Company: Southern California Gas Company (U 904 G)
Proceeding: 2019 General Rate Case
Application: A.17-10-___
Exhibit: SCG-10-R

REVISED

SOCALGAS

DIRECT TESTIMONY OF NEIL P. NAVIN

(UNDERGROUND STORAGE)

December 2017

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

SoCalGas
A Sempra Energy utility®

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SUMMARY

My testimony supports the Test Year (TY) 2019 forecasts for operations and maintenance ("O&M") costs for both shared and non-shared services and capital costs for the forecast years 2017, 2018, and 2019, associated with the Underground Storage area of SoCalGas. My cost forecasts support the Company's goals of maintaining and enhancing public and employee safety, as well as providing reliable supplies of gas for service delivery. Underground Storage's support of SoCalGas' safety, integrity and reliability goals is discussed in greater detail within this testimony. Tables NPN-1 and Table NPN-2 below summarize my sponsored costs.

Table NPN-1
Southern California Gas Company
Underground Storage O&M

UNDERGROUND STORAGE (In 2016 $)			
	2016 Adjusted-Recorded (000s)	TY2019 Estimated (000s)	Change (000s)
Total Non-Shared Services	45,853	59,640	13,787
Total Shared Services (Incurred)	455	434	-21
Total O&M	**46,308**	**60,074**	**13,766**

Table NPN-2
Southern California Gas Company
Underground Storage Capital

UNDERGROUND STORAGE (In 2016 $)				
	2016 Adjusted-Recorded (000s)	**Estimated 2017 (000s)**	**Estimated 2018 (000s)**	**Estimated 2019 (000s)**
Total CAPITAL	**125,411**	**208,535**	**180,646**	**172,606**

Summary of Requests

The funding summarized above and described in my testimony is reasonable and represents the required O&M expenses and capital investments for SoCalGas' underground storage facilities to:

- Maintain the safety, integrity, and effective operations of the natural gas storage system;

- Provide a reliable and economic supply of gas for customers throughout the service territory, especially during periods of high demand;
- Achieve compliance with operating and environmental regulations; and
- Allow gas deliveries to be efficiently balanced throughout the overall transmission and distribution system.

The Underground Storage forecasts in my testimony have been structured to address those costs related to individual organizations that are under the Gas Storage operational umbrella. These functional organizations are: 1) Aboveground Gas Storage (AGS), 2) Underground Storage (UGS), 3) Storage Integrity Management Program (SIMP); and 4) Storage Risk Management (SRM). The descriptions of the organizations are as follows:

1) AGS includes the operation and maintenance of the storage field aboveground assets. These assets include compressors, pipelines, purification, and auxiliary equipment.

2) UGS includes the operation and maintenance of the storage reservoir, and the operation, maintenance and installation of storage field wells.

3) SIMP is a proactive, methodical, and structured integrity management approach to storage facilities that uses state-of-the-art inspection technologies and risk management disciplines to address storage field and well integrity issues.

4) SRM supports above ground monitoring, data management, compliance, and audit support at all the storage fields.

The driving force behind the expenditure plan for UGS is the objective of SoCalGas and its employees to provide safe, reliable deliveries of natural gas to customers at reasonable rates. O&M and capital investments also enhance the efficiency and responsiveness of operations, allow the organization to install and maintain assets, and facilitate compliance with new and emerging governmental regulations.

Currently, the primary, new, and emerging regulations that impact my forecasts include:

- Division of Oil, Gas, and Geothermal Resources (DOGGR) Requirements for California Underground Gas Storage Projects, outlined in 14 California Code of Regulations (CCR) § 1724.9. Gas Storage Projects, and proposed new Article 4. Requirements for Underground Gas Storage Projects DOGGR 14 CCR § 1726 with subsections 1726.1. through 1726.10.

- DOGGR Underground Injection Control (UIC) guidelines as outlined in DOGGR 14 CCR § 1724.6. Approval of Underground Injection Projects, is currently undergoing revision.
- U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) Underground Natural Gas Storage (UGS) regulations 49 Code of Federal Regulations (CFR) §192.12 (Interim Final Rule or IFR).[1]
- California Senate Bill (SB) 887 (Pavley) Natural Gas Storage Facility Monitoring.
- California Air Resources Board (CARB) Oil and Gas Regulation, proposed regulation for greenhouse gas emission standards for crude oil and natural gas facilities.

The above regulations are discussed further throughout my testimony.

The Underground Storage forecasts were developed as follows:

- The routine[2] O&M labor forecasts, AGS and UGS, were established using a 5-year trend.
- The routine O&M non-labor forecasts, AGS and UGS, were established using a base year recorded with additional incremental costs.
- The O&M forecasts for non-refundable SRM, and refundable SIMP, were established using a zero-based approach. In workpapers, SIMP projects are identified RSIMP –(Refundable Storage Integrity Management Program) (RSIMP), and the balancing account is identified as SIMPBA.
- All capital forecasts, AGS, UGS and SIMP, were established using a zero-based approach.

Additional detail on the selected forecast method is discussed in greater detail below.

To better understand the TY 2019 forecasts, the following factors should be considered:

- Storage facilities consist of large, complex, and interconnected industrial equipment. The increasing volume, frequency, and complexity of above-ground and below-ground maintenance work and the difficulty in procurement or

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[1] See also 81 Fed. Reg. 91860, 91871-73 (adding §192.12). The IFR makes changes to sections: §§191.1, 191.3, 191.15, 191.17. 191.21, 191.22, 191.23, 192.3, 192.7, and adopts American Petroleum Institute (API) Recommended Practices 1170 and 1171.

[2] Routine O&M excludes the refundable balancing account and non-refundable SRM.

reproduction of replacement components for older assets exposed to demanding field conditions, all continue to place upward pressure on operating costs.

- Costs for storage activities have been increasing in support of safety, system integrity, maintenance, reliability, deliverability, and regulatory compliance objectives. SoCalGas has proposed safety enhancements such as new operating functions and work efforts, in compliance with new and emerging regulations. As a result, it is difficult to single out primary contributors for the increasing AGS and UGS O&M trend.
- The increasing requirements due to new and proposed regulations and regulatory fees are reflected in the base-year AGS and UGS O&M non-labor forecasts.
- O&M forecasts also included reductions associated with the Fueling our Future (FOF) initiative and are shown in Section I.C of this testimony.
- The development of the new SRM department works to reduce uncertainty when failures or preemptive repair situations occur. The associated mitigation costs for such occurrences can vary from year to year. This potential for peaks and valleys in spending trends supports a longer-term (five-year) trending methodology to forecast routine labor O&M costs.
- AGS and UGS capital costs for routine storage functions have been driven by new and proposed regulations. In an effort to address the evolving regulatory requirements, a zero-based methodology was used to forecast costs for capital expenditures.
- Underground storage reservoirs are geological assets where gas injection and withdrawal capabilities can change over time. These changes, which include facility infrastructure updates and storage volume variability due to fluid extraction or intrusion, require ongoing studies and capital investments in new or replacement wells to support storage deliverability rates. The number of new or replacement wells planned, the cost of constructing these assets, along with a historical trend for this particular sub-activity supports a zero-based approach to forecasting the capital costs for new wells.
- SIMP as proposed in the TY 2016 General Rate Case (GRC) does not reflect SIMP implementation in 2016. Pilot work in 2014 and 2015 focused on testing

inspection logs and laying out a new data management plan designed around the volume of data generated from increased logging activity. SIMP in 2016 began work on the storage well baseline mechanical integrity assessments and reflected an accelerated pace (roughly two-fold) of the described TY 2016 activities. 2017 and 2018 forecasts likewise reflect an accelerated pace of work focused on continued baseline mechanical integrity testing and compliance with new and emergency regulations.

- The capital forecasts for TY 2019 SIMP focus on complying with current, proposed, and anticipated regulations and regulatory interpretations. TY 2019 capital workpapers cover well workovers associated with DOGGR's proposed 24-month inspection interval, pilot projects for emerging and expected regulations, and ongoing data management reflecting the increase in data generation from new and proposed regulatory requirements.
- The O&M forecasts for TY 2019 SIMP focus on complying with current, proposed, and anticipated regulations. This includes inspection logging, data management, implementation of regulations and regulatory interpretations, and associated personnel.
- Gas storage regulatory fees for DOGGR have increased and for PHMSA have been imposed. DOGGR fees have increased from $137.35 per well in 2015/2016 to $11,785.32 per well in 2016/2017. In 2015/2016 this equated to $31,040.96 for 226 wells, and in 2016/2017 this equated to $2,074,216.32 for 176 wells. PHMSA extended their jurisdiction effective 2017; the 2016 calendar year fee is $154,083.
- Special Leak Survey cost increased with the new CARB Oil and Gas Regulations 17 CCR §95665. The special leak survey began at Aliso Canyon in 2016 and is forecasted to start at Honor Ranch, La Goleta and Playa del Rey storage fields in 2018.

REVISED SOCALGAS DIRECT TESTIMONY OF NEIL P. NAVIN (UNDERGROUND STORAGE)

I. INTRODUCTION

A. Summary of Gas Storage Costs and Activities

My testimony supports the TY 2019 forecasts for O&M costs for the shared Senior Vice President of Transmission and Storage services, non-shared services, and capital costs for the forecast years 2017, 2018, and 2019, associated with the organization (Underground Storage[3]) for SoCalGas. My cost forecasts support the Company's goals of maintaining and enhancing public and employee safety, as well as providing reliable supplies of gas for service delivery. Underground Storage's support of SoCalGas' safety, integrity and reliability goals is discussed in greater detail within this testimony. Tables NPN-3 and NPN-4 below summarize my sponsored costs.

Table NPN-3
Southern California Gas Company
Test Year 2019 Summary of Total Costs

UNDERGROUND STORAGE (In 2016 $)			
	2016 Adjusted-Recorded (000s)	TY2019 Estimated (000s)	Change (000s)
Total Non-Shared Services	45,853	59,640	13,787
Total Shared Services (Incurred)	455	434	-21
Total O&M	**46,308**	**60,074**	**13,766**

Table NPN-4
Southern California Gas Company
Underground Storage Capital

UNDERGROUND STORAGE (In 2016 $)				
	2016 Adjusted-Recorded (000s)	**Estimated 2017 (000s)**	**Estimated 2018 (000s)**	**Estimated 2019 (000s)**
Total CAPITAL	**125,411**	**208,535**	**180,646**	**172,606**

[3] Underground Storage organization includes AGS, UGS, SRM, and SIMP.

SoCalGas operates four underground storage fields: Aliso Canyon, La Goleta, Honor Rancho, and Playa del Rey. Underground Storage promotes the safety, integrity, design, operations, maintenance, and gas injection/withdrawal activities, along with environmental and regulatory compliance functions, within the four storage fields. The organization plans and constructs the capital investments necessary to provide storage services for SoCalGas customers. The critical goals for storage are safety, integrity, gas availability, and reliability, which are achieved in compliance with governmental regulations.[4]

Gas storage fields can only be constructed in areas with specific underground geologic characteristics, and in proximity to local gas consumers and transmission and distribution pipelines. The geologic conditions of SoCalGas' storage fields, all former hydrocarbon-producing fields, and their location with respect to gas loads make them ideally suited for storage operations within the SoCalGas system. More information about what determines a good storage field is provided in Appendix A: Underground Storage of Natural Gas, and incorporated here by reference.

By their nature, gas storage fields occupy large open areas of land and require the continual installation, maintenance, refurbishment, and replacement of heavy industrial equipment such as engines, compressors, electrical systems, wells and piping, gas processing components, and instrumentation.

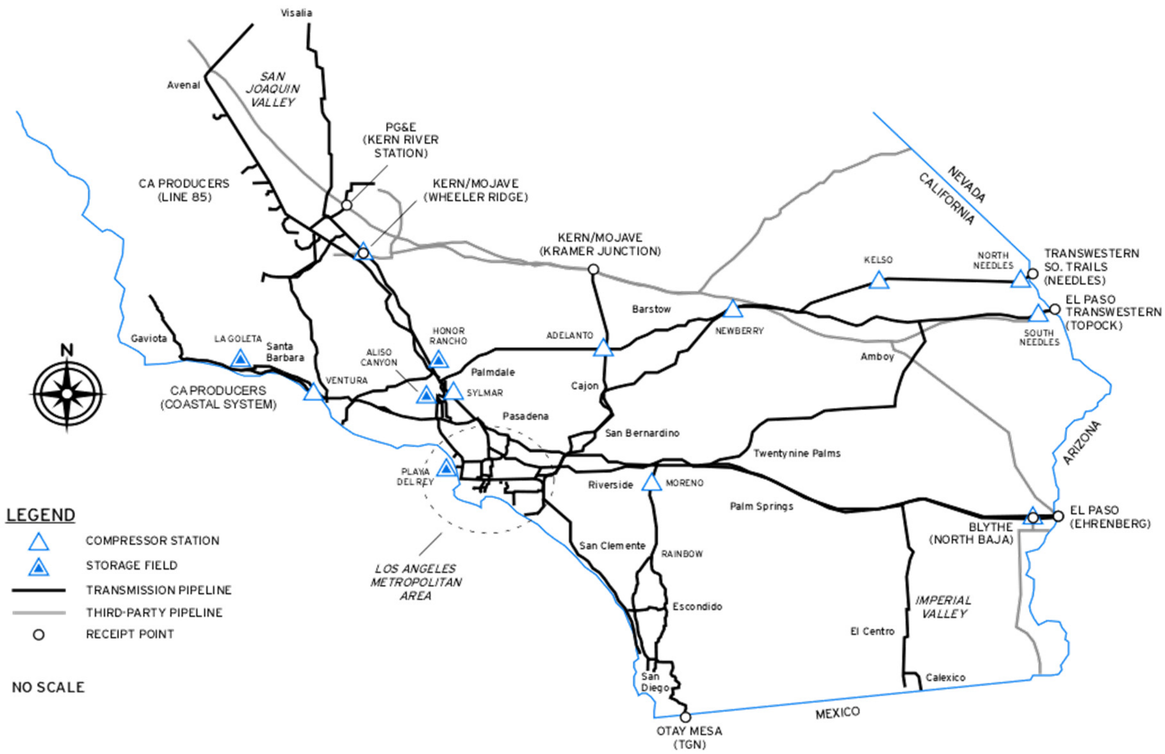
Natural gas is compressed onsite and injected underground into the field reservoirs through piping networks and storage wells, typically during seasonal periods when gas consumption is low and supplies are ample.

Storage gas is typically withdrawn and delivered to customers through SoCalGas's transmission and distribution system when customer demand exceeds flowing gas supplies.

For context, a diagram/map of the SoCalGas/San Diego Gas and Electric (SDG&E) gas transmission system, including the location of the four storage fields is shown in Figure NPN-1 below.

[4] Additional information on storage operations can be found in Appendices A and B.

Figure NPN-1
Southern California Gas Company
SoCalGas and SDG&E
Transmission and Storage System



The four storage facilities are an integrated part of the energy infrastructure required to provide southern California businesses and residents with safe and reliable energy and gas storage services at a reasonable cost.

Aliso Canyon

Aliso Canyon is located in Northern Los Angeles County and is the largest of the four gas storage fields that delivers gas to the Los Angeles pipeline loop. Aliso Canyon historically has a design working capacity of 86 Bcf.[5] Aliso Canyon began storage operations in 1973. Aliso Canyon has 114[6] injection/withdrawal/observation wells and is designed for a maximum withdrawal capability of approximately 1.8 Bcf per day.[7] Within the field, there are approximately 38 miles of gas injection, withdrawal, and liquid-handling pipelines that connect the storage wells to processing and compression facilities.

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[5] Aliso Canyon is currently restricted to a working gas range of 14.8 to 23.6 Bcf, per CPUC July 19th 2017 letter Re: Directive to maintain a range of working gas in the Aliso Canyon gas storage facility.
[6] Some of these wells are currently in the process of being plugged and abandoned.
[7] Withdrawal capacity is dependent on well availability and inventory.

Honor Rancho

Honor Rancho is also located in Northern Los Angeles County, approximately ten miles north of Aliso Canyon, with a design working capacity of approximately 27 Bcf and delivers to the Los Angeles pipeline loop. Honor Rancho began storage operations in 1975. Honor Rancho has 38 injection/withdrawal wells and is designed for a maximum withdrawal capability of 1.0 Bcf per day. Approximately 12 miles of pipelines connect the storage wells to processing and compression facilities.

Playa Del Rey

Playa Del Rey, located in central Los Angeles County, was placed into storage operations in 1942. It has a design working capacity of approximately 2.4 Bcf. Playa Del Rey has 54 injection/withdrawal/observation wells. Approximately 11 miles of pipeline connect the storage wells to processing and compression facilities. Playa Del Rey is designed for a maximum withdrawal capability of 0.4 Bcf per day to meet residential, commercial, and industrial loads throughout the western part of Los Angeles, including oil refineries and power generators.

La Goleta

La Goleta is located in Santa Barbara County and provides service to the northern coastal area of the SoCalGas territory. La Goleta began storage operations in 1941 and has a design working capacity of approximately 21 Bcf. La Goleta has 20 injection/withdrawal/observation wells and is designed for a maximum withdrawal capability of 0.4 Bcf per day. Approximately 8 miles of pipelines connect the storage wells to processing and compression facilities.

B. Summary of Safety and Risk-Related Costs

Certain costs supported in my testimony are driven by activities described in SoCalGas and SDG&E's November 30, 2016 Risk Assessment Mitigation Phase (RAMP) Report.[8]

In the course of preparing the GRC forecasts, the scope, schedule, resource requirements and synergies of RAMP-related projects and programs were evaluated. Therefore, the final representation of RAMP costs may differ from the ranges shown in the original RAMP Report.

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[8] I.16-10-015/I.16-10-016 Risk Assessment and Mitigation Phase Report of San Diego Gas & Electric Company and Southern California Gas Company, November 30, 2016. Please also refer to the Risk Management & Policy testimony of Ms. Diana Day (Ex. SCG/SDG&E-02, Chapter 1) for more details regarding the utilities' RAMP Report.

Table NPN-5 and Table NPN-6 provide a summary of the RAMP-related costs supported by my testimony by RAMP risk:

Table NPN-5
Southern California Gas Company
Summary of RAMP O&M Overlay

UNDERGROUND STORAGE (In 2016 $)			
RAMP Risk Chapter	**2016 Embedded Base Costs (000s)**	**TY2019 Estimated Incremental (000s)**	**Total (000s)**
SCG-4 Catastrophic Damage Involving High-Pressure Pipeline Failure	3,307	0	3,307
SCG-6 Physical Security of Critical Gas Infrastructure	616	687	1,303
SCG-11 Catastrophic Event related to Storage Well Integrity	16,163	6,859	23,022
Total O&M	**20,086**	**7,546**	**27,632**

Table NPN-6
Southern California Gas Company
Summary of RAMP Capital Overlay

UNDERGROUND STORAGE (In 2016 $)			
RAMP Risk Chapter	**2017 Estimated RAMP Total (000s)**	**2018 Estimated RAMP Total (000s)**	**2019 Estimated RAMP Total (000s)**
SCG-9 Climate Change Adaptation	9,400	11,500	2,000
SCG-11 Catastrophic Event related to Storage Well Integrity	134,870	120,495	111,601
Total Capital	**144,270**	**131,995**	**113,601**

SoCalGas' Risk Management and Policy witness, Ms. Diana Day (Exhibit SCG-02/SDG&E-02, Chapter 1), describes how safety and security risks are assessed and factored into cost decisions on an enterprise-wide basis. My testimony includes costs to mitigate Underground Gas System Integrity risks. This includes the implementation of an internal corrosion plan within Storage Operations, putting in place physical security measures to protect our employees and infrastructure, ground stabilization to address potential land movement, and various activities to mitigate the drivers that could lead to storage well integrity events. Specific risks, mitigating measures and associated costs are further discussed in Section II of my testimony.

Work elements are managed daily, based on a variety of risk factors and work drivers, such as federal and state regulatory requirements, customer and pipeline growth expectations, franchise obligations, permitting requirements, and conditions found during inspections. These work elements are prioritized based first on safety and compliance considerations, and then, work is prioritized considering factors such as regulatory compliance deadlines, customer scheduling requirements, and overall infrastructure condition.

C. Summary of Costs Related to Fueling our Future (FOF)

As described in the FOF testimony of Mr. Hal Snyder and Mr. Randall Clark (Ex. SCG/SDG&E-03), the utilities kicked off the FOF initiative in May 2016, to identify and implement operational efficiency improvements. The underground storage costs efficiencies include expanded minimum qualifications, establishing two-year bid restrictions for senior level positions, and replacing some classroom training with on the job training. Table NPN-7 provides a summary of the FOF cost efficiencies described in my testimony:

Table NPN-7
Southern California Gas Company
Summary of FOF Costs

UNDERGROUND STORAGE (In 2016 $)			
FOF O&M	**Estimated 2017 (000s)**	**Estimated 2018 (000s)**	**Estimated 2019 (000s)**
FOF-Ongoing/(Benefits)	-21	-327	-327
Total O&M	**-21**	**-327**	**-327**

D. Summary of Aliso Incident-Related Costs

In compliance with D.16-06-054,[9] the Aliso Incident Expenditure Requirements testimony of Mr. Andrew Steinberg (Exhibit SCG-12) describes the process undertaken so the TY 2019 forecasts do not include the additional costs from the Aliso Canyon Storage Facility gas leak incident (Aliso Incident), and demonstrates that the itemized recorded costs are removed from the historical information used by the impacted GRC witnesses.

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[9] Decision (D).16-06-054 Ordering Paragraph (OP) 12 at 332, Conclusion of Law (COL) 75 at 324.

As a result of removing historical costs related to the Aliso Incident from Gas Storage adjusted recorded data, and in tandem with the forecasting method(s) employed and described herein, additional costs of the Aliso Incident response are not included as a component of my TY 2019 funding request. Historical Gas Storage costs that are related to the Aliso Incident are removed as adjustments in my workpapers (EX-SCG-10-WP) and also identified in Table NPN-8 and Table NPN-9 below.

Table NPN-8
Southern California Gas Company
Summary of O&M Excluded Aliso-Related Costs

UNDERGROUND STORAGE			
Workpaper	**2015 Adjustment (000s)**	**2016 Adjustment (000s)**	**Total (000s)**
2US000.000, Underground Storage	-1,473	-90,019	-91,492
2US002.000, Underground Storage - RSIMP	0	-70	-70
Total Non-Shared	**-1,473**	**-90,089**	**-91,562**
2200-2594.000, VICE PRESIDENT OF TRANSMISSION & STORAGE	0	-3	-3
Total Shared Services	**0**	**-3**	**-3**
Total O&M	**-1,473**	**-90,092**	**-91,565**

Table NPN-9
Southern California Gas Company
Summary of Capital Excluded Aliso-Related Costs

UNDERGROUND STORAGE			
Workpaper	**2015 Adjustment (000s)**	**2016 Adjustment (000s)**	**Total (000s)**
004120.000, GT Stor Wells / Externally Driven	-4,298	6,886	2,588
004190.000, GT Stor Aux Equip & Infrastr / Externally Driven	0	-1,277	-1,277
Total Capital	**-4,298**	**5,609**	**1,311**

Further discussion of the process by which these costs were identified and removed can be found in the testimony of Mr. Steinberg (Exhibit SCG-12).

E. Summary of Aliso Canyon Turbine Replacement Project (ACTR)

As described in the Aliso Canyon Turbine Replacement testimony of Mr. David Buczkowski (Exhibit SCG-11), the Commission's decision D.13-11-023 in 2013 placed a $200.9 million cost cap on the ACTR project. Per the Commission's decision, cost recovery of $200.9 million was to be allowed when the asset was placed in service. The project costs in excess of $200.9 million are being sought through the TY 2019 GRC and are discussed in detail in Mr. Buczkowski's testimony.

F. Summary of Fire Hazard Prevention Memorandum Account (FHPMA)

The Commission issued Order Instituting Rulemaking (OIR) 08-11-005 to develop regulations designed to protect the public from potential hazards, including fires, which may be caused from electric utility transmission or distribution lines or communications infrastructure providers' facilities in proximity to the electric overhead transmission or distribution lines. SoCalGas created the FHPMA to record costs associated with fire hazard prevention activities incurred from 2009-2011, complying with D.09-08-029. In my testimony, I am discussing the details of the activities related to the O&M and capital-related costs recovery requested in the Regulatory Accounts testimony of Ms. Rae Marie Yu (Exhibit SCG-42). As instructed in Phase 2 of the OIR,[10] the recovery of the costs would be requested in future application filings. The cost recovery request seeks the ending balance, including the depreciation, taxes, and returns of the FHPMA activities completed in 2009-2011. The activities included the installation of weather stations, electrical equipment and system upgrades for Red Flag[11]:

- The installation of anaometers (weather station) were completed to monitor conditions for red flag weather conditions.
- Electrical equipment was installed to provide manual capacity shutoff to the field in the event of a red flag shut-in condition notification from Gas Control.
- Electric generators were installed for the continuous operation of vapor recovery equipment during red flag events.

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[10] Ordering paragraph 14 of D.12-01-032

[11] Red Flag declaration conditions are: (1) non-living fuel moisture < 10%, (2) living fuel moisture <75%, (3) relative humidity < 20%, (4) wind speed sustained at or greater than 30mph or 25mph with 55mph gusts, and (5) Red Flag Warning is issued by National Weather Service.

- Inspection and maintenance of high and medium voltage power distribution system.
- Development of Geographic Information System (GIS) based maintenance program.

Below is Table NPN-10 which summarizes the FHPMA related costs:

Table NPN-10
Southern California Gas Company
Summary of FHPMA-Related Costs

Forecasted Balance of FHPMA	Estimated 2018($M)
O&M Expenses	$1.8
Depreciation, taxes and returns	$0.5
Interest	$0.1
Total	$2.4

G. Organization of Testimony

My testimony is organized as follows:

- Introduction;
- Non-shared services costs –Underground Storage, SRM, and SIMP;
- Shared services Costs – Senior Vice President;
- Capital costs; and
- Conclusion.

Workpapers to this testimony are:

- SCG 10-WP, O&M workpapers
- SCG 10-CWP, Capital workpapers

II. RISK ASSESSMENT MITIGATION PHASE AND SAFETY CULTURE

A. Risk Assessment Mitigation Phase

As illustrated in Tables NPN-3 and NPN-4, part of my requested funds is linked to mitigating key safety risks that have been identified in the RAMP Report. These risks are further described in the table below:

Table NPN-11
Southern California Gas Company
Summary of RAMP Risk Chapter Descriptions

SCG-4 Catastrophic Damage Involving High-Pressure Pipeline Failure	This risk relates to the potential public safety and property impacts that may result from the failure of high-pressure pipelines (greater than 60 psi).
SCG-6 Physical Security of Critical Gas Infrastructure	This risk relates to the damage to critical gas infrastructure that can result from intentional acts.
SCG-9 Climate Change Adaptation	This risk involves safety-related threats to gas infrastructure posed by global climate change.
SCG-11 Catastrophic Event related to Storage Well Integrity	This risk relates to potential catastrophic event related to storage well integrity.

In development of this request, priority was given to these key safety risks to determine which currently established risk control measures were important to continue and what incremental efforts were needed to further mitigate these risks. The storage organizations' forecasts were influenced by the ongoing risk mitigation and preventive measures related to the continuous maintenance of storage field wells, pipelines, and equipment.

Identifying projects and programs that help to mitigate these risks manifest themselves in my testimony as adjustments to my forecasted costs. This adjustment process was used to identify both RAMP mitigation costs embedded as part of traditional and historic activities, as well as forecasted RAMP-incremental costs, which are also associated with mitigation strategies and correspond to historic or new activities. These can be found in my workpapers as described below. The general treatment of RAMP forecasting is described in the Risk Management & Policy testimony of Ms. Diana Day (Ex SCG-02/SDG&E-02, Chapter 1) and RAMP to GRC Integration testimony of Ms. Jamie York (Ex. SCG-02/SDG&E-02, Chapter 3).

For each of these risks, an "embedded" 2016 estimated cost-to-mitigate, and any incremental costs expected by the TY 2019 are shown in the following tables. RAMP-related costs are further described in Sections III, IV, and V below as well as in my workpapers. The tables also provide the location in my workpapers where the specific adjustments representing those incremental costs can be found.

Table NPN-12
Southern California Gas Company
Summary of Related O&M RAMP Costs

UNDERGROUND STORAGE (In 2016 $)			
SCG-4 Catastrophic Damage Involving High-Pressure Pipeline Failure	**2016 Embedded Base Costs (000s)**	**TY2019 Estimated Incremental (000s)**	**Total (000s)**
2US000.000, Underground Storage	3,307	0	3,307
Total	**3,307**	**0**	**3,307**
SCG-6 Physical Security of Critical Gas Infrastructure	**2016 Embedded Base Costs (000s)**	**TY2019 Estimated Incremental (000s)**	**Total (000s)**
2US000.000, Underground Storage	616	687	1,303
Total	**616**	**687**	**1,303**
SCG-11 Catastrophic Event related to Storage Well Integrity	**2016 Embedded Base Costs (000s)**	**TY2019 Estimated Incremental (000s)**	**Total (000s)**
2US000.000, Underground Storage	4,112	0	4,112
2US002.000, Underground Storage - RSIMP	12,051	6,859	18,910
Total	**16,163**	**6,859**	**23,022**

Table NPN-13
Southern California Gas Company
Summary of Capital Related RAMP Costs

UNDERGROUND STORAGE (In 2016 $)			
SCG-9 Climate Change Adaptation	**2017 Estimated RAMP Total (000s)**	**2018 Estimated RAMP Total (000s)**	**2019 Estimated RAMP Total (000s)**
00413B.001, RAMP - Base- ALISO PIPE BRIDGE REPLACEMENT	8,000	8,000	0
00419C.001, RAMP - Base - ALISO CANYON-FERNANDO FEE 32 SLOPE STABILITY - 2017	1,000	1,000	1,000
00419F.001, RAMP - Base - PLAYA DEL REY-HILLSIDE SOIL EROSION & SLOPE STABILITY	400	2,500	1,000
Total	**9,400**	**11,500**	**2,000**
SCG-11 Catastrophic Event related to Storage Well Integrity	**2017 Estimated RAMP Total (000s)**	**2018 Estimated RAMP Total (000s)**	**2019 Estimated RAMP Total (000s)**
00412A.001, RAMP - Base - C1 - WELL REPLACEMENTS	4,000	18,000	49,000
00412B.001, RAMP - Base - C2 - WELL PLUG & ABANDON	38,900	23,150	7,250
00412C.001, RAMP - Base - C3 - TUBING UPSIZING	2,680	1,050	0
00412D.001, RAMP - Base - C4 - WELL WORKOVERS	11,969	5,369	969
00412E.001, RAMP - Base - C5 - WELLHEAD REPAIRS AND REPLACMENTS	1,036	556	0
00412G.001, RAMP - Base - C7- WELLS - BLANKET PROJECTS	1,000	1,000	1,000
00441B.001, RAMP Incremental - RSIMP - Plug and Abandonment of Wells	3,800	1,900	0
00441C.001, RAMP Incremental - RSIMP - Inspection/Return to Operation	68,905	68,120	46,232
00441D.001, RAMP Incremental - RSIMP - Data Management	2,580	1,350	650
00441E.001, RAMP Incremental - RSIMP - Emerging Monitoring Integrity and Safety Technology Pilot	0	0	5,000
00441G.001, RAMP Incremental - RSIMP - Cathodic Protection	0	0	1,500
Total	**134,870**	**120,495**	**111,601**

As the tables demonstrate, the RAMP risk mitigation efforts are associated with specific programs or projects. For each of these mitigation efforts, an evaluation was made to determine the portion, if any, that was already being performed in our historical activities. A determination was also made of the portion that may be accommodated within a particular forecasting methodology such as averaging or trending, as well as the portion, if any, that represents a true incremental cost increase or decrease from that forecasting methodology.

While the starting point for consideration of the risk mitigation effort and cost was the RAMP Report, our evaluation of those efforts continued through the preparation of this GRC request. Changes in scope, schedule, availability of resources, overlaps or synergies of mitigation efforts, and shared costs or benefits were also considered. Therefore, the incremental costs of risk mitigation sponsored in my testimony may differ from those first identified in the RAMP report. Significant changes to those original cost estimates are discussed further in my testimony or workpapers related to that mitigation effort.

My incremental request supports the on-going management of these risks that could pose significant safety, reliability, and/or financial consequences to our customers and employees. The anticipated risk reduction benefits that may be achieved by my incremental ask are summarized below by risk element.

1. Catastrophic Damage Involving High-Pressure Pipeline Failure

My funding request includes risk mitigation efforts, including maintenance of high pressure storage lines, internal corrosion enhancement, and monitoring internal corrosion conditions. These efforts will enhance safety by mitigating risks associated with corrosion (internal, external, and stress corrosion cracking) and equipment failures.

The maintenance activities include performing pipeline patrols, inspections, and maintenance on a regular basis throughout the year. The activities for corrosion control include the installation and maintenance of cathodic protection and monitoring equipment.

2. Physical Security of Critical Gas Infrastructure

My funding request includes risk mitigation efforts for physical security measures put in place to promote the security and safety of employees and infrastructure. Mitigations for this risk include the maintenance and improvement of safety through the implementation of proactive threat identification and mitigation measures; and more effective access control, detection, and interdiction capabilities.

Physical security systems provide protection enhancements to infrastructure to improve access control, intrusion detection, and interdiction capabilities to deter, detect, delay, or prevent undesirable events at Company facilities. The type and extent of security upgrades varies by facility, but several have been completed, including, fences, gates and cameras. In addition to security systems, SoCalGas employs contract security (security guards) to secure and physically protect assets and people.

Alternatives Considered:

Physical security systems (cameras, fences, etc.) and guards may be used as alternatives to each other depending on the facility and the threat. The alternatives are considered for each individual facility and, ultimately, the appropriate option was selected based on facility-specific considerations and cost effectiveness.

3. Climate Change Adaptation

My funding request includes risk mitigation efforts for climate change adaptation for the promotion of safety by making sure pipelines are not impacted by land movement or loss. Areas within the storage fields have been identified as having land movement or loss potential and require attention to avoid impact on existing pipelines. The risk mitigation work includes slope stability and installation of a pipe bridge.

Similar project that mitigate this risk will include, but are not limited to, the following:

a. Identifying emergency replacement pipe and related equipment

b. Increase pipeline patrols

c. Implement satellite monitoring in the areas identified

d. Install strain gauges in area identified

e. Complete road and storm drainage improvements

f. Implement construction storm water management plans

g. Alter or create channel or drainage paths

h. Install protective structural walls or retention ponds

i. Install tie-back systems (soil nails) coupled with shotcrete

j. Install Riprap, shot rock, or vegetation

4. Catastrophic Event Related to Storage Well Integrity

My incremental request includes risk mitigation efforts to mitigate catastrophic events related to storage well integrity. These efforts, as applied to storage well integrity, address risk drivers and potential consequences. The mitigations for this risk include both capital and maintenance well work as well as SIMP well work, consistent with updated, new, and proposed DOGGR and PHMSA regulations. These regulations impact well construction, inspection, maintenance, and abandonment activities.

The maintenance well work consists of O&M costs for salaries and expenses associated with routinely operating storage reservoirs including, but not limited to: operation of wells, well testing and pressure surveys, and wellhead and down-hole activities for contractors that perform subsurface leak surveys on injection/withdrawal facilities. Other activities include patrolling field lines, lubricating valves, cleaning lines, disposing of pipeline drips, injecting corrosion inhibitors, pressure monitors, and maintaining alarms and gauges. Existing maintenance well work monitors, maintains, and validates the continued safety and integrity of the wells.

The capital well work includes: replacing components on existing wells, abandoning existing wells, drilling and completion of replacement wells for the injection and withdrawal of natural gas and reservoir observation purposes. This includes well workover contractors (major well work), drilling contractors, and component materials such as tubing, casing, valves, pumps, and other down-hole equipment. By replacing and upgrading storage assets, the existing capital well work promotes the continued safety and integrity of the wells.

The SIMP activities include conducting a baseline threat identification, risk assessment, inspection and preventative and mitigation measures. This includes, among other things, mechanical integrity testing, installing a new Fence Line Monitoring System that will detect ambient methane levels in the storage field and the surrounding area and, as part of new thermal imaging leak detection requirements, implementation of daily well inspections at underground storage facilities. These activities will enhance the proactive assessment, monitoring, management, planning, repair, and replacement of below-ground infrastructure and enhance the continued safety and integrity of the wells.

A more detailed discussion of the mitigation activities is provided in the subsequent sections of my testimony.

Alternatives Considered:

Two alternative mitigations were considered in addition to the mitigations described previously. The first alternative considered was to complete the SIMP baseline assessments in six years, as opposed to the four-year timeframe of our proposed mitigation. This alternative was not chosen because the new DOGGR regulations and state law includes inspection requirements that would not be met in a six-year timeframe. In contrast, a four-year timeframe will more quickly validate the integrity and safety of the SoCalGas storage facilities. The second alternative considered was to abandon additional wells and drill new wells over a six-year time period, versus the four-year timeframe of our proposed mitigation. This alternative was not chosen because it was determined to be less cost effective at enhancing safety than the proposed mitigation.

B. Safety Culture

SoCalGas' longstanding commitment to safety focuses on three primary areas – (1) employee/contractor safety, (2) customer/public safety, and (3) the safety of our gas delivery systems. This safety focus is embedded in what we do and is the foundation for who we are – from initial employee training, to the installation, operation, and maintenance of our utility infrastructure and to our commitment to provide safe and reliable service to our customers.

An important aspect of a safety culture is that the company's safety goals are carried throughout the organization into each of its various operating and business units. As described earlier in my testimony, the Underground Storage goals of maintaining and enhancing public and employee safety, as well as providing reliable supplies of natural gas, include:

- Maintaining the safety, integrity, and effective operations of the natural gas storage system;
- Providing a reliable and economic supply of gas for customers throughout the service territory, especially during periods of high demand;
- Achieving compliance with operating and environmental regulations; and
- Allowing gas deliveries to be efficiently balanced throughout the overall transmission and distribution system.

The storage organizations' operations and maintenance efforts toward achieving a safety culture include: the identification of risks, the development of mitigation efforts to reduce those risks, incorporation and fulfillment of regulatory compliance efforts, the assignment of specific roles and responsibilities, and the development and activation of emergency response efforts to mitigate those risks. These activities are designed to mitigate a catastrophic event related to storage well integrity.

The Underground Storage area maintains the gas infrastructure related to the above ground and below ground assets for gas storage, such as pressure testing, field patrols, and alarm testing as a few examples. As part of this responsibility, the Underground Storage area recommends maintenance and capital expenditures to operate safely, reliably, and within operations compliance. Examples include:

- SIMP is a proactive, methodical, and structured integrity management approach to storage facilities that uses state-of-the-art inspection technologies and risk management disciplines to address storage field and well integrity issues.
- Proposed safety enhancements such as new operating functions and work efforts, in compliance with new and emerging regulations

Fueling Our Future (FOF) initiative for the Underground Storage area involves efforts to improve and increase the expertise and knowledge of personnel by expanding minimum qualifications, establishing two-year bid restrictions for senior level positions, and replacing some classroom training with on the job training.

Additionally, SoCalGas has policies and protocols in place to respond to any emergency involving its gas storage facilities. The Emergency Operations Center and/or the Electric Distribution Operations Storm Desk activate to monitor and respond to risks on the utility systems.

Finally, part of SoCalGas' commitment to safety is the ongoing. The training and education of its workforce to ensure the safe operations of the gas storage facilities for the benefit of the public as well as the employees. The training and education program includes training in accordance with current PHMSA and DOGGR regulations. This training is an important component of building and maintaining a safety culture as it positively reinforces the correct actions.

III. NON-SHARED COSTS

A. Introduction

"Non-shared services" are activities that are performed by a utility for the utility's benefit. Corporate Center provides certain services to the utilities and to other subsidiaries. For purposes of this GRC, SoCalGas treats costs for services received from Corporate Center as non-shared services costs, consistent with any other outside vendor costs incurred by the utility. Table NPN-13 summarizes the total non-shared O&M forecasts for the listed cost categories.

Table NPN-14
Southern California Gas Company
Non-Shared O&M Summary of Costs

UNDERGROUND STORAGE (In 2016 $)			
Categories of Management	**2016 Adjusted-Recorded (000s)**	**TY2019 Estimated (000s)**	**Change (000s)**
A. Underground Storage and Aboveground Storage	33,323	38,699	5,376
B. Storage Risk Management - Non-Refundable	479	2,031	1,552
C. Underground Storage - RSIMP	12,051	18,910	6,859
Total Non-Shared Services	**45,853**	**59,640**	**13,787**

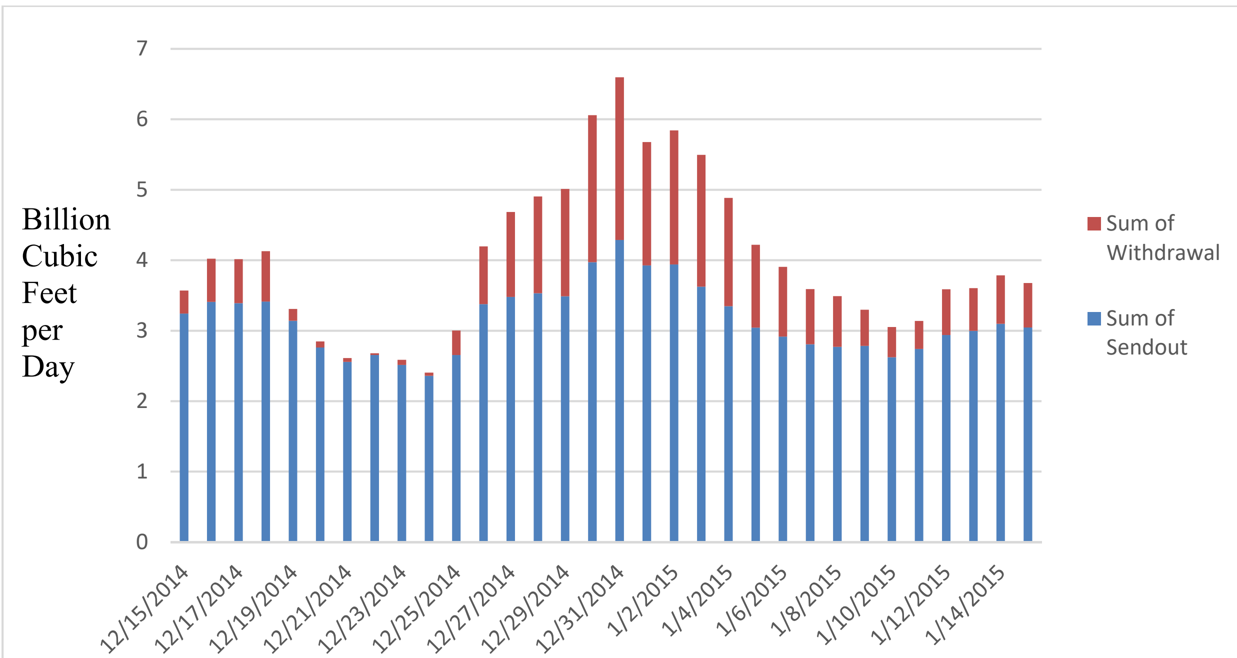
B. Underground Storage – AGS and UGS Routine O&M

1. Description of Costs and Underlying Activities

SoCalGas operates four underground storage fields – Aliso Canyon, Honor Rancho, La Goleta, and Playa del Rey – as an essential part of its integrated transmission pipeline and distribution system. This interconnected system consists of high-pressure pipelines, compressor stations, and underground storage fields, designed to receive natural gas from interstate pipelines and local production sources. The integrated system enables deliveries of natural gas to customers or into storage field reservoirs, depending on system demands. SoCalGas uses its storage assets to efficiently meet gas balancing requirements. To satisfy these needs, the individual storage facilities act as "gas suppliers" or "consumers," depending upon the withdrawal or injection requirements as managed by Gas Control. Fluctuating demands may require storage operations to perform gas injection or withdrawal functions at any hour of the day, 365 days per year. Storage fields are continually staffed with operating crews and on-call personnel to support these critical 24/7 operations.

Figure NPN-2 below illustrates the crucial role of storage in the delivery of reliable gas service for energy consumers within Southern California during the fall and winter heating season.

Figure NPN-2
Southern California Gas Company
System Send-out December 2014 through January 2015



From the bar chart in Figure NPN-2, it can be observed that SoCalGas underground storage provided approximately 32% of the system send-out, or 12.9 Bcf, for a seven-day period beginning on December 29, 2014. On December 31, 2014, storage actually delivered 2.31 Bcf or 35% of the gas consumed by residential, commercial and industrial customers on this cold day. Had underground storage not been available, curtailments may have occurred. Therefore, having underground storage is critical to Southern California's energy reliability.

The reliance and dependency on underground storage to instantly supply the SoCalGas system with such volumes of gas over short period of times due to extreme weather conditions occurring locally or out of state, unforeseen pipeline maintenance, or from the temporary reduction of interstate supplies for other reasons, places demands on the wells, pipelines, and other storage facilities that must support the withdrawal demands. The reliance on the instant availability of storage gas requires continuous maintenance activities and ongoing investments to satisfy customer demands.

Underground Storage is responsible for the operation, maintenance, integrity, and engineering functions associated with the use of facilities within the perimeter of the fields. This responsibility also extends beyond the plant perimeter in some areas, where gas injection and withdrawal pipelines and storage wells exist outside of the main storage field property.

The Underground Storage department presently consists of approximately 310 employees. It is organized with both operational and technical support groups that provide services essential to operating and maintaining the safety, integrity, security, and reliability of its crucial gas delivery assets. While each storage field has its own unique operating conditions and characteristics, there are common support activities performed on a regular basis that make up the bulk of routine expenses presented in this testimony.

In general, the activities are performed in compliance with increasing regulatory requirements that drive the routine O&M costs for Underground Storage. These regulatory requirements include, but are not limited to, the following:

- DOGGR 14 CCR §1726[12] – Requirements for California Underground Gas Storage Projects: The regulations include requirements and standards such as well construction, mechanical integrity testing, risk management, emergency response plans, data management, monitoring and inspecting, wellhead and valve maintenance, and well decommissioning. Appendix B shows a "downhole" schematic and a "wellhead" diagram for illustrative purposes.
- DOGGR 14 CCR §1724[13] – UIC Regulations: The regulation includes requirements and standards addressing: well construction, mechanical integrity testing, monitoring and inspecting, wellhead, additional geologic and reservoir data, and safety precautions.

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[12] DOGGR 14 CCR §1726 exists as discussion draft v2. Current regulation is DOGGR 14 CCR §1724.9.
[13] DOGGR UIC is undergoing revision. Discussion draft v1 was issued in 2016, v2 was issued in 2017.

- SB 887[14] – Natural Gas Storage Facility Monitoring: SB 887 includes requirements for continuous monitoring plan, testing regime, additional reporting, construction standards, risk management plans, training, and mentoring programs.
- U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) recently revised the Federal pipeline safety regulations for the first time to address downhole facilities, including wells, wellbore tubing, and casing.[15]

The activities, which would be impacted by the current and proposed requirements listed above, can be summarized as follows:

Management, Supervision, Training, and Engineering

These activities cover the administrative salaries and engineering costs associated with the operation of the underground storage fields. This includes funding for studies in connection with reservoir operations and wells necessary to maintain the integrity of the storage system. Leadership, safety, technical training, operator qualification, and quality assurance functions are other critical components of this grouping.

Wells and Pipelines

These costs include salaries and expenses associated with routinely operating storage reservoirs such as: operating wells, well testing and pressure surveys, and wellhead and down-hole activities for contractors that perform subsurface leakage surveys on injection/withdrawal facilities. Other expenses include the costs associated with patrolling field lines, lubricating valves, cleaning lines, disposing of pipeline drips, injecting corrosion inhibitors, pressure monitors, and maintaining alarms and gauges.

Equipment Operation and Maintenance

These costs include salaries and expenses for maintenance work performed on gas compressors and other mechanical equipment. The work ranges from the basic repair to a major

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[14] Senate Bill No. 887, Chapter 673, An act to add Chapter 6 (commencing with Section 42710) to Part 4 of Division 26 of the Health and Safety Code, to amend Section 3403.5 of, and to add Article 3.5 (commencing with Section 3180) to Chapter 1 of Division 3 of, the Public Resources Code, and to add Section 1103 to the Public Utilities Code, relating to natural gas. 9/26/2016.

[15] See 81 Fed. Reg. 91860, 91871-73 (adding §192.12 and making changes to 191.1, 191.3, 191.15, 191.17. 191.21, 191.22, 191.23, 192.3)

time consuming overhaul of a compressor engine. Other maintenance functions include: work on measurement and regulating equipment, starting and monitoring engines, lubricating machinery, environmental compliance, checking pressures, work on equipment used for conditioning extracted gas, and wastewater disposal systems. Lastly, this area includes costs for chemicals, consumables, fuel, and electrical power used to operate storage reservoirs and compressors.

Structural Improvements, Rents, and Royalties

These costs include salaries and expenses for maintenance work performed on compressor station structures at underground storage facilities along with property rental costs. Royalty payments associated with gas wells and land acreage located at underground storage properties are also included.

Data and Records Management

These activities are associated with maintaining data and records related to storage assets and operations. Typical types of work performed include: work order authorizations, surveys and documentation of wells, pipelines, topography, roads, rights-of-way, various infrastructure and easements boundary verification, and creation and maintenance of maps related to underground zones/rights. In addition, the work activities related to internal and external audits and data requests are performed.

2. Forecast Method

A five-year trending methodology using 2012 to 2016 adjusted-recorded expenses for AGS and UGS labor was used to forecast the TY 2019 O&M for routine Storage operations, since routine O&M costs have been increasing at a relatively consistent rate. Storage facilities consist of large heavy duty equipment located above and below ground. The volume of maintenance work, along with its complexity and the limited availability of replacement components on equipment such as the compressors, continues to push costs consistently higher on an annual basis.

A base-year with incremental costs methodology using 2016 for AGS and UGS non-labor was used to forecast the TY 2019 O&M. Increasingly stringent regulations, operator qualification requirements, enhanced employee training, chemical consumables, records management functions, DOGGR Gas Storage Assessment Fees and increased audit activities contribute to the upward incremental costs.

3. Cost Drivers

Most increases in AGS and UGS labor costs over the five-year trend period are driven by routine work, the new operating functions to address new and emerging requirements affecting routine O&M, implementation of best practices,[16] special leak survey such as Forward Looking Infrared (FLIR) efforts that are required to safely operate and maintain the infrastructure of the fields, and more frequent and abrupt cycling of storage field equipment to support varying gas demand loads.

Additionally, the ambient air methane monitoring costs for Aliso Canyon, Honor Ranch, La Goleta, and Playa del Rey, in support compliance with new regulations and legislation such as SB887 (Pavley) or CARB O&G rules, contribute to the increase in the labor costs. So that costs included in these GRC forecasts do not include costs stemming from a settlement related to the Aliso Incident, the costs for Aliso Canyon have been prorated for TY 2019 to reflect the O&M costs in 2020 and 2021. The forecasted Aliso Canyon fenceline monitoring O&M costs begin in 2020.

Beginning in 2016, operating expenses have increased because of pipeline integrity inspection requirements, the frequency and depth of regulatory audits and resulting compliance activities, additional focus on employee training and supervisory qualification, increase use of chemical consumables, increased permitting and reporting to regulatory agencies, along with new and existing environmental regulations. Thus, AGS and UGS O&M costs are expected to continue to increase, if not exceed, the annual historical rate of approximately 3.1%.

The incremental increases in AGS and UGS non-labor costs for Storage are driven by new and an increase in regulatory fees and special leak surveys. The DOGGR Gas Storage Assessment Fee regulatory fees have increased from $137.35 per well in 2015/2016 to $11,785.32 per well in 2016/2017. In 2015/2016 this equated to $31,040.96 for 226 wells; in 2016/2017 this equated to $2,074,216.32 for 176 wells. PHSMA has established a new DOT Pipeline User Fee Assessment. It is $154,083 for 2016. The special leak surveys require the use of the thermal imaging technology at all four storage fields. Due to the high volume of work required, this work is completed with use of contractors.

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[16] API Recommended Practice (RP) 1171 Functional Integrity of Natural Gas Storage in Depleted Hydrocarbon Reservoirs and Aquifer Reservoirs (American Petroleum Institute 1st ed. Sept. 2015).

A reduction in operating costs is expected due to the future switchover of the ACTR from the existing natural gas turbine-driven compressors, or TDCs, to electric-driven compressors. As described by Mr. David Buczkowski (Ex. SCG-11), this is anticipated to occur in early 2019 after a successful trial period during which both the existing TDCs and the new electric-drive compressors will be operational. These cost reductions are reflected in Storage O&M and capital requests.

C. Risk Management – Non-Refundable O&M

Table NPN-15
Southern California Gas Company
Non-Refundable Risk Management O&M

UNDERGROUND STORAGE (In 2016 $)			
B. Storage Risk Management – Non-Refundable	**2016 Adjusted-Recorded (000s)**	**TY 2019 Estimated (000s)**	**Change (000s)**
1. Storage Risk Management	479	2,031	1,552
Total	**479**	**2,031**	**1,552**

1. Description of Costs and Underlying Activities

This cost supports the company's goals of safety and compliance. The non-refundable risk management O&M costs are directly related to the supporting of aboveground monitoring, data management, compliance, and audit support at all the storage fields. This group was organized and resourced to address CARB, DOGGR, and PHMSA regulations.

2. Forecast Method

The forecast method developed for this cost category is the base year plus projected incremental costs. This adjusted base year method is most appropriate since the team was largely in place in 2017 and the new regulatory requirements for increase in reporting requirements were effective.

3. Cost Drivers

The cost drivers behind these forecasts are additional regulations from CARB, DOGGR, and PHMSA.

D. Storage Integrity Management Program – O&M

Table NPN-16
Southern California Gas Company
Underground Storage O&M

UNDERGROUND STORAGE (In 2016 $)			
C. Underground Storage - RSIMP	**2016 Adjusted-Recorded (000s)**	**TY 2019 Estimated (000s)**	**Change (000s)**
C. Underground Storage - RSIMP	12,051	18,910	6,859
Underground Storage - RSIMP	**12,051**	**18,910**	**6,859**

1. Description of Costs and Underlying Activities

The Commission approved SoCalGas' SIMP in the TY 2016 General Rate Case, and approved a regulatory balancing account – SIMPBA – to account for SIMP costs.[17] SoCalGas modelled SIMP after elements of the federally mandated transmission integrity management program. In that regard, SoCalGas intended and designed SIMP to provide a proactive, methodical, and structured approach, using state-of-the-art inspection technologies and risk management disciplines to address storage field and well integrity issues. Specifically, SIMP O&M work consists of physical well inspection, risk management, and data management of the activities of the Underground Gas Storage program.

Since the Commission's authorization of SIMP in 2016, SoCalGas has accelerated the pace of SIMP O&M evaluation of the gas storage wells at Aliso Canyon, Honor Rancho, Playa del Rey, and La Goleta gas storage fields. This, in turn, has impacted SIMP costs and is reflected in SoCalGas' SIMP O&M forecasts.

Costs for SIMP work has been balanced and recorded in the SIMP regulatory balancing account and SoCalGas requests that this balancing treatment continue for TY 2019 forecasts. Continuing the balancing account treatment is appropriate to address new, revised, and proposed integrity regulations governing gas storage projects and varying costs stemming from, for example, the variable nature of well inspection strategies and responsive actions. It is not known when regulations in discussion draft will be finalized, and it is not certain that no new regulations will be proposed through the TY 2019 GRC cycle. As referenced in the introduction, DOGGR

[17] D.16-06-054.

has proposed the creation of DOGGR 14 CCR § 1726. Requirements for Underground Gas Storage Projects[18] and issued a discussion draft[19] on DOGGR 14 CCR § 1724.6. Underground Injection Control.

SIMP O&M forecasting therefore assumes discussion draft regulations will be accepted, such as the proposed 2-year (24 month) re-inspection cycle of wells from DOGGR discussion draft Version 2 of DOGGR 14 CCR § 1726. Should a less frequent inspection schedule be adopted in final regulations or on a well by well basis per DOGGR approval (as stated in the discussion draft Version 2 of DOGGR 14 CCR § 1726.6(a)(2)), the balancing account treatment of SIMP allows the re-inspection funds to be returned.

In addition, SoCalGas employees supported by the SIMP balancing account are organized with both operational and technical support groups that provide delivery of services essential to operating and maintaining the safety, integrity, security, and reliability of its crucial gas delivery assets. The SIMP well work team presently consists of approximately 14 full time employees. The SIMP risk and data management teams are forecasted to have approximately 39 employees working primarily on SIMP O&M projects. With limited historical data available for many aspects of SIMP, much of the cost forecasting relies on activity in 2016 and early 2017 and vendor quotes solicited in preparation of enacting projects such as data management.

In general, the activities performed in compliance with increasing regulatory requirements that drive the future O&M costs for SIMP are summarized below, with additional detail in the supplemental workpapers. O&M costs and activities are described in six supplemental workpapers: Personnel, Inspections, Underground Storage Regulatory Implementation, Data Management, Noise and Temperature Logs, and Emerging Regulations. Costs include both labor and non-labor activities:

<u>Personnel</u>

These activities cover the salaries and costs associated with the integrity management, data management, and risk management of the underground storage fields. Leadership, safety, and technical training, are also critical components of this grouping. The estimated costs for personnel is described more fully in the supplemental workpaper 2US002.000 Personnel.

[18] DOGGR has issued a discussion draft of Underground Storage regulation in 2016 (Version 1) and in 2017 (Version 2); it is not known when a final version will be issued.
[19] DOGGR has issued a UIC discussion draft in 2016 (Version 1) and in 2017 (Version 2); it is not known when a final version will be issued.

Well Inspections

These costs include well log expenses associated with O&M well mechanical integrity testing, including baseline, full, partial, and recurrent. As mentioned above, a 24-month recurrence interval of mechanical integrity testing has been proposed in the DOGGR Requirements for California Underground Gas Storage (May 19th 2017, Version 2), but has not yet been finalized, thus the need for balancing account treatment of these costs. The cost of logs to inspect one well is $80K, and the inspection may require repeating. Examples of reasons to repeat the log may include validation testing after the well undergoes modification. As such, the average cost of inspection for one well is closer to $110K. Additional detail is available in supplemental workpaper 2US002.000 Well Inspections.

Underground Storage Regulatory Implementation

These costs include consultant fees for industry expert support in updating gas standards, enacting gas standards, and O&M studies and activities to maintain safety and compliance with dynamic regulation of gas storage fields from agencies such as DOGGR and PHMSA. Additional detail is available in supplemental workpaper 2US002.000 Underground Storage Regulatory Implementation.

Data Management

These activities are associated with maintaining data related to storage assets and operations, in compliance with proposed DOGGR Requirements for California Underground Gas Storage Projects. Both the pace and volume of SIMP activity generates a robust suite of data for each gas storage well and requires enhancement in data management. SIMP data management has upfront implementation costs in 2016, 2017, and 2018 and may not show predictable O&M trends until 2019 and onward. The estimated costs for Data Management is described more fully in the supplemental workpaper 2US002.000 Data Management.

Noise and Temperature Logging

These costs reflect noise and temperature logging in compliance with DOGGR requirements. Additional detail is available in supplemental workpaper 2US002.000 Noise and Temperature Logging.

Emerging Regulations

The estimated costs and expectations for emerging regulations affecting gas storage from agencies such as DOGGR and PHMSA are described more fully in the supplemental workpaper 2US002.000 Emerging Regulations.

2. Forecast Method

The forecast method developed for this cost category is zero-based. This method is most appropriate because of the limited historical data available and limited relevance of historical data. SIMP O&M work began on a limited basis in 2014 but was not recorded as SIMP because the balancing account was not approved by the Commission until 2016. Both SIMP O&M and Capital work were fully implemented, beyond original forecasted budget and pace, in 2016. For GRC TY 2019, SIMP work requires a zero-based forecasting because it has been planned at a year-specific level of detail addressing compliance with existing and proposed regulations and allows for compliance with emerging regulations.

The SIMP work follows both a strict internal schedule and a strict regulatory based schedule, including completion of initial inspection by 2019 and re-testing of wells (not approved for return to service) within a 1-year period. There is an expectation that additional regulations and orders will continue to be proposed, revised, and enacted, maintaining the need for compliance in a quick-paced environment that can be safely met with flexibility in cost forecasting. The budget proposed herein largely reflects assumed implementation of all proposed regulations on underground gas storage.

3. Cost Drivers

The cost drivers behind these forecasts are safety, risk management, and state and federal regulations. The primary drivers for the TY 2019 GRC are the proposed DOGGR Requirements for California Underground Gas Storage Projects DOGGR 14 CCR §1726 and PHMSA Underground Natural Gas Storage regulations §192.12. DOGGR UIC requirements and other federal, state, and local agency considerations also play a role. Cost drivers for individual components of SIMP O&M work are cited in the corresponding supplemental workpapers.

IV. SHARED COSTS

A. Introduction

As described in the Shared Services Policy & Billing testimony of Mr. Jim Vanderhye (Ex SCG-34), shared services are activities performed by a utility shared services department (i.e., functional area) for the benefit of: (i) SDG&E or SoCalGas, (ii) Sempra Energy Corporate Center, and/or (iii) any unregulated subsidiaries. The utility providing shared services allocates and bills incurred costs to the entity or entities receiving those services.

Table NPN-17 summarizes the total shared O&M forecasts for the listed cost categories.

Table NPN-17
Southern California Gas Company
Shared O&M Summary of Costs

UNDERGROUND STORAGE (In 2016 $)			
	2016 Adjusted-Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
Total Shared Services (Incurred)	455	434	-21
Total O&M	**455**	**434**	**-21**

I am sponsoring the forecasts on a total incurred basis, as well as the shared services allocation percentages related to those costs. Those percentages are presented in my shared services workpapers, along with a description explaining the activities being allocated. See Ex. 10-WP SCG/Navin. The dollar amounts allocated to affiliates are presented by Mr. Jim Vanderhye (Ex. SCG-34).

B. Senior Vice President of Transmission and Storage

1. Description of Costs and Underlying Activities

Within the Transmission and Storage group there is the leadership cost centers 2200-2594, which represents the Senior Vice President's activities. The Senior Vice President activities extend beyond Underground Storage since the Senior Vice President is also responsible for the Transmission, Capacity Planning, Gas Control & System Planning and Emergency Services. The Senior Vice President's expenses include technical and financial support, as well as policy issuance to successfully staff the operation and further the goals of the company.

2. Forecast Method

The forecast method developed for this cost category is the base year plus the incremental cost. This method is most appropriate because the incremental costs will achieve the annual labor expectations.

3. Cost Drivers

The cost drivers behind these forecasts are the provided leadership and guidance of the Senior Vice President for the organizations of Underground Storage, Transmission, Capacity Planning, Gas Control & System Planning, and Emergency Services and are therefore applicable here as well.

V. CAPITAL

A. Introduction

The costs described in this section cover the capital expenditures estimated for Storage operations. The intent behind the capital expenditure plan is to provide safe, reliable delivery of natural gas to customers at reasonable costs. These investments also enhance the integrity, efficiency, and responsiveness of operations while maintaining compliance with applicable regulatory and environmental regulations. Table NPN-14 below summarizes the total capital forecasts for Gas Storage for 2017, and 2018. The 2019 capital request of $167.409 million was derived using a zero-based forecast methodology. As noted previously, SoCalGas seeks two-way balancing treatment of the SIMP capital cost estimates. Additional detail on the categories and costs that comprise the total capital forecasts are presented in the sections below.

Table NPN-18 summarizes the total capital forecasts for 2017, 2018, and 2019.

Table NPN-18
Southern California Gas Company
Capital Expenditures Summary of Costs

UNDERGROUND STORAGE (In 2016 $)			
Categories of Management	**Estimated 2017 (000s)**	**Estimated 2018 (000s)**	**Estimated 2019 (000s)**
A. COMPRESSORS	9,000	16,496	25,700
B. WELLS	59,585	49,125	60,559
C. PIPELINES	20,347	12,880	7,680
D. PURIFICATION	5,510	9,785	5,610
E. AUXILLARY EQUIPMENT	19,206	19,740	19,675
F. SIMP	75,285	71,370	53,382
G. COMPRESSORS - ACTR	19,602	1,250	0
Total	**208,535**	**180,646**	**172,606**

B. Storage Compressors

This Budget Category includes costs associated with natural gas compressors. These storage compressor units increase the pressure of natural gas so it can be injected into the underground reservoirs. Examples of equipment within this area include turbines, engines, high pressure gas compressors, compressed air system equipment, fire suppression systems, gas scrubbers, and related control instruments. This budget category includes the necessary capital for maintenance, replacements, and upgrades of the various storage field compressors to uphold safety, maintain or improve reliability, extend equipment life, achieve environmental compliance, and to meet the required injection capacities. Table NPN-19 below summarizes the cost forecasts for storage compressors.

Table NPN-19
Southern California Gas Company
Capital Expenditures Summary of Costs

UNDERGROUND STORAGE (In 2016 $)			
A. COMPRESSORS	**Estimated 2017(000s)**	**Estimated 2018(000s)**	**Estimated 2019(000s)**
1. GOLETA- MAIN UNIT #4 O	2,000	326	0
2. HONOR RANCH-REPLACE MA	1,000	3,000	10,000
3. PLAYA DEL REY-WET GAS	1,000	1,000	0
4. COMPRESSORS - BLANKET PROJECTS	5,000	12,170	15,700
Total	**9,000**	**16,496**	**25,700**

Due to the annual variability of this category, a zero-based methodology was used to develop the 2019 estimate, as presented in Figure NPN-7 below. Projects expected to cost over $1 million are supported by individual capital workpapers that accompany this testimony, Exhibit SCG 10-CWP).

The Storage Compressor category in this testimony is further described using the following sub-sections:

- 1-Goleta - Main Unit #4 Overhaul & Engine Block Oil Heater
- 2-Honor Ranch - Replace Main Compressor
- 3-Playa Del Rey – Wet Gas Compressor
- 4-Blanket Projects

1. Goleta – Main Unit #4 Overhaul & Engine Block Oil Heater Addition

a. Description

The forecasts for Goleta-Main Unit #4 Overhaul & Engine Block Oil Heater for 2017, 2018, and 2019, in millions, are $2M, $0.326M, and $0M, respectively. SoCalGas plans to build and place in service the Goleta – Main Unit #4 Overhaul & Engine Block Oil Heater by TY 2019.

Goleta Unit #4 compressor has reached the maximum run time between overhauls. The overhaul will eliminate the need to replace the compressor with an in-kind unit. Overhauls are necessary for safety, to restore and/or maintain their efficiency, deliver capacity, and maintain compliance with environmental regulations. While parts and compressor service contractors are still available, an overhaul is typically the most cost-effective solution. The installation of an oil heater will reduce the operational wear on internal components. The specific details regarding the Goleta – Main Unit #4 Overhaul & engine Block Oil Heater are found in my capital workpapers - Exhibit (SCG 10-CWP).

b. Forecast Method

The forecast method developed for this cost category is based on the knowledge of experienced personnel who have handled similar overhauls and oil heater installations in the recent past. Such experience is based on this method is most appropriate because it is based on recent costs of components and quotes by qualified contractors.

c. Cost Drivers

The cost drivers for these capital projects relate to the very specific skill sets, tooling, parts, and specialized knowledge for gas engines, equipment, and the high pressure natural gas compressors they power.

2. Honor Ranch – Replace Main Compressor Units Study

a. Description

The forecasts for the Honor Ranch Compressor Replacement Study for 2017, 2018, and 2019, in $ millions, are $1.0M, $3.0M, and $10.0M, respectively. Honor Rancho Storage Field facility plays a vital role in the delivery of natural gas to millions of residential, commercial, and industrial customers throughout Southern California. It is one of the largest storage field in the SoCalGas service territory. Honor Rancho compressors have reached the end of their useful life after four decades of service. Replacement of obsolete DeLaval reciprocating injection compressors will provide capacity for required maintenance and provide capacity needed to improve reliability and availability of safely serving natural gas to our customers. This project will study the replacement of the five compressors and enterprise high speed reciprocating engines to improve efficiency and reliability to serve our customers. This feasibility study will consist of a review of activities associated with preliminary, detailed engineering and design, material procurement, permitting, demolition, construction, testing, and startup of each new compressor units. These costs do not include detailed design or construction activities related to the replacement of the units. The specific details regarding the Honor Ranch Compressor Replacement Study project are found in my capital workpapers - Exhibit (SCG 10-CWP).

b. Forecast Method

The forecast method developed for this cost category is based on a zero-base methodology. This method is most appropriate because estimated costs are based upon historic pricing for similar size and scope of the project.

c. Cost Drivers

The underlying cost driver(s) for this capital project relate to costs estimates based on the knowledge of experienced personnel who have received vendor quotes and previously completed similar work.

3. Playa Del Rey – Wet Gas Compressor

a. Description

The forecasts for the Playa Del Rey Wet Gas Compressor for 2017, 2018, and 2019 are, in $millions, $1.0M, $1.0M, and $0M, respectively. SoCalGas plans to build and place in service the Playa del Rey Wet Gas Compressor by the TY 2019. Low pressure gas is generated during the liquid handling process. This gas can be processed and reinjected into the high-pressure withdrawal system. This project will include the installation of a wet gas compression system to avoid the venting of gas to atmosphere. The specific details regarding the Playa del Rey wet Gas Compressor are found in my capital workpapers - Exhibit (SCG 10-CWP).

b. Forecast Method

The forecast method developed for this cost category is similar projects completed in recent years as well as material quotes and contractor.

c. Cost Drivers

The cost driver for this project are vendor material quotes, contractor daily rate sheets and previously completed similar projects.

4. Compressors - Blanket Projects

a. Description

Forecasts of capital costs for Blanket projects in $ millions for 2017, 2018, and 2019 are $5.0M, $12.17M, and $15.70M, respectively. Compressor Station equipment must have continuing capital maintenance as items continue to age and to wear out. SoCalGas plans to replace and upgrade compressor equipment via smaller projects with individual costs estimates that do not justify the preparation of individual workpapers. These smaller projects typically include capital maintenance of equipment where parts are no longer manufactured. These projects are addressed as "Blanket" projects and cost estimates vary from tens of thousands to several hundred thousands of dollars. Projected work includes, but is not limited to overhauls, rebuilds, major equipment replacements, and upgrades to critical assets such as power turbines, gear boxes, compressors, and engines. Deferral of these smaller compressor maintenance projects promotes employee safety and helps avoid equipment shutdowns, which can threaten supply continuity. Specific details regarding storage well replacements are found in my capital workpapers. Exhibit (SCG 10-CWP).

b. Forecast Method

This estimate is based on the local knowledge and judgment of the managers at the storage fields, and the historical conditions at each field that routinely need correcting through Blanket capital projects.

c. Cost Drivers

The underlying cost drivers for Blanket projects relate to equipment type and complexity, operating location, availability of qualified contractors, and workload. There are a limited number of qualified contractors available for compressor work in Southern California, and they perform work for customers other than SoCalGas. Thus, prices for these specialized services vary based on contractor workload and associated equipment lead times. Parts and equipment costs are driven by the limited number of competing suppliers and the very specialized nature of the hardware.

C. Storage Wells

This Budget Category includes costs associated with replacing components on existing wells and the design, drilling and completion of replacement wells for the injection and withdrawal of natural gas and reservoir observation purposes. This includes well workover contractors (major well work), drilling contractors, and component materials such as tubing, casing, valves, pumps, and other down-hole equipment. Table NPN-20 below summarizes the capital cost forecasts for this Budget Category.

Table NPN-20
Southern California Gas Company
Capital Expenditures Summary of Costs

B. WELLS	**Estimated 2017(000s)**	**Estimated 2018(000s)**	**Estimated 2019(000s)**
1. RAMP - C1 - WELL REPLACEMENTS	4,000	18,000	49,000
2. RAMP - C2 - WELL PLUG & ABANDON	38,900	23,150	7,250
4. RAMP - C3 - TUBING UPSIZING	2,680	1,050	0
5. RAMP - C4 - WELL WORKOVERS	11,969	5,369	969
6. RAMP - C5 - WELLHEAD REPAIRS AND REPLACMENTS	1,036	556	0
7. RAMP - C6 - WELL RECOMPLETIONS	0	0	0
8. RAMP - C7- GAS STORAGE - WELLS - BLANKET PROJECTS	1,000	1,000	1,000
9. C8 - CUSHION GAS PURCHASE	0	0	2,340
Total	**59,585**	**49,125**	**60,559**

The Storage Wells category in this testimony is further described using the following sub-categories C.:

- C1-Well Replacements
- C2-Well Plug & Abandon
- C3-Tubing Upsizing
- C4-Well Workovers
- C5-Wellhead Repairs and Replacements
- C6-Well Recompletions
- C7-Wells - Blanket Projects
- C8-Cushion Gas

1. C1-Well Replacements

a. Description

The forecasts for replacement storage wells in $ millions are $4M, $18M, and $49M for 2017, 2018, and 2019, respectively. SoCalGas plans to replace mechanically constrained wells with curtailed deliverability, along with high operating cost injection/withdrawal wells and their associated production, with new wells that provide higher deliverability rates. These new wells are necessary replacements due to lost deliverability from failed gravel packs or poor deliverability rates.

There are approximately fifty-seven to sixty-five (57-65) wells within the existing storage fields that are planned for abandonment in 2017-2019. The replacement storage wells will be drilled to replace abandoned wells that were of high operating cost including injection/withdrawal, observation and/or liquid removal wells.

With modern well design and completion techniques, opportunities exist to reduce the number of storage wells by drilling new replacement wells in a manner that may allow for better than a one-for-one replacement. Depending on the storage field and its geology, a newly drilled and completed replacement well is likely to provide the replacement deliverability of two or more existing older wells. This scenario would be repeated as each new replacement storage well is drilled, thus potentially reducing the overall storage well count and operating expenses.

These projects will locate and prepare drill sites, drill, and complete new replacement storage injection/withdrawal wells to be strategically located throughout the Storage Fields. Included are all services and materials to complete each well. The anticipated numbers of the replacement wells are as follows:

- 2017 - 2018 – One Water Withdrawal Well and Three Storage Wells
- 2019 – Seven Storage Wells

This work is required to replace naturally declining deliverability from existing wells and wells that were abandoned and decrease the footprint of a facility by bringing remotely located wells in a high consequence area closer to the main station and removing injection/withdrawal lines from environmentally-sensitive areas. Specific details regarding storage well replacements are found in my capital workpapers - Exhibit (SCG 10-CWP).

b. Forecast Method

Planned replacement wells located among the storage fields will vary in cost, but the average costs total approximately $7 million each. Costs are based on historical well drilling costs combined with recent vendor cost estimates.

c. Cost Drivers

The underlying cost drivers for these capital projects relate to the highly-specialized nature of work performed on high pressure wells and the necessarily skilled workforce and equipment employed. Phasing in these new higher-deliverability replacement wells and eliminating higher cost wells over time may reduce the Company's long term operating costs by reducing the need for mitigation such as gravel pack capital projects.

2. C2-Well Plug & Abandon

a. Description

The cost in $ millions for well plug and abandonments are forecasted to be $38.9M, $23.15M, and $7.25M, for 2017, 2018, and 2019, respectively. SoCalGas plans to abandon wells that have high operating costs and have a decreased or lack of productivity. A number of the abandonments are required for the removal of wells and their operations from environmentally sensitive areas or locations near the public and relocating the new replacement storage wells within storage field boundaries.

SoCalGas will focus on the abandonment of storage wells pursuant to Public Resources Code 3208. Projected costs include the material and services required to plug and abandon the wells in a manner that meets or exceeds California DOGGR requirements. Specific details regarding well abandonment projects are found in the capital workpapers - Exhibit (SCG 10-CWP).

b. Forecast Method

There are approximately fifty-seven to sixty-five (57-65) wells within the existing storage fields that are planned for abandonment in 2017-2019. The average cost of each abandonment is $850k. The individual well abandonment costs will vary depending on the condition of the well at the time of the abandonment, surface location of the well, in addition to the depth of the well to be abandoned.

c. Cost Drivers

The underlying cost drivers for these capital projects relate to the highly-specialized nature of work performed on high pressure gas wells and the necessarily skilled workforce and equipment employed.

3. C3-Tubing Upsizing

a. Description

The forecasts for tubing upsizing for 2017, 2018, and 2019 in $ millions are $2.68M, $1.05M and $0.0, respectively. SoCalGas will be redesigning all gas storage wells for tubing flow only to create a dual barrier of safety. This change in well operation will require the upsizing of tubing pipe to increase injection and withdrawal capacity. SoCalGas plans to have completed all required tubing upsizing by the TY 2019. Upsizing of tubing strings in approximately 78 wells, where workovers are being performed, will be upgraded for tubing only flow. The wells are located at the four storage fields. The specific details regarding tubing upsizing are found in the capital workpapers - Exhibit (SCG 10-CWP).

b. Forecast Method

The forecast method developed for this cost category is zero base. This method is most appropriate because tubing upsizing is a direct impact of SoCalGas's new Storage Safety Enhancement Plan which was proposed in 2017 and therefore lacks historical trends. SoCalGas expects dual barrier operation of underground gas storage wells to be implemented in new regulations by DOGGR. This practice was also recommended in the October 2016 Federal Joint Taskforce Report.[20]

c. Cost Drivers

The underlying cost driver for this capital project relate to the cost and installation of the increased tubing strings for the 78 wells. The cost per well is approximately $35K. The cost is based on historical costs in addition to recent vendor quotes. Documentation of these cost drivers are included as supplemental capital workpapers - Exhibit (SCG 10-CWP).

4. C4-Well Workovers

a. Description

The forecasts for well workovers for 2017, 2018, and 2019 in $ millions are $11.969M, $5.369M, and $ 0.969M, respectively. Well workovers are critical maintenance activities performed on gas storage wells to maintenance withdrawal and injection capacity. When well workovers are not completed the impact may lead to fluid encroachment in the storage reservoir or diminished number of wells available for withdrawal. SoCalGas plans to complete 23 well workovers at four of the storage fields by the TY 2019. The specific details regarding well workovers are found in my capital workpapers – Exhibit (SCG 10-CWP).

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[20] Ensuring Safe and Reliable Underground Natural Gas Storage, Final Report of the Interagency Task Force on Natural Gas Storage Safety, October 2016, page 54

b. **Forecast Method**

The forecast method developed for this cost category is zero-based. This method is most appropriate because the well count is based on the known average well equipment failures all existing wells within the storage fields.

c. **Cost Drivers**

The underlying cost driver for this capital project are related to the 23 planned well workovers planned between 2017 and 2019. Each workover is estimated to have an average cost of $950K.

5. **C5-Wellhead Repairs and Replacements**

a. **Description**

The forecasts for wellhead repairs and replacements in $ millions for 2017, 2018, and 2019 are $1.036M, $0.556M, and $ 0.0, respectively. SoCalGas plans replaced and upgraded wellhead valves and wellhead seals on various wells located throughout the storages fields. These activities promote safety and maintain equipment integrity. Wellhead equipment are critical to provide isolation of the well from the pipeline system and to allow for entry into the well for routine inspection. The specific details regarding wellhead repairs and replacements are found in my capital workpapers – Exhibit (SCG 10-CWP).

b. **Forecast Method**

The forecast method developed for this cost category is zero-based. This method is most appropriate because the work can be estimated on the planned workovers between 2017 and 2019. The increase in workovers will minimize the need for the wellhead repair and replacements based on historical work activities.

c. **Cost Drivers**

The underlying cost drivers for this capital project relate to the approximate 20 workovers completed over 2017 and 2018 in which the associated wellhead valves and wellhead seals will be replaced at a cost of $80K each. The cost includes the material and services required to remove, and reinstall each wellhead seal replacement and return the well to service.

6. C7-Wells -- Blanket Projects

a. Description

The forecasts in $ million for 2017, 2018, and 2019 are $1.00, $1.00, and $1.00, respectively. SoCalGas plans to build and place in service multiple smaller projects with individual costs that do not warrant the preparation of individual workpapers. These forecasted capital expenditures support the goals of maintaining the safety of the public and employees, as well as operating efficiency, reliability and continuity of supply. The costs of individual projects in this category will vary from as low as ten thousand to as high as several hundreds of thousands of dollars. They include projects related to geology and storage engineering, and smaller technology upgrades. Specific details regarding these projects are found in my capital workpapers – Exhibit (SCG 10-CWP).

b. Forecast Method

The forecasts of these smaller projects are based on local knowledge of required upgrades and capital maintenance projects prepared by experienced professionals. This method is appropriate because these professionals are responsible for preparing a list of upgrades and projects, which is updated and prioritized regularly, based on equipment age, wear and tear, operational history, and technical obsolescence.

c. Cost Drivers

The underlying cost drivers for these kinds of projects relate to equipment type and complexity, operating location, availability of qualified contractors, and workload. There are a limited number of qualified contractors available for Storage field work. Thus, the prices for this very specialized work varies according to the contractor's workload and associated lead times. Parts and equipment costs are driven by the limited number of competing suppliers and the very specialized nature of the hardware.

7. C8-Cushion Gas

a. Description

The forecasts for cushion gas purchases in $ million are $0, $0, and $2.34M, for 2017, 2018, and 2019, respectively. SoCalGas plans to purchase cushion gas to support the final phase of the Honor Rancho expansion project. Cushion gas is the volume of gas intended to serve as the permanent inventory within a storage reservoir that is required to maintain adequate pressure for deliverability rates throughout the withdrawal season. The need for storage capacity expansion and its relationship to Gas System supply reliability was established by the CPUC in D.10-04-034. Specific details regarding this estimate of cushion gas costs may be found in my capital workpapers – Exhibit (SCG 10-CWP).

b. Forecast Method

Costs are estimated for the purchase of 200 MMCF, at a price of \$2.74 - \$2.91 per decatherm.

c. Cost Drivers

The unit cost of the gas is driven by conditions in the natural gas market.

D. Storage Pipelines

This Budget Category includes costs associated with upgrading or replacing failed field piping and related components. The forecasts for this work are summarized in Table NPN-21 below.

Table NPN-21
Southern California Gas Company
Capital Expenditures Summary of Costs

C. PIPELINES	**Estimated 2017(000s)**	**Estimated 2018(000s)**	**Estimated 2019(000s)**
1. ALISO CANYON - VALVE REPLACEMENTS	880	880	880
2. RAMP - ALISO PIPE BRIDGE REPLACEMENT	8,000	8,000	0
3. PIPELINES - BLANKET PROJECTS	11,467	4,000	6,800
Total	**20,347**	**12,880**	**7,680**

The Storage Pipelines category in this testimony is further described using the following sub-sections:

- 1-Valve Replacements
- 2-Aliso Pipe Bridge Replacement
- 3-Pipelines – Blanket Projects

1. Aliso Canyon - Valve Replacements

a. Description

The costs for valve replacements are forecasted in \$ millions as \$0.88M, \$0.88M, and \$0.88M for 2017, 2018, and 2019, respectively. SoCalGas plans to replace various aboveground valves of differing sizes and pressure ratings throughout the year, depending on line shut-in capability and valve conditions. Specific details regarding this valve work may be found in my capital workpapers – Exhibit (SCG 10-CWP).

b. Forecast Method

Historical average costs are approximately $20K per valve. The estimated number of replacements, approximately 5% of the larger field valves every year, is based on recent operational experience.

c. Cost Drivers

The underlying cost drivers for this capital category relate to the purchase price of the valves and their installation costs. This includes specialized work performed on high pressure gas lines and the skilled workforce and equipment employed for replacements.

2. Aliso Canyon Pipe Bridge Replacement

a. Description

The costs in $ million for the Aliso Pipe Bridge Replacement are projected to be $8.0M, $8.0M, and $0 for 2017, 2018, and 2019, respectively. SoCalGas plans to relocate an existing pipe rack in Aliso Canyon out of a ravine area with landslide and soil erosion risks. This project includes the installation of a new pipe bridge across the ravine. New pipe will be installed on the bridge and be connected to existing pipe for on each end. Specific details regarding this project may be found in my capital workpapers – Exhibit (SCG 10-CWP).

b. Forecast Method

The project costs were derived by estimates from a formal RFP and bid process.

c. Cost Drivers

The underlying cost driver for this capital project relates to the soil types, customized design, permits, steel fabrication, and the highly-specialized nature of work performed on high pressure gas piping, and the skilled workforce and equipment employed.

3. Pipelines - Blanket Projects

a. Description

The costs in $ million are estimated to be $11.467M, $4.0M, and $6.8M, for 2017, 2018, and 2019, respectively. SoCalGas plans to perform necessary work to alleviate various pipeline issues. This can include various projects including pipe replacements, expansions, upsizing, supports, corrosion protection, and other elements related to piping systems. The upgrade of station piping will help maintain injection and deliverability capacity. Specific details regarding these projects may be found in my capital workpapers – Exhibit (SCG 10-CWP).

b. Forecast Method

This estimate is based on the local knowledge and judgment of the managers at the storage fields and the historical conditions at each field that routinely need correcting through blanket capital projects.

c. Cost Drivers

The underlying cost drivers for this capital project relate to the highly-specialized nature of work performed and the skilled workforce and equipment employed.

E. Storage Purification Systems

This budget category forecasts costs associated with equipment used primarily for the removal of impurities from, or the conditioning of, natural gas withdrawn from storage. Examples of equipment included in this area are dehydrators, coolers, scrubbers, boilers, pumps, valves, piping, power supply, controls, and instrumentation. Table NPN-22 below summarizes the forecasts of capital expenditures for Storage Purification Systems.

TABLE NPN-22
Southern California Gas Company
Capital Expenditures Summary of Costs

D. PURIFICATION	Estimated 2017(000s)	Estimated 2018(000s)	Estimated 2019(000s)
1. ALISO CANYON DEHYDRATION UPGRADES	750	1,250	1,250
2. GOLETA DEHYDRATION UPGRADES	0	3,050	0
3. PURIFICATION - BLANKET PROJECTS	4,760	5,485	4,360
Total	**5,510**	**9,785**	**5,610**

The Storage Purification Systems category in this testimony is further described using the following sub-sections:

- 1-Aliso Canyon Dehydration Upgrades
- 2-Goleta Dehydration Upgrades
- 3-Purification – Blanket Projects

1. **Aliso Canyon Dehydration Upgrades**

a. **Description**

The estimated forecasts in $ million for this project are $0.75M, $1.25M, and $1.25M, for 2017, 2018, and 2019 respectively. This project will include the installation of new gas and glycol filters for improved gas conditioning. Instrumentation upgrades will also improve the ability to remotely monitor the plant during operation. Currently Dehydration 2 plant is manned while in operation, and the upgrade will allow for full monitoring from the operations room. The Dehydration 2 plant at Aliso Canyon has withdrawal design capacity of approximately 750 MMCFD. SoCalGas has plans to upgrade the Dehydration 2 plant to increase its withdrawal capacity. Specific details regarding this project may be found in my capital workpapers – Exhibit (SCG 10-CWP).

b. **Forecast Method**

Costs are based on quotes provided by vessel fabricators, equipment manufacturers, contractor estimates, and similar work completed on previous projects.

c. **Cost Drivers**

The underlying cost drivers for this capital project relate to the highly-specialized nature of work performed, the necessarily skilled workforce, equipment employed, and the cost of materials.

2. **Goleta Dehydration Upgrades**

a. **Description**

Costs for the Goleta dehydration project in $ million are projected to be $0, $3.05M, and $0 for 2017, 2018, and 2019, respectively. SoCalGas plans to install new gas and glycol filters, heat exchangers, glycol regeneration equipment upgrades and instrumentation for remote monitoring in order to improve dehydration efficiency. This project will also allow the station to better achieve water content standards in pipeline-quality natural gas. Specific details regarding this capital project may be found in my capital workpapers – Exhibit (SCG 10-CWP).

b. **Forecast Method**

Costs are based on quotes provided by vessel fabricators, equipment manufacturers, contractor estimates, and similar work completed on previous projects.

c. Cost Drivers

The underlying cost drivers for this capital project relate to the highly-specialized nature of work performed, the necessarily skilled workforce and equipment employed, and the cost of materials.

3. Purification – Blanket Projects

a. Description

The costs in $ million are estimated to be $4.76M, $5.485M, and $4.36M, for 2017, 2018, and 2019, respectively. SoCalGas plans to perform necessary work to alleviate gas processing and purification issues. This can include work on various equipment including dehydrators, coolers, scrubbers, boilers, pumps, valves, piping, power supply, controls, and instrumentation. Upgrade of purification equipment will help maintain deliverability capacity and allow the station to better achieve water content standards in pipeline-quality natural gas. Specific details regarding this project may be found in my capital workpapers – Exhibit (SCG 10-CWP).

b. Forecast Method

This estimate is based on the local knowledge and judgment of the managers at the storage fields and the historical conditions at each field that routinely need correcting through blanket capital projects.

c. Cost Drivers

The underlying cost drivers for this capital project relate to the highly-specialized nature of work performed and the skilled workforce and equipment employed.

F. Storage Auxiliary Systems

This budget code includes work on various types of field equipment not included in other budget codes such as instrumentation, measurement, controls, electrical, drainage, infrastructure, safety, security, and communications systems. The costs associated with this work are summarized in Table NPN-23 below.

Table NPN-23
Southern California Gas Company
Capital Expenditures Summary of Costs

E. AUXILLARY EQUIPMENT	**Estimated 2017(000s)**	**Estimated 2018(000s)**	**Estimated 2019(000s)**
1. ALISO CANYON - OVERHEAD POWER SYSTEM UPGRADES	0	1,000	1,250
2. ALISO CANYON - GO-95 ELECTRICAL SYS UPGRADES – NR	3,450	2,520	2,500
3. RAMP-ALISO CYN-FRNANDO FEE 32 SLOPE STABILITY	1,000	1,000	1,000
4. ALISO CANYON SESNON GATHERING PLANT RELIEF	750	750	500
5. HONOR RANCH - OPERATIONS CENTER MODERNIZATION	200	1,000	1,800
6. RAMP-PLAYA DEL REY-HILLSID SOIL EROSN & SLOPE STAB	400	2,500	1,000
7. AUX EQUIPMENT - BLANKET PROJECTS	13,406	10,970	11,625
Total	**19,206**	**19,740**	**19,675**

The Auxiliary Systems category in this testimony is further described under the following sub-sections:

- 1-Aliso Canyon – Overhead Power System Upgrades
- 2-Aliso Canyon GO-95 Electrical System Upgrades
- 3-Aliso Canyon-Fernando Fee 32 Slope Stability
- 4-Aliso Canyon Sesnon Gathering Plant Project
- 5-Honor Ranch – Operations Center Modernization
- 6-Playa Del Rey – Hillside Soil Erosion & Slope Stability
- 7-Auxiliary Equipment Blanket Projects

1. Aliso Canyon – Overhead Power System Upgrades

a. Description

The forecasts for Overhead Power System Upgrades for 2017, 2018, and 2019 are in the $ millions $0.0, $ 1.0M, and $1.25M, respectively. SoCalGas plans to continue to upgrade the overhead power system with new poles and system infrastructure to meet weather conditions and applicable electrical standards. This project will provide Aliso Canyon Storage Field with increased electrical reliability by upgrading the system infrastructure and protection to the main plant, dehydration and gathering plants, while reducing the potential for system damage, increasing personnel safety, and reducing the risk of a potential fire. Specific details regarding this project may be found in my capital workpapers – Exhibit (SCG 10-CWP).

b. Forecast Method

The forecast method developed for this cost category is based on historical costs of similar work completed.

c. Cost Drivers

The underlying cost drivers for this capital project relate to the design, the specialized nature of work performed, the availability of qualified workers, and equipment purchases.

2. Aliso Canyon – GO-95 Electrical System Upgrades

a. Description

The forecasts for General Order (GO) 95 Electrical System Upgrades for 2017, 2018, and 2019 are, in the $ millions, $3.45M, $2.52M and $2.5M, respectively. SoCalGas plans to continue infrastructure upgrades with new poles and wires to meet operating conditions during high wind conditions. This project was initiated in 2014. This work is required by GO-95 because Aliso Canyon is subject to GO-95 Section IV, Heavy Loading design criteria. Specific details regarding this project may be found in my capital workpapers – Exhibit (SCG 10-CWP).

b. Forecast Method

The forecast method developed for this cost category is based on historical costs of similar work completed.

c. Cost Drivers

The underlying cost drivers for this capital project relate to the design, the specialized nature of work performed, the availability of qualified workers, and equipment purchases.

3. Aliso Canyon – Fernando Fee 32 Slope Stability

a. Description

The forecasts in $ millions for Aliso Canyon Fernando Fee 32 Slope Stability project for 2017, 2018, and 2019 are $1.0M, $ 1.0M, and $1.0M, respectively. The slope stability project will enhance safety around the Fernando Fee (FF)-32 wellsite. The FF-32 wellsite consists of active injection and withdrawal wells. In areas of erosion the project will enhance safety by protect high pressure piping. The work was phased across multiple years which is required due to the impact of seasonal rain periods and environmental work restrictions. Specific details regarding this project may be found in my capital workpapers – Exhibit (SCG 10-CWP).

b. Forecast Method

The forecast method developed for this cost category is zero-based. Forecasts are based on received vendor quotes for similarly completed work in previous years.

c. Cost Drivers

The underlying cost drivers for these capital projects relate to the highly-specialized nature of work performed, the availability of necessarily-skilled workforce, and equipment employed and the cost of materials.

4. Aliso Canyon Sesnon Gathering Plant Relief

a. Description

The forecasts for this project in $ million are $.75M, $0.75M, and $0.5M, for 2017, 2018, and 2019, respectively. Design elements identified during a process hazard analysis of the pressure relief system at the Aliso Sesnon Gathering Plant will be addressed with a redesign. A new relief vessel with drip pot will be installed, system piping will be modified to eliminate low points, and relief valves will be replaced to better address existing and new process conditions. Specific details regarding this work may be found in my capital workpapers- Exhibit (SCG 10-CWP).

b. Forecast Method

The forecast methodology for this project is zero-based. Estimated costs are based on vendor quotes and previously completed work.

c. Cost Drivers

The underlying cost drivers for these capital projects relate to the highly-specialized nature of work performed, the availability of necessarily-skilled workforce, and equipment employed and the cost of materials.

5. Honor Ranch – Operations Center Modernization

a. Description

The forecasts for the Honor Ranch Operations Center Modernization project in $ million are $0.2M, $1.0M, and $1.8M, for 2017, 2018, and 2019 respectively. SoCalGas plans to update, modernize, and reconfigure the control room at the Honor Ranch storage facility. This project includes modernization of control room displays, communication equipment, and building renovation. This upgrade of the operations center, will allow for full operation meetings, and improve efficiency of monitoring and operating the equipment. Specific details regarding this project may be found in my capital workpapers – Exhibit (SCG 10-CWP).

b. Forecast Method

Estimated costs are based on recent projects of similar scope and complexity in addition to recently-received vendor quotes.

c. Cost Drivers

The underlying cost drivers for this capital project relate to the highly-specialized nature of work performed, the skilled workforce and equipment employed, and the cost of materials.

6. Playa Del Rey – Hillside Soil Erosion and Slope Stability

a. Description

The forecasts in $ millions for Playa Del Rey Hillside Soil Erosion and Slope Stability project for 2017, 2018, and 2019 are $0.4M, $ 2.5M, and $1.0M, respectively. The Playa del Rey compressor building is located along a bluff. This project will enhance safety by protecting high pressure piping from bluff erosion. The work will be completed along the hillside areas with erosion. Specific details regarding this project may be found in my capital workpapers - Exhibit (SCG 10-CWP).

b. Forecast Method

Estimated costs are based on recent phases of the project, complexity in the remaining phases, and recently-received vendor quotes.

c. Cost Drivers

The underlying cost drivers for this capital project relate to the highly-specialized nature of work performed, the skilled workforce and equipment employed, and the cost of materials.

7. Auxiliary Systems Blanket Projects

a. Description

The costs of this project in $ million are estimated to be $13.406M, $10.97M, and $11.625M, for 2017, 2018, and 2019, respectively. SoCalGas plans to perform necessary work to alleviate instrumentation, Supervisory, Control and Data Acquisition (SCADA), measurement, controls, electrical, cyber security, and other auxiliary systems support issues. This can include work on various equipment including, coolers, scrubbers, boilers, pumps, valves, piping, and power supplies. The upgrade of auxiliary systems will help maintain safety, security, deliverability, and reliability in the delivery of pipeline-quality natural gas. Specific details regarding this project may be found in my capital workpapers - Exhibit (SCG 10-CWP).

b. Forecast Method

This estimate is based on the local knowledge and judgment of the managers at the storage fields, and the historical conditions at each field that routinely need correcting through blanket capital projects.

c. Cost Drivers

The underlying cost drivers for this capital project relate to the highly-specialized nature of work performed and the skilled workforce and equipment employed.

G. Storage Integrity Management Program

Table NPN-24
Southern California Gas
Capital Expenditures Summary of Costs

F. SIMP	**Estimated 2017(000s)**	**Estimated 2018(000s)**	**Estimated 2019(000s)**
1. RSIMP - Plug and Abandonment of Wells	3,800	1,900	0
2. RSIMP - Inspection/Return to Operation	68,905	68,120	46,232
3. RSIMP - Data Management	2,580	1,350	650
4. RSIMP-Emerging Monitoring Integrity & Safety Technology Pilot	0	0	5,000
5. RSIMP - Cathodic Protection	0	0	1,500
Total	**75,285**	**71,370**	**53,382**

a. Description

The capital costs in $ million for the SIMP are forecasted to be $75.285M, $71.37M, and $53.382M for 2017, 2018, and 2019, respectively.

The SIMP O&M testimony references several regulatory influencers on SIMP work that also apply to SIMP capital projects. SoCalGas proposes that these capital costs likewise continue to receive two-way balancing account treatment due to the changing nature of regulations. SIMP capital work began in 2014; and in 2016 it was recorded in the balancing account, and implemented beyond original forecasted pace. The majority of SIMP capital activity in 2016, 2017, and 2018 is for the completion of well work mitigation resulting from inspections of SoCalGas gas storage wells. 2018 also marks the beginning of the second-cycle well work mitigation for all wells initially inspected in 2016, per the proposed two year inspection cycle in discussion draft Version 2 of DOGGR 14 CCR §1726. SIMP TY 2019 capital work continues re-inspection well workovers (inspection rounds 2 and 3) and includes data management and two pilot efforts: monitoring integrity and evaluation of external cathodic protection. It is expected that additional regulations and orders affecting capital work will continue to be proposed, revised, and enacted, maintaining the need for compliance in a quick-paced environment that can be safely met with flexibility from a balancing account.

SIMP inspection and return to operation of gas storage wells is dependent on equipment and personnel also used throughout the oil and gas industry. The ability to timely secure these assets is dependent on energy demand and rig availability nationwide. The oil and gas industry downturn beginning in November 2014 allowed for greater access to workover infrastructure and personnel; however, there has been increased activity starting in mid-2016 that may forecast increased competition for resources required. Financial outlays to secure rigs and oil/gas field services can vary greatly over time due to domestic and foreign developments related to energy.

b. Forecast Method

The forecast method developed for this cost category is zero-based. While average costs from 2016 and early 2017 SIMP capital inspection at Aliso Canyon were utilized to prepare forecasts for TY 2019 SIMP, these years reflect the first round of the new inspection and workover procedures. Because draft Version 2 of DOGGR 14 CCR § 1726 requires a two-year (24 month) inspection interval, round two inspections (re-inspections) and workovers of SoCalGas wells inspected in 2016 begins in 2018. TY 2019 capital workovers are forecasted assuming approval of proposed DOGGR 14 CCR § 1726, and 2019, 2020, and 2021 activity therefore consists of round two and round three re-inspections, plus initial inspection of newly constructed wells. As with SIMP O&M forecasting, should these capital inspections prove less costly, or a less frequent inspection schedule be adopted in final regulations – or on a well by well basis per DOGGR approval, the balancing account treatment of SIMP allows the re-inspection funds to be returned. Additional detail on forecasting SIMP capital projects are discussed in workpapers and below in their respective sections.

c. **Cost Drivers**

The cost drivers behind these forecasts are safety, risk management, and state and federal regulations. The primary drivers for the TY 2019 GRC are the proposed DOGGR Requirements for California Underground Gas Storage Projects DOGGR 14 CCR §1726 and PHMSA Underground Natural Gas Storage (UGS) regulations 49 CFR §192.12. DOGGR UIC requirements and other federal, state, and local agency considerations also play a role. The primary regulations are outlined the testimony summary, and specific applicability is described for each capital section.

1. RSIMP – Plug and Abandon

a. **Description**

The forecasts in $ millions for SIMP Plug and Abandonment of wells for 2017 and 2018, are $3.8M and $1.9M, respectively. No SIMP Plug and Abandonment work is expected in 2019 onward. SoCalGas expects to Plug and Abandon approximately 6 gas storage wells through SIMP by TY 2019. These wells have been selected for abandonment under SIMP because they represent proactive abandonment born out of the integrity inspection and risk assessment processes. The decision to plug the wells came after remediation efforts of $1-2M per well.

These forecasted capital expenditures support the company's goals of safety and risk management because of the proactive nature of this work. All wells classified for SIMP abandonment have undergone logging inspection, and often remediation effort, prior to decision to plug and abandon.

This cost will be balanced and recorded in a regulatory balancing account, SIMP. This treatment is appropriate because plug and abandonment cost is highly well specific. DOGGR has set plug and abandonment requirements for wells under California Public Resources Code § 3208, and well abandonments must be ultimately approved as successful by DOGGR. This activity therefore does not follow a set cost and may exceed historic cost averages.

b. **Forecast Method**

The forecast method developed for this cost category is zero-based. Each SIMP abandonment is forecasted to cost $950K, including labor and non-labor, based on vendor estimates and work completed in 2016.

c. **Cost Drivers**

The underlying cost driver(s) for this capital project relate to compliance with DOGGR plug and abandonment requirements, as outlined in California Public Resources Code § 3208. Documentation of these cost drivers are included in the capital workpaper – Exhibit (SCG 10-CWP).

2. **RSIMP – Inspection/Return to Operation**

a. **Description**

The forecasts in $ millions for RSIMP – Inspection/Return to Operations for 2017, 2018, and 2019 are $68.905M, $68.12M, and $46.232M, respectively. SoCalGas plans to complete all first round gas storage well inspection/return to operation, or workovers, for all fields by the end of TY 2019.

These forecasted capital expenditures support the company's goals of safety, risk management, reliability and service, as this capital work activity consists of first inspecting each gas storage well and then completing repairs needed for the safe return to operation, or safely isolating the well from the gas storage reservoir until the well is plugged and abandoned.

This cost will be balanced and recorded in a regulatory balancing account.

b. **Forecast Method**

The forecast method developed for this cost category is zero-based. The current estimate is $1,295K per workover. This is based on limited historical data and a general expectation of 75% of workovers at $1,100K and 25% at $1,750K for inner string installation. Each field has varying conditions that affect workover cost. The Honor Rancho inspections are forecasted to take longer due to the greater depth of the reservoir at this field, resulting in greater casing length to examine. La Goleta and Playa del Rey have relatively shallower reservoirs, thus shorter length of casing inspection. All workovers require filling the well with fluid; the La Goleta field typically requires denser fluids than the other fields, adding material cost to the workover. The Playa del Rey field has limited work hours for workover activity and higher access costs than the other fields. Ultimately the time and cost for workover is dependent on conditions encountered once inspection begins.

c. Cost Drivers

The underlying cost driver(s) for this capital project relate to the regulations listed in the testimony summary.

3. RSIMP – Data Management

a. Description

The forecasts in $ millions for RSIMP Data Management for 2017, 2018, and 2019 are $ 2.58M, $1.35M, and $0.65M respectively. SoCalGas has frontloaded much of the implementation of the Well Integrity Management System into 2017, including software licensing. 2018 onward is forecasted to be focused on project management. – Exhibit (SCG-10-CWP.

These forecasted capital expenditures support the company's goals of reliability, safety, and risk management. SIMP work – inspections, plug and abandonment, reservoir studies – generates large volumes of data and records that gain efficiency and effectiveness from an updated management system. This cost will be balanced and recorded in a regulatory balancing account because it was included as part of SIMP in the 2016 GRC filing.

b. Forecast Method

The forecast method developed for this cost category is zero-based. This method is most appropriate because there is limited history for SIMP data management and limited history on SIMP data generation. SIMP data management for began on a pilot basis in 2014 and 2015. The budgets for 2016, 2017, and 2018 reflect a ramping up of the system. Regulations implemented in 2016 onward for gas storage fields affect the rate and volume of data generation and records creation. Data management forecasting is expected to achieve predictability in 2019 when systems are implemented and regulations affecting data and records are finalized. The costs described in workpapers are established through vendor quotes.

c. Cost Drivers

The underlying cost driver(s) for this capital project relate to robust data management, data availability to sustain and provide access to reliable well data to support engineering analysis, risk assessment and the decision making process over the well life cycle.

4. RSIMP – Emerging Monitoring Integrity and Safety Technology Pilot

a. Description

The forecasts in $ millions for the RSIMP – Emerging Monitoring Integrity and Safety Technology Pilot in 2019 is $5M. Based on emerging regulatory understanding at the national, state, and local level, SoCalGas expects to employ technologies to monitor health and status of facilities, in the order of 2-3 projects, each with a Capital value ranging $1M-$2M per year.

One planned project is to evaluate implementation of UAV (Unmanned Aerial Vehicle) technology. UAVs mounted with video cameras or optical imaging cameras can efficiently and safely inspect and survey storage facilities. UAVs can cover large areas in the field regardless of terrain.

Another project for pilot evaluation is fiber optic technology in the gas storage wellbores. This may involve technologies deployed in the well tubing such as Fiber Optic Distributed Temperature Sensors (DTS) and Fiber Optic Distributed Acoustic Sensors (DAS).

b. Forecast Method

The forecast method developed for this cost category is zero-based. This method is most appropriate because of the dynamic nature of this proposed project, focused on addressing emerging best-practices and emerging regulatory objectives. Both fiber optic and UAV technology have a range of implementation and maintenance cost based on selection of hardware and monitoring program. Approximately $2M per year is expected for UAV pilot efforts and approximately $3M per year is expected for fiber optic and other pilot efforts.

c. Cost Drivers

This capital project furthers SoCalGas's goal of placing its storage fields at the forefront of safety by evaluating new tools designed for gas storage well monitoring. The underlying cost driver(s) for this capital project relate to a series of studies being implemented within the company, in accordance with federal and state legislation and regulations, and to enhance the monitoring of gas storage fields effectively through high-value technology. Exhibit (SCG-10-CWP.

5. RSIMP – Cathodic Protection

a. Description

The forecasts in $ millions for RSIMP – Cathodic Protection is $1.5M in 2019. The specific focus of this activity is a pilot test of external cathodic protection as a means of external corrosion mitigation for gas storage wells. SoCalGas plans to evaluate this risk mitigation effort in TY 2019, and implement work in TY 2019 if deemed effective. This may result in the implementation of approximately 9 external cathodic protection wells in 2019. The specific details regarding RSIMP – Cathodic Protection are found in capital workpapers - Exhibit (SCG 10-CWP).

These forecasted capital expenditures support the company's goals of safety, reliability, and risk mitigation.

SIMPBA treatment of these costs is appropriate because this a potentially proactive integrity management project and technique being implemented on a trial basis, and could be expanded based on regulations, best practices, and the specific underground conditions at issue. If deemed practical and effective for underground storage applications generally, external cathodic protection for gas storage wells could be applied on a well-by-well basis, depending on, among other things, underground conditions, interference from other nearby metal sources, etc. The degree of well corrosion is measured in the inspection well logging activities described in SIMP O&M, and mitigated through capital workovers.

b. Forecast Method

The forecast method developed for this cost category is zero-based from vendor quotes. This method is most appropriate because external cathodic protection has only been implemented on a limited basis to this point and additional external cathodic protection efforts will start out first in test mode.

c. Cost Drivers

The underlying cost driver for this capital project is evaluating a means to address external corrosion. Reduction in external corrosion from effective external cathodic protection efforts could help reduce the need for costly well modification such as installation of inner string liners. Documentation of these cost drivers is included in capital workpapers - Exhibit (SCG 10-CWP).

H. Aliso Canyon Turbine Replacement Project

Table NPN-25
Southern California Gas Company
ACTR Costs

G. COMPRESSORS - ACTR	Estimated 2017(000s)	Estimated 2018(000s)	Estimated 2019(000s)
1. ALISO CANYON TURBINE REPLACEMENT	19,602	1,250	0
Total	**19,602**	**1,250**	**0**

a. Description

The forecasts for the Aliso Canyon Turbine Replacement Project for 2017, 2018, and 2019 are, in $millions, $19,603M, $1,250M, and $0, respectively. The specific details regarding the Aliso Canyon Turbine Replacement project are found in Mr. Buczkowski's testimony and supplement workpapers (Ex. SCG-11).

VI. CONCLUSION

In this testimony, I describe activities and projects necessary for SoCalGas to achieve its goals of maintaining the safety and reliability of essential gas underground storage infrastructure. The expenditures discussed in this testimony are required to maintain public and employee safety while cost-effectively meeting customer needs, in compliance with mandated regulatory requirements. My O&M and capital forecasts represent a reasonable level of funding for the activities and capital projects planned during this forecast period. The forecasts of the planned O&M and capital expenditures represented in this testimony are appropriate and prudently derived, and should be adopted by the Commission. The SIMP costs are justified and prudent. The request for a continued balancing account treatment for SIMP costs is reasonable and should be adopted.

VII. WITNESS QUALIFICATIONS

My name is Neil P. Navin. As of October 7, 2017, I am the Vice President of Gas Transmission & Storage for SoCalGas. My business address is 555 West Fifth Street, Los Angeles, California 90013-1011. I have been employed by SoCalGas since March of 2014. At SoCalGas, I have held the positions of Director of Major Projects and Controls, Director of Project Management and Construction, and Director of Storage Risk Management.

My present responsibilities include providing leadership to a team of professionals responsible for the safe and reliable delivery of gas energy from and through the SoCalGas natural gas storage facilities, and SoCalGas and SDG&E transmission pipeline network, including the operation, maintenance, installation, and replacement of the facilities, equipment and pipeline system associated with these elements

Prior to joining SoCalGas, I served as a project manager on several multi-billion dollar mega-projects. Through my career my roles have included project management, engineering management, and start-up for projects in refineries, oil and gas processing facilities, biofuels, fuel cells, chemical weapons destruction facilities, and petrochemical plants. Project scopes included conceptual engineering, technology licensing, basic engineering, front-end engineering, program management, and detailed engineering and design, procurement and construction efforts.

From 2001 to 2014, I worked for Fluor in various project management positions of increasing responsibility, ultimately serving in the role of Senior Project Director. In that role, I had overall responsibility for project cost, schedule, and execution, including engineering/design, procurement, contracts, and construction of large capital projects. From 1991 to 2001, I was employed by Parsons Corporation, first as a Process Engineer, then in various project management positions of increasing responsibility.

I graduated from McGill University in 1991 with a Bachelor of Science degree in Chemical Engineering. I have over 25 years of domestic and international experience in various energy industries.

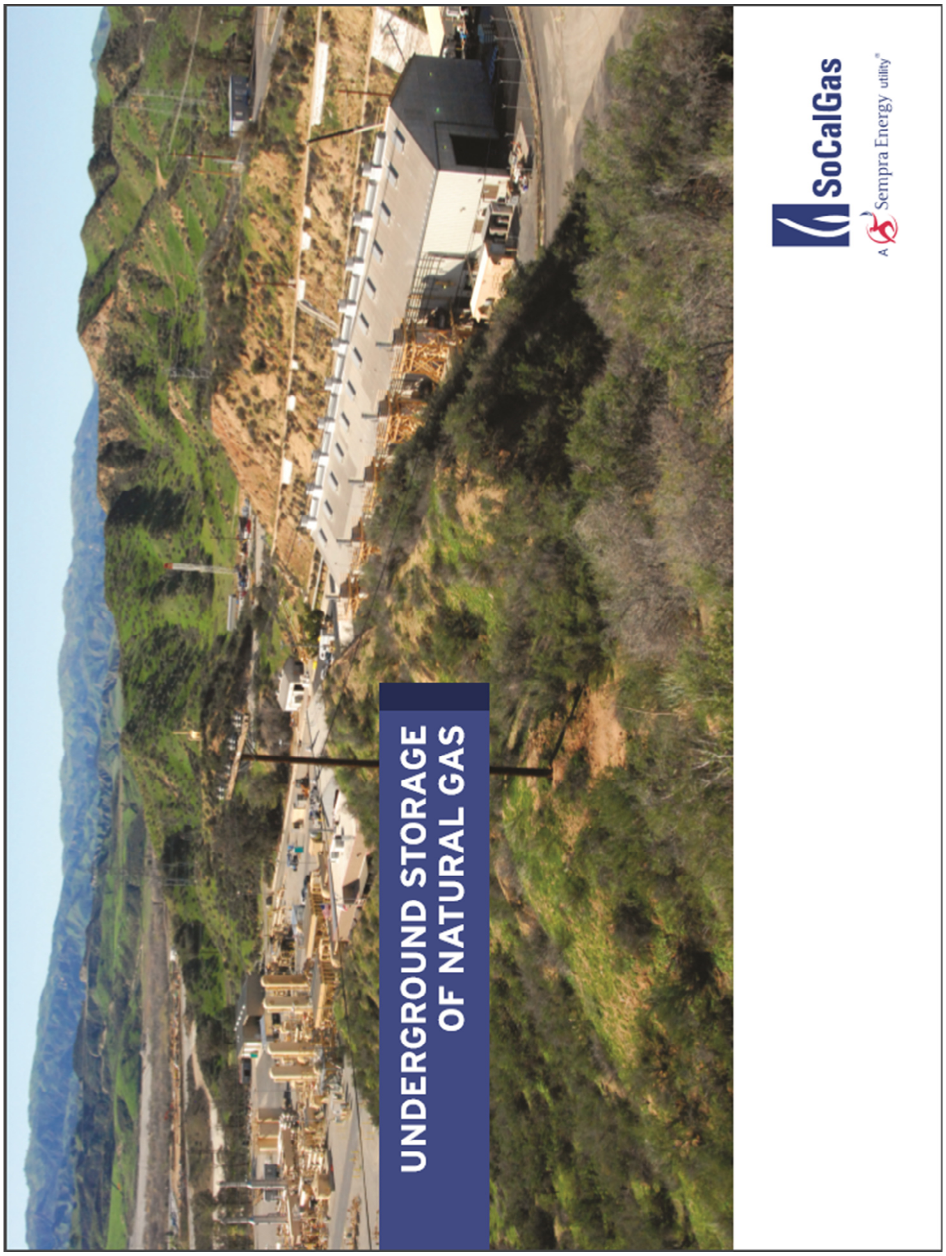
I sponsor the 2019 General Rate Case Testimony for Southern California Gas Company's Underground Storage Operations and Maintenance expenses and Capital spending plan.

This concludes my prepared direct testimony.

LIST OF ACRONYMS

BCF	Billion Cubic Feet
BCFD	Billion Cubic Feet per Day
CPUC	California Public Utilities Commission
DA	District Attorney
DIMP	Distribution Integrity Management Program
DOGGR	California Department of Oil, Gas and Geothermal Resources
DOT	United States Department of Transportation
FTE	Full Time Equivalents
MMCF	Million Cubic Feet
MMCFD	Million Cubic Feet per Day
NERBA	New Environmental Regulatory Balancing Account
O&M	Operations and Maintenance
PHMSA	Pipeline and Hazardous Materials Safety Administration
PSIG	Pounds per Square Inch Gauge
RCA	Root Cause Analysis
SoCalGas	Southern California Gas Company
SIMP	Storage Integrity Management Program
TCAP	Triennial Cost Allocation Proceeding
TIMP	Transmission Integrity Management Program

APPENDIX A – Underground Storage of Natural Gas



STORING NATURAL GAS THE SAME WAY NATURE ALWAYS HAS...

DEEP UNDERGROUND

Most of the natural gas used in Southern California travels from supply sources as far away as Texas and Canada. So, in order to maintain a balance between supply and demand, storage is a necessity. Without it, we might not always be able to meet our customers' needs.

Customer needs change by the season, by the day, and even by the hour. On a cold winter day, for example, residential customers can use seven times the amount of natural gas used on an average summer day.

Five decades ago, balancing customer demand meant relying on natural gas holding structures, which stood several stories high and resembled oil storage tanks.

In 1941 we introduced a new system to the Southwest: underground storage of natural gas. This system is based on the simple premise that if an underground rock formation held oil and natural gas securely for millions of years, it could continue to do so under controlled circumstances.

Underground storage is based on the simple premise that if an underground rock formation held oil and natural gas securely for millions of years, it could continue to do under controlled conditions.

Extensive research and our experience have proven that this concept is sound. Depleted oil and natural gas fields offer ideal storage conditions because they are comprised of natural underground traps. Care is taken that the original formation pressure of the field is not exceeded. These subterranean rock formations can be repeatedly refilled and drawn from to meet the fluctuating needs of our customers.

When out of state pipelines can't deliver enough natural gas to meet heavy demand, which might occur on a cold winter day, we withdraw natural gas stored underground to supplement pipeline supplies. When customer needs for natural gas drop below the available pipeline supply, which can happen during the summer, we inject the surplus natural gas into the underground reservoirs. We also sell storage capacity to other large companies so they will have natural gas (which they purchase on the open market) available to them when they need it.

Geologic traps are rock formations which trap and hold natural gas, oil and water.

WHERE IS THE GAS STORED?

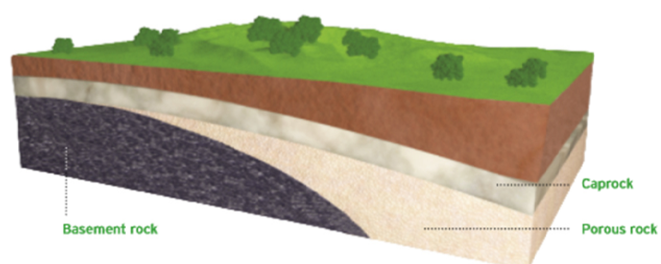
Surplus natural gas is forced down through wells drilled into porous rock formations thousands of feet below the earth's surface, where oil and natural gas originated. The formations appear solid but are actually sandstone made up of sand, with spaces between the grains.

The rock formations are called "geologic traps" because they are shaped by nature, and trap and hold natural gas, oil and water within a specific area. Like a sandwich, the basic trap contains porous reservoir rock between layers of nonporous rock. The top layer is commonly called "caprock," while the bottom most layer is often called "basement rock."

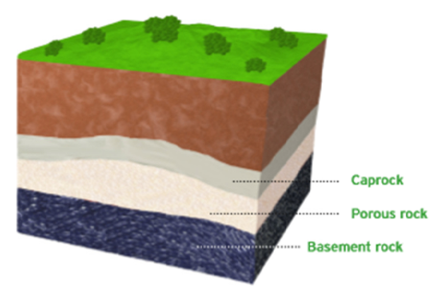
There are several different kinds of geologic traps. One is a pinch-out trap (left, below), in which the caprock meets the basement rock at one end, effectively sealing the porous storage area. The most common geologic trap is the anticlinal trap (right, below) which resembles a buried hill. This is because the caprock arches over the top of the porous rock "reservoir" to stop natural gas from traveling upward. Another type of trap is formed by shifts in the ancient earth strata that moved one section of rock against another, so that it abuts the caprock, creating a fault-bounded trap.

We can depend upon the force of gravity to separate the natural gas, oil and water that may already be in any trap. As the lightest component, natural gas will always rise to the top.

PINCH-OUT TRAP



ANTICLINAL TRAP

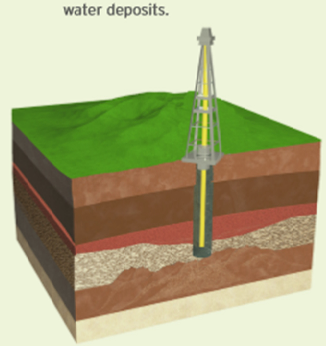


WHAT DETERMINES A GOOD STORAGE FIELD

CORE SAMPLES

Before using any former oil or natural gas field for our storage, extensive geologic data of each of the field's rock layers are carefully examined. This usually is accomplished by studying "core samples," which are taken by drilling with a hollow core diamond cutting edge deep down through the earth's sedimentary layers.

Numerous core samples and other geologic surveys help us profile a specific field. Measuring anywhere from 10 to 60 feet (3 to 20 meters) long, the core samples tell us the location, depth and condition of the caprock, the storage reservoir and the basement rock. They also determine the present concentration of any natural gas, oil or water deposits.

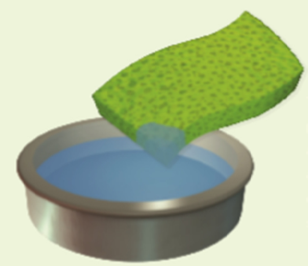


Core samples are taken by drilling with a hollow core deep into the earth.

POROSITY

The first characteristic we look for when examining the core sample is porosity. Porosity refers to the volume percentage of rock pore space available for natural gas or liquid retention between the rock or sand grains. It is essential that the reservoir of rock have high porosity, because that indicates a high storage capacity.

The ability of porous rock to absorb natural gas and liquids can be demonstrated with a sponge. Take the sponge and barely touch one corner to the surface of a liquid. Watch it soak up the liquid until saturated, without altering the shape or size of the sponge. The fluid simply fills the small pores of the sponge. Underground storage is based on the same principle.



The ability of a porous rock trap to absorb natural gas and liquids can be demonstrated with a sponge.

PERMEABILITY

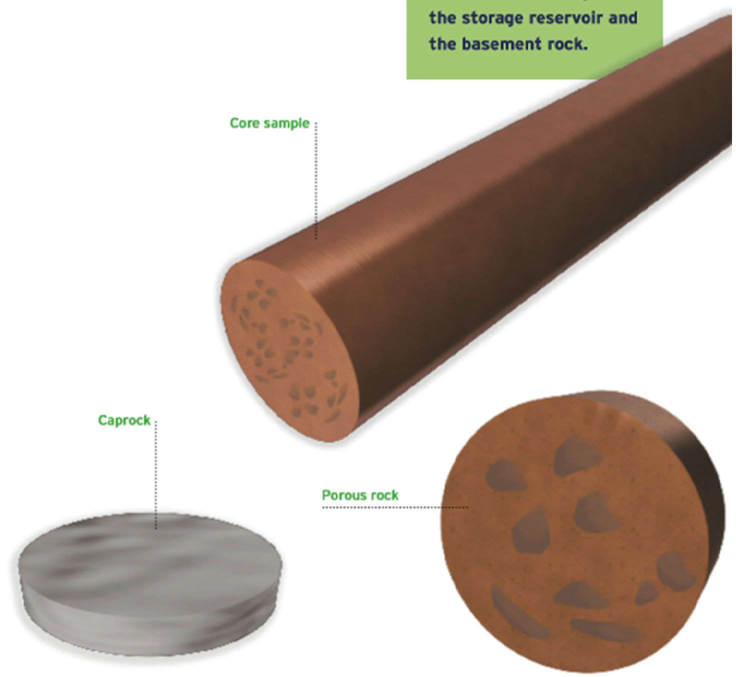
Permeability, closely related to porosity, is another characteristic we look for when evaluating core samples. Permeability is important for efficient natural gas storage because it measures how well the pore spaces are interconnected.

It is essential that the reservoir rock be highly permeable because the natural gas must be able to move freely through the storage zone during injection and withdrawal. If the rock isn't very permeable, meaning most of the pore spaces are isolated, then the natural gas injection and withdrawal rates will be low.

In caprock, we look for just the opposite. A rock such as shale is an ideal caprock since its impermeability prevents natural gas from traveling upwards and being lost.

Below the caprock, we need a porous, permeable layer of rock that will permit natural gas to flow in and out of the reservoir. The underlying water-saturated rock and dense basement rock trap the lighter natural gas in place above.

Core samples tell us the location, depth and condition of the caprock, the storage reservoir and the basement rock.



A TYPICAL UNDERGROUND GAS STORAGE FIELD

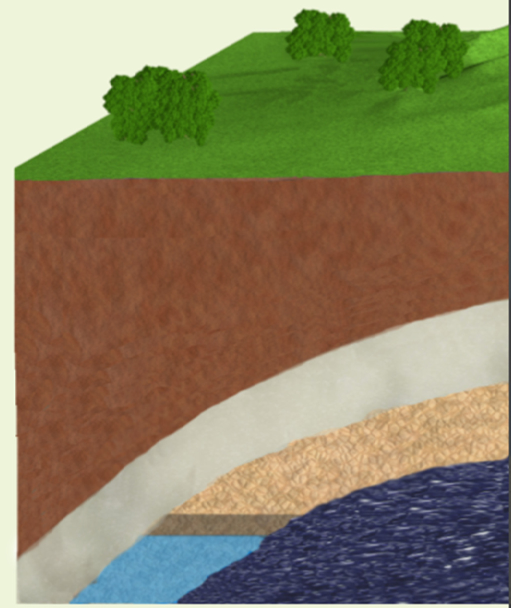
As shown at right, we operate two basic types of wells in our natural gas storage fields.

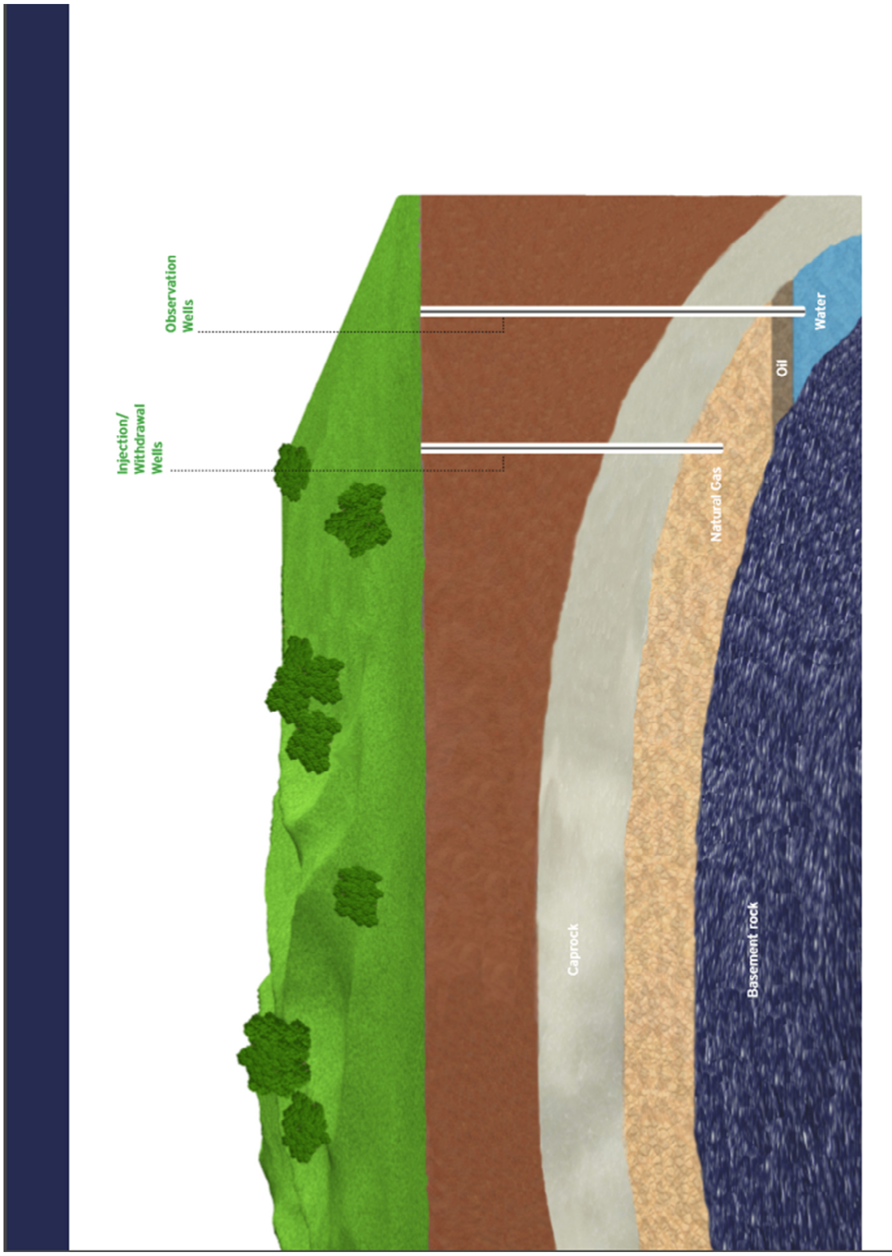
❶ INJECTION/WITHDRAWAL WELLS

Functioning in the upper level of the reservoir and at shorter depths, these wells are used for withdrawing natural gas from storage. Many of these wells are also used to inject natural gas into the storage zone.

❷ OBSERVATION WELLS

Observation wells are used for monitoring reservoir pressures and the integrity of the caprock.





Observation Wells
Injection/ Withdrawal Wells
Caprock
Natural Gas
Basement rock
Oil
Water

OPERATING THE UNDERGROUND STORAGE FACILITY

Storage operations are activated on orders from our gas control center to specific storage fields. Customarily, storage is required for seasonal load balancing: injecting summer supplies of gas underground to be held in reserve for winter withdrawal.

INJECTION

Storage operations are activated on orders from our natural gas control center to specific storage fields. Customarily, storage is required for "seasonal load balancing": injecting summer supplies of natural gas underground to be held in reserve for winter withdrawal.

SCRUBBING

As natural gas comes from the pipeline, it is run through intake scrubbers to remove any liquids that may have accumulated in the pipeline and might damage the compressors. Only natural gas that meets set specifications is brought into our pipeline system and injected into our fields.

COMPRESSION

Gas supplied in transmission pipelines flows under pressures often ranging from 250 pounds to 1,030 pounds per square inch (psi). The pressure in the underground storage reservoir, however, can be up to three or four times higher. To force the natural gas a mile or more down into the porous rock, it must be compressed to 1,500 psi (103 bars) or higher. This function is handled in two stages. Initially, high horsepower engines boost the pressure up to 800 to 1,500 psi (55 to 103 bars), significantly raising the temperature of the natural gas, since compression generates heat. To increase compression efficiency, the natural gas is next sent through cooling equipment before the second compression stage boosts it to 1,500 to 3,900 psi (103 to 270 bars), completing the process.

Before injection, the compressed natural gas will again be cooled to protect pipelines and other equipment in the storage field.

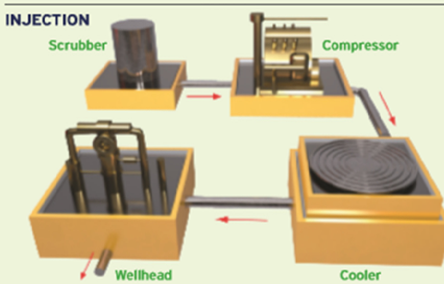
COOLING

Most of our storage facilities use the unique cooling system known as a "fin-fan." Appropriately named, each cooler contains a set of giant fan blades, whose rapid rotation pulls cool air across a system of tubes containing the natural gas. The tubes are wrapped with thin aluminum "fins" that assist in the cooling.

THE WELLHEAD

Generally referred to as a "Christmas tree," this collection of piping and valves controls all natural gas movement in and out of the storage wells. The Christmas tree controls are easily accessible to the crews which operate them during injection and withdrawal of natural gas.

INJECTION



WITHDRAWAL

Just as in storage injection, the signal to commence withdrawal of natural gas from storage is relayed to the field from our main natural gas control center. Withdrawal is usually ordered to meet heavy customer demand (1) throughout the cold, rainy winter season; (2) on air pollution episode days; or (3) during peak-load conditions when natural gas from storage augments the volumes constantly flowing in from out-of-state suppliers.

THE WELLHEAD

To start withdrawal, valves at the well site must be opened. Both injection/withdrawal wells and oil wells can be used to withdraw natural gas supplies, although the percentage of natural gas produced by the oil wells is limited.

SEPARATORS

When natural gas is withdrawn from the field, it generally flows under its own pressure directly into special vessels which separate most of the oil and water from the natural gas coming out of storage. Since natural gas is lighter than the accompanying fluids, it rises in the vessels, where it is collected for cooling. The oil and water left behind are separated, with the oil stored in tanks to be sold and the water stored for disposal or reinjected in the ground.

COOLING AND DEHYDRATION

When natural gas is removed from underground storage, it brings along petroleum liquids, water vapor and the hot temperatures from the earth a mile or two below. The natural gas is cooled by running it through a cooling system, and any free liquids are removed by another scrubber. Next, triethylene glycol, a substance similar to the ethylene glycol used as antifreeze in automobile cooling systems, is used to remove water vapor from the natural gas via a process known as dehydration.

ODORIZING

Natural gas is normally odorless. Its characteristic aroma is man-made for safety reasons and after its stay underground, the natural gas loses some of its manufactured scent. To give it that characteristic odor so important in detecting leaks, we add a drop of chemicals (as much as (1) 8-ounce cup per million cubic feet) just before delivering the natural gas into our distribution lines.

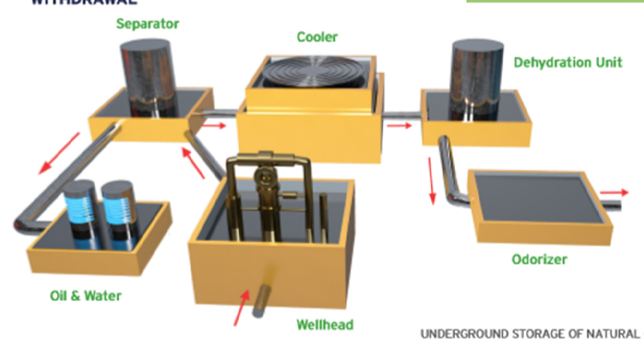
Just as in storage injection the signal to commence withdrawal of natural gas from storage is relayed to the field from our main natural gas control center. Withdrawal is usually ordered to meet heavy customer demand

1 throughout the cold, rainy winter season;

2 on air pollution episode days; or

3 during peak-load conditions when natural gas from the storage augments the volumes constantly flowing in from out-of-state suppliers.

WITHDRAWAL



SOCALGAS UNDERGROUND STORAGE SITES

SoCalGas, operates four underground storage fields. Each facility has been developed due to unique geological characteristics, which makes it ideal for natural gas storage. The work done at these sites performs an essential function for all of our natural gas customers in the Southern California area. We work to meet our customers' needs in a safe and environmentally sound manner, thereby assuring the continuance of good neighbor relations with surrounding residents.

FACTS ABOUT NATURAL GAS

NATURAL GAS HAS SOME IMPORTANT PROPERTIES:

- It is colorless and odorless. We add the distinctive smell to natural gas as a safety precaution.
- It is lighter than air, which is an important built-in safety feature. If natural gas should escape outside, it will rise and dissipate harmlessly into the atmosphere.
- It is the cleanest burning of all hydrocarbon fuels.
- It will burn only when specific concentrations come in contact with an ignition source.

A TRADITION OF SERVICE

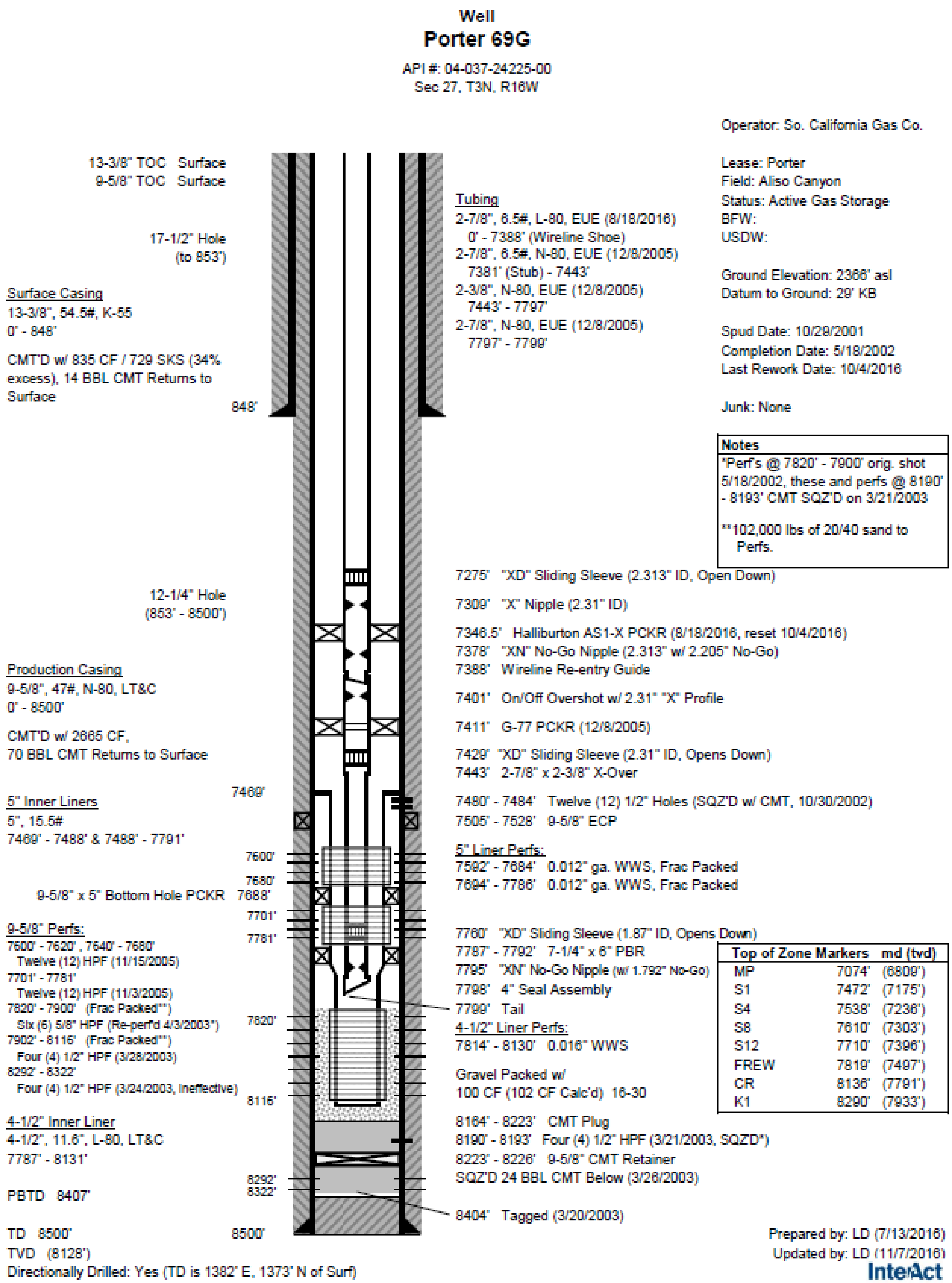
SoCalGas has a long tradition of providing dependable service to homes, business and industries in over 530 communities in a twelve-county area.

As the largest natural natural gas distribution company in the nation, we serve most of Central and Southern California. Providing safe, reliable and efficient natural gas service to meet this vast and fluctuating energy demand requires a highly responsive distribution system of more than 45,000 miles (83,000 kilometers) of natural gas main. The underground storage of natural gas plays a vital role in balancing the region's energy supply and demand.

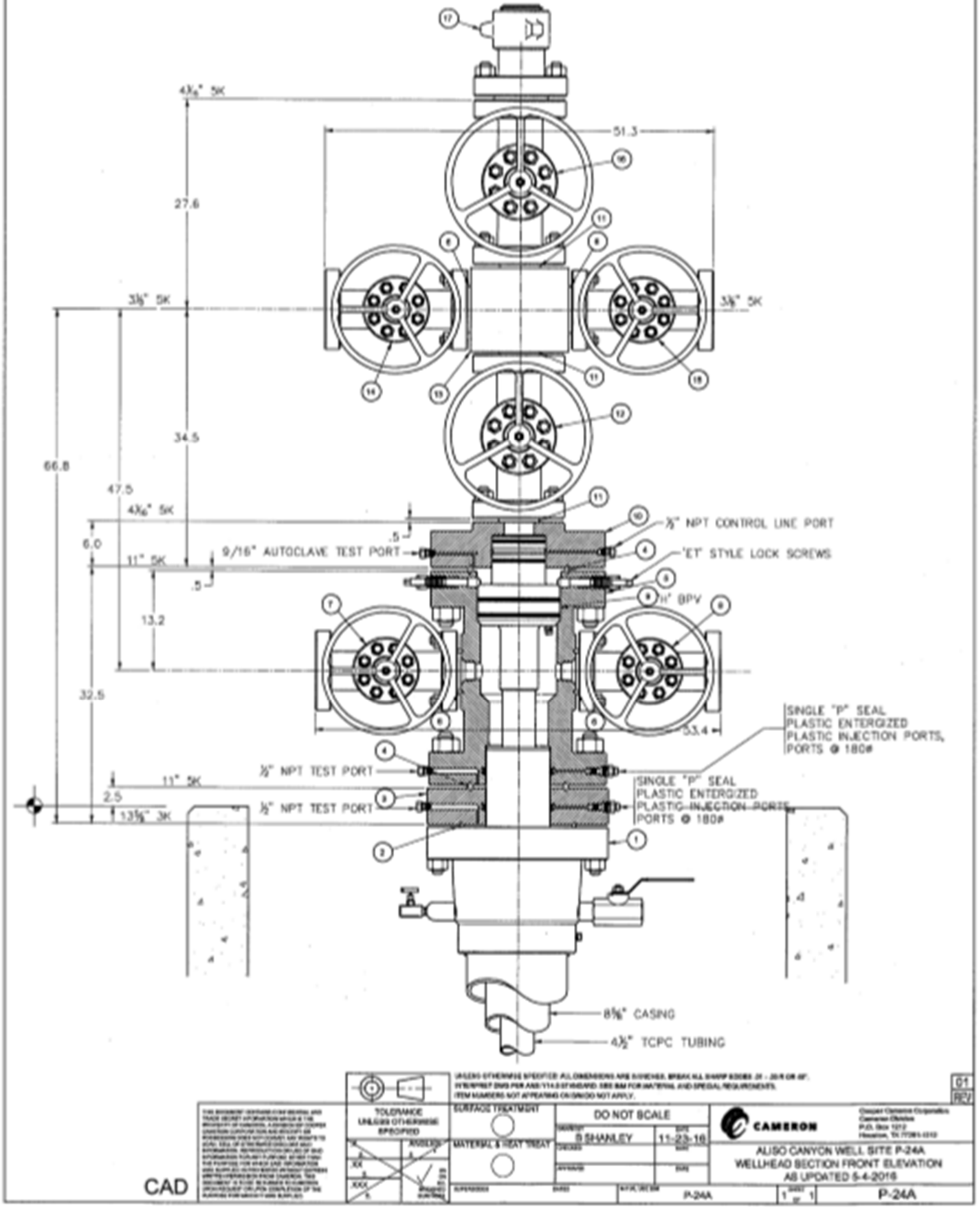
SAFETY FIRST

Safety has always been a top priority with us. The technology to monitor and operate an underground natural gas storage field has developed steadily through the years. In addition, all of our operations are closely monitored for compliance with the safety standards of the California Public Utilities Commission, the Division of Oil, Gas, & Geothermal Resources, the Occupational Safety and Health Administration, and local fire departments.

APPENDIX B – Downhole Schematic and Wellhead Diagram



WELL P-24A



4 1/16" 5K
51.3
27.6
3 1/8" 5K
3 1/8" 5K
34.5
66.8
47.5
4 1/16" 5K
1/2" NPT CONTROL LINE PORT
6.0
9/16" AUTOCLAVE TEST PORT
'ET' STYLE LOCK SCREWS
11" 5K
H' BPV
13.2
32.5
53.4
SINGLE "P" SEAL
PLASTIC ENTERGIZED
PLASTIC INJECTION PORTS,
PORTS @ 180#
1/2" NPT TEST PORT
11" 5K
2.5
1/2" NPT TEST PORT
13 5/8" 3K
8 5/8" CASING
4 1/2" TCPC TUBING
TOLERANCE UNLESS OTHERWISE SPECIFIED
SURFACE TREATMENT
MATERIAL & HEAT TREAT
DO NOT SCALE
B SHANLEY
11-23-16
CAMERON
ALISO CANYON WELL SITE P-24A
WELLHEAD SECTION FRONT ELEVATION
AS UPDATED 5-4-2016
P-24A
P-24A
CAD

SCG 2019 GRC Testimony Revision Log – December 2017

Exhibit	Witness	Page	Line	Revision Detail
SCG-10	Neil Navin	NPN-26		Removed footnote 20 which stated, "During the updating of these estimates for expected O&M cost and final preparation of this testimony it was found that the forecast of the noise and temperature log expenses were included in Underground Storage O&M as well as SIMP O&M. This costs should have only been identified for SIMP O&M and did not affect the TY 2019 forecasts."
SCG-10	Neil Navin	NPN-5		Updated Table NPN-6 Summary of Ramp Capital Overlay. SCG-9 Climate Change Adaptation 2018 and 2019 estimates updated from 10,500 and 1,000 to 11,500 and 2,000, respectively. SCG-11 Catastrophic Event related to Storage Well Integrity 2017 estimate updated from "118,870" to "134,870". In addition, totals for 2017, 2018 and 2019 estimates updated from "128,270", "130,995" and "112,601" to "144,270", "131,995" and "113,601", respectively.
SCG-10	Neil Navin	NPN-12		Updated Table NPN-13 Summary of Capital Related RAMP costs, **SCG-9 Climate Change Adaptation**. 00419C.001, RAMP - Base - ALISO CANYON-FERNANDO FEE 32 SLOPE STABILITY - 2018 and 2019 estimates updated from "0" and "0" to "1,000" and "1,000", respectively. In addition, totals for 2018 and 2019 estimates updated from "10,500" and "1,000" to "11,500" and "2,000", respectively.
SCG-10	Neil Navin	NPN-12		Updated Table NPN-13 Summary of Capital Related RAMP costs, **SCG-11 Catastrophic Event related to Storage Well Integrity**. 00412B.001, RAMP - Base - C2 - WELL PLUG & ABANDON – 2017 estimate updated from "22,900" to "38,900". In addition, total for 2017 estimates updated from "118,870" to "134,870".
SCG-10	Neil Navin	NPN-iii		Updated Table NPN-1 Southern California Gas Company Underground Storage O&M 2016 Adjusted-Recorded (000s) Total Non-Shared Services

Exhibit	Witness	Page	Line	Revision Detail
				from 45,693 to 45,853. This reflects an adjustment in 2016 SIMP O&M to recorded actuals from the original adjustment of recorded Jan-Oct plus estimated Nov-Dec. Note 70 of Aliso-Related exclusions were moved from 2US000.000 to 2US002.000. However this does not affect the overall O&M total 2016 adjusted-recorded.
SCG-10	Neil Navin	NPN-1		Updated Table NPN-3 Southern California Gas Company Underground Storage O&M 2016 Adjusted-Recorded (000s) Total Non-Shared Services from 45,693 to 45,853. This reflects an adjustment in 70 of Aliso-Related exclusions from 2US000.000 to 2US002.000 -RSIMP; and 2016 RSIMP O&M to recorded actuals from the original adjustment of recorded Jan-Oct plus estimated Nov-Dec.
SCG-10	Neil Navin	NPN-5		Updated Table NPN-5 Southern California Gas Company Summary of RAMP O&M Overlay 2016 in two places (1) Embedded Base Costs (000s) SCG-11 Catastrophic Event related to Storage Well Integrity from 4,112 to 16,163. This reflects an adjustment from assigning all SIMP 2016 O&M recorded from incremental to embedded. (2) TY2019 Estimated Incremental (000s) SCG-11 Catastrophic Event related to Storage Well Integrity from 18,910 to 6,589. This also reflects moving 12,051 2016 SIMP recorded O&M from incremental to embedded, thus reducing the forecasted 2019 incremental to 6,859.
SCG-10	Neil Navin	NPN-7		Updated Table NPN-8 Southern California Gas Company Summary of O&M Excluded Aliso-Related Costs in two places (1) 2US000.000 Underground Storage 2016 Adjustments (000s) from -90,089 to -90,019. (2) 2US002.000 Underground Storage – RSIMP 2016 Adjustments (000s) from 0 to -70. This reflects an inadvertent removal of 70 in Aliso-Related costs in 2US000.000 that should have been removed from 2US002.000. Therefore the overall adjustment from NPN O&M in Aliso-Related costs was correctly recorded as -91,562 in the original testimony and related workpapers.

Exhibit	Witness	Page	Line	Revision Detail
SCG-10	Neil Navin	NPN-11		Updated Table NPN-12 Southern California Gas Company Summary of Related O&M RAMP Costs 2016 to add a line item for 2US002.000 with two associated updates (1) Embedded Base Costs (000s) is now 12,051 instead of 0. This reflects an adjustment from assigning all SIMP 2016 O&M recorded from incremental to embedded. (2) TY2019 Estimated Incremental (000s) SCG-11 Catastrophic Event related to Storage Well Integrity from 18,910 to 6,589. This also reflects moving 12,051 2016 SIMP recorded O&M from incremental to embedded, thus reducing the forecasted 2019 incremental to 6,859.
SCG-10	Neil Navin	NPN-18		Updated Table NPN-14 Southern California Gas Company Non-Shared O&M Summary of Costs 2016 Adjusted-Recorded (000s) in two places (1) A. Underground Storage and Aboveground Storage from 33,243 to 33,323 and (2) C. Underground Storage – RSIMP from 11,971 to 12,051. The associated Change (000s) column for each category also changed from 5,456 to 5,376 in A. and from 6,939 to 6,859 in C. This reflects an adjustment of Aliso-Related exclusions from A. to C. and an adjustment in 2016 SIMP O&M to recorded actuals from the original adjustment of recorded Jan-Oct plus estimated Nov-Dec.
SCG-10	Neil Navin	NPN-25		Updated Table NPN-16 Southern California Gas Company Underground Storage O&M 2016 Adjusted-Recorded (000s) C. Underground Storage – RSIMP from 11,971 to 12,051. This reflects an adjustment in 2016 SIMP O&M to recorded actuals from the original adjustment of recorded Jan-Oct plus estimated Nov-Dec, and a removal of 70 in Aliso-Related costs inadvertently removed from A. Underground Storage and Aboveground Storage.