SoCalGas-27

Prepared Sur-Reply Testimony of Tim Hower and Charlie Stinson of MHA Petroleum Consultants (June 30, 2020)

I.19-06-016

ALJs: Hecht/Poirier

Date Served: March 12, 2021

Order Instituting Investigation on the Commission's Own Motion into the Operations and Practices of Southern California Gas Company with Respect to the Aliso Canyon storage facility and the release of natural gas, and Order to Show Cause Why Southern California Gas Company Should Not Be Sanctioned for Allowing the Uncontrolled Release of Natural Gas from Its Aliso Canyon Storage Facility. (U904G).

I.19-06-016
(Filed June 27, 2019)

CHAPTER IV

PREPARED SUR-REPLY TESTIMONY OF TIM HOWER AND CHARLIE STINSON OF MHA PETROLEUM CONSULTANTS ON BEHALF OF SOUTHERN CALIFORNIA GAS COMPANY (U 904 G)

June 30, 2020

TABLE OF CONTENTS

CHAPTER IV

PREPARED SUR-REPLY TESTIMONY OF TIM HOWER AND CHARLIE STINSON OF MHA PETROLEUM CONSULTANTS ON BEHALF OF SOUTHERN CALIFORNIA GAS COMPANY (U 904 G)

I. INTRODUCTION.

The purpose of the following prepared sur-reply testimony, submitted on behalf of the Southern California Gas Company ("SoCalGas"), is to address the Reply Testimony of Margaret Felts on behalf of the California Public Utilities Commission's ("Commission") Safety Enforcement Division ("SED"). Ms. Felts' Reply Testimony alleges seventeen (17) reasons ("Reasons") why SoCalGas failed to show cause as to why the Commission should not find that it violated California Public Utilities Code Section 451 ("Section 451"). This sur-reply testimony responds to and rebuts Reasons 2–3, 7–9, and 12, which, as described below, are based on either misinterpretations or mischaracterizations of either or both of SoCalGas' Testimony and the Blade Report. Instead, as detailed in SoCalGas' Reply Testimony, Chapter I (Hower / Stinson), SoCalGas operated and maintained the Aliso Canyon Storage Facility consistent with industry standards.[1]

[1] For purposes of this testimony "industry standard" means the prevailing practice within the industry. In response to SoCalGas' data requests, SED has consistently failed to describe its understanding of the industry standards that apply to SoCalGas' operations. *See, e.g.*, Ex. IV-1 (SED's Supplemental Data Response to SoCalGas Data Request 3 (as supplemented Jan. 30, 2020), Responses 1(a), 2(a), 3(a), 4(a), 5(a), 7(a), 9(a), 11(d) ("[It] is SoCalGas's (not SED's) mandated responsibility, pursuant to California Public Utilities Code Section 451.")); Ex. IV-2 (SED's Data Response to SoCalGas Data Request 7 (Jan. 6, 2020), Response 2 (largely incorporating its objections from Responses to SoCalGas Data Request 3)); Ex. IV-3 (SED's Data Response to SoCalGas Data Request 8 (March 12, 2020)); Ex. IV-4 (SED's Data Response to SoCalGas Data Request 9 (April 30, 2020), Response 2 ("…prior to or at the time of the LEAK, it was SoCalGas's responsibility, not that of SED, to be aware of policies or practices of other gas storage operators with respect to underground gas storage well casings.")).

II. DISCUSSION.

A. DOGGR Set The Groundwater Depth And SoCalGas Reasonably Relied On That Estimate When Operating SS-25.

SED asserts in Reason 2 that "SoCalGas falsely claim[ed] that it isolated well SS-25 from exposure to groundwater."[2] Specifically, SED alleges that Mr. Neville's testimony "that Well SS-25 had 'casing run to the depth of the base of fresh water' shows that SoCalGas knew that the casing was exposed to fresh water."[3] Further, SED alleges that the surface casing of SS-25 was partially cemented and "was found to have at [*sic*] 50 holes . . . caused by corrosion from exposure to fresh ground water," and the production casing was not cemented from 990 feet to 7000 feet.[4] SED further claims that SoCalGas "failed to take the necessary steps . . . to prevent corrosion in the surface and production casings."[5] Finally, SED alleges that "SoCalGas exposed Well SS-25's casing to groundwater, despite common knowledge in the industry that exposing well pipe to water can lead to corrosion."[6]

SoCalGas does not dispute that exposing steel casings to water can lead to pipe corrosion. Importantly, however, gas storage operators do not operate storage wells with zero tolerance for corrosion. Like most other operators, SoCalGas reasonably believed, based on past experience

---

[2] SED Reply Testimony (Felts) at 3.
[3] *Id.* at 3.
[4] *Id.* at 3.
[5] *Id.* at 3-4.
[6] In support Ms. Felts cites to SPE-1606-G-PA and NACE-SP0186-2007, Bates No. SED_RT_0020 and No. SED_RT_0029. (SED Reply Testimony (Felts) at 4, n.14). SPE-1606-G-PA is irrelevant insofar as it relates to use of oxygen scavengers to inhibit corrosion in oil wells following initial well completion. Further, while NACE-SP0186-2007 describes procedures for the control of external corrosion of steel well casing through applying cathodic protection, it is a general document and does not designate practices for specific situations or specific gas storage fields, such as Aliso Canyon, and the document notes that the complexity of certain well casing spacing, the subsurface proximity to other well casings, and environmental conditions preclude standardizing the application of cathodic protection. Further, the document states that the usual procedures for predicting the probability and the rate of corrosion of well casing include the corrosion history of the same material in the same general area and the frequency of leaks observed in well casings in the area, both of which were observed and noted by SoCalGas at Aliso Canyon.

and consistent with industry standards, that to the degree that leaks occurred, SoCalGas would be able to assess and repair leaks as they arose.

However, SED mischaracterizes both SoCalGas' testimony and the Blade Report in several respects. Once DOGGR approved the drilling application, including the bottom of the surface casing based on the groundwater depth, the surface casing was cemented in place. SoCalGas' predecessor pumped cement down the casing and up the annulus. Since there were no returns to surface, cement was then pumped from the surface down the annulus to fill the annulus with cement up to the surface (a "top job").[7] Two top jobs were performed on SS-25. This is a typical, industry standard operation when there are no surface returns, as was the case in the SS-25 well.

Once SoCalGas took control of the field, SoCalGas would have reasonably relied on its predecessors' drilling and cementing records to conclude that the well was properly cemented to the surface. Aside from isolating ground water zones in connection with setting the surface casing, it is not industry standard practice to conduct additional testing to assess changes in water depths over time.

And as noted by Blade, the well *was* cemented from 990' deep to the surface.[8] While Blade concluded that there were gaps, it would neither be reasonably feasible nor consistent with industry standards for SoCalGas to conduct an evaluation of the integrity of the surface casing cement job that had been completed by its predecessor. Because the surface casing was cemented in place around the production casing, which was also cemented within the wellbore, the only way SoCalGas could have inspected the cementing of the surface casing would have

[7] For more description on the initial drilling process, *see* Blade Report at 25.
[8] Blade Report at 25, 27.

been to run a cement bond log on the surface casing. This would have required physically removing approximately 1000 feet of production casing from the well.[9] While technically possible, removing the production casing would compromise the production casing and would likely require abandoning the wellbore altogether. Instead, gas storage operators at that time would have reviewed the drilling records of the prior operator to confirm that the surface casing was cemented consistent with industry standards. By reviewing the records of the initial cementing jobs, the approvals by DOGGR, and by external observation, SoCalGas would have understood the surface casing to be properly cemented. Once the production casing is set, it is not feasible to re-inspect the integrity of the cement behind the surface casing.

SED also overstates the conclusions of the Blade Report. Specifically, SED alleges that the 50 holes in the surface casing were caused by "corrosion from exposure to fresh ground water."[10] As described in SoCalGas' Reply Testimony, however, the Blade Report makes no such finding.[11]

With respect to SED's claim that SoCalGas "failed to take the necessary steps . . . to prevent corrosion in the surface and production casings" it is unclear what specific "steps" SED

---

[9] *See also*, Ex. IV-5 (Blade's Response to SED's Data Request 78 (June 22, 2020), p. 11, Sec. e. ("Monitoring corrosion of the surface casing with the production casing in place is difficult with today's technology. There are no known quantitative corrosion evaluation tools available to reliably detect, monitor, and measure remaining wall thickness caused by corrosion of the surface casing. The production casing is inside the surface casing, isolating it, and preventing running casing inspection surveys directly in the surface casing. Corrosion of surface casing is usually identified after the production casing is removed from the well. When the production casing is recovered, it exposes the surface casing and an inspection survey can be run in the surface casing to evaluate wall thickness and determine its condition.")

[10] SED Reply Testimony (Felts) at 3.

[11] See SoCalGas Reply Testimony Ch. I (Hower / Stinson), p. 17-18. See also, Blade Report at 119. (Noting that while "[s]ome of these approximately 58 holes [in the 11 ¾-in surface casing] could have existed prior to the 7 in. casing axial rupture," "[m]any of the holes exhibited sharp corners that may have been more typical of a burst failure, implying that they occurred due to a pressure surge in the surface casing.")

is referring to here. To the degree that SED is referring to cathodic protection, we reiterate that application of cathodic protection to the production casing would not have prevented the leak and that application of cathodic protection to surface casings at all wells was neither required by regulation nor industry standard practice.[12] Even today CalGEM is only beginning to consider "requirements for cathodic protection measures for well casings, where appropriate, on a well-by-well or field-by-field basis."[13]

The testimony and evidence we reviewed establishes that SoCalGas followed industry standard practice with respect to configuration and operation and maintenance of SS-25 including as it relates to cementing of the well and assessment of water relative to the casings. The well was cemented in place pursuant to industry standards and the cementing was approved by the relevant regulatory agency.

B. Pressure Testing Would Not Have Identified Deterioration of Casing Wall Thickness.

SED alleges in Reason 3 that SoCalGas did not sufficiently pressure test SS-25 in order to operate it safely.[14] Specifically, SED contends that "the only significant pressure test SoCalGas ran on the Well SS-25 well casing" was in 1973 and was "insufficient for future safe operations of the well."[15] Further, SED alleges that this pressure test was not done at the

[12] *See also*, Ex. IV-5 (Blade's Response to SED's Data Request 78 (June 22, 2020), p. 12-14 (In response to SED's Data Request 78 Blade reiterates: "[y]es, Blade agrees. A cathodic protection system could have prevented the external corrosion on the 11 ¾ in. casing. A cathodic protection system could not have prevented the 7 in. casing corrosion. This is discussed on Page 215 of the Blade Main Report.")
[13] In February 2020 CalGEM convened a workshop to discuss implementation of Senate Bill 463 and development of requirements related to, among other things, cathodic protection, investigation of leaks, and well specific well control plans. It remains uncertain what specific requirements, if any, CalGEM will adopt on these issues. See Ex. IV-6.
[14] SED Reply Testimony (Felts) at 4.
[15] *Id.* at 4.

appropriate pressure, being below the reservoir pressure and below the highest pressure "to which the well could be exposed."[16]

SED misunderstands the purpose of pressure testing. The purpose of pressure testing is to identify leaks that already exist, not to assess wall loss. Prior to October 23, 2015, there was no indication of an existing leak at SS-25 and therefore there no further pressure testing was warranted.

Further, SoCalGas followed industry standards regarding pressure testing. As stated in our Reply Testimony, pressure tests were performed successfully according to DOGGR standards. Moreover, only a minority (10 of 31) of states require mechanical integrity testing at all.[17] California is one of those states. In California, temperature logging was approved by DOGGR as an approved method for compliance with the mechanical integrity testing requirement.[18] SoCalGas ran temperature logs on SS-25 and all of its wells on an annual basis, and with noise logs as needed.[19]

Finally, after initial conversion, pressure testing at or above maximum operating pressure was not required by regulation or industry standard prior to the incident. Blade has acknowledged that the purpose of pressure testing, moreover, is not to detect wall loss, but to identify existing leaks.[20] Pressure testing can introduce unnecessary risk to the extent that a workover is required, which, as described in our reply testimony, increases the risk of an undesired incident.[21] As noted in SoCalGas' Opening Testimony, when a well required a

[16] *Id.* at 5.
[17] *See* SoCalGas Reply Testimony, Ch. I (Hower / Stinson), Sec. IV.
[18] *Id.*
[19] *See* SoCalGas Opening Testimony, Ch. I (Neville), Sec. II-G.
[20] Ex. IV-10 (Blade's Response to SED's Data Request 58 (, 2020)) at 14.
[21] SoCalGas Reply Testimony, Ch. I (Hower / Stinson) at 33-35.

workover, SoCalGas used the opportunity to engage in integrity tests, including the use of ultrasonic inspection tools ("USIT"), to test wall thickness.[22]

C. SoCalGas' Leak Remediation Practices Met Or Exceeded Industry Standards.

In Reason 7, SED alleges that "SoCalGas's statement that it used effective leak remediation practices is contradicted by extrinsic evidence."[23] SED argues that "[c]learly, remediation practices were not effective in preventing the Well SS-25 failure."[24] Moreover, SED states that it "feels confident that SoCalGas's long term integrity management program utilizing only temperature and noise surveys was a failure and, in fact, an unsafe practice that violates California Public Utilities Code Section 451."[25] Lastly, SED concludes that SoCalGas was simply identifying leaks when they happened, then reacted by patching the leaks in some instances."[26]

SED's reasoning is flawed and unsupported by the facts. First, SED misunderstands SoCalGas' remediation program. SED conflates a mechanical integrity management program with remediation practices. Leak remediation practices center around detection of leaks as they occur, and then making the necessary repairs. As stated in Mr. Neville's Opening Testimony, SoCalGas has a history of successfully addressing and repairing infrequent casing leaks as they arose. Blade confirms this, stating that "[h]istorically, leaks had been detected and were successfully mitigated, but on an individual well basis."[27] Remediation measures have little to do with "preventing the Well SS-25 failure" because Well SS-25 did not have a pre-existing leak

[22] *See* SoCalGas Opening Testimony, Ch. I (Neville), Sec. II-F.
[23] SED Reply Testimony (Felts) at 8 (citing to Section III of SoCalGas' Opening Testimony for Mr. Neville's statement that "SoCalGas's leak remediation practices were effective").
[24] SED Reply Testimony (Felts) at 8.
[25] SED Reply Testimony (Felts) at 9.
[26] SED Reply Testimony (Felts) at 9-10.
[27] Blade Report at 220.

that could be remediated. Thus, contrary to SED's central argument that SoCalGas' remediation practices were not effective because they did not prevent the SS-25 incident, SoCalGas' remediation practices had historically been effective and SS-25 had no pre-existing leaks that would warrant remediation measures.

Second, SoCalGas' leak remediation practices met or exceeded industry standards. While SED may fault SoCalGas for relying on annual temperature and noise surveys, DOGGR explicitly approved of SoCalGas' well integrity monitoring program and in particular the use of annual temperature surveys with noise logging as needed.[28] Moreover, and as detailed in our Reply Testimony, only two states required periodic corrosion log inspections.[29] Only ten states (including California) required *any* periodic mechanical integrity testing on gas storage wells.[30] Thus, SoCalGas, in operating Aliso Canyon, was following DOGGR's requirements and exceeding national standards by conducting annual temperature surveys.

Moreover, SoCalGas' remediation practices were effective. Historically, when a workover was necessary, SoCalGas was able to identify the likely cause of the failure.[31] Similar to other operators in the gas storage industry, SoCalGas ran casing inspection logs to identify possible casing leaks and other mechanical issues to determine the location of the leak/issue and then remediated the leak/issue with a well workover.[32] If the situation required, for example if a pattern of failures developed, then SoCalGas would investigate the leak/issue more thoroughly.[33]

---

[28] DOGGR Project Approval Letter, April 18, 1989; revised July 26, 1989 (see, SCG Reply Testimony Ex. I-5). SED acknowledges that DOGGR has primary jurisdiction over down hole gas storage and gas storage wells. SoCalGas Reply Testimony Ex. I-10 (Tr. at 235:19-22 (Felts)).
[29] SoCalGas Reply Testimony Chapter I (Hower / Stinson) at 30.
[30] *Id.*
[31] SoCalGas Reply Testimony Chapter I (Hower / Stinson) at 10.
[32] *Id.*
[33] SoCalGas Reply Testimony Chapter I (Hower / Stinson) at 11:3-7. For example, at wells FF-34A and Frew 3, where gas migrated in the subsurface away from the wellbores, SoCalGas conducted gas

As Blade has acknowledged, there was no such "general pattern" of casing failures that would have alerted SoCalGas that the SS-25 failure was likely.[34]

Lastly, SED's assertion that SoCalGas was "simply identifying" and "patching the leaks" implies that patching is somehow deficient mode of repair. This is incorrect. Casing patches are commonly used by operators in the industry and are a safe and effective method of repairing leaks.

D. Maintaining Records of Daily Site Inspections Was Not The Industry Standard.

SED alleges in Reason 8 that "[a]s a general practice, SoCalGas did not maintain records of daily site inspections."[35] As an initial matter, it is not clear what SED is alleging in Reason 8. SoCalGas' practice of performing daily site inspections was not required by regulation and exceeded industry standards. Other operators perform site inspections periodically but not every day. As Blade states "[w]ells do not require daily maintenance or observation unlike a compressor or other complex machinery. They can be operated for many years without problems."[36] Because daily site visits are not industry standard or mandated, maintenance of daily site inspection records is also not required or industry standard. Thus, SoCalGas exceeded industry standards by conducting daily site inspections at Aliso Canyon.

---

sampling to locate the source of the leaking gas, offset well analysis to understand the extent of gas migration, and numerical simulation models to determine both the areal extent and volume of the leaked gas. *See* Ex. IV-7 (Interoffice Correspondence Re FF-34-A, dated Oct. 24, 1990); Ex. IV-8 (Well Activity Reports for Frew 3).

[34] *See* Blade Report at 204; *see also*, Ex. IV-5 (Blade's Response to SED's Data Request 78 (June 22, 2020), p. 10.

[35] SED Reply Testimony (Felts) at 11.

[36] Blade Report at 220.

E. SoCalGas Reasonably Investigated Anomalies And Conducted Workovers In Accordance With Industry Standards.

SED alleges in Reason 9 that "SoCalGas's response [to SED's data request] is deficient because it concludes a lack of anomalous readings provides no basis to investigate. But SoCalGas's failure to investigate meant it could not conduct analysis or identify trends that could have helped SoCalGas evaluate the condition of Well SS-25."[37] We find that SED's reasoning is flawed for several reasons.

First, SoCalGas did not solely rely on weekly surface pressure readings at the Aliso Canyon storage field. As referenced above, SoCalGas also performed daily site inspections and conducted annual temperature logging (with noise logs, as needed), which met or exceeded industry standards, and then-applicable California regulations. When SoCalGas found anomalies through annual mechanical testing, it used a noise log to determine if leaks existed.[38]

Second, SoCalGas' practices were consistent with industry standard practice. While it is unclear what SED is arguing here, SoCalGas agrees that it would conduct a further investigation only if there were an anomaly—for example, an indication of a leak. In doing so, SoCalGas' practices were consistent with other operators in the industry. As discussed above, running casing inspection logs, as SED suggests, would necessitate risky workovers that are not appropriate for all leaks, let alone instances when there is not any anomalous data that would even suggest a leak.

Lastly, SoCalGas could rely on approximately forty years of noise, temperature, and pressure data to identify trends to help it evaluate the condition of SS-25. For example, SoCalGas could compare a temperature anomaly with temperature readings in prior years. As

[37] SED Reply Testimony (Felts) at 12.
[38] Blade Report at A-3 ("To investigate anomalies, additional surveys are made such as temperature surveys, noise logs, spinner surveys, and radioactive tracer surveys").

Blade acknowledged, there was "no general pattern" that would have led SoCalGas staff to determine a systemic failure would occur at SS-25.[39] Thus, for these stated reasons, SED's Reason 9 is flawed.

F. SoCalGas' Integrity Monitoring Program Met DOGGR Regulations And Industry Standards By Utilizing Temperature Surveys And Noise Logs.

SED's Reason 12 alleges that, by relying on temperature surveys, and noise logs and tracer surveys as needed, "SoCalGas did not employ a strategy of integrity monitoring in compliance with California Public Utilities Code Section 451."[40] The particular allegations in Reason 12 are addressed specifically in the opening testimony of Mr. Neville (Chapter I).

SoCalGas' described integrity monitoring practices met or exceeded industry standard practice. As discussed in our Reply Testimony, DOGGR approved of SoCalGas' mechanical integrity monitoring program.[41] Moreover, SoCalGas exceeded nationwide standards by utilizing annual temperature surveys.[42]

G. SoCal Gas Historically Engaged In Casing Failure Analysis And Continues To Do So.

SED's Reply Testimony concludes that "SoCalGas has never performed a failure analysis on a well casing and probably has no plans to do so in the future, choosing, instead, to continue to react to well failures rather than prevent them."[43] SED based this conclusion on its alleged failure to find any "failure analysis investigations or reports" in the well files provided by

[39] SoCalGas Reply Testimony (Felts) at 11.
[40] SED Reply Testimony (Felts) at 13.
[41] SoCalGas Reply Testimony Chapter I (Hower / Stinson) at 30; DOGGR Project Approval Letter, April 18, 1989; revised July 26, 1989 (see, SoCalGas Reply Testimony Ex. I-5).
[42] *See also* SoCalGas Reply Testimony Chapter I (Hower / Stinson) at 30.
[43] SED Reply Testimony (Felts) at 22.

SoCalGas.[44] Further, SED alleged that SoCalGas' own testimony was contradictory on future casing analyses.[45]

However, as discussed in depth in both SoCalGas' Opening Testimony and our Reply Testimony, SoCalGas conducted numerous and extensive failure analysis on a number of wells over its history of operating Aliso Canyon.[46] [47] While it does not technically apply to gas storage operations, we note that SoCalGas' investigations were consistent with API RP 585 as well as industry standards.

First, as explained in SoCalGas' Opening Testimony, there are multiple types of leaks and therefore multiple types of investigation: "[a] leak could involve a breach of the wellhead seal barrier, a breach of the casing body/thread barrier, or a breach of the casing shoe cement barrier; or, in some wells, a leak could involve a breach of certain components such as stage collars, casing patches, or packers."[48] Historically, SoCalGas would assess the leak and, if appropriate, perform a workover to repair the leak and conduct further investigative work, as needed. The workover program was submitted to DOGGR for approval.

Moreover, in order to remediate a leak discovered in any gas storage well, SoCalGas necessarily had to assess and diagnose the issue first.[49] There are different types of inspections that are necessary under different circumstances. Diagnostics included running temperature, noise and tracer surveys to determine the location of the leak and correlation to casing

---

[44] *Id.*
[45] *Id.* at 21.
[46] *See* SoCalGas Reply Testimony Ch. I (Hower / Stinson), Sec. III-B. (Listing dozens of "well failures," as alleged by SED, and showing SoCalGas' various investigations into each – and noting that most were not "well failures" at all). *See also* SoCalGas Opening Testimony Ch. I (Neville), Sec. III. (Describing SoCalGas leak investigation procedures, including notifications to and orders from DOGGR).
[47] SoCalGas notes that when it described that the failure analyses were in the well files, as SED alleges, SoCalGas was referring to casing logs (which are part of the well files).
[48] SoCalGas Opening Testimony Ch. I (Neville), Sec. III.
[49] *See* SoCalGas Opening Testimony Ch. III (Kitson), p. 3.

components (e.g. stage collar, casing body, shoe). If a leak was confirmed, SoCalGas would schedule a workover to conduct pressure testing (including pump in and bleed off evaluations), cement evaluation, and running casing inspection logs. Together these assessments helped determine whether a defect was caused by corrosion, erosion, by mechanical failure, or existing perforation. The details of these investigations on prior "leaks" were provided, in detail, in our Reply Testimony.[50] The evidence shows that SoCalGas acted pursuant to industry standard practices when investigating and remediating well leaks prior to and during the SS-25 leak.

III. CONCLUSION.

This concludes our prepared sur-reply testimony.

[50] *See* SoCalGas Reply Testimony, Ch. 1 (Hower / Stinson), Sec. III-B; see also Ex. IV-9 (SoCalGas Response to SED's Data Request 65, Question 2 (Apr. 27, 2020)).