APPLICATION OF SOUTHERN CALIFORNIA GAS COMPANY FOR ANGELES LINK PHASE 1 REASONABLENESS REVIEW (DATA REQUEST Cal PA-SCG-04)

Date Requested: January 13, 2026. Revised Requested: January 14, 2026
Submitted: January 28, 2026

QUESTION 1: Page 27 of the Angeles Link Phase 1 Pipeline Sizing & Design Criteria Final Report states, "It is assumed that the underground storage cavern is pre-charged with hydrogen such that any additional hydrogen stored by the operation can be fully retrieved by the system."

a. Explain what is meant by "pre-charged."
b. Explain what is meant by "any additional hydrogen stored by the operation."
c. Explain what is meant by stating hydrogen "can be fully retrieved by the system."

RESPONSE 1:

SoCalGas 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.

a. "Pre-charged" means that the underground storage cavern is assumed to contain an initial quantity of hydrogen serving as cushion gas to meet operating requirements.

b. "Any additional hydrogen stored by the operation" refers to hydrogen injected into the underground storage cavern in excess of the pre-charged cushion gas.

c. "Can be fully retrieved by the system" means that hydrogen injected in excess of the pre-charged cushion gas is assumed to be recoverable for withdrawal under normal operating conditions.

QUESTION 2: Page 29 of the Angeles Link Phase 1 Pipeline Sizing & Design Criteria Final Report states, “Figure 3 illustrates where potential third-party production could be as well as potential storage locations which may be developed in the future to support regional hydrogen producers and end users.” The inset legend for Figure 3 only includes Evaluated Corridors and Production areas. Where are the potential storage locations referenced in Figure 3?

RESPONSE 2:

SoCalGas 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. SoCalGas further 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 objections, SoCalGas responds as follows.

The potential storage locations referenced in the Pipeline Sizing & Design Criteria Study (Design Study) in Figure 3 at page 29 are described in the subsequent sentences of that paragraph. Please refer to the Angeles Link Phase 1 Production Planning & Assessment Study (Production Study) for additional information on underground storage locations.

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QUESTION 3: Page 31 of the Angeles Link Phase 1 Pipeline Sizing & Design Criteria Final Report states, “Figure 4 illustrates where potential third-party production could be as well as potential storage locations which may be developed in the future to support regional hydrogen producers and end users.” The inset legend for Figure 4 only includes Evaluated Corridors and Production areas. Where are the potential storage locations referenced in Figure 4?

RESPONSE 3:

SoCalGas 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. SoCalGas further 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 objections, SoCalGas responds as follows.

The potential storage locations referenced in the Design Study in Figure 4 at page 31 are described in the subsequent sentences of that paragraph. Please refer to the Production Study for additional information on underground storage locations.

QUESTION 4: Page 32 of the Angeles Link Phase 1 Pipeline Sizing & Design Criteria Final Report states, “Figure 5 illustrates where potential third-party production could be as well as potential storage locations which may be developed in the future to support regional hydrogen producers and end users.” The inset legend for Figure 5 only includes Evaluated Corridors and Production areas. Where are the potential storage locations referenced in Figure 5?

RESPONSE 4:

SoCalGas 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. SoCalGas further 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 objections, SoCalGas responds as follows.

The potential storage locations referenced in the Design Study in Figure 5 at page 32 are described in the subsequent sentences of that paragraph. Please refer to the Production Study for additional information on underground storage locations.

QUESTION 5: Page 33 of the Angeles Link Phase 1 Pipeline Sizing & Design Criteria Final Report states, "In all scenarios, the Central Zone (the area near the Ports of Los Angeles and Long Beach) has pipeline loops, allowing most of the lines in this area to be single lines. The Central Zone is represented in Figure 6. Once the main pipelines reach the Central Zone, the main pipeline(s) split, allowing them to cover more geographic areas that can serve as future demand takeoff points as hydrogen demand increases."

Does SoCalGas envision neighborhoods in immediate proximity to the Central Zone (Compton, Lynwood, South Gate, etc.) pipeline loops to have a higher likelihood of being future residential and commercial demand takeoff points as compared to neighborhoods farther away from the Central Zone (Beverly Hills, Santa Monica, West Covina, etc.) pipeline loops?

RESPONSE 5:

SoCalGas 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. SoCalGas further objects to this request on the grounds that it calls for speculation. Subject to and without waiving the foregoing objections, SoCalGas responds as follows.

Angeles Link is envisioned to serve hard-to-electrify sectors, including mobility, power generation, and industrial applications. SoCalGas does not anticipate that Angeles Link, including the Central Zone pipelines, will serve residential customers. See the Preliminary Routing/Configuration Analysis (Routing Analysis) for information about how Phase 1 routes were developed and future considerations. The Routing Analysis was conducted at a high-level and sought to identify broad directional pathways with the highest potential of achieving the purpose of the Angeles Link pipeline system. Subsequent Pre Front End Engineering Design (Pre-FEED) and FEED activities described in the Phase 2 Application will further inform route development. Please refer to the Angles Link Phase 2 Application (A.24-12-011) for additional information on subsequent evaluations.

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QUESTION 6: Table 4 at Page 55 of the Angeles Link Phase 1 Preliminary Routing/Configuration Analysis Final Report shows that the Central Zone segments are consistent across all Preferred Routes. Figure 13 through Figure 20 at Pages 35 through 42 similarly show no variation within the Central Zone segment routes across the eight analyzed scenarios.

a. Describe how the routing configuration for the Central Zone pipeline was developed.
    i. Include how the Central Zone route configuration was influenced by geography, land rights, environmental social justice/disadvantaged communities, and proximity to potential production and/or demand areas. Identify the relative importance of each of these factors in determining the preferred Central Zone pipeline route configuration.
b. Identify the locations of potential demand offtakers relative to the preferred Central Zone pipeline route on a map similar to that of Figure 24 of the Angeles Link Phase 1 Preliminary Routing/Configuration Analysis Final Report at 48.

RESPONSE 6:

SoCalGas 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. SoCalGas further objects to this request on the grounds it is unduly burdensome to the extent this information is equally available to the requesting party. SoCalGas also 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.

a. Please refer to the Routing Analysis at Section 2.3.1 – Agency Data Sets, Section 3.1.1 – Segment Analysis & Evaluation, and Section 7 - Future Considerations for information regarding how route configurations were developed and how various factors were considered The relative importance or weighting of features was not a component of Phase 1.

   Subsequent Pre-FEED and FEED activities in Phase 2 will further inform route development. Please refer to the Angeles Link Phase 2 Application (A.24-12-011) for additional information on subsequent evaluations.

b. The Routing Analysis considered potential demand based on industry type and geographic regions, as depicted in Figure 31. The locations of the Alliance for Renewable Clean Hydrogen Energy System (ARCHES) potential offtake sites, at the time the Routing Analysis was published (December 2024), can be found in Figures 27 through 30. In Phase 2, to inform FEED activities, SoCalGas proposes to build on the Phase 1 Demand Study and perform a more in-depth analysis to identify operational characteristics and geographical locations of potential end users to help inform the preferred route with more precision and defined throughput. Please refer to the Angels Link Phase 2 Application (A.24-12-011) for additional information on subsequent evaluations.

QUESTION 7: Page 55 of the Angeles Link Phase 1 Pipeline Sizing & Design Criteria Final Report states, “In most hydrogen pipeline service, hydrogen embrittlement occurs much more slowly, if at all.” This sentence cites as reference “DOE Hydrogen Program FY 2005 Progress Report 449, Contract Number: DE-FC36-04GO14229, Start Date: 9/1/04, Projected End Date: 3/31/2006. See also Xiao Xing, Mengshan Yu, Olayinka Tehinse, Weixing Chen, Hao Zhang "The Effects of Pressure Fluctuations on Hydrogen Embrittlement in Pipeline Steels" Proc. ASME. IPC2016, Volume 1: Pipelines and Facilities Integrity, V001T03A025, September 26–30, 2016 Paper No: IPC2016-64478”

a. Define “hydrogen pipeline service.”
b. Quantify the statement “hydrogen embrittlement occurs much more slowly” in terms of months or years.
c. Provide a copy of the referenced DOE Hydrogen Program FY 2005 Progress Report 449 and the referenced paper, "The Effects of Pressure Fluctuations on Hydrogen Embrittlement in Pipeline Steels" by also Xiao Xing, Mengshan Yu, Olayinka Tehinse, Weixing Chen, Hao Zhang.

RESPONSE 7:

SoCalGas 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. SoCalGas further 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 objections, SoCalGas responds as follows.

a. “Hydrogen pipeline service” refers to a pipeline that is operating with hydrogen gas.

b. The sentence that contains the quoted statement is written relative to the preceding sentence in the paragraph sited. Embrittlement is scenario specific, dependent on factors such as material properties, operating conditions, hydrogen concentration, and stress levels.

c. DOE Hydrogen Program FY 2005 Progress Report 449 is available for web-viewing at https://digital.library.unt.edu/ark:/67531/metadc793612/m1/3/.

   "The Effects of Pressure Fluctuations on Hydrogen Embrittlement in Pipeline Steels" can be purchased at: https://asmedigitalcollection.asme.org/IPC/proceedings-abstract/IPC2016/50251/V001T03A025/266682

QUESTION 8: Page 16 of the Angeles Link Phase 1 Pipeline Sizing & Design Criteria Final Report states "The hydrogen supply follows a solar (without battery storage) energy hourly profile, which varies by the hour and season. The Production Study concluded that the maximum hourly flow injection rates from production may be 2.8 times the average annual injection flow rates. Furthermore, the peak demand may be highly driven by the power generation sector with potential hourly demand data indicating peak flow rates may exceed 3.8 times the average production rate from storage to the demand locations."

a. Does SoCalGas plan on operating its hydrogen pipelines as described by the above modeled variations in flow rates and associated changes in hydrogen pressure?
b. How will these modeled variations in flow rates and associated changes in hydrogen pressure within the pipeline impact potential hydrogen embrittlement of the pipeline?
c. How will these modeled variations in flow rates and associated changes in hydrogen pressures within the pipeline impact possible fatigue of the cyclically loaded pipeline?

RESPONSE 8:

SoCalGas 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. SoCalGas further objects to this request on the grounds that it calls for speculation. SoCalGas also 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 objections, SoCalGas responds as follows.

a. Operating philosophy will be developed as detailed engineering and design is conducted. Please refer to the Design Study at Section 8 - Future Considerations, for additional information on hydraulic modelling, development of operational standards, and design development.

b. Please refer to Response 8a. Potential pipeline impacts will be considered in Angeles Link Phase 2 during detailed engineering and design.

c. Please refer to Response 8a. Pipeline fatigue will be considered in Angeles Link Phase 2 during detailed engineering and design.

QUESTION 9: Section 8.2.3 of the Angeles Link Phase 1 Pipeline Sizing & Design Criteria Final Report discusses Geohazards.

a. List each of the proposed routing scenarios that cross the San Andreas Fault System.
b. List each of the proposed routing scenarios that cross areas of moderate, high, or very high Fire Hazard Severity according to Cal Fire's most current Fire Hazard Severity Zone mapping.
c. List each of the proposed routing scenarios that traverse areas of high landslide risk according to current landslide risk mapping from the United States Geological Survey (USGS).

RESPONSE 9:

SoCalGas 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. SoCalGas also objects to this request on the grounds it is unduly burdensome to the extent this information is equally available to the requesting party. 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.

a. Section 8 of the Design Study, including Section 8.2.3, identified future engineering and design development considerations to be evaluated in Phase 2 to advance Angeles Link. See Appendix B of the Routing Analysis for information on which conceptual pipeline segments. cross a fault area. Detailed geohazard quantification of the San Andreas Fault System was beyond the scope of Angeles Link Phase 1 assessments.

b. The Angeles Link Phase 1 Environmental Analysis provided information on where the conceptual pipeline segments crossed Cal Fire's Fire Hazard Severity Zones in Chapter 3 - Environmental Analysis.

c. Please refer to Response 9a. Detailed geohazard quantification of high landslide risk was beyond the scope of the Angeles Link Phase 1 assessments.

QUESTION 10: In response to Question 8 of Angeles Link Phase 2 DR-02 when asked whether the project would contain offtakers outside of the state of California, SoCalGas responded, "As illustrated in the Angeles Link Phase 1 Routing Analysis, Angeles Link is envisioned and was evaluated as an *intrastate* pipeline system with offtake located in state." (emphasis added)

In response to Question 9 of Angeles Link Phase 2 DR-02 when asked whether the San Joaquin Valley and Lancaster segments (which SoCalGas calls Hub Segments) will connect to pipelines out of state, SoCalGas responded, "See Response 8 above. At this time, SoCalGas does not anticipate that the Hub Segments will connect to pipelines out of state."

Page 27 of the Angeles Link Phase 1 Pipeline Sizing & Design Criteria Final Report states, "For the Lancaster and SJV production locations, it is assumed the pipeline passes by potential underground storage between production and the demand centers in the LA Basin. For the Blythe production location, it is assumed the pipeline can connect to potential salt cavern storage in both Arizona and Utah."

a. Explain the discrepancy between SoCalGas' response to Question 8 where Angeles Link is envisioned "as an intrastate pipeline with offtake located in state" and Page 27 which assumes that "the pipeline can connect to potential salt cavern storage in both Arizona and Utah"?
b. Does SoCalGas intend for Angeles Link to only connect to production and demand in state?
c. Has SoCalGas received inquiries from out-of-state hydrogen offtakers? If so, how have responses to providing hydrogen to out-of-state offtakers or connecting to out-of-state pipelines changed since the November 4, 2025 announcement of the pause on the Alliance for Renewable Clean Hydrogen Energy System (ARCHES) hydrogen hub activities?
d. In the High-Level Feasibility Assessment and Permitting Analysis, SoCalGas considers pipeline routes that provide interstate connections to Nevada and Arizona, as shown in Figure 1 at 4.
    i. Has SoCalGas identified interconnection points with other hydrogen pipeline systems at those locations?

    a [ii] If so, identify the owner(s) of those hydrogen systems, whether additional permitting will be necessary to establish the interconnection, and whether additional transformation of the hydrogen gas (compression, purification, etc.) would be necessary to successfully integrate those systems with Angeles Link.

RESPONSE 10:

SoCalGas 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. 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.

a. SoCalGas also objects to this request on the grounds that it is vague and ambiguous, particularly with respect to the term "discrepancy. In addition, SoCalGas objects to this request

to the extent it assumes facts that do not exist, particularly that a storage field is "offtake." Subject to and without waiving the foregoing objections, SoCalGas responds as follows.

Angeles Link is envisioned and evaluated as an intrastate pipeline system with hydrogen offtake located within California, consistent with the Demand Study assumptions and SoCalGas' response to Question 8 of Angeles Link Phase 2 Data Request02. Question 9 of Angeles Link Phase 2 Data Request02 referenced the Hub Segments which are not located near state borders. The reference to potential salt cavern storage in Arizona and Utah in the Design Study – to be developed by third-party operators – reflects a high-level evaluation of potential hydrogen storage options and technologies considered in the Design Study at page 27, is consistent with a feasibility level analysis and with the Production Study, and does not imply out-of-state offtake or interstate pipeline operations.

Please refer to Table 21 - Theme: Multiple Routing Scenarios in the Design Study for SoCalGas's response to stakeholder requests to identify inter-state options separately from intra-state options and clearly document the associated assumptions.

b. SoCalGas objects to this request on the grounds that it calls for speculation. Subject to and without waiving the foregoing objection, SoCalGas responds as follows. As envisioned, Angeles Link will connect to production and demand in state with the potential to connect to secondary pipeline systems that could extend to third-party facilities out of state.

c. SoCalGas objects to this request on the grounds that it is vague and ambiguous, particularly with respect to the phrase "out-of-state offtakers." SoCalGas further objects to this request on the grounds that it is overly broad and unduly burdensome.

d. SoCalGas objects to this request on the grounds that it assumes facts that do not exist. Subject to and without waiving the foregoing objection, SoCalGas responds as follows. The High-Level Feasibility Assessment and Permitting Analysis evaluated the permits and authorizations anticipated to be required for the construction of the 1,300 miles conceptual pipeline routes of an intrastate pipeline system.
    i. Specific pipeline alignments and potential interconnection points with existing or future hydrogen systems will be evaluated in Phase 2 of Angeles Link.
    ii. Please refer to Response 10d(i).

QUESTION 11: The Angeles Link Phase 1 Production Planning & Assessment Final Report Table 8.1 at Page 50 cites that roughly 400,000 metric tons ("tonnes") of hydrogen storage working capacity would be necessary to support the 1.5 MTPY demand scenario. Figure 13.12 at Page 97 shows that depleted field/aquifers have roughly 19,000 tonnes of hydrogen storage working capacity, with salt caverns yielding another 4,000 tonnes.

The Angeles Link Phase 1 High-Level Economic Analysis & Cost Effectiveness Final Report Table 43 at 126 describes the storage cost parameters used in the study involve 425,000 tonnes of hydrogen storage capacity for each of depleted oil fields, salt caverns, and above-ground liquid storage.

a. Provide a citation for Figure 13.12 and a copy of the source material for the figure (research paper, presentation, etc.).
b. Provide an estimation of the underground hydrogen storage working capacity across the salt basins described in Table C.3 of the Angeles Link Phase 1 Production Planning & Assessment Final Report at 116.
c. Provide an estimation of the underground hydrogen storage working capacity across the depleted oil and gas fields described in Table C.4 of the Angeles Link Phase 1 Production Planning & Assessment Final Report at 117 through 122.

RESPONSE 11:

SoCalGas 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. SoCalGas further 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 objections, SoCalGas responds as follows.

a. The information presented in in the Production Report in Figure 13.12 at page 97 was sourced from the Texas Bureau of Economic Geology and reflects data originally presented by Ahluwalia et al. (2019) for the U.S. DOE Hydrogen and Fuel Cells Program. Link to the paper: Pdfs.semanticscholar.org/2b0c/7f96813695bf23268f90e0fa2ec345bb9cc7.pdf [pdfs.semanticscholar.org]

b. The evaluation analyzed the geologic suitability assessment potential of underground hydrogen storage options, as discussed in Appendix B of the Production Study, and did not estimate the capacity for individual salt basins or depleted oil and gas fields. The storage evaluation identified underground storage site candidates that can potentially, either individually or in aggregate, provide sufficient storage adequacy volumes over time to support potential supply and demand in Central and Southern California.

c. Please refer to Response 11b.

QUESTION 12: Page 99 of the Production Planning & Assessment Final Report states "Furthermore, the geologic structures represented by oil and gas fields have provided containment of buoyant fluids (oil and/or gas and/or natural gas liquids) and prevented or limited upward migration of the fluids to the ground surface over timespans of millions of years. This supports their potential to contain natural gas and other gases, including hydrogen, under a wide variety of pressures."

Quantify the statement "a wide variety of pressures" by providing a specific pressure range.

RESPONSE 12:

SoCalGas 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.

Storage pressures in depleted oil and gas reservoirs vary widely and are associated with depth, location, structural make-up/configuration, caprock integrity, pressure cycling and stress assessment, and other technical site characteristics. Detailed pressure quantification was beyond the conceptual scope of the Angeles Link Phase 1 assessments as such values would require comprehensive site-specific reservoir engineering analysis.