
QUESTION 1: In the Angeles Link Phase 1 Hydrogen Leakage Assessment Final Report ("Leakage Assessment") at 4-3, SoCalGas states, "Liquid storage was not evaluated for this Study."

Provide a rationale for why the leakage potential from liquid hydrogen storage was not evaluated in the Leakage Assessment.

RESPONSE 1:

SoCalGas objects to this request on the grounds it is unduly burdensome to the extent this information is equally available to the requesting party. Subject to and without waiving the foregoing objection, SoCalGas responds as follows.

As noted in the Hydrogen Leakage Assessment (Leakage Assessment) at page 4-3, "This Study focused on leakage as it pertains to storage of hydrogen in gaseous form. Liquid storage was not evaluated for this Study."

<u>QUESTION 2:</u> Snapshot 3 at 4-15 of the Leakage Assessment describes leakage rates of 0.24% to 0.52% for “various scenarios, including electrolytic production with full recombination of hydrogen from purging and crossover venting, and CCUS-enabled production.”

Are there industry standards or regulatory requirements that require the use of recombination of hydrogen from purging and crossover venting or have hydrogen producers testified that purging and crossover venting has been or will be used as a best management practice for electrolytic hydrogen production? If so, describe the standards, requirements, or testimony that was provided.

<u>RESPONSE 2:</u>

SoCalGas objects to this request on the grounds it is unduly burdensome to the extent this information is equally available to the requesting party. Subject to and without waiving the foregoing objection, SoCalGas responds as follows.

Regulatory requirements related to hydrogen leakage are discussed in Section 3.3 “Regulatory Requirements.” At present, neither industry standards nor regulatory requirements require the recombination of hydrogen from purging and crossover venting. However, as discussed at page 4-4, “sources of potential leakage can be mitigated by routing the hydrogen for recompression into the process stream.” This datapoint is underscored by the Frazer- Nash Consultancy study (Frazer-Nash Study) entitled “Fugitive Hydrogen Emissions in a Future Hydrogen Economy,” which is referenced throughout the Leakage Assessment (see Section 9.0 References). The Frazer-Nash Study states that it would be relatively easy to incorporate technology to recombine the hydrogen purged and vented due to cross-over back into water. As electrolytic hydrogen production is scaled up, it will become more feasible to incorporate this technology.

QUESTION 3: In the Leakage Assessment at 4-24, SoCalGas states, "To prepare a preliminary high-level estimate of the potential for leakage associated with general hydrogen infrastructure, the leakage estimates provided in the literature for production, compression, aboveground storage, underground storage, and transmission, as shown in snapshots 3, 4, 5, and 6, were compiled. Additionally, the value of 1% leakage rate provided by stakeholder comment for aboveground storage was utilized. The median and mean of these 25 values were calculated and determined to be 0.24% and 0.92%, respectively."

a. Describe how the methodology of using the median and average leakage rates across the different infrastructure components (e.g., production, compression, above and belowground storage, and transmission) as the general hydrogen infrastructure leakage rate was developed.

b. Provide information, including any supporting documentation, regarding the validity of the 1% leakage rate for aboveground storage that was provided by stakeholder comment.

c. Did SoCalGas consider a scenario that utilizes a reasonable maximum leakage from each infrastructure component or from the system as a whole as opposed to the median and average estimates?

RESPONSE 3:

SoCalGas objects to this request on the grounds it is unduly burdensome to the extent this information is equally available to the requesting party. Subject to and without waiving the foregoing objection, SoCalGas responds as follows.

a. See page 4-24 "Preliminary Leakage Estimate" of the Leakage Study for discussion of high-level estimate of potential leakage. The two methods considered were total value chain approach (top down) and component-count level approach (bottom-up). See Section 2.1.1 "Technical Approach" at page 2-2, which describes the two options considered to develop leakage estimates, and 2.1.2 "Calculation Methodology" at page 2-5 of the Leakage Assessment.

b. See Section 4.2 "Leakage Estimation Methodologies" starting at page 4-5. Technical references provided by stakeholders are provided in Section 7.0 "Stakeholder Feedback," including a summary of literature provided by stakeholders. See also Table 5: "Summary of Incorporated Stakeholder Feedback." Additional technical reference materials are cited in Section 9.0 "References."

c. See Response 3.a. and 3.b. above.

QUESTION 4: In the Leakage Assessment at 4-17, SoCalGas describes leakage rates for third party production being "predicted with a 50% confidence level, representing expected leakage under standard conditions" and "with a 99% confidence level, indicating the upper threshold of potential leakage in less optimized scenarios." The 50% confidence level and 99% confidence levels are also used to describe leakage estimates for aboveground and underground storage at 4-21.

Clarify the interpretation of the values associated with the 50% and 99% confidence intervals, such as whether the rates described with the "50% confidence level" represent the central estimate and the rates described with the "99% confidence level" represent the upper bounds of the 99% confidence interval.

RESPONSE 4:

SoCalGas objects to this request on the grounds it is unduly burdensome to the extent this information is equally available to the requesting party. Subject to and without waiving the foregoing objection, SoCalGas responds as follows.

The specific confidence levels are derived from the Frazer-Nash Study in which a probabilistic model was used to predict emissions at different confidence levels. (See Leakage Assessment, Section 9.0 "References").

The model provides predictions at different confidence levels allowing for uncertainty in the inputs. The values of 50% confidence (central estimate) and 99% confidence (credible maximum) are used throughout the study to highlight the most likely and upper limit of the emissions, respectively.

QUESTION 5: In the Leakage Assessment at 4-21, SoCalGas describes the leakage rates of 1%, 2.77%, and 6.52% for aboveground storage and 0.02% and 0.06% for underground storage.

In the GHG Assessment at 5.3, SoCalGas states, "Data from 2022 from the "2023 California Gas Report Supplement" was used to estimate a California-specific value for the fraction of annual hydrogen demand that would be stored… it was assumed that annually 13.8% of hydrogen demand would be stored."

a. Did SoCalGas consider using 13.8% of the total annual hydrogen throughput as the basis for determining leakage from aboveground or underground hydrogen storage for the Angeles Link project?

b. Given the wide disparity in leakage rates between aboveground and underground storage, did SoCalGas consider separate leakage scenarios for aboveground versus underground hydrogen storage? If so, describe the scenarios.

RESPONSE 5:

SoCalGas objects to this request on the grounds it is unduly burdensome to the extent this information is equally available to the requesting party. Subject to and without waiving the foregoing objection, SoCalGas responds as follows.

a. No.

b. Yes, see the following in the Leakage Assessment:
   - Page 4-21, Section 4.2.2 "Published Studies Regarding Hydrogen Leakage," "Third Party Storage," and subsections "Aboveground Storage" and "Underground Storage."
   - Page 4-25, Section 4.3 "High-Level Preliminary Leakage Estimate" Table 2A: "Preliminary Leakage Estimate for General Infrastructure" and Table 3B: "Preliminary Leakage Estimate for Angeles Link Infrastructure." Table 2A and 3B provide leakage estimates based on the Low Throughput, Medium Throughput and High Throughput scenarios.

QUESTION 6: In the Leakage Assessment at 4-24, SoCalGas states "To prepare a preliminary high-level estimate of the potential for leakage associated with anticipated Angeles Link hydrogen infrastructure, the leakage estimates provided in the literature for compression and transmission as shown in snapshots 4 and 6 were compiled. The median and mean of these 10 values were calculated and determined to be 0.17% and 0.27%, respectively."

a. Describe how the methodology of using the median and average leakage rates across the different infrastructure components (e.g., production, compression, above and belowground storage, and transmission) as the Angeles Link hydrogen infrastructure leakage rate was developed.

b. Did SoCalGas consider a scenario that utilizes a reasonable maximum leakage from each infrastructure component or from the Angeles Link system as a whole as opposed to the median and average estimates?

RESPONSE 6:

SoCalGas objects to this request on the grounds it is unduly burdensome to the extent this information is equally available to the requesting party. Subject to and without waiving the foregoing objection, SoCalGas responds as follows.

a. See Section 2.1.2 "Calculation Methodology" at page 2-5.

b. No.

<u>QUESTION 7:</u> In the Leakage Assessment at 4-26, SoCalGas states, "Although detailed reduction estimates have not been provided for each mitigation opportunity described, based on the potential mitigation measures identified, the overall reductions could be more than 90% from assumed leakage rates in the literature."

a. Clarify whether this 90% emission reduction from the rates assumed in literature is applicable to leakage rates across the general hydrogen infrastructure (i.e., Production, Compression, Storage, and Transmission) or is specific to the Angeles Link infrastructure (Compression and Transmission).

b. Describe how the estimation of 90% emission reductions from the rates assumed in literature was derived. Consider the cumulative leakage across the infrastructure segments for which this statistic applies (general infrastructure or Angeles Link infrastructure.)

<u>RESPONSE 7:</u>

SoCalGas objects to this request on the grounds it is unduly burdensome to the extent this information is equally available to the requesting party. Subject to and without waiving the foregoing objection, SoCalGas responds as follows.

a. As noted on page 6-2: "The selection of available mitigation measures for equipment and systems that comprise Angeles Link infrastructure will determine the overall reductions. Based on the potential mitigation measures identified, the overall reductions can be more than 90%."

b. See Section 4.4 "Opportunities to Minimize Leakage" starting at page 4-26 and specifically Table 4. SoCalGas used the range of emission reductions from 89 to 100% and determined that 90% was a conservative representation of leakage range.

QUESTION 8: In the Angeles Link Phase 1 Greenhouse Gas ("GHG") Emissions Evaluation Final Report ("GHG Report") at 1.2, SoCalGas states, "The GHG emissions associated with water procurement, water conveyance, and water treatment for production of hydrogen were not included in the scope of this Study."

Footnote 7 at 1.2 of the GHG Report states, "The GHG emissions associated with water conveyance for production of hydrogen were also outside the scope of the parallel Angeles Link Phase 1 Water Resources Evaluation due to the variety of potential water supply sources and unknown final selection of sources third-party producers may pursue to produce clean renewable hydrogen. In response to stakeholder feedback on potential GHG emissions associated with water supply development, the Water Resources Evaluation added a supplemental desktop analysis of potential GHG emissions associated with water supply treatment and conveyance and that analysis is now included as part of that separate study." (GHG Emission Evaluation at 1.2)

a. Provide the range of GHG emissions intensity for the combined procurement, conveyance, and treatment of water for the production of hydrogen per gallon of water, or an equivalent unit, and per kilogram of hydrogen produced, or an equivalent unit, as discovered in supplemental desktop analysis.

b. Describe the sources of water that were evaluated in the desktop analysis and the respective GHG emissions intensities for the procurement, conveyance, and treatment of each water source evaluated.

RESPONSE 8:

SoCalGas objects to this request on the grounds it is unduly burdensome to the extent this information is equally available to the requesting party. SoCalGas objects to this request to the extent it seeks information that is not readily available and would impose an undue burden on SoCalGas by requiring it to perform additional analysis that does not currently exist. Subject to and without waiving the foregoing objections, SoCalGas responds as follows.

a. SoCalGas did not evaluate the range of GHG emissions intensity for the combined procurement, conveyance, and treatment of different water sources for the production of hydrogen per gallon of water, as that was beyond the scope of the feasibility study for Phase 1 Angeles Link. As noted in the Water Resources Evaluation (WRE), Chapter 5, the Supplemental Desktop Analysis provided a high-level desktop analysis of potential GHG emissions associated with water conveyance and treatment of water. See "Supplemental Desktop Analysis – Greenhouse Gas Emissions Associated with Water Treatment and Conveyance" at page 5-1.

b. See Response 8a above.

QUESTION 9: In the GHG Report at 1.3, SoCalGas states, "GHG estimates were calculated using initial estimates from the Demand Study. Then the ratio of anticipated hydrogen throughput values for Angeles Link to the projected values in the Demand Study were calculated for each of the conservative (26.85%), moderate (31.12%), and ambitious (25.36%) scenarios. The ratios were applied to the GHG estimated emissions using the Demand Study Scenarios to estimate potential GHG emission reductions associated with Angeles Link Throughput Scenarios."

Because specific end users have not been selected to receive hydrogen from the Angeles Link pipeline, and the Angeles Link pipeline has been designed to meet a portion of the demand calculated under the conservative, moderate, and ambitious scenarios, the actual delivery of hydrogen by sector will potentially not be proportional to the portion of the hydrogen demand projected within each sector.

a. Using the Mobility Direct GHG Combustion Emission Reductions presented in Table 6 at 5.7, estimate the GHG emission reductions that would be achieved by the Angeles Link pipeline if the projected hydrogen throughputs, 0.5 MTPY and 1.5 MTPY respectively, were to be utilized entirely by the mobility sector.
    i. Include estimates for the moderate demand and throughput scenario if the data is available.

b. Using the Power Generation Direct GHG Combustion Emission Reductions under the conservative and ambitious demand scenarios presented in Table 7 at 5.10, estimate the GHG emission reductions that would be achieved by the Angeles Link pipeline if the projected hydrogen throughputs, 0.5 MTPY and 1.5 MTPY respectively, were to be utilized entirely by the power generation sector.
    i. Include estimates for the moderate demand and throughput scenario if the data is available.

c. Using the Hard-to-Electrify Industrial Direct GHG Combustion Emission Reductions presented in Table 8 at 5.14, estimate the GHG emission reductions that would be achieved by the Angeles Link pipeline if the projected hydrogen throughputs, 0.5 MTPY and 1.5 MTPY respectively, were to be utilized entirely by the industrial sector. Assume any remaining hydrogen throughput is utilized by the power generation sector and present the combined emission reductions.
    i. Include estimates for the moderate demand and throughput scenario if the data is available.

d. Using the Hard-to-Electrify Industrial Direct GHG Combustion Emission Reductions presented in Table 8 at 5.14, estimate the GHG emission reductions that would be achieved by the Angeles Link pipeline if the projected hydrogen throughputs, 0.5 MTPY and 1.5 MTPY respectively, were to be utilized entirely by the industrial sector. Assume any remaining hydrogen throughput is utilized by the mobility sector and present the combined emission reductions.
    i. Include estimates for the moderate demand and throughput scenario if the data is available.

RESPONSE 9:

SoCalGas objects to this request to the extent it seeks information that is not readily available and would impose an undue burden on SoCalGas by requiring it to perform additional analysis that does not currently exist. Subject to and without waiving the foregoing objection, SoCalGas responds as follows.

a. - d. The GHG Study relies upon the Demand Study and Angeles Link throughput scenarios to provide a reasonable range of GHG estimates. A midpoint between the low and high values would not provide greater detail than the projected range and as such, was not developed as a part of the GHG Study.

QUESTION 10: In the NOx and other Air Emissions Assessment Final Report ("NOx Assessment") at 1.2 and 1.3, SoCalGas states, "To estimate the potential NOx emissions associated with the project, including those from not just transmission of hydrogen, but also from third-party production and third-party storage as well as end users, emissions were calculated using the Demand Study data. The ratio of anticipated hydrogen throughput values for Angeles Link to projected values in the Demand Study were then calculated for each of the conservative (26.85%), moderate (31.12%), and ambitious (25.36%) scenarios. These ratios were then applied to the NOx and other pollutants estimated emissions using the Demand Study scenarios to determine NOx and other pollutants estimates associated with Angeles Link Throughput Scenarios."

Because specific end users have not been selected to receive hydrogen from the Angeles Link pipeline, and the Angeles Link pipeline has been designed to meet a portion of the demand calculated under the conservative, moderate, and ambitious scenarios, the actual delivery of hydrogen by sector will potentially not be proportional to the portion of the hydrogen demand projected within each sector.

a. Using the Mobility NOx Emissions (ton/year) Reductions for Each Demand Scenario presented in Table 15 at 7.10, estimate the NOx emission reductions that would be achieved by the Angeles Link pipeline if the projected hydrogen throughputs, 0.5 MTPY, 1.0 MTPY, and 1.5 MTPY respectively, were to be utilized entirely by the mobility sector.

b. Using the Power Generation NOx Emissions (ton/year) Reductions for Each Demand Scenario presented in Table 18 at 7.15, estimate the NOx emission reductions that would be achieved by the Angeles Link pipeline if the projected hydrogen throughputs, 0.5 MTPY, 1.0 MTPY, and 1.5 MTPY respectively, were to be utilized entirely by the power generation sector.

c. Using the Hard to Electrify Industrial NOx Reductions (ton/year) for Each Demand Scenario presented in Table 19 at 7.19, estimate the NOx emission reductions that would be achieved by the Angeles Link pipeline if the projected hydrogen throughputs, 0.5 MTPY, 1.0 MTPY, and 1.5 MTPY respectively, were to be utilized entirely by the industrial sector. Assume any remaining hydrogen throughput is utilized by the power generation sector and present the combined emission reductions.

d. Using the Hard to Electrify Industrial NOx Reductions (ton/year) for Each Demand Scenario presented in Table 19 at 7.19, estimate the NOx emission reductions that would be achieved by the Angeles Link pipeline if the projected hydrogen throughputs, 0.5 MTPY, 1.0 MTPY, and 1.5 MTPY respectively, were to be utilized entirely by the industrial sector. Assume any remaining hydrogen throughput is utilized by the mobility sector and present the combined emission reductions.

RESPONSE 10:

SoCalGas objects to this request on the grounds that it seeks information that is not readily available and would impose an undue burden on SoCalGas by requiring it to perform additional analysis that does not currently exist.

QUESTION 11: In the GHG Report at 3.3, SoCalGas states, “Reciprocating or centrifugal compressors would be fueled by clean renewable hydrogen and would not produce CO2.”

Figure A-2 of the GHG Report Appendix A at A.8 describes that the “Fraction of Gas Consumed to Energize the Pumps Corresponds to the Relative Energy Consumption of the Transported Gas.”

The Preliminary Routing/Configuration Analysis Final Report (“Routing Analysis”) details Preferred Routes A through D at 60 through 63 which range from 390 miles to 481 miles (or 627 km to 774 km). According to Figure A-2 of the GHG Report, the compressors necessary to transport hydrogen this distance would consume roughly 7% of the initial hydrogen gas.

a. Was the hydrogen consumption needed to power the Angeles Link compressors accounted for in the Final Production Planning & Assessment Final Report (“Production Report”), the Final High-Level Economic Analysis & Cost Effectiveness Final Report (“Cost Effectiveness Report”), or any other of the reports generated for the Angeles Link Phase 1 analysis?

b. Describe how similar compressors used in SoCalGas’s transmission pipelines for natural gas are powered, whether that be via the existing fuel stream (e.g., natural gas for natural gas pipelines), grid or renewable electricity, or another power source.

    i. If a variety of power sources are used across different natural gas compressor systems, provide an estimate of the prevalence of each power type used and describe the design factors that determine what power source is utilized for a given compressor.

    ii. Are the power sources for the compressor systems used for the Angeles Link transmission pipelines likely to be designed according to similar factors as the natural gas compressor systems? If not, what other considerations will be made?

RESPONSE 11:

SoCalGas objects to this request on the grounds it is unduly burdensome to the extent this information is equally available to the requesting party. Subject to and without waiving the foregoing objection, SoCalGas responds as follows.

a. Hydrogen consumption that could be used to power the Angeles Link compressors was accounted for in the following studies:

    - The GHG Study. See page 3.7, Section 3.5 “Calculation Methodology” and pages 5.2 to 5.5, Section 5.1.2 “Storage (Third-Party) and Transmission.”
    - The NOx and other Air Emissions Assessment – Final Report (NOx Study). See page 3.3.
    - The Leakage Assessment. See page 6-1.

    The Production Study did not include potential hydrogen consumption to power Angeles Link compressors. The Cost Effectiveness Study assumes all-electric compression.

b. SoCalGas further objects to this request under Rule 10.1 of the Commission's Rules of Practice and Procedure to the extent it seeks the production of information that is neither relevant to the cost recovery issues in the pending proceeding nor is likely reasonably calculated to lead to the discovery of admissible evidence. Subject to and without waiving the foregoing objection, SoCalGas responds as follows.

   SoCalGas uses existing fuel streams from natural gas pipelines to power existing transmission compressor drivers.

   i. Most of SoCalGas' existing transmission compressors are natural gas fueled. SoCalGas has one proposed hybrid configuration (2 electric & 2 natural gas) compressor modernization project on the transmission pipeline system that is currently going through regulatory review. When selecting compressor equipment, SoCalGas considers a variety of design criteria including but not limited to, compression needs, grid power needs and availability, GHG and NOx emissions, and cost efficiency.

   ii. SoCalGas further objects to this request on the grounds that it seeks further analysis rather than information. Subject to and without waiving the foregoing objections, SoCalGas responds as follows.

      See Design Study Section 3.6.3. SoCalGas identified future engineering and design development considerations to be evaluated in Phase 2 to advance Angeles Link.

QUESTION 12: In the GHG Report at 5.1, SoCalGas states the study's assumption that "electrolyzers powered by renewable electricity: zero GHG emissions."

In Appendix B of the GHG Report at B.1, SoCalGas states, "At the time of this study, details regarding third-party production for new hydrogen infrastructure are not complete, and therefore it is not feasible to estimate Scope 3 greenhouse gas emissions for the specific processes." However, in Table B-1 at B.2, SoCalGas provides a Summary of Hydrogen Production Carbon Intensity Estimates from Existing Research for electrolysis, biomass gasification, and steam methane reforming, shown below.

Table B-1 Summary of Hydrogen Production Carbon Intensity Estimates from Existing Research

Production	Feedstock	Carbon Intensity Cradle-to-Gate (kg CO_2e/kg H2)	Study
Electrolysis	Renewable Electricity	0	GREET
Electrolysis	Solar-powered Electricity	2.3	Cho et al. 2022
Biomass Gasification	Not Specified	1.61	GREET
Biomass Gasification	Average of five biomass types	2.46	Cho et al. 2022
Steam Methane Reforming	Landfill Gas	3.57	Cho et al. 2022

a. Provide a supplement to Table 3 at 5.2 of the GHG Report, "Potential Direct GHG Emissions from Hydrogen Production Based on Demand Scenarios" that includes production scenarios of electrolysis with a feedstock of solar-powered electricity, biomass gasification according to GREET, and steam methane reforming with a feedstock of landfill gas using the emission factors shown in Table B-1.

b. Provide a supplement to Table 9 at 6.2 of the GHG Report, "Annual Change in Direct GHG Emissions for Demand Scenarios" that utilizes the production scenarios described in the previous part of this question in place of the production emissions within the Infrastructure category of Table 9.

RESPONSE 12:

SoCalGas objects to this request to the extent it seeks information that is not readily available and would impose an undue burden on SoCalGas by requiring it to perform additional analysis that does not currently exist.

QUESTION 13: In Section 3.4.1 of the NOx Assessment: Combustion of Displaced Fossil Fuels at 3.6, SoCalGas states, "Pollutant emission factors from the combustion of carbon-based fuels for various types of combustion equipment have been published by numerous sources. The EPA developed and continues to maintain their AP-42: Compilation of Air Emissions Factors from Stationary Sources."

AP-42 Chapter 1: External Combustion Sources and Chapter 3: Stationary Internal Combustion Sources feature both controlled and uncontrolled NOx emission factors for various combustion sources and fuel types.

In Section 3.4.2: Combustion of Hydrogen at 3.7, SoCalGas states, "regulatory emission limits and BACT/LAER will be the upper bound for future NOx emissions within the project geography."

a. Clarify whether the emission factors used to calculate the baseline emissions for displaced fossil fuels were uncontrolled emission factors detailed in AP-42, controlled emission factors detailed in AP-42, or the existing BACT/LAER emission standards.

b. If uncontrolled or controlled emission factors for AP-42 were utilized for displaced fossil fuels, but BACT/LAER emission factors were gathered to determine hydrogen combustion emissions, why were the existing BACT/LAER emission standards not similarly applied to existing combustion sources?

RESPONSE 13:

a. Individual BACT/LAER emission standards from local air districts were used to calculate emissions.

b. Not applicable; BACT/LAER was utilized for displaced fossil fuels.

QUESTION 14: In the NOx Assessment at 3.7, SoCalGas states, "Research conducted under this study searched for direct measurement NOx emissions data for pure hydrogen combustion, but very little test data is available, as few types of combustion units can effectively operate on pure 100% hydrogen fuel at this time. The direct measurement NOx emissions data from hydrogen combustion is available for various percentages of hydrogen within various equipment types and operated at a range of conditions and equivalence ratios."

In the NOx Assessment at 3.9, SoCalGas states, "For the purposes of this study, it was assumed that adjustments to the hydrogen combustion process such as lowering of combustion temperature and modifying air-to- fuel ratios, and technological advancements would be in place so permitted NOx emissions would stay the same or decrease with the combustion of hydrogen in equipment in the power generation and hard to electrify industrial sectors."

Describe whether, for the studies of direct measurement NOx emissions data from blended hydrogen combustion, the hydrogen blends achieved greater, equal, or lower NOx emissions as the equivalent non-hydrogen equipment.

RESPONSE 14:

SoCalGas objects to this request on the grounds it is unduly burdensome to the extent this information is equally available to the requesting party. Subject to and without waiving the foregoing objection, SoCalGas responds as follows.

The NOx Study found that there are not enough existing direct measurements of NOx emissions from combustion units at various hydrogen percentages and for each of the different equipment and burner types to utilize as representative of hydrogen combustion technology to quantify and compare categories of NOx emissions.

<u>QUESTION 15:</u> Table 4 of the NOx Assessment at 3.24 displays NOx emission factors for on- and off-road vehicles fueled by diesel or gasoline.

Clarify whether the emissions of natural gas on- and off-road vehicles were considered in the baseline assessment for the mobility sector NOx emissions.

<u>RESPONSE 15:</u>

SoCalGas objects to this request on the grounds it is unduly burdensome to the extent this information is equally available to the requesting party. Subject to and without waiving the foregoing objection, SoCalGas responds as follows.

Yes, emissions of natural gas on-and off-road vehicles were considered in the baseline assessment for the mobility sector. See Section 3.5.2.1 “Mobility Sector” at page 3.23.