainment by at least one year, either alone or in combination with other reasonably available control measures. This means the combined emission reductions from RACM must be sufficient to reduce the emission inventory projected for 2025 (or earlier) to the inventory currently projected for 2026, the attainment year, or lower. For the purpose of this analysis, estimated emission reductions are calculated for achievability by 2025 to advance this date. If such emission reductions can be demonstrated, the combined RACM measures must be implemented.

Stationary Source RACM

The District has been classified as a serious nonattainment area for all historical ozone National Ambient Air Quality Standards (NAAQS). The District has a mature and comprehensive set of prohibitory rules which are some of the strictest in the nation. The stringency and comprehensiveness of existing reactive organic gases (ROG) and nitrogen oxides (NOx) emission control requirements in the District significantly reduce the availability of new measures that could provide additional emission reductions sufficient to advance the attainment year.

The projected anthropogenic NOx and ROG emissions are 27.4 and 30.1 tons per day, respectively, in the attainment year 2026. The projected 2025 NOx and ROG emissions are 27.6 and 30.3 tons per day, respectively. Therefore, in order to be considered RACM, the combined control measures must reduce NOx emissions by 0.2 tons per day.

In addition, the actual and projected ROG emissions are stable at 31.3 ± 0.2 tons per day for nine years from 2018 through 2026. During this time the ozone design value is projected to decline by 7 ppb, apparently due to NOx emissions reductions. Therefore, at this stage in the attainment planning for Ventura County, it is unclear what level of anthropogenic ROG emission reductions would advance the attainment year.

2020 RACT State Implementation Plan (SIP)

The District approved its RACT SIP on June 9, 2020 and sent it to the California Air Resources Board (CARB) for submittal to the United States Environmental Protection Agency (EPA). CARB submitted the District’s RACT SIP to EPA on July 28, 2020 and EPA has yet to take final action to approve. The RACT SIP found that all applicable District rules that apply to ozone precursor emissions fulfill RACT requirements for the 8-hour ozone NAAQS.

However, RACT equivalency does not ensure that those rules meet RACM requirements. As presented by EPA on February 11, 2021, their *Reasonably Available Control Measure Demonstration for Ozone National Ambient Air Quality Standards* requires all rules and potential rules to be evaluated for RACM emission reductions.

RACM Evaluations

All District ROG and/or NOx prohibitory rules were evaluated for potential RACM emission reductions. Staff compared District rules to equivalent rules adopted or proposed as control measures by other air districts with higher or "worse" nonattainment classifications, namely the South Coast Air Quality Management District (SCAQMD) and the San Joaquin Valley Air Pollution Control District (SJVAPCD). Staff also reviewed equivalent rules from other air districts such as the Bay Area Air Quality Management District (BAAQMD). Table D-1 lists the District rules reviewed for the stationary source RACM requirement.

District staff also evaluated rules or proposed Control Measures from other air districts that apply to unregulated source categories in Ventura County. District staff conducted preliminary evaluations of the potential emission reductions, including the cost effectiveness and timing of the potential reductions. The identified source categories are shown in Table D-2.

A very conservative estimate of the total emission reductions achievable under RACM with new and amended District rules are as follows:

NOx: 0.013 tons per day
ROG: 0.436 tons per day

As noted above, in order to advance attainment by one year, emission reductions of at least 0.2 tons of NOx per day must be achieved. The potential RACM identified by the District could only achieve approximately one tenth of the required NOx reductions.

Since the ROG inventory remains stable for the eight years prior to the District's modeled attainment, it is unclear how much ROG emissions reductions would be required to advance the attainment date. However, District staff believes reducing ROG emissions less than 2% of the county's anthropogenic emissions inventory is insufficient to advance the attainment date. Such a reduction is well within the margin of error for the emissions inventory and the annual variability of emissions due to other factors.

Table D-1
District Rules Evaluated for RACM Determination

VCAPCD Rule	Rule Name	Other District Rule/CM Number(s)	Other District Rule(s) Stricter?	NOx Emission Reduction Potential (tons/day)	ROG Emission Reduction Potential (tons/day)
59	Electrical Power Generating Equipment - Oxides of Nitrogen Emissions	SC L-CMB-06 SJ 4306	Yes†	0	0
62.6	Ethylene Oxide - Sterilization and Aeration	SJ 7021 SC 1405	No	0	0
70	Storage and Transfer of Gasoline	SJ 4621 SC 462	Yes	0	0.020
71.1	Crude Oil Production and Separation	SJ 4623 SC 1178	No	0	0
71.2	Storage of Reactive Organic Compound Liquids	SJ 4623 SC 1178	Yes	0	0.045
71.3	Transfer of Organic Reactive Compound Liquids	SJ 4624 SC 462	No	0	0
71.4	Petroleum Sumps, Pits, Ponds, and Well Cellars	SJ 4402 SC 1176	No	0	0
71.5	Glycol Dehydrators	SJ 4408 SC 1148.1	No	0	0
74.2	Architectural Coatings	The rule will be considered as a contingency measure if required.			
74.3	Paper, Fabric and Film Coating Operations	SJ 4607 SC 1128	Yes†	0	0
74.4	Cutback Asphalt	SJ 4641 SC 1108	Yes†	0	0
74.5.1	Petroleum Solvent Dry Cleaning	SJ 4672 SC 1102	Yes	0	0.012
74.5.2	Synthetic Solvent Dry Cleaning	SC 1102	Yes†	0	0
74.6	Surface Cleaning and Degreasing	SJ 4662 SJ 4663 SC 1122 SC 1171	No	0	0
74.6.1	Batch Loaded Vapor Degreasers	SJ 4662 SC 1122	No	0	0

Table D-1
District Rules Evaluated for RACM Determination

VCAPCD Rule	Rule Name	Other District Rule/CM Number(s)	Other District Rule(s) Stricter?	NOx Emission Reduction Potential (tons/day)	ROG Emission Reduction Potential (tons/day)
74.7	Fugitive Emissions of ROC at Petroleum Refineries and Chemical Plants (VOC)	SJ 4455 SC 1173	Yes†	0	0
74.8	Refinery Vacuum Producing Systems, Wastewater Separators, and Process Turnarounds	SJ 4453 SC 465	Yes†	0	0
74.9	Stationary Internal Combustion Engines	SJ 4702 SC 1110.2	Proposed as Control Measure		
74.10	Components at Crude Oil and Natural Gas Production and Processing Facilities	SJ 4409 SC 1173 SC FUG-01	Planned 2023 Amendment		
74.11	Natural Gas-Fired Water Heaters	SJ 4902 SC 1146.2 SC R-CMB-01	Yes†	0	0
74.11.1	Large Water Heaters and Small Boilers	SJ 4308 SC 1146.2 SC R-CMB-01	Yes	0.008	0
74.12	Surface Coating of Metal Parts and Products	SJ 4603 SC 1107 SC CTS-01	Yes†	0	0
74.13	Aerospace Assembly and Component Manufacturing Operations	SJ 4605 SC 1124	Yes	0	0.001*
74.14	Polyester Resin Material Operations	SJ 4684 SC 1162	Yes	0	0.02
74.15	Boilers, Steam Generators and Process Heaters (1 to 5 MMBTUs)	SJ 4320 SC 1146 SC C-CMB-01	Yes†	0	0
74.15.1	Boilers, Steam Generators and Process Heaters	SJ 4307 SC 1146.1	Yes	0.005	0
74.16	Oilfield Drilling Operations		N/A	0	0
74.17.1	Municipal Solid Waste Landfills	SJ 4642 SC 1150.1	No	0	0

Table D-1
District Rules Evaluated for RACM Determination

VCAPCD Rule	Rule Name	Other District Rule/CM Number(s)	Other District Rule(s) Stricter?	NOx Emission Reduction Potential (tons/day)	ROG Emission Reduction Potential (tons/day)
74.18	Motor Vehicle and Mobile Equipment Coating Operations	SC 1151 SC CTS-01	No	0	0
74.19	Graphic Arts	SJ 4607 SC 1130 SC 1171	No	0	0
74.19.1	Screen Printing Operations	SC 1130.1 SC 1171	Yes	0	0.022
74.20	Adhesives and Sealants	SJ 4653 SC 1168 SC CTS-01	No	0	0
74.21	Semiconductor Manufacturing	SC 1164 BA 8-30	No	0	0
74.22	Natural Gas-Fired, Fan-Type Central Furnaces	SJ 4905 SC 1111 SC R-CMB-02	Proposed as Control Measure		
74.23	Stationary Gas Turbines	SJ 4703 SC 1134 SC L-CMB-05	Yes†	0	0
74.24	Marine Coatings Operations	SC 1106	Yes	0	0.007
74.24.1	Pleasure Craft Coating and Commercial Boatyard Operations	SC 1106.1	No	0	0
74.25	Restaurant Cooking Operations	SC C-CMB-03	Yes†	0	0
74.26	Crude Oil Storage Tank Degassing	SC 1149	Yes	0	0.023
74.27	Gasoline and ROC Liquid Storage Tank Degassing Operations	SC 1149	Yes	0	0.001*
74.28	Asphalt Roofing Operations	MD 471	No	0	0
74.29	Soil Decontamination Operations	SJ 4651 SC 1166	Yes	0	0.12
74.30	Wood Products Coating	SJ 4606 SC 1136	No	0	0

Table D-1
District Rules Evaluated for RACM Determination

VCAPCD Rule	Rule Name	Other District Rule/CM Number(s)	Other District Rule(s) Stricter?	NOx Emission Reduction Potential (tons/day)	ROG Emission Reduction Potential (tons/day)
74.31	Metalworking Fluids and Direct Contact Lubricants	SC 1144	No	0	0
74.32	Organic Material Handling and Conversion	SC 1133.3	Proposed as Control Measure		
74.33	Liquified Petroleum Gas Transfer or Dispensing	SC 1177	No	0	0
74.34	NOx Reductions from Miscellaneous Sources	SJ 4309 SC 1147 SC L-CMB-01	Yes†	0	0

Notes:
SC = South Coast Air Quality Management District
SJV = San Joaquin Valley Air Pollution Control District
BA = Bay Area Air Quality Management District
MD = Mojave Desert Air Quality Management District
N/A = Not applicable – this rule does not include restrictions or mandate reductions in NOx or ROG emissions
* All values between 0 and 0.001 were rounded up to 0.001
† See discussion below

Table D-2
Stationary Source Categories for Which Other Districts Have Either Adopted Rules or Proposed as Control Measures and VCAPCD Has No Equivalent Rule

Rule Name	Other District Rule Number(s)	Applicable Sources in Ventura County?	NOx Emission Reduction Potential (tons/day)	ROG Emission Reduction Potential (tons/day)
Composting and Organic Material Conversion Operations	SC 1133 SJV 4566	New District Rule 74.32 will be adopted as discussed in Chapter 3 as part of control measure R-607		
Flares at Petroleum Refineries	BA 12-12 SC 1118	NO	None	None
Vacuum Truck Operations	BA 8-53	YES	Potential Increase*	0.16
Emissions of Oxides of Nitrogen from Commercial Food Ovens	SC 1153.1	YES	None	None
Food Products Manufacturing and Processing Operations	SC 1131	YES†	None	0.006
Residential Combustion Equipment	SC R-CMB-03 SC R-CMB-04	YES†	None	None
Emissions from Commercial Space Heating	SC C-CMB-02	YES†	None	None
Emergency Standby Engines	SC L-CMB-04	YES†	None	None

Notes:
BA = Bay Area Air Quality Management District
SC = South Coast Air Quality Management District
SJV = San Joaquin Valley Air Pollution Control District
MD = Mojave Desert Air Quality Management District
* If a combustion process is used to comply with emissions abatement requirements, this rule will increase NOx emissions
** All values between 0 and 0.001 were rounded up to 0.001
† See discussion below

The summaries below discuss the RACM evaluations and provide a determination whether rule updates or new rules could be considered RACM.

RULE 59: ELECTRICAL POWER GENERATING EQUIPMENT – OXIDES OF NITROGEN EMISSIONS (Last Revised 7/15/1997)

Rule 59 reduces NOx emissions from electric power generating steam boilers with a rated heat input capacity of greater than three hundred (300) million British thermal units (BTU) per hour and any auxiliary boiler with an electric power generating steam boiler not subject to Rule 74.15, *Boilers, Steam Generators, and Process Heaters*. In the 2020 RACT SIP, it was determined that Rule 59 was equivalent to SJVAPCD 4306 and met RACT requirements.

SCAQMD is proposing Control Measure L-CMB-06 to reduce the emissions from electrical generating facility equipment including turbines and the associated duct burners, boilers, and diesel internal combustion engines. Emission reductions for this control measure are associated with implementation of zero-emission technology and repowering with lower emission combustion units.

There is currently one facility in Ventura County that is subject to Rule 59, which is expected to decommission between 2025 and 2027 due to State regulations eliminating the use of once-through-cooling technology, which is utilized by this facility. VCAPCD will monitor potential emission reductions from this source category but at this time, it does not qualify for RACM due to emission reductions being realized before the attainment date of 2026.

RULE 62.6: ETHYLENE OXIDE – STERILIZATION AND AERATION (Last Revised 7/16/1991)

Rule 62.6 reduces ethylene oxide emissions from sterilizers using ethylene oxide. During the 2020 RACT analysis, it was determined there were two known and permitted facilities that employ ethylene oxide sterilizers in Ventura County. Cumulative permitted consumption was limited to 238 pounds of ethylene oxide per year.

SCAQMD Rule 1405 (last amended 1/4/1991) and SJVUAPCD Rule 7021 (last amended 12/17/1992) apply to similar process emissions as Rule 62.6 with nearly identical requirements. VCAPCD will monitor potential emission reductions from this source category but since Rule 62.6 is equivalent to SCAQMD and SJVAPCD rules at this time, no additional emission reductions are expected from this source category.

RULE 70: STORAGE AND TRANSFER OF GASOLINE (Last Revised 3/10/2009)

Rule 70 reduces ROG emissions from the storage and transfer of gasoline at bulk plants, terminals, and vehicle dispensing facilities (service stations). The storage of gasoline in containers with more than 40,000 gallons capacity is also regulated by the Rule 71.2, *Storage of Reactive Organic Compound Liquids*.

The CARB sets vapor recovery system standards for gasoline dispensing and is responsible for certifying fuel systems to meet those standards. California's local air districts have the primary authority for regulating gasoline dispensing facilities under vapor recovery rules. CARB began implementing enhanced vapor recovery requirements starting in 2001. BAAQMD amended its rules applicable to gasoline bulk terminals and plants, Rules 8-33 and 8-39, in April of 2009. The revised rules include lower emission limits (0.4 lb. ROG per 1,000 gallons transferred vs. 0.8 lb. ROG per 1,000 gallons transferred in Rule 70). Emission reductions for amendments to Rule 70 were estimated from improving bulk loading vapor control.

RULE 71.1: CRUDE OIL PRODUCTION AND SEPARATION (Last Revised 6/16/1992)

Rule 71.1 controls ROG emissions from equipment used in the production, gathering, storage, processing, and separation of crude oil and natural gas from any petroleum production unit prior to custody transfer.

SCAQMD Rule 1148.1 (last amended 9/4/2015) requires 95% control of produced gas that is not recovered, whereas Rule 71.1 requires 90% control of ROG emissions for produced gas not recovered or flared. SJVAPCD Rule 4623 (last amended 5/19/2005) tailors tank requirements based on tank size and vapor pressure of tank constituents, but the strictest requirements allow for vapor recovery systems similar to those allowed by Rule 71.1.

Currently, Ventura County has forty permitted facilities of which six are considered major sources (42 U.S.C. §7511a) of ROG subject to Rule 71.1. A review of all facilities' permits confirmed that most facilities route their produced gas into a fuel system, sales gas system, and/or flare, with only one facility utilizing a permanent carbon adsorption system which already achieves greater than 95% vapor control. The 90% control alternative does not apply to any existing source complying with Rule 71.1, therefore the requirement has no effect. It is important to note facilities operating a properly designed flare will achieve 98% destruction efficiency or greater. Any new source would be subject to BACT which would require a greater ROG destruction efficiency than required by Rule 71.1.

RULE 71.2: STORAGE OF REACTIVE ORGANIC COMPOUND LIQUIDS (Last Revised 9/26/1989)

Rule 71.2 reduces ROG emissions from equipment used to store crude oil or ROG liquids with a Modified Reid Vapor Pressure (MRVP) greater than 0.5 psia. The rule does not apply to any storage equipment subject to Rule 71.1, gasoline storage container with a capacity equal to or less than 40,000 gallons, or to any other storage container with a capacity equal to or less than 5,000 gallons.

SCAQMD Rules 463 (last amended 11/4/2011) and 1178 (last amended 11/6/2020) and SJVAPCD Rule 4623 (last amended 5/19/2005) apply to similar equipment as Rule 71.2. Rule 71.2 includes an exemption for tanks <5,000 gallons, while Rule 463 applies to all tanks >1,100 gallons. Rule 463 applies to above-ground tanks >19,815 gallons and above-ground gasoline tanks with capacities between 251 and 19,815 gallons. Rule 1178 applies only to tanks at petroleum facilities with greater than 20 tons of ROG emissions reported in the year 2000 and to tanks with capacities greater than 19,815 gallons. The rules contain many similar provisions and requirements for tanks containing volatile organic liquids. The rules all have minor differences in the detailed requirements. The provisions for fixed roof tanks are equivalent in all of the above-mentioned rules – a pressure-vacuum relief valve or vapor recovery system. Most of the differences relate to floating roof tanks.

The combined permitted emissions of the seven existing floating roof tanks in Ventura County are less than 17.33 tons ROG per year. By implementing BACT for Rule 71.2 (incorporating domed coverings with 95% vapor control) ROG emissions would be reduced from the current permitted equipment by approximately 16.46 tons per year (0.045 tpd ROG). During the 2006 RACT SIP analysis, such retrofits had an estimated cost effectiveness of $12 per pound reduced, which is less than the current BACT threshold of $15 per pound. Due to differences between permitted emissions, actual emissions, and cost-effectiveness considerations which may influence rule language the actual emission reductions would likely be much less than this.

RULE 71.3: TRANSFER OF REACTIVE COMPOUND LIQUIDS (Last Revised 5/11/2021)

Rule 71.3 reduces ROG emissions from equipment used to transfer ROG liquids with a MRVP greater than or equal to 0.5 psia. The provisions of this rule do not apply to the transfer of gasoline or the transfer of ROG liquids via pipeline. This rule implemented BARCT on 5/11/2021 and achieved the maximum amount of emission reductions for this source equipment.

RULE 71.4: PETROLEUM SUMPS, PITS, PONDS, AND WELL CELLARS (Last Revised 6/8/1993)

Rule 71.4 controls ROG emissions from sumps, pits, ponds and well cellars at facilities where crude oil or petroleum material is produced, gathered, separated, processed, or stored. SCAQMD Rule 1176 (amended 9/13/1996) and SJVAPCD Rule 4402 (amended 12/15/2011) apply to similar equipment as District Rule 71.4.

Rule 71.4 requires covers on allowed sumps that physically cover 90% of the liquid surface area. Both SCAQMD and SJVAPCD's equivalent rules require sump covers that have very limited gaps at the edges. Alternatively, they must cover the liquid completely and have no open hatches, etc. However, Rule 71.4 includes a provision that the cover must not leak per the definition located in Rule 71.1 (1,000 ppm ROG as methane above background). In addition, Rule 71.4 applies to liquids with significantly lower ROG concentrations (5 mg ROG/L vs 35 mg ROG/L for Rule 4402). VCAPCD will monitor potential emission reductions from this source category but at this time no potential emission reductions are expected by increasing surface coverage with the existing leak-free requirements established in Rule 71.4.

RULE 71.5: GLYCOL DEHYDRATORS (Last Revised 12/13/1994)

Rule 71.5 controls and/or reduces ROG emissions from glycol dehydrators anywhere natural gas is dehydrated. SJVAPCD Rule 4408 (adopted 12/19/2002) applies to the same type of equipment as Rule 71.5. The rules are essentially equivalent, but Rule 71.5 has a lower exemption threshold and therefore applies to all glycol dehydrators in the District. SCAQMD Rule 1148.1 (last amended 9/4/2015) has a similar 95% emission control requirement on systems handling produced gas, but SCAQMD does not specifically regulate glycol dehydrators. VCAPCD will monitor potential emission reductions from this source category but since Rule 71.5 is equivalent to the SCAQMD and SJVAPCD rules at this time, no additional emission reductions are expected from this source category at this time.

RULE 74.2: ARCHITECTURAL COATINGS (Last Revised 11/10/2020)

Rule 74.2 reduces ROG emissions from architectural coatings and is applicable to any person who supplies, sells, offers for sale, or manufactures any architectural coating for use within the District, as well as any person who applies or solicits the application of any architectural coating within the District. Rule 74.2 was amended on 11/10/2020 which implemented the 2019 CARB SCM. The existing potential emission reductions from this source category due to the elimination of the small container exemption may be considered as a contingency measure if additional measures are required.

RULE 74.3: PAPER, FABRIC AND FILM COATING OPERATIONS (Last Revised 12/10/1991)

Rule 74.3 reduces ROG emissions from any application process involving the coating of paper, fabric or film. SCAQMD Rule 1128 (last amended 3/8/1996) and SJVAPCD Rule 4607 (last amended 12/18/2008) apply to the same operations as District Rule 74.3. The only comparable deficiencies found in Rule 74.3 with respect to both SCAQMD Rule 1128 and SJVAPCD Rule 4607 is the lack of plastisol ROG limits and not requiring application methods equivalent to the use of HVLP equipment.

Review of the District sources found no sources with emissions from activities which would be regulated by Rule 74.3. Any newly permitted sources would have to comply with more stringent BACT requirements pursuant to Rule 26, New Source Review. No further emission reductions are available from processes regulated by Rule 74.3.

RULE 74.4: CUTBACK ASPHALT (Last Revised 7/5/1983)

Rule 74.4 reduces ROG emissions from application of rapid cure cutback asphalt for highway or street paving or maintenance and applies to any person who manufactures, sells, or offers for sale cutback asphalt for such use or application. Rule 74.4 is equivalent to the cutback asphalt restrictions in other air districts in California. All reviewed rules prohibit the use of cutback asphalts with greater than 0.5% organic compounds with boiling points less than 500°F. Some rules, including Rule 74.4, have exemptions for material used at temperatures less than 50°F and therefore Rule 74.4 is considered BACT.

RULE 74.5.1: PETROLEUM SOLVENT DRY CLEANING (Last Revised 12/4/1990)

Rule 74.5.1 reduces ROG emissions from petroleum solvent dry cleaning operations through emission control, filtration equipment, and operating requirements. SCAQMD Rule 1102 (amended 11/17/2000) and SJVAPCD Rule 4672 (amended 12/17/1992) apply to similar equipment as District Rule 74.5.1. Rule 4672 has similar emission limits and operational requirements with the addition of a leak inspection and leak repair cycle information label requirement. Rule 1102 includes detailed leak check and repair requirements with time limits for repairing leaks. The Ventura County rule prohibits operating leaking equipment but does not include specific leak check and repair requirements or allowances for operating leaking equipment.

Rule 1102 prohibits operation of transfer machines effective January 1, 2005. District Rule 74.5.1 does not prohibit transfer machines and a review of District emissions inventory indicates petroleum-based dry-cleaning solvents contributed 14.34 tons of ROG in the base year 2018. SCAQMD discussed in their staff report for the 2000 amendments to Rule 1102 that banning transfer machines would reduce category emissions by 30%. If VCAPCD were to ban such equipment it would have the maximum emission reduction potential of 4.302 tons per year (0.012 tpd ROG), which is an upper bound estimate since any petroleum-based dry-cleaning operations permitted since 2000 would be required to implement BACT, not allowing the use of transfer machines.

RULE 74.5.2: SYNTHETIC SOLVENT DRY CLEANING (Last Revised 5/9/1995)

Rule 74.5.2 reduces ROG emissions from synthetic solvent dry cleaning equipment that does not use percholorethylene through emission control, filtration equipment, and operating requirements. SCAQMD Rule 1102 (amended 11/17/2000) applies to any dry cleaning equipment not using perchloroethylene solvent. SJVAPCD Rule 4672 applies only to petroleum solvent dry cleaning equipment and so is not applicable to the same sources. Rule 1102 includes detailed leak check and repair requirements with time limits for repairing leaks. Rule 74.5.2 prohibits operating leaking equipment but does not include specific leak check and repair requirements or allowances for operating leaking equipment. Rule 1102 prohibits operation of transfer machines effective January 1, 2005. District Rule 74.5.2 prohibits installation of transfer machines effective December 4, 1990. A review of District permits during the 2020 RACT SIP analysis indicated no transfer equipment using synthetic solvent remain operating in Ventura County.

RULE 74.6: SURFACE CLEANING AND DEGREASING (Last Revised 11/10/2020)

Rule 74.6 reduces ROG emissions from surface cleaning conducted outside of degreasing tanks (e.g., hand wipe cleaning, cleaning with handheld spray bottles) or using cold cleaning apparatus.

Due to comments received from EPA in 2020, BACT for Rule 74.6 was implemented with the 11/10/2020 amendments. During the rule development process, no further emission reductions were cost-effective for this source category.

RULE 74.6.1: BATCH LOADED VAPOR DEGREASERS (Last Revised 11/10/2020)

Rule 74.6.1 reduces ROG emissions from batch loaded vapor degreasers by specifying equipment and operating practice requirements.

SCAQMD Rule 1122 (amended 5/1/2009) and SJVAPCD Rule 4662 (amended 9/20/2007) regulate similar sources to those regulated by Rule 74.6.1. It should be noted that Rule 74.6.1 does not regulate conveyorized vapor degreasers but no equipment of that type is currently permitted in Ventura County. The rules are all essentially equivalent, although each has minor details in the requirements that the others do not. On 11/10/2020, Rule 74.6.1 was amended to eliminate an exemption for halogenated solvents and to require 85% control efficiency for degreasers. No further emission reductions were considered cost effective at the time of the amendment.

RULE 74.7: FUGITIVE EMISSIONS OF ROC AT PETROLEUM REFINERIES AND CHEMICAL PLANTS (Last Revised 10/10/1995)

Rule 74.7 reduces ROG emissions through operational and inspection requirements at petroleum refineries and chemical plants. Historically, only one petroleum refinery and only a few chemical plants have operated in Ventura County. The petroleum refinery has not operated since 1984. Only two facilities remain in the county, with a combined emissions of 8.95 tons per year.

SCAQMD Rule 1173 (last amended 2/6/2009) and SJVAPCD 4455 (last amended 4/20/2005) regulate similar sources to those regulated by 74.7. The leak repair requirements of Rule 1173 apply to any gaseous leak greater than 500 ppm while Rule 74.7 applies to leaks greater than 1,000 ppm. VCAPCD has no processes which are currently regulated by 74.7 at this time. Any new source would be subject to BACT which would require greater operational and inspection requirements than is found in Rule 74.7.

RULE 74.8: REFINERY VACUUM PRODUCING SYSTEMS, WASTEWATER SEPARATORS, AND PROCESS TURNAROUNDS (Last Revised 7/5/1983)

Rule 74.8 reduces ROG emissions from refinery vacuum producing systems, wastewater separators, and process turnarounds at petroleum refineries. Historically, only a single petroleum refinery operated in the county. The petroleum refinery has not operated since 1984. Rule 74.8 applies only to petroleum refineries. Therefore, Rule 74.8 does not have any potential emission reductions for the purpose of RACM.

RULE 74.9: STATIONARY INTERNAL COMBUSTION ENGINES (Last Revised 11/8/2005)

Rule 74.9 reduces NOx emissions from stationary spark-ignited or diesel internal combustion engines rated at 50 or more horsepower, operated on any gaseous fuel, including liquefied petroleum gas (LPG), or liquid fuel, and not subject to the provisions of Rule 74.16. Because Rule 74.9 is proposed as a Further Study Control Measure in this AQMP, it is not subject to evaluation for RACM.

RULE 74.10: COMPONENTS AT CRUDE OIL AND NATURAL GAS PRODUCTION AND PROCESSING FACILITIES (Last Revised 3/10/1998)

Rule 74.10 reduces ROG emissions from components at crude oil and natural gas production facilities, including pipeline transfer stations and natural gas processing plants. ROG emissions from these facilities are controlled by active leak detection and repair. This rule is set to implement BARCT in 2023 and as such does not qualify for RACM evaluation.

RULE 74.11: NATURAL GAS FIRED WATER HEATERS (Last Revised 1/12/2010)

Rule 74.11 reduces NOx emissions from residential water heaters and applies to residential water heaters, distributers, and installers.

In VCAPCD's 2020 RACT SIP Revision, it was discussed that this rule is essentially the same as SCAQMD Rule 1146.2 (last amended 12/7/2018) and SJVAPCD Rule 4902 (last amended 3/19/2009). Additionally, there are no known major sources of NOx subject to this rule in the District.

SCAQMD is evaluating Rule 1146.2 for RACM emission reductions by proposing incentives for existing unit retrofits and requiring new installations to implement zero-emission technologies. However, VCAPCD does not have the financial resources to implement such incentives at this time. In addition, due to considerations regarding energy resiliency for our wildfire-prone area, with some facilities being subject to frequent Public Safety Power Shutoffs, known as PSPS events, it is not safe or feasible for requiring zero emission technology at this time. VCAPCD will monitor potential emission reductions from this source category but at this time Rule 74.11 does not have any potential emission reductions for the purpose of RACM.

<u>RULE 74.11.1: LARGE WATER HEATERS AND SMALL BOILERS (Last Revised 9/11/2012)</u>

Rule 74.11.1 is a point-of-sale rule that reduces NOx emissions from large water heaters and small boilers that are sold, offered for sale, or installed in Ventura County through certain requirements and limits. Units subject to Rule 74.11.1 are required to not exceed 40 nanograms per joule of heat output.

SCAQMD Rule 1146.2 (last amended 12/7/2018) apply to similar sources as Rule 74.11.1. Rule 1146.2 regulates small boilers and water heaters with a rated heat input rating of between 75,000 BTU/hour and 2,000,000 BTU/hour, while Rule 74.11.1 applies to units 75,000 BTU/hour and 1,000,000 BTU/hour. Rule 1146.2 requires emissions of comparable units to not exceed 14 nanograms per joule of heat output.

SCAQMD is proposing to further reduce emissions with C-CMB-01 through providing incentives for voluntary installation of zero-emission water heaters and by amending regulations to require zero-emission technology or lower-emitting units for new installs. VCAPCD does not have the financial resources to implement such incentives at this time, and the implementation period for new installations would limit the emission reductions realized by the attainment deadline of 2027. Due to considerations regarding energy resiliency for our wildfire-prone area, with some residencies being subject to frequent PSPS events, it is not safe or feasible for requiring zero emission technology at this time. There were 15.334 tpy of NOx in 2018 for from EIC 600-300-1100-000. Emission reductions estimated for Rule 74.11.1 are based on reducing emission limits from 40 to 14 nanograms per joule of head output which could be realized before 2027. Because this equipment has an average lifespan of 10 years, we estimate after rule adoption each year will realize 10% of total emission reductions if the rule was amended in 2023. (ER = 15.334 tpy * (26/40) = 9.97 tpy = 0.0273 tpd at full saturation * (0.30) = 0.008 tpd NOx)

<u>RULE 74.12: SURFACE COATING OF METAL PARTS AND PRODUCTS (Last Revised 4/8/2008)</u>

Rule 74.12 reduces ROG emissions by specifying ROG content limits in coatings used to coat metal parts and products and work practice requirements.

SCAQMD Rule 1107 (amended 2/7/2020) and SJVAPCD Rule 4603 (amended 9/17/2009) apply to similar sources as Rule 74.12. The coating ROG content restrictions are mostly equivalent, with Rule 74.12 including lower limits on a few specialty coatings. While minor differences in work practice requirements and exemptions exist, the differences do not impact the emissions. The most recent amendment to Rule 1107 implemented more stringent work practices and removed multiple exemptions but did not estimate any emission reductions. VCAPCD will monitor potential emission reductions from this source category but at this time Rule 74.12 does not have any potential emission reductions for the purpose of RACM.

RULE 74.13: AEROSPACE ASSEMBLY AND COMPONENT MANUFACTURING OPERATIONS (Last Revised 9/11/2012)

Rule 74.13 reduces ROG emissions from the manufacturing, assembling, coating, masking, bonding, paint stripping, and surface cleaning of aerospace components and the clean-up of equipment associated with these operations.

SCAQMD Rule 1124 (amended 9/21/2001) and SJVAPCD Rule 4605 (amended 6/16/2011) apply to sources similar to those subject to Rule 74.13. Rule 74.13 limits the emissions of ROG from the application of coatings or adhesives on aerospace components. This rule contains limits on the ROG content of coatings, adhesives and cleaners used at aerospace component manufacturing operations. The ROG control requirements of this rule are equivalent to SCAQMD Rule 1124, *Aerospace Assembly and Component Manufacturing Operation*, with a few variations in limits for specialty coatings or adhesives.

The main differences between Rule 74.13 and Rule 1124 are Adhesion Promoters at 850 g/L versus 250 g/L, Adhesive Bond Primer at 780 g/L versus the new commercial aircraft limit of 250 g/L, Long and Short Term Adhesive Bond Primers at 780 g/L versus 250 g/L, and Extrudable, Rollable or Brushable Sealants at 600 g/L versus 280 g/L.

In the base year of 2018, there was 0.02 tpy of ROG emissions from operations regulated by Rule 74.13. For the purpose of RACM, emission reductions are estimated assuming all emissions are from the previously mentioned categories where VCAPCD's ROG limits are higher than neighboring districts.

RULE 74.14: POLYESTER RESIN MATERIAL OPERATIONS (Last Revised 4/12/2005)

Rule 74.14 reduces ROG emissions from operations that manufacture products from or otherwise use polyester resin material. ROG emissions from this manufacturing process are controlled by limiting loss rate, monomer ROG content, application technique, or by requiring emission control equipment. Limits are also placed on the ROG content of cleaning materials.

SCAQMD Rule 1162 (amended 7/8/2005) and SJVAPCD Rule 4684 (amended 8/18/2011) apply to sources similar to those subject to Rule 74.14. The required ROG content limits are equivalent to 74.14, generally not exceeding 35%, excluding specialty resins.

Rule 74.14 currently requires the monomer ROG content of the polyester resin material to be no more than 35 percent by weight, excluding specialty resins, and does not contain limits for the ROG content of non-monomer. The maximum potential emission reductions for Rule 74.14 would require a non-monomer content ROG limit of no more than 5 percent by weight. (0.02 tpd ROG, or 36% reduction)

RULE 74.15: BOILERS, STEAM GENERATORS AND PROCESS HEATERS (Equal to or Greater than 5 MMBTU) (Last Revised 11/10/2020)

This rule reduces NOx emissions from boilers, steam generators and process heaters used in all industrial, institutional and commercial operations, except utility electric power generating units and any auxiliary boiler used with a utility electric power generating unit and water heaters.

Rule 74.15 was recently amended implementing BARCT. No additional cost-effective emission reductions are possible from this source category.

RULE 74.15.1: BOILERS, STEAM GENERATORS AND PROCESS HEATERS (1 TO 5 MMBTU) (Last Revised 6/23/2015)

This rule is a point-of-sale rule that reduces NOx emissions by requiring large water heaters and small boilers that are sold, offered for sale, or installed in Ventura County to meet certain requirements.

The NOx and CO control requirements of this rule are equivalent to SCAQMD Rule 1146.1 (amended 12/7/2018) and SJVAPCD Rule 4307 (amended 4/21/2016) for most categories with some minor differences. For example, SJVAPCD Rule 4307 has only two categories, Atmospheric and Non-atmospheric while Rule 74.15.1 contains additional categories such as Landfill Gas, Biogas and LPG.

Rule 74.15.1 includes tables of NOx limits for different categories of combustion sources. The NOx emission limits range from 9 ppm for Pressurized Natural Gas-fired units to 25 ppm for Landfill Gas-fired units. Both Rule 1146.1 and Rule 4320 include similar limits as baseline limits for all subject units not eligible for a low use exemption. All three rules include a compliance option for units with total annual fuel use less than 1.8×10^9 BTU. Such units may comply with the rule by performing regular tune ups (twice per year, with different specific scheduling requirements) in accordance with rule requirements.

Rule 1146.1 includes a stricter NOx limit on fire-tube category sources. However, the SCAQMD staff report associated with the adoption of that limit indicates the cost effectiveness ranges from $11,000 to $36,000 per ton of NOx emissions reduced, which is close to the VCAPCD BACT threshold of $30,000 per ton of NOx reduced. SCAQMD is proposing to further reduce emissions from this source category through the use of incentives and requiring lower NOx emission limits through L-CMB-02.

Due to considerations regarding energy resiliency for our wildfire-prone area, with some facilities being subject to frequent PSPS events, it is not safe or feasible for requiring zero emission technology at this time. Emission reductions estimated for Rule 74.15.1 are based on reducing emission limits to current SCAQMD Rule 1146.1 requirements. Baseline emissions were identified as 25.38 tpy of NOx for all equipment subject to Rule 74.15.1, fire-tube boilers represent a small portion of these units, but to conservatively estimate emission reductions all units were assumed to be fire-tube design. Because this equipment has an average lifespan of 10 years, we estimate after rule adoption each year will realize 10% of total emission reductions if the rule was amended in 2023. (ER = 2/9 * fire tube inventory * 0.3) =1.692 tpy=0.005 tpd NOx

RULE 74.16: OILFIELD DRILLING OPERATIONS (Last Revised 1/8/1991)

Rule 74.16 reduces NOx emissions by requiring oilfield drilling rigs to be powered by electric utility grid power. The rule requires the District to grant an exemption from this requirement in cases where the cost of bringing grid power to the drilling site makes electric drilling economically infeasible. In cases where the District grants such an exemption, Rule 74.16 requires the diesel engines used in oilfield drilling rigs to meet NOx limits equivalent to Tier 1 diesel engines. No oil well drilling rigs currently hold a District Permit to Operate. To obtain a Permit to Operate, oil well drilling engines would have to comply with more stringent BACT requirements pursuant to Rule 26, New Source Review. No additional emission reductions are available from equipment regulated by Rule 74.16.

RULE 74.17.1: MUNICIPAL SOLID WASTE LANDFILLS (Last Revised 2/9/1999)

Rule 74.17.1 reduces fugitive ROG emissions from municipal solid waste landfills by means of requiring a landfill gas collection and control system. All municipal solid waste landfills in Ventura County are subject to either the federal New Source Performance Standard (40 CFR part 60 subpart WWW) or Rule 74.17.1, as applicable. SCAQMD Rule 1150.1 (amended 4/1/2011) and SJVAPCD Rule 4642 (amended 4/16/1998) have similar processes and do not contain more stringent requirements; no emission reductions are estimated from amendments to Rule 74.17.1. VCAPCD will monitor potential emission reductions from this source category but at this time, Rule 74.17.1 does not have any potential emission reductions for the purpose of RACM.

RULE 74.18: MOTOR VEHICLE AND MOBILE EQUIPMENT COATING OPERATIONS (Last Revised 11/11/2008)

Rule 74.18 limits ROG emissions from the application of automotive refinish coatings. This rule contains limits on the ROG content of refinish coatings used to coat both repaired auto bodies and entire vehicles in addition to ROG content limits on cleaners used for surface preparation and application equipment cleanup. CARB amended the statewide Suggested Control Measure (SCM) for Automotive Coatings on October 20, 2005. On November 11, 2008, the District adopted the SCM. The vast majority of the emission reductions from this SCM results from auto body shops switching from solvent-based color base coats to new waterborne color base coats. Other provisions of the SCM and Rule 74.18 include new ROG limits of primer sealers, specialty coatings, and cleaning solvents used for cleaning application equipment.

SCAQMD Rule 1151 (last amended 9/2014) applies to similar operations and has similar ROG content limits except that Rule 74.18 has a few more coating categories. In addition, for non-compliant coatings, Rule 74.18 requires 85% capture and control on all compliant & non-compliant coatings while Rule 1151 requires control on incremental differences between the emissions that would result from the use of compliant and non-compliant coatings. The transfer efficiency, cleanup and cleaning solvents requirements are the same and the rules are functionally equivalent.

SCAQMD is proposing to further reduce ROG emissions from Rule 1151 with CTS-01. The proposed reduction in emissions is through the required use of zero and near-zero ROG materials along with alternative curing technologies. VCAPCD will monitor potential emission reductions from this source category as SCAQMD implements new technology, but at this time no emission reductions are associated with processes regulated by Rule 74.18.

RULE 74.19: GRAPHIC ARTS (Last Revised 6/14/2011)

Rule 74.19 reduces ROG emissions from the use of inks, fountain solutions, coatings, adhesives, and cleaners used at graphic arts operations through limits on the ROG content of inks, coating, adhesives, fountain solutions, and solvent cleaners. On June 14, 2011, the District adopted new lower ROG content limits in Rule 74.19 for some fountain solutions and cleaning solutions used in this source category. The new limits are equivalent to or stricter than limits in SCAQMD Rule 1130 (amended 5/2/2014), SJVAPCD Rule 4607 (amended 12/18/2008) and, for the solvent cleaning aspects of the rule, SCAQMD Rule 1171 (amended 5/1/2009). VCAPCD will monitor potential emission reductions from this source category but at this time no emission reductions are associated with emissions associated with Rule 74.18.

RULE 74.19.1: SCREEN PRINTING OPERATIONS (Last Revised 11/11/2003)

Rule 74.19.1 reduces ROG emissions from the use of inks, coatings, adhesives, and cleaners used at screen printing operations. The rule specifies limits on the ROG content of inks, coating, adhesives and fountain solutions, whereas ROG emissions from cleaning solvents are limited by ROG content and ROG composite vapor pressure requirements.

SCAQMD Rule 1130.1 (last amended 12/13/1996) applies to similar processes in Rule 1171 (last amended 5/1/2009) applying to the use of solvents for the cleaning of equipment. Rule 74.19.1 has as stringent or more ROG content requirements as Rule 1130.1, while Rule 1171 has lower ROG content requirements for certain categories of solvents used for screen printing activities. However, Rule 1171 does provide the ability to use higher ROG content solvents if at least 70 percent vapor capture and 95 percent control is achieved, while Rule 74.19.1 requires a combined 75% capture and control for solvents that exceed required ROG content limits. For the purpose of RACM analysis, all emissions are assumed to be controlled by 75% and emission reductions are calculated if this was increased to 95%. (ER = 0.0273 tpd baseline *.80) = 0.022 tpd ROG

RULE 74.20: ADHESIVES AND SEALANTS (Last Revised 10/09/2018)

Rule 74.20 reduces ROG emissions from the use of adhesives, sealants, adhesive primers, sealant primers, and cleaning solvents used at bonding operations. Rule requirements limit ROG emissions by limiting the ROG content of adhesives, sealants, primers, and cleaners.

In VCAPCD's 2020 RACT SIP Revision, it was discussed that this rule is equivalent to SCAQMD Rule 1168 (amended 10/6/2017) and SJVAPCD Rule 4653 (Amended 9/16/2010) with some minor differences. Furthermore, there are no major sources in this source category in Ventura County.

SCAQMD is evaluating Rule 1168 for RACM emission reductions by requiring zero and near-zero ROG technology which would reduce emissions from this source category, but cost-effectiveness has not been determined. The use of incentives to encourage lower-emitting materials is also being considered by SCAQMD; however, VCAPCD does not have the financial resources to implement similar incentives at this time. VCAPCD will monitor potential emission reductions from this source category but at this time there are no potential emission reductions.

RULE 74.21: SEMICONDUCTOR MANUFACTURING (Last Revised 4/6/1993)

Rule 74.21 reduces ROG emissions from semiconductor manufacturing operations through various operational requirements and solvent concentration limits. Rule requirements limit ROG emissions by limiting ROG content of maskants, developers, or cleaning solvents used as part of a semiconductor manufacturing operation or to anyone who manufactures or supplies such products.

SCAQMD Rule 1164 (last amended 1/13/95) and BAAQMD Rule 8-30 (last amended 10/7/1998) applies to similar processes. Rule 74.21 regulates ROG content for more categories and at a more restrictive level than both Rule 1164 and 8-30, while all require an emission control system with at least 90 percent efficiency. VCAPCD will monitor potential emission reductions from this source category but at this time there are no further potential emission reductions.

RULE 74.22: NATURAL GAS-FIRED, FAN-TYPE CENTRAL FURNACES (Last Revised 11/9/1993)

Rule 74.22 reduces ROG emissions by prohibiting the sale and installation of forced air space heaters that do not meet specified NOx limits. Amendments to Rule 74.22 are already proposed as a Control Measure and therefore, does not qualify for RACM analysis as the maximum emissions reductions from this source category will be implemented.

RULE 74.23: STATIONARY GAS TURBINES (Last Revised 11/12/2019)

Rule 74.23 reduces NOx emissions from stationary turbines with rated output greater than 0.3 MW fueled with gaseous or liquid fuels. This applicability limit is the same as SCAQMD Rule 1134 (amended 2/4/2022) and SJVAPCD Rule 4703 (amended 9/20/2007).

Rule 74.23's 2019 amendments implemented BARCT, achieving all emission reductions from this source category that was considered cost-effective. VCAPCD will monitor potential emission reductions from this source category but at this time there are no further potential emission reductions.

RULE 74.24: MARINE COATINGS OPERATIONS (Last Revised 9/11/2012)

Rule 74.24 reduces ROG emissions from coating and cleaning solvents used to coat marine or freshwater vessels, excluding boatyard repair facilities and marinas. Rule requirements limit ROG emissions by limiting the ROG content of topcoats and primers. Emissions of ROG from cleaners are also controlled by limiting the ROG content of surface prep cleaners and application equipment cleaners.

The ROG control requirements of this rule are equivalent to South Coast AQMD Rule 1106 (last amended 5/3/2019) with some minor differences. Rule 74.24 has additional coating categories that Rule 1106 does not have, while Rule 1106 requires lower ROG limits for baked and air-dried High Gloss Coatings and Pretreatment Wash Primer. Additionally, the following coatings specified in Rule 74.24 would be subject to the default ROG coating limits of 275 g/L for baked and 340 g/L for air dried: Air Flask Coatings, Military Exterior, Rubber Camouflage Coatings, Specialty Interior, and Wood Sealer. For the purpose of RACM evaluation, all emission reductions were estimated for the more restrictive baked limit for Rule 1106's default category, i.e., reducing allowed ROG content 65 g/L from 340 g/L to 275 g/L. (ER = 0.03570 tpd from category * 65/340 = 0.006825 tpd ROG)

RULE 74.24.1: PLEASURE CRAFT COATING AND COMMERCIAL BOATYARD OPERATIONS (Last Revised 11/10/2020)

Rule 74.24.1 reduces ROG emissions from the use of coatings and cleaning solvents used to coat marine or freshwater vessels at commercial boatyard repair facilities and marinas. This rule also contains a sales prohibition for non-complying coatings sold at marine stores that sell pleasure craft coatings. Rule requirements limit ROG emissions through ROG content limits on topcoats and primers. Emissions of ROG from cleaners are also controlled by limits on the ROG content of surface prep cleaners, the ROG composite vapor pressure of cleaning solvents, and requiring the use of enclosed spray gun washers. Also, this rule requires use of high transfer efficiency spray equipment such as HVLP spray equipment.

Rule 74.24.1 was most recently amended to reduce ROG limits for Pleasure Craft Antifoulant Coatings, Topcoat categories, and added a Low-Solids Coating category to demonstrate equivalence to RACT. A separate category was created for Commercial Antifoulant Coatings at this time, as there were no products which were able to meet a lower ROG content limit.

SCAQMD Rule 1106 (amended 5/3/2019) applies to similar processes as 74.24.1. Rule 74.1 is as stringent as Rule 1106, and no additional emission reductions were found to be available from this category.

RULE 74.25: RESTAURANT COOKING OPERATIONS (Adopted 10/12/2004)

Rule 24.25 reduces ROG and PM emissions from conveyorized charbroilers that are used to cook 875 pounds of meat or more per week. It is similar to SCAQMD Rule 1138 (last amended 11/14/1997) and SJVAPCD Rule 4692 (last amended 6/21/2018). Rule 4692 has a few provisions that are slightly more restrictive than Rule 74.25. Rule 74.25 requires at least 83% reduction of both ROG and PM10 from applicable units, while Rule 4692 requires at least 83% reduction in PM10 and 86% reduction in ROG. In addition, SJVAPCD applies to charbroilers used to cook more than 400 pounds of meat per week.

While the additional restrictions in the SVJAPCD rule could be added to Rule 74.25, it would not be likely to help advance attainment of the ozone NAAQS in Ventura County. The rulemaking process takes approximately one year, which would allow for adoption at about 2024. It is necessary to provide time for industry to adjust to the new requirements and either demonstrate compliance or purchase new equipment that meets the requirements of a new rule. Therefore, any new reductions would not likely occur until the ozone season of 2026, which is the attainment year for Ventura County. In addition, the incremental cost effectiveness of increasing the control efficiency from 83% to 86% would likely be astronomical, due to the minimal reduction in emissions. Many of the catalytic oxidizers currently in use likely meet the 86% ROG reduction requirement in Rule 4692, and these changes to Rule 74.25 would not result in actual emission reductions from those units.

<u>RULE 74.26: CRUDE OIL STORAGE TANK DEGASSING (Last Revised 11/8/1994)</u>

Rule 74.26 reduces ROG emissions by prohibiting the venting of ROG vapors to the atmosphere from above-ground tanks with a capacity of 2,000 barrels or greater used to store crude oil or produced water. When such tanks are undergoing maintenance or being decommissioned, the rule requires ROG vapors to be treated rather than released to the air.

SCAQMD Rule 1149 (last amended 5/2/2008) applies to similar process as 74.26. Rule 1149 has a lower threshold of ROG for degassed tanks, 5,000 ppmv versus 10,000 ppmv for Rule 74.26. Rule 1149 also applies to pipeline degassing activities. Rule 1149 also applies to smaller tanks with a storage capacity of 500 gallons or greater.

Rule 74.26 was evaluated for emission reductions by including pipeline degassing activities in 2021. It was estimated that by including pipeline degassing in the requirements of Rule 74.26, it would result in an ROG emission reduction of 542 pounds per year. Cost estimates for similar degassing activities in Santa Barbara County were $16,000 per event, with multiple pipeline degassing events occurring each year. Discussions with pipeline owners in Ventura County informed VCAPCD that there are at least 2 degassing events per year. At 2 events per year, emissions would be reduced at a cost of $118,081 per ton of ROG reduced, exceeding the District's cost threshold for BACT of $30,000 per ton. Of the larger tank emissions, about 97% of VCAPCD tank degassing is attributed to crude oil storage tanks with a capacity of 2,000 barrels or greater.

<u>(ER = 50% * existing inventory + 95% control of tanks >= 500 gallons < 2,000 bbl)</u>
<u>ER = (8.24 tpy * 0.5) + (4.51 tpy * .95) = (4.12 tpy) + (4.28 tpy) = 8.41 tpy = 0.023 tpd</u>

<u>RULE 74.27: GASOLINE AND ROC LIQUID STORAGE TANK DEGASSING OPERATIONS (Last Revised 11/8/1994)</u>

Rule 74.27 reduces ROG emissions by prohibiting the venting of ROG vapors to the atmosphere from any gasoline storage tank that has a storage capacity greater than 5,000 gallons and any

storage tank that has a storage capacity greater than 5,000 gallons that stores ROG liquids, excluding petroleum liquids, having a true vapor pressure equal to or greater than that determined by: TVP @ 68 °F (psia) = 2.3 + 23,000/V, where V is the volume of the tank in gallons. When such tanks are undergoing maintenance or being decommissioned, the rule requires ROG vapors to be treated rather than released to the air.

SCAQMD Rule 1149 (amended 5/2/2008) has a lower ROG threshold, 5,000 ppmv versus 10,000 ppmv for Rule 74.27. SCAQMD also has a lower tank size applicability threshold for Rule 1149, applying to tanks with a volume of 500 gallons or greater.

(ER = existing emissions * 0.5, + comparable control (95%) to tanks >= 500 <= 5000 gal)
<u>ER = (0.282 tpy * 0.5) + (0.175 tpy * 0.950) = 0.141 + 0.166 = 0.307 tpy = 0.00084 tpd</u>

<u>RULE 74.28: ASPHALT ROOFING OPERATIONS (Last Revised 5/10/1994)</u>

Rule 74.28 reduces ROG emissions from asphalt roofing equipment and operations by requiring close fitting container lids and temperature limits. Rule 74.28 applies to equipment used for melting, heating or holding asphalt or coal tar pitch.

MDAQMD Rule 471 (last amended 12/21/1994) applies to similar sources as Rule 74.28. The requirements are identical between these rules and no additional emission reductions were found to be available from this category.

<u>RULE 74.29: SOIL DECONTAMINATION OPERATIONS (Last Revised 4/8/2008)</u>

This rule established procedures by which ROG emissions are minimized during the aeration, treatment or removal of soil contaminated with petroleum fuel. Rule 74.29 applies to soil decontamination equipment and handling of contaminated soil.

SJVAPCD Rule 4651 (last amended 11/20/2007) and SCAQMD Rule 1166 (last amended 5/11/2001) apply to similar processes and have similar work practice requirements to reduce ROG emissions. Both Rule 4651 and Rule 1166 have similar prohibitory requirements with a 95% vapor control for aeration of contaminated soils which is comparable to the flat rate emission limit found in Rule 74.29 of 100 ppm for small aeration projects and 0.08 lbs/hour emission limit for larger projects. Both SJVAPCD and SCAQMD however do not exempt the use of certain contaminated soils for the use of daily cover at Class III Solid Waste Disposal Sites. Rule 74.29 allows the use of soils which contain equal to or less than 100 ppmw gasoline or 1,000 ppmw diesel for daily cover. One landfill within VCAPCD's jurisdiction uses contaminated soils as ADC and has used on average 369,002 tons of contaminated soil as cover per year over the last five years. Due to similar requirements between the three districts, the only emission reductions from amendments to Rule 74.29 would be removal of the contaminated soil exemption for use as a daily cover at landfills. (ER = tons of soil * gasoline ROG content [diesel evaporation from soil will be insignificant overnight] ER = 396,002 tons soil/year * 100 tons ROG/1,000,000 tons soil = 435.6 tpy ROG = 0.12 tpd)

RULE 74.30: WOOD PRODUCTS COATING (Last Revised 6/27/2006)

Rule 74.30 reduces ROG emissions from wood products coatings and cleaning materials by ROG content limits and by requiring certain application methods. Rule 74.30, SCAQMD Rule 1136 (amended 6/4/1996), and SJVAPCD Rule 4606 (amended 10/16/2008) are equivalent in stringency and no additional emission reductions were found to be available from this rule at this time.

RULE 74.31: METALWORKING FLUIDS AND DIRECT CONTACT LUBRICANTS (Last Revised 11/12/2013)

Rule 74.31 applies to the production, sale and use of metalworking fluids and direct contact lubricants and reduces ROG emissions by requiring substitution of high-ROG metalworking fluids with low-ROG fluids, including medium naphthenic oils, paraffinic oils, vegetable oils, synthetic or semi-synthetic oils, or water-reducible fluids.

SCAQMD Rule 1144 (last amended 7/9/2010) applies to similar processes and is effectively identical to Rule 74.31 and no additional emission reductions were found to be available from this rule.

RULE 74.33: LIQUEFIED PETROLEUM GAS TRANSFER OR DISPENSING (Last Revised 1/11/2015)

Ruel 74.33 applies to the transfer or dispensing of liquefied petroleum gas (LPG) and reduces the ROG emissions by requiring the use of proper transfer lines, fittings, gaskets, and gages as specified in the rule. This rule applies to the transfer of LPG to or from any cargo tank, any stationary or portable storage tank, or any cylinder.

SCAQMD Rule 1177 (adopted 6/1/2012) applies to similar processes and was the basis for the adoption of Rule 74.33. Rule 1177 has similar requirements on transfer for bulk transfer, transfer and dispensing facilities. VCAPCD will monitor potential emission reductions from this source category but at this time there are no potential emission reductions.

RULE 74.34: NOX REDUCTIONS FROM MISCELLANEOUS SOURCES (Last Revised 12/13/2016)

Rule 74.34 reduces NOx and CO emissions from dryers, furnaces, heaters, incinerators, kilns, ovens, and duct burners where the total rated heat input for the unit is 5 million BTU per hour or greater.

SCAQMD Rule 1147 (amended 7/7/2017) and SJVAPCD Rule 4309 (adopted 12/15/2005) regulate sources similar to those regulated by Rule 74.34. The emission limits in Rule 1147 and Rule 4309 are similar to those in Rule 74.34, however Rule 1147 regulates emissions from units down to 1 million BTU per hour. Rule 4309 is more similar to Rule 74.34 in that it strictly regulates emissions from sources rated at 5 million BTU per hour or greater. The decision to regulate only the units rated at 5 million BTU per hour or greater was determined on cost-effectiveness. Rule 1147 was recently amended to make changes that provides relief to affected businesses by delaying compliance dates for specific units, to raise the NOx limit for low temperature units, and adds and clarifies a number of exemptions for a variety of equipment categories.

Rule 74.34 provides exemptions for combustion equipment operating as ROG control devices, such as afterburners, catalytic oxidizers, thermal oxidizers, and vapor incinerators. The emission inventory for the county indicates that there is only one thermal oxidizer used for ROG control rated at 5 million BTU per hour that might be subject to this rule. However, this unit is associated with the destruction of nitrogen-containing compounds and these NOx emissions cannot be controlled by modifying combustion conditions. Additionally, an exemption is provided for gas flares and low-use units.

During the rule development of Rule 74.34, it was calculated that additional emission reductions from requiring lower NOx concentrations through the use of SCR had an incremental cost-effectiveness between $53 and $141 per pound of NOx reduced, which exceeds VCAPCD's BACT threshold of $15 per pound. VCAPCD will monitor potential emission reductions from this source category but at this time there are no potential emission reductions.

VACUUM TRUCK OPERATIONS (BAAQMD Rule 8-53 – No VCAPCD Equivalent Rule)

Rule 8-53 was adopted April 18, 2012, and applies to the following facilities: petroleum refineries, bulk plants, bulk terminals, marine terminals, and organic liquid pipeline facilities. Moreover, on May 2, 2008, SCAQMD revised their Rule 1149, *Storage Tank and Pipeline Cleaning and Degassing*, to, among other provisions, require that until certain other provisions are met, vacuum trucks that remove residual product and sludge from pipeline and storage tanks subject to the rule must exhaust vapors into a control device and the exhaust concentration of control devices must not exceed 500 ppmv, measured as methane. BAAQMD staff estimate that Rule 8-53 will reduce ROG emissions from vacuum truck operations by 1.05 ton per day. This represents an 85 percent reduction in emissions from moving regulated materials and a 70 percent reduction of overall organic emissions from vacuum truck operations.

Opportunities for significant emission reductions from vacuum trucks are more limited in Ventura County than in the Bay Area AQMD and South AQMD regions. Ventura County no longer has any refineries or marine terminals and only a few bulk plants and terminals. It does, however, have numerous oil production, storage, and processing facilities, including storage tanks, sumps, boxes, and pipelines. Moreover, vacuum trucks are often used in Ventura County to transport produced crude oil from small and isolated production locations to storage and processing facilities.

Ventura County annual oil production amounts to 2.8% of the refinery capacity in the Bay Area (ratio of CalGEM 2015 oil production data for Ventura County to California Energy Commission refinery capacity data). Therefore, a conservative estimate of the emission reductions from a vacuum truck control rule in Ventura County is 15% of the BAAQMD rule, or 0.16 tons ROG per day. Note that due to rule development and implementation timelines, the soonest this could be in effect is 2026.

EMISSIONS OF NITROGEN OXIDES FROM COMMERCIAL FOOD OVENS (SCAQMD Rule 1153.1 – No VCAPCD Equivalent Rule)

SCAQMD Rule 1153.1 applies to in-use ovens, dryers, smokers, and dry roasters with NOx emissions from fuel combustion that require SCAQMD permits and are used to prepare food or products for making beverages for human consumption. Preliminary calculations based on population ratio indicate possible NOx reductions of 0.008 tons per day from commercial food ovens in Ventura County. This estimate is based on estimated reductions from SCAQMD Rule 1147 when it was originally adopted in November 2008.

SCAQMD adopted Rule 1153.1 to remove commercial food ovens from Rule 1147 applicability. Control technologies have not matured in a timely manner for commercial food ovens. In response, SCAQMD removed food ovens, including roasters and smokehouses, from Rule 1147 applicability and subjected them to new Rule 1153.1 with different emission limits and compliance dates.

Rule 1153.1 extends the compliance time for most applicable units to three years or more after the adoption date in 2014. In order to provide similar compliance timeframes in Ventura County, the emission reductions would not be required until 2026 or later so they would not affect the attainment date. Therefore, reductions from these sources would not be considered RACM at this time.

FOOD PRODUCTS MANUFACTURING AND PROCESSING OPERATIONS (SCAQMD Rule 1131 – No VCAPCD Equivalent Rule)

Rule 1131 was adopted September 15, 2000 (last amended 6/6/2003) and applies to food manufacturing facilities. Rule 1131 reduced ROG emissions from food manufacturing and processing operations by limiting the ROG content of process solvents and solvents used for sterilization of equipment; or requiring control equipment; or requiring equivalent reductions through reformulation or process modifications. Affected operations include distillation, extraction, reacting, blending, drying, crystallizing, granulation, separation, sterilization, and filtering.

SCAQMD staff estimated that Rule 1131 would reduce ROG emissions from food manufacturing operations by two tons per day. This represents an 81 percent reduction in emissions from subject operations.

During the last RACM analysis, it was determined that Ventura County has a number of food processing facilities, but they do not use the kind of processes cited above that require significant solvent use. None of the food processing facilities in Ventura County have permitted equipment or processes that use solvent as the rule indicates. Therefore, solvent use at the facilities must be below the exemption threshold of 200 pounds of ROG per year. Maximum solvent use at all food processing facilities combined is 2.7 tons of ROG per year, or 0.0074 tons ROG per day. Applying the estimated 81% reduction, a very conservative estimate, the potential emission reductions from this type of rule in Ventura County would be 0.006 tons ROG per day.

EMISSIONS FROM RESIDENTIAL COMBUSTION DEVICES (SCAQMD R-CMB-03, R-CMB-04 – No VCAPCD Equivalent Rule)

Residential combustion devices such as stoves, ovens, griddles, broilers, dryers, and other combustion equipment not regulated by other rules are currently not controlled by VCAPCD. Control of emissions from this equipment would be achieved by requiring new units to install low-NOx or zero-emission technology. SCAQMD estimates 1.7 tons per day of NOx reduced, a 70% reduction of their baseline emissions from this category of equipment.

For the purpose of RACM analysis, adoption of this regulation is estimated no sooner than 2024 and would likely include sell-through provisions for existing inventory, therefore, there are no emission reductions calculated for what can be realized by the 2026 attainment year. VCAPCD will monitor potential emission reductions from this source category but at this time there are no potential emission reductions for the purpose of RACM.

EMISSIONS FROM COMMERCIAL SPACE HEATING (SCAQMD C-CMB-02 – No VCAPCD Equivalent Rule)

Commercial sized space heating furnaces with a heat input rating between 175,000 BTU per hour and 5,000,000 BTU per hour are currently not controlled by VCAPCD. Control of emissions from this equipment would involve requiring installation of low-NOx or zero-emission technology for new and replacement units and incentives to encourage early adoption. SCAQMD estimates 0.17 tons per day of NOx reduced, a 62% reduction from baseline.

For the purpose of RACM analysis, adoption of this regulation is estimated no sooner than 2024 and would likely include sell-through provisions for existing inventory, therefore, there are no emission reductions calculated for what can be realized by the 2026 attainment year. VCAPCD will monitor potential emission reductions from this source category but at this time there are no potential emission reductions for the purpose of RACM.

EMERGENCY STANDBY ENGINES (SCAQMD L-CMB-04 – No VCAPCD Equivalent Rule)

Emergency standby internal combustion engines are required to obtain a District permit if rated at 50 brake horsepower or greater, but the emissions from this equipment is currently not regulated by VCAPCD. New installations are required to install a BACT equivalent, but many engines which were installed in the past have older technology and higher pollution emissions associated with them. SCAQMD is proposing to reduce emissions from this source category, evaluating the ability to require replacement with low-NOx or zero-emission technology. Due to cost-effectiveness considerations, since these emergency engines are limited to less than 50 hours of operation per year, and the limited access to widely available zero-emission technology, emission reductions are not expected to be realized before VCAPCD's attainment date of 2026.

For the purpose of RACM analysis, adoption of this regulation is estimated no sooner than 2026 which will result in no emission reductions by VCAPCD's attainment year. VCAPCD will monitor potential emission reductions from this source category but at this time there are no potential emission reductions for the purpose of RACM.

APPENDIX E

VENTURA COUNTY

TRANSPORTATION CONTROL MEASURES

REASONABLY AVAILABLE CONTROL MEASURE ASSESSMENT

Introduction

The Clean Air Act (CAA) Section 172(c)(1) requires a review of Reasonably Available Control Measures (RACM) during the Air Quality Management Plan/State Implementation Plan (AQMP/SIP) development process to consider possible Transportation Control Measures (TCMs) that are feasible to implement in Ventura County. For TCMs to be RACM, TCMs must be both technologically and economically feasible and must advance the projected attainment date of the National Ambient Air Quality Standard (NAAQS).

The U.S. Environmental Protection Agency (EPA) left the definitions for technologically and economically feasibility vague so that areas of the country could determine what measures would be feasible or infeasible according to local factors. Factors such as the availability of control measures, ability to achieve emission reductions, and degree of cost effectiveness are the primary considerations on an area-by-area basis. In addition, EPA did not provide a conclusive definition on "advancing attainment," so agencies have based their determination of RACM on whether a measure or group of measures would advance attainment of the NAAQS by at least one year.

The Southern California Area of Governments (SCAG) is the metropolitan planning organization for the Ventura County portion of the South Central Coast Air Basin. Ventura County TCMs are included in both the SCAG Regional Transportation Plan, called Connect SoCal, and the Federal Transportation Improvement Program (FTIP). Emission reductions associated with TCMs are accounted for in the Connect SoCal and FTIP baseline emissions. Thus, the VC AQMP/SIP does not claim TCM emission reductions separately, as an additional benefit, because their reductions are already included in the Connect SoCal and FTIP baseline emissions used for the AQMP/SIP modeling.

In the SCAG region, TCM development and updates are continually conducted through the FTIP process. TCM development, approval, and changes are govern by the FTIP guidelines that establishes procedures for the selection, funding, and completion of TCMs. This "rollover process" was established for Ventura County to replace a process that previously required a SIP update each time a TCM was adopted or replaced. The rollover process continues to regulate the selection and implementation of TCMs through a more comprehensive planning process with local and regional participation.

Methodology

A list of candidate RACM was prepared by the District using TCMs from the Clean Air Act (CAA) Section 108(f)(1)(A), the 2016 Ventura County AQMP and other air district 8-hour ozone plans, such as the 2016 South Coast AQMP, 2016 San Joaquin AQMP, 2017 Sacramento AQMP, and the 2016 San Diego AQMP.

The RACM under consideration were organized according to the sixteen TCM categories listed in CAA Section 108(f), shown below.

i. Programs for improved use of public transit;

ii. Restriction of certain roads or lanes to, or construction of such roads or lanes for use by, passenger buses or high occupancy vehicles;

iii. Employer-based transportation management plans, including incentives;

iv. Trip-reduction ordinances;

v. Traffic flow improvement programs that achieve emission reductions;

vi. Fringe and transportation corridor parking facilities, serving multiple occupancy vehicle programs or transit service;

vii. Programs to limit or restrict vehicle use in downtown areas or other areas of emission concentration, particularly during periods of peak use;

viii. Programs for the provision of all forms of high-occupancy, shared-ride services, such as the pooled use of vans;

ix. Programs to limit portions of road surfaces or certain sections of the metropolitan area to the use of non-motorized vehicles or pedestrian use, both as to time and place;

x. Programs for secure bicycle storage facilities and other facilities, including bicycle lanes, for the convenience and protection of bicyclists, in both public and private areas;

xi. Programs to control extended idling of vehicles;

xii. Programs to reduce motor vehicle emissions, consistent with Title II of the Clean Air Act, which are caused by extreme cold start conditions;

xiii Employer-sponsored programs to permit flexible work schedules;

xiv. Programs and ordinances to facilitate non-automobile travel, provision, and utilization of mass transit, and to generally reduce the need for single-occupant vehicle travel, as part of transportation planning and development efforts of a locality, including programs and ordinances applicable to new shopping centers, special events, and other centers of vehicle activity;

xv. Programs for new construction and major reconstruction of paths, tracks, or areas solely for the use by pedestrian or other non-motorized means of transportation, when economically feasible and in the public interest; and

xvi. Programs to encourage the voluntary removal from use and the marketplace of pre-1980 model year light duty vehicles and pre-1980 model light duty trucks.

The District conducted an initial RACM analysis of the candidate list. Each TCM on the list was given a control measure number, title, and a brief description. If a TCM was found feasible for Ventura County, it was recommended as a potential measure for the 2022 AQMP along with the appropriate implementing agency. If a TCM was determined infeasible for Ventura County, it was not recommended as a measure for the 2022 AQMP and a reasoned justification was provided. The RACM list was posted on the VCAPCD website and was presented to the VCTC (Ventura County Transportation Commission) staff and the following committees for their review: Technical Transportation Advisory Committee, Transit Operators Committee, Citizen Transportation Advisory Committee, and Social Services Transportation Advisory Committee, and the SCAG Transportation Conformity Working Group. These groups generally meet on a monthly or quarterly basis and provide opportunities for the public to participate and contribute. The measures are summarized in Table E-1.

Based on this comprehensive analysis and review, the TCMs that were determined to be feasible are already being implemented or have been implemented in Ventura County. Feasible TCMs in the analysis are included in the SCAG Connect SoCal plan and FTIP. Thus, their emission reductions are already included in the baseline emissions used for the AQMP/SIP modeling and may not be claimed again, separately, in the 2022 AQMP. The TCMs that were determined to be infeasible did not meet the criteria for RACM because of the individual reasons provided in the analysis. Moreover, implementing all feasible TCMs in the RACM assessments would not advance Ventura County's 8-hour ozone attainment date by at least one year. This criterion also applies to RACM implementation.

Summary

The CAA Section 172(c)(1) requires a comprehensive review of RACM during the AQMP/SIP development process to ensure the implementation of TCMs in Ventura County as expeditiously as practicable. For TCMs to be considered RACM they must be both economically and technologically feasible and must advance the attainment date of the NAAQS by at least one year. Based on this comprehensive analysis, the TCMs determined to be feasible are either being implemented or have been implemented in Ventura County and are included in the SCAG Connect SoCal and FTIP. The TCMs determined to be infeasible did not meet the criteria for RACM implementation because of the individual reasons provided in the analysis. Moreover, implementing all feasible TCMs in the RACM analysis would not advance Ventura County's 2015 8-hour ozone NAAQS attainment date by at least one year.

Table E-1
2022 Ventura County Reasonably Available Control Measures Analysis

Measure No.	Measure Title	Description	Feasible for VC?	Used before in VC?	Reasoned Justification for Infeasible Measure	Potential Implementing Agency
Section 108(f) 1. Programs For Improved Public Transit						
1.1	Regional Express Bus Program	Purchase of buses to operate regional express bus services.	yes	yes		Transit Operators, VCTC
1.2	Transit Access to Airports	Operation of transit to airport to serve air passengers.	no	no	Not economically feasible because there are not enough air passengers in Ventura County.	
1.3	Study Benefits of a Particulate Trap Retrofit Program	Examine potential to accelerate application of particulate traps on diesel-powered buses to achieve earlier compliance with State regulations.	yes	yes		Transit Operators, VCAPCD, VCTC
1.4	Major Expansion of Mass Transit	Major change to the scope and service levels.	no	no	Not economically feasible because there is not enough transit demand for order of magnitude increases in spending.	
1.5	Expansion of Public Transportation Systems	Expand and enhance existing public transit services.	yes	yes		Transit Operators, VCTC
1.6	Transit Service Improvements in Combination with Park-and-Ride Lots and Parking Management	Local jurisdictions and transit agency improve the public transit system and add new Park-and-Ride facilities and spaces on an as needed basis.	yes	yes		Cities, County, Transit Operators, VCTC
1.7	Free transit during special events	Offer free transit during selected special events to reduce event-related congestion and associated emission increases.	no	no	No authority to implement, however, individual transit agencies could decide whether this measure would be feasible to implement for them.	

Measure No.	Measure Title	Description	Feasible for VC?	Used before in VC?	Reasoned Justification for Infeasible Measure	Potential Implementing Agency
1.8	Require that government employees use transit for home to work trips, expand transit, and encourage large businesses to promote transit use	Require all government employees to use transit a specified number of times per week.	no	no	No authority to implement.	
1.9	Increase parking at transit centers or stops	Encourage transit convenience by providing additional parking at transit centers.	yes	yes		Cities, County, Transit Operators, VCTC
1.10	Expand regional transit connection ticket distribution	Provides interchangeability of transit ticket.	yes	yes		Transit Operators, VCTC
1.11	Provide free public transit during episodes	Provide free transit rides during high level ozone episodes.	no	no	Not economically feasible.	
1.12	Dedicated Bus Lanes	Dedicate or construct lanes for transit bus service.	yes	yes		Cities, County, Transit Operators
1.13	Half Price Fares on Feeder Bus Service	All local transit bus services to rail stations reduce fare by half.	no	yes	Not economically feasible.	
1.14	Real-Time Bus Schedule information	Expand trials of real-time bus schedule information to local transit providers.	yes	yes		Transit Operators, VCTC
1.15	Shorter Distance from Buildings to Bus Stops	For existing buildings, re-route traffic to allow buses to come closer to the building. For new buildings, alter setback requirements to allow closer bus access.	no	no	Not economically feasible, however, some jurisdictions may already have existing requirements for new development.	
1.16	Subscription Services	Free van service to provide transportation for the elderly, handicapped or individuals who have no access to transportation.	no	yes	Not economically feasible, however, some transit agencies provide free bus service w/ ADA or DAR ID.	

Measure No.	Measure Title	Description	Feasible for VC?	Used before in VC?	Reasoned Justification for Infeasible Measure	Potential Implementing Agency
1.17	Consolidation of Public Transit Operators	Consolidate all public transit agencies in the County.	no	no	No authority to implement.	
1.18	Transit Voucher Program	Transit vouchers for elderly and low income commuter.	yes	yes		Transit Operators, VCTC
1.19	Bus Signal Priority	Bus signal priority system on bus fleets for increased operation efficiency and travel time savings.	yes	yes		Transit Operators
1.20	Passenger Rail Improvements	Installation of additional platforms, double tracks, concrete ties, bridges, signal relocation.	yes	yes		Cities, Rail Transit Agencies
1.21	Alternative Fuel Buses	Self-explanatory.	yes	yes		Cities, Transit Operators
1.22	Intermodal Centers	Improved transit connection of various travel modes	yes	yes		Cities, Transit Operators
1.23	Maglev	Construct Regional low-speed magnetic levitation transit.	no	no	Not economically feasible.	
1.24	Paratransit Service	Self-explanatory	yes	yes		VCTC, Cities, Transit Operators
Section 108(f) 2. Restriction Of Certain Roads Or Lanes To, Or Construction Of Such Roads Or Lanes For Use By, Passenger Buses Or High Occupancy Vehicles						
2.1	Update High Occupancy Vehicle (HOV) Lane Master Plan	Increase enforcement, increasing occupancy requirements, conversion of existing HOV lanes to bus only lanes, designate new carpool lanes as bus-only lanes, convert mixed flow to HOV to close gaps & extend existing lanes; utilize freeway shoulders for peak-period express bus use; commercial vehicle buy-in to HOV lanes; & appropriateness of HOV lanes for corridors that consider congestion pricing.	yes	yes		Caltrans, SCAG, VCTC

Measure No.	Measure Title	Description	Feasible for VC?	Used before in VC?	Reasoned Justification for Infeasible Measure	Potential Implementing Agency
2.2	Fixed Lanes for Buses and Carpools on Arterials	Provide fixed lanes for buses and carpools on arterial streets where appropriate.	yes	yes		Caltrans, VCTC
2.3	Expand number of freeway miles available, allow use by alternative fuel vehicles, changes to HOV lane requirements and hours	Various measures evaluated in many ozone nonattainment areas. Specifics vary according to freeway system, use patterns and local characteristics.	yes	yes		ARB, Caltrans
2.4	Express toll lanes/High Occupancy Toll Lanes	Self-explanatory	no	no	Not economically feasible	
Section 108(f) 3. Employer-Based Transportation Management Plans, Including Incentives						
3.1	Commute Solutions	The federal law that complements parking cash-out is called the Commuter Choice Program. It provides benefits that employers can offer to commute to work by methods other than driving alone.	yes	yes		Employers, Transit Operators, VCTC
3.2	Parking Cash-Out	State law requires certain employers who provide subsidized parking for their employees to offer cash allowance in lieu of a parking space.	yes	yes		ARB, Employers
3.3	Employer Rideshare Program Incentives	Employer rideshare incentives and introduction of strategies designed to reduce single occupant vehicle trips. Examples include public awareness campaigns, Transportation Management Associations among employers, alternative work hours, and financial incentives for TCM participants as well as tax breaks for employers.	yes	yes		Employers, VCAPCD, VCTC

Measure No.	Measure Title	Description	Feasible for VC?	Used before in VC?	Reasoned Justification for Infeasible Measure	Potential Implementing Agency
3.4	Implement Parking Charge Incentive Program	Evaluate feasibility of an incentive program for cities and employers that convert free public parking spaces to paid spaces. Review existing parking polices as they relate to new development approvals.	yes	yes		Cities, County, Employers
3.5	Preferential Parking for Carpools and Vanpools	This measure encourages public and private employers to provide preferential parking spaces for carpools and vanpools to decrease the number of single occupant automobile work trips. The preferential treatment could include covered parking spaces or nearby spaces.	yes	yes		Employers, VCAPCD
3.6	Employee Parking Fees	Encourage public and private employers to charge employees for parking.	no	no	Not technologically feasible because the region is not urbanized enough to make it effective and could have negative effect to public parking areas (curb parking).	
3.7	Merchant Transportation Incentives	Implement "non-work" trip reduction ordinances requiring merchants to offer customers mode shift travel incentives such as free bus passes and requiring owners, managers & developers of large retail establishments to provide facilities for non-motorized modes.	no	no	No authority to implement.	
3.8	Purchase vans for vanpools	Purchase a specified number of vans for use in employee commute travel.	yes	yes		Employers

Measure No.	Measure Title	Description	Feasible for VC?	Used before in VC?	Reasoned Justification for Infeasible Measure	Potential Implementing Agency
3.9	Encourage merchants and employers to subsidize the cost of transit for employees	Provide outreach and possible financial incentives to encourage local employers to provide transit passes or subsidies to encourage less individual vehicle travel.	yes	yes		VCAPCD, VCTC
3.10	Off-days for ozone alerts just like sick days	On ozone alert days, notify employees through email that there is an ozone alert. Employees are given a pre-specified number of days they can decide not to come in to work on ozone forecast days.	no	no	No authority to implement. Not economically feasible.	
3.11	Pay for in-house meals on ozone action days	Employer pays for meals in-house on ozone alert days so that employees do not travel to off-site locations.	no	no	No authority to implement.	
3.12	Voluntary business closures on ozone action days	A more expensive version of "off-days" for ozone alerts.	no	no	No authority to implement. Not economically feasible.	
3.13	Close government offices on ozone action days to serve as an example	Similar to voluntary business closures.	no	no	No authority to implement.	
3.14	Mandatory compressed work weeks	Self-explanatory.	no	no	No authority to implement. Employer could decide individually if this measure is feasible for them.	
3.15	Adopt a Safe Routes to School Policy	Adopt policy to increase the number of students that walk/bike to school by removing barriers that prevent children and adults from doing so.	yes	yes		Cities, County, School Districts, State, VCAPCD, VCTC
3.16	Increase Walk-to-School Programs	Develop and promote programs that encourage students to walk to school.	yes	yes		Cities, County, School Districts, VCAPCD, VCTC

Measure No.	Measure Title	Description	Feasible for VC?	Used before in VC?	Reasoned Justification for Infeasible Measure	Potential Implementing Agency
3.17	Showers and Lockers at Work	Provide showers and lockers to encourage walking and biking to work.	yes	yes		Cities, County, State
3.18	Voluntary Employer Parking Cash-out Subsidy	Employers who provide free parking would voluntarily provide the cash equivalent of the parking subsidy to employees who do not drive to work.	yes	yes		Cities, County, Employers, State
3.19	Bike to Workday	Conduct a one-day bike-to-work event. Provide outreach activities, education on the bike-to-work option, and provide assistance in trying bike to work.	yes	yes		Cities, County, VCAPCD, VCTC
3.20	Compressed Work Weeks	Work 80 hours in 9 days, 40 hours in 4 days, or 36 hours in 3 days in lieu of working 40 hours in 5 days.	yes	yes		Employers
3.21	Telecommuting	Goal of specified percentage of employees telecommuting at least one day per week	yes	yes		Employers
3.22	Income Tax Credit to Telecommuters	Provide tax relief to employees who participate in telecommuting programs.	no	no	Requires State legislation	
3.23	Extend parking cash-out rule to more employers	Self-explanatory.	no	no	Requires State legislation	
Section 108(f) 4. Trip Reduction Ordinance						
	In December 1995, Congress changed the Clean Air Act Amendments to make the Employee Commute Option program voluntary (no longer mandatory). California State Law prohibits mandatory employer based trip reduction ordinance programs (Lewis SB 437). Therefore, no mandatory programs can be imposed.					

Measure No.	Measure Title	Description	Feasible for VC?	Used before in VC?	Reasoned Justification for Infeasible Measure	Potential Implementing Agency
Section 108(f) 5. Traffic Flow Improvement Programs That Achieve Emission Reductions						
5.1	Develop Intelligent Transportation Systems	A variety of technological applications intended to produce more efficient use of existing transportation corridors.	yes	yes		Caltrans, Cities, County, SCAG, Transit Operators, VCTC
5.2	Coordinate Traffic Signal Systems	This measure implements and enhances synchronized traffic signal systems to promote steady traffic flow at moderate speeds.	yes	yes		Cities, County, VCTC
5.3	Reduce Traffic Congestion at Major Intersections	This measure implements a wide range of traffic control techniques designed to facilitate smooth, safe travel through intersections: signalization, turn lanes, median dividers, grade separations.	yes	yes		Cities, County
5.4	Site-Specific Transportation Control Measures	This measure could include geometric or traffic control improvements at specific congested intersections or at other substandard locations. Another example might be programming left turn signals at certain intersections to lag, rather than lead, the green time for through traffic.	yes	yes		Cities, County
5.5	Removal of On-Street Parking	Require all commercial & industrial development to design and implement off-street parking.	no	no	No authority to implement.	
5.6	Reversible Lanes	Implement reversible lanes on arterial streets to improve traffic flow where appropriate.	no	no	Not technologically feasible because there is not sufficient congestion.	
5.7	One-Way Streets	Redesignate streets (or portions of downtown areas) as one-way to improve traffic flow where appropriate.	yes	yes		Cities, County

Measure No.	Measure Title	Description	Feasible for VC?	Used before in VC?	Reasoned Justification for Infeasible Measure	Potential Implementing Agency
5.8	On-Street Parking Restrictions	Restrict on-street parking where appropriate.	no	no	No authority to implement.	
5.9	Bus Pullouts in Curbs for Passenger Loading	Provide bus pullouts in curbs, or queue jumper lanes for passenger loading and unloading.	yes	yes		Cities, County, Transit Operators, VCTC
5.10	Additional Freeway Service Patrol	Operation of new roving tow truck patrols to clear incidents and reduce delay on freeways during peak periods.	yes	yes		VCTC
5.11	Consider scheduling of arterial and highway maintenance to exclude ozone action days if the maintenance activities require lane reductions on heavily utilized arterials and highways	Self-explanatory.	yes	no		Caltrans, Cities, County, VCAPCD
5.12	Reroute trucks on ozone action days	Self-explanatory.	yes	no		VCAPCD
5.13	Fewer stop signs	Improve flow-through traffic by removing stop signs.	no	no	Not technologically feasible because the safety issue outweighs the potential small air quality benefit.	
5.14	Ban left turns	Banning all left turns would stop the creation of bottlenecks, although slightly increasing travel distances.	no	no	No clear demonstration of air quality benefits.	
5.15	Adaptive traffic signals and signal timing	Self-explanatory.	yes	yes		Caltrans, Cities, County
5.16	Freeway bottleneck improvements (add lanes, construct shoulders, etc.)	Identify key freeway bottlenecks and take accelerated action to mitigate them.	yes	yes		Caltrans, SCAG, VCTC

Measure No.	Measure Title	Description	Feasible for VC?	Used before in VC?	Reasoned Justification for Infeasible Measure	Potential Implementing Agency
5.17	Minimize impact of construction on traveling public. Have contractors pay when lanes are closed as an incentive to keep lanes open	Prohibit lane closures during peak hours, limit construction to weekends or nights.	yes	yes		Caltrans, Cities, County
5.18	Internet provided road and route information	Reduce travel on highly congested roadways by providing accessible information on congestion and travel.	yes	yes		Caltrans
5.19	Regional route marking systems to encourage underutilized capacity	Encourage travel on local roads and arterials by better route marking to show alternatives.	yes	yes		Caltrans, Cities, County, VCTC
5.20	Congestion management field team to clear incidents	Self-explanatory.	no	no	Not economically feasible. Current and projected congestion levels are too low to warrant measure.	
5.21	Use dynamic message signs to direct/smooth speeds during incidents	Self-explanatory.	yes	yes		Caltrans
5.22	Get real-time traffic information to drivers	Self-explanatory.	yes	yes		Caltrans, VCTC
5.23	55 mph speed limit during ozone season	Self-explanatory.	no	no	No authority to implement. The measure requires state legislative change.	
5.24	Require 40 mph speed limit on all facilities	Self-explanatory.	no	no	No authority to implement. The measure requires state legislative change.	
5.25	Require lower speeds during peak periods	Self-explanatory.	no	no	No authority to implement. The measure requires state legislative change.	

Measure No.	Measure Title	Description	Feasible for VC?	Used before in VC?	Reasoned Justification for Infeasible Measure	Potential Implementing Agency
5.26	Street Intersection Realignment	Realign skewed intersections to provide better traffic flow and safety.	yes	yes		Caltrans, Cities, County
5.27	Extend Ramp Metering	Install signals to control flow of vehicles at selected freeway ramp entrances to maintain level of service.	yes	yes		Caltrans
5.28	Road Hazard Reporting	Provide real-time traffic information to help drivers make decisions about when and where to travel.	yes	yes		Caltrans
5.29	On-street Parking Restrictions	Restrict on-street parking where appropriate.	yes	yes		State, County, Cities
5.30	Roundabouts at Low Traffic Intersections	Construct roundabouts and remove stop signs as appropriate.	yes	yes		County, Cities
5.31	Eco-Driving Educational Program	Education program on improve vehicle efficiency by improving driving habits.	no	no	No clear demonstration of emission reduction benefits.	
Section 108(f) 6. Fringe And Transportation Corridor Parking Facilities Serving Multiple Occupancy Vehicle Programs Or Transit Service						
6.1	Park and ride lots	Develop, design, and implement new Park and Ride facilities in locations where they are needed.	yes	yes		Caltrans, Cities, County, Transit Operators, VCTC
6.2	Park and ride lots serving perimeter counties	Specific to a locality.	yes	yes		Cities, County, SCAG, VCTC
6.3	Regional Parking Regulation to Provide Incentives for alternative transportation modes	Regulation to provide parking facilities and designs to encourage carpools, vanpools, and bicycling.	yes	yes		Cities, County, SCAG, VCTC
Section 108(f) 7. Programs To Limit Or Restrict Vehicle Use In Downtown Areas Or Other Areas Of Emission Concentration Particularly During Periods Of Peak Use						
7.1	Off-Peak Goods Movement	Implement an ordinance to restrict truck deliveries by time or place to minimize traffic congestion during peak periods.	no	no	No authority to implement. Cities could decide individually if this measure is feasible for them.	

Measure No.	Measure Title	Description	Feasible for VC?	Used before in VC?	Reasoned Justification for Infeasible Measure	Potential Implementing Agency
7.2	Truck Restrictions During Peak Periods	Implement an ordinance to restrict truck travel during peak periods to minimize traffic congestion.	no	no	No authority to implement. Cities could decide individually if this measure is feasible for them.	
7.3	Involve school districts to encourage walking to school	Decrease vehicle emissions due to school trips by reducing these trips through education and out-reach programs.	yes	yes		School Districts, VCAPCD
7.4	Adjust school hours so they do not coincide with peak traffic periods and ozone seasons	Measure to reduce travel during peak periods and ozone-contributing periods in the early morning.	no	no	No authority to implement.	
7.5	Area-wide tax for parking	Reduce driving by limiting parking through pricing measures.	no	no	No authority to implement.	
7.6	Increase parking fees	Same as above.	no	no	No authority to implement.	
7.7	Graduated pricing starting with highest in Central Business District (CBD)	Charge the most for parking in the central business or other high volume areas in a city to discourage vehicle travel in these areas.	no	no	No authority to implement.	
7.8	Buy parking lots and convert to other land use	Limit parking by converting available parking to other land uses to discourage driving.	no	no	Not technologically feasible because the area is too rural to be able to make this effective.	
7.9	Limit the number of parking spaces at commercial airlines to support mass transit	Reduce airport travel by limits on parking at airports.	no	no	Not technologically feasible because it is at the discretion of regional and local airport authority to make land use decisions pertaining to airports.	
7.10	No CBD vehicles unless LEV, alternative fuel, or electric	Define high-use areas and ticket any vehicles present unless they are low emitting, alternative fueled or electric.	no	no	No authority to implement.	

Measure No.	Measure Title	Description	Feasible for VC?	Used before in VC?	Reasoned Justification for Infeasible Measure	Potential Implementing Agency
7.11	Auto restricted zones	No vehicles allowed in certain areas where high emissions and, congestion contribute to ozone problems.	no	no	No authority to implement.	
7.12	Incentives to increase density around transit centers	Lower travel by increasing residential and commercial density in areas near transit.	yes	yes		Cities, County
7.13	Land use/air quality guidelines	Guidelines for development that contributes to air quality goals.	yes	yes		VCAPCD
7.14	Incentives for cities with good development practices	Provide financial or other incentives to cities that practice air quality-sensitive development.	yes	yes		ARB, SCAG, State Legislature
7.15	Cash incentives to foster jobs/housing balance	Specific to locality – encouraged by California Clean Air Plan.	yes	yes		ARB, Cities, County, SCAG, VCAPCD
7.16	Trip reduction oriented development	Specific to locality – encouraged by California Clean Air Plan.	yes	yes		ARB, Cities, County, SCAG, VCAPCD
7.17	Transit oriented development	Specific to locality – encouraged by California Clean Air Plan.	yes	yes		ARB, Cities, County, SCAG, VCAPCD
7.18	Sustainable development	Specific to locality – encouraged by California Clean Air Plan.	yes	yes		ARB, Cities, County, SCAG, VCAPCD
7.19	Increase fees for parking garages and meters during ozone episodes	Increase fees for parking garages to deter vehicle use during high ozone level days.	no	no	Not economically feasible.	
7.20	Charge city-owned parking garage pass holders a fee for more than one entrance and exit each day	Extra charges for pass holders to deter additional vehicle use and vehicle trips.	no	no	Not economically feasible.	
7.21	VMT Tax	Charge VMT tax per mile for all vehicles registered or garaged in the region.	no	no	Need state legislation.	

Measure No.	Measure Title	Description	Feasible for VC?	Used before in VC?	Reasoned Justification for Infeasible Measure	Potential Implementing Agency
7.22	Smart Parking Detection System	Utilize mobile communication devices to access the parking availability at multiple sites.	yes	yes		Cities
7.23	Programs to Encourage Goods Movement by Rail	Self-explanatory	yes	yes		CARB
7.24	Divert Trucks from Nonattainment Areas	Require H-D trucks passing through the SCAG region to choose routes away from the SCAG region.	no	no	No authority to implement and not feasible because the SCAG region is all in a nonattainment area.	
Section 108(f) 8. Programs For The Provision Of All Forms Of High-Occupancy, Shared-Ride Services						
8.1	Financial Incentives, Including Zero Bus Fares	Provide financial incentives or other benefits, such as free or subsidized bus passes and cash payments for not driving, in lieu of parking spaces for employees who do not drive to the workplace.	yes	yes		Employers
8.2	Internet ride matching services	Provide match-lists, route info, hours, and contact information over the internet to assist individuals in joining or developing carpools.	yes	yes		SCAG, VCTC
8.3	Preferential parking for carpoolers	Provide free, covered, near-building or similar incentives to carpoolers.	yes	yes		Cities, County, Employers, VCTC
8.4	Credits and incentives for carpoolers	Self-explanatory.	yes	yes		Cities, County, Employers, VCTC
8.5	Employers provide vehicles to carpoolers for running errands or emergencies	Having vehicles available for work-day errands makes it easier to go to work without one.	yes	yes		Cities, County, Employers
8.6	School carpools	Self-explanatory.	no	no	No authority to implement.	

Measure No.	Measure Title	Description	Feasible for VC?	Used before in VC?	Reasoned Justification for Infeasible Measure	Potential Implementing Agency
8.7	Guaranteed ride home	Provide guaranteed rides via taxi, rental cars, etc. to carpoolers & vanpoolers who are left without a ride home.	yes	yes		Employers, VCTC
8.8	Auto sharing Program	Fund incentives for new auto sharing customers (i.e., Zipcar, etc.).	yes	yes		Cities, County, VCTC
8.9	Subscription Services	Free van services to provide transportation for the elderly handicapped or other individuals who have no access to transportation.	yes	yes		County, VCTC, Employers
8.10	Rideshare and Vanpool Services	Non-employer based rideshare and vanpool option near transit stations.	yes	yes		CTC, Transit Operators, Cities, County
Section 108(f) 9. Programs To Limit Portions Of Road Surfaces Or Certain Sections Of The Metropolitan Area To The Use Of Non-Motorized Vehicles Or Pedestrian Use, Both As To Time And Place						
9.1	Establish Auto Free Zones and Pedestrian Malls	Establish auto free zones and pedestrian malls where appropriate.	yes	yes		Cities, County
9.2	Encouragement of Pedestrian Travel	Encourage the use of pedestrian travel as an alternative to automobile travel. Pedestrian travel is quite feasible for short shopping, business, or school trips. Promotion of pedestrian travel could be included in air pollution public awareness efforts to remind people of this basic alternative.	yes	yes		SCAG, VCTC, VCAPCD
9.3	Bicycle & Pedestrian Program	Fund high priority projects in countywide plans consistent with funding availability.	yes	yes		Cities, County, VCTC
9.4	Close certain roads for use by non-motorized traffic	During special events, weekends, or certain times of the day, close some roads to all but non-motorized traffic.	yes	yes		Cities, County

Measure No.	Measure Title	Description	Feasible for VC?	Used before in VC?	Reasoned Justification for Infeasible Measure	Potential Implementing Agency
9.5	Encouragement of Bicycle Travel	Promotion of bicycle travel to reduce automobile use and improve air quality. Bikeway system planning, routes for inter-city bike trips to help bicyclists avoid other, less safe facilities. Another area for potential actions is the development and distribution of educational materials regarding bicycle use and safety.	yes	yes		Caltrans, Cities, County, VCAPCD, VCTC
9.6	Free Bicycles	Provide simple utilitarian bikes that can be used throughout the metro area and dropped off at destination for use by anyone desiring use.	no	no	No authority to implement. Evidence suggests that bicycle theft & dumping is a problem in other programs and renders this measure not technically and economically feasible.	
9.7	Cash Rebates for Bicycles	Provide financial incentives to purchase bicycles and thereby encourage use.	no	no	No clear demonstration of air quality benefits.	
9.8	Close streets for special events for use by bikes and pedestrians	Self-explanatory.	yes	yes		Cities, County
9.9	Use condemned dirt roads for bike trails	Self-explanatory.	no	no	Not applicable because there are no condemned dirt roads in the region.	
9.10	Safe Routes to School Programs	Encourage educational and encouragement programs for families and schools and support policies to improve pedestrian and bicycle safety.	yes	yes		State, County, VCTC, Cities

Measure No.	Measure Title	Description	Feasible for VC?	Used before in VC?	Reasoned Justification for Infeasible Measure	Potential Implementing Agency
Section 108(f) 10. Programs For Secure Bicycle Storage Facilities And Other Facilities, Including Bicycle Lanes, For The Convenience And Protection Of Bicyclists, In Both Public And Private Areas						
10.1	Bike racks at work sites	Self-explanatory.	yes	yes		Cities, County, Employers, VCTC
10.2	Bike Racks on Buses	Bike racks would be placed on a to-be-determined number of buses to increase bicycle travel.	yes	yes		Transit Operators, VCTC
10.3	Regional Bike Parking Ordinance for all new construction	Bike Transit Centers for/at all employment centers 100+ employees: Bike lockers, clothing lockers, showers, cleaners drop-off and pick-up. Bike repair and rental.	no	no	No authority to implement.	
10.4	Bike lockers at Metro stations, park & ride lots, other locations	Expand existing bike lockers at Metrorail stations; install bicycle storage spaces in parking lots.	no	no	Not economically feasible.	
10.5	Development of bicycle travel facilities	Encourages a variety of capital improvements to increase bicycle use. Off-street bikeways where high-speed roadways preclude safe bicycling. Clearly mark travel facilities signs and provide adequate maintenance.	yes	yes		Cities, County, VCTC
10.6	Provide bike pedestrian facilities safety patrols	Self-explanatory.	yes	yes		Cities, County
10.7	Inclusion of bicycle lanes on thoroughfare projects	Self-explanatory.	yes	yes		Cities, County, State
10.8	Bicycle lanes on arterial and frontage roads	Self-explanatory.	yes	yes		Cities, County, State
10.9	Bicycle route lighting	Self-explanatory.	yes	yes		Cities, County, State

Measure No.	Measure Title	Description	Feasible for VC?	Used before in VC?	Reasoned Justification for Infeasible Measure	Potential Implementing Agency
10.10	Expedite bicycle projects from the RTP/SCS	Create bicycle and pedestrian master plan and build out at an accelerated rate to achieve benefits in time for attainment deadline.	yes	yes		Cities, County, SCAG, VCTC
10.11	Complete Streets	Install bicycle and pedestrian facilities, upgrade traffic control systems, urban design improvements, streetlights, and transit connections.	yes	Yes		Cities, County, VCTC, Transit Operators
10.12	Bike Share	Provide bike-share and neighborhood electric vehicle transit services in downtown areas.	yes	yes		Cities, County, Transit Operators
10.13	Bike Purchase Incentives	Cash incentives to transit riders to purchase collapsible or electric bikes.	yes	yes		Cities
10.14	Longer Bike Racks on Buses	Install or modify bike rack on transit buses to accommodate up to three bikes.	yes	yes		Transit Operators
10.15	Greenway Network	Use riverbeds and other rights-of-way for bike and pedestrian paths to separate them from auto traffic.	yes	yes		Cities, County
10.16	First Mile/Last Mile Program	Variety of strategies to encourage active transportation including wayfinding, sidewalk improvements, pedestrian priority signalization, and bike/pedestrian facilities near transit.	yes	yes		VCTC, Transit Operators

Measure No.	Measure Title	Description	Feasible for VC?	Used before in VC?	Reasoned Justification for Infeasible Measure	Potential Implementing Agency
Section 108(f) 11. Programs To Control Extended Idling Of Vehicles						
11.1	Limit Excessive Car Dealership Vehicle Starts	Require car dealers to limit the starting of vehicles for sale on their lot(s) to once every two weeks. Presently, a few new and used car dealers start their vehicles daily to avoid battery failure and assure smooth start-ups for customer test drives.	no	no	Not technologically feasible because vehicles in the South Central Coast are started much less frequently than in colder climates.	
11.2	Limitations on Vehicle Idling	Limitations to limit extended idling operations of trucks.	yes	yes		ARB, VCAPCD
11.3	Turn off engines while stalled in traffic	Public outreach or police-enforced program.	no	no	The measure raises safety and congestion concerns and has no clear demonstration of air quality emissions benefits.	
11.4	Restrict idling	Require idle limits for trucks.	yes	yes		ARB, VCAPCD
11.5	Reduced idling at drive-throughs. Close window service	Mandate no idling or do not allow drive-through windows during ozone season.	no	no	No clear demonstration of air quality emissions benefits. This measure is not economically feasible.	
11.6	Promote use of Pony engines	Use special battery engines to keep air conditioning and other truck systems working while truck not in use.	yes	yes		ARB, VCAPCD
11.7	Idle restrictions at airport curbsides	Police enforced.	no	no	No commercial airport in county. This measure is implemented based on security restrictions.	

Measure No.	Measure Title	Description	Feasible for VC?	Used before in VC?	Reasoned Justification for Infeasible Measure	Potential Implementing Agency
11.8	Control extended idling of Buses and Trucks	Step-up enforcement of existing regulations to prevent extended vehicle idling.	no	no	Not economically feasible. Enforcement of idle restrictions is a low priority for police relative to their other duties.	
11.9	Reduce idling at schools	Self-explanatory	yes	yes		CARB
11.10	Outlaw idling in parking lots	Self-explanatory and police enforced program.	no	no	Not economically feasible. Enforcement of idle restrictions is a low priority for police relative to their other missions. The cost effectiveness of this measure has not been demonstrated.	
11.11	Truck Stop Electrification	Provide electric charging stations at truck stops to power heating/AC units and other on-board equipment.	yes	yes		ARB, Caltrans, VCTC
Section 108(f) 12. Program To Reduce Motor Vehicle Emissions, Consistent With Title II, Which Are Caused By Extreme Cold Start Conditions						
The definition of an "extreme cold start" specifies temperatures below 20 degrees Fahrenheit. Not applicable in the South Central Coast - no extreme cold start conditions.						
Section 108(f) 13. Employer-Sponsored Programs To Permit Flexible Work Schedules						
13.1	Alternative Work Schedules	Enables workers to choose their own working hours within certain constraints. Flextime provides the opportunity for employees to use public transit, ridesharing, and other nonmotorized transportation. A related strategy, staggered work hours, is designed to reduce peak congestion in the vicinity of the workplace.	yes	yes		Employers, VCAPCD

Measure No.	Measure Title	Description	Feasible for VC?	Used before in VC?	Reasoned Justification for Infeasible Measure	Potential Implementing Agency
13.2	Modifications of Work Schedules	Implement alternate work schedules that flex the scheduled shift time for employees. Encourage the use of flexible or staggered work hours to promote off-peak driving and accommodate the use of transit and carpooling.	yes	yes		Employers, VCAPCD
13.3	Telecommunication-Telecommuting	Encourage the use of telecommuting in place of motor vehicle use where appropriate.	yes	yes		SCAG, VCAPCD
Section 108(f) 14. Programs And Ordinances To Facilitate Non-Automobile Travel, Provision And Utilization Of Mass Transit, And To Generally Reduce The Need For Single-Occupant Vehicle Travel, As Part Of Transportation Planning And Development Efforts Of A Locality, Including Programs And Ordinances Applicable To New Shopping Centers, Special Events, And Other Centers Of Vehicle Activity						
14.1	Areawide Public Awareness Programs	This measure focuses on conducting ongoing public awareness programs throughout the year to provide the public with information on air pollution and encourage changes in driving behavior and transportation mode use.	yes	yes		VCAPCD, VCTC
14.2	Special Event Controls	This measure would require new and existing owners/operators of the special event centers to reduce mobile source emissions generated by their events. A list of optional strategies would be available that reduce mobile source emissions. The definition of “special event center” could be developed through the rule development process.	yes	yes		VCAPCD

Measure No.	Measure Title	Description	Feasible for VC?	Used before in VC?	Reasoned Justification for Infeasible Measure	Potential Implementing Agency
14.3	Land Use/Development Alternatives	This measure includes encouraging land use patterns which support public transit and other alternative modes of transportation. In general, this measure would also encourage land use patterns designed to reduce travel distances between related land uses (e.g., residential-commercial). Shorter trip lengths ultimately relieve traffic congestion and improve air quality.	yes	yes		Cities, County, SCAG, VCTC
14.4	Voluntary No Drive Day Programs	Conduct voluntary no drive day programs during the ozone season through media and employer based public awareness activities.	yes	yes		VCAPCD
14.5	Evaluation of the Air Quality Impacts of New Development and Mitigation of Adverse Impacts	Evaluate the air quality impacts of new development and mitigate any adverse impacts.	yes	yes		Cities, County, VCAPCD
14.6	Transportation for Livable Communities /Housing Incentives Program	Program provides planning grants, technical assistance, and capital grants to help cities and nonprofit agencies define and implement transportation projects that support community plans including increased housing near transit.	yes	yes		SCAG, State, VCTC
14.7	Incentives to increase density around transit centers	Lower travel by increasing residential and commercial density in areas near transit.	yes	yes		Cities, County
14.8	Incentives for cities with good development practices	Provide financial or other incentive to local cities that practice air quality sensitive development.	yes	yes		Cities, SCAG, State

Measure No.	Measure Title	Description	Feasible for VC?	Used before in VC?	Reasoned Justification for Infeasible Measure	Potential Implementing Agency
14.9	Increase state gas tax	Self-explanatory.	no	no	No authority to implement and no clear demonstration of air quality benefits.	
14.10	Notification of Spare the Air	This measure focuses on conducting ongoing public awareness programs throughout the year to provide the public with information on air pollution and encourage changes in driving behavior and transportation mode use.	yes	yes		VCAPCD
14.11	Display air quality data on billboards	Self-explanatory.	no	no	Not economically feasible.	
14.12	Sell clean air license plate to fund air quality programs	Self-explanatory	no	no	Need state legislation. No clear demonstration of air quality benefits.	
14.13	Government Action Days (spare the air day, ozone action day)	Declare a Spare The Air day when ozone levels reach episodic thresholds so that the public is informed and encouraged to scale back activities generating pollutants.	yes	yes		VCAPCD
14.14	Vehicle tax for two or more vehicles per household	Initiate legislation to put a vehicle tax on household with two or more vehicles.	no	no	Need state legislation. No clear demonstration of air quality benefits. Not economically feasible.	
14.15	Pay-As-You-Drive Insurance	Self-explanatory.	no	no	Need state legislation. No clear demonstration of air quality emissions benefits.	
Section 108 (f) 15. Programs For New Construction And Major Reconstructions Of Paths, Tracks Or Areas Solely For The Use By Pedestrian Or Other Non-Motorized Means Of Transportation When Economically Feasible And In The Public Interest. For Purposes Of This Clause, The Administrator Shall Also Consult With The Secretary Of The Interior						
15.1	Encouragement of Pedestrian Travel	Promote public awareness and use of walking as an alternative to the motor vehicle	yes	yes		ARB, SCAG, VCAPCD

Measure No.	Measure Title	Description	Feasible for VC?	Used before in VC?	Reasoned Justification for Infeasible Measure	Potential Implementing Agency
15.2	Pedestrian and Bicycle Overpasses Where Safety Dictates	Ongoing implementation as development occurs.	yes	yes		Cities, County
15.3	Require inclusion of bicycle lanes on state and federally funded thoroughfare projects	Require bicycle lanes on all state and federally funded road projects.	no	no	No authority to implement. Not economically feasible.	
15.4	Require inclusion of paved shoulders adequate for bicycle use on state or federally funded reconstruction or widening of federal collectors	Require paved shoulders on state and federally funded roads that require reconstruction or widening.	no	no	No authority to implement. Not economically feasible.	
Section 108(f) 16. Program To Encourage The Voluntary Removal From Use And The Marketplace Of Pre-1980 Model Year Light Duty Vehicles And Pre-1980 Model Light Duty Trucks						
16.1	Counties assess $10 license plate fee to fund repair/replacement program for high-emitters	Self-explanatory.	no	no	No authority to implement.	
16.2	Buy vehicles older than 1975	Self-explanatory.	yes	yes		ARB, VCAPCD
16.3	Demolish impounded vehicles that are high emitters	Self-explanatory.	no	no	No authority to implement. Not economically feasible.	
16.4	Do whatever is necessary to allow cities to remove the engines of high emitting vehicles (pre-1980) that are abandoned and to be auctioned	Self-explanatory.	no	no	No authority to implement. Not economically feasible.	
16.5	Accelerated retirement program	Identify high emitting vehicle age groups and develop a program to remove them from use.	yes	yes		ARB, VCAPCD

Appendix F
Ventura County
OZONE REASONABLY AVAILABLE CONTROL MEASURES Assessment
STATE SOURCES

Prepared for:
Ventura County Air Pollution Control District
Ventura, California

By

California Air Resources Board
Planning and Technical Support Division
Sacramento, California

OZONE REASONABLE AVAILABLE CONTROL MEASURES ASSESSMENT – STATE SOURCES

The Clean Air Act (Act) requires the implementation of all reasonably available control measures (RACM) as expeditiously as practicable and shall provide for attainment of the air quality standards. This section demonstrates that for the 70 ppb 8-hour ozone standard, California's mobile source and consumer products measures along with the Department of Pesticides (DPR) measures meet the RACM requirement in Ventura County.

A. RACM Requirements

U.S. EPA has interpreted RACM to be those emission control measures that are technologically and economically feasible and when considered in aggregate, would advance the attainment date by at least one year. Section 172(c)(1) of the Act requires SIPs to provide for the implementation of RACM as expeditiously as practicable. Given the severity of California's air quality challenges, CARB has implemented the most stringent mobile source emissions control program in the nation. CARB's comprehensive strategy to reduce emissions from mobile sources includes stringent emissions standards for new vehicles, in-use programs to reduce emissions from existing vehicle and equipment fleets, cleaner fuels that minimize emissions, and incentive programs to accelerate the penetration of the cleanest vehicles beyond that achieved by regulations alone. Taken together, California's mobile source program meets RACM requirements in the context of ozone nonattainment.

To ensure the State continues to meet RACM requirements and achieve its emissions reductions goals in the future, California continues to develop new programs and regulations to strengthen its overall mobile source program and to achieve new emissions reductions from mobile sources.

B. RACM For Mobile Sources

1. Waiver and Authorizations

While section 209 of the Act preempts other states from adopting emission standards and other emission-related requirements for new motor vehicles and engines that differ from the federal standards set by U.S. EPA, the Act provides California with the ability to seek a waiver or authorization from the federal preemption clause in order to enact emission standards and other emission-related requirements for new motor vehicles and engines, as well as new and in-use off-road vehicles and engines[1] – provided that the California standards are at least as protective as applicable federal standards.

Over the years, California has received waivers and authorizations for over 100 regulations. The most recent California standards and regulations that have received waivers and authorizations are: the Advanced Clean Cars (ACC) regulations for light-duty vehicles (including the Zero-

[1] Locomotives and engines less than 175 horsepower (hp) used in farm and construction equipment are exempt from California's waiver authority.

Emission Vehicle (ZEV) and the Low-Emission Vehicle III (LEV III) regulations); the On-Board Diagnostics (OBD) regulation; the Heavy-Duty Idling, Malfunction and Diagnostics System Regulation; the In-Use Off-Road Diesel Fleets Regulation; the Large Spark Ignition (LSI) Fleet Regulation; and the Mobile Cargo Handling Equipment (CHE) regulation. Further, CARB has recently submitted waiver requests for: the Advanced Clean Transit (ACT) regulation; the Zero-Emission Airport Shuttle Buses Regulation; the Zero-Emission Powertrain Certification Regulation, and the Heavy-Duty Omnibus Regulation. Other authorizations include the Off-Highway Recreational Vehicles and the Portable Equipment Registration Program (PERP). Additionally, CARB obtained an authorization from U.S. EPA to enforce adopted emission standards for off-road engines used in yard trucks and two-engine sweepers. CARB adopted the off-road emission standards as part of its "Regulation to Reduce Emissions of Diesel Particulate Matter, Oxides of Nitrogen and Other Criteria Pollutants from In-Use Heavy-Duty Diesel-Fueled Vehicles," (Truck and Bus Regulation). The bulk of the regulation applies to in-use heavy-duty diesel on-road motor vehicles with a gross vehicle weight rating in excess of 14,000 pounds, which are not subject to preemption under section 209(a) of the Act and do not require a waiver under section 209(b).

The waiver and authorizations California has received are integral to the success and stringent emission requirements that characterize CARB's mobile source program. Due to California's unique waiver authority under the Act, no other state or nonattainment area has the authority to promulgate mobile source emission standards at levels that are more stringent than the federal standards. Other states can elect to match either the federal standards or the more stringent California standards. As such, no state or nonattainment area has a more stringent suite of mobile source emission control programs than California, implying a de-facto level of control that at least meets, if not exceeds, RACM.

2. CARB's Mobile Source Controls

CARB's current mobile source control program, along with efforts at the local and federal level, have been tremendously successful in reducing emissions of air pollutants, resulting in significantly cleaner vehicles and equipment in operation today.

CARB developed its *2022 State Strategy for the State Implementation Plan* (2022 State SIP Strategy)[2] through a multi-step measure development process, including extensive public consultation, to develop and evaluate potential strategies for mobile source categories under CARB's regulatory authority that could contribute to expeditious attainment of the 70 ppb 8-hour ozone standard, as well as supporting attainment for other national and State air quality standards. This effort builds on the measures and commitments already made in the 2016 State SIP Strategy and expands on the scenarios and concepts included in the 2020 Mobile Source Strategy, CARB's multi-pollutant planning effort that identifies the pathways forward to achieve

[2] CARB 2022 State Strategy for the State Implementation Plan (2022 State SIP Strategy) https://ww2.arb.ca.gov/resources/documents/2022-state-strategy-state-implementation-plan-2022-state-sip-strategy

the State's many air quality, climate, and community risk reduction goals. The Board adopted the 2022 State SIP Strategy in September 2022.

With the 2022 State SIP Strategy, CARB is pursuing an unprecedented variety of new measures to reduce emissions from the sources under our authority using all mechanisms available. The measures included in the 2022 State SIP Strategy encompass actions to establish requirements for cleaner technologies (both zero emissions and near zero emissions), deploy these technologies into the fleet, and to accelerate the deployment of cleaner technologies.

3. Light- and Medium-Duty Vehicles

Since setting the nation's first motor vehicle exhaust emission standards in 1966 that led to the first pollution controls, California has dramatically tightened emission standards for light-duty vehicles. Through CARB regulations, today's new cars pollute 99 percent less than their predecessors did thirty years ago. In 1970, CARB required auto manufacturers to meet the first standards to control NOx emissions along with hydrocarbon emissions, which together form smog. The simultaneous control of emissions from motor vehicles and fuels led to the use of cleaner-burning gasoline that has removed the emissions equivalent of 3.5 million vehicles from California's roads.

Light- and medium-duty vehicles are currently regulated under California's ACC program, which includes the LEV III and ZEV programs. The ACC program combines the control of smog, soot-causing pollutants, and greenhouse gas emissions into a single coordinated package of requirements for model years 2015 through 2025. Since first adopted in 1990, CARB's LEV I and LEV II, and the ZEV Programs have resulted in the production and sales of hundreds of thousands of ZEVs in California. Advanced Clean Cars II (ACC II), a measure in the 2016 State SIP Strategy, is a significant effort critical to meeting air quality standards. ACC II, which was recently adopted by the CARB Board in August 2022, has the goal of cutting emissions from new combustion vehicles while taking all new vehicle sales to 100 percent zero-emission no later than 2035.

For passenger vehicles, the 2022 State SIP Strategy includes actions to increase the penetration of ZEVs by targeting ride-hailing services offered by transportation network companies through the Clean Miles Standard regulation in order to reduce GHG and criteria pollutant emissions and promote electrification of the fleet. For motorcycles, the 2022 State SIP Strategy proposes more stringent exhaust and evaporative emissions standards along with zero-emissions sales thresholds. The primary goal of the On-Road Motorcycle New Emissions Standard measure is to reduce emissions from new, on-road motorcycles by adopting more stringent exhaust and evaporative emissions standards along with zero-emissions sales thresholds.

CARB is also active in implementing in-use programs for owners of older dirtier vehicles to retire them early. The "car scrap" programs, like Clean Cars 4 All and Clean Vehicle Rebate Project provide monetary incentives to replace old vehicles with zero-emission vehicles. Other

California programs and goals such as the 2012 Governor's Executive Order to put 1.5 million zero-emission vehicles on the road by 2025 and will produce substantial and cost-effective emission reductions from the light-duty vehicle sector.

Taken together, California's emission standards, fuel specifications, and incentive programs for on-road light- and medium-duty vehicles represent all measures that are technologically and economically feasible within California. There are no additional measures that, when considered in aggregate, would advance the attainment date by at least one year.

4. Heavy-Duty Vehicles

California's heavy-duty vehicle emissions control program includes requirements for increasingly stringent new engine emission standards and addresses vehicle idling, certification procedures, on-board diagnostics, emissions control device verification, and in-use measures to ensure that emissions from the existing vehicle fleet remain adequately controlled. Taken together, the on-road heavy-duty vehicle program is designed to achieve in 2023 an on-road heavy-duty diesel fleet with 2010 engines emitting 98 percent less NOx and PM2.5 than trucks sold in 1986.

Other significant in-use control measures CARB has in place include: the On-Road Heavy-Duty Diesel Vehicle (In-Use) Regulation; the Drayage (Port or Rail Yard) Regulation; the Public Agency and Utilities Regulation; the Solid Waste Collection Vehicle Regulation; the Heavy-Duty (Tractor-Trailer) Greenhouse Gas (GHG) Regulation, the Airborne Toxic Control Measures (ATCM) to Limit Diesel-Fueled Commercial Motor Vehicle Idling; the Heavy-Duty Diesel Vehicle Inspection Program; the Periodic Smoke Inspection Program (PSIP); the, Fleet Rule for Transit Agencies; the Lower-Emission School Bus Program; and Heavy-Duty Truck Idling Requirements.

In 2013, California recognized the heavy-duty engines could be cleaner and established optional low-NOx standards for heavy-duty diesel engines (Optional Reduced Emissions Standards for Heavy-Duty Engines regulation), with the most aggressive standard being 0.02 g/bhp-hr, 90 percent below the 2010 federal standard. Further, in 2021, CARB adopted the Heavy-Duty Engine and Vehicle Omnibus Regulation (Omnibus Regulation) which made the 0.02 g/bhp-hr a mandatory standard, and comprehensively overhauled how NOx emissions from new heavy-duty engines are regulated in California. The Omnibus Regulation also includes in-use standards that significantly reduce tailpipe NOx emissions during most vehicle operating modes, and revisions to the emissions warranty, useful life, emissions warranty and reporting information and corrective action procedures, and durability demonstration procedures.

To further control emissions from the in-use fleet, CARB adopted in 2021 the Heavy-Duty Inspection and Maintenance Regulation, which requires periodic demonstration that vehicles' emissions control systems are properly functioning in order to legally operate within the State.

This regulation is designed to achieve criteria emissions reductions by ensuring that malfunctioning emissions control systems are timely repaired.

In June 2020, CARB adopted the ACT regulation, a first of its kind regulation requiring medium- and heavy-duty manufacturers to produce ZEVs as an increasing portion of their sales beginning in 2024. This regulation is expected to result in roughly 100,000 ZEVs by 2030 and nearly 300,000 ZEVs by 2035. Most recently in the ongoing efforts to go beyond federal standards and achieve further reductions, the 2022 State SIP Strategy includes the complementary Advanced Clean Fleets measure. Through this program, CARB is developing a medium and heavy-duty zero-emission fleet regulation with the goal of achieving a zero-emission truck and bus California fleet by 2045 everywhere feasible, and significantly earlier for certain market segments such as last mile delivery and drayage applications.

The 2022 State SIP Strategy also includes the Zero-Emissions Trucks Measure, which would accelerate the number of zero-emission heavy-duty vehicles beyond existing measures, and the Advanced Clean Fleets regulation. The Zero-Emissions Trucks Measure was developed in response to comments from the public related to turning over heavy-duty trucks at the end of their useful life. The Zero Emissions Trucks Measure targets the replacement of older trucks in order to increase the number of heavy-duty ZEVs as soon as possible and reduces emissions from fleets not affected by the Advanced Clean Fleets measure. CARB is exploring new methods to replace older trucks, including market signal tools, that would not unduly burden low-income truckers, provide flexibility, and target reductions in the areas that need it most.

In addition, CARB’s significant investment in incentive programs provides an additional mechanism to achieve maximum emission reductions from this source sector. California has a variety of programs to incentivize clean heavy-duty vehicles that include the Carl Moyer Air Quality Standards Attainment Program, the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project, the Truck Loan Program, and AB 617 Community Air Protection Funds.

Taken together, California’s emission standards, fuel specifications, and incentive programs for on-road heavy-duty vehicles represent all measures that are technologically and economically feasible within California. There are no additional measures that, when considered in aggregate, would advance the attainment date by at least one year.

5. Off-Road Vehicles and Engines

California regulations for off-road equipment include not only increasingly stringent emission standards for new off-road diesel engines, but also in-use requirements and idling restrictions. CARB has programs in place to control emissions from various new off-road vehicles and equipment. CARB also has in-use programs for off-road vehicles and equipment, including the In-Use Off-Road Diesel Fueled Fleets Regulation (Off-Road Regulation) and Large Spark-Ignition Engine Fleet Requirements Regulation, as well as incentive programs including the Clean Off-Road Equipment (CORE) Voucher Incentive Project. CARB adopted amendments to the small off-road engine regulations in December 2021, the Transport Refrigeration Unit Part 1 regulatory action in February 2022 and will be proposing the Zero-Emission Off-Road Forklift regulation in the next year.

The Off-Road Regulation, adopted in 2010, is an extensive program designed to accelerate the penetration of the cleanest equipment into California's fleets, and impose idling limits on off-road diesel vehicles. The program goes beyond emission standards for new engines through comprehensive in-use requirements for legacy fleets. CARB is also including in the 2022 State SIP Strategy a measure for amendments to the existing Off-Road Regulation. These amendments would create additional requirements to the currently regulated fleets by targeting the oldest and dirtiest equipment that is allowed to operate indefinitely under the current regulation's structure, potentially through an operational ban on the oldest and dirtiest equipment and limitations on vehicles added to a fleet.

The LSI Engine Fleet Requirements Regulation applies to operators of forklifts, sweeper/scrubbers, industrial tow tractors, and airport ground support equipment (GSE). The 2006 LSI rulemaking and 2010 amendments required operators of in-use fleets to achieve specific hydrocarbon + NOx fleet average emission level standards that became more stringent over time. CARB adopted amendments to the small off-road engine (SORE) regulations in December 2021 that will accelerate the transition of SORE equipment to Zero-Emission Equipment (ZEE). Deployment of ZEE is key to meeting the expected emission reductions in the 2016 State SIP Strategy.

As discussed in the 2016 State SIP Strategy, CARB is also developing new requirements to transition diesel-powered transport refrigeration units (TRUs) to zero-emission technology in two phases. CARB adopted the Part 1 amendments to the existing TRU ATCM in February 2022, which requires the transition of diesel-powered truck TRUs to zero-emission. As discussed in the 2022 State SIP Strategy, CARB plans to develop a subsequent Part 2 regulation to require zero-emission trailer TRUs, domestic shipping container TRUs, railcar TRUs, and TRU generator sets, for future Board consideration.

Additionally, the 2022 State SIP Strategy includes the Tier 5 Off-Road New Compression-Ignition Engine Standards measure to reduce NOx and PM emissions from new, off-road compression-ignition engines by adopting more stringent exhaust standards for all power categories. Compression-ignition engines are used in a wide range of off-road equipment including tractors, excavators, bulldozers, graders, and backhoes. The standards considered for this measure would be more stringent than required by current U.S. EPA and European Stage V nonroad regulations and would require the use of best available control technologies for both PM and NOx.

CARB is also developing a measure, as described in the 2022 State SIP Strategy, to accelerate the development and production of zero-emission off-road equipment and powertrains through the Off-Road Zero-Emission Targeted Manufacturer Rule. Existing zero-emission regulations and regulations currently under development target a variety of sectors (e.g., forklifts, cargo handling equipment, off-road fleets, small off-road engines, etc.) however, as technology advancements occur, more sectors, including wheel loaders, excavators, and bulldozers) could be accelerated through this measure.

Further, CARB implements a number of incentive programs and projects to advance the turnover of off-road equipment to cleaner technologies. The Moyer Program has provided funding towards on- and off-road equipment for decades. CORE is a newer project that is intended to accelerate deployment of advanced technology in the off-road sector and targets commercial-ready products that have not yet achieved a significant market foothold. For engines and equipment used in agricultural processes, CARB has the Funding Agricultural Replacement Measures for Emission Reductions (FARMER) program to support fleet turnover to cleaner engines.

Taken together, California’s comprehensive suite of emission standards, fuel specifications, and incentive programs for off-road vehicles and engines represent all measures that are technologically and economically feasible within California. There are no additional measures that, when considered in aggregate, would advance the attainment date by at least one year.

6. Marine Sources

Commercial harbor craft include any private, commercial, government, or military marine vessels including, but not limited to ferries, excursion vessels, tugboats (including ocean-going tugboats), barges, and commercial and commercial passenger fishing boats. CARB’s Commercial Harbor Craft Regulation (CHC Regulation) was adopted in 2007 to reduce toxic and criteria emissions to protect public health and subsequently amended in 2010. As described in the Draft 2022 State SIP Strategy, the Board also adopted amendments to the CHC Regulation in March 2022, which establish expanded and more stringent in-use requirements to cover more vessel categories and mandate accelerated deployment of zero-emission and advanced technologies in vessel categories where technology feasibility has been demonstrated.

To reduce emissions from Ocean Going Vessels (OGV), CARB has adopted to date the Ocean-Going Vessel Fuel Regulation “Fuel Sulfur and Other Operational Requirements for Ocean-Going Vessels within California Waters and 24 Nautical Miles of the California Baseline” (2008) and the Ocean-Going Vessels At-Berth Regulation (2007). The At-Berth Regulation requires container ships, passenger ships, and refrigerated-cargo ships at six California ports to meet compliance requirements for auxiliary engines while they are docked, including emission or power reduction requirements. Reduced vessel speeds also provide emission reduction benefits, and programs are operated by local air districts along the California coast to incentivize lower speeds. CARB staff received comments during the public process about including a statewide vessel speed reduction program. In the Draft 2022 State SIP Strategy, the CARB measure for ‘Future Emissions Reductions from Ocean-Going Vessels’ discusses pursuing options available under CARB authority to achieve further emissions reductions, including developing a statewide vessel speed reduction program.

To control emissions from personal watercraft, CARB staff is also exploring development of Spark-Ignition Marine Engine Standards, as described in the 2022 State SIP Strategy. For this measure, CARB would develop and propose catalyst-based standards for outboard and personal watercraft engines greater than or equal to 40 kW in power that will gradually reduce emission standards to approximately 70 percent below current levels and consider actions that would require a percentage of outboard and personal watercraft vessels to be propelled by zero-emission technologies for certain applications.

Taken together, California's comprehensive suite of emission standards, fuel specifications, and incentive programs for marine vehicles and engines represent all measures that are technologically and economically feasible within California. There are no additional measures that, when considered in aggregate, would advance the attainment date by at least one year.

7. Fuels

As mentioned earlier, cleaner burning fuels also play an important role in reducing emissions from motor vehicles and engines in these source categories. CARB has adopted standards to ensure that the fuels sold in California are the cleanest in the nation. These programs include the California Reformulated Gasoline program (CaRFG), which controls emissions from gasoline, and the Ultra-Low Sulfur Diesel requirements (2006), which provide the nation's cleanest diesel fuel specifications and help to ensure that diesel fuels burn as cleanly as possible and work synergistically with cleaner-operating heavy-duty trucks equipped with advanced emission control systems that debuted in 2007, and the Low Carbon Fuel Standard. These fuel standards, in combination with engine technology requirements, ensure that California's transportation system achieves the most effective emission reductions possible.

Taken together, California's emission standards, fuel specifications, and incentive programs for other mobile sources and fuels represent all measures that are technologically and economically feasible within California. There are no additional measures that, when considered in aggregate, would advance the attainment date by at least one year.

8. Mobile Source Summary

California's long history of comprehensive and innovative emissions control has resulted in the most stringent mobile source control program in the nation. U.S. EPA has previously acknowledged the strength of the program through the waiver process, and in their approvals of CARB's regulations and District plans.

In its 2020 approval of Ventura County's 75 ppb 8-hour ozone standard, which included the State's current control program and new measure commitments from the 2016 State SIP Strategy, U.S. EPA found that "CARB and the Southern California Association of Governments

(SCAG) provide for the implementation of RACM for mobile sources of NOx and ROG; there are no additional RACM that would advance attainment of the 2008 ozone NAAQS in Ventura County by at least one year; and therefore, the 2016 Ventura County AQMP provide for the implementation of all RACM as required by [the] CAA."[3]

In addition to declarations that the mobile source control program meets RACM requirements, U.S. EPA has also provided past determinations that CARB's mobile source control programs meet the more rigorous Best Available Control Measure (BACM) requirements. As BACM requirements are considered a more stringent threshold to meet than RACM, U.S. EPA has stated that a determination that the control program has meet BACM requirements also constitutes a conclusion that it meets RACM requirements.[4] U.S. EPA has acknowledged CARB's mobile source control program as meeting BACM in their 2020 approval of the San Joaquin Valley's PM2.5 Serious Area 2018 Plan, [5] and in their 2019 approval of the South Coast's PM2.5 Serious Area Plan.[6] In their 2018 proposal for that approval, U.S. EPA noted that,

"With respect to mobile sources, we recognize that CARB's current program addresses the full range of mobile sources in the South Coast through regulatory programs for both new and in-use vehicles… Overall, we believe that the program developed and administered by CARB and SCAG provide for the implementation of BACM for PM2.5 and PM2.5 precursors in the South Coast nonattainment area."[7]

In their 2020 approval of the San Joaquin Valley's PM2.5 Serious Area 2018 Plan, [8] U.S. EPA further found that CARB's mobile source control program met the more stringent level of Most Stringent Measures (MSM). In their 2020 proposal for that plan, U.S. EPA found that,

"CARB's programs constitute the most stringent emission control programs currently available for the mobile source and fuels categories, taking into account economic and technological feasibility."[9]

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[3] 85 FR 11814 https://www.govinfo.gov/content/pkg/FR-2020-02-27/pdf/2020-03246.pdf

[4] "We interpret the BACM requirement as generally subsuming the RACM requirement (i.e., if we determine that the measures are indeed the ''best available,'' we have necessarily concluded that they are ''reasonably available''). Consequently, our proposed approval of the… provisions relating to the implementation of BACM also constitutes a proposed finding that the Plan provides for the implementation of RACM."
69 FR 5411 https://www.federalregister.gov/documents/2004/02/04/04-2264/approval-and-promulgation-of-implementation-plans-for-california-san-joaquin-valley-pm-10

[5] 85 FR 44192 https://www.federalregister.gov/documents/2020/07/22/2020-14471/clean-air-plans-2006-fine-particulate-matter-nonattainment-area-requirements-san-joaquin-valley

[6] 84 FR 3305 https://www.federalregister.gov/documents/2019/02/12/2019-01922/approval-and-promulgation-of-implementation-plans-california-south-coast-serious-area-plan-for-the

[7] 83 FR 49872 https://www.federalregister.gov/documents/2018/10/03/2018-21560/approval-and-promulgation-of-implementation-plans-california-south-coast-serious-area-plan-for-the

[8] 85 FR 44192 https://www.federalregister.gov/documents/2020/07/22/2020-14471/clean-air-plans-2006-fine-particulate-matter-nonattainment-area-requirements-san-joaquin-valley

CARB has continued to substantially enhance and accelerate reductions from our mobile source control programs through the implementation of more stringent engine emissions standards, in-use requirements, incentive funding, and other policies and initiatives as described in the preceding sections. The CARB process for developing CARB's control measures includes an extensive public process and is consistent with U.S. EPA RACM guidance. Through this process, CARB found that with, the current mobile source control program and new measures included in the 2022 State SIP Strategy, there are no additional reasonable available control measures that would advance attainment of the 70 ppb 8-hour ozone standard in the Ventura County nonattainment area. There are no reasonable regulatory control measures excluded from use in this plan; therefore, there are no emissions reductions associated with unused regulatory control measures. As a result, California's mobile source control programs fully meet the requirements for RACM.

C. RACM for Consumer Products

Consumer products are defined as chemically formulated products used by household and institutional consumers. For thirty years, CARB has taken actions pertaining to the regulation of consumer products. Three regulations have set ROG limits for 129 consumer product categories. These regulations, referred to as the Consumer Product Program, have been amended frequently, and progressively stringent ROG limits and reactivity limits have been established. These are Regulation for Reducing ROG Emissions from Antiperspirants and Deodorants; Regulation for Reducing Emissions from Consumer Products; and Regulation for Reducing the Ozone Formed from Aerosol Coating Product Emissions, and the Tables of Maximum Incremental Reactivity Values. Additionally, a voluntary regulation, the Alternative Control Plan has been adopted to provide compliance flexibility to companies. The program's most recent rulemaking occurred in 2021 with amendments to Consumer Products Regulation and Method 310.

U.S. EPA also regulates consumer products. U.S. EPA's consumer products regulation was promulgated in 1998, however, federal consumer products ROG limits have not been revised since their adoption. U.S. EPA also promulgated reactivity limits for aerosol coatings. As with the general consumer products, California's requirements for aerosol coatings are more stringent than the U.S. EPA's requirements. Other jurisdictions, such as the Ozone Transport Commission states, have established ROG limits for consumer products which are modeled after the California program. However, the ROG limits typically lag those applicable in California.

In summary, California's Consumer Products Program, with the most stringent ROG requirements applicable to consumer products, meets RACM. There are no additional measures that, when considered in aggregate, would advance the attainment date by at least one year.

[9] 85 FR 17382 https://www.federalregister.gov/documents/2020/03/27/2020-05914/clean-air-plans-2006-fine-particulate-matter-nonattainment-area-requirements-san-joaquin-valley

D. RACM for Pesticides

The Department of Pesticide Regulation (DPR) is the State agency responsible for regulating the application of pesticides, which are a source of ROGs in Ventura County. California began including in the SIP controls to reduce ROG emissions from pesticide applications in the 1994 Ozone SIP. The 1994 Ozone SIP included a commitment to reduce ROG emissions from pesticide use 20 percent below the 1990 baseline emission levels by 2005, with flexibility to achieve reductions of less than 20 percent if less pesticidal ROG emissions reductions were needed in a given district. This commitment, known as the 1994 Pesticide Element, governed the application of agricultural and structural pesticides in five California nonattainment areas: South Coast, San Joaquin Valley, Sacramento Metro, Ventura County, and the Southeast Desert.

Under the Pesticide Element of the 1994 Ozone SIP, California's commitment for Ventura County was to adopt and submit to U.S. EPA by 1997, any regulations necessary to reduce ROG emissions resulting from agricultural and structural pesticides in Ventura by 20 percent of the 1990 base year emissions, and by 2.4 tons per day, by 2005.[10] This aligns with the 2007 Revised Pesticide Element for Ventura County, which requires that ROG emissions from agricultural and commercial structural pesticides do not exceed the targeted threshold of 20 percent below 1990 base year emissions.[11]

DPR compiles and publishes annual reports on ROG emissions from pesticides. In its latest report, DPR identified that ROG emissions in the Ventura County nonattainment area were 72 percent lower than the 1990 base year, and remain in compliance with the SIP goal benchmark of 20 percent below 1990 levels.[12] Beyond ensuring that the control measures in Ventura County are maintaining that ROG emissions from pesticides do not exceed the prescribed limits, DPR assessment indicates that no other state, aside from California, is required to adopt into their SIP measures to reduce ROG emissions from pesticides. This requirement suggests that the California pesticide control program exceeds the RACT threshold of 'reasonably available' control technologies and meet at least the more stringent threshold of "Best available" control technologies (BACT).

Finally, the pesticide control program currently being implemented in Ventura County has been found by U.S. EPA to meet RACT/RACM requirements. In 2012, as part of their final approval of California's 2009 Field Fumigant Regulations and the Revised SIP Commitment for the SJV, U.S. EPA evaluated California's field fumigant regulations for the South Coast, Ventura County, Southeast Desert, San Joaquin Valley, and Sacramento Metropolitan nonattainment areas, and concluded that the controls met RACT requirements:

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[10] 73 FR 21885 Proposed Approval of the Revised Pesticide Element for Ventura County (April 23, 2008).
[11] 62 Federal Register 1169-1170; January 8, 1997
[12] California DPR October 2021 "Annual Report on Volatile Organic Compound Emissions from Pesticides for 1990 – 2019"
https://www.cdpr.ca.gov/docs/emon/vocs/vocproj/2019_voc_annual_report.pdf

"[U.S.] EPA believes, based on the information provided in the CDPR's alternatives analysis, and the research cited to support it, that CDPR has demonstrated that the proposed regulations are stringent enough to implement RACT-level controls on the application of pesticides."[13]

U.S. EPA has also approved the RACM demonstration in the 80 ppb 8-hour ozone SIPs for the South Coast and San Joaquin Valley, including the ROG control measures,[14] as well as the RACM demonstration in the PM2.5 SIP for the South Coast.[15] Finally, U.S. EPA has also determined that California's pesticide control program meets the more stringent control level requirements of BACM, as was affirmed in the Technical Support Document for U.S. EPA's action to approve California's 2009 Field Fumigant Regulations and the Revised SIP Commitment, [16] wherein they reference their prior approval of the PM10 SIPs for South Coast and Southeast Desert[17] and other SIPs:

"The approval of the fumigant regulations is consistent with these approved RACM/BACM demonstrations and therefore will not interfere with these SIPs' compliance with the RACM/BACM requirements."

Beyond the ROG controls provided by the pesticide control program currently being implemented, the 2022 State SIP Strategy also includes a measure to reduce emissions associated with the use of a pesticide known as 1,3-Dichloropropene (1,3-D), which is considered a ROG. This measure was developed to limit short-term air concentrations of 1,3-D, a fumigant used to control nematodes, insects, and disease organisms in soil, by shifting application methods to those with lower emissions, such as requiring applicators to use totally impermeable film (TIF) tarpaulins or other mitigation measures. DPR is in the process of developing this regulation, which has a targeted effective date of 2024.

In summary, DPR's pesticide regulations represent all measures that are technologically and reasonably available in the context of Ventura County's 70 ppb 8-hour ozone attainment plan and meets RACM. There are no additional measures that, when considered in aggregate, would advance the attainment date by at least one year.

[13] U.S. EPA *Technical Support Document for Final Rule* (August 14, 2012) https://www.regulations.gov/document/EPA-R09-OAR-2012-0194-0023
[14] See 77 FR 12652 (March 1, 2012) (SJV 2007 8-hour Ozone SIP), and 77 FR 12674 (March 1, 2012) (South Coast 8-hour Ozone Plan)
[15] 76 FR 69928 (November 9, 2011)
[16] U.S. EPA *Technical Support Document for Final Rule* (August 14, 2012) https://www.regulations.gov/document/EPA-R09-OAR-2012-0194-0023
[17] 70 FR 69081 (November 14, 2005)

APPENDIX G

VENTURA COUNTY

LIST OF PRE-BASE EMISSION INVENTORY YEAR BANKED EMISSION REDUCTION CREDITS

Table G-1 provides a list of pre-2018 emission reduction credits (ERCs).

Table G-1
ERCs by Company and Certificate (tons per year)

Company Name	Area of County	ERC	ROC	NOx	PM10	SOx
ABA Energy Corporation	Oxnard	1219	0.49	0	0	0
ABA Energy Corporation	Camarillo	1240	7.41	0	0	0
Aera Energy LLC	Ventura (Ojai)	1036	0	0.39	0.44	0.04
Aera Energy LLC	Ventura (Ojai)	1053	0.02	0.1	0.01	0
Aera Energy LLC	Ventura (Ojai)	1087	2.17	0	0	0
Aera Energy LLC	Ventura (Ojai)	1064	0.34	0	0	0
Aera Energy LLC	Ventura (Ojai)	1063	4.11	2.07	0.12	0.01
Aera Energy LLC	Ventura (Ojai)	1062	0.87	5.38	0.32	0.03
Aera Energy LLC	Ventura (Ojai)	1059	0.31	0.31	0.16	0.01
Aera Energy LLC	Ventura (Ojai)	1058	0.1	0.31	0.02	0
Aera Energy LLC	Ventura (Ojai)	1128	0	0	0	0.01
Aera Energy LLC	Ventura (Ojai)	1130	0	0	0	0.3
Aera Energy LLC	Ventura (Ojai)	1129	0.85	0	0.17	0.03
Aera Energy LLC	Ventura (Ojai)	1127	224.84	0	0	0
Aera Energy LLC	Ventura (Ojai)	1238	0.27	0	0	0
Aera Energy LLC	Santa Paula	1038	1.33	3.34	0.45	0.01
Amgen Inc.	Camarillo	1101	0	4.79	0	0
Amgen Inc.	Thousand Oaks	1141	0.11	0	0.07	0.01
Ample Resources, Inc.	Ventura (Ojai)	1213	0.01	0	0	0
BMW of North America, LLC	Oxnard	1210	0.36	0.23	0.03	0.01
C.D. Lyon Construction, Inc.	Ventura (Ojai)	1188	1	0	0	0
California Resources Production Crp	Ojai	1218	0	0.67	0.18	0.01
California Resources Production Crp	Ventura (Ojai)	1217	4.46	0	0	0

Company Name	Area of County	ERC	ROC	NOx	PM10	SOx
California Resources Production Crp	Ventura (Ojai)	1057	0	1.33	0.04	0
California Resources Production Crp	Ventura (Ojai)	1123	0.04	3.49	0.14	0.02
California Resources Production Crp	Ventura (Ojai)	1056	0	3.17	0.09	0.01
California Resources Production Crp	Ventura (Ojai)	1207	0	1.54	0.82	0
California Resources Production Crp	Ventura (Ojai)	1224	19.87	0	0	0
California Resources Production Crp	Ventura (Ojai)	1054	0	5.93	0.18	0.02
California Resources Production Crp	Santa Paula	1042	0.01	0	0	0
California Resources Production Crp	Santa Paula	1041	1.49	31.09	0.15	0.02
California Resources Production Crp	Fillmore	1017	0.03	22.37	0.09	0
California Resources Production Crp	Piru	1031	0	16.5	0.05	0
California Resources Production Crp	Oxnard	1021	27.13	0	0	0
California Resources Production Crp	Oxnard	1002	0	0	0.04	0
California Resources Production Crp	Oxnard	1027	0	1.75	0.18	0.01
California Resources Production Crp	Oxnard	1001	0	0	0.01	0
California Resources Production Crp	Oxnard	1022	10.82	0	0	0
California Resources Production Crp	Oxnard	1026	6.64	2.4	0.3	0.03
California Resources Production Crp	Camarillo	1229	0	52.87	0	0
California Resources Production Crp	North Zone	1227	3.96	0	0	0
California Resources Production Crp	North Zone	1226	2.4	0	0	0
Carbon California Operating Co.	Ojai	1142	2.29	0	0	0
Carbon California Operating Co.	Ojai	1155	0.32	0.14	0	0
Carbon California Operating Co.	North Zone	1132	0.06	0.02	0	0
Carbon California Operating Co.	North Zone	1135	0.01	0	0	0
Carlton Forge Works	Oxnard	1241	0.06	1.84	2.33	0.04
Chevron Environmental Management Co	Fillmore	1008	1.13	0	0	0
ChevronTexaco	Ventura (Ojai)	1049	0	0	0.08	0
ChevronTexaco	Ventura (Ojai)	1048	0	0.2	0.08	0
ChevronTexaco	Ventura (Ojai)	1051	0	0.08	0.01	0.34
ChevronTexaco	Ventura (Ojai)	1047	125.73	0	0	0
ChevronTexaco	Fillmore	1082	0.44	1.67	0.09	0.03
ChevronTexaco	Piru	1033	0.55	0	0	0
Compositair	Camarillo	1072	0	0.06	0	0

Company Name	Area of County	ERC	ROC	NOx	PM10	SOx
Costco Wholesale Corporation	Ventura (Ojai)	1194	4.12	0	0	0
Costco Wholesale Corporation	Oxnard	1202	0.54	0	0	0
Dos Cuadras Offshore Resources, LLC	Ojai	1018	0	0	0.18	0.02
Dos Cuadras Offshore Resources, LLC	Ventura (Ojai)	1185	0	0.19	0	0
Dos Cuadras Offshore Resources, LLC	Ventura (Ojai)	1204	0	1.32	0.95	0.08
Dos Cuadras Offshore Resources, LLC	Fillmore	1149	1.75	0	0	0
Element Markets LLC	Oxnard	1214	0	0.26	0.36	0
GenOn Emissions, LLC	Ventura (Ojai)	1175	0.24	0	0	0
GenOn Emissions, LLC	Santa Paula	1100	0.03	0.47	0.76	0.01
GenOn Emissions, LLC	Camarillo	1239	3.97	0	0	0
Gilroy Foods Inc.	Oxnard	1020	0	0.09	0.01	0
Haas Automation	Oxnard	1116	0	0.06	0	0
Hanson Aggregates	Ventura (Ojai)	1090	0	0	0.69	0
Houwelings Nurseries Oxnard, Inc.	Camarillo	1236	1.12	2.48	1.55	0.12
Hunter Resources Development	Fillmore	1125	0.09	0.01	0.01	0
KTI Engineers & Constructors	Port Hueneme	1034	0	0	1.5	0
LWFP, LLC	North Zone	1151	0	0	0.33	0
LWFP, LLC	North Zone	1158	0	0	0.16	0
LWFP, LLC	North Zone	1191	0	0	0.08	0
Mirada Petroleum, Inc.	Ventura (Ojai)	1165	0.05	0	0	0
Mirada Petroleum, Inc.	Camarillo	1231	2.78	0	0	0
Naval Base Ventura County	Oxnard	1114	0	0	0.12	0
Naval Base Ventura County	Oxnard	1113	0	0	0	0.04
Naval Base Ventura County	Oxnard	1112	1.27	0	0	0
Naval Base Ventura County	Oxnard	1108	0.01	0	0	0
Naval Base Ventura County	Oxnard	1160	1.23	0	0	0
Naval Base Ventura County	Oxnard	1187	0.04	1.14	0.17	0.46
Naval Base Ventura County	Port Hueneme	1144	0.01	2.68	0.06	0.02
Naval Base Ventura County	Port Hueneme	1154	0.06	0.86	0.1	0.06
Naval Base Ventura County	Port Hueneme	1121	0	0	3.9	0
Naval Base Ventura County	Camarillo	1140	0	0.11	0	0

Company Name	Area of County	ERC	ROC	NOx	PM10	SOx
Nestle Food Company	Oxnard	1137	0.11	1.54	0.12	0.02
Northrop Grumman Corporation	Thousand Oaks	1046	0	0	0.01	0.01
Northrop Grumman Corporation	Thousand Oaks	1146	0	0.01	0	0
Occidental Chemical Corp.	Oxnard	1131	0.07	3.79	1.33	0.02
Oxnard Lemon Co.	Oxnard	1152	0	0.1	0	0
P.W. Gillibrand Company Inc.	Simi Valley	1201	0	5.11	0	0.03
Pacific Operators Offshore LLC	Ventura (Ojai)	1093	0.21	0.89	0.09	0.02
Pacific Operators Offshore LLC	Ventura (Ojai)	1075	0	0.88	0	0
Pacific Recovery Corporation	Oxnard	1212	0.12	0	0	0.03
Parker Hannifin Corporation	Santa Paula	1120	3.43	0	0	0
Parker Hannifin Corporation	Camarillo	1122	0.61	0	0	0
Parker Hannifin Corporation	Thousand Oaks	1174	2.35	0	0	0
Peak Operator LLC	Ventura (Ojai)	1153	1.06	0	0	0
Peak Operator LLC	Oxnard	1203	0.29	0	0	0
Peak Operator LLC	Oxnard	1030	0.19	0	0	0
Peak Operator LLC	Oxnard	1234	0.36	0	0	0
Peak Operator LLC	Oxnard	1124	0.58	0	0	0.02
Peak Operator LLC	Camarillo	1233	3.6	0	0	0
Peak Operator LLC	Camarillo	1221	0.92	0	0	0
Peak Operator LLC	Camarillo	1173	0.21	0	0	0
Peak Operator LLC	Camarillo	1096	0	0.51	0.03	0.01
Peak Operator LLC	Camarillo	1190	0.3	0	0	0
Peak Operator LLC	Camarillo	1206	0.59	0	0	0
Peak Operator LLC	Camarillo	1222	0.58	0	0	0
Peak Operator LLC	Thousand Oaks	1200	0.34	0	0	0
Procter & Gamble Paper Products	Oxnard	1166	0	0	16.9	0
Procter & Gamble Paper Products	Oxnard	1181	0	22.17	0	0
Procter & Gamble Paper Products	Oxnard	1134	0	0	2.81	0
Procter & Gamble Paper Products	Oxnard	1189	0	0	3.44	0
Procter & Gamble Paper Products	Camarillo	1081	32	0	0	0
PTI Technologies Inc.	Thousand Oaks	1162	0.25	0	0	0
Reichhold Chemicals Inc.	Santa Paula	1136	0	0.1	0	0
Royal Coatings	Oxnard	1161	0.06	0	0	0
Santa Fe Energy OperatingPrtnr	Fillmore	1076	0.01	0	0	0
Santa Fe Minerals Inc.	Fillmore	1009	0.55	0	0	0

Company Name	Area of County	ERC	ROC	NOx	PM10	SOx
Skyworks Solutions, Inc.	Oxnard	1220	0.01	0	0	0
Southern California Edison Co.	Ojai	1094	0	5.57	0	0.02
Southern California Edison Co.	Ventura (Ojai)	1097	0	4.97	0	0.03
Southern California Edison Co.	Ventura (Ojai)	1091	0	6.41	0	0.03
Southern California Edison Co.	Santa Paula	1078	0	3.66	0	0.02
Southern California Edison Co.	Santa Paula	1083	0	0.22	0	0.01
Southern California Edison Co.	Fillmore	1079	0	0.72	0	0.01
Southern California Edison Co.	Fillmore	1085	0	0.42	0	0
Southern California Edison Co.	Fillmore	1080	0	0.17	0	0
Southern California Edison Co.	Fillmore	1109	0	1.93	0	0
Southern California Edison Co.	Fillmore	1084	0	0.09	0	0
Southern California Edison Co.	Camarillo	1092	0	23.24	0.22	0.03
Southern California Edison Co.	North Zone	1107	0	3.2	0	0
Southern California Edison Co.	North Zone	1104	0	2.08	0	0.01
St. John's Regional Medical Center	Oxnard	1089	0	0.18	0	0
Sully-Miller Contracting Co.	Oxnard	1183	0	1.51	3.33	0.02
Technicolor Home Entertainment Serv	Ventura (Ojai)	1180	0.01	0	0	0
TEG Oil & Gas USA, Inc.	Oxnard	1177	0.3	0	0	0
The Boeing Company	Santa Paula	1119	0.45	0	0	0
The Boeing Company	Simi Valley	1035	0	0	0.12	0.47
The Boeing Company	Simi Valley	1148	0.24	2.44	0.49	0.1
The Boeing Company	Simi Valley	1211	0.01	0.37	0	0
The Boeing Company	North Zone	1163	0	0.01	0	0
The Termo Company	Santa Paula	1102	0.02	0	0	0
The Termo Company	Oxnard	1230	0.05	0	0	0
Unocal	Santa Paula	1044	0.13	0	0	0
Unocal	Simi Valley	1145	4.32	0	0	0
Vaquero Energy	Fillmore	1013	0.06	0.79	0	0
Venoco, Inc.	Fillmore	1182	0	3.04	0	0
Venoco, Inc.	Oxnard	1147	0.05	0	0	0
Venoco, Inc.	Oxnard	1205	0.17	0	0	0
Venoco, Inc.	Oxnard	1025	0	1.61	0.05	0.01
Venoco, Inc.	OCS Area	1208	0	0.37	0	0
Venoco, Inc.	OCS Area	1184	0	16.5	0	0
Venoco, Inc.	OCS Area	1164	0	0	0.13	0.08
Venoco, Inc.	OCS Area	1139	0	0	0.13	0.01
Ventura County APC Board	Camarillo	1167	55	0	0	0
Vulcan Materials Co.	Oxnard	1235	0	1.56	0	0

Company Name	Area of County	ERC	ROC	NOx	PM10	SOx
Waste Management Energy Solutions	Ventura (Ojai)	1170	0	3.02	0	0
Waste Management of California	Oxnard	1215	0	22.98	0	0
Total			578.95	315.87	46.78	2.81

APPENDIX H
VENTURA COUNTY
WEIGHT OF EVIDENCE ASSESSMENT

Prepared for

Ventura County Air Pollution Control District
Ventura, California

By

California Air Resources Board
Planning and Technical Support Division
Sacramento, California

Ventura County Weight of Evidence Assessment

Introduction

Ventura County (County) is currently classified as a serious nonattainment area for the 2015 0.070 parts per million (ppm) federal 8-hour ozone standard (2015 ozone standard). For areas designated as moderate or above nonattainment for the 2015 ozone standard, photochemical modeling is a required element of the State Implementation Plan (SIP) to determine whether existing and planned control strategies provide the reductions needed to meet the 2015 ozone standard by the attainment deadline.

To address the uncertainties inherent to modeling assessments, U.S. Environmental Protection Agency (U.S. EPA) guidance, *Draft Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, $PM_{2.5}$, and Regional Haze,* recommends that supplemental analyses accompany all model attainment demonstrations. Further, U.S. EPA guidance indicates that as an area approaches the target attainment date, ambient air quality and emissions data become an increasingly important element in demonstrating progress toward air quality goals.

To complement regional photochemical modeling analyses included in the Ventura County SIP, the following Weight Of Evidence (WOE) demonstration includes detailed analyses of ambient ozone data, county level precursor emission trends, population exposure trends, and a discussion of conditions that contribute to exceedances of the 2015 ozone standard. Further, the rate of progress toward air quality goals was evaluated by considering trends in ozone design values, precursor emission reductions, the relationship between ozone air quality and past emission reductions, as well as taking into account the impact of wildfire emissions.

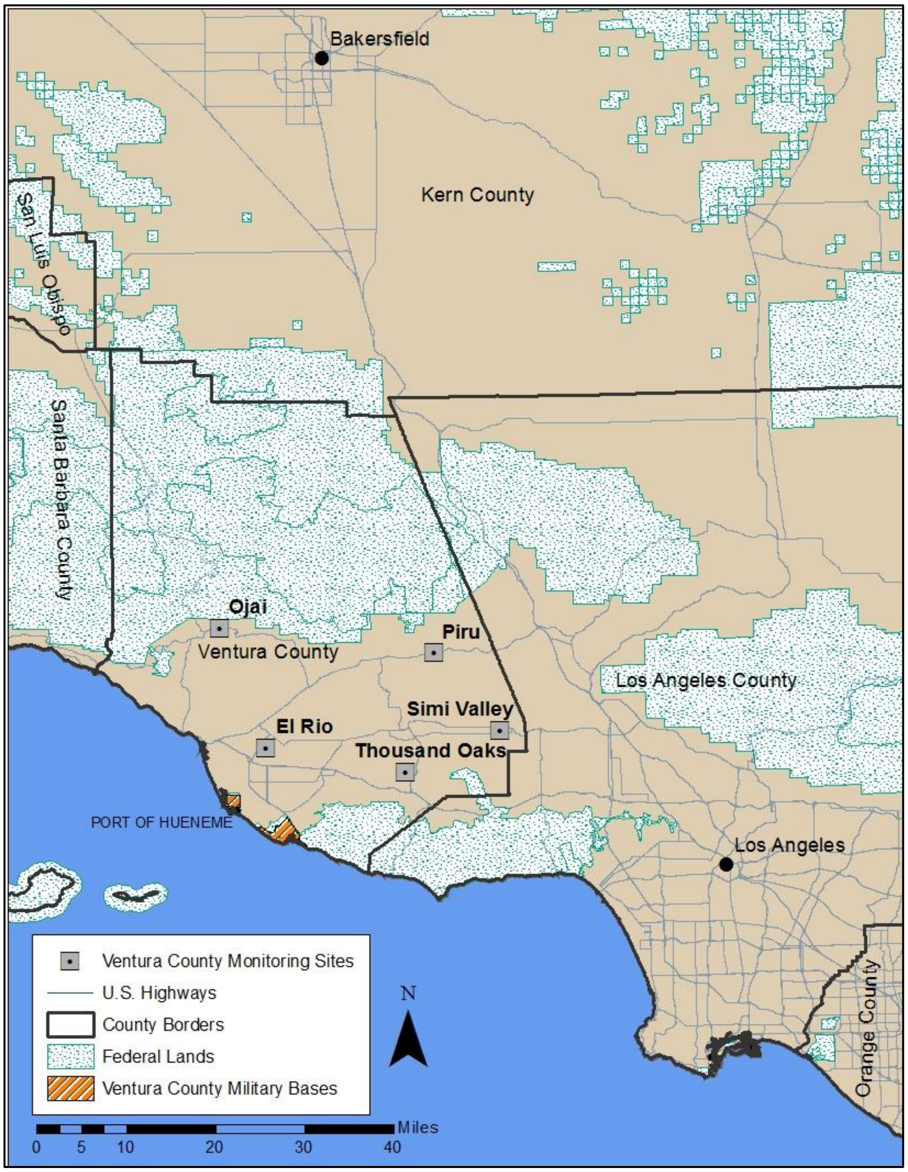
Photochemical modeling for Ventura County has demonstrated that all sites will meet the 2015 ozone standard by the 2026 attainment deadline for serious nonattainment areas. Air quality analyses show that measured ozone concentrations and emissions of ozone precursors in Ventura County have declined markedly over the last two decades and consistent with the modeling results, indicating that the County will meet the 2026 attainment date.

Area Description

Located in the South Central Coast Air Basin, Ventura County is west of Los Angeles County, south of Kern County, and east of Santa Barbara County. Figure H-1 shows the location of Ventura County. Nearly 850,000 people live in the County, making it the thirteenth most populous county in California. The largest employer is the U.S. military which hosts three facilities operating as Naval Base Ventura County (NBVC) and one Air National Guard base in Ventura County. The other major industries are agriculture, biotechnology, oil production, technology, and tourism.

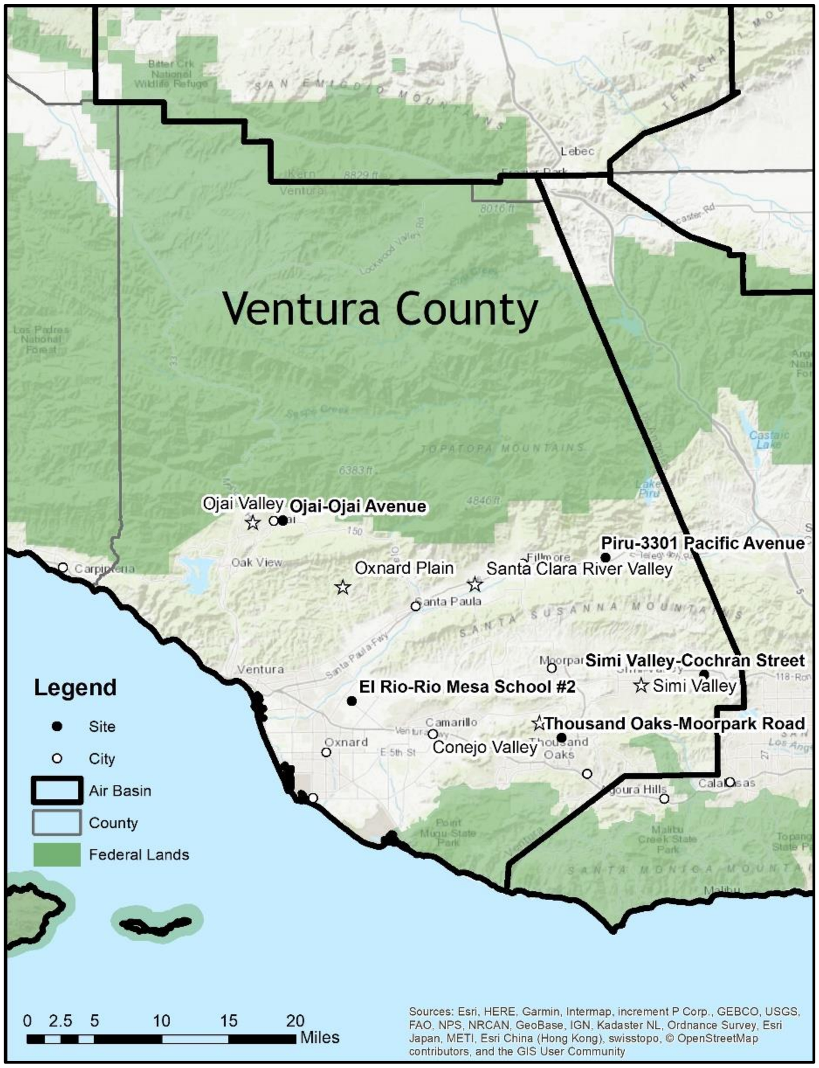
Ventura County encompasses 1,843 square miles. The northern portion of the County is comprised of the rural, mountainous Los Padres National Forest. The southern portion of the County is comprised of 42 miles of coastline that gives way to coastal plain and broad inland valleys. Most of the population resides in the southern portion of the County.

Figure H-1: Area Map of Ventura County and Surrounding Areas



The Ventura County Air Pollution Control District currently operates a network of five ozone monitoring sites, which are sited to represent the five distinct geographical areas of the southern portion of the County that are shown in Figure H-2. The coastal monitoring sites include El Rio and Thousand Oaks, which measure air quality that is representative of conditions in Ventura and the Oxnard Plain, and Conejo Valley, respectively. The inland monitoring sites include Ojai, Piru, and Simi Valley, which measure air quality that is representative of conditions in Ojai Valley, Santa Clara River Valley, and Simi Valley, respectively.

Figure H-2: Map of Geographical Regions in Ventura County and Locations of Representative Air Monitoring Sites



There is a large gradient in ozone concentrations between the coastal and inland areas due to the difference in prevailing meteorological conditions between these two areas. As shown in Table H-1, higher ozone concentrations measured at the inland monitoring sites drive Ventura County's serious nonattainment status. The nonattainment area is limited to the mainland portions of the County and does not include the Channel Islands.

Table H-1: Ozone Design Values at Ventura County Monitoring Sites

Site Name	AQS ID	Region	2019 Design Value (ppm)	2020 Design Value (ppm)	Meet 2015 Ozone Standard
Thousand Oaks	061110007	Conejo Valley	0.068	0.069	Yes
Piru	061110009	Santa Clara River Valley	0.071	0.070	Yes
Ojai	061111004	Ojai Valley	0.067	0.067	Yes
Simi Valley	061112002	Simi Valley	0.076	0.075	No
El Rio	061113001	Ventura and Oxnard Plain	0.060	0.061	Yes

Conceptual Model

Local emissions and transport of ozone and ozone precursors from neighboring areas, including the South Coast Air Basin, contribute to elevated ozone in Ventura County. The majority of days with elevated ozone concentrations occur during the late spring, summer, and early fall and, historically, under conditions that are conducive to photochemical production from accumulated local and regional precursor emissions.

In the spring, summer, and early fall, the predominant weather pattern in the coastal area of Ventura County consists of a persistent marine layer of clouds situated at 1,000 to 3,000 feet above sea level. The marine layer extends into the valleys in the southern portion of the County on most days, carried by a daily afternoon breeze that flows from the cooler coastal area into the warmer inland areas. Once the sun sets, air over the land cools faster than air over the ocean, which causes air to flow back toward the coastline at night. The east-to-west downward sloping terrain further promotes the flow of air from the valleys back toward the coastal plain at night. This sea/land breeze circulation pattern moves air masses back and forth over the same populated areas of the County, accumulating emissions with each pass. Ozone exceedances can occur when these recirculated emissions stagnate onshore.

Ventura County can intercept ozone and ozone precursor emissions from neighboring areas, including South Coast, under a variety of scenarios. Due to the terrain and predominant meteorological patterns in southern California, inland emissions will accumulate offshore, typically at night. During periods of offshore accumulation, emissions derived from Ventura County can intermingle with pollution derived from other regional source areas. When onshore flow resumes, air masses with accumulated, intermingled regional pollution will move inland and potentially impact air quality in Ventura County.

Alternatively, when areas of high pressure build over inland areas and areas of lower pressure persist over the ocean, offshore winds can develop and draw emissions from areas upwind into the County. Under this scenario, conditions are typically breezy along the coast with relatively stagnant conditions inland in the County which can cause ozone exceedances in the inland areas.

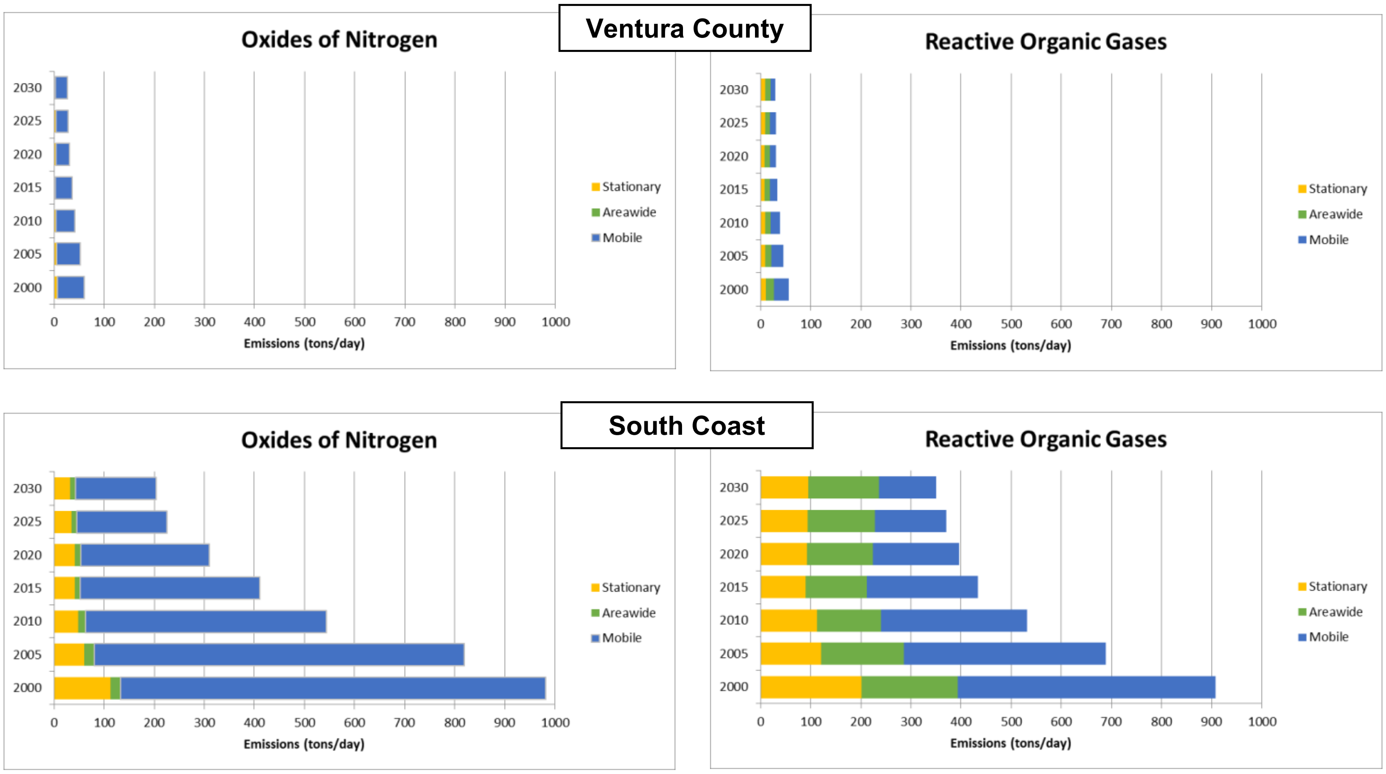
Air quality problems may also arise episodically due to regional wildfires. Certain meteorological conditions promote wildfire outbreaks. In the fall through spring, a system of high pressure can form east of Ventura County, over the Great Basin. During these months, temperatures throughout southern California are typically warmer than those in the Great Basin. At times, air flowing clockwise around the Great Basin high will be pushed westward through mountain passes and into southern California. The flow of air accelerates as it moves through mountain passes and into lower elevation areas of southern California. The descent from the mountain passes causes the air to warm and humidity to markedly decline. The resultant strong, warm, and dry easterly downslope flow is termed a Santa Ana wind. Santa Ana winds, although only typically lasting for a few days at a time, significantly increase the risk of wildfire in Ventura County and other areas of southern California. Wildfires, like other combustion sources, produce ozone precursors and can contribute to elevated ozone in adjacent and downwind areas. In the south central coast in particular, easterly winds can cause emissions from regional wildfires to accumulate offshore. When onshore flow resumes, these accumulated wildfire emissions can be recirculated into Ventura County and exacerbate air quality problems.

Anthropogenic Emissions

Ozone precursor emissions in Ventura County, which include reactive organic gases (ROG) and oxides of nitrogen (NOx), are predominantly from mobile sources, as shown in Figure H-3. Data from the California Air Resources Board's (CARB) 2022 Ozone SIP Inventory for Summer (Version 1.01 with approved external adjustments and include SCC, OC1, OC2 out to 100 nautical miles) for Ventura County indicate that in 2021 mobile sources accounted for 88 percent of NOx emissions whereas areawide and stationary sources accounted for two percent and ten percent of NOx emissions, respectively. In contrast, mobile, areawide, and stationary sources accounted for 41 percent, 32 percent, and 27 percent of ROG emissions, respectively.

Although mobile sources dominate the emission inventory in Ventura County, emissions from a deep water port, agriculture, natural gas electric generation facilities, naval base operations, oil production and processing, and other industrial operations can also contribute to ozone formation in the County. Proximity to a much larger source of upwind precursor emission, South Coast, also contributes to the County's ozone formation. South Coast's emissions numbers (which reflect 2022 SIP Inventory v1.01 with external adjustments and include SCAB, OC1, OC2 out to 100 nautical miles) are included at the same scale as Ventura County for comparison purposes of the scale difference between the two areas.

Figure H-3: Inventory of Ventura County and South Coast Emissions



Data source: CARB 2022 Ozone SIP Inventory for summer (Version 1.01 with approved external adjustments)

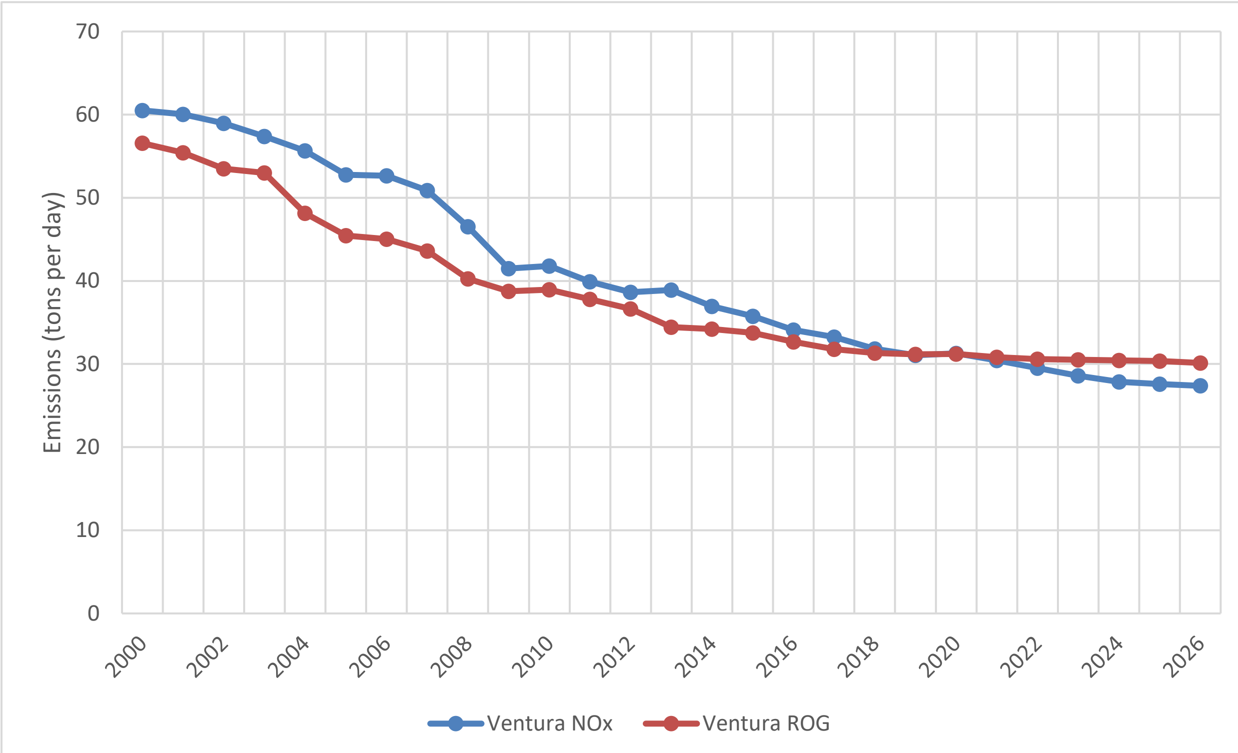
Significant reductions of ozone precursor emissions were achieved in the County between 2000 and 2021.

- Total NOx emissions declined by nearly 50 percent, and
- Total ROG emissions declined by nearly 46 percent.

Emissions from mobile sources, which contribute the largest magnitude of ozone precursors in the County, declined substantially between 2000 and 2021.

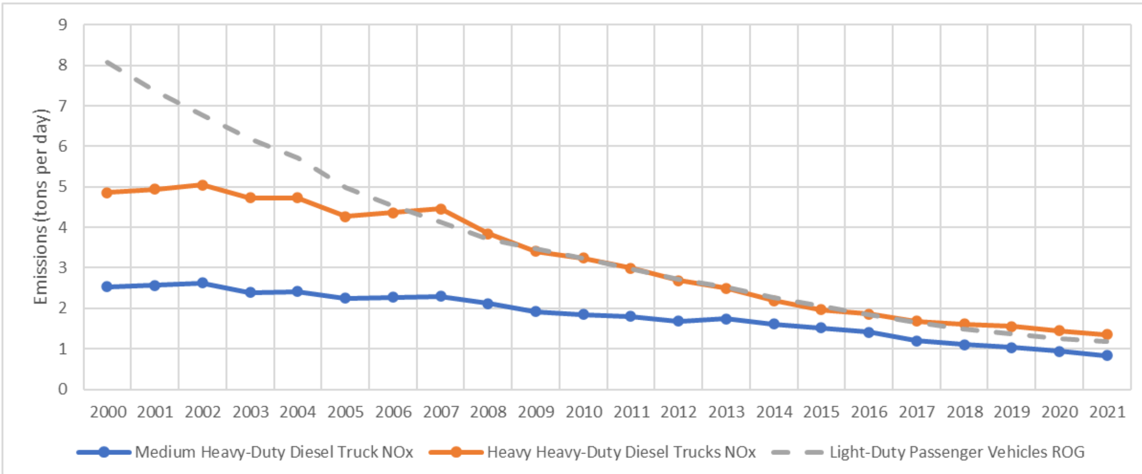
- Mobile source NOx emissions declined by nearly 50 percent, and
- Mobile source ROG emissions declined by nearly 59 percent.

Figure H-4: Inventory of Ventura County



As shown in Figure H-4, emissions have declined considerably in the County for both ROG and NOx and are expected to continue the same trend as additional approved controls and new controls come online. Additionally, in Ventura County the largest on-road mobile source subcategories in the NOx emission inventory are medium heavy-duty trucks and heavy heavy-duty diesel trucks, whereas light-duty passenger vehicles are the largest on-road mobile source subcategory in the ROG emission inventory. Statewide emission control programs targeting mobile sources have yielded substantial reductions in ozone precursor emissions in Ventura County. For example, CARB's adoption of regulations targeting various mobile sources of emissions such as heavy-duty trucks and buses and off-road equipment has led to marked progress in reducing NOx emissions As shown in Figure H-5, between 2000 and 2021, NOx emissions from medium and heavy heavy-duty diesel truck subcategories declined 67 percent and 72 percent, respectively. For the same period, ROG emissions from the light-duty passenger vehicle subcategory declined 85 percent.

Figure H-5: Emissions from the Largest Mobile Source Categories in Ventura County for 2000-2021



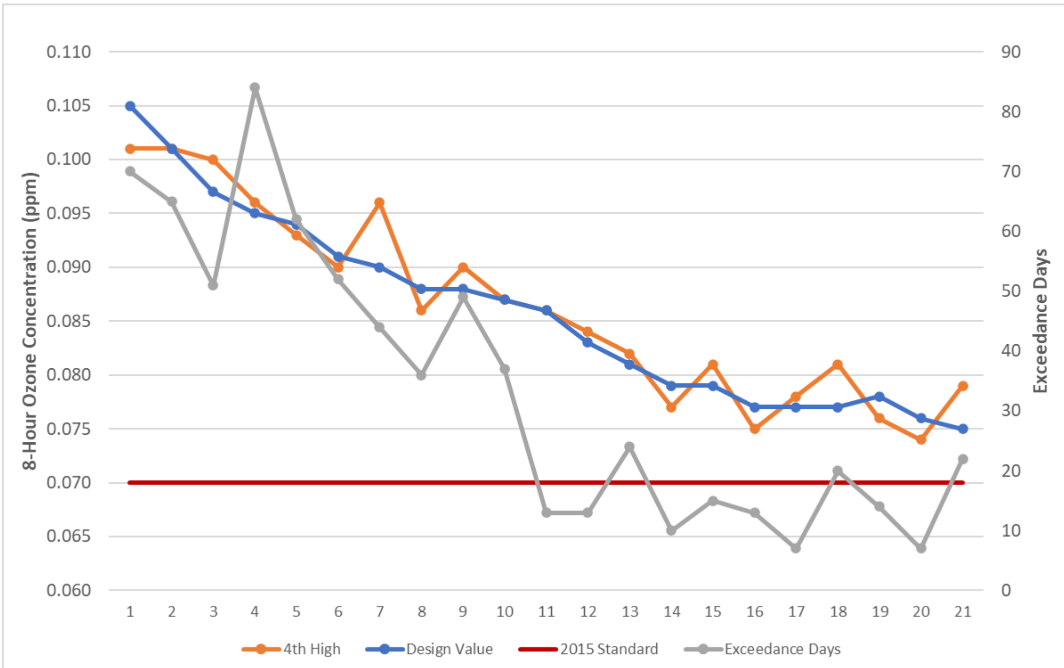
Emissions inventory projections for Ventura County indicate that ongoing implementation of current emission control programs will continue to yield reductions across many categories in the coming years. Between 2021 and 2026, in Ventura County, NOx emissions are projected to decline an additional 52 percent for medium heavy-duty diesel trucks. Emissions of NOx from heavy heavy-duty trucks are expected to decline an additional 54 percent between 2021 and 2026. Emissions of ROG from light-duty passenger vehicles are expected to decline an additional 25 percent between 2021 and 2026.

As described above, statewide programs, particularly those targeting emissions from mobile sources, have yielded significant reductions in emissions of ozone precursors in Ventura County. Although mobile sources account for the majority of ozone precursor emissions in Ventura County, marked reductions in emissions from areawide and stationary sources were also achieved between 2000 and 2021. NOx emissions from stationary and areawide sources declined by nearly 45 percent and 62 percent, respectively, between 2000 and 2021. Moreover, ROG emissions from stationary and areawide sources declined by 16 and nearly 39 percent, respectively, during this time period. In response to persistent reductions in ozone precursors, ozone air quality throughout Ventura County has improved markedly.

Ozone Air Quality

In response to declining emissions over the last 20 years, the frequency, magnitude, and spatial extent of ozone exceedances in Ventura County has significantly declined. As shown in Figure H-6, between 2000 and 2020, the number of ozone exceedance days in the County declined by nearly 69 percent, from 70 days to 22 days. Over this same period, the annual fourth highest daily maximum 8-hour concentration decreased from 0.101 to 0.079 ppm, a decrease of nearly 22 percent; and Ventura County's design value decreased by over 28 percent, from 0.105 to 0.075 ppm. Additionally, the decrease in the design value and fourth highest daily maximum have been included to reflect the concurrence by U.S. EPA of the exceptional events outlined by CARB for 2020.

Figure H-6: 2000 – 2020 Ventura County Ozone Statistics



In 2000, all sites in operation, except the El Rio monitoring site, exceeded the 2015 ozone standard but in response to declining precursor emissions, ozone air quality has been steadily improving over the last 20 years, as shown in Figure H-7. Four out of the five monitoring sites currently meet the 2015 ozone standard. The El Rio monitoring site has been in attainment since 1999. Thousand Oaks has been in attainment since 2013. Ojai attained the 2015 ozone standard in 2019, Piru just dropped below the standard in 2020, and Simi Valley is on track to attain the 2015 ozone standard within the next few years.

The time scale considered in the analyses of ambient measurements, 2000 to 2020, was selected to provide the most complete and representative sample of progress made toward air quality goals throughout Ventura County.

The site level data presented in Figure H-8 demonstrate the ongoing decrease in the frequency and magnitude of ozone exceedance days at Ventura County's design site over the last 20 years. In 2020, exceedances of the 2015 ozone standard occurred on 22 days throughout the county and exceedances occurred at all five sites. This was likely due to the exceptional wildfire emissions blanketing much of the state of California in 2020 and discussed later in this document. Even with the exceptional impact of the wildfire emissions, this is still significantly lower than in 2000, when the 0.070 ppm threshold was routinely exceeded at the three inland sites in operation at that time and saw 70 exceedance days countywide.

Figure H-7: Ozone Design Values at Ventura County Monitoring Sites

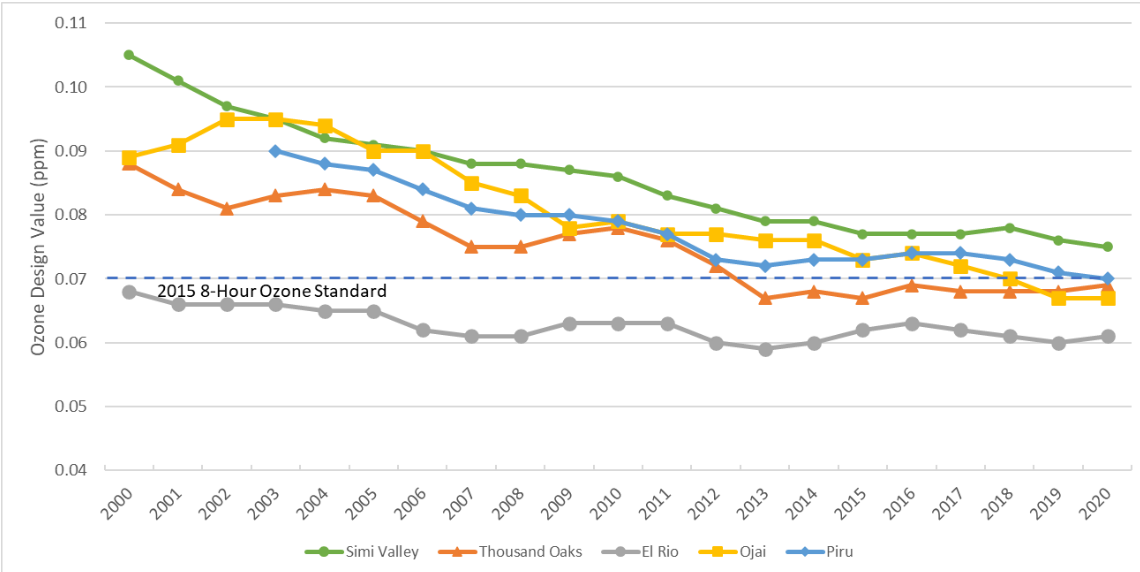
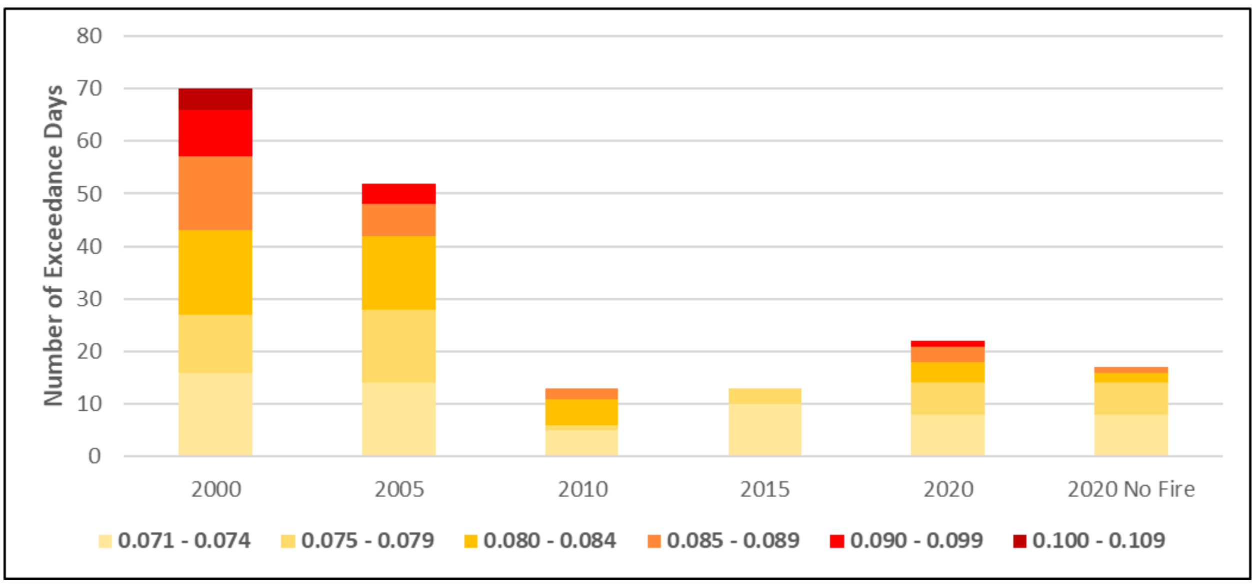


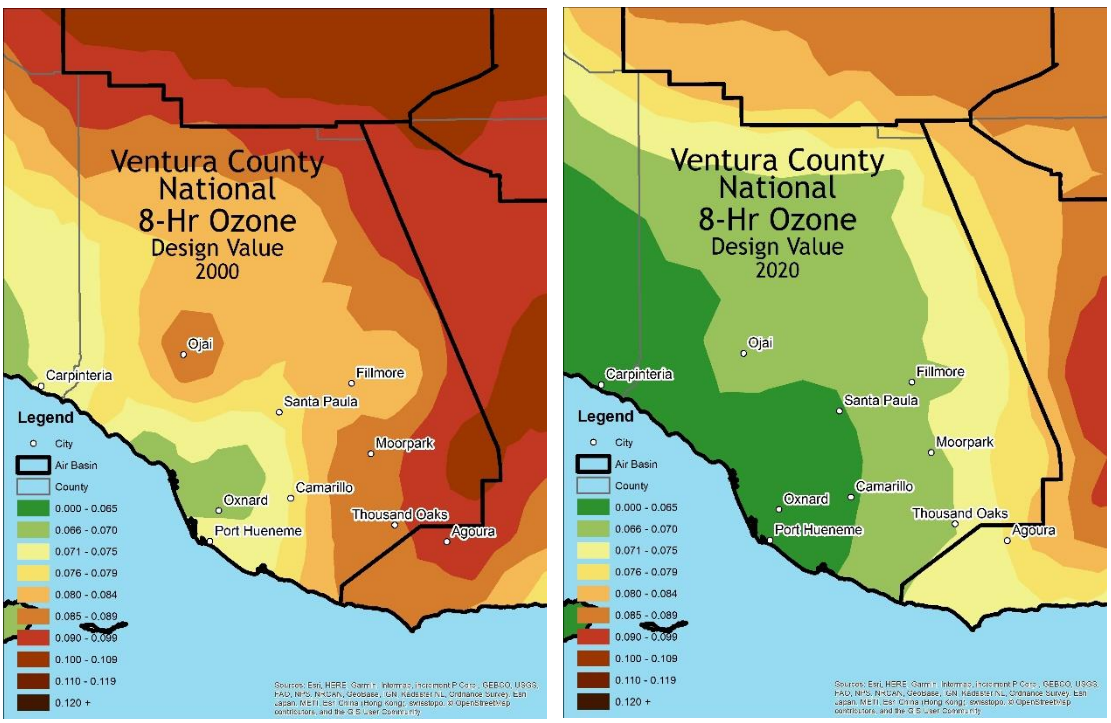
Figure H-8: Frequency and Magnitude of Exceedance Days at Ventura County Design Site (Simi Valley) in 2000, 2005, 2010, 2015, and 2020



At the Simi Valley monitoring site, which is positioned to capture the highest ozone concentrations in the County, the number of exceedance days declined by nearly 69 percent between 2000 and 2020. On exceedance days in 2000, maximum 8-hour ozone concentrations ranged from 0.071 to 0.108 ppm, up to 54 percent above the 2015 ozone standard. In contrast, maximum 8-hour ozone concentrations on exceedance days in 2020 ranged from 0.071 to 0.095 ppm, at most 36 percent above the 2015 ozone standard, and the highest days were eliminated from consideration based on exceptional event determinations.

As a result of the marked decline in the magnitude, frequency, and spatial extent of exceedances in Ventura County, the number of people exposed to elevated ozone has been reduced substantially. The contour maps in Figure H-9 illustrate the change in population exposure over the last 20 years. In 2000, the areas in Ventura County that met the 2015 ozone standard were limited to portions of the coast and inland areas adjacent to those coastal areas. Areas in the northern and eastern part of the County were more than 0.015 ppm above the 2015 ozone standard. In 2020, all of the coastal areas were in attainment with the 2015 ozone standard as well as a significant portion of the inland areas of the County. The contour maps indicate that the only inland areas yet to meet the 2015 ozone standard are within 0.005 ppm of the 0.070 ppm threshold.

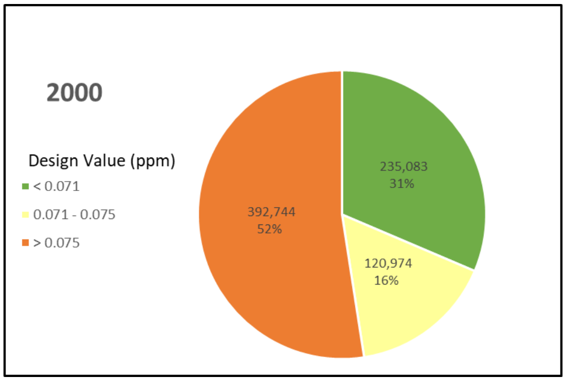
Figure H-9: Contour Maps Representing the Spatial Distribution of Ozone Air Quality in Ventura County for 2000 and 2020



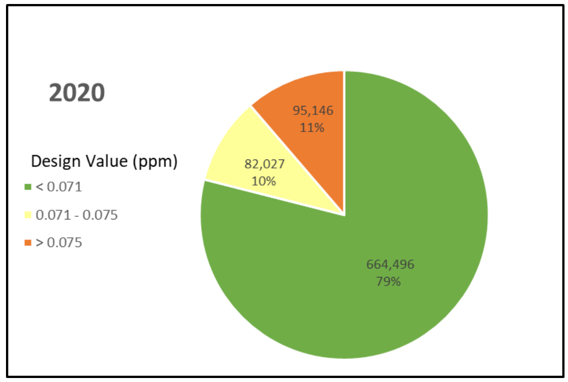
Contour maps were developed using used inverse distance weighting (IDW) to spatially interpolate design values from sites throughout the State.

To evaluate changes in population exposure, spatial analysis tools were used to overlay county level census data with the previous design value contour maps. As shown in Figure H-10, between 2000 and 2020, the number of people residing in areas of the County that exceeded the 2015 ozone standard substantially declined. In 2020, 79 percent of the population resided in areas with air quality that met the 2015 ozone standard compared to 31 percent in 2000. Furthermore, although 21 percent of the population lives in areas that are above the 0.070 ppm threshold, the ozone levels are just slightly above the current standard.

Figure H-10: Population Distribution by Ozone Design Value in 2000 and 2020



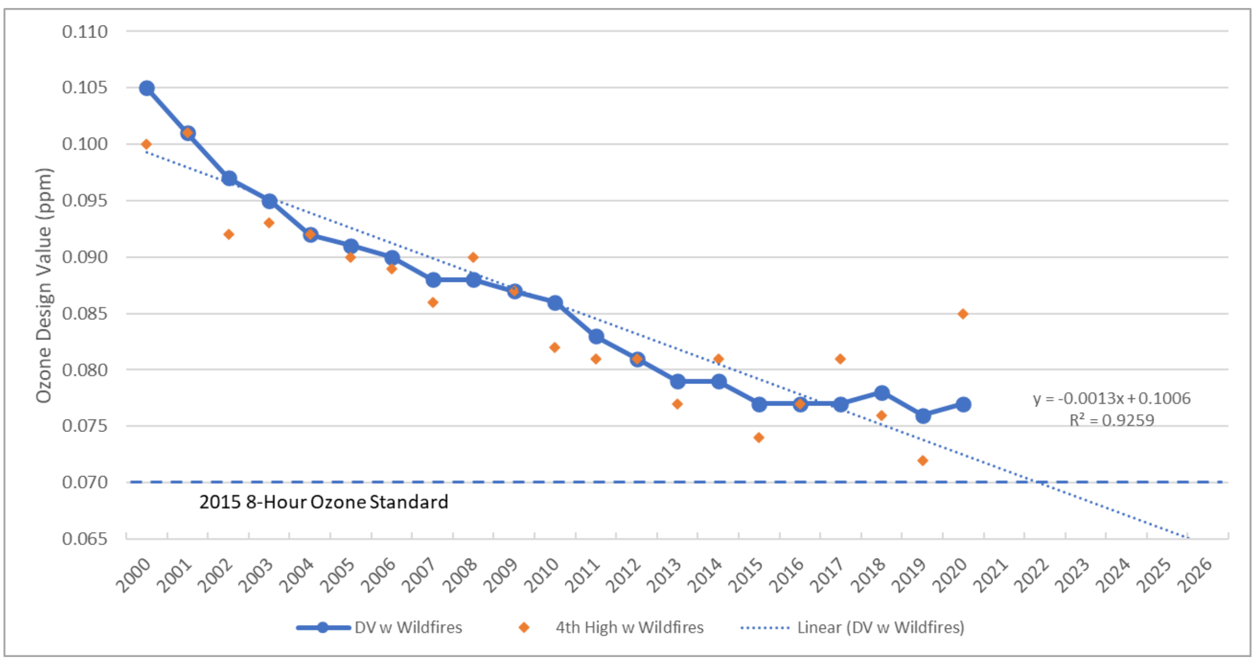
Based on 2000 U.S. Census population and 2000 Design Values



Based on 2020 U.S. Census population and 2020 Design Values

Figure H-11 shows 8-hour ozone design value trends for Simi Valley, with wildfire impacted days, extended to the 2026 attainment deadline. The trends indicate that even while including wildfire impacts the area is anticipated to meet the 2015 ozone standard of 0.070 ppm by 2024 based solely on the design value trendline. While the year of attainment differs between modeling and the design value trendline, both indicate attainment no later than 2026.

Figure H-11: 8-hour Design Value Projections and 4th Highs with Wildfire days included



In summary, ozone air quality has improved throughout Ventura County in response to declining emissions of ozone precursors. The analyses presented above illustrate the extent of improvement over the last 20 years. Currently, four of the five monitoring sites meet the 2015 ozone standard. Simi Valley which has a 2020 design value that is still relatively close to the 2015 ozone standard even with the impact of wildfires, is continuing to make progress toward attainment. The ozone design value has improved at a consistent rate over the past 20 years indicating that Ventura County is on track to meet the 2026 attainment date.

Attainment Projections

I. Photochemical Modeling Results

In 2022, South Coast Air Quality Management District (AQMD) released results of the regional photochemical modeling assessment conducted for Ventura County, which are shown in Table H-2. Based on the implementation of existing control measures, the regional modeling analyses, and taking into account exceptional events approved by U.S. EPA as well as three additional wildfire-impacted days identified by Ventura County staff; taken together these indicate ozone design values at all sites in Ventura County will meet the 2015 ozone standard in 2026.

Table H-2: Regional Modeling Design Values and Projections of Design Site (Simi Valley) Design Value in 2026 (with 3 additional days, identified below, removed)

Site	2016	2017	2018	2019	2020	2026
Thousand Oaks	0.069	0.068	0.068	0.068	0.069	
Piru	0.074	0.074	0.073	0.071	0.070	
Ojai	0.074	0.072	0.070	0.067	0.067	
Simi Valley (Wildfire-impacted days removed)	0.076	0.076	0.076	0.076	0.075	0.070
El Rio	0.063	0.062	0.061	0.060	0.061	

To complement the regional photochemical modeling assessment, the following analyses were conducted to analyze the impact of additional days removed due to impact from wildfires on the projected future design values and ability to attain the standards.

Wildfire Analysis

I. General Information

A. Introduction

Over recent years from 2015-2020 extreme fuel conditions in California created extreme fire seasons. Almost all of California was affected with smoke and haze lingering for weeks. As expected, numerous monitoring sites in Ventura County recorded elevated particulate matter (PM) concentration levels, with many days above the National Ambient Air Quality Standards (NAAQS) for both $PM_{2.5}$ and PM_{10}. Ozone concentrations were also impacted. The wildfire smoke impact on air quality was particularly strong in 2018 and 2020 but was also impacted by local fires at times in other years.

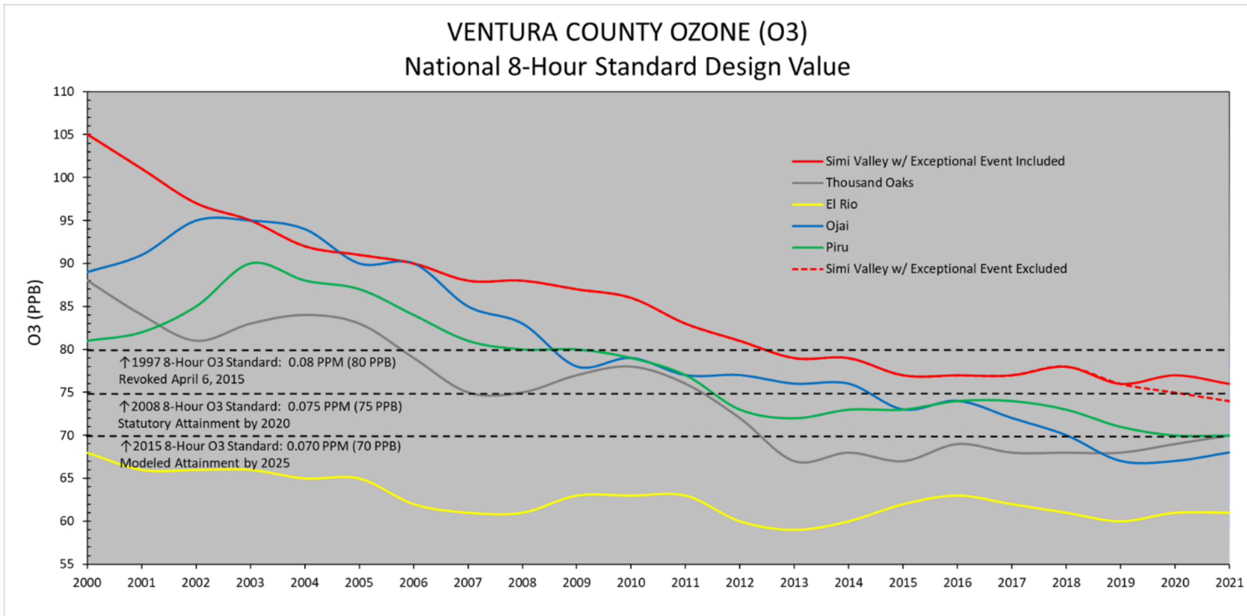
To project the ozone design value and therefore, designation status into the future a baseline eight-hour ozone design value is needed for modeling purposes. In the ideal modeling scenario, the baseline ozone design value would represent the true ozone concentrations in the county without influence from exceptional events such as wildfires.

The baseline design value in this section is calculated using the three NAAQS design value calculation for the period 2016-2020 and averaged. The design value calculations reflect eliminating five days impacted by fires in 2020 that were included in an official exceptional event filing and concurred with by U.S. EPA. Excerpts of that filing are included in Attachment H-1 and reference the wildfires involved, how they impacted the Simi Valley monitor and Ventura County, and the justification for why they should be considered exceptional events and removed from Design Value calculations. This section also focuses on three additional days impacted by wildfire.

Wildfire impacted ozone values on many more than eight days between 2016-2020, however staff included information about three days in this section to suggest these three days were strongly impacted by wildfire smoke. Additionally, these three days have a modeling significance because excluding these three values from the baseline design value suggests Ventura County can meet the 2015 ozone standard by 2026 for the Simi valley monitoring site. Ozone data in Ventura County is showing downward trends and excellent progress towards achieving the 2015 ozone standard by 2026. In fact, in 2020 the County met the 2008 0.075 ppm federal 8-hour ozone standard with a design value of 0.075 ppm after removing the five wildfire-impacted exceptional event days that were concurred by U.S. EPA. Figure H-12 below shows the 8-hour design value by site in Ventura County from 2000 to 2021 and the overall downward trend.

This section utilizes a combination of enhanced imagery, meteorological conditions/discussion, and $PM_{2.5}$ data as an indicator of the potential presence of smoke to support the conclusion that ozone values on these three days had influence from wildfires. Again, we would like to stress that additional days are available that could also be excluded but staff did not find it necessary to include it in this section.

Figure H-12 Ventura County 2015 Ozone Standard Design Value Progress 2001-2021



B. Ozone Exceedances 2016-2020

Table H-3 – 2016-2020 ten highest Eight Hour ozone Values recorded at Simi Valley – Cochran Street (06-111-2002):

Ten Highest Eight Hour Ozone Values by Year														
2020	DATE	RANK	2019	DATE	RANK	2018	DATE	RANK	2017	DATE	RANK	2016	DATE	RANK
0.095	3-Oct	1	0.078	5-Oct	1	0.092	7-Aug	1	0.094	8-Jul	1	0.083	27-Jun	1
0.086	18-Aug	2	0.075	6-Oct	2	0.080	7-Jul	2	0.091	30-Aug	2	0.082	3-Jun	2
0.086	2-Oct	3	0.074	14-Sep	3	0.077	9-Sep	3	0.085	2-Sep	3	0.078	23-Jul	3
0.085	4-Sep	4	0.072	14-Aug	4	0.076	10-Apr	4	0.081	2-Aug	4	0.077	4-Jun	4
0.084	15-Oct		0.072	25-Sep		0.076	25-Jul		0.081	29-Aug		0.073	29-Jun	
0.082	21-Aug		0.071	11-Jun		0.075	12-Jun		0.077	2-May		0.072	2-Jun	
0.081	8-May		0.071	6-Aug		0.075	8-Jul		0.077	6-Jul		0.071	29-Jul	
0.080	4-Oct		0.070	10-Jun		0.075	26-Jul		0.077	7-Jul		0.070	18-Apr	
0.079	7-May		0.070	13-Jul		0.073	27-Jul		0.077	1-Aug		0.070	22-Jul	
0.079	18-Sep		0.069	15-Aug		0.073	27-Sep		0.076	26-Aug		0.070	30-Aug	

Table H-4 - 2016-2020 ten highest Eight Hour ozone Values recorded at Simi Valley – Cochran Street (06-111-2002) excluding days impacted by wildfire:

Ten Highest Eight Hour Ozone Values by Year Excluding Days Impacted by Wildfire														
2020	DATE	RANK	2019	DATE	RANK	2018	DATE	RANK	2017	DATE	RANK	2016	DATE	RANK
0.095	3-Oct		0.078	5-Oct	1	0.092	7-Aug		0.094	8-Jul	1	0.083	27-Jun	1
0.086	18-Aug		0.075	6-Oct	2	0.080	7-Jul	1	0.091	30-Aug	2	0.082	3-Jun	2
0.086	2-Oct		0.074	14-Sep	3	0.077	9-Sep	2	0.085	2-Sep	3	0.078	23-Jul	
0.085	4-Sep	1	0.072	14-Aug	4	0.076	10-Apr	3	0.081	2-Aug	4	0.077	4-Jun	3
0.084	15-Oct	2	0.072	25-Sep		0.076	25-Jul		0.081	29-Aug		0.073	29-Jun	4
0.082	21-Aug		0.071	11-Jun		0.075	12-Jun	4	0.077	2-May		0.072	2-Jun	
0.081	8-May	3	0.071	6-Aug		0.075	8-Jul		0.077	6-Jul		0.071	29-Jul	
0.080	4-Oct		0.070	10-Jun		0.075	26-Jul		0.077	7-Jul		0.070	18-Apr	
0.079	7-May	4	0.070	13-Jul		0.073	27-Jul		0.077	1-Aug		0.070	22-Jul	
0.079	18-Sep		0.069	15-Aug		0.073	27-Sep		0.076	26-Aug		0.070	30-Aug	

C. Baseline Design Value 2016-2020

Table H-5 Ozone Baseline Design Value Calculations

4th Highest Adjusted 2016-2020		
2020	0.079	
2019	0.072	
2018	0.075	
D.V.	0.07533	0.07533
2019	0.072	
2018	0.075	
2017	0.081	
D.V.	0.07600	0.07600
2018	0.075	
2017	0.081	
2016	0.073	
D.V.	0.07633	0.07633
Baseline Average		0.07589
RRF	0.934	0.07088
Truncated		0.070

II. July 23, 2016 Weighted Evidence

On July 22, 2016, the Sand Fire started in Los Angeles County. It burned 41,432 acres and was extinguished on August 3, 2016. The 24-Hour concentration of $PM_{2.5}$ was 23 percent higher than the annual mean at the Simi Valley site for the same year.

A. Introduction and Meteorology

Southern California was sitting under a very strong dome of high pressure, at approximately 592 dm (decameters). At the surface, there was a mix of light offshore and onshore winds, which allowed for transport of smoke from the Sand Fire to enter Simi Valley. This is evident with the surface winds and $PM_{2.5}$ concentrations recorded at Simi Valley. The satellite image below also shows the rest of Ventura County under the influence of smoke. The onshore winds transported smoke from other parts of the county into Simi Valley as well.

B. National Weather Service Spot Forecast Discussion

FXUS66 KLOX 231813
AFDLOX
AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE LOS ANGELES/OXNARD CA
1113 AM PDT SAT JUL 23, 2016
.SYNOPSIS...
Weakening high pressure aloft will shift to and persist over the four
corners next week. This will lead to one more hot day today with
temperatures cooling to near normal Sunday with little change in
temperatures for much of next week. High pressure across the four
corners area may support an influx of monsoon moisture with
showers and thunderstorms possible at times next week.

.SHORT TERM...(TDY-MON)
An unusual high temperature record was set last night at SBA
airport. A hot lower atmosphere combined with strong sundowner winds
brought record heat to SBA airport before 1 AM PDT (midnight PST).
The temperature soared to 94 degrees around 1243 AM PDT (1143 PM
PST) which broke the record for the calendar day (standard time) of
July 22nd. The record high of 94 exceeded the record of 92 degrees
set in 1960.

Clear skies covered much of the forecast area this morning, except
for patchy low clouds and dense fog early for the SBA County Central
Coast into the Santa Ynez Valley, and areas of smoke from the Sand Fire
which spread out of the Newhall area into the L.A. Basin last night
into this morning due to northerly winds. The smoke layer over L.A.

will spread off to the northeast and out of the area this afternoon.
Otherwise, mostly sunny skies will prevail across the forecast area.
There were lingering gusty northerly winds over the foothills and mtns this
morning, but will turn onshore this afternoon. Strong upper level
high with 500 mb heights around 595 to 596 dm will persist over
SoCal today, helping to build the heat to dangerous levels again for
the valleys and lower mtns of VTU/L.A. Counties. Highs of 100 to 110
can be expected for the most part for these areas, with heat index
values reaching 100 to 105 at times. The Excessive Heat Warning will
continue thru 8 PM this evening for the vlys/lower mtns of VTU/L.A.
Counties.

.FIRE WEATHER... 23/900 AM.
Red flag warning remains in effect for the mountains in Santa
Barbara, Ventura, and Los Angeles Counties, as well as the Santa
Barbara County South Coast in the foothill areas through Midnight
tonight, due to gusty winds, extremely low relative humidity, and
hot temperatures. Widespread humidity's in single digits and
teens can be expected.

Winds around the Sand Fire will linger from the north this
morning, but is expected to turn southwest by 1 PM this afternoon.
Mixing levels are forecast to be up to 12000 feet this afternoon,
with good plume development expected.

C. Air Quality Alert Issued for Santa Clarita

The SCAQMD issued an air quality alert for the Santa Clarita which is near Simi Valley to the East. Periods of smoke influence pushed into Simi Valley in the afternoon identified by the highlighted portion of the above NWS discussion and elevated $PM_{2.5}$ values observed at the station in the afternoon. Ozone values increased in the afternoon corresponding with the increase in observed $PM_{2.5}$ values.

Air quality alert for Santa Clarita, San Gabriel Valley

The Sand Fire burns in the Angeles National Forest Sunday July 24th, 2016 under a Red Flag Warning high high winds.
STUART PALLEY FOR KPCC

KPCC Staff | August 1, 2016

D. July 23, 2016 Raw Data

The Table H-6 below shows the hourly values for: Ozone, $PM_{2.5}$, Wind Direction, and Wind Speed from the Simi Valley monitoring site on July 23, 2016 during the Sand Fire. The 24-Hour concentration of $PM_{2.5}$ was 83 percent higher than the annual mean at the Simi Valley site for the same year. Figure H-13 shows a satellite image of the impacts.

Table H-6 Hourly Data: Simi Valley July 23rd, 2016

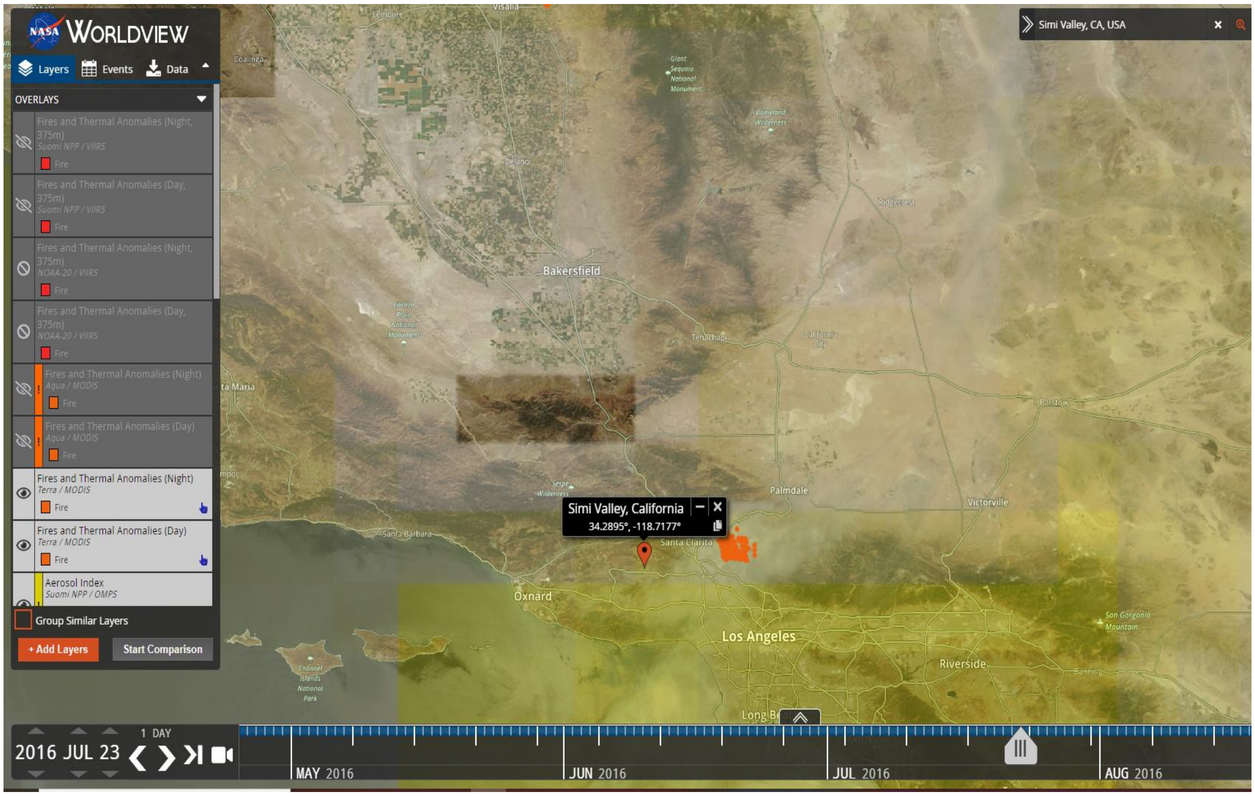
Ventura County Air Pollution Control District

Daily Summary Report - 7/23/2016

Site: Simi Valley-Cochran Street Interval: 001h

	LC25	O3	WD-S	WS-S
Time	UG/M3	PPB	DEG	m/s
00:00	-1.	53.	246.	2.1
01:00	3.	<	284.	2.4
02:00	3.	55.	272.	3.
03:00	2.	47.	233.	1.2
04:00	3.	31.	80.	1.2
05:00	4.	24.	119.	1.1
06:00	5.	27.	133.	.7
07:00	3.	38.	257.	1.5
08:00	2.	47.	276.	1.8
09:00	4.	55.	282.	1.3
10:00	16.	73.	123.	2.
11:00	24.	84.	255.	2.9
12:00	21.	93.	253.	3.8
13:00	19.	88.	269.	4.7
14:00	20.	79.	266.	4.1
15:00	17.	76.	265.	3.9
16:00	10.	73.	218.	3.6
17:00	13.	63.	121.	4.3
18:00	19.	48.	118.	4.7
19:00	16.	41.	117.	4.3
20:00	15.	47.	110.	4.1
21:00	16.	42.	114.	3.8
22:00	21.	39.	118.	2.9
23:00	9.	47.	121.	2.8
Average	11	55	194	2.8
Max	24.	93.	284.	4.7

Figure H-13 Satellite Imagery of Aerosols – MODIS Fire & Thermal Anomalies MOD14 w/ Aerosol Index – July 23, 2016



E. July 23, 2016 Summary

Based on the above discussion, it is clear that July 23, 2016 is a day that was heavily impacted by smoke from a nearby wildfire; as evidenced by the proximity of said fire, wind flow patterns transporting smoke inland to the Simi Valley site, increased $PM_{2.5}$ values out of the norm for the site, and a commensurate increase in ozone values. As such, it should not be included in the calculation of baseline ozone modeling design value from which modeled future design values are calculated.

III. July 25, 2018 Weighted Evidence

In July 2018, many fires were burning throughout California, including the Ferguson Fire and the Cranston Fire. The 24-Hour concentration of $PM_{2.5}$ was 125 percent higher than the annual mean at the Simi Valley site for the same year.

A. Introduction and Meteorology

The Ferguson Fire started on July 13, 2018 in Mariposa County. It burned 96,901 acres and was extinguished on August 18, 2018. The Cranston Fire started on July 25, 2018 in Riverside County. It burned 13,139 acres and was extinguished on August 10, 2018. Southern California was sitting under a very strong dome of high pressure, at approximately 595 dm. At the surface, onshore gradient set up for less late night/early morning offshore flow, resulting in six hours of offshore flow. This allowed for smoke from the Cranston Fire to enter Simi Valley. There were also about three hours late night/early morning of northwesterly flow, allowing for smoke from the Ferguson Fire to enter Simi Valley. This is evident with the surface winds and $PM_{2.5}$ concentrations recorded at Simi Valley.

B. July 25, 2018 Raw Data

Table H-7 below shows the hourly values for: Ozone, $PM_{2.5}$, Wind Direction, and Wind Speed from the Simi Valley monitoring site on July 25, 2018 during multiple California fires. Figure H-14 shows the relationship between PM2.5 and ozone from July 25, 2018, to August 15, 2018. Figure H-15 shows a satellite image of aerosols on July 25, 2018.

Table H-7 Hourly Data: Simi Valley July 25th, 2018

Ventura County Air Pollution Control District

Daily Summary Report - 7/25/2018

Site: Simi Valley-Cochran Street Interval: 001h

	LC25	O3	WD-S	WS-S
Time	UG/M3	PPB	DEG	m/s
00:00	11.	27.	344.	1.1
01:00	14.	<	95.	1.7
02:00	13.	19.	337.	1.4
03:00	17.	11.	292.	1.7
04:00	18.	7.	270.	1.5
05:00	21.	9.	258.	1.
06:00	21.	10.	184.	.6
07:00	18.	24.	233.	.6
08:00	20.	44.	252.	1.4
09:00	15.	65.	272.	2.1
10:00	19.	78.	267.	3.2
11:00	21.	80.	269.	4.1
12:00	17.	76.	261.	4.3
13:00	16.	78.	260.	4.
14:00	20.	78.	275.	4.
15:00	15.	77.	267.	3.6
16:00	14.	74.	265.	3.2
17:00	15.	70.	256.	2.9
18:00	14.	60.	259.	2.6
19:00	17.	48.	257.	1.7
20:00	16.	39.	250.	.7
21:00	17.	29.	90.	1.1
22:00	14.	33.	114.	2.9
23:00	16.	36.	112.	3.4
Average	17	46	239	2.3
Max	21.	80.	344.	4.3

Figure H-14 July 25, 2018 and August 7, 2018 $PM_{2.5}$ and Ozone Relationship

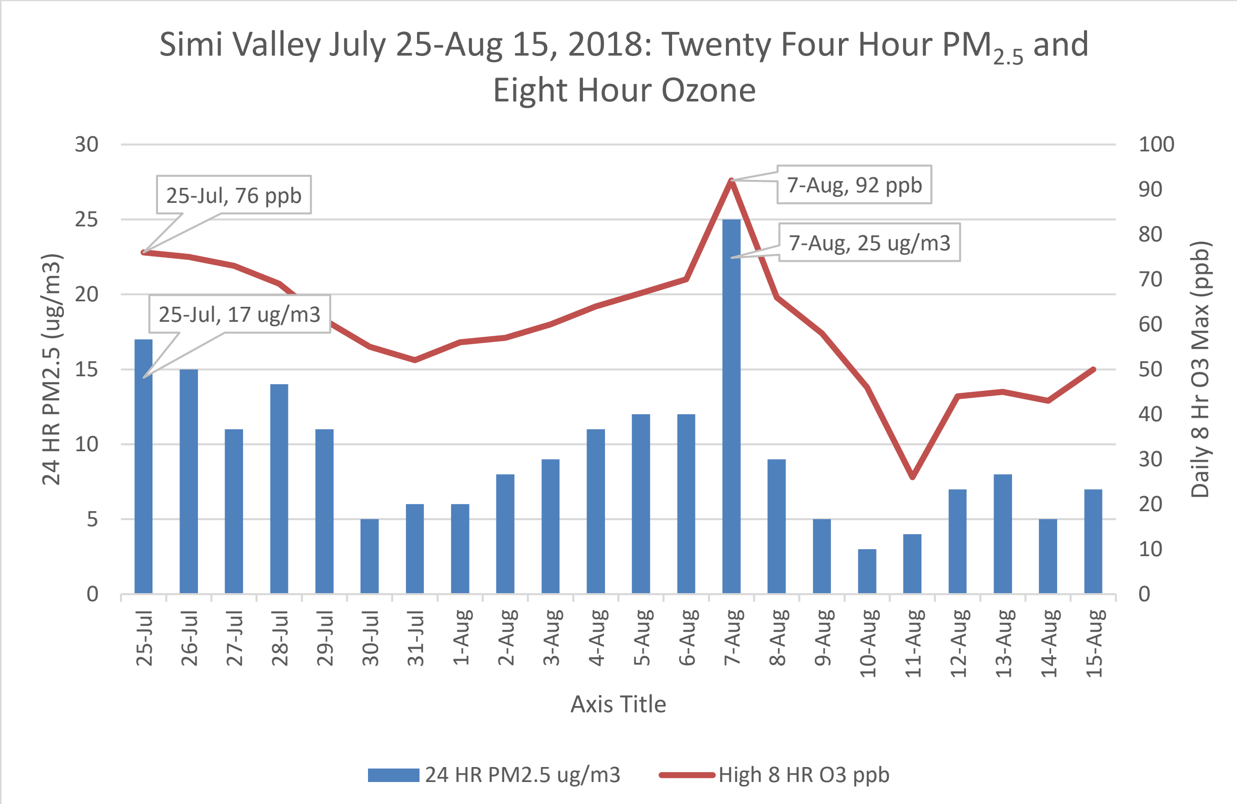
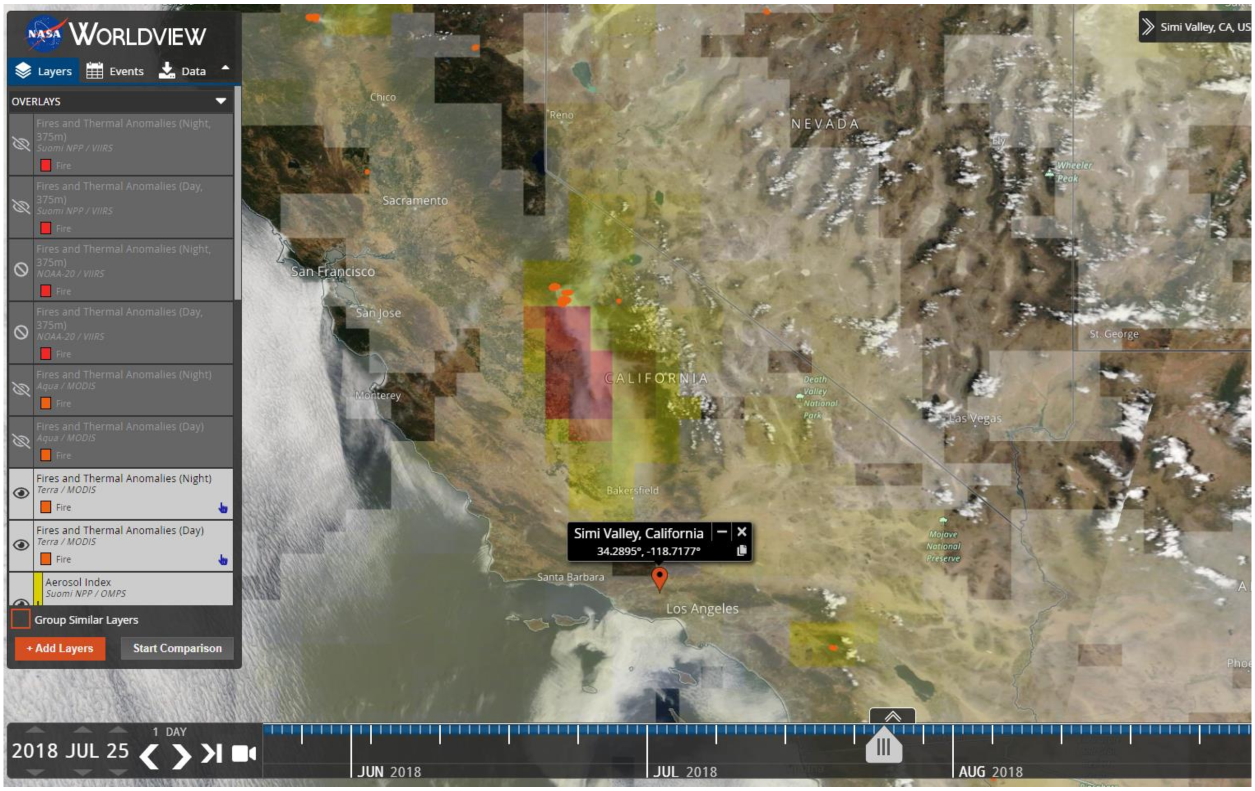


Figure H-15 Satellite Imagery of Aerosols – MODIS Fire & Thermal Anomalies MOD14 w/ Aerosol Index – July 25, 2018



C. July 25, 2018 Summary

Based on the above discussion, it is clear that July 25, 2018 is a day that was heavily impacted by smoke from nearby wildfires; as evidenced by proximity of said fires, wind flow patterns transporting smoke inland to the Simi Valley site, increased $PM_{2.5}$ values out of the norm for the site, and a commensurate increase in ozone values. As such, it should not be included in the calculation of baseline ozone modeling design value from which modeled future design values are calculated.

IV. August 7, 2018 Weighted Evidence

On August 7, 2018, many fires were burning throughout California, including the Mendocino Complex Fire, the Donnell Fire, the Ferguson Fire, and the Cranston Fire as well as others. These fires and the number of acres burned are shown in Table H-8 below.

Table H-8 Summary of Major Active California Wildfires During August 7, 2018

Fire Name	Start Date	Acres Burned	County
Holy	8/6/2018	23,136	Orange, Riverside
Ferguson	7/13/2018	96,901	Mariposa
Donnell	8/1/2018	36,450	Tuolumne
Mendocino Complex	7/27/2018	459,123	Mendocino, Lake, Colusa, Glenn
Cranston	7/25/2018	13,139	Riverside
Total		**628,749**	

A. Introduction and Meteorology

On August 7, 2018, many fires were burning throughout California, including the Mendocino Complex Fire, the Donnell Fire, the Ferguson Fire, and the Cranston Fire. Southern California was sitting under a strong dome of high pressure, at approximately 590 dm. At the surface, a mild offshore wind pattern existed which would allow for late night/early morning offshore winds with a light sea breeze during the afternoon hours. This pattern allowed for smoke to travel through Simi Valley towards the coast during the late night and early morning hours. The afternoon sea breeze allowed for the smoke to return into Simi Valley. This is evident with the surface winds and $PM_{2.5}$ concentrations recorded at Simi Valley.

B. August 7, 2018 Raw Data

Table H-9 shows the hourly values for: Ozone, $PM_{2.5}$, Wind Direction, and Wind Speed from the Simi Valley monitoring site on August 7, 2018 during multiple California fires. Figure H-16 shows a satellite image of aerosols on August 7, 2018.

Table H-9 Hourly Data: Simi Valley August 7th, 2018

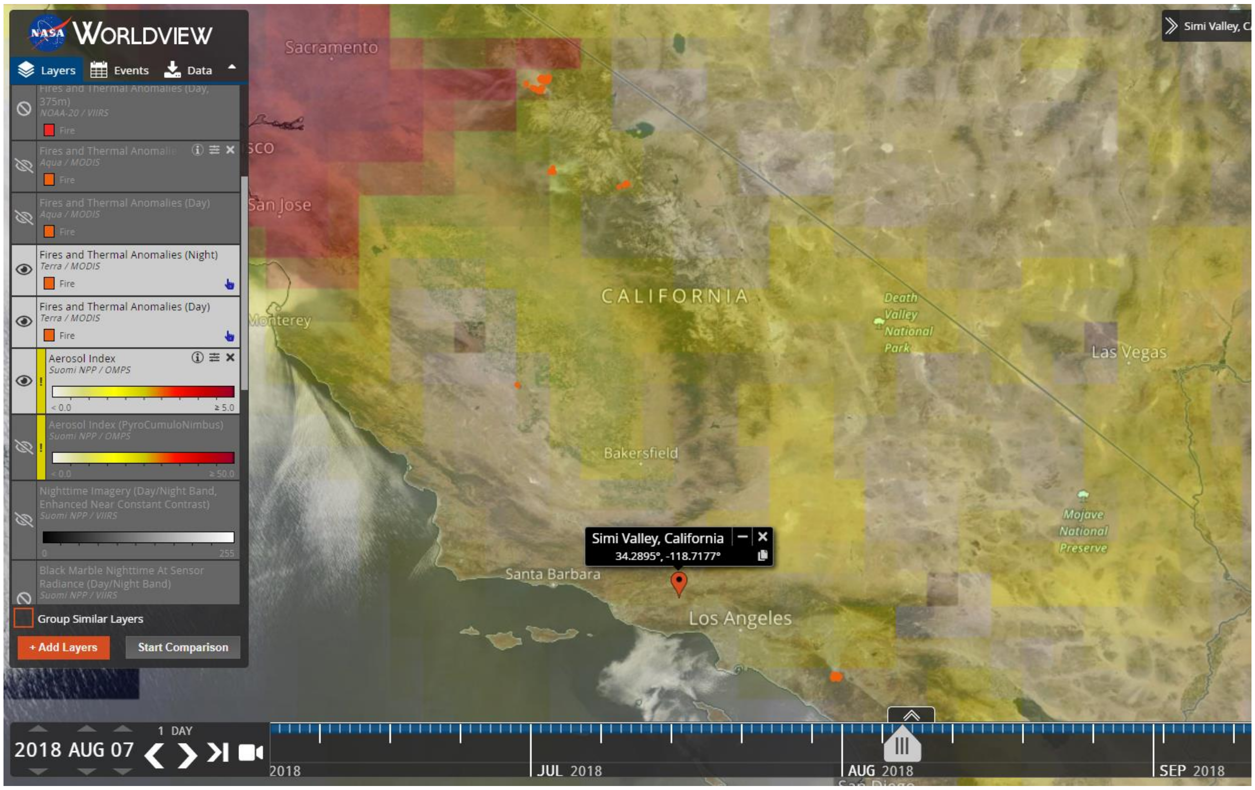
Ventura County Air Pollution Control District

Daily Summary Report - 8/7/2018

Site: Simi Valley-Cochran Street Interval: 001h

	LC25	O3	WD-S	WS-S
Time	UG/M3	PPB	DEG	m/s
00:00	17.	36.	84.	1.
01:00	17.	<	84.	.9
02:00	23.	33.	84.	.9
03:00	25.	28.	76.	.8
04:00	30.	19.	49.	.9
05:00	35.	8.	113.	1.
06:00	28.	13.	102.	.8
07:00	37.	37.	93.	.8
08:00	38.	71.	111.	2.4
09:00	31.	85.	149.	2.9
10:00	33.	94.	268.	3.6
11:00	31.	101.	263.	4.7
12:00	24.	99.	266.	4.5
13:00	24.	97.	268.	5.3
14:00	17.	92.	272.	5.
15:00	26.	88.	275.	3.6
16:00	21.	86.	266.	3.1
17:00	22.	83.	255.	3.6
18:00	20.	78.	256.	2.4
19:00	28.	75.	211.	1.1
20:00	28.	54.	80.	.6
21:00	24.	41.	70.	1.1
22:00	15.	68.	110.	3.5
23:00	13.	66.	114.	4.7
Average	25	63	163	2.5
Max	38.	101.	275.	5.3

Figure H-16 Satellite Imagery of Aerosols - MODIS Fire & Thermal Anomalies MOD14 w/ Aerosol Index – August 7, 2018



C. August 7, 2018 Summary

Based on the above discussion, it is clear that August 7, 2018 is a day that was heavily impacted by smoke from nearby wildfires; as evidenced by proximity and sheer number of said fires and their acreage, wind flow patterns transporting smoke offshore with a return onshore via a sea breeze allowing it to return to the Simi Valley site, increased $PM_{2.5}$ values well out of the norm for the site, and a commensurate increase in ozone values. As such, it should not be included in the calculation of baseline ozone modeling design value from which modeled future design values are calculated.

Summary

This WOE demonstration evaluated ambient air quality and emission trends to complement the regional photochemical modeling analyses conducted to evaluate Ventura County's progress toward meeting the 2026 attainment date. Control measures implemented in the County through federal, State, and local programs have led to a substantial decline in emissions of ozone precursors and a substantial improvement in ozone air quality. Between 2000 and 2021, total NOx emissions in Ventura County declined by nearly 50 percent and total ROG emissions declined by 45 percent. Moreover, between 2000 and 2020, the number of exceedance days in the County declined by nearly 69 percent and the design value decreased by over 28 percent, from 0.105 ppm to 0.075 ppm. In 2020, four out of five monitoring sites in the County met the 2015 ozone standard.

Ventura County is currently classified as a serious nonattainment area, for the 2015 8-hour Ozone Standard of 0.070 ppm, with a 2026 attainment date. Downward trends among nearly all emission categories, as well as historical ozone metrics trending downward, and wildfire impact analysis which when combined with regional photochemical modeling results, conducted by South Coast AQMD, produce adjusted design value projections indicating that the area is on track to attain the 2015 ozone standard by 2026.

References

U.S. EPA *Draft Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, $PM_{2.5}$, and Regional Haze*, December 2014.

Appendix H Attachment 1: Submitted Exceptional Event Analysis

The following discussion, data, tables, and figures are excerpted from the "Exceptional Events Demonstration for Ozone Exceedances: Southern California 2020 Wildfire Events" submittal sent to U.S. EPA in support of removing five wildfire impacted days in Ventura County. These exceptional event dates were subsequently approved by the U.S. EPA on May 4, 2022. Relevant Table, Figure, and other numbering have been kept for reference. Original report may be accessed on the CARB website at *https://ww2.arb.ca.gov/our-work/programs/state-and-federal-area-designations/exceptional-events* for additional detail.

I. Overview/Introduction

C. Actions Requested

Although a significant number of ozone nonattainment areas were impacted by the historic 2020 wildfires, not all areas have upcoming regulatory determinations applicable under the revised Exceptional Events Rule (EER). The California Air Resources Board (CARB) is submitting this Exceptional Event demonstration to U.S. EPA for days in the summer and fall of 2020 that impacted the entirety of the ozone nonattainment area of Ventura County. In accordance with the U.S. EPA interpretation of the Exceptional Event Rule only the dates necessary to reach attainment are submitted in this demonstration, although other days could also qualify. The submitted days will affect the upcoming attainment year determinations for the pertinent 2008 and 2015 ozone NAAQS for areas which have otherwise met the level of the standards (Figure I-1, Table I-1). The specific exceedances of the standards requested for concurrence at monitors in Ventura County are listed in Table I-2.

Figure I-1: 8-hour Ozone Design Values at Simi Valley

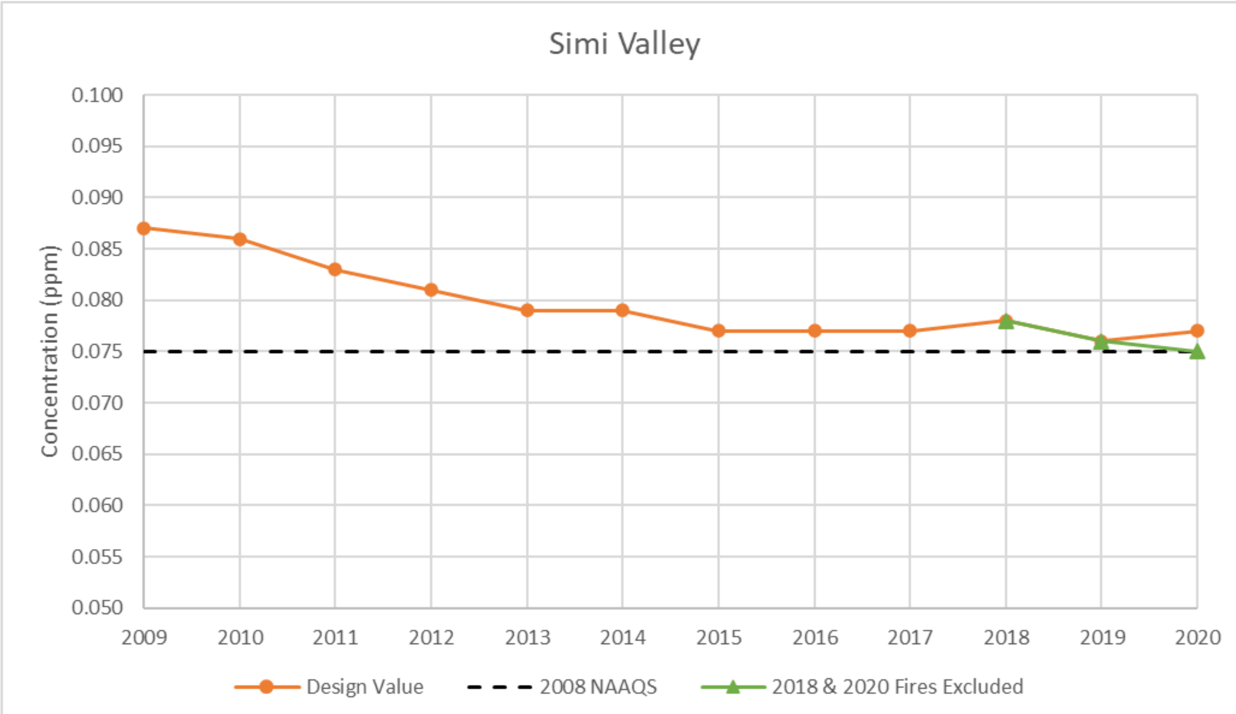


Table I-1: 8-hour Ozone Design Values with and without U.S. EPA Concurrence (2018 and 2020 Events)

Design Value without Concurrence of 2018 nor 2020 Demonstrations

Site	2018	2019	2020
Simi Valley*	0.078	0.076	0.077

Design Values with Concurrence of both 2018 and 2020 Demonstrations

Site	2018	2019	2020
Simi Valley*	0.078	0.076	0.075

* 8-hour design value for 2008 (0.075 ppm) NAAQS

Table I-2: Summary of 2020 8-Hour Ozone Exceedances Influenced by Wildland Fires

Air District	Monitoring Site	AQS ID	POC	Date	8-Hour Concentration (ppm)
Ventura	Simi Valley	06-111-2002	1	8/18/2020	0.086
Ventura	Simi Valley	06-111-2002	1	8/21/2020	0.082
Ventura	Simi Valley	06-111-2002	1	10/2/2020	0.086
Ventura	Simi Valley	06-111-2002	1	10/3/2020	0.095
Ventura	Simi Valley	06-111-2002	1	10/4/2020	0.080

II. Background

A. Characteristics of Non-Event Ozone Formation

Ground-level ozone is formed by chemical reactions between oxides of nitrogen (NOx) and volatile organic compounds (ROG or VOC) in the presence of heat and sunlight. A more detailed discussion for each of the areas is provided below.

1. Ventura County (Simi Valley)

Based on historic, non-event ozone monitoring data for the previous 5 years, below are the characteristics of ozone levels throughout the year in Simi Valley.

- January through March: Generally lowest ozone concentrations during the year because of cooler temperatures, shorter days, and unsettled weather patterns.
- April through June: Transitional period between spring and summer when elevated 8-hour ozone concentrations are unusual but can occur at times when meteorological conditions are favorable for ozone formation, especially when a Pacific ridge of high pressure settles in the area.
- June through August: Typically, highest ozone concentrations caused by a ridge of high pressure over the southwestern United States influencing the area. Smoke from an early wildfire season can impact ozone concentrations as well.
- September through October: Ozone concentrations typically begin to decrease as temperatures and solar radiation decrease. Santa Ana wind events (offshore winds) begin to dominate the region, which leads to elevated ozone levels with the return of onshore winds (post Santa Ana's).
- November through December: Ozone concentrations are typically low during these months because of cooler temperatures, shorter days, and unsettled weather patterns.

The highest ozone values at Simi Valley occur during the ozone season from April through October, with exceedances during the remainder of the year extremely rare. Ozone concentrations at Simi Valley typically peak midday (Figure II-1) and are lowest in the mid-morning. Daily calibration checks frequently occurred in the overnight hours during 2015-2019, so data for hour

1 was excluded from the calculation of percentiles. 1-hour ozone concentrations for the event days (Figure II-2) indicate that ozone concentrations were significantly above the 95 percentile during peak hours.

Figure II-1: Typical April-October 1-Hour Ozone Diurnal Pattern at Simi Valley (2015-2019)

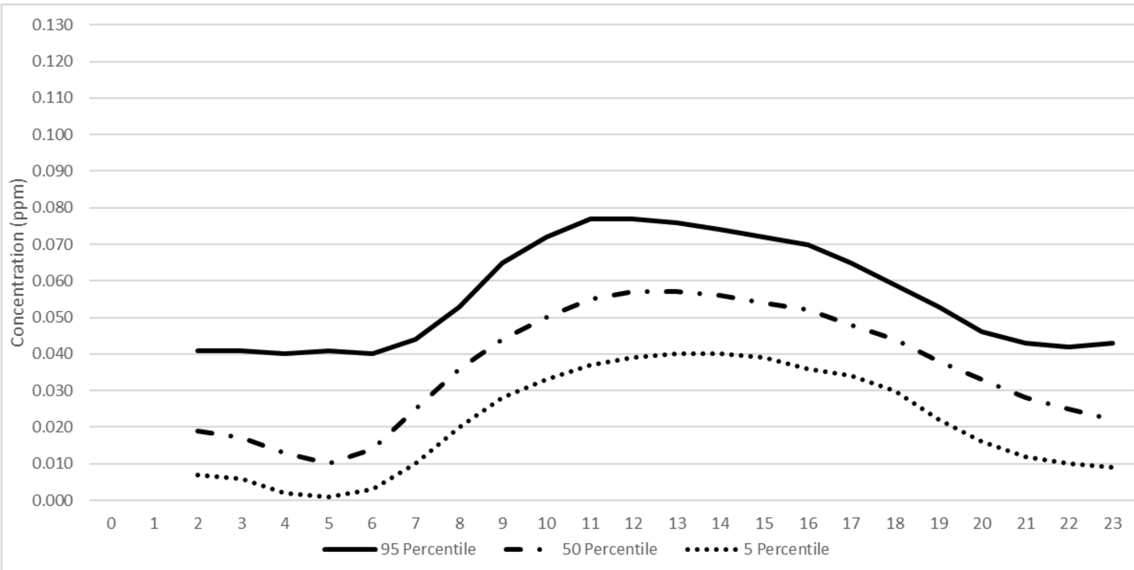
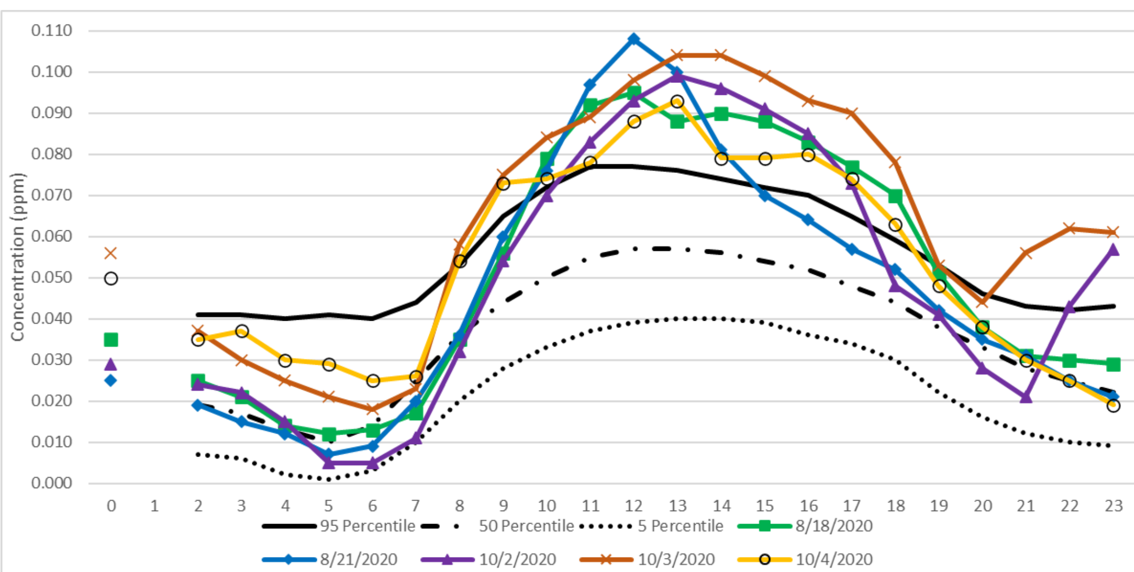


Figure II-2: 1-Hour Ozone Concentrations during Event Days compared to May-November 2015-2019 Percentiles at Simi Valley



B. Characteristics of Event Ozone Formation

Although wildfires occur in California every year, the number of wildfires and the amount of acreage burned has increased substantially, from a 5-year average of less than 5,000 fires burning 200,000 acres as of 2017,[1] to the prior record 7,948 incidents and 1,975,086 acres burned in 2018,[2] to the new record 9,917 incidents and 4,257,863 acres burned in 2020.[3] The impact of these wildfires on air quality has been dramatic. Smoke from large fires has caused high concentrations of PM and ozone, especially in the western United States.[4] Wildfires generate large amount of ozone precursors including NOx and ROG which can contribute to elevated ozone levels in California. However, there are large variations in the amount of emissions (depending on the fuel type and combustion temperature), plume heights, smoke density, and meteorological conditions during different wildfires, and all these factors can significantly impact subsequent ozone production.[5] In addition, the amount of ozone within a smoke plume also varies with distance from the fire.[6] Due to the titration by NO from fire emissions and the blocking of sunlight by PM emissions, which hinders photochemical reactions, ozone concentrations near active fires are sometimes even lower relative to baseline concentrations. As the ozone precursors transport downwind along with the other air pollutants such as PM, ozone is produced within the smoke plume which could result in ozone exceedances at the surface in downwind areas. Research studies found that distant wildfires can raise ground-level ozone concentrations to unhealthy levels even at large distances from the fire location.[7]

III. Narrative Conceptual Model

The Narrative Conceptual Model describes the events causing the exceedances or violations seen at the monitor and includes a discussion of how the events led to concentrations above the NAAQS during August 18 to 21 and September 30 to October 4 of 2020.

A. Wildfire Information

2020 was another extreme year for wildfires, with numerous wildfires active during the time of the exceedances discussed in this demonstration (Figure III-1, Table III-1); although not all wildfires impacted each monitor on any given day. Hot and dry conditions at the surface combined with mid-level moisture resulted in elevated instability during parts of August and

[1] CalFire, *2017 Statistics and Events (5 year average)*, last accessed 8/20/21. *https://www.fire.ca.gov/stats-events/*
[2] CalFire, 2018 Incident Archive, last accessed 11/17/21. *https://www.fire.ca.gov/incidents/2018/*
[3] CalFire, 2020 Statistics and Events, last accessed 11/17/21. *https://www.fire.ca.gov/stats-events/*
[4] Gong et al., 2017; Laing and Jaffe, 2019; Mass and Ovens, 2019; Jaffe et al., 2020
[5] Jaffe and Wigder, 2012; Faloona et al., 2020
[6] Faloona et al., 2020
[7] Pfister et al., 2008

early September. The ensuing thunderstorms ignited multiple wildfires, resulting in smoke that accumulated throughout California. The accumulating smoke layers made identification of the impact of individual wildfires difficult. The majority of these fires, and all of the megafires, occurred on wildland or in the urban/wildland interface.

Figure III-1: Impacted Monitors and Active Major Wildfires, August 18-October 4, 2020

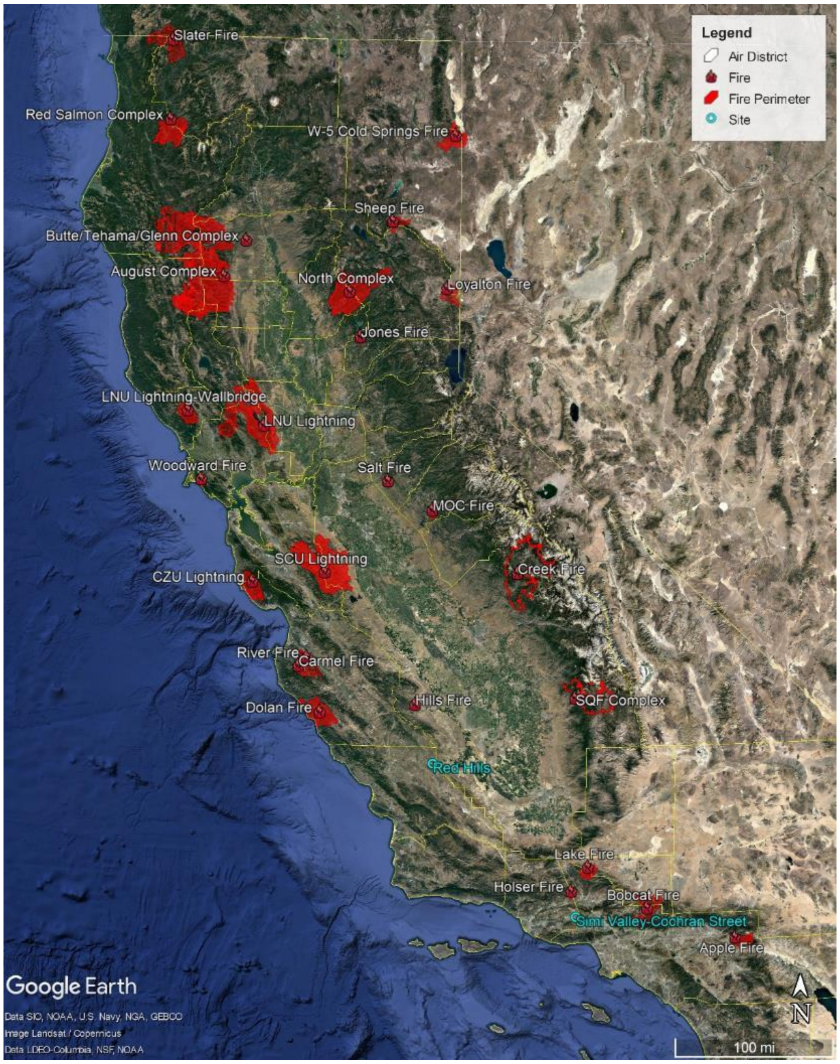


Table III-1: Major wildfires active during August 18-October 4, 2020 events

Fire	Source	Start Date	Containment	Latitude	Longitude	Total Acres
Red Salmon Complex	Lightning	7/27/2020	11/23/2020	41.16800	-123.40700	144,698
Lake Fire	Lightning	8/12/2020	9/28/2020	34.67900	-118.45200	31,089
Hills Fire	Lightning	8/15/2020	8/24/2020	36.09876	-120.42734	2,121

Fire	Source	Start Date	Containment	Latitude	Longitude	Total Acres
CZU Lightning Complex (Including Warnella Fire)	Lightning	8/16/2020	9/22/2020	37.17162	-122.22275	86,509
August Complex (includes Doe Fire)	Lightning	8/16/2020	11/11/2020	39.77600	-122.67300	1,032,648
River Fire	Lightning	8/16/2020	9/4/2020	36.60239	-121.62161	48,088
LNU Lightning Complex (includes Hennessey, Gamble, 15-10, Spanish, Markley, 13-4, 11-16, Walbridge)	Lightning	8/17/2020	10/2/2020	38.48193	-122.14864	363,220
Holser Fire	Investigating	8/17/2020	9/6/2020	34.43876	-118.75897	3,000
North Complex Fire	Lightning	8/18/2020	12/3/2020	39.69072	-121.22718	318,935
Salt Fire	Investigating	8/18/2020	8/24/2020	38.02792	-120.76326	1,789
Woodward Fire	Investigating	8/18/2020	10/2/2020	38.01809	-122.83670	4,929
Carmel Fire	Vehicle	8/18/2020	9/4/2020	36.44630	-121.68181	6,905
SCU Lightning Complex	Lightning	8/18/2020	10/1/2020	37.43944	-121.30435	396,624
Dolan Fire	Unknown	8/19/2020	12/31/2020	36.12300	-121.60200	124,924
SQF Complex Fire (Includes Castle Fire and Shotgun Fire)	Lightning	8/19/2020	1/6/2021	36.25500	-118.49700	174,178
Creek Fire	Investigating	9/4/2020	12/24/2020	37.19147	-119.26118	379,895
Bobcat Fire	Investigating	9/6/2020	11/8/2020	39.24465	-117.96484	115,796

The August Complex[8] fire started as 38 separate fires, most of which were small (Figures/Tables removed for brevity). The four main fires were the Doe, Tatham, Glade and Hull fires, which merged by August 30. The fires began from lightning strikes on August 16 and 17, 2020 and actively burned in Mendocino, Shasta-Trinity, and Six Rivers National Forests. The fires burned 1,032,648 acres, 935 structures, and caused one death before full containment on November 15, 2020. The August Complex fire is the largest fire complex in recorded California history[9].

The Butte/Tehama/Glenn Lightning Complex[10] fire included the Elkhorn and Hopkins fires and began on August 19, 2020 due to lighting and actively burned in Tehama and Glenn counties. By September 9, the Elkhorn and Hopkins fires had merged with the August Complex, forming the North Zone of the August Complex, and dropping the Butte/Tehama/Glenn Fire from 66,959 acres to 19,069 acres. The Butte/Tehama/Glenn Lightning Complex was fully contained on October 9, 2020.

The LNU Lightning Complex[11] fire (Figures/Tables removed for brevity) started as many small separate fires. The main fires were the Hennessey fire, which merged with the Gamble Green, Markley, Spanish, and Morgan fires burning 305,651 acres, as well as the Walbridge, and Meyers fires. These fires began due to lightning on August 16 and 17, 2020 and actively burned in six counties: Solano, Napa, Sonoma, Yolo, Lake, and Colusa. The fires burned on the hills surrounding several large cities including Napa, Fairfield, and Vacaville and burned 363,220 acres, 1,491 structures, and lead to six confirmed fatalities before full containment on October 2, 2020. The LNU lighting complex is the 6th largest California wildfire in recorded history[12].

CZU Lightning Complex[13] fire (Figures/Tables removed for brevity) started as many small fires including the Warnella fire and three fires that would become the northern edge of the CZU complex. The Northern edge fires merged, a few days after they began, due to changing wind patterns and quickly grew to over 40,000 acres. These fires began due to a lightning strike on August 16, 2020 and actively burned in Butano and Big Basin Redwoods state parks in San Mateo and Santa Cruz counties. The fires burned 86,509 acres, destroyed 1,490 structures, damaged an

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[8]August Complex, accessed 10/11/2021. *https://www.fire.ca.gov/incidents/2020/8/16/august-complex-includes-doe-fire/*

[9]Top 20 Largest California Wildfires, accessed 10/11/2021. *https://www.fire.ca.gov/media/4jandlhh/top20_acres.pdf*

[10] Butte/Tehama/Glenn Lightning Complex. *https://www.fire.ca.gov/incidents/2020/8/19/butte-tehama-glenn-lightning-complex-tehama-glenn-zone/*

[11] Solano County 2020 LN Lightning Complex Fire. Accessed 10/11/2021. *https://www.solanocounty.com/depts/rm/lnu_fire_cleanup_n_rebuilding/default.asp*

[12] *https://www.fire.ca.gov/media/4jandlhh/top20_acres.pdf*

[13] CZU Lightning Complex (Including Warnella Fire). *https://www.fire.ca.gov/incidents/2020/8/16/czu-lightning-complex-including-warnella-fire/*

additional 140 structures, and lead to one confirmed fatality before being fully contained on September 22, 2020.

River Fire[14] (Figures/Tables removed for brevity) began due to a lightning strike on August 16, 2020 and actively burned in a wildland urban interface zone within Monterey County. The fire burned 48,088 acres, destroyed 30 structures, and damaged 13 before full containment on September 4, 2020.

Carmel Fire[15] (Figures/Tables removed for brevity) began on August 18, 2020 due to a vehicle malfunction and actively burned in a wildland urban interface zone within Monterey County. The fire burned 6,905 acres, destroyed 73 structures, and damaged 7 before full containment on September 4, 2020.

SCU Lightning Complex[16] (Figures/Tables removed for brevity) began as the Deer, Canyon, and Santa Clara fires, by August 26 the Deer fire was fully contained and the Canyon and Santa Clara fires merged. These fires began from lightning strikes on August 18, 2020 and actively burned in the Diablo mountain range in Santa Clara, Alameda, Contra Costa, San Joaquín, and Stanislaus counties. The fires burned 396,624 acres, destroyed 222 structures, and damaged 26 before full containment on October 1, 2020. The SCU Lighting complex is the 4th largest California wildfire in recorded history[17].

Creek Fire[18] (Figures/Tables removed for brevity) began on September 4, 2020 with the source currently under investigation. Within the first four days of starting the Creek Fire grew anywhere between 20,000 to 50,000 acres due to the strong winds in the area. The fire activity burned in the Sierra National Forest in Fresno and Madera counties, burning 379,895 acres and destroying 853 structures, including many homes in Big Creek, before full containment on December 24, 2020. The creek fire is the 5th largest California wildfire and the 2nd largest single California wildfire in recorded history[19].

North Complex Fire[20] (Figures/Tables removed for brevity) began during a lightning strike on August 17, 2020 and actively burned in Plumas National Forest in Plumas, Butte, and Yuba counties. By September 5, 2020 all the individual fires had been contained except for the Claremont and Bear fires. These two fires merged on September 5, 2020 and due to strong winds rapidly grew spreading to the Southwest and leveling the towns of Berry Creek and Feather Falls. The fires burned 318,935 acres, damaging or destroying 2,352 structures, and causing 15 fatalities

[14] River Fire. *https://www.fire.ca.gov/incidents/2020/8/16/river-fire/*
[15] Carmel Fire. *https://www.fire.ca.gov/incidents/2020/8/18/carmel-fire/*
[16] SCU Lightning Complex. *https://www.fire.ca.gov/incidents/2020/8/18/scu-lightning-complex/*
[17] *https://www.fire.ca.gov/media/4jandlhh/top20_acres.pdf*
[18] Creek Fire. *https://www.fire.ca.gov/incidents/2020/9/4/creek-fire/*
[19] *https://www.fire.ca.gov/media/4jandlhh/top20_acres.pdf*
[20] North Complex Fire. *https://inciweb.nwcg.gov/incident/6997/*

before full containment on December 3, 2020. The North Complex Fire is the 7th largest California wildfire in recorded history[21].

Woodward Fire[22] (Figures/Tables removed for brevity) began during a lightning strike on August 17, 2020 and was initially named the 4-5 Fire and on August 18, 2020 a second fire initially named the 4-6 Fire was found nearby, these were later renamed to the Woodward Fire[23]. These fires quickly grew due to winds and actively burned in the Point Reyes National Seashore. The fires burned 4,929 before full containment on October 1, 2020.

SQF Complex Fire[24] (Figures/Tables removed for brevity) began as the Castle and Shotgun fires during a lightning strike on August 19, 2020. The Castle fire actively burned in Sequoia National Forest and Giant Sequoia National Monument, Inyo National Forest, Sequoia National Park, lands managed by the Bureau of Land Management, State, County, and private lands with the Shotgun fire actively burning in the Golden Trout Wilderness and Sequoia National Forest. The fires burned 174,178 acres and destroyed 228 structures before full containment on January 5, 2021.

Hills Fire[25] (Figures/Tables removed for brevity) began on August 15, 2020 during a lightning strike. The fire actively burned in the wildland urban interface zone within Fresno County. The Hills fire burned 2,121 acres and caused one fatality before being fully contained on August 24, 2020.

Holser Fire[26] (Figures/Tables removed for brevity) began on August 17, 2020 as a bush fire with the source of the fire still unknown. The fire actively burned in Piru Canyon in Ventura County, approximately 12 miles north of the Simi Valley monitor, and burned 3,000 acres before being fully contained on September 9, 2020.

Lake Fire[27] (Figures/Tables removed for brevity) began on August 12, 2020 during a lightning strike. The fire actively burned in the Angeles National Forest in Los Angeles County. The Lake Fire burned 31,089 acres, destroyed 33 structures, damaged 6 structures, and destroyed 21 outbuildings before being fully contained on September 29, 2020.

Bobcat Fire[28] (Figures/Tables removed for brevity) began on September 6, 2020 with the source of the fire still unknown. The fire actively burned chaparral, brush, and timber near Cogswell Dam

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[21] *https://www.fire.ca.gov/media/4jandlhh/top20_acres.pdf*
[22] Woodward Fire. *https://www.nps.gov/pore/learn/management/firemanagement_woodwardfire.htm*
[23] National Park Service. Point Reyes – National Seashore California. *https://www.nps.gov/pore/learn/management/firemanagement_woodwardfire.htm*
[24] SQF Complex Fire. *https://inciweb.nwcg.gov/incident/7048/*
[25] Cal Fire – Hills Fire. *https://www.fire.ca.gov/incidents/2020/8/15/hills-fire/*
[26] Cal Fire – Holser Fire. *https://www.fire.ca.gov/incidents/2020/8/17/holser-fire/*
[27] Cal Fire – Lake Fire. *https://fire.ca.gov/incidents/2020/8/12/lake-fire/*
[28] Inciweb – Bobcat Fire. *https://inciweb.nwcg.gov/incident/7152/*

in Angeles National Forest in Los Angeles County. The Bobcat Fire burned 115,796 acres, destroyed 171 structures before being last updated at 92% contained on October 19, 2020.

Dolan Fire[29] (Figures/Tables removed for brevity) began on August 19, 2020 with the source of the fire still unknown. The fire actively burned in state parks and animal sanctuaries in Monterey County and burned 124,924 acres before being fully contained on December 31, 2020.

Salt Fire[30] (Figures/Tables removed for brevity) began on August 18, 2020 due to a source that is under investigation and actively burned near the Salt Springs Valley Reservoir in a wildland urban interface zone within Calaveras County. The fire burned 1,789 acres before full containment on August 24, 2020.

Red Salmon Complex[31] (Figures/Tables removed for brevity) began during a lightning strike on July 27, 2020 and was comprised of the Red and Salmon fires. These fires actively burned in Six Rivers National Forest, Shasta Trinity National Forest, Klamath National Forest, and Hoopa Valley Reservation. The fires burned 144,698 acres before full containment on November 17, 2020.

These fires occurred in areas that meet the definition of wildland which is "an area in which human activity and development is essentially non-existent, except for roads, railroads, power lines, and similar transportation facilities. Structures, if any, are widely scattered." Wildlands can include forestland, shrubland, grassland, and wetlands and includes lands that are predominantly wildland, such as land in the wildland-urban interface, as specified in the preamble of the Exceptional Events Rule.[32] (Figures removed for brevity) indicate these areas with the fire perimeters outlined in red.

B. Summary of Event

A series of large wildfires were ignited across California from mid-August to early October 2020. The majority of these fires occurred in the northern and central portions of the State, including the August Complex, which burned 1,032,648 acres and resulted in one fatality; the SCU Lightning Complex, which burned 396,624 acres; and the North Complex Fire, which burned 318,935 acres and resulted in fifteen fatalities. On August 22, 2020, a national disaster was first declared for the State of California,[33] due to the extensive wildfires burning there.[34]

The following section provides evidence of the impact of these exceptional events on the Simi Valley ozone monitors from August 18 to August 21, and September 30 to October 4, 2020.

[29] Dolan Fire. *https://inciweb.nwcg.gov/incident/7018/*
[30] Salt Fire. *https://www.fire.ca.gov/incidents/2020/8/18/salt-fire/*
[31] Red Salmon Complex - *https://inciweb.nwcg.gov/incident/6891/*
[32] 81 FR 68248
[33] 85 FR 53428, *Presidential Declaration of a Major Disaster for the State of California*, dated 8/22/20
[34] FEMA, *California Wildfires and High Winds, DR-4558-CA.* *https://www.fema.gov/disaster/4558*

Presented as phases of the event, the evidence shows the source wildfires that collectively contributed emissions impacting these sites in the South Central Coast Air Basin.

NOAA's HYSPLIT[35] model was used to determine simple back-trajectories showing the path that an air parcel took for a specified period of time (here, 36 hours), starting at each monitor at times of peak concentrations on each day. Three height levels (red: 100 meters (m); blue: 500m; green: 1000m) were used to indicate transport near the surface and in the upper atmosphere.

The HYSPLIT model was also used to indicate how emissions from the wildfires were transported toward the monitor (forward trajectory). Trajectories in this section are shown from the fire(s) estimated to have the highest contribution. The trajectories were initiated from each major fire at 12z (04PST). These model runs provide insight into the most likely center path a parcel of air (and smoke) from each fire would take in the 36 hours after the 12z start time. This provides a simplified understanding of smoke transport from a fire across the region, connecting these wildfires with smoke seen in satellite imagery, and indicating potential correlations at a site through analysis of parcel transport timing and backwards trajectories when they overlap. These forward trajectories, overlaid on satellite images from the SUOMI NPP / VIIRS[36] platform using Google Earth, provide a visual analysis of the smoke emitting from the fires and impacting the monitors.

Google Earth was used as a platform to combine the HYSPLIT back-trajectories and the NOAA Hazard and Mapping System (HMS) Fire and Smoke Product[37] smoke layers and fire locations. The back-trajectories for each monitor shown in the following sections traced back from the time of the maximum ozone concentration in the exceeding 8-hour period. Since different monitors will have maximum concentrations at different times, a table of the monitoring sites presented in the back-trajectory figures is included, indicating in both PST and UTC, the hours each trajectory began. Back-trajectories from the hour of the maximum ozone concentration in the exceeding 8-hour period for all exceptional event dates that are requested in this document are included in Appendix D.

The HYSPLIT trajectory model results, as well as Suomi satellite layers from the NASA Worldview application, and HMS smoke plume analyses, show impacts from multiple California wildfires dispersed throughout the northern and central portions of the State. Although the model results can show potential influence from specific fires, they do not always show the cumulative effect of continuing wildfire emissions that impacted California from August to early November.

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35 HYbrid Single Particle Lagrangian Integrated Trajectory (HYSPLIT)

36 NASA Worldview, *https://worldview.earthdata.nasa.gov/. Last accessed 11/16/21*

37 NOAA Satellite Smoke Text Product, *https://www.ssd.noaa.gov/PS/FIRE/smoke.html. Last accessed 11/17/21*

1. August 18-21, 2020

Strong 500 mb high pressure centered over the Great Basin area of Nevada and Utah and southwestern United States (Figure removed for brevity) provided for very hot temperatures across California, including the inland portions of Ventura County. Some monsoonal moisture moved into interior California with strong atmospheric dynamics favorable for convection, generated thunderstorms that initiated several wildfires in very dry vegetation during August 16-18. These wildfires rapidly spread and grew due to strong winds and low surface humidity across much of the region, causing increased smoke coverage and thickness while impacting surface locations across the State. Upper-level low pressure off the coast of Canada slowly pushes into the northwestern United States with a series of weak troughs moving onshore. This gradually erodes high pressure influence in the northwest United States but leaves southern California hot with above normal temperatures. Near Simi Valley, the Holser Fire (started August 12) and Lake Fire (started August 17) both rapidly grew in size by over 3,000 acres each during the evening August 17 through August 18, eschewing smoke in and near Ventura County and impacting Simi Valley on August 18. The Lake Fire contributed to smoke at Simi Valley when the wind shifted during morning August 18 and brought smoke southward from the Lake Fire, which mixed down into the valley during early August 18, as indicated by trajectory (Figure removed for brevity).

2. September 30-October 4, 2020

Strong 500mb high pressure influence extended from Mexico to the Canadian border, which provided for hot and dry surface conditions across much of the western United States, including California, as shown in (Figure removed for brevity). These weather conditions promoted high ozone concentrations which were further elevated by transported smoke emissions with associated ozone and precursors from multiple wildfires across the state. During late September, conditions were also favorable for Santa Ana winds which stimulated the spread of any nearby wildfires, further increased wildfire emissions, and broadly spread wildfire smoke across California. The National Weather Service advised of wildfire smoke and haze which impacted the forecast area, including Simi Valley, during this period (NWS Area Forecast Discussions in Appendix C). Along the south-central California coastline, a weak prevailing offshore/onshore diurnal pattern set up and provided for light offshore breezes that pulled air from the San Joaquin Valley and South Coast through Ventura County with warm overnight temperatures during the night. Then during the day, light onshore breezes brought this air back onshore causing a buildup of pollutants near the coast.

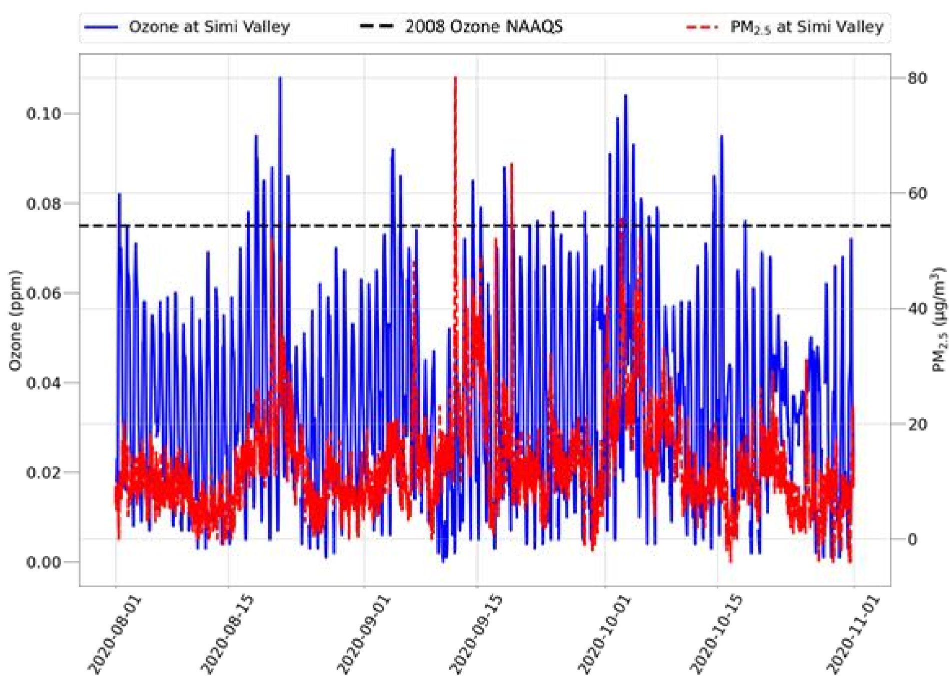
C. Event Related Concentrations and Long-Term Trends

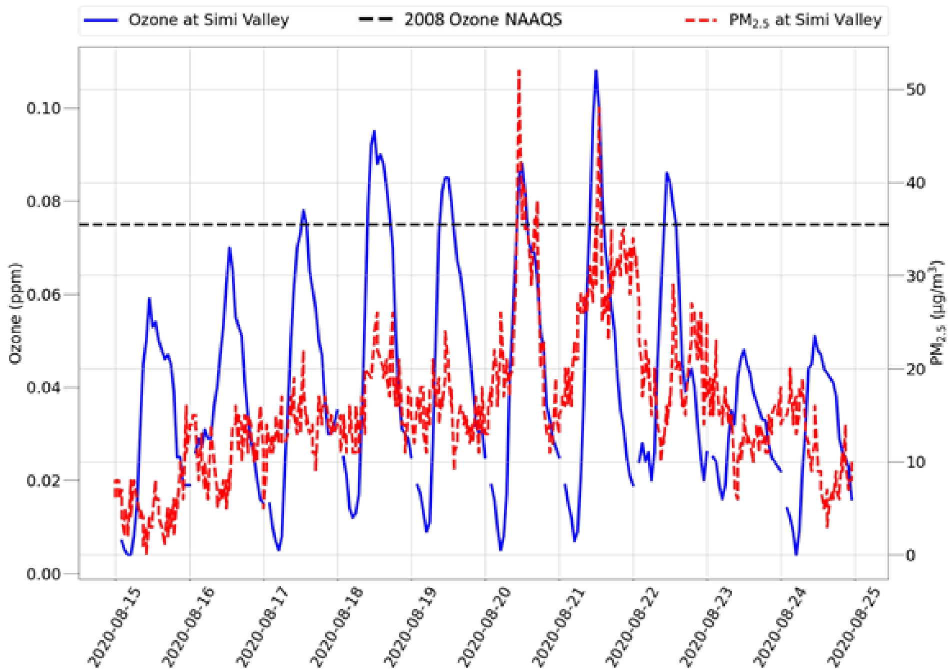
2. Ventura County (Simi Valley)

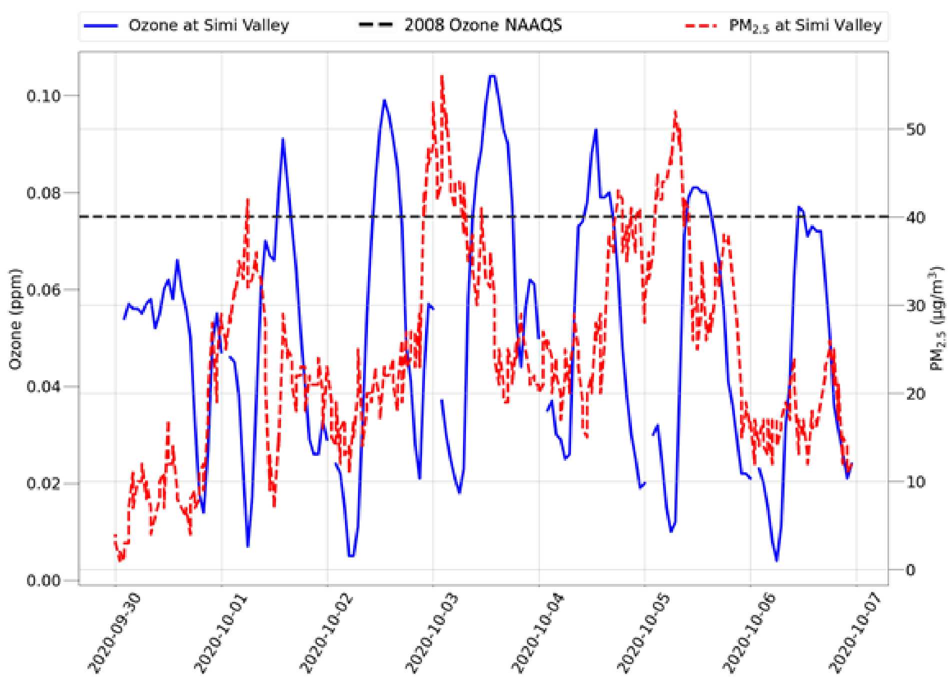
Multiple wildfires impacted the City of Simi Valley during the periods of concern, where winds generally transported wildfire smoke and ozone precursors from the Lake, Holser, CZU Lightning Complex, River, LNU Lightning Complex, Salt, Woodward, Carmel, SCU Lightning Complex, Dolan, Bobcat, SQF Complex, and Creek wildfires in California. These wildfire emissions caused elevated ozone concentrations at the Simi Valley monitoring site. Additionally, the smoke from the August Complex, Butte/Tehama/Glenn Complex, Red Salmon, North Complex, and Jones fires from northern California may have been transported to the area and contributed to ozone concentrations during some days. Elevated $PM_{2.5}$ concentrations and associated timing support the presence of wildfire smoke in the City of Simi Valley.

Figure III-2 shows the ozone and $PM_{2.5}$ concentration encompassing August, September, and October (top), a zoomed in range of August 15 to August 25 (center) and a zoomed in range of September 30 to October 7, 2020 (bottom), which includes the requested exceptional events listed in (Table removed for brevity). The timing of relative $PM_{2.5}$ elevated concentrations show strong connections with ozone increases and prolonged elevated concentrations. All the event periods show a consistent relationship between high $PM_{2.5}$ and elevated ozone values which is supportive of a strong influence by wildfire smoke.

Figure III-2: 1-hour Ozone and 1-hour PM2.5 Concentrations







Recent trends show a general decrease in 8-hour ozone design values at the Simi Valley monitoring site as shown in Figure III-3 while the annual 4th highs (Figure III-4) have shown a downwards trend during the past twelve years. The trend fit for design values is very strong. The 2020 8-hour ozone design value did not follow this trend, being above the standard. Concurrence of the requested exceptional event dates would bring the area into attainment of the 2008 ozone standard based on the adjusted 2020 8-hour ozone design value, as anticipated with the historical trend line.

Figure III-3: 8-hour Ozone Design Values with Trend at Simi Valley

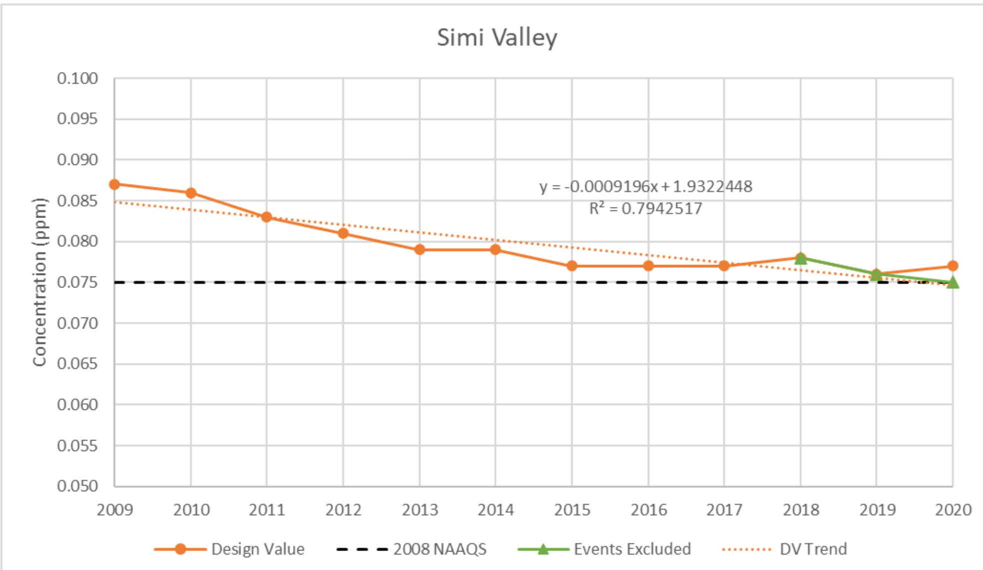
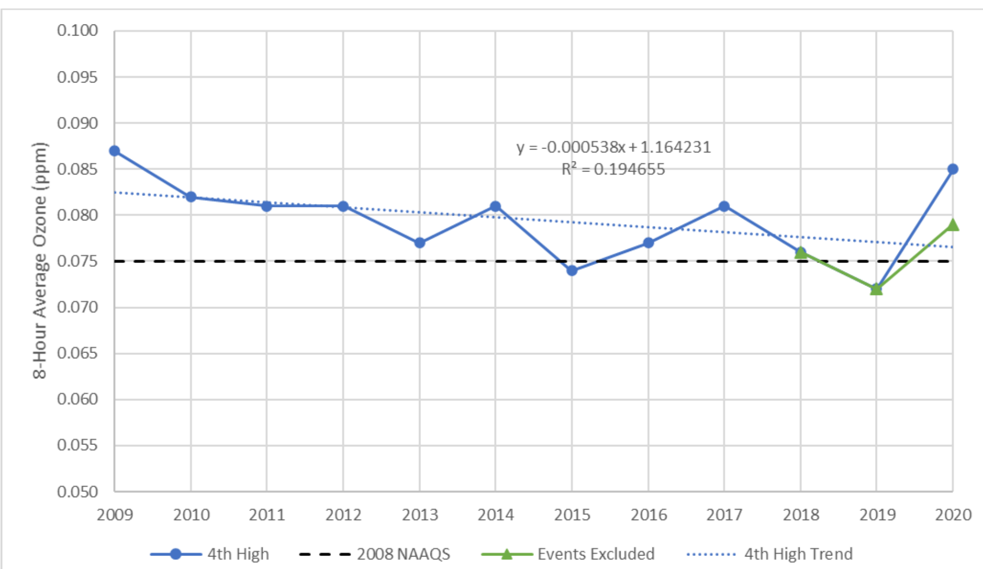


Figure III-4: Annual 4th High 8-Hour Average Ozone with Trend at Simi Valley



D. Meteorological Conditions

2. Simi Valley / Ventura County

Table III-2: Maximum Daily Values of Ozone, Temperature, and Wind Speed on Exceptional Event and Surrounding Days, 8/15-8/24/2020, at Simi Valley Monitoring Site

Date	**8/15**	**8/16**	**8/17**	**8/18***	**8/19**	**8/20**	**8/21***	**8/22**	**8/23**	**8/24**
1hr Ozone (ppm)	0.060	0.067	0.069	0.082	0.073	0.083	0.126	0.082	0.062	0.050
8hr Ozone (ppm)	0.050	0.057	0.067	0.086	0.076	0.074	0.082	0.070	0.041	0.045
Temperature (°F)	102.6	96.8	93.6	103.8	97.9	97.0	97.0	95.5	90.9	84.7
Wind Speed (mph)	10.3	13.0	9.8	10.5	10.1	9.4	8.5	11.2	11.4	9.8

* Denotes Exceptional Event Dates Requested for Data Exclusion

Table III-3: Maximum Daily Values of Ozone, Temperature, and Wind Speed on Exceptional Event and Surrounding Days, 9/30-10/6/2020, at Simi Valley Monitoring Site

Date	9/30	10/1	10/2*	10/3*	10/4*	10/5	10/6
1hr Ozone (ppm)	0.066	0.091	0.099	0.104	0.093	0.081	0.077
8hr Ozone (ppm)	0.058	0.074	0.086	0.095	0.080	0.077	0.070
Temperature (°F)	103.8	104.0	98.4	95.9	95.9	93.7	91.0
Wind Speed (mph)	11.6	10.5	9.6	8.9	9.4	9.6	10.3

* Denotes Exceptional Event Dates Requested for Data Exclusion

Table III-2 shows the daily values for the event period of August 15 to August 24, 2020. Maximum temperatures were generally in the 90s throughout most of the event with August 15 being over 100°F and temperatures cooling off into the 80s on August 24, 2020. Maximum daily resultant wind speeds were generally light to moderate with ranging from 8-13 mph. Maximum ozone concentration varied significantly with a range of 76 ppb and 45 ppb for the 1-hour and 8-hour ozone, respectively. Comparing August 21 with August 15, ozone concentrations were much higher while temperature was lower and wind speed slightly lower on August 21, indicating the day was likely complicated but unlikely to lead to such an extreme ozone concentration under normal conditions. Comparing August 18 with August 15, ozone concentrations were much higher while the high temperature was slightly warmer and exhibited similar wind speeds during August 18 which would be expected to lead to higher ozone concentrations but probably not as high as was measured.

Table III-3 shows the daily values for the event period of September 30 to October 6, 2020. Maximum temperatures were generally in the 90s throughout the event, with September 30 and October 1 being over 100°F. Maximum daily resultant wind speeds were generally light to moderate with ranging from 8-11 mph. Maximum ozone concentration varied significantly with a range of 38 ppb and 37 ppb for the 1-hour and 8-hour averaged ozone, respectively. Comparing October 2 through 4 with preceding days September 30 and October 1, maximum temperatures decrease with relatively small decrease in wind speeds which would not be expected to lead to such high ozone concentrations.

The weather data, for both event periods, supports that ozone directly related to wildfire smoke from the wildfires in California affected the Simi Valley monitor and increased ozone concentrations. Unusual weather, other than the transport of ozone and related wildfire smoke, was not a factor contributing to the exceptional event.

IV. Clear Causal Relationship

A. Tier 1 Key Factor Analysis

This section provides the documentation requested for a Tier 1 analysis per the *Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations*.[38] The Tier 1 analysis is for wildfires that clearly influence monitored ozone exceedances or violations when they occur in an area that typically experiences lower ozone concentrations. This includes establishing the seasonality and/or distinctive level of the monitored ozone concentration as well as providing evidence that the wildfire emissions were transported to the monitors. Analyses presented in this document include 2015-2020 8-hour maximums (Figure removed for brevity) to show seasonality and non-event related concentrations, proximity of wildfires (Section B of the Narrative Conceptual Model chapter), and transport of emissions from wildfires to the exceeding monitors (Section B of the Narrative Conceptual Model chapter and Section C of this chapter).

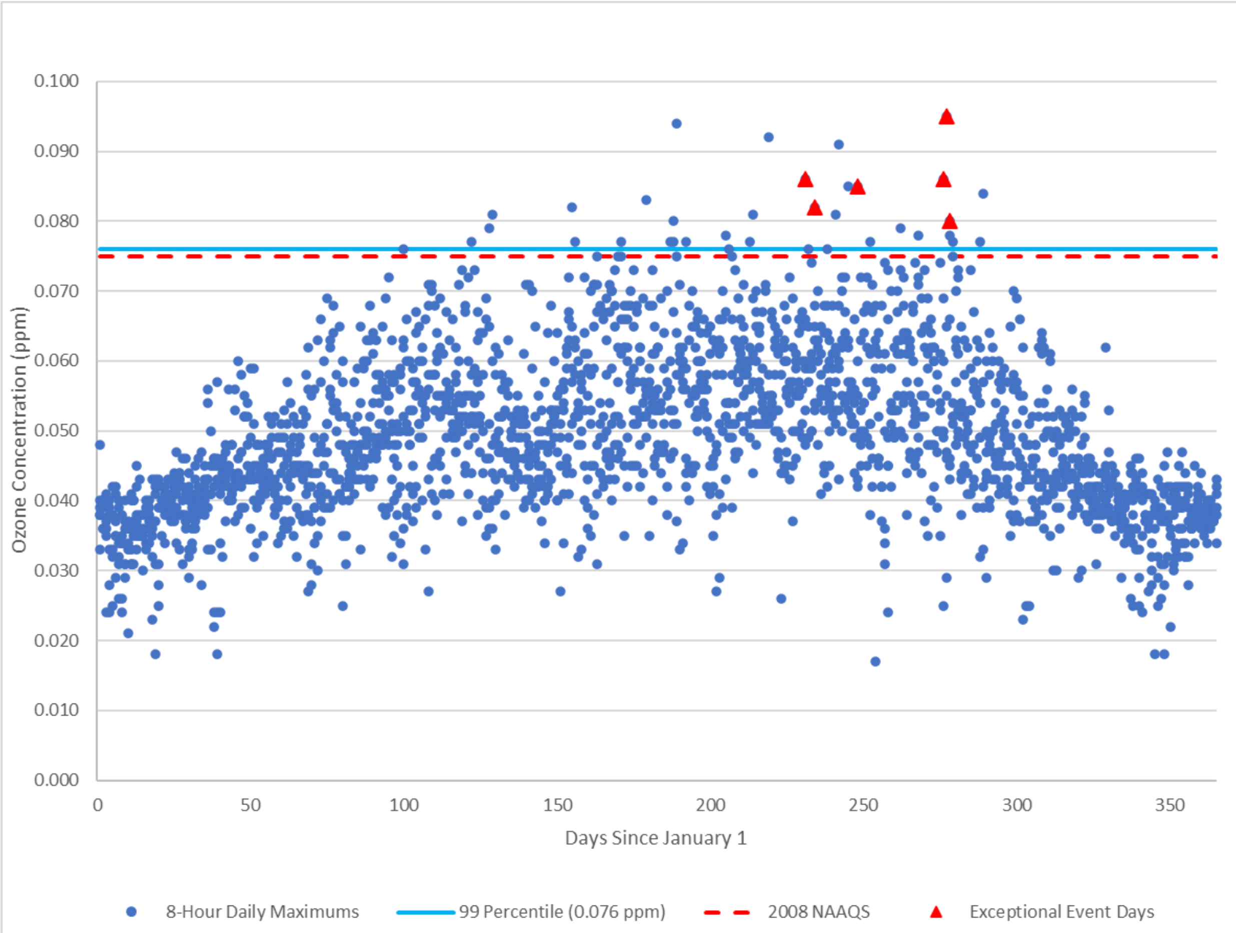
The key factor for Tier 1 requires establishing the seasonality and/or distinctive level of the monitored ozone concentration. The event-related exceedance occurs during a time of year that typically has no exceedances or is clearly distinguishable (at least 0.005 ppm higher) from non-event exceedances. Additionally, ozone impacts should be accompanied by clear evidence that the wildfire's emissions were transported to the location of the monitor.

(Figure removed for brevity) and Figure IV-1 shows that the exceedances occurred during the time of year where ozone concentrations tend to be higher for both monitoring sites, and that most of these exceedances are not clearly distinguishable from non-event exceedances as defined by guidance.

The Simi Valley (Ventura County) exceedance on October 3, 2020 of 0.095 ppm was the greatest concentration during 2015-2020 but was only 1 ppb higher than the second greatest concentration on July 8, 2017 of 0.094 ppm, which does not qualify for a Tier 1 analysis. The remainder of the exceedances were high for the season at Simi Valley; they do not qualify for a Tier 1 analysis.

[38] U.S. EPA, *Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations*, p. 13, last accessed 7/26/21.

Figure IV-1: Simi Valley 8-Hour Daily Ozone Maximums by Day of the Year for 2015-2020



As most exceedances do not qualify for Tier 1, additional evidence that the wildfire emissions were transported to the monitors is needed for further Tier 2 analyses. Transport evidence is provided in Section B of the Narrative Conceptual Model chapter and Section C of this chapter as part of the Tier 3 – Weight of Evidence.

B. Tier 2 Key Factor Analysis

This section provides the documentation requested for a Tier 2 analysis, where ozone concentrations are not clearly higher than non-event related concentrations nor do they occur outside of the area's normal ozone season, in effect not meeting Tier 1 requirements. Tier 2 requires a demonstration that the impacts of the wildfire event on ozone are higher than a non-event related concentration and that fire emissions compared to the fire's distance from the monitor indicate a clear causal relationship. Analyses include those indicated in Section A of this chapter for Tier 1 as well as Q/D estimations, a more detailed comparison of the event-related ozone concentrations with non-event-related high ozone concentrations, and evidence that the emissions affected the monitor. The following sections provide the documentation requested for a Tier 2 analysis per U.S. EPA guidance.[39]

> Key Factor #1 - Fire emissions and distance of fire(s) to affected monitoring site location(s), and
>
> Key Factor #2 - Comparison of the event-related ozone concentrations with non-event related high ozone concentrations.

Evidence that the fire emissions impacted the exceeding monitor are also required. This evidence is provided with satellite evidence of smoke at the monitor (Narrative Conceptual Model chapter and Section C of this chapter), graphs of $PM_{2.5}$ concentrations nearby and in the same airshed (Section C of this chapter), and $PM_{2.5}$ speciation data near the wildfires impacting the monitor (Section C of this chapter), and differences in spatial and temporal patterns (Section C of this chapter).

1. Key Factor #1 (Q/D)

Key factor 1 requires determining the fire emissions (Q) and the distance (D) between the wildfires to the affected monitor. CARB staff worked with U.S. EPA staff, and provided shapefiles delineating perimeters, start dates, and end dates of all California wildfires in 2020 retrieved from the National Interagency Fire Center. U.S. EPA modeled the wildfires and emissions, produced emissions estimates for the fires for each date, and calculated the summed aggregate of emissions divided by the distance (Q/D) for each day for each monitoring site.

2. Key Factor #2 (Event vs Non-Event Ozone Concentrations)

Key factor #2 in a Tier 2 demonstration requires a comparison of the event related ozone concentration with non-event related high ozone concentrations. Statistical analyses of the exceedances must either demonstrate that exceedance concentrations are in the 99th percentile of the 5-year distribution of ozone monitoring data, or one of the 4 highest ozone concentrations within the year.

Due to the large number of dates impacted by the multiple large wildfires burning historically large amount of acreage producing massive amounts of emissions, CARB believes it reasonable to include all dates whereby wildfire emissions caused exceedances of the appropriate ozone NAAQS up to the adjusted 4th high, as noted in the tables below. Dates that are impacted by exceptional events should not count against the tally of "the 4 highest ozone concentrations within the year" as they were exceedances caused by contributions from wildfire emissions. This list also does not preclude the non-exceptional event requested dates from future consideration as wildfire related

[39] Ibid, p. 15

exceptional events, only that they are not being demonstrated as such as part of this exceptional events demonstration.

The 99th percentile value for the 5-year (2015-2019) distribution of ozone monitoring data at Simi Valley is 0.076 ppm. All dates being requested for exclusion due to wildfire exceptional events are in the top 8 concentrations in 2020 and in the 99th percentile or higher for concentrations during the prior 5-year distribution of data as shown below in (Table removed for brevity). After accounting for the exceptional event dates being requested the adjusted 4th high is 0.079 ppm, below all requested exceptional event dates. All requested dates qualify under the requirements for Tier 2 – Key factor #2.

C. Tier 3 – Weight of Evidence

The following sections provide additional evidence as required to support a Tier 3 analysis per U.S. EPA guidance[40] where the requested dates do not qualify for either a Tier 1 or a Tier 2 analysis. All dates requested for exclusion will be included in this Tier 3 analysis. The Tier 3 analysis utilizes a more complicated "weight of evidence" approach with additional complex analyses to show a clear causal relationship between wildfire emissions and the ozone concentrations at a site. Additional required elements in a Tier 3 analysis must provide:

1. Evidence that the emissions from the wildfire affected the exceeding monitor.

This requirement is met through evidence shown in Sections B and C of the Narrative Conceptual Model chapter and Section C of this chapter, and particularly in the evidence of an ozone/$PM_{2.5}$ correlation (Figure removed for brevity and Figure III-36), unusual ozone diurnal patterns seen in many of the (Figures removed for brevity), and unusual $PM_{2.5}$ patterns seen in many of the (Figures removed for brevity). Social media reports of smoke in the vicinity can also be found in Appendix F.

2. Evidence that the emissions were transported to the monitor.

This requirement is met through evidence given in the Narrative Conceptual Model chapter and this chapter using both backward trajectory analysis from the monitor as well as forward trajectory modeling from individual wildfires, satellite imagery and HMS satellite-derived smoke layers, NAAPS modeled aerosol optical depth, and meteorological analyses.

3. Additional evidence that the emissions caused the exceedance by reaching the ground and affecting the monitors.

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[40] U.S. EPA, *Final Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations*, p.25, last accessed 7/29/21

This requirement is met through the analysis of $PM_{2.5}$, black carbon, NAAPS modeled smoke surface concentration, and NWS Area Forecast Discussions in the following section as well as media reports of smoke at ground level.

1. 1-Hour Ozone (Diurnal Comparison)

The following figures (Figures removed for brevity) compare the daily diurnal pattern for each exceedance day with the hourly diurnal percentiles for ozone from 2015-2019. For the Simi Valley site, data is missing for the 0100 PST hour due to running daily quality check routines during the 0100-0200 PST hour and the seasonal ozone season is defined as April through October. Calculations of the 8-hour averages for the 2015 NAAQS are limited to the starting hours between 0700-2300 (hours 0000-0600 are excluded) while the 2008 NAAQS includes all starting hours of the day. These figures show that during many of the days for each site the pattern was unusual compared to the percentiles of each site's typical diurnal pattern with unusually timed peaks or spikes. Some days were extremely high throughout the day due to the ongoing presence of wildfire emissions with ozone precursors and ozone impacting these sites. These diurnal ozone figures support that the ozone exceedance days were unusual compared to historical patterns and act as supporting evidence that wildfire emissions directly impacted ozone concentrations at each site.

2. $PM_{2.5}$

Evidence of ground-level impacts of smoke on the monitor can also be indicated through analysis of particulate matter, as well as other speciated components.

The following figures show elevated $PM_{2.5}$ concentrations at multiple sites along California's central coast and on the western side of the San Joaquin Valley during the time of the exceptional event, which was a direct result of smoke and emissions from the wildfires in northern and central California. This supports that the wildfire smoke and emissions were widespread across the region and directly impacted monitors at the surface during the period.

3. Additional Supporting Ground-Level Evidence

a) Area Forecast Discussions

In the days prior to the smoke impacts in southern California, Area Forecast Discussions issued by the National Weather Service (NWS) Los Angeles/Oxnard (LOX) office focused on high temperatures and the potential for thunderstorms. On August 17, the AFD only mentioned the pyrocumulous plumes from the Lake and Ranch2 Fires. Smoke impacts were not noted until August 18 with an initial mention of impacts for flight regulations at the San Luis Obispo Airport (KSBP). Later, LOX noted the presence of a thick layer of smoke from the fires over Monterey

County covering San Luis Obispo and Santa Barbara Counties.[41] AFDs from that point, though October, frequently noted the presence of smoke and the impacts on air quality, temperature forecasting, and aviation. Air Quality Alerts were issued by LOX for Ventura County (Appendix C).

A sampling of Area Forecast Discussions from the NWS Los Angeles/Oxnard forecast office are included in Appendix C.

b) Satellite Smoke Indications

The smoke that enhanced the ozone reaching the exceeding monitors from mid-August through early November 2020 was primarily from the wildfires in the northern and central portions of the State, along with the River and Dolan Fires in Monterey County, just to the north, the Creek Fire and the SQF Complex on the eastern side of the San Joaquin Valley, and the Apple and Bobcat Fires in the South Coast Air Basin. A smaller fire just 12 miles north of Simi Valley, the Holser Fire, contributed to smoke impacts in mid-August. The combined smoke from these fires increasingly impacted sites throughout California, including monitors in the South Central Coast Air Basin. Several tools are available to look at smoke in the areas that impacted the monitors.

The NOAA Hazard and Mapping System (HMS) Fire and Smoke Product is an analysis of various satellite imagery to map out the scope and even to some extent thickness of smoke layers. These products were extensively utilized in the Narrative Conceptual Model and Clear Causal Relationship chapters of this document.

NOAA Smoke Text Product[42] is a text-based analysis of satellite imagery. These products are used to give an overall view of smoke origins, current locations, and potential transport. Unfortunately, Smoke Text Products were unavailable for the August 2020 events. Relevant Smoke Text Products issued from September 30 through October 4 are in Appendix E, with an example shown here.

4. NAAPS Global Aerosol Model

The NAAPS (Navy Aerosol Analysis and Prediction System) Global Aerosol Model is used to predict the distribution of tropospheric aerosols using global meteorological fields.[43] The model can provide smoke simulations in near-real-time with up to 120-hour forecasts. Of particular interest are the total optical depth and smoke surface concentration outputs. Aerosol optical depth (AOD) can indicate how much aerosol is in the atmosphere, with higher AOD values corresponding with increasing levels of particulate matter. The model can also give a simulation

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[41] Iowa State University, Mesonet, *Area Forecast Discussions, AFDLOX 2020-08-19 05:25 UTC*, last accessed 11/5/21

[42] NOAA Hazard and Mapping System (HMS), *Fire and Smoke Text Product*, last accessed 11/8/21

[43] Naval Research Laboratory, *Navy Aerosol Analysis and Prediction System (NAAPS) Global Aerosol Model*, last accessed 11/16/21

of AOD further broken down into sulfates, dust, and smoke. In addition, the model can also simulate concentrations of smoke at the surface, with darker colors indicating thicker smoke. (Figure removed for brevity) shows the high smoke AOD levels and smoke surface concentrations at the Simi Valley monitors during August 21. Additional AOD and smoke surface concentration model outputs covering the requested event dates are shown in Appendix E and show the presence of smoke in the Ventura County area.

5. Conclusion

Beginning in mid-August 2020, smoke from several large wildfires throughout California generated emissions that directly resulted in elevated concentrations at the Simi Valley ozone monitor in the Ventura County ozone nonattainment area. Inspection of $PM_{2.5}$ concentrations, satellite-derived smoke layers, and modeled trajectories indicate pathways for the transport of smoke and associated precursors from the wildfires in California to move downrange and into the surface boundary layer. This supports the transport of smoke, ozone precursors, and generated ozone that mixed down to the surface at the exceeding monitoring sites.

All requested dates for exceptional events were in the 99th percentile of the prior 5-year distribution of 8-hour ozone data and fall in the adjusted top 4 rank for 2020 when excluding the requested exceptional events days. Area forecast discussions, satellite smoke products, black carbon analyses, and NAAPS Global Aerosol Model all indicated periods of wildfire smoke aloft and at the surface during the requested event dates. Daily diurnal comparison graphs show many days with abnormal patterns and unusually timed peaks due to the impacts of wildfire emissions.

The comparisons and analyses provided in the Narrative Conceptual Model and Clear Causal Relationship chapters of this demonstration support our conclusion that the numerous wildfire events affected air quality in such a way that there exists a clear causal relationship between the monitoring exceedances or violations as listed in Table I-4 and thus satisfies the clear causal relationship criteria.

V. Natural Event/Human Activity Unlikely to Recur

The Background and Narrative Conceptual Model chapters of this document provide evidence that the event qualifies as a “Natural Event” as defined in 40 CFR 50.1(k). The fires that impacted the exceeding ozone monitors occurred on wildlands that meet the definition in 40 CFR 50.1(n) and (o). When considering fire cause, "wildfires on wildland initiated by accident or arson are considered natural events, and on a case-by-case basis this treatment for wildfires may bear on the appropriate treatment of accidental and arson-set structural fires.[44]”

[44] 81 FR 68233, Footnote 35

U.S. EPA generally considers the emissions of ozone precursors from wildfires on wildland to meet the regulatory definition of a natural event at 40 CFR 50.1(k), and accordingly, CARB has shown that this event is a natural event and may be considered for treatment as an exceptional event.

VI. Not Reasonably Controllable and/or Not Reasonably Preventable

The Background and Narrative Conceptual Model chapters of this document provide evidence the wildfires impacting the ozone monitors at Simi Valley in Ventura County were natural events predominantly occurring on wildland in California. CARB is not aware of any evidence clearly demonstrating that prevention or control efforts beyond those actually made would have been reasonable. Therefore, emissions from the wildfires were not reasonably controllable or preventable.

VII. Public Notification

As presented in Sections E and F of the Narrative Conceptual Model chapter, all affected districts maintain public alert systems as well as publicly available information via their websites to keep residents informed of potential wildfire smoke impacts. Examples of the information released to the public is included in Appendix B and Appendix F.

The CARB will hold a 30-day public comment period to solicit public input regarding this demonstration. Notification of the public comment period will be posted on the CARB website and emailed to interested stakeholders. Any comments received, and CARB's responses, will be submitted to U.S. EPA at the end of the 30-day public comment period.

VIII. Summary/Conclusion

Seven major wildfire complexes (including the August, SCU Lightning, LNU Lightning, and North Complex fires which each exceeded 300,000 acres burned) and ten individual fires (including the Creek, Dolan, and Bobcat wildfires which each exceeded 100,000 acres burned) were the primary focus of these retroactive analyses and discussions but is likely not inclusive of all wildfires that were active and contributed emissions during these events. These massive fires were all active producers of vast amounts of wildfire smoke and emissions, which ultimately consumed over four million acres of wildlands in California during 2020.

During the event timeframe of August 18 to October 4, wildfires were particularly active, producing enormous amounts of wildfire smoke and emissions, including ozone precursors, which blew downwind blanketing vast portions of northern California and often settling into valleys and foothills when conditions allowed. Air quality monitors showed elevated $PM_{2.5}$ throughout the South Central Coast Air Basin and in surrounding regions, indicating smoke impacts at the surface.

Black carbon and NAAPS Global Aerosol Model products further identified the wildfires as sources of the emissions impacting surface sites. Elevated ozone concentrations correlated well with the elevated $PM_{2.5}$ concentrations at collocated or nearby monitors (as available) during the event at each of the impacted sites.

This 2020 Southern California Ozone Exceptional Events Demonstration supports the criteria for an exceptional event as detailed in the 2016 Exceptional Events Rule[45] and Wildfire Ozone Guidance.[46] This documentation used the following evidence to demonstrate the exceptional event:

- Ambient air monitoring data
- HYSPLIT forward and backward trajectory analyses
- Satellite imagery and narratives
- Wildfire smoke emissions estimates
- Statistical historical concentration comparisons
- Meteorological conditions
- Air Quality District alerts and advisories
- NOAA and HMS smoke products
- Aerosol modeling

This Exceptional Events Demonstration clearly demonstrates justification for exclusion of data as listed in Table I-4 due to an exceptional event under 40 CFR 50.14(c)(3)(iv). The 2020 Southern California Ozone Exceptional Events Demonstration has provided evidence that:

- Describes the events causing the exceedance and a discussion of how emissions from the event led to the exceedance at each monitor;
- Demonstrates a clear causal relationship between the wildfire emissions and the ozone exceedances at each monitor for their respective requested dates;
- Shows that event-influenced concentrations were unusual and above normal historical concentrations;
- Demonstrates the event was neither reasonably controllable nor reasonably preventable; and
- Verifies the event was multiple wildfires, all-natural events or human activity that is unlikely to recur at a particular location, all occurring predominantly on wildlands.

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[45] 81 FR 68216

[46] U.S. EPA, *Final Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations*, p.25, last accessed 7/29/21

APPENDIX I
PHOTOCHEMICAL MODELING PROTOCOL

Excerpted from:

South Coast AQMD 2022 Draft Air Quality Management Plan
Appendix V – Modeling and Attainment Demonstrations

Prepared by:

South Coast Air Quality Management District
Diamond Bar, California

Background

One of the basic requirements of a modeling attainment demonstration is the development of a comprehensive modeling protocol that defines the scope of the regional modeling analyses. This includes the attainment demonstration methodology, meteorological and chemical transport platforms, gridded and speciated emission inventories, and geographical characteristics of the modeling domains. The protocol also defines the methodology to assess model performance and the selection of the simulation periods. The 2016 AQMP provided a comprehensive discussion of the modeling protocol used for the development of the PM2.5 and ozone attainment demonstrations. The 2016 AQMP Modeling Protocol served as the prototype of the 2022 AQMP modeling protocol. This AQMP demonstrates attainment of the 2015 federal 8-hour ozone standard with 2018 as the base year and 2037 as the attainment year. Future attainment years (See Table V-2-1) are identified based on nonattainment designation, pollutant standards, and geographical area.

TABLE V-2-1

UPCOMING ATTAINMENT YEARS FOR THE 2015 8-HOUR OZONE NAAQS

Attainment Year	NAAQS	NAAQS level	Areas
2018	Base Year	Modeling Base Year	
2026	2015 ozone	70 ppb	Ventura
2032	2015 ozone	70 ppb	Coachella, W. Mojave Desert
2037	2015 ozone	70 ppb	South Coast

Attainment Demonstration

8-hour Ozone

The 8-hour attainment demonstration was performed based on the U.S. EPA guidance document, "Modeling Guidance for Demonstrating Air Quality Goals for Ozone, PM2.5, and Regional Haze", issued on November 29, 2018. The guidance requires that a maximum concentration be determined among 9 grid cells around a monitoring station and that the specific grid location be preserved in the future year modeling scenario when calculating relative response factors (RRF). The RRF calculation is limited to the top 10 days of simulated concentrations which are higher than 60 ppb. Focusing on the top 10 days produces future-year design values that are more responsive to emission reductions.

Numerical Models

Table V-2-2 provides a side-by-side comparison of the 2012, 2016 and the current 2022 AQMP modeling protocols. In general, changes have occurred in the following categories: emissions inventories, future-year simulations, the level of the non-attainment designation and the attainment demonstration methodology. As such, these changes are expected to occur with each subsequent modeling update. Table V-2-3 highlights the main differences in CMAQ setup since the 2016 AQMP.

TABLE V-2-2

NUMERICAL MODELING PLATFORMS AND DOMAINS FOR 2022 AND PREVIOUS AQMPS

	2012 AQMP	2016 AQMP	2022 AQMP
Modeling Base Year	2008 Ozone: June – Aug PM: Annual	2012 Ozone: May – Sep PM: Annual	2018 Ozone: May - Sep
Chemical Transport Model	CMAQ as primary tool CAMx as weight of evidence	CMAQ	CMAQ
Meteorological Model	WRF version 3.3 with Updated Land Use	WRF version 3.6 with Updated Land Use	WRF version 4.0.3 Unified Noah
Emission: On-Road Off-Road	EMFAC 2011 EMFAC-LDV EMFAC-HD EMFAC-SG Category Specific Calculation	EMFAC 2014 Single package Category Specific Calculation	EMFAC 2017 Single package Category Specific Calculation
Modeling Domain	624 km by 408 km	624 km by 408 km	624 km by 408 km
Grid Resolution	4km by 4 km grid	4km by 4km grid	4km by 4km grid
Vertical Layer	18 layers with 14 layer below 2000 m Above Ground Level (AGL) and 50 hPa as top boundary	18 layers with 14 layer below 2000 m AGL and 50 hPa as top boundary	30 layers with 14 layer below 2000 m AGL and 50 hPa as top boundary

TABLE V-2-3

CHEMICAL TRANSPORT MODELING PLATFORM FOR THE 2016 AND 2012 AQMPS

Options	2016 AQMP	2022 AQMP
Numerical Model	CMAQ version 5.0.2	CMAQ version 5.2.1
Modeling Grid	156 by 102 grids with 4 km grid distance	Same
Vertical Layers	18 layers	30 layers
Gas Phase Chemical Mechanism	SAPRC07 with version "c" toluene updates	Same
Aerosol Mechanism	AERO6	Same
Chemical Solver	Euler Backward Iterative solver (EBI)	Same
Horizontal Advection	Yamo	Same
Vertical Advection	WRF	Same
Horizontal Diffusion	Multiscale CMAQ scheme	Same
Vertical Diffusion	ACM2	Same
Photolysis	In-line Calculation	Same
Initial Values	Clean Homogeneous Condition	Same
Boundary Values	Model for OZone and Related chemical Tracers (MOZART)	Nested modeling with 12km statewide CMAQ The Outer CMAQ domain used boundaries from the global model of Community Atmosphere Model with Chemistry (CAM-chem)

The Weather Research and Forecast (WRF) model remains the primary tool for meteorological modeling. WRF was updated with the most recent version (version 4.0.3) available at the time of protocol preparation and was evaluated with a set of observation data. Later WRF version 4.3 was conducted and evaluated to ensure the accuracy and reliability of meteorological predictions, while version 4.0.3 served as the primary WRF for this AQMP. WRF simulations were conducted with three nested domains with grid resolutions of 36, 12 and 4 km. The innermost domain spans 652 km by 460 km in the east–west and north–south directions, respectively, which includes the greater Los Angeles area, its surrounding mountains, and ocean waters off the coast of the Basin (Figure V-2-1). A Lambert conformal map projection was used with reference latitudes of 30° and 60° N and the center of the modeling domain positioned at 37° N and 120° 30' W. Details on the WRF model configuration are provided in Chapter 3.

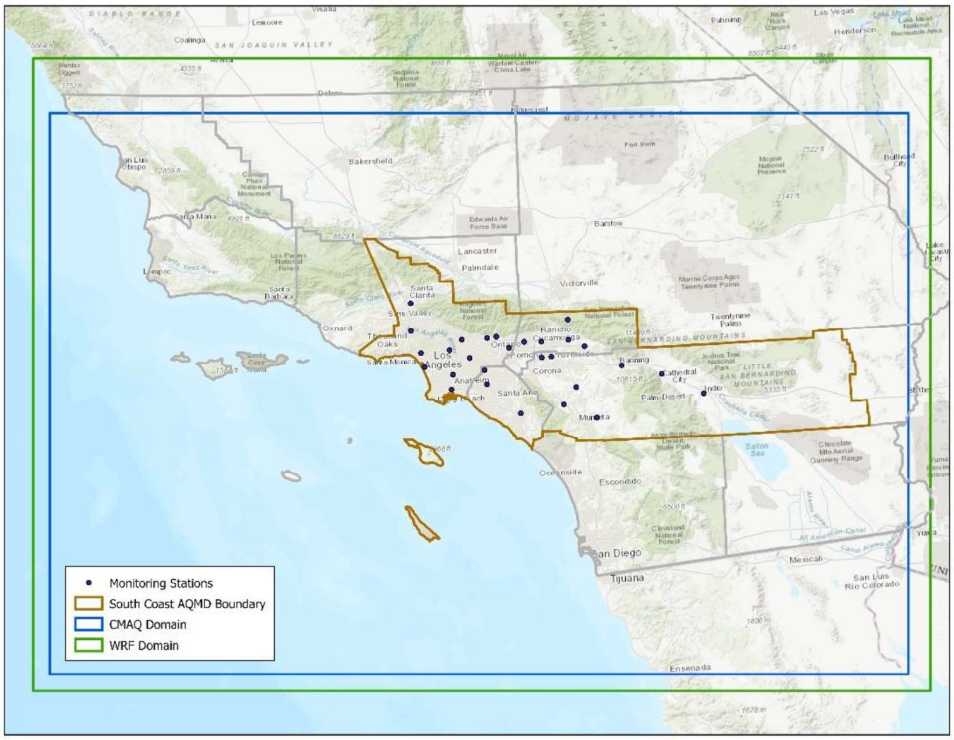

FIGURE V-2-1

THE RELATIVE LOCATIONS OF THE INNER MOST WRF DOMAIN COMPARED TO THE CMAQ DOMAIN. THE BOUNDARY OF SOUTH COAST AQMD JURISDICTION BOUNDARY AND AIR MONITORING LOCATIONS ARE OVERLAID BY A THICK SOLID LINE AND BLACK DOTS, RESPECTIVELY.

Emissions Processing

Emissions inventories are often developed on an annual basis for large geographic areas and a process must be developed to allocate the emissions to a time-dependent grid for use in chemical transport modeling. Traditionally, emissions were allocated to the modeling grid using generic or average activity patterns and profiles. These approaches did not sufficiently reflect the real-world characteristics of emissions sources. Shortcomings of previous emissions allocation methods included an inability to account for traffic flows responding to changes in weather, vessels transiting outside of well-known shipping lanes, or aircraft following airport-specific landing and takeoff trajectories. For these reasons, new approaches were developed to spatially and temporally allocate emissions from on-road mobile sources, Ocean-Going Vessels (OGV), and aircraft. Each method used information from sensor or transponder-based datasets, which accurately reflected where and when emissions were occurring. Further details on the updated allocation methods are presented in Chapter 4 of this appendix.

TABLE V-2-4

SUMMARY OF EMISSION PROCESSING FOR 2016 AND 2022 AQMPS

Options	2016 AQMP	2022 AQMP
On-Road Emissions	EMFAC 2014 ○ Emissions mode to get total amount of emissions in Tons per Day ○ Emissions rate to estimate grams per emissions of specific vehicle category, activity, etc. Temporal allocation using Caltrans real-time Performance Measurement System (PeMS) traffic data for light and medium duty vehicles, and Weight in Motion (WIM) for heavy duty vehicles	EMFAC 2017 Temporal allocation using Caltrans real-time PeMS single loop detector-based traffic data for light, medium, and heavy-duty vehicles
Aircraft Emissions	Treated as point sources with inline emissions calculation	ACARS/GATE[1] spatial allocation
OGV Emissions	Prescribed spatial allocation following major shipping channels	AIS-based[2] spatial allocation
Vehicle Miles Traveled	2016 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS)	2020 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS)
Off-Road Emissions	Category Specific Calculation	Same
Mexico Emissions	CARB's Mexican emissions profile	Same

[1] Aircraft Communication Addressing and Reporting System (ACARS)/Gridded Aircraft Trajectory Emissions (GATE)

[2] Automated Identification System

TABLE V-2-5

LIST OF EMISSIONS CATEGORIES WITH AND TEMPORAL PROFILE USED

Day-Specific Profile	Generic Profile
• Wildfires[1] • Prescribed burns[1] • Biogenic and On-Road motor vehicle emissions are adjusted using day/hour-specific meteorological data.	• Agricultural burning • Residential wood combustion • Facilities • Paved road dust • Unpaved road dust • Windblown dust • Livestock dust

[1] Wildfires and prescribed burns were modeled using day-specific profiles for the model performance evaluation only. For the attainment demonstration, wildfire emissions were excluded, and prescribed burns were modeled using a generic profile.

V-2-Biogenic Emissions

Daily biogenic VOC emissions were calculated using the Model of Emissions of Gases and Aerosols from Nature version 3.0 (MEGAN3.0) using 2018 meteorology as input. MEGAN was executed in its default configuration, except for the normalized Leaf Area Index (LAIv) input. LAIv was developed by the California Air Resources Board using 2018 data from the Moderate Resolution Imaging Spectroradiometer (MODIS) on the National Aeronautical Space Administration’s Terra and Aqua satellites. Because MODIS does not provide data in urban areas, LAIv in these areas was based on tree survey data from the US Forest Service. A detailed description of the biogenic inventory is provided in Chapter 4.

Computational Resources

The main computation platform employs high performance nodes. New servers, compiled to enhance computational capability, were configured with Red-Hat Enterprise Linux 7 and 64-bit operating systems. Details of the computing resources are summarized in Table V-2-6.

TABLE V-2-6

DETAILS OF COMPUTATIONAL RESOURCES USED IN THE 2012, 2016 AND 2022 AQMPS.

2012 AQMP	2016 AQMP	2022 AQMP
HP DL380 G7, 64 bit 3.3 GHz, 2x6 cores	HP DL560 G8, 64 bit 4x8 cores	HP DL380 G10, 64 bit 2x16 cores
HP DL560 G8 Total **140** processors	HP DL560 G8, Total **320** processors	HPE DL380 G10 Total **320** processors
	HP DL560 G8 Total **64** processors	HP DL560 G8, Total **256** processors

References

US EPA (2018) Modeling Guidance for Demonstrating Air Quality Goals for Ozone, PM2.5, and Regional Haze

APPENDIX J

VENTURA COUNTY

MODEL PERFORMANCE ANALYSIS
Prepared by SCAQMD for VCAPCD

STATISTICAL EVALUATION

The statistics used to evaluate 8-hour average CMAQ ozone performance include the following:

Statistic for O_3	Definition
Daily-Max Bias Error Unpaired	Average of the differences in observed and predicted daily maximum values. Negative values indicate under-prediction. $BiasError = \frac{1}{N}\sum(Obs - Pred)$
Daily-Max Bias Error Paired	Average of the differences in daily maximum observed value and the corresponding predicted concentration at the hour that the observational maximum was reached. Negative values indicate under-prediction. $BiasError = \frac{1}{N}\sum(Obs - Pred)$
Daily-Max Gross Error Unpaired	Average of the absolute differences in observed and predicted daily maximum values $GrossError = \frac{1}{N}\sum\lvert Obs - Pred\rvert$
Daily-Max Gross Error Paired	Average of the absolute differences in daily maximum observed value and the corresponding predicted concentration at the hour that the observational maximum was reached. $GrossError = \frac{1}{N}\sum\lvert Obs - Pred\rvert$
Normalized Daily-Max Bias Error Unpaired	Average of the quantity: difference in observed and predicted daily maximum values normalized by the observed daily maximum values. Negative values indicate under-prediction. $NormBiasError = \frac{1}{N}\sum\left(\frac{Obs-Pred}{Obs}\right)\cdot 100$

Normalized Daily-Max Bias Error Paired	Average of the quantity: difference in daily maximum observed value and the corresponding predicted concentration at the hour that the observational maximum was reached normalized by the observed daily maximum concentration. Negative values indicate under-prediction. $NormBiasError = \frac{1}{N}\sum\left(\frac{Obs-Pred}{Obs}\right)\cdot 100$
Normalized Daily-Max Gross Error Unpaired	Average of the quantity: absolute difference in observed and predicted daily maximum values normalized by the observed daily maximum concentration $NormGrossError = \frac{1}{N}\sum\left\lvert\frac{Obs-Pred}{Obs}\right\rvert\cdot 100$
Normalized Daily-Max Gross Error Paired	Average of the quantity: absolute difference in daily maximum observed value and the corresponding predicted concentration at the hour that the observational maximum was reached normalized by the observed daily maximum concentration $NormGrossError = \frac{1}{N}\sum\left\lvert\frac{Obs-Pred}{Obs}\right\rvert\cdot 100$
Peak Prediction Accuracy Unpaired	Difference in the maximum of the observed daily maximum and the maximum of the predicted daily maximum normalized by the maximum of the observed daily maximum $PPA = \frac{(maximum(Pred)-\mathrm{maximum}\ (Obs))}{\mathrm{maximum}(Pred)}$ Predicted concentrations are extracted from model output in the grid cell that each monitoring station resides.

The modeling results for Ventura County are based on modeling performed by the South Coast AQMD as part of its 2022 South Coast AQMD Air Quality Management Plan.[1] Modeling protocol and detailed modeling approach are available in Appendix V of the 2022 South Coast AQMP. We evaluated the base year average regional model performance for maximum daily average 8-hour (MDA8)

[1] http://www.aqmd.gov/2022aqmp

ozone during May through September 2018 for days when Ventura County maximum 8-hour ozone levels were 60 parts per billion (ppb) or higher. Ozone performance criteria are presented in Table 1. Only stations with more than 74.5% of the hourly measurements during each month of the ozone season were included in the analysis based on EPA's data completeness requirement. These stations include Thousand Oaks, Piru, Ojai, Simi Valley, and El Rio.

TABLE 1

2018 BASE YEAR MDA8 OZONE PERFORMANCE FOR DAYS WHEN REGIONAL 8-HOUR MAXIMUM ≥ 60 PPB

Month	Number of Days with regional MDA8 >= 60 ppb	Number of Data Points	MDA8 Mean Pred. Unpaired [ppb]	MDA8 Mean Pred. Paired [ppb]	MDA8 Mean Obs. [ppb]	MDA8 Bias Err. Unpaired [ppb]	MDA8 Bias Err. Paired [ppb]	MDA8 Gross Err. Unpaired [ppb]	MDA8 Gross Err. Paired [ppb]	Norm MDA8 Bias Err. Unpaired [%]	Norm MDA8 Bias Err. Paired [%]	Norm MDA8 Gross Err. Unpaired [%]	Norm MDA8 Gross Err. Paired [%]	Peak Prediction Accuracy Unpaired [%]
May	4	25	60.5	60.1	56.4	4.1	3.7	5.6	5.6	8.0	7.4	10.7	10.7	15.4
Jun	11	58	62.0	61.7	55.9	6.1	5.7	7.6	7.6	12.1	11.4	14.5	14.4	6.3
Jul	11	59	60.3	59.8	57.2	3.2	2.6	7.3	6.9	8.3	7.3	14.4	13.6	1.2
Aug	9	65	56.2	55.7	55.8	0.4	-0.1	5.9	6.0	3.0	2.1	10.8	10.8	-19.5
Sep	14	74	61.7	61.3	57.1	4.6	4.1	7.0	6.9	9.3	8.5	13.1	13.0	1.3

Since ozone standards are based on the daily maximum ozone values, model prediction of higher concentrations is more consequential. Figure 1 illustrates the model performance of MDA8 ozone. MDA8 ozone values are slightly over-predicted, but most of the data lie within 10 percent of the measured values. The "unpaired" MDA8 bias error metric indicates that the model is positively biased (i.e., over-predicts ozone) with bias error values of 3.9 ppb, 6.1 ppb, 2.8 ppb, and 4.4 ppb during May, June, July, and September, respectively. In August, however, the model had a slight negative bias (i.e., under-prediction of ozone) of 0.1 ppb. The same trend was observed for the "paired" bias error metric with bias error values of 3.4, 5.7 ppb, 2.2 ppb, -0.5 ppb, and 4.1 ppb during May, June, July, August, and September, respectively.

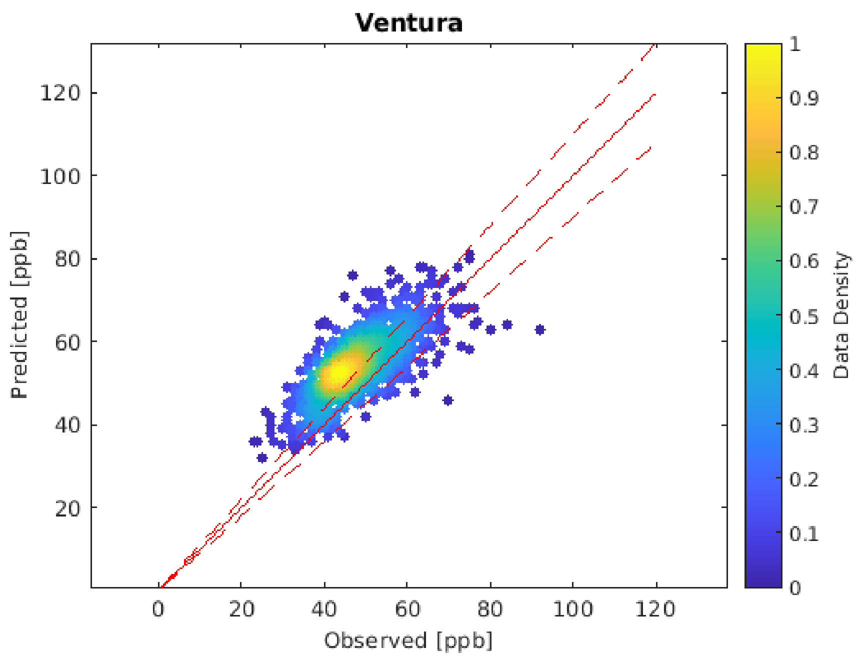

Figure 1: Density scatter plot of 8-hour maximum daily 8-hour (MDA8) ozone values in Ventura County. Dashed lines indicate the bounds of 10% agreement.

Figures 2-6 include model performance scatter plots of 2018 MDA8 ozone predictions versus observations color-coded by weekends versus weekdays; both the MDA8 data points and a generalized linear model fit (blue and green lines) with 95 percent confidence interval (shaded area) along with 1:1 line (red line) are shown in the scatter plots. Although emissions on weekdays and weekends differ, observed and modeled ozone levels do not show marked differences between weekdays and weekends. The weekday/weekend emission differences were analyzed as a dynamic evaluation, which assesses the model's ability to respond to emission changes. The similar, albeit slightly higher slope on weekends suggests that the model responds well to changes in emissions.

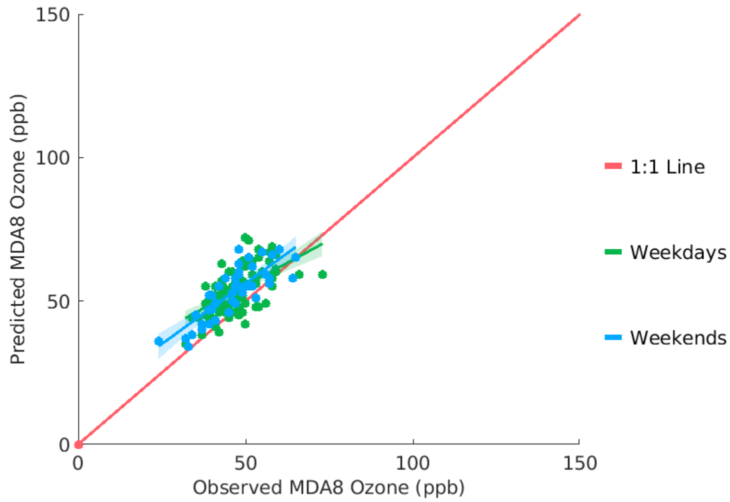

Figure 2: Eight-hour ozone daily maxima model performance at Thousand Oaks (s7).

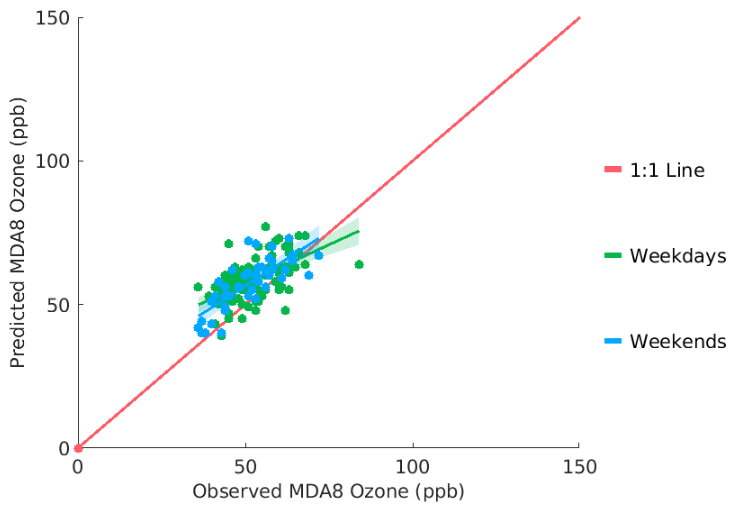

Figure 3: Eight-hour ozone daily maxima model performance at Piru (s9).

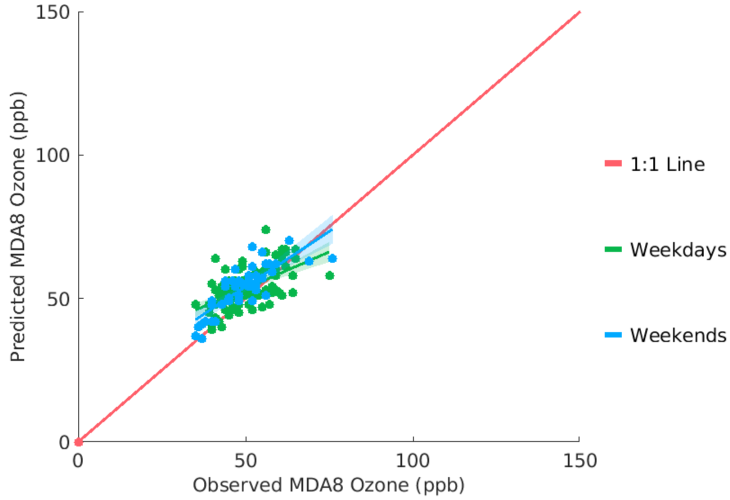

Figure 4: Eight-hour daily maxima model performance at Ojai (s1004).

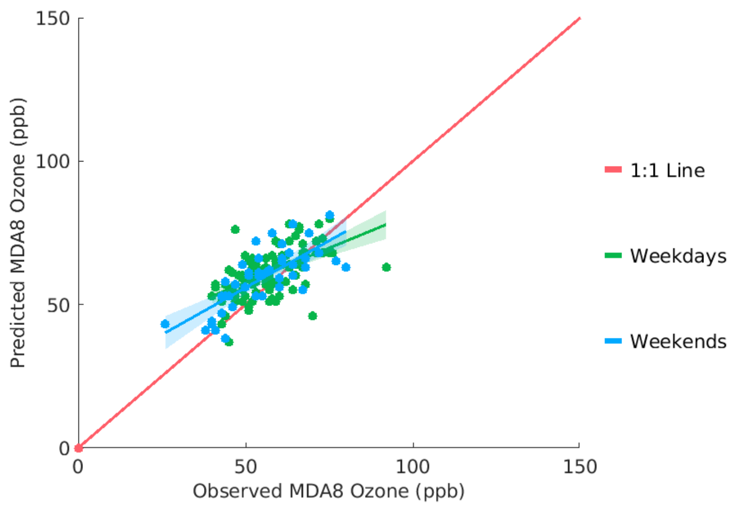

Figure 5: Eight-hour daily maxima model performance at Simi Valley (s2002).

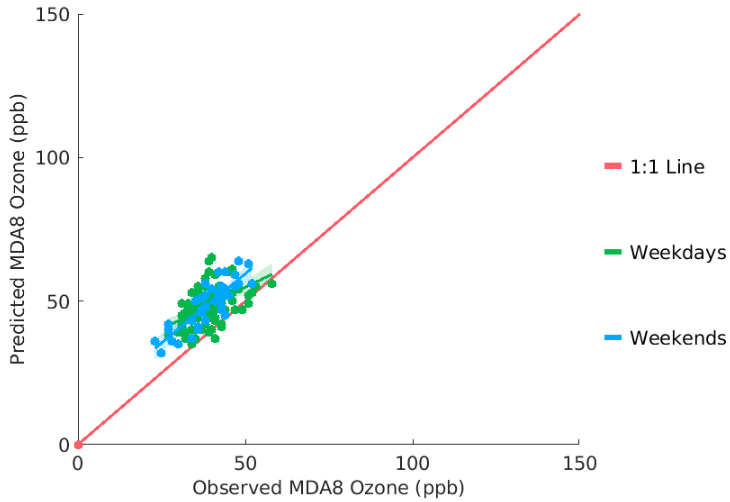

Figure 6: Eight-hour daily maxima model performance at El Rio (s3001).

BASE AND FUTURE YEAR DESIGN VALUES

Table 2 details the base and future year design values for all stations with design values that meet the U.S. EPA's data completeness criteria. The base design value represents the 5-year weighted 8-hour ozone design value for 2018 (average of the 8-hour ozone design values for 2018, 2019 and 2020, excluding the days affected by wildfires[2]). Future design values were determined using comprehensive meteorological and chemical transport modeling and spatially resolved emissions projections following the U.S. EPA guidance.

To bridge the gap between air quality model predictions and measurements, the U.S. EPA recommends the use of relative response factors (RRFs).[3] In this approach, future year concentration predictions require two elements: base year design values and RRFs. The RRF is a ratio of the future year predicted air quality to the simulated air quality in the base year, representing the model-predicted change in air quality in response to projected emissions changes. Future year concentrations are estimated by multiplying the non-dimensional RRF by the base year design value, thus applying the model-predicted change in air quality directly to the measured concentrations in the base year. Assuming any potential modeling biases are similar in the base and future years, the RRF approach acts to minimize their impact on predictions. Details are documented in Appendix V of South Coast AQMD's Revised Draft 2022 AQMP.[4]

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[2] See Appendix H, Attachment 1
[3] https://www.epa.gov/sites/default/files/2020-10/documents/o3-pm-rh-modeling_guidance-2018.pdf
[4] http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2022-air-quality-management-plan/revised-draft-2022-aqmp/revised-draft-2022-aqmp-appendix-v.pdf?sfvrsn=4

Based on the South Coast AQMD's modeling, the baseline 2026 design value in Ventura County is expected to be 70.6 ppb. Ozone design value of 70.9 ppb or lower meets the 70-ppb national ambient air quality standard. The baseline is an emission scenario that reflects adopted federal, state, and local regulations. The control scenario reflects emissions reduction strategy included in the CARB's 2022 State SIP Strategy in addition to the on-going emission reductions reflected in the baseline. The 2026 design value with the control strategy would further lower the design value to 70.3 ppb.

TABLE 2

BASE YEAR AND FUTURE YEAR DESIGN VALUES

Station Name	AQS Station Number	5-year weighted 2018 Design Value	Baseline 2026 Design Value	Control 2026 Design Value
Thousand Oaks-Moorpark Road	061110007	68.3	65.2	65.1
Piru-3301 Pacific Avenue	061110009	71.3	66.7	66.5
Ojai-Ojai Avenue	061111004	68	64.9	64.8
Simi Valley-Cochran Street	061112002	75.7	70.6	70.3
El Rio-Rio Mesa School	061113001	60.7	59.0	58.9

APPENDIX K

VENTURA COUNTY

UNMONITORED AREA ANALYSIS
Prepared by SCAQMD for VCAPCD

Unmonitored Area Analysis

An unmonitored area analysis was conducted to estimate 8-hour ozone design values in unmonitored locations. This analysis uses both the measurement design values and the modelled ozone profiles throughout the modeling domain. Details of this analysis are presented in Appendix 5, Chapter 5 of the 2022 AQMP. The same procedures and methodology were used for the South Coast Air Basin unmonitored area analysis.

Five-year weighted design values were calculated for all monitoring stations within and in the vicinity of the modeling domain for the 2016 to 2020 period. Only stations that met the data completeness requirement for each of the 5 years were included in the analysis. A model gradient adjustment method was implemented to determine base year ozone in unmonitored locations. The adjustment method selected the nearest monitors and calculated the ratio of the top five modeled 8-hour ozone values during July-September at unmonitored and monitored locations. It then multiplied the ratio by the measured design values while applying an inverse distance weight; thus, monitors nearest to the unmonitored location carried the greatest weight. Figure K-1 illustrates the spatial distribution of 8-hour ozone 5-year weighted design values calculated using the model gradient adjustment method. Ventura County APCD provided a custom 5-year weighted 2016-2020 design value of 75.7 ppb for Simi Valley, which discarded days affected by wildfires; all other monitors used design values retrieved through U.S. EPA's Air Quality System.

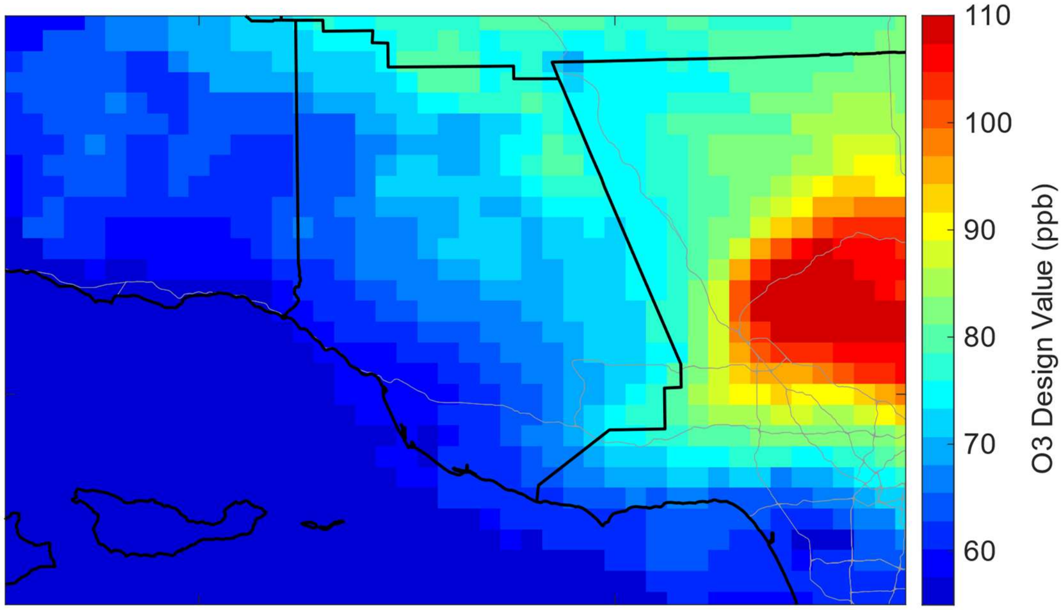

FIGURE K-1: 5-YEAR WEIGHTED 2016-2020 DESIGN VALUES

The relative response factors representing the ratio between the 2026 simulated ozone and the base-year (2018) simulated ozone are presented below in Figure K-2. The 2026 simulation accounted for implementation of the control strategy.

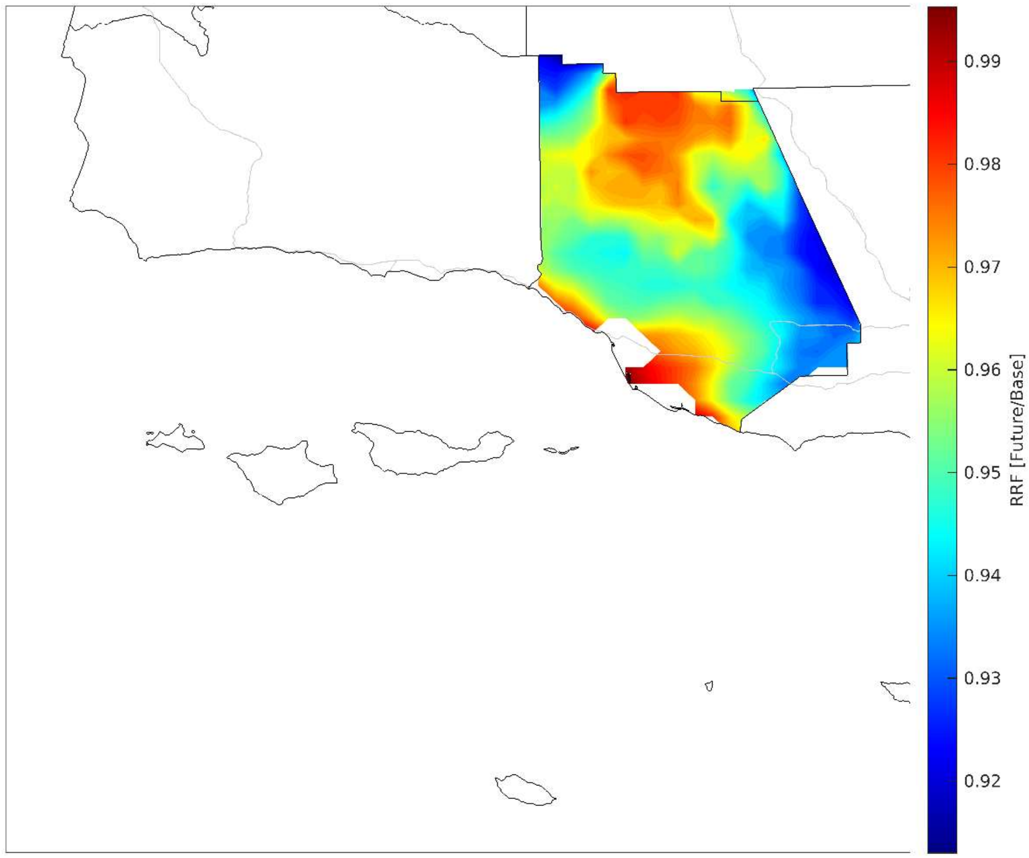

FIGURE K-2: 2026 RRF FIELDS

The relative response factors suggest that ozone will decrease fastest in eastern and northwestern Ventura County, while Coastal Ventura County and northern Ventura County will exhibit the slowest decrease in future ozone concentrations.

The calculated Relative Response Factor (RRF) field is then used to project the interpolated measurement field to simulate future year concentrations. Figure K-3 shows the predicted future ozone concentrations for 2026 in Ventura County.

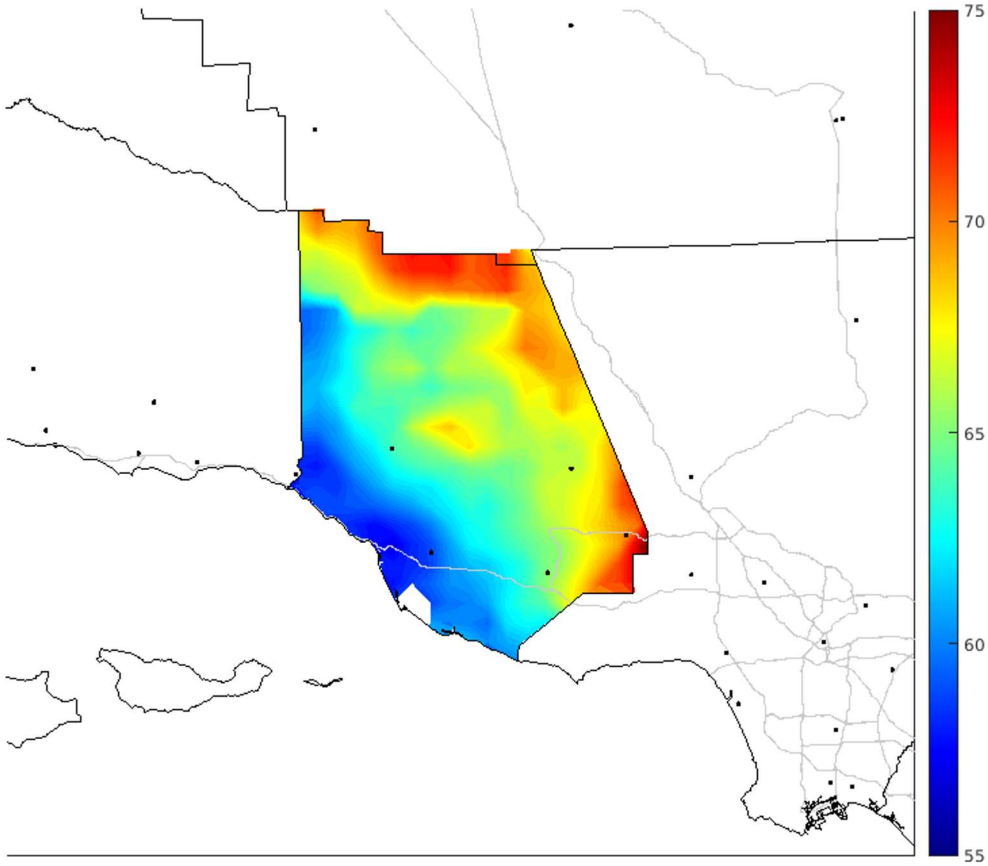

FIGURE K-3: 2026 PREDICTED 8-HR OZONE DESIGN VALUES – MONITORING STATIONS ARE NOTATED WITH BLACK DOTS

Eastern and northern Ventura County are projected to exhibit the highest concentrations. The maximum ozone design value is projected to be 73.8 ppb east of Simi Valley due to the proximity to Reseda and Santa Clarita (91.3 ppb and 100.3 ppb respective 2016-2020 base design values). The method of interpolation places more weight in the stations that are the closest to a given unmonitored area, without necessarily accounting for how atmospheric transport affects ozone distribution. However, for the eastern portion of Ventura observations show that high ozone concentrations occur when air masses are transported from the west, with little influence from winds coming from the South Coast Air Basin. The Ventura Simi Valley station is located approximately 3 miles to the west of the County boundary and is well located to capture the highest ozone concentrations in the southeastern quadrant of the County. Most of the higher concentration modeled area along the Eastern edge of Ventura County between the Simi Valley Station and the County line is mountainous, sparsely populated, and acts as a topographical boundary to unimpeded transport. Thus, there is reason to believe that the interpolation method may be overestimating ozone concentrations in unmonitored areas in the eastern portion of Ventura. Additional discussion on the ozone transport in this area is provided in the next section.

Meanwhile, the exceedances in northern Ventura County cannot be validated due to the lack of regulatory monitors in the area. It may be impractical to place a monitor in this area due to the sparse population and its location in the Los Padres National Forest (see Figure K-4). This area is part of the Transverse Ranges, characterized by rugged terrain with mountain ranges up to 8,000 feet high. It separates the San Joaquin Valley in the north from the southern part of Ventura County. Because of the method of interpolation, concentrations over this northern part of Ventura are heavily impacted by the high concentrations in the southern San Joaquin Valley. The closest station to Northern Ventura is Maricopa, as shown in the ozone pollution roses in Figure K-5, and shows little transport towards Ventura, likely limited by topography. However, the lack of monitors in this remote area does not allow for a sound model evaluation of whether the model captures the transport of high ozone from the north. Thus, predictions for that area can be highly uncertain.

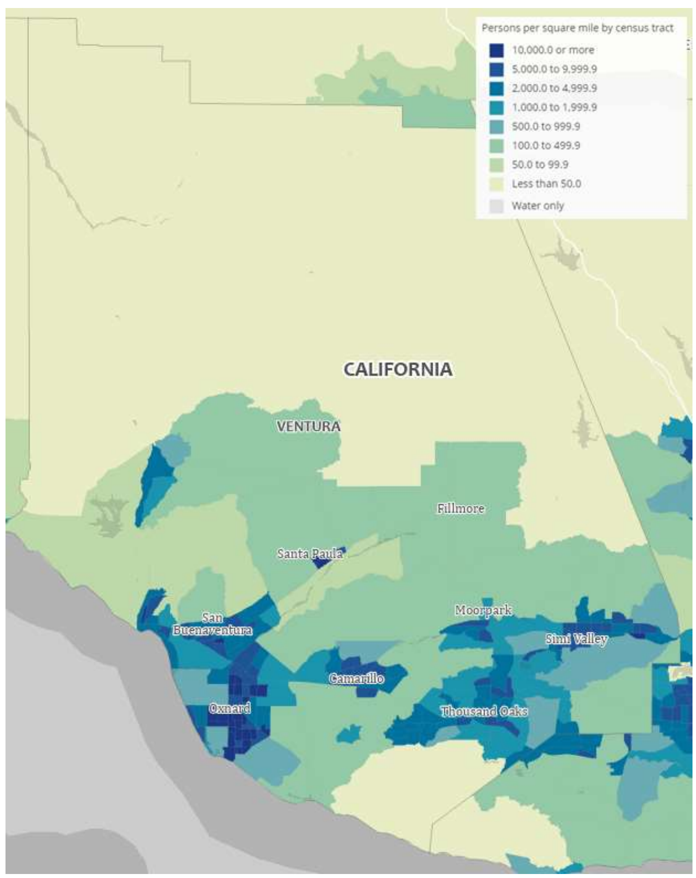

FIGURE K-4: 2020 CENSUS POPULATION BY CENSUS TRACT[1]

[1] Source: 2020 Census Demographic Data Map Viewer

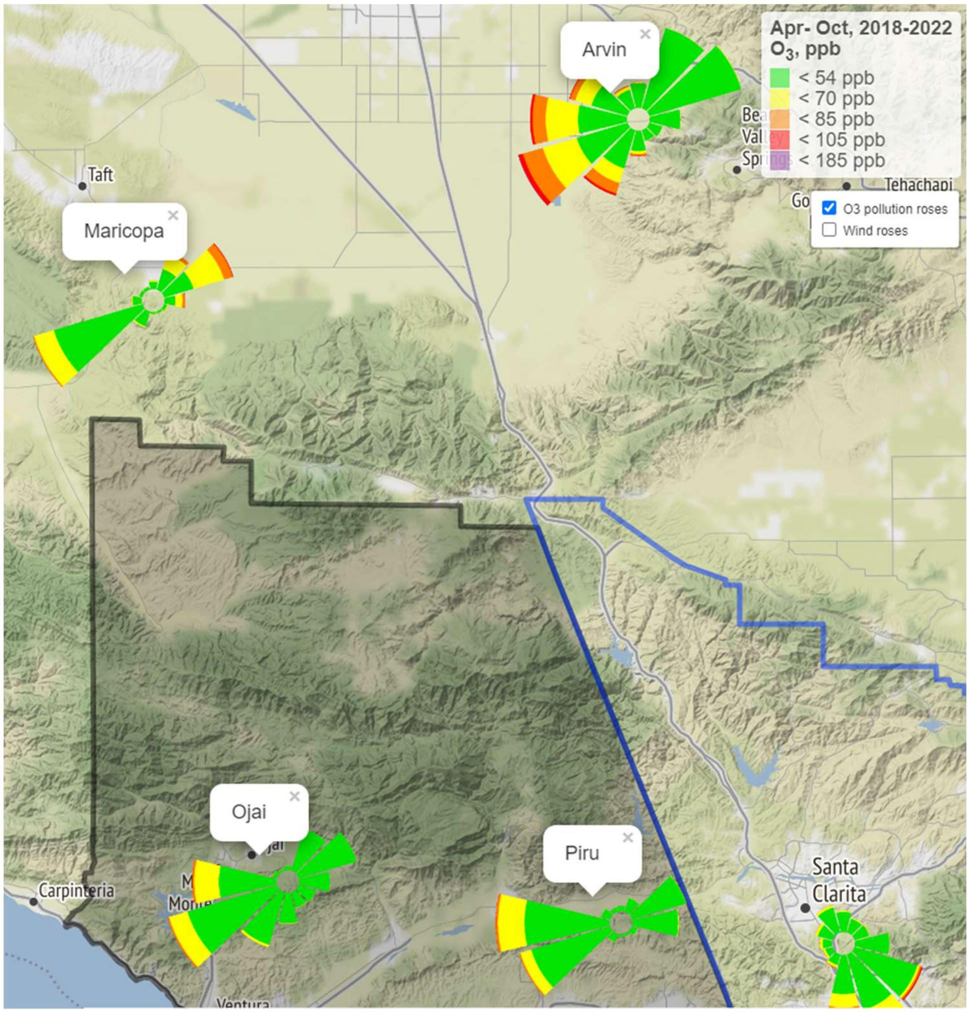

FIGURE K-5: OZONE POLLUTION ROSES IN NORTHERN VENTURA AND KERN COUNTIES, 2018-2022 OZONE SEASONS

In summary, the unmonitored area analysis using modeling projections and observations suggests that the vast majority of Ventura County, including all areas of highest population density, should attain the 2015 ozone standard by 2026. Only some uncertainty remains for remote areas in the northern part of the county. Ventura operates a robust network of 5 Ozone monitoring stations above the minimum monitoring requirements for the County and well distributed across the populated regions within the County.

Ozone transport from Los Angeles to Ventura County

Figure K-6 shows a map of ozone pollution roses at three sites in northern Los Angeles County (North Hollywood, Reseda and Santa Clarita), and two in Ventura County (Piru and Simi Valley). Five years of ozone data (April to October in each of 2018- 2022) were used to construct these roses, with winds recorded on-site. The highest ozone levels in LA County occur during southerly and southeasterly winds when precursors from Los Angeles and its suburbs are transported to the northern areas of the county. However, the terrain surrounding the Santa Clarita valley does not appear to allow the ozone plume to travel much further north or towards the west. East winds at Piru are not associated with ozone levels higher than 54 ppb.

East winds at Simi Valley are only seldom (2.1% of the time) associated with ozone over 54 ppb. Some ozone from the San Fernando Valley could potentially get transported westward over Santa Susana Pass and impact Simi Valley. However, this contribution is dwarfed by ozone during periods of west winds, when LA county could not possibly contribute ozone precursors to Simi Valley.

Figure K-7 shows the mean diurnal ozone time series at the same sites. The Ventura County sites not only have lower maxima but they peak at 11AM- noon. LA County sites peak a few hours later, suggesting that ozone which continues to form at the latter sites is not transported to Ventura County.

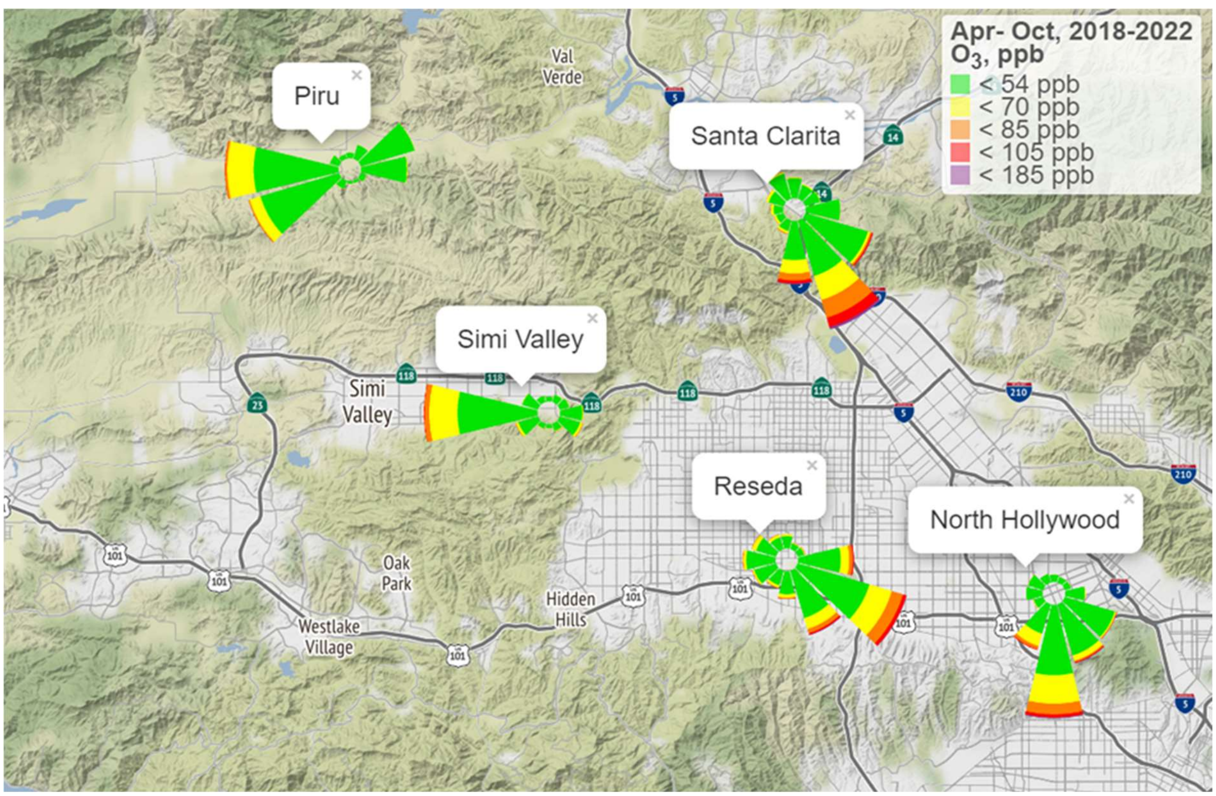

FIGURE K-6: OZONE POLLUTION ROSES IN NORTHERN LOS ANGELES COUNTY AND VENTURA COUNTY, 2018-2022 OZONE SEASONS

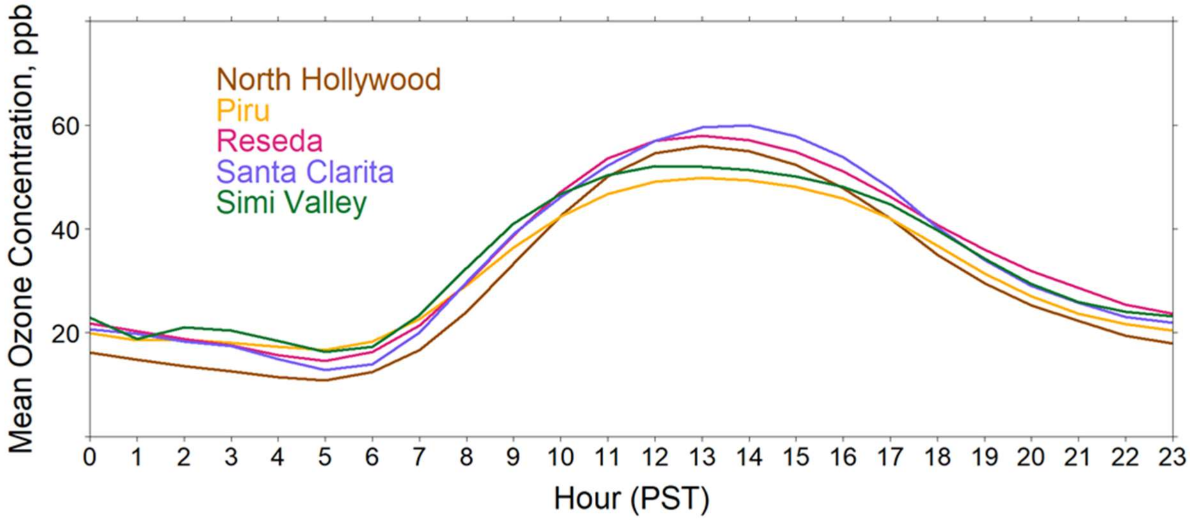

FIGURE K-7: MEAN DIURNAL PROFILES OF OZONE IN NORTHERN LA COUNTY AND VENTURA COUNTY, APRIL- OCTOBER 2018-2022

Ventura County
Air Pollution
Control District

Air Toxics "Hot Spots" Information and Assessment Act (AB 2588)

2022 ANNUAL REPORT

Prepared By: Air Toxics Section
Planning Division

I. Introduction

The Air Toxics "Hot Spots" Information and Assessment Act (the "Hot Spots" Act) was originally adopted in September 1987. Several additions and modifications to the "Hot Spots" Act have been adopted since 1987. This report describes the "Hot Spots" program as it is currently being implemented by the Ventura County Air Pollution Control District (District).

II. Air Toxics "Hot Spots" Program

The primary goals of the Air Toxics "Hot Spots" program is to

1) Collect air toxics emission inventories from facilities subject to the program;
2) Determine if these emissions are causing localized impacts high enough to expose individuals or population groups to significant health risks;
3) Notify nearby individuals or population groups if there are significant health risks; and
4) Require those "high level" facilities to reduce the health risks below the level of significance.

Since adoption of the "Hot Spots" Act in 1987, several methods have been used to select the facilities subject to the program. Those methods can be found in Emission Inventory Criteria and Guidelines for the Air Toxics "Hot Spots" program. The guidelines were amended in August 27, 2007 and can be found at http://www.arb.ca.gov/ab2588/2588guid.htm.

The facilities subject to the program are required to prepare and submit emission inventories. The completed emission inventories are reviewed and approved by the District. After an emission inventory is completed, District staff analyzes the information and prioritize the facilities as having a high, intermediate, or low probability of causing a health risk. During the prioritization analysis, a numerical score is calculated for each facility based on the amount of emissions from the facility, the toxic potency of the emitted compounds, and the distance from the emission point to a receptor.

In February 2015, OEHHA (Office of Environmental Health Hazard Assessment) adopted updated guidelines that the District is required to use for preparing "Hot Spots" health risk assessments. The guidelines were updated in response to the Children's Environmental Health Protection Act of 1999 (H&SC 39606) which required that infants and children be explicitly considered in assessing air toxics risks. Under the updated guidelines, calculated cancer risks may be substantially higher than under the old guidelines. This will likely result in additional health risk assessments being required from facilities. Additional public notification and risk reduction could be required as a result. On November 8, 2016, the procedure used by the District to prioritize facilities was updated to implement the new OEHHA guidelines.

The District uses the table below to assign priority level for facilities subject to AB-2588.

	Prioritization Scores		Health Risk Assessment	
	Cancer Score	Non-Cancer Score	Cancer Risk	Non-Cancer Hazard Index
High Priority	≥10	≥10	≥10	≥1
Intermediate Priority	>1 and <10	>1 and <10	≥1 and <10	≥0.1 and <1
Low Priority	≤1	≤1	<1	<0.1

https://ww3.arb.ca.gov/ab2588/district_levels.htm

Appendix A lists the facilities that are currently in the “Hot Spots” program and the current priority for each facility based on Prioritization Scores.

High priority from prioritization scores requires facilities to prepare a health risk assessment according to methods developed by the OEHHA. The health risk assessments are reviewed and approved by both District staff and OEHHA staff. Facilities are then assigned to the appropriate priority level based on the results from health risk assessments.

Intermediate priority from prioritization scores (Appendix A) or intermediate priority from health risk assessment (Appendix B) are exempt from further program requirements until the next four-year cycle begins. Both Appendix A and B lists the facilities that are currently in the “Hot Spots” program and the current priority for each facility based on the results from prioritization scores and health risk assessments.

For Ventura County, a significant health risk for purposes of providing public notice under the “Hot Spots” program has been defined as a lifetime excess cancer risk of greater than or equal to 10 in a million or an acute or chronic noncancer total hazard index greater than or equal to 1.

Therefore, high priority from Appendix B will require public notification and risk reduction plan. For public notification requirement, the District prepares a letter describing the risk for distribution to affected residents and businesses. The facility may also prepare a letter of its own to include in the notification. Upon request of the letter recipients, the District and the facility will hold a public meeting to respond to public concerns.

Finally, facilities that may pose a significant health risk to nearby residents or workers are required to develop and implement a plan to reduce the health risk below the level of significance. All the facilities in Ventura County that have been determined to create a significant risk through the “Hot Spots” program have reduced the risks to below the significant risk level. Therefore, based on 2016 Annual Report, Ventura County does not have any facility that has been found to have a significant health risk. If there were facilities in the past with significant health risk, those facilities were either shut down (out of business) or due to changes in their operations, they no longer pose any significant risks based on the most recent health risk assessment guidelines.

Low priority from prioritization scores or low priority from health risk assessment are exempt from any further requirements unless new information becomes available that suggests the need for re-evaluation. Facilities that have shut down (out of business) are also exempt from any further requirements. The list below shows facilities that become exempt from any further requirements from “Hot Sports” program.

Fac #	Facility Name	Facility Location	Area	Year	Exempt
65	Ormond Beach Generating Station	6635 S Edison Drive	Oxnard	2019	Prioritization Scores < 1
92	CalMat Company	5596 Bennett Road	Simi Valley	2021	Out of Business
150	Hill Canyon Wastewater Treatment	9600 Santa Rosa Road	Camarillo	2020	Prioritization Scores < 1
152	W.L.Rubottom Company Inc.	320 W Lewis Street	Ventura	2020	Prioritization Scores < 1
310	CalNRG Operating, LLC	3824 Guiberson Road	Piru	2021	Prioritization Scores < 1
392	Joro Inc.	Calumet Canyon Tank Farm	Fillmore	2020	Prioritization Scores < 1
446	Performance Materials Corp.	1150 Calle Suerte	Camarillo	2020	Prioritization Scores < 1
470	Dairy Farmers of America, Inc.	4375 N. Ventura Avenue	Ventura	2020	Prioritization Scores < 1
691	Astrofoam Holdings, LLC	4117 Calle Tesoro	Camarillo	2020	Prioritization Scores < 1
939	Carbon California Company, LLC	W Clark Leases – Timber Canyon	Santa Paula	2020	Prioritization Scores < 1
970	DCOR, LLC	5777 W Pacific Coast Highway	Ventura	2020	Prioritization Scores < 1
1017	Mandalay Onshore Facility	201 N Harbor Blvd.	Oxnard	2020	Prioritization Scores < 1
1030	PRE Resources, LLC	Sespe 14 Tank Battery	Fillmore	2021	Prioritization Scores < 1
1202	Perez Family Cremations	3150 Loma Vista Drive	Ventura	2021	Suspended Operation since 2021
1207	Naval Base Ventura County	San Nicolas Island	San Nicolas Isd	2021	Prioritization Scores < 1
1270	J.M. Smucker Company	800 Commercial Avenue	Oxnard	2021	Prioritization Scores < 1
1321	Cooper Interconnect, Inc.	750 W Ventura Blvd.	Camarillo	2021	Prioritization Scores < 1
1383	Naumann Drill Site	3214 Etting Road	Oxnard	2021	Prioritization Scores < 1
5690	Fleet Ventura	1457 Fleet Avenue	Ventura	2021	Out of Business
5757	Simi Gas	501 Los Angeles Avenue	Simi Valley	2021	Out of Business
7277	Jano Graphics	4893 McGrath Street	Ventura	2021	Out of Business
7299	Wilwood Engineering	4700 Calle Bolero	Camarillo	2021	Prioritization Scores < 1
7515	Southern Counties Oil Company	4480 Dupont Ct.	Ventura	2021	Out of Business
7854	Hill Canyon Wastewater Treatment	9600 Santa Rosa Road	Camarillo	2020	Prioritization Scores < 1
7891	McGrath Peaker Generating Station	251 N Harbor Blvd.	Oxnard	2020	Prioritization Scores < 1
8363	Technicolor Home Entertainment	3601 Calle Tecate Suite 120	Camarillo	2018	Prioritization Scores < 1

III. Industrywide Facilities

In addition to the procedures described above that apply to individual facilities, the District staff is responsible for analyzing the potential health risk posed by certain classes of smaller facilities that are called "industrywide" facilities. Facilities that are included in industrywide assessments by the District are autobody shops, retail gasoline stations and gasoline bulk plants, dry cleaners using perchloroethylene, and furniture strippers using methylene chloride. Industrywide facilities are prioritized same as District's core facilities. The District has been prioritizing gasoline stations, gasoline bulk plants, and autobody shops using statewide guidelines. These types of facilities may potentially pose significant health risks to surrounding community.

Perchloroethylene (Perc) Dry Cleaners

In 1991, California Air Resources Board (ARB) identified Perchloroethylene (Perc) as a toxic air contaminant (TAC). As a result, many perchloroethylene (perc) dry cleaning facilities could pose significant risks to surrounding community in Ventura County. Therefore, on October 14, 1993, ARB adopted ATCM for Emissions of Perchloroethylene from Dry Cleaning Operations to reduce emissions of perchloroethylene from dry cleaning facilities. On January 25, 2007, the ATCM was amended to phase out the use of Perc dry cleaning machines and related equipment entirely by January 1, 2023. Because of that amendment, drycleaners located in Ventura County began to stop using Perc dry cleaning machines and related equipment at their operations. In 2019, the last Perc dry cleaner in Ventura County removed their Perc dry cleaning machines. As a result, non-perc drycleaners are exempt from AB-2588 requirements – Appendix E of Emission Inventory Criteria and Guidelines.

Gasoline Dispensing Facilities and Gasoline Bulk Plants

In 1997, CAPCOA (California Air Pollution Control Officers Association) developed Gasoline Service Station Industrywide Risk Assessment Guidelines to provide procedures for preparing gasoline station emissions inventories and risk assessments to meet the requirements of AB-2588. However, as mentioned above, 2015 OEHHA guidelines typically result~~s~~ in higher cancer risks compared to using the old guidelines. In February 2022, California Air Resources Board (ARB) published an updated Gasoline Service Station Industrywide Risk Assessment Guidance (Guidance). The Guidance provides an updated emission factors to the 1997 CAPCOA Gasoline Service Station Industrywide Risk Assessment Guidelines. The new Guidance also provides risk assessment screening tools (Look-up Tool and Variable Met Tool) using 2015 OEHHA guidelines for preparing gas station emission inventories and risk assessments to meet the requirements of individual facilities subject to AB-2588.

The District utilized 2022 ARB's risk assessment screening tool to determine priority levels for179 retail gas stations and 10 gasoline bulk plants located in Ventura County during 2022. Based on screening results, all those facilities have been determined to be low or intermediate priority. The District did not find any high priority retail gas stations or gasoline bulk plants.

Auto Body Shops

In 1996, CAPCOA also developed Auto Body Shop Industrywide Risk Assessment Guidelines to provide air districts guidance in preparing toxic emission inventories and health risk assessments. Again, based on 1996 Auto Body Shop Industrywide Risk Assessment Guidelines and District's 2016 Annual Report, auto body shops located in Ventura County have been determined to be low or intermediate priority. Because of the 2015 OEHHA guidelines, ARB and CAPCOA are also developing the new risk assessment guidance to update 1996 Auto Body Shop Guidelines. Once the guidance is finalized, the District plans to re-prioritize auto body shops.

One reason autobody shops, gasoline stations, and gasoline bulk plants in Ventura County are less than high priority is due to existing District rules. APCD Rule 74.18 requires most automotive painting to be performed in a paint spray booth, requires high transfer efficiency coating application methods to be used, and prohibits use of coatings containing lead or hexavalent chromium from being applied outside a spray booth. Under the California Air Resources Board Air Toxic Control Measure (ATCM) for Emissions of Hexavalent Chromium and Cadmium from Motor Vehicle and Mobile Equipment Coatings, the use of coatings containing hexavalent chromium or cadmium for automotive painting has been prohibited as of December 31, 2003. Additionally, APCD Rule 70 requires gasoline stations to use

Phase I and Phase II vapor recovery systems and requires that vent pipes on gasoline tanks to be equipped with pressure/vacuum (P/V) vent valves. Rule 70 also requires gasoline bulk plants to use CARB certified vapor recovery systems.

No statewide guidelines are being prepared for methylene chloride furniture stripping. There are only two facilities in Ventura County (164 – Lawrence Business Center and 1455 – The Wood Reviver) using methylene chloride. The District developed the methodology to perform the industrywide assessment for furniture strippers by calculating prioritization scores using toxic emission inventories from those facilities. Based on Rule 46 and prioritization scores, those facilities are exempt from AB-2588 program.

The industrywide guidelines documents and corresponding risk assessments will be updated as needed to implement the new OEHHA health risk assessment guidelines.

Appendix C is a list of industrywide facilities and indicates which facilities have been determined to be less than significant risks.

IV. Air Toxics Rules

No specific rules to control emissions of air toxics have been adopted by the District based on the Air Toxics "Hot Spots" data.

ARB uses the Air Toxics "Hot Spots" data in developing air toxic control measures (ATCM) under the Toxic Air Contaminant Identification and Control Program. The US Environmental Protection Agency (US EPA) is also using the toxics emission data in developing Maximum Achievable Control Technology (MACT) standards under Title III of the 1990 Clean Air Act Amendments.

ARB adopted several ATCMs to control emissions of diesel engine exhaust particulate matter (DPM). Data gathered under the "Hot Spots" program was used in the development of the ATCM for stationary diesel engines, which was finalized December 18, 2004. The Air Toxics “Hot Spots” Emission Inventory Criteria and Guidelines Report has been revised to include more diesel engines in the “Hot Spots” program. The additional diesel engines will be included in the “Hot Spots” program after the ATCM is fully implemented.

The District is required under state law to implement and enforce both state ATCMs and federal MACT standards.

AB 2588 Air Toxics "Hot Spots" Program
Priority-Level Facilities (Prioritization Scores)

Fac #	Facility Name	Facility Location	Area	Year	Cancer Score	Noncancer Score	Priority
36	Arcosa LWFP – Frazier Park	17410 E. Lockwood Valley Rd.	Frazier Park	2019	5.4365	4.6270	Intermediate
66	ABA Energy Corp.	Maulhardt Lease	Oxnard	2019	2.1042	1.2319	Intermediate
77	Honor Rancho Wayside Canyon Holding	Oak Park/Big Mountain Leases	Simi Valley	2017	1.4466	0.1286	Intermediate
82	Crimson CA Pipeline – Ventura Harbor	1200 Spinnaker Drive	Ventura	2017	5.413	2.1128	Intermediate
121	Ivy Lawn Memorial Park	5400 Valentine Road	Ventura	2020	3.5155	3.2422	Intermediate
165	City of Simi Valley- Sanitation	600 W. Los Angeles Ave.	Simi Valley	2019	5.4265	0.8259	Intermediate
174	Simi Valley Hospital	2975 N Sycamore Drive	Simi Valley	2022	8.5431	0.0384	Intermediate
330	CalNRG Operating, LLC	Santa Clara/Freidrich Lease	Oxnard	2018	4.0178	0.1567	Intermediate
390	The Termo Company	South Mountain Leases	Somis	2016	7.3643	1.0979	Intermediate
396	CalNRG Operating, LLC	State Lease & Colonia Unit	Oxnard	2017	2.8704	0.091	Intermediate
464	Pentair Water Pool & Spa, Inc.	10951 W. Los Angeles Ave.	Moorpark	2018	2.9789	0.0057	Intermediate
990	Carbon California Company, LLC	Sespe Field Leases	Fillmore	2017	1.8729	0.0800	Intermediate
997	Naval Base Ventura County	Point Mugu Site	Point Mugu	2019	5.4967	1.8664	Intermediate
1006	Naval Base Ventura County	Port Hueneme Site	Port Hueneme	2019	7.523	1.148	Intermediate
1040	Air National Guard – Channel Island	100 Mulcahey Drive	Port Hueneme	2019	3.413	0.0051	Intermediate
1078	Baxalta US Inc.	1700 Rancho Conejo Blvd.	Thousand Oaks	2020	6.55	0.0596	Intermediate
1083	Ventura Harbor Boatyard, Inc.	1415 Spinnaker Drive	Ventura	2019	5.0798	1.7110	Intermediate
1139	Ventura Port District	1603 Anchors Way Drive	Ventura	2020	9.7351	0.0144	Intermediate
1266	Mason Construction Company	Portable Dredge	Ventura	2018	3.5268	0.0052	Intermediate
1267	Trustees of CSU & CSUCI Site Auth.	1947 W. Potrero Road	Camarillo	2017	4.3578	0.9295	Intermediate
1291	Skyworks Solutions, Inc.	2427 W. Hillcrest Drive	Newbury Park	2020	7.7176	2.0004	Intermediate
1296	Quatal Canyon Gypsum Mine	4219 Quatal Canyon Road	Maricopa	2021	1.553	0.6486	Intermediate
1300	PAC Foundries	705 Industrial Avenue	Port Hueneme	2017	1.3408	0.1784	Intermediate
1338	Gillibrand Industrial Sands, Inc.	5810 East Bennett Road	Simi Valley	2020	2.665	0.233	Intermediate
1340	PTI Technologies, Inc.	501 Del Norte Blvd.	Oxnard	2021	7.6199	0.8223	Intermediate
1395	Simi Valley Landfill	2801 Madera Road	Simi Valley	2020	2.4148	0.7292	Intermediate
7340	Toland Road Landfill	3500 Toland Road	Santa Paula	2021	4.0389	0.0233	Intermediate
7528	CSU – Channel Island	One University Drive	Camarillo	2021	2.9128	0.0196	Intermediate
8132	Glass House Camarillo Cultivation	645 W Laguna Road	Camarillo	2021	2.4813	0.1806	Intermediate

AB 2588 Air Toxics "Hot Spots" Program
Priority-Level Facilities (Health Risk Assessments)

Fac #	Facility Name	Facility Location	Area	Year	Cancer Risk	Chronic HI	Acute HI	Priority
4	Carbon California Company, LLC	Ojai Oil Field Leases	Santa Paula	2019	2.5	0.019	0.238	Intermediate
8	CalNRG Operating, LLC	Rincon Area Leases	Ventura	1989	8	0.09	0.2	Intermediate
15	Procter & Gamble Paper Products	800 North Rice Avenue	Oxnard	2019	0.577	0.013	0.126	Intermediate
25	CalMat Co. dba Vulcan Materials	6029 Vineyard Avenue	Oxnard	2019	1.56	0.0175	0.779	Intermediate
41	Aera Energy LLC	3328 N. Ventura Avenue	Ventura	2019	5.95	0.039	0.32	Intermediate
42	CalNRG Operating, LLC	Saticoy Field Leases	Santa Paula	2018	3.11	0.046	0.43	Intermediate
53	CalNRG Operating, LLC	South & West Mountain Lse.	Santa Paula	2019	2.94	0.018	0.165	Intermediate
61	Southern California Gas Co.	1555 North Olive Street	Ventura	2021	0.871	0.0247	0.618	Intermediate
123	Community Memorial Hospital	147 N Brent Street	Ventura	2020	4.676	0.0016	0.0016	Intermediate
143	Ventura County Medical Center	300 Hillmont Avenue	Ventura	2019	8.54	0.003	0.599	Intermediate
157	New-Indy Oxnard, LLC	5936 Perkins Road	Oxnard	2018	0.101	0.002	0.348	Intermediate
214	E.F. Oxnard, LLC	550 Diaz Avenue	Oxnard	2019	4.79	0.004	0.005	Intermediate
820	St. John's Regional Medical Center	1600 N Rose Avenue	Oxnard	2020	4.76	0.0017	0.0021	Intermediate
984	CalNRG Operating, LLC	Bardsdale Field Leases	Fillmore	2018	8.84	0.043	0.398	Intermediate
1137	Oxnard Wastewater Treatment Plant	6001 South Perkins Road	Oxnard	2019	7.14	0.34	0.31	Intermediate
1377	Ventura Wastewater Plant	1400 Spinnaker Drive	Ventura	2019	1.87	0.066	0.6566	Intermediate
1381	Amgen Inc.	One Amgen Center Drive	Thousand Oaks	2020	3.87	0.04	0.309	Intermediate
1425	Cathedral Mortuary Associates	1810 Sunkist Circle – Room 7	Oxnard	2018	0.48	0.057	0.487	Intermediate
7926	Wiefels & Son II, Inc.	3953 Transport Street Unit B	Ventura	2020	0.127	0.095	0.276	Intermediate
8348	Precious Pets Memorial Service	2802 N. Ventura Ave. Unit A	Ventura	2020	3.77	0.109	0.053	Intermediate

Cancer Risk is expressed as excess cancer risk in chances per million.

HI is the hazard index, which is the ratio of the concentration to the reference exposure level.

Health risk assessments have been approved by the District. These results were reviewed by the Cal EPA Office of Environmental Health Hazard Assessment, as applicable.

Air Toxics "Hot Spots" Program (AB 2588)
Retail Gasoline Dispensing Facilities
(Industrywide)

Fac #	Facility Name	Location	Area	Inventory Year	Screened
74	Channel Islands Aviation, Inc.	Camarillo Airport Fuel Farm	Camarillo	2022	Y
75	Western Cardinal Self-Serve	Camarillo Airport	Camarillo	2022	Y
560	Aspen Helicopters, Inc.	Oxnard Airport Fuel Farm	Oxnard	2022	Y
569	Cardlock Fuels System, Inc.	3815 Vineyard Avenue	Oxnard	2022	Y
635	Southern California Edison Co.	3589 Foothill Drive	Thousand Oaks	2022	Y
790	MacValley Oil Company	100 Del Norte Boulevard	Oxnard	2022	Y
858	Southern California Edison Co.	10060 Telegraph Road	Ventura	2022	Y
1132	Santa Paula Airport	28 Wright Taxi	Santa Paula	2022	Y
5252	Speedway No. 43114	4418 E. Central Ave.	Camarillo	2022	Y
5284	Cardlock Fuels System Inc.	75 West Easy Street	Simi Valley	2022	Y
5402	Oxnard Vineyard Chevron	2251 N. Oxnard Blvd.	Oxnard	2022	Y
5403	Westlake Chevron	225 Hampshire Rd.	Thousand Oaks	2022	Y
5408	Wooley Gas Faal Corporation	1060 South J Street	Oxnard	2022	Y
5413	Chevron Stations Inc. #202037	2395 Erringer Road	Simi Valley	2022	Y
5416	Thousand Oaks Chevron	1201 E. Thousand Oaks Blvd.	Thousand Oaks	2022	Y
5418	Jenda, Inc.	3995 Thousand Oaks Blvd.	Westlake Village	2022	Y
5419	Main & Mills Mobil	3500 E. Main St.	Ventura	2022	Y
5430	USA Gasoline #63208	1501 W Gonzales Rd	Oxnard	2022	Y
5434	Tesoro USA #63217	2211 Tapo Street	Simi Valley	2022	Y
5435	USA Gasoline #63211	1715 Thousand Oaks Blvd.	Thousand Oaks	2022	Y
5437	Valero of Santa Paula	145 S. 10th Street	Santa Paula	2022	Y
5439	G&M Oil Co./Chevron #308293	2314 E. Thompson Blvd.	Ventura	2022	Y
5441	USA Gasoline #63216	1356 Erringer Rd	Simi Valley	2022	Y
5442	GSE 76 Ventu Park	575 N. Ventu Park Rd.	Newbury Park	2022	Y
5443	Tesoro USA #63215	706 Los Angeles Ave.	Simi Valley	2022	Y
5445	Oxnard Arco	700 South Oxnard Blvd	Oxnard	2022	Y
5448	Newbury 76	848 Wendy Drive	Newbury Park	2022	Y
5452	Chevron	877 S. Ventura Rd.	Oxnard	2022	Y
5453	Shell #68564	301 W. New Los Angeles Ave.	Moorpark	2022	Y
5455	Borchard Arco AM/PM	2305 Borchard Rd.	Newbury Park	2022	Y

Fac #	Facility Name	Location	Area	Inventory Year	Screened
5457	S&G Energy, Inc.	4735 Pleasant Valley Road	Camarillo	2022	Y
5458	7-Eleven Store #33567	255 N. Carmen Drive	Camarillo	2022	Y
5460	Circle K #2211185	5195 East Cochran Street	Simi Valley	2022	Y
5462	Circle K #2211127	2340 N. Kuehner Drive	Simi Valley	2022	Y
5463	Kam's Canyon Mobil Service Center	2500 Tapo Canyon Road	Simi Valley	2022	Y
5464	Alliance	5803 East Los Angeles Avenue	Simi Valley	2022	Y
5465	1st Noor LLC	1099 East Los Angeles Avenue	Simi Valley	2022	Y
5467	Circle K #2211092	855 North Wendy Drive	Newbury Park	2022	Y
5468	Michael E. Ply Hampshire 76	3102 East Thousand Oaks Blvd.	Thousand Oaks	2022	Y
5472	Las Posas Mobil, Inc.	501 Las Posas Road	Camarillo	2022	Y
5477	H.D.O.C. #106	774 North Ventura Avenue	Ventura	2022	Y
5480	Poole Oil Company	3885 Vineyard Ave.	Oxnard	2022	Y
5485	Arco Facility #83345	650 N. Arneill Road	Camarillo	2022	Y
5491	Valero	2689 N. Moorpark Road	Thousand Oaks	2022	Y
5492	Arco Smog Pros	600 Moorpark Road	Thousand Oaks	2022	Y
5494	Zaitoon Inc.	605 S Mills Road	Ventura	2022	Y
5495	Ventura Valero	11005 Citrus Dr.	Ventura	2022	Y
5497	Saviers 76	3650 Saviers Rd.	Oxnard	2022	Y
5498	RJR Enter. dba Simi Valley Arco	25 W. Tierra Rejada Rd.	Simi Valley	2022	Y
5501	ProGas, Inc. dba Thousand Oaks Arco	2473 Thousand Oaks Blvd.	Thousand Oaks	2022	Y
5502	Valero Corner Station #3751	117 E. Ventura St.	Fillmore	2022	Y
5503	Fred's Gas & Food Mart	3211 Saviers Road	Oxnard	2022	Y
5505	Valero Corner Store #3754	616 E. Ojai Ave.	Ojai	2022	Y
5507	Adolfo Gas & Food	4007 Adolfo Road	Camarillo	2022	Y
5511	Auto Tech Gas Buster Mart	2157 Las Posas Road	Camarillo	2022	Y
5514	Circle K #22111126	942 Westlake Blvd.	Westlake Village	2022	Y
5516	S&G Energy Inc.	445 Ventu Park Road	Newbury Park	2022	Y
5523	USA Gasoline #68224	1640 N. Moorpark Rd.	Thousand Oaks	2022	Y
5526	Shell Camarillo	1604 Ventura Blvd.	Camarillo	2022	Y
5528	Oak View Shell	905 Ventura Ave.	Oak View	2022	Y
5529	A & I Mini Mart & Gas	246 West El Roblar Drive	Ojai	2022	Y
5537	Swank's Chevron	2449 Stearns Street	Simi Valley	2022	Y
5541	Hampshire Road Shell	395 Hampshire Road	Thousand Oaks	2022	Y
5544	Ventura Road Chevron #9-7423	1860 N. Ventura Road	Oxnard	2022	Y
5546	S & S Chevron	2901 Saviers Road	Oxnard	2022	Y
5548	Oxnard EZ Gas	303 N. Oxnard Blvd.	Oxnard	2022	Y

Fac #	Facility Name	Location	Area	Inventory Year	Screened
5558	Shell #68579	1440 Channel Islands Blvd.	Oxnard	2022	Y
5564	Convenience Retailers LLC #5696	1445 W. Channel Islands Blvd.	Oxnard	2022	Y
5568	Nissim Tovim, Inc.	1400 S. Oxnard Blvd.	Oxnard	2022	Y
5584	Lashkari's Service Station	105 North Oxnard Boulevard	Oxnard	2022	Y
5588	Oxnard Ultramar Carwash	655 South Ventura Road	Oxnard	2022	Y
5592	Oxnard Arco AM/PM	1132 S. Oxnard Blvd.	Oxnard	2022	Y
5599	Alliance Station	1861 North Ventura Road	Oxnard	2022	Y
5604	Ventura Co. CI Harbor Fuel Dock	3855 Pelican Way	Oxnard	2022	Y
5611	Thousand Oaks Union 76	2861 Moorpark Rd	Thousand Oaks	2022	Y
5614	TR Oil	3050 E. Thousand Oaks Blvd.	Thousand Oaks	2022	Y
5616	Arneill Chevron	255 Arneill Rd.	Camarillo	2022	Y
5617	Hilu Chevron	522 North Las Posas Road	Camarillo	2022	Y
5623	Rafi’s Chevron #6	1152 Avenida De Los Arboles	Thousand Oaks	2022	Y
5630	Wendy Auto Center Inc.	420 E. Thousand Oaks Blvd.	Thousand Oaks	2022	Y
5631	Rolling Oaks 76	293 S. Moorpark Rd.	Thousand Oaks	2022	Y
5639	Oaks Shell	56 E. Thousand Oaks Blvd.	Thousand Oaks	2022	Y
5643	Dalex Chevron	172 N. Moorpark Rd.	Thousand Oaks	2022	Y
5650	Circle K #2211246	45 N. Reino Road	Newbury Park	2022	Y
5652	Wendy Drive Chevron	2870 Camino Dos Rios	Newbury Park	2022	Y
5656	Borchard Chevron	2290 W. Borchard Rd.	Newbury Park	2022	Y
5665	Arco #42054	2124 East Harbor Blvd.	Ventura	2022	Y
5666	Carmen Auto Center	256 Carmen Dr.	Camarillo	2022	Y
5667	Moorpark Service Inc.	13800 Princeton Ave.	Moorpark	2022	Y
5668	Moorpark Chevron	502 Los Angeles Ave.	Moorpark	2022	Y
5669	USA Gasoline #63207	795 Ventura Avenue	Oak View	2022	Y
5672	California Chevron	507 E Thompson Blvd.	Ventura	2022	Y
5673	Chevron #9-0576	920 S. Seaward Ave.	Ventura	2022	Y
5682	Seaward Inc.	2099 E. Harbor Blvd,	Ventura	2022	Y
5686	Kassra, Inc.	2292 Thompson Blvd.	Ventura	2022	Y
5691	Rafat’s Chevron #5	3477 Telegraph Road	Ventura	2022	Y
5694	Victoria Oil Corp #255523	1121 S. Victoria Ave.	Ventura	2022	Y
5696	Tesoro Shell #68632	7841 Telephone Rd.	Ventura	2022	Y
5699	College Shell	4111 Telegraph Road	Ventura	2022	Y
5700	Victoria Chevron	2199 S. Victoria Avenue	Ventura	2022	Y
5701	Telephone Road Chevron	9460 Telephone Rd.	Ventura	2022	Y
5703	TBA Enterprises, Inc.	7700 Telegraph Rd.	Ventura	2022	Y

Fac #	Facility Name	Location	Area	Inventory Year	Screened
5710	Tesoro USA #68233	1717 S. Victoria Ave.	Ventura	2022	Y
5715	Dave's	1404 Anchors Way	Ventura	2022	Y
5716	Harbor Mobil & Subway	2121 East Harbor Blvd.	Ventura	2022	Y
5719	USA Gasoline #63036	887 North Ventura Avenue	Ventura	2022	Y
5725	Seaward Gas Station & Mini Mart	779 South Seaward	Ventura	2022	Y
5735	Silvas Oil Company, Inc.	50 Julian Street	Ventura	2022	Y
5740	Joe's Gas & Smog	1720 S. Oxnard Blvd.	Oxnard	2022	Y
5743	HDOC #093	3402 Vineyard Avenue	Oxnard	2022	Y
5745	Chevron #9-1024	2568 Sycamore Drive	Simi Valley	2022	Y
5747	Sycamore Shell	2405 N. Sycamore Dr.	Simi Valley	2022	Y
5758	Simi Valley Union 76	2705 Los Angeles Avenue	Simi Valley	2022	Y
5763	Simi Shell Food Mart	1120 Los Angeles Avenue	Simi Valley	2022	Y
5764	Chevron Car Wash	1196 E. Los Angeles Avenue	Simi Valley	2022	Y
5765	USA Gasoline #68135	660 Ventura Street	Fillmore	2022	Y
5766	HD Fuel	2399 Tapo Street	Simi Valley	2022	Y
5767	Chevron #9-7983	704 Ventura Street	Fillmore	2022	Y
5769	Stearns Petroleum, Inc.	2605 Stearns Street	Simi Valley	2022	Y
5770	Shell #68621	2390 Tapo Street	Simi Valley	2022	Y
5782	Anita Spirit	415 E. Thompson Blvd.	Ventura	2022	Y
5785	Fastlane 76	206 East Harvard Blvd.	Santa Paula	2022	Y
5789	ADAR Chevron	983 E. Harvard Blvd.	Santa Paula	2022	Y
5795	Universal Victoria Inc.	2440 S. Victoria Ave.	Ventura	2022	Y
5797	Ventura 76	11008 Citrus Drive	Ventura	2022	Y
5799	USA Gasoline #68189	2651 N. Ventura Rd.	Port Hueneme	2022	Y
5805	Ojai Gas, Inc.	1124 Maricopa Rd.	Ojai	2022	Y
5808	Ojai Chevron #9-0478	360 East Ojai Ave.	Ojai	2022	Y
5812	Tesoro USA #68232	2661 E. Thompson Blvd.	Ventura	2022	Y
5820	Tesoro USA #68182	1790 E. Pleasant Valley Rd.	Oxnard	2022	Y
5862	James E. Clark II Cardlock	18115 East Telegraph Road	Santa Paula	2022	Y
5866	USA Gasoline #68183	5040 Saviers Road	Oxnard	2022	Y
6056	Offshore Gas	1050 S. Ventura Road	Oxnard	2022	Y
6106	Sycamore Union 76	2383 Sycamore Avenue	Simi Valley	2022	Y
6116	USA Gasoline #68174	518 Rancho Conejo Blvd.	Newbury Park	2022	Y
6186	Circle K #01045	11408 Ventura Avenue	Ojai	2022	Y
6192	Proud Auto	4676 Adolfo Road	Camarillo	2022	Y
6196	Stearns Alliance Gas Minimart	2404 Stearns St.	Simi Valley	2022	Y

Fac #	Facility Name	Location	Area	Inventory Year	Screened
6197	Simi Valley Circle K	510 East Los Angeles Ave.	Simi Valley	2022	Y
6203	Circle K #05238	765 W. Harvard Boulevard	Santa Paula	2022	Y
6205	Plaza Food Mart	1695 Royal Avenue	Simi Valley	2022	Y
6228	Johnson Oil Corp.	6762 North Bank Drive	Ventura	2022	Y
6257	Chevron #200209	4870 Santa Rosa Road	Camarillo	2022	Y
6280	Silvas Oil Company, Inc.	2191 North Ventura Avenue	Ventura	2022	Y
6281	Lake Casitas Marina Inc.	11311 Santa Ana Road	Ventura	2022	Y
6282	Saif's Food Mart	423 Ventura Street	Fillmore	2022	Y
6286	Peck Oil Corp.	806 W. Harvard Blvd.	Santa Paula	2022	Y
6287	Auto Fuels, Inc.	2460 Auto Center Drive	Oxnard	2022	Y
6338	Yosemite Shell	2627 Yosemite Avenue	Simi Valley	2022	Y
6342	Moorpark Petroleum	50 W. New Los Angeles Ave.	Moorpark	2022	Y
6347	Market Street Carwash & Gas	4411 Market St.	Ventura	2022	Y
6386	Arco AM/PM	500 Victoria Avenue	Oxnard	2022	Y
6387	Rose Shell	1901 N. Rose Ave.	Oxnard	2022	Y
6389	USA Gasoline #68116	305 Carmen Dr.	Camarillo	2022	Y
6393	Ventura Gas & Mini Mart	2599 East Main St.	Ventura	2022	Y
6397	Tesoro Shell #68511	107 W. Ventura Blvd.	Camarillo	2022	Y
6399	Costco Wholesale Corp. #420	2001 E. Ventura Blvd.	Oxnard	2022	Y
6400	Fillmore Shell Inc.	1107 W. Ventura St.	Fillmore	2022	Y
6401	T. O. Oil, Inc. dba T. O. Chevron	3505 Moorpark Road	Thousand Oaks	2022	Y
6406	Circle K #2209460	2200 N. Rose Ave.	Oxnard	2022	Y
6408	El Rio Vineyard Shell & Foodmart	2778 Vineyard Avenue	Oxnard	2022	Y
6411	Union 76	550 W. Los Angeles Avenue	Moorpark	2022	Y
6413	Costco Wholesale Corp. #128	2660 Park Center Drive	Simi Valley	2022	Y
6414	7-Eleven #33513	903 Ventura St.	Fillmore	2022	Y
6417	Dawson Carwash	2911 Petit St.	Camarillo	2022	Y
6418	Circle K #2709483	490 S. Victoria Ave.	Oxnard	2022	Y
6419	Las Posas Car Wash	100 S. Las Posas Rd.	Camarillo	2022	Y
6422	Chevron SS #20-8020	1900 N. Rose Ave.	Oxnard	2022	Y
6423	Santa Paula Shell	100 S. Hallock Dr.	Santa Paula	2022	Y
6426	Johnson Drive Carwash & Gas	2757 Johnson Dr.	Ventura	2022	Y
6427	Valley Shell	1220 Sycamore Dr	Simi Valley	2022	Y
6429	Arco AM/PM #06516	3907 E. Telegraph Rd.	Piru	2022	Y
6430	Oxnard Service Station LLC	2800 S. Rose Ave.	Oxnard	2022	Y
6431	Golden State Petroleum	55 Hallock Drive	Santa Paula	2022	Y

Fac #	Facility Name	Location	Area	Inventory Year	Screened
6433	7-Eleven #33162	609 Rancho Conejo Blvd.	Thousand Oaks	2022	Y
6434	Del Norte Shell	200 Del Norte Boulevard	Oxnard	2022	Y
6436	7-Eleven #33159	1501 W. 5th Street	Oxnard	2022	Y
6437	Rose & 5th Inc.	501 S. Rose Ave.	Oxnard	2022	Y
6438	Vineyard Mobil	851 E. Vineyard Ave.	Oxnard	2022	Y
6440	7-Eleven Facility #33399	2201 E. Gonzales Rd.	Oxnard	2022	Y
6441	Campus Plaza Shell	6599 Collins Drive	Moorpark	2022	Y
6444	Apro LLC dba United Oil #10	108 Cochran Street	Simi Valley	2022	Y
6448	Lake Piru Recreational Area	4780 Piru Canyon Rd.	Piru	2022	Y
6449	Silvas Oil Company, Inc.	6417 Ventura Blvd.	Ventura	2022	Y
6450	Arco AM/PM	5669 Valentine Rd.	Ventura	2022	Y
6456	Food 4 Less Fuel Center #335	150 W Esplanade Drive	Oxnard	2022	Y
6459	7-Eleven #35660	1369 Erringer Road	Simi Valley	2022	Y
7253	Sun Air Jets LLC	Camarillo Airport Fuel Farm	Camarillo	2022	Y
7296	Western Cardinal, Inc.	Camarillo Airport Fuel Farm	Camarillo	2022	Y
81253	Kroger Camarillo	672 Las Posas Road	Camarillo	2022	Y

Air Toxics "Hot Spots" Program (AB 2588)
Auto Body Shops (Industrywide)

Fac #	Facility Name	Location	Area	Inventory Year	Screened
224	The Body Shop	2463 Tapo Street	Simi Valley		Y
564	Conde's Auto Body & Paint	1221 Commercial Ave.	Oxnard		Y
570	Simi Valley Ford	2440 First Street	Simi Valley		Y
572	Auto Body International	932 E. 5th St.	Oxnard		Y
575	B & B Auto Body	3043 Thousand Oaks Boulevard	Thousand Oaks		Y
576	City Auto Body	765 East Easy Street	Simi Valley		Y
578	Buena Vista Collision Ctr of Ven	3900 Market Street	Ventura		Y
580	Supertech Paint & Body	240 North Ventura Avenue	Ventura		Y
581	Pacific Coast Auto Body Inc.	5162 Goldman Avenue	Moorpark		Y
583	Paradise Chevrolet	6350 Leland Drive	Ventura		Y
586	City Auto Body	2045 Easy Way	Simi Valley		Y
587	Tip Top Body & Paint Shop	145 N. Olive St.	Ventura		Y
589	Premier Coach	3053 Los Feliz Drive	Thousand Oaks		Y
590	Caliber Bodyworks, Inc.	6200 King Street	Ventura		Y

Fac #	Facility Name	Location	Area	Inventory Year	Screened
594	Virgil's Auto Body	3479 Old Conejo Road Unit E11	Newbury Park		Y
597	DJ's Auto Collision Center	1501 South Pine Street	Oxnard		Y
598	Brue's Body Shop	207 Bryant Street	Ojai		Y
599	Jazz Auto Body	1030 Donlon Avenue	Oxnard		Y
601	Ford of Ventura Body Shop	3680 Market Street	Ventura		Y
602	American Collision Center	2957 Los Feliz Drive	Thousand Oaks		Y
603	Kirby Oldsmobile-Jeep/Eagle	6424 Leland Street	Ventura		Y
604	Auto Body Unlimited, Inc.	4610 Los Angeles Ave.	Simi Valley		Y
606	Allen Auto Body Shop, Inc.	3400 Sunset Dr.	Thousand Oaks		Y
607	Conejo Valley Auto Body	102 Cunningham Rd.	Thousand Oaks		Y
609	Kemp Ford	3810 Thousand Oaks Boulevard	Thousand Oaks		Y
613	North Ranch Body Craft & Glass, Inc.	3075 Los Feliz Drive	Thousand Oaks		Y
618	Hub Auto Body	1401 Lirio Avenue	Saticoy		Y
620	Superior Collision Center	2780 W. Wooley Rd.	Oxnard		Y
626	A & G Auto Painter	142 North 11th Street	Santa Paula		Y
631	Harry’s Auto Collision Group	3610 Thousand Oaks Boulevard	Thousand Oaks		Y
638	Caliber Collision Centers	390 E. Easy St.	Simi Valley		Y
657	Star Auto Body, Inc.	1856 Los Angeles Ave.	Simi Valley		Y
666	Tri-County Auto Body & Paint	6353 Ventura Boulevard #36	Ventura		Y
671	Gibbs International Truck Inc.	2201 East Ventura Boulevard	Oxnard		Y
673	Dualans Auto Body	1130 Industrial Avenue	Oxnard		Y
700	Leo's Body Shop	3925 North Ventura Avenue	Ventura		Y
706	GM Celes Body Shop	238 Central Ave.	Fillmore		Y
707	New Image Auto Body	860 Corporation Street	Santa Paula		Y
716	Chuy Auto Body	730 Mercantile St.	Oxnard		Y
717	Aztlan Body Shop	1520 Cypress Street	Oxnard		Y
718	Santa Paula Chevrolet	101 West Harvard Boulevard	Santa Paula		Y
721	Saticoy Auto Body & Truck	1322 Los Angeles Avenue	Saticoy		Y
722	Fender Mender Body Shop	1555 Morse Avenue Units E & F	Ventura		Y
739	Roscoe Morris	1117 E. Main St.	Santa Paula		Y
746	T&S Auto Refinishing	3800 Market Street No. E	Ventura		Y
747	Simi Valley Auto Body	725 East Easy Street	Simi Valley		Y
752	Tony's Body Shop	497 Lambert Street	Oxnard		Y
771	Premier Coach-Camarillo	852 Via Alondra	Camarillo		Y
774	Avenue Body Shop	378 North Ventura Avenue	Ventura		Y
779	New Vehicle Auto Body & Paint	2368 N. Oxnard Blvd. No. 8 & 9	Oxnard		Y

Fac #	Facility Name	Location	Area	Inventory Year	Screened
781	Caliber Collision Center	3169 Los Feliz Drive	Thousand Oaks		Y
784	Affordable Collision Center	4773 Ortega St. No. A	Ventura		Y
789	Eddie’s Auto Body and Paint	1275 S. Oxnard Blvd.	Oxnard		Y
796	Next Auto Body Shop	1378 Los Angeles Ave. E, F & G	Simi Valley		Y
816	Mission Oaks Auto Body	575 South Dawson Drive No. 5	Camarillo		Y
848	Thousand Oaks/Muni Service Ctr	1993 Rancho Conejo Blvd.	Thousand Oaks		Y
859	First Collision Center Inc.	1001 Cochran St.	Simi Valley		Y
879	WWL Vehicle Services Americas, Inc.	5601 South Edison Drive	Oxnard		Y
881	Auto Collision Center, Inc.	299 E. Thousand Oaks Blvd.	Thousand Oaks		Y
1028	Bodytech Ltd.	2920 Seaborg Avenue	Ventura		Y
1043	Oxnard College	4000 S. Rose Ave.	Oxnard		Y
1076	Bump & Shine	1555 Morse Avenue Unit J	Ventura		Y
1084	Bodymaster U.S.A.	6401 Ventura Boulevard	Ventura		Y
1255	Adon’s Autobody and Paint	141 E. Wooley Road	Oxnard		Y
1326	Maaco Auto Painting/Body Works	1571 Goodyear Avenue	Ventura		Y
1365	Star Paint & Body	700 East Fifth Street	Oxnard		Y
1394	World Class Paint & Body	2180 First Street	Simi Valley		Y
1430	New Era Body Shop Inc.	700 Mountain View No. D	Oxnard		Y
1439	GTS Customs	495 E. Easy Street Unit A	Simi Valley		Y
1446	Ocean Body Shop	2500 Channel Drive	Ventura		Y
1459	Ventura RV/Car Connection	1345 N. Oxnard Blvd.	Oxnard		Y
1478	E & I Paint & Body	260 W. Wooley Rd.	Oxnard		Y
1483	Commercial Auto Body Shop	1237 Commercial Avenue	Oxnard		Y
7009	E. J. Harrison & Sons, Inc.	1589 Lirio Avenue	Saticoy		Y
7016	Classic Motor Cars	1000 S. Oxnard Blvd.	Oxnard		Y
7068	High Quality Customs	640 Mountain View Ave. Suite B	Oxnard		Y
7085	Prestige Bodyworks, Inc.	4121 N. South Bank Rd.	Oxnard		Y
7086	G.I. Rubbish Company	195 West Los Angeles Ave.	Simi Valley		Y
7117	MAACO Collision Repair & Auto	1100 Commercial Avenue	Oxnard		Y
7200	Low-Cost Auto Body	1564 Morse Ave., Unit J	Ventura		Y
7245	Coachcraft	302 Orange Grove Avenue	Fillmore		Y
7279	Becker Body Shop	1850 Sunkist Circle #A	Oxnard		Y
7322	Ortega’s Collision Center	1742 Morse Ave.	Ventura		Y
7362	Superior Collision Center	260 Lambert Street - Unit P	Oxnard		Y
7391	Color Kustoms Auto Body	1205 N. Oxnard Blvd.	Oxnard		Y
7401	Alexander Buick GMC	1600 Auto Center Drive	Oxnard		Y

Fac #	Facility Name	Location	Area	Inventory Year	Screened
7407	Global Auto Processing Services, Inc	USN - Patterson Rd. & 32nd Ave.	Port Hueneme		Y
7419	HAH Marine Properties, Inc.	3037 W. 5th St., Unit B	Oxnard		Y
7435	Santos Truck & Auto Repair	3431 Galaxy Place	Oxnard		Y
7443	J & C Auto Body	6680 Crescent St.	Ventura		Y
7469	Camarillo Auto Body	695 Via Alondra	Camarillo		Y
7475	Caliber Collision Centers	3101 Sturgis Rd.	Oxnard		Y
7484	America Antiques & Classics	1519 Palma Drive	Ventura		Y
7593	Timeless Kustoms	2255 E. Pleasant Valley Rd., #H	Camarillo		Y
7612	A & A Auto Collision Center	771 E. Wooley Rd.	Oxnard		Y
7678	Iron Horse Custom Factory	290 Easy St., No. 5	Simi Valley		Y
7806	Saticoy Paint Booth Site #11	11201-A1 Riverbank Dr.	Saticoy		Y
7852	Recon To Go	613 Fitch Ave., Unit #4	Moorpark		Y
7868	Daedalus Auto Body Shop	373 S. Dawson Dr., Unit 4N	Camarillo		Y
7880	212 Body and Restoration	212 Bryant St.	Ojai		Y
7910	Regional Occupational Program	465 Horizon Circle	Camarillo		Y
7944	Campbell’s Custom Paint & Body	619 Finch Ave., #4	Moorpark		Y
7991	Paint by Kevin	339 N. Dawson Dr.	Camarillo		Y
8024	A-1 Truck and Equipment Co.	1588 Los Angeles Ave.	Saticoy		Y
8045	JR Customs	532 S. Dawson Dr., Unit No. 5N	Camarillo		Y
8049	Cal. Body Shop dba Avenue Body Shop	1247 Mercantile Street	Oxnard		Y
8071	SoCal Auto Body	511 Dawson Dr., Unit A	Camarillo		Y
8087	Allen Motors	2594 E. Thousand Oaks Blvd.	Thousand Oaks		Y
8100	Conejo Auto Detail & Window Tinting	3177 E. Thousand Oaks Blvd.	Thousand Oaks		Y
8133	Toy Shop	1355 Lawrence Drive, #202	Newbury Park		Y
8170	Ocean Honda of Ventura Body Shop	6450 Auto Center Drive	Ventura		Y
8182	Auto Image Restorations and Customs	4820 Adohr Lane	Camarillo		Y
8194	Palmer’s Customs Inc.	5395 Kazuko Ct. Unit A	Moorpark		Y