SoCalGas-51

Chapters One Through Nine Prepared Sur-Reply Testimony Of Margaret Felts (June 30, 2020)

I.19-06-016

ALJs: Hecht/Poirier

Date Served: March 15, 2021

Docket:	:	I.19-06-016
Exhibit Number	:	
Commissioner	:	Cliff Rechtschaffen
Admin. Law Judge	:	Tim Kenney
	:	Marcelo Poirier
	:	

SAFETY ENFORCEMENT DIVISION
CALIFORNIA PUBLIC UTILITIES COMMISSION

CHAPTER ONE
PREPARED SUR-REPLY TESTIMONY
OF
MARGARET FELTS IN RESPONSE TO
REPLY TESTIMONY OF
TIM HOWER AND CHARLIE STINSON

San Francisco, California
June 30, 2020

Exhibit
2-02
2/24/2021
M. Felts

TABLE OF CONTENTS

I. INTRODUCTION

The purpose of the following prepared rebuttal testimony, submitted on behalf of the California Public Utilities Commission's ("Commission") Safety Enforcement Division ("SED") is to rebut statements made by Messrs. Hower and Stinson (Hower & Stinson) regarding violations that I identified in my Opening Testimony. Specifically, the Hower and Stinson reply testimony addresses the following violations from my Opening Testimony of California Public Utilities Code Section 451 (Section 451): SoCalGas 1) did not conduct failure analyses at Aliso Canyon (Violations 1-60), 2) failed to follow its plan to check the casing of 13 wells for metal loss (Violations 61-73), 3) operated well SS-25 without a backup mechanical barrier to the production casing (Violation 77), 4) did not have a policy that required well casing wall thickness inspection and measurement (Violation 78), 5) did not appropriately understand and address groundwater (Violations 84-85), 6) did not fully cement or cathodically protect the casing against corrosion (Violation 86), 7) failed to have a continuous pressure monitoring system and thereby prevented immediate identification of the leak (Violation 87), and 8) had imprudent and unreasonable recordkeeping practices (Violations 327-329).

II. RESPONSE TO SOCALGAS 'GENERAL DISCUSSION REGARDING INDUSTRY STANDARDS

Hower & Stinson begin their Reply by stating that it is necessary to assess the relevant industry standards that applied to Aliso Canyon gas storage field (Aliso) prior to 2015. However, as shown in multiple examples in this testimony, Hower & Stinson then claim that SoCalGas exceeds industry standards that they have asserted did not exist. A draft of the Hower & Stinson testimony recognized this, stating, "Do we have a disconnect here in that we (a) state above that there really were no industry standards, and then (b) applaud SCG for meeting and exceeding industry standards?"[1] The discussion of industry standards takes many turns throughout the testimony. While I address this thread of the argument, in general, even if there were industry standards, they would not

[1] See SoCalGas Response to SED Data Request 71, I1906016_SCG_SED_DR_71_0001146.

necessarily set the standard to determine whether or not SoCalGas violated Section 451, which is the section of the PU Code that requires the Utility to operate its facilities safely. My Opening Testimony charges SoCalGas with safety violations, not violations of industry standards. If the industry had collectively set specific safety standards, my Opening Testimony would have cited to those when identifying Section 451 violations.[2] Other than for cathodic protection of wells, such standards could not be found, and Hower & Stinson confirm that none existed prior to October 2015.[3] The non-existence of industry standards does not exempt SoCalGas from operating its facilities safely to protect its employees, contractors, and the general public. Basic engineering principles and the availability of applicable technologies can be used to develop and implement safety plans and programs that ensure the safe operation and maintenance of SoCalGas ' facilities, in this case, its underground gas storage (UGS) facilities, including wells. SoCalGas has petroleum engineers, metallurgists, and other types of engineers on staff who could easily design a preventative maintenance program.[4] In fact, some of those engineers recommended preventative programs over the years that were not implemented.[5]

Hower & Stinson say that my testimony fails to identify any violation of industry standards by SoCalGas and that I demonstrated a lack of knowledge of gas industry standard practice, citing to numerous documents I provided to SoCalGas in response to a data request.[6] First, Hower & Stinson and I agree that there are no industry standards[7] (using Hower & Stinson's first definition of the term), so it would be impossible for SED

---

[2] For instance, in the case of cathodic protection for well casings, in this sur-Reply, I cite the National Association of Corrosion Engineers (NACE) Standard Practice, Application of Cathodic Protection for External Surfaces of Steel Well Casings, NACE SP0186-2007, published in 2007.

[3] Hower & Stinson testimony, p.3 lines 20-22 through p.4, line 1.

[4] SED DR 45 Q.7 SoCalGas identifies 17 metallurgists they employ.

[5] Examination Under Oath of Frank Selga, August 1, 2018. p.78 - 80 re recommendations to apply Cathodic protection to well casings, and Examination Under Oath of James Mansdorfer, September 13, 2018, pp. 41-43.

[6] SoCalGas DR 3.Q.7.c., Q.9.c, Q.9.b., and Q.10.c.

[7] Except for the 2007 NACE Standard for Cathodic Protection, which I cite above.

or me to identify violations of such standards.[8] Second, all violations identified in my opening testimony are direct violations of PU Code Section 451, as accurately stated by Hower & Stinson on page 1, line 9 of their reply testimony. Third, it is Hower & Stinson, not me, who are confused about the issue of standards and SED's response to SoCalGas data request number 3 (DR 3). The documents referred to by Hower & Stinson were provided in response to SoCalGas 'DR 3 Q7.c, Q.9.c, Q9.b, and Q.10.c, which request documents, not standards.[9] I provided publicly available research, case study, and technical documents per SoCalGas 'request. These documents represent information that was readily available to SoCalGas if it had wanted to use information that had been shared within the gas industry to design and implement operation and maintenance programs that would ensure the safety of its UGS facilities.

After declaring there were no industry standards, Hower & Stinson present a table in which they attempt to design a set of their own industry standards.[10] The table presented by Hower & Stinson shows no information that could be useful in relieving SoCalGas of its obligations toward safety under Section 451. Instead, it appears that they argue that since there were no industry standards, SoCalGas should not be held accountable to the safety requirement under Section 451. Hower & Stinson state that "[b]ased on the dearth of formal industry standards, we use the term "industry standards" throughout this testimony to refer to the consistent practices we have observed first-hand

---

Hower & Stinson cite to API Recommended Practice 1171 ("API RP 1171"), "Functional Integrity of Natural Gas Storage in Depleted Hydrocarbon 21 Reservoirs and Aquifer Reservoirs," as the first documented gas storage industry-wide procedures that would have been considered industry standard practice.[8] Hower & Stinson take the position that prior to 2015 there were no applicable industry standards. Here, they say that for purposes of this testimony "industry standard practice" means prevailing practice within the industry.

[9] For reference, the text of DR 3 Q.7.c: "Identify and produce all DOCUMENTS, aside from the Blade Report, that support SED's contention that SoCalGas did not employ a "reasonable understanding of the groundwater depths relative to the surface casing shoe and production casing of wellSS-25" prior to the drilling of the two groundwater wells which were drilled for RCA purposes."

[10] Hower & Stinson testimony, pp. 4-6.

through our work experiences."[11] Even considering the resumes of these two experts,[12] it does not seem appropriate to designate their experience as sufficient to stand in for industry standards in an industry of about 672 UGS facilities in operation in the world, with 392 active storage facilities in the US and 62 in Canada.[13] Hower & Stinson have toured only 49 of those 672 facilities.[14] Touring a UGS facility would not make them familiar with the design, construction, operating, and maintenance history of each well in the field. Hower & Stinson admit that they do not have first-hand knowledge of how all owners and operators of underground gas storage units manage their underground storage wells, reservoirs, and related facilities.[15]

Hower & Stinson add, "As of the date of the incident there was no documented industry standard related to investigation of casing failures in gas storage operations."[16] SED quoted SoCalGas and asked Blade whether Blade agreed with this statement. Blade answered yes,[17] which is consistent with my view on the matter as well.

Hower & Stinson went on to say on page 10 that, "Blade states that "API RP 585 was developed for Pressure Equipment Integrity Incident Investigation," not gas storage well integrity management and only "presents this as an option that could be applied" to gas storage. [Footnote omitted.]. Further, Blade states that there "are no specific standards or practices related to 'failure analysis or subsequent risk assessment 'related to gas storage well casings."

To enable me to directly respond to Hower & Stinson's testimony at page 10, SED asked Blade, "What is Blade's basis for saying that API RP 585 could be applied to gas

---

[11] Hower & Stinson testimony, p. 7. fn.29.

[12] Hower & Stinson testimony, pp. 42-45 – resumes of authors.

[13] Underground Gas Storage in the World -- July 2017 Status Report prepared by Sylvie Cornot-Gandolphe for CEDIGAZ http://cngascn.com/public/uploads/file/20181121/20181121100841_50998.pdf.

[14] Stinson Resume and Response to DR 90 Q.9.b, which lists 60 line items, but it appears that these only represent 49 actual USG facilities.

[15] Response to SED DR 90 Q.9.a.

[16] Hower & Stinson, testimony, p. 9.

[17] Blade Response to SED Data Request 69, Question 2, p. 17.

storage?" In response to SED's data request, Blade provided its basis for including it, as follows: "Although API 585 was not specifically for gas storage projects, Blade identified it as a solution as part of their Root Cause Analysis (RCA)."[18] Blade then explained why it believed that API RP 585 could be applied to gas storage.[19] Blade added its professional opinion that it would be a safe practice for SoCalGas to apply API RP 585 to gas storage well integrity management and the reasons for doing so.[20] To show the details of these points, Blade's data response is attached to this testimony.[21]

III. SOCALGAS FAILED TO INVESTIGATE CAUSES OF LEAKS

In Section III, Hower & Stinson lead off with the statement "[a]s discussed below, SoCalGas met or exceeded gas storage industry and industry standard practices regarding well failures and subsequent investigation into their causes."[22] Since Hower & Stinson testified in a previous paragraph that there were no applicable gas storage industry standard practices prior to 2015, the statement on page 8 must refer to Hower & Stinson's standards, as stated in their footnote 29, the standards Hower & Stinson created.[23] The question, then, is how SoCalGas "met or exceeded" Hower & Stinson's personal gas storage industry standard practices. Hower & Stinson fail to summarize an answer to this question.

Although Hower & Stinson assert that SoCalGas met or exceeded industry standards, their own discussion regarding past leaks at Aliso has no basis in industry standards. Upon SED's inquiry regarding what "gas storage industry and industry standard practices" meant, SoCalGas responded with a replacement sentence: "[t]he above-quoted testimony should say "SoCalGas met or exceeded gas storage industry

[18] Blade Response to SED Data Request 69, Question 3.a, pp. 17-18.

[19] Blade Response to SED Data Request 69, Question 3.a, pp. 17-18.

[20] Blade Response to SED Data Request 69, Questions 3b and 3c, pp. 18-19.

[21] Blade Response to SED Data Request 69.

[22] Hower & Stinson, testimony, p. 8.

[23] Hower & Stinson testimony, p. 7. fn. 29.

standard practices regarding well failures and subsequent investigations into their causes."[24] When asked what the definition of this "industry standard practices" was, SoCalGas responded:

> "gas storage industry standard practices" refers to prevailing practice within the gas storage industry based on the practices that Messrs. Hower and Stinson have knowledge of through their work experience as well as any additional information gathered by Messrs. Hower and Stinson in their review of gas storage industry standard practices as explained in response to request 4.c above.[25]

Their testimony launches into a lengthy discussion of the detection, investigation, and remediation of 60 cases of well casing leaks itemized by SED's violations 1-60.[26] Hower & Stinson immediately note that "the number of casing leaks is less than half that number, and only two of those (FF-34A and Frew 3) were of the scale where gas migrated some distance in the subsurface away from the wellbore."[27] This statement frames what must be a personal Hower & Stinson view about what an industry standard should be, rather than an actual industry standard, because it does not appear in any literature that I could find, i.e. that leaks are contingent on the distance gas has migrated in the subsurface away from the wellbore. SED asked if it is Messrs. Hower and Stinson's contention that if a well leaks, but the gas does not migrate some distance in the subsurface away from the wellbore, that well leak is insignificant and does not need to be investigated or repaired?[28] Their answer was "no."[29]

After noting that there were no existing industry standards, Hower & Stinson title Subsection A. "SoCalGas Detected, Investigated, and Remediated Well Casing Issues

---

[24] SoCalGas Response to SED DR 90 Q10.a.

[25] See SoCalGas Response to SED DR 90 Q10.b. SoCalGas response to DR.90.Q4.c was ". . . Messrs. Hower and Stinson performed a review of state regulations in states with underground gas storage operations as well as a review of available documents from the American Gas Association, the American Petroleum Institute, the Society of Professional Engineers and other sources."

[26] Hower & Stinson testimony, p. 14.

[27] Hower & Stinson testimony, p. 8. l.15 – p. 9. l.1.

[28] SED DR90 Q.11.a.

[29] SoCalGas response to SED DR90 Q.11.a.

Consistent with Industry Standards,"[30] which apparently alludes to standards created by Hower & Stinson.[31]" Standards or not, SED did *not* cite SoCalGas with failing to detect, investigate and remediate well casing leaks, or "issues" as Hower & Stinson label them.[32] Violations 1-60 are based on the failure to determine the *cause* of 60 casing leaks.[33] The wording of these violations is "SoCalGas failed to perform *failure investigations*, *failure analyses* or *Root Cause Analyses* on failed Aliso Canyon wells despite more than 60 well casings experiencing leaks…"[34] SED gave SoCalGas ample opportunities to show that it sought to determine the cause of past leaks.[35] In every response, SoCalGas proved the validity of violations 1-60 by failing to produce any evidence of investigations into the causes of leaks.[36]

SoCalGas operated its wells to failure and then responded by patching them up.[37] Determining the causes of leaks would be the first step to designing a program that would

---

[30] Hower & Stinson testimony, p. 9.

[31] Hower & Stinson testimony, p. 7, fn.29. "Based on the dearth of formal industry standards, we use the term 'industry standards' throughout this testimony to refer to the consistent practices we have observed first-hand through our work experiences."

[32] Hower & Stinson testimony, p. 9, including footnote 33, which cites, but mischaracterizes SED Opening Testimony at page 2. The incorrect Hower & Stinson testimony says, "SoCalGas Detected, Investigated, and Remediated Well Casing Issues Consistent with Industry Standards. In its summary of violations, SED alleges 60 violations related to SoCalGas' alleged failure to adequately investigate casing "leaks".

[33] Opening Testimony, pp.7-8. Blade reviewed 124gas storage wells and identified 63 casing leaks, 29 tight spots, 4 parted casings, and 3other types of failures. (Blade Report pp. 2 and 162.)

[34] Opening Testimony p. 2, referencing SectionII.B.1.

[35] SoCalGas responses to SED DRs 11.Q.3.d, 48.Q.24, 65.Q.2, and 71.

[36] SoCalGas responses to SED DRs 11.Q.3.d, 48.Q.24, 65.Q.2, and 71.

[37] Based on my review of SoCalGas 'Aliso well files and supported by Direct Testimony of Phillip E. Baker, Underground Storage, November 2014 (2016 General Rate Case) p.PEB.5, "While we have historically managed risk at our storage facilities by relying on more traditional monitoring activities and identification of potential component failures, we believe that it is critical that we adopt a more proactive and in-depth approach. . . SoCalGas proposes to manage and approach the integrity of its storage well assets . . . in a manner consistent with the approach adopted for distribution and transmission systems." (emphasis added).

prevent future leaks and would, therefore, reduce long term costs of emergency repairs and should extend the useful life of the wells.[38]

Hower & Stinson's testimony misunderstands the nature of the 60 SED violations, and discussions of each leak identified by Blade. Therefore, Hower & Stinson's testimony misses the point and fails to show that SoCalGas properly investigated the cause of those leaks.[39] Although Hower & Stinson take time to distinguish each of the leaks underlying these violations from the cause of SS-25 well failure, once again, this exercise fails to prove that the causes of the 60 leaks were properly investigated.[40] Likewise, SoCalGas failed to show that it investigated the cause of the past leaks.[41] Therefore, the violations 1-60 should stand as valid.

IV. SOCALGAS FAILED TO TAKE REASONABLE STEPS TO PREVENT AND MEASURE CORROSION

Section IV in Hower & Stinson's testimony is titled "SoCalGas Used Reasonable Industry Practices to Prevent and Measure Corrosion,"[42] but there is no clear link to specific violations identified in their introduction. Below, I address comments by Hower & Stinson laid out under their Section IV.

---

[38] See Phillip E. Baker statement in previous footnote. In the 2016 General Rate Case Application (A.14-11-004), SoCalGas presented its rational for developing such a system to be included in rates. Also based on Felts' experience using basic engineering principles of collecting relevant data for the development of operating instructions, compliance programs, safety programs and preventative maintenance programs for Amoco Oil Company, Celanese, the Department of Defense, the Department of Toxic Substances Control and several private clients.

[39] Hower & Stinson testimony, pp.13-16 bulleted paragraphs.

[40] Although the leaks themselves are a different issue than the violations, which go to SoCalGas' failure to investigate the leaks, SED asked Blade whether it agreed with Hower & Stinson's assertion on page 8 that there were only 31 leaks, approximately half of what Blade identified. Blade said it did not, corrected Hower & Stinson's testimony, and explained the basis for those corrections. This is found in Blade's response to SED Data Request 69, question 1, pages 5 through 17.

[41] Refer to fn 19 above, SoCalGas responses to SED DRs 11.Q.3.d, 48.Q.24, 65, 68, 71, 74, 75, 76 and 77.

[42] Hower & Stinson Testimony, p. 17, lines 2-3.

A. Corrosion from Groundwater Did Not Create the Holes on the 14 ¾ Inch Surface Casing

Hower and Stinson begin this section by stating that my allegations appear to be based on misunderstandings and are contradicted by the Blade report or are simply irrelevant to whether or not SoCalGas acted reasonably operating Aliso.[43]

Hower & Stinson confusingly state that my testimony assumes that the 58 holes in the surface casing were due to corrosion [and] caused the corrosion and resulting failure on the SS-25 production casing.[44] In my testimony, I state that Blade identified 58 through-wall-metal-loss holes in the surface casing of well SS-25.[45]

Hower & Stinson seem to suggest that we disagree about the 58 holes, but like Hower & Stinson, I understood from the Blade report that at least some of these 58 holes were areas of corrosion that turned into holes due to the pressure that occurred during the failure event or soon thereafter.[46] [47] In fact, there are no violations in my testimony regarding the 58 through-wall holes in the surface casing.

Violations 61-72 were for failure to follow the Company's internal 1988 plan to check casings of 12 wells (other than SS-25) for metal loss, as recommended by its own engineers. The 58 holes are examples of locations in well SS-25 that experienced corrosion before the failure.[48] Those areas of corrosion, the corrosion found in the 7-inch production casing at and near the location of failure, and SoCalGas 'failure to inspect

---

[43] Hower & Stinson testimony, p. 17, lines 4-7.

[44] Hower & Stinson refer to the 7 inch production casing in their heading, but then discuss the holes in the surface casing, so I assume there is a typo in the heading. Hower & Stinson Testimony p.18, subheading A.

[45] SED Opening Testimony p. 11

[46] Hower & Stinson Testimony, p. 19.

[47] Blade Main Report, p. 119.

[48] Blade Main Report, p. 3 "The gas flowing through the axial rupture on the 7 in. production casing caused an increase in pressure on the 11 3/4 in. surface casing. This caused several of the surface casing corroded regions to fail, creating holes and thus providing a pathway for gas to escape. Over 50 such holes provided a pathway for the gas to surface."

well SS-25 for metal loss as recommended by its own engineers in 1988 are the bases of the violation 73.[49]

B. Violations 83-84

Related to violations 83-85, Hower & Stinson incorrectly state that, "There Were and Are No Tools Available to Perform the Kind of Inspections SED Demands."[50] This section clarifies Hower & Stinson's confusion, and sets the record straight as to what violations 83, 84, and 85 stated.[51]

Hower & Stinson misstate violations 83 through 85, falsely characterizing my testimony as stating "[c]orrosion was not detected on SS-25 because the seven inch casing wall thickness on SS-25 had never been inspected;"[52] and also misstating that "SED's apparent premise underlying this argument is that SoCalGas failed to inspect and identify the 58 holes in the surface casing…"[53] In fact, my testimony identified violation 83 as "prevention of surface plumbing failures on SS-25 from enabling that well [SS-25] to be kept filled."[54]As Blade said in its report regarding the sixth kill attempt:

> It appeared to have killed the well, but fluid loss into the formation kept the annular fluid column from stabilizing. It is probable that continued pumping from the surface might have kept up with the fluid loss, but surface failures prevented the well from being kept filled.[55]

This issue is related specifically to well kill number 6 and has nothing to do with using tools to inspect the well for corrosion or the holes in the surface casing.

To further correct Hower & Stinson's misstatement of the violations, violation 84 was for allowing the groundwater to cause corrosion on the surface and production

---

[49] SED Opening Testimony, p. 3, Table of Violations and p. 12.

[50] Hower & Stinson Testimony, p. 18.

[51] On p.1 Hower & Stinson do not list in Violation 83 in their introduction as part of their testimony

[52] Hower & Stinson testimony, p. 18.

[53] Hower & Stinson testimony, p. 18, fn 93.

[54] SED Opening Testimony, p. 4, and p. 32, fn 217, referencing Blade Report, at p. 151.

[55] Blade Main Report at p. 151.

casings of SS-25.[56] Hower & Stinson frame the violation as saying SoCalGas did not use various tools that could have been used to measure well [casing] thickness along the entire length of the casing or tubing.[57] Hower & Stinson testify that tools were not available to measure casing wall thickness during normal operation of SS-25 because the production casing was cemented in the well and could not be extracted.[58] They further state that tools such as caliper logs, cameras and casing inspection logs would not have been able to evaluate the integrity of the surface casing due to the presence of the production casing. Hower & Stinson are simply uninformed about the tools that have been available at least since 2007 to evaluate single casings and multi-level well casings for corrosion.[59]

Hower & Stinson seem to argue that the technology of the 80's and 90's was inaccurate. Therefore, results cannot be used when assessing the history of maintenance on well casings. But this is just perfect hindsight. At the time, SoCalGas used these tools and technologies, they were cutting edge and best available technology. SoCalGas chose to use these tools and technologies. Data that was collected was the best they could collect and is the historical record that we have for review and consideration. To the extent that inconsistencies and errors might be proved using today's tools and technologies, we simply have to accept the inferior quality of the earlier results, but we do not have to discount them entirely.

Finally, in the SoCalGas Reply, Abel (Chapter III) and Kitson (Chapter VI) testify that SoCalGas had a SIMP-like integrity management program as far back as 2007. If

---

[56] SED Opening Testimony, p. 4.

[57] Hower & Stinson testimony, p. 18, lines 14-15.

[58] Hower & Stinson testimony p. 19, lines 4-7.

[59] For instance, ARCO announced a tool in 1988 that would identify external corrosion on casings. (1988.0101.SPWLA-1988-UU-NN). In 2007, there is a report of ultrasonic logging tool that can view corrosion without removing tubing (2007.0924.SPE-108195-MS_NNN), in 2007 a paper by ConocoPhillips reports on a method for external corrosion and damage detection on outer and middle concentric strings of casings (2007.1111.SPE-108698-MS_NNN); Slumberger currently markets its electronic magnetic casing inspection tool for evaluation of multiple casing strings. (SLB.em-pipe-scanner-br).

that were true, SoCalGas had plenty of time to inspect Well SS-25 for casing integrity. But they did not.

Violation 83 should stand because Hower & Stinson fail to argue that it is not valid. Violation 84 should stand because Hower & Stinson fail to acknowledge existing technology that SoCalGas could have used to inspect Well SS-25 before the casing failed.

C. Violation 85

Violation 85 is for failure to assess the relationship between groundwater in and around the well site and surface casing.[60] Hower & Stinson incorrectly state that an "understanding of the groundwater depth is only relevant and necessary when initially drilling the well."[61] Water control agencies that also have regulatory interests related to drilling wells think otherwise. The Groundwater Protection Council published guidelines in 2012 titled "Well Construction & Groundwater Protection.[62] In their introduction, they say that surface casing must be cemented properly to protect the environment by preventing oil and gas from migrating from the well into groundwater during initial drilling and for the life of the well.[63]

Hower & Stinson go on to say that there is no conclusive evidence that groundwater or corrosion created any holes in the surface casing.[64] Actually, there is evidence that the surface casing was in contact with groundwater due to poor cement and that the external wall of the surface casing was corroded.[65] Blade found that the surface

---

[60] SED Opening Testimony, p. 4.

[61] Hower & Stinson testimony, p. 19.

[62] Well Construction & Groundwater Protection, 2012, Groundwater Protection Council (of State Water Control Agencies) http://www.gwpc.org/.

[63] Well Construction & Groundwater Protection, 2012, Groundwater Protection Council (of State Water Control Agencies) http://www.gwpc.org/: "Casing strings are an important element of well completion with respect to the protection of groundwater resources because they provide for the isolation of fresh water zones and groundwater from the inside of the well. Casing is also used to transmit flowback fluids from well treatment. In this regard, surface casing is the first line of defence and production casing provides a second layer of protection for groundwater."

[64] Hower & Stinson testimony, pp. 19-20.

[65] Blade Main Report, p. 3 "The shallow groundwater above 400 ft accessed the poorly cemented 11 3/4 in. surface casing and caused localized corrosion on the surface casing OD. . . The gas flowing through

casing wall, which was corroded, finally failed under pressure caused by the October 2015 event because the edges of the holes had sharp edges.[66] Blade points out that during construction of SS-25, the well had lost circulation while cementing the 11 ¾-inch surface casing, therefore there was no indication of cement above 600 ft.[67] The 7-inch casing failure (rupture and casing parting) was above the 11 ¾-inch surface casing shoe at a depth or 892 ft.[68]

Hower & Stinson state, "Additionally, both the Blade Report and the SED testimony present a figure which shows the groundwater entering the annulus of the 7-inch production casing and the wellbore below the depth of the surface casing."[69] The image shows groundwater entering the annulus between the 7-inch production casing and the 11 ¾-inch surface casing through holes in the 11 ¾-inch surface casing. It shows groundwater that seeped through the surface casing displacing any existing mud outside of the 7-inch production casing, above and below the 11 ¾-inch surface casing shoe. The groundwater in contact with the 7-inch casing corroded the outside of the external wall of the production casing where the drilling mud from 1953 construction had leaked off.[70]

Hower & Stinson argue that because SoCalGas inherited the well drilled by Tidewater in 1953, "there really is no reason for SoCalGas to have a 'reasonable understanding of the groundwater depths relative to the surface casing shoe and

---

the axial rupture on the 7 in. production casing caused an increase in pressure on the 11 3/4 in. surface casing. This caused several of the surface casing corroded regions to fail, creating holes and thus providing a pathway for gas to escape. Over 50 such holes provided a pathway for the gas to surface." Also, Blade Main Report p. 95, where Blade explains the observations it made regarding groundwater and well SS-25. Specifically: "one massive and several thinner high-permeability water layers are observed between approximately 400 and 450 ft in the Modelo formation, Several thin to moderately thick high-permeability water layers are observed between approximately 740 and 790 ft in the upper Topanga formation," and "a moderately thick high-permeability water layer between 990 and 1,000 ft is observed below the basalt, right at the 11 ¾ in. casing shoe, and several thick high-permeability water layers between 1,100 and 1,190 ft are observed below the shoe."

[66] Blade Main Report p.3, 119, and 121.

[67] Blade Main report, p. 121.

[68] Blade Main report, p. 121.

[69] Hower & Stinson testimony, p. 20 including fn. 99, citing Blade Report at 100 and SED Opening Testimony, p. 43.

[70] Blade Report, p. 43.

production casing of well SS-25'."[71] The failure of SS-25 alone provides SoCalGas good reason to have such an understanding. In addition, SoCalGas purchased the well and renovated it for gas injection and production purposes.[72] Prior to purchasing the well, it had to have reviewed the well files to understand what it was purchasing and what it would take to revamp the construction. When SoCalGas renovated the well in 1973,[73] it could have assessed the condition of the drilling mud outside of the production casing, but apparently chose not to do that, even though the tubing was pulled at the time, giving them access for the use of various tools.[74] Furthermore, years before the 2015 casing failure, a reasonable preventative maintenance program for wells should have included considering the degradation of the drilling mud outside of the casing and the potential for corrosion of casings – surface and production.[75] This is not new science or technology. Concerns about groundwater and casing corrosion issues have existed since at least 1959.[76]

Hower & Stinson note that the production casing string is cemented[77] and the surface casing is cemented,[78] creating two levels of casing. Although they do not say so,

---

[71] Hower & Stinson, p. 21.

[72] AC_CPUC_SED_DR_30_0000778.1973.

[73] AC_CPUC_SED_DR_30_0000778.1973 – Well View record "5/24/73 - 6/6/73 Cleaned out to 8748', pressure tested csg, perforated for conversion to gas storage, ran tbg with gas lift valves."

[74] AC_CPUC_SED_DR_30_0000778.1973.

[75] For instance, ARCO announced a tool in 1988 that would identify external corrosion on casings.(1988.0101.SPWLA-1988-UU-NN). In 2007, there is a report of ultrasonic logging tool that can view corrosion without removing tubing (2007.0924.SPE-108195-MS_NNN), in 2007 a paper by ConocoPhillips reports on a method for external corrosion and damage detection on outer and middle concentric strings of casings (2007.1111.SPE-108698-MS_NNN); Slumberger currently markets its electronic magnetic casing inspection tool for evaluation of multiple casing strings. (SLB.em-pipe-scanner-br).

[76] 1959.0519.API-59-199.

[77] Hower & Stinson testimony, p. 24, subheading E. "The Production Casing Was Cemented Properly pursuant to Industry Standard Practices." This is another example of the disconnect from Hower & Stinson's claim on pages 3 and 4 of their testimony that "Prior to September 2015. . . there were no documented gas storage industry wide procedures that would have been considered industry standard practice."

[78] Hower & Stinson testimony, p. 21, lines 10-11.

they seem to jump back to Violation 84 with this comment, which was for allowing the groundwater to cause corrosion on the surface and production casing.[79] They also state before 2015, the casing inspection logging tools used by the gas storage industry could only evaluate a single string of pipe.[80] This statement is not true. Tools did exist to inspect multiple levels of casing.[81] [82] And, there is no reason to distinguish gas storage industry wells from any other oil & gas wells. The tools would be the same, no matter what the purpose of the well is.

Hower & Stinson state that "[b]ased on the historical data in the Aliso Canyon field, there was no reason for SoCalGas to anticipate there might be a potential problem with corrosion of the production casing at a depth above the surface casing shoe inside the annulus between the production casing and the surface casing, as occurred in the SS-25 well."[83] However, SoCalGas knew that external corrosion of any casing underground was a possibility because its personnel attended all of the NACE conferences and kept up with the development of the standards.[84] It is highly likely that SoCalGas was not aware of the extent of corrosion in its well casings because, historically, it had made no effort to inspect for corrosion.[85] After the SS-25 failure, SoCalGas inspected all of its wells within

---

[79] Hower & Stinson Testimony, p. 22, lines 8-18.

[80] Hower & Stinson Testimony, p. 21, lines 9-16.

[81] Brill, Thilo & Demichel, Cindy & Nichols, Edward & Bermudez, Fernando. (2011). Electromagnetic Casing Inspection Tool for Corrosion Evaluation. Society of Petroleum Engineers - International Petroleum Technology Conference 2012, IPTC 2012. 3. 10.2523/14865-MS.

[82] Johns, J. E., Cary, D. N., Dethlefs, J. C., Ellis, B. C., McConnell, M. L., & Schwartz, G. L. (2007, January 1). Locating and Repairing Casing Leaks with Tubing in Place - Ultrasonic Logging and Pressure-Activated Sealant Methods. Society of Petroleum Engineers. doi:10.2118/108195-MS (SPE - 108195-MS).

[83] Hower & Stinson Testimony, p. 21. Line 17 through p. 22, line 2.

[84] Examination Under Oath Transcript (Tr.) of Frank Selga, p. 45, line 24 to p. 46, line 21.

[85] Based on my review of well files provided by SoCalGas. Also see EUO Tr. of James Mansdorfer, p. 103, line 23 to p. 104, line 14. "Q: Okay. We understood generally from Mr. Selga that there was communication about a lack of O2 in the field, which would be a source of a threat of corrosion; and I hope I'm not misstating this, but this is our understanding of – of part of the reasoning that went into not doing cathodic protection.

A: Well, yeah, that's right. I mean if you don't have oxygen in the water, in the subsurface water, you're not going to have corrosion. And that's – I didn't get into the details, but on the very eastern part of the

a few months using its new SIMP protocol.[86] A large number of its wells were plugged and isolated as a result of these inspections, indicating that the findings mirrored those of Frew 2 (a natural gas well owned by SoCalGas), which was severely corroded.[87]

Jumping again to Violation 85, Hower & Stinson state that, "Knowledge of the hydrogeology and groundwater is *only* relevant for the design and implementation of the surface casing." (Emphasis added.) In support of this assertion, Hower & Stinson incorrectly used my deposition statement as support for their ridiculous claim.[88] The transcripts of my deposition that Hower & Stinson referenced state as follows:

> "Q: Okay. And circling back on your earlier statement, it would be necessary to have an understanding of groundwater depths for purposes of setting the surface casing, correct?
>
> A: Yes."[89]

Nowhere in that question did SoCalGas 'attorney ask me whether knowledge of hydrogeology and groundwater was *only* relevant for design and implementation of surface casing. Of course, as I stated, knowledge of groundwater is necessary to set a surface casing properly. However, SoCalGas must maintain ongoing knowledge of groundwater in the Aliso Canyon gas storage area, from the surface to the bottom of their deepest well because leaks through failed cement can cause groundwater contamination and water at any depth could cause corrosion of a well casing.[90] In a data response to SED, Blade stated it disagreed with this statement from Hower & Stinson.[91] Blade went on to say that it does not accept as true that knowledge of hydrogeology and groundwater

---

field, the formation dip is different than the rest of the field, and there's – it dips to the surface, so rainwater, that carries oxygen, can get down to the wells. The rest of the field, that's not the case. And, in fact, there's – **there is no history of external corrosion on the rest of the field." (Emphasis added.)**

[86] SED Reply Testimony, p. 9. Exhibit Bates No. SED_RT_0167.

[87] SED Reply Testimony, p. 8. Exhibit Bates No. SED_RT_0161. SED asked SoCalGas for the HR Vertilog results for the wells on this list that were plugged and isolated. SoCalGas refused to provide the records on the basis that they are outside the scope of this proceeding.

[88] Hower & Stinson Testimony, p. 22, lines 10-11.

[89] Felts Depo. Tr. 254:1-5.

[90] See discussion in Section III above.

[91] Blade Response to SED Data Request 72, Question 2a, p. 5 of 7.

is irrelevant for operations and maintenance of the production casing.[92] Blade provided detailed bases for both answers.[93]

Finally, on this issue, Hower & Stinson suggest that SoCalGas can rely on the Division of Oil & Gas to provide information about groundwater and that the well was cemented to industry standards of the US gas storage industry that existed in 1953, the time of installation.[94] This statement is problematic for two reasons. First, the Division of Oil & Gas is not in the business of regularly monitoring groundwater depths, so it would be unwise to depend on this agency for current groundwater depths relative to each well casing. Second, after making the case that there are no industry standards other than the ones they created for their testimony, Hower & Stinson change their position on standards in this statement, stating that there were US gas storage industry standards in 1953 that Tidewater adhered to when the well was first installed. Hower & Stinson do not provide reference to those 1953 industry standards, and I am not aware of any.[95]

Hower & Stinson fail to provide sufficient arguments to prove that SoCalGas could not have assessed the potential for corrosion from groundwater. Violations 84 and 85 should also stand.

D. Violation 86 - Surface and Production Casing Corrosion

Hower & Stinson misstate opening testimony Violation 86, which states that SoCalGas did not have systematic practices to protect surface casing strings against external corrosion. Therefore, SoCalGas did not employ proper understanding of the consequences of corroded surface casings and uncemented production casings.

Violation 86 in my opening testimony states that SoCalGas failed to have systematic practice to protect surface casing strings against external corrosion and failed to employ proper understanding of the consequences of corroded surface casings and

[92] Blade Response to SED Data Request 72, Question 2c, pp. 5 of 7.

[93] Blade Response to SED Data Request 72, Question 2, pp. 5-6.

[94] Hower & Stinson Testimony, p. 22.

[95] Hower & Stinson Testimony, p. 22.

uncemented production casings.[96] In contrast, the title Hower & Stinson's testimony assigns to this violation is "Corrosion of the Surface Casing did not cause Corrosion in the Production Casing and the Surface Casing is not Intended as a Gas Barrier."[97]

As discussed above, Hower & Stinson did not understand my opening testimony and misunderstand Blade's report. Despite Hower & Stinson's subheading, my opening testimony does not say that corrosion of the surface casing caused corrosion in the production casing, or that the surface casing was intended to be a gas barrier.

To clarify, the basis for violation 86 was that cement along the exterior of the surface casing had failed and no longer served as a useful bond against groundwater in SS-25. The production casing was not cemented to surface. Instead, mud was left in place to serve as a barrier between formations and the exterior of the production casing. Over time, the mud barrier failed and was replaced by groundwater. This groundwater contributed to creating a perfect environment for microbial corrosion (MIC). The violation holds SoCalGas responsible for failing to use generally available industry information, as well as information that could have been obtained about its own wells to assess the relationships between well casing muds & cements, groundwater, and external corrosion of its well casings.[98]

Hower & Stinson also say "it is interesting to note that nowhere in their testimony does SED indicate what the consequences were of external corrosion of the surface casing in the SS-25 well."[99] I will clarify here, although the consequences seem obvious. The consequences of external corrosion of the surface casing occurred after the initial production casing failure and during the extent of the failure event, up until today, and will continue for some time into the future.[100] The external corrosion on the surface casing created holes, and even more holes occurred under pressure from the failure event

---

[96] Violation 86, p. 42 at II.B.7 of SED Opening Testimony. See also Opening Testimony, p. 4.

[97] Hower & Stinson Testimony, p. 23, line 1, subheading D.

[98] See Section III above and referenced exhibits.

[99] Hower & Stinson Testimony, p. 23, lines 6-8.

[100] Exhibit – P.13 Blade Post-Failure Analysis 2019.0531.

(release of high pressure gas when the production casing failed). Reservoir gas flowed up the 7-inch production casing (which failed due to corrosion), out of the parted casing, through the holes in the surface casing, and exited through the soil surrounding the well to the atmosphere. The consequences included:

- Uncontrolled natural gas release for 111 days;
- Seven unsuccessful kill attempts;
- Drilling a relief well;
- Blade's root Cause Analysis;
- Impacts on civilian neighbors;
- Civil suits against SoCalGas;
- Loss of use of the Aliso Reservoir for a period of time; and
- Several CPUC cases, including this Order Instituting Investigation and Order to Show Cause, with resulting demand on Commission resources.
- All of the associated costs are consequences that SED refers to in its statement,[101] and seem to have eluded Messrs. Hower & Stinson. They continue their discussion of this violation in Subsection E.

E. Hower & Stinson Misstate Opening Testimony Violation 86 which states that SoCalGas Failed to Have a Systematic Practice to Inspect External Casing Cement and Mud Bonds To Ensure Safe Operations

Subsection E of Hower & Stinson seems to make another argument based upon a misstatement of violation 86. Opening Testimony violation 86 states that SoCalGas failed to have systematic practices to protect surface casing strings against external corrosion and failure to employ proper understanding of the consequences of corroded surface casings and uncemented production casings.[102] Hower & Stinson shorten this 451 violation to "did not understand the consequences of uncemented production casings" and then title their subsection E to say that, "The Production Casing was Cemented Properly

[101] SED Opening Testimony, p. 47.

[102] SED Opening Testimony, p. 4.

pursuant to Industry Standard Practices".[103] [104] Once again, Hower & Stinson refer to industry standard practices that they previously said did not exist. I agree that SS-25 was installed in 1953 using the well design that was typical in the industry at the time for drilling and completing oil & gas production wells. However, in 1973, SoCalGas renovated the well knowing that the production casing would be put into different service, exposed regularly to the high pressures of injected and produced natural gas. They also should have known the depths of water from geological surveys. Still, SoCalGas took no steps during renovation to cement the casing to surface or to inspect the condition of the original cement bond and drilling mud after 20 years.[105] Over the life of the well after 1973 (another 42 years), SoCalGas failed to perform surveys of the casing to determine the condition of the cement bond and mud seal between the casing and formations. SoCalGas made no effort to determine if corrosion was occurring.[106] Therefore, SoCalGas failed to take steps to make the SS-25 well safe for continued operation, which is a 451 violation. Hower & Stinson continue their discussion of violation 86 in subsection F.

F. There was an Industry Standard for Cathodic Protection, and Findings by Blade and SoCalGas Indicate SS-25 was Significantly Corroded

Hower & Stinson address the final piece of violation 86 in their subsection F. Again, rather than capture the entire violation, they quote only a part of it, stating, "SED alleges that '[c]athodic protection systems are commonly used to protect pipelines from corrosion and goes on to imply that SoCalGas is in violation of Section 451 for not employing cathodic protection on SS-25."[107] The complete statement of violation 86 is

---

[103] Hower & Stinson Testimony, p. 24.

[104] The point in time suggested by this statement would have been in 1953, when tidewater completed SS-25.

[105] AC_CPUC_SED_DR_30_0000778.1973 – Well View record "5/24/73 - 6/6/73 Cleaned out to 8748', pressure tested csg, perforated for conversion to gas storage, ran tbg with gas lift valves."

[106] Based on review of SS-25 well files provided by SoCalGas.

[107] Hower & Stinson Testimony, p. 25.

that "SoCalGas failed to have systematic practice to protect surface casing strings against external corrosion and failed to employ proper understanding of the consequences of corroded surface casings and uncemented production casings."[108]

Regarding the part of violation 86 that Hower & Stinson address in subsection F, they argue that "[C]athodic protection is not the industry standard for gas storage wells."[109] Apparently, Hower & Stinson are using their personally devised industry standards to conclude that cathodic protection is not an industry standard for gas storage wells, because there is a standard in this case that has been around since at least 2001.[110] There is no point in distinguishing gas storage wells from any other wells that have steel casings. In fact, SS-25 was originally an oil well, and the original steel casing was still in use when it failed from corrosion. Cathodic protection has been used in the oil & gas industry to protect well casings since 1959.[111] The NACE standard titled "Standard Practice – Application of Cathodic Protection for External Surfaces of Steel Well Casings" was published in 2007.[112] In fact, SoCalGas has been using cathodic protection at least since 1992, as indicated by an internal memo discussing applying cathodic protection to well FF-34A at Aliso.[113] SoCalGas has installed cathodic protection on wells in all of its UGS areas.[114] Hower & Stinson are simply misinformed.

Hower & Stinson point out that Blade did not find a "hot spot" of casing corrosion around SS-25.[115] By "hot spot" I assume they are talking about an area within Aliso that had more casing corrosion than other areas. But this finding was likely because SoCalGas

---

[108] Opening Testimony, pp. 4 and 45.

[109] Hower & Stinson Testimony, p. 25.

[110] NACE Standard Practice SP0186-2007 titled "Application of Cathodic Protection of External Surfaces of Well Casings" was formerly RP0186-2001.

[111] 1959.0519.API-59-199, presentation by Standard Oil of California.

[112] SED_RT_0029 – SED_RT_0056.

[113] AC_CPUC_0022178.FF34-A.CP.

[114] Selga, p.30, lines 13-16 "there is cathodic protection applied to the well casings at Goleta, Honor Rancho, and then some at Aliso Canyon."

[115] Hower & Stinson Testimony, p. 26, lines 4-13.

had only performed one model SIMP investigation that showed the extent of corrosion before failure[116] by the time SS-25 failed.[117] In 2016, SoCalGas investigations of the other Aliso wells led to immediately closing of many of them.[118] SoCalGas '2016 investigations suggests findings that might have led Blade to conclude that corrosion was far more common than SoCalGas data led them to believe. Blade found that SS-25 had external corrosion on the surface casing and the production casing, something SoCalGas was apparently unaware of prior to the casing failure.[119] A multi-caliper log of the SS-25 production casing performed in January 2016 shows wall loss up to 39%, which can significantly weaken the casing.[120] Despite logistical issues cited by Hower & Stinson, SoCalGas could have considered installing cathodic protection on SS-25 and other wells to combat corrosion. SoCalGas' own employees believe it could have been done.[121]

Hower & Stinson's arguments regarding cathodic protection, the final piece of violation 86, fail. Therefore, violation 86 should stand.

V. SOCAL GAS DID NOT IMPLEMENT ITS SIMP PROGRAM UNTIL AFTER THE SS-25 WELL FAILURE

In Section V of their testimony, titled "SoCalGas Had Wellbore Integrity Management Program Before The Incident That Met Or Exceeded Industry Standard Practices," Hower & Stinson claim that violations 74, 75, and 78 are unfounded.[122] Once again, Hower & Stinson misstate violation 74 to reach their conclusion. Here is the comparison showing Hower & Stinson's misuse of facts, and what the violations actually say.

---

[116] Well Frew 2. SED Reply Testimony, pp. 8-10.

[117] 2016.1001.AC_CPUC_0014708.SIMP.10.2016.Status.

[118] 2016.1001.AC_CPUC_0014708.SIMP.10.2016.Status.

[119] Blade Main Report, p. 5.

[120] 2016.0121.I1906016_SCG_SED_DR_67_0000004.SS-25.wall.loss.

[121] Examination Under Oath of Frank Selga, August 1, 2018. p.78 - 80 re recommendations to apply Cathodic protection to well casings, and Examination Under Oath of James Mansdorfer, September 13, 2018, pp. 41-43.

[122] Hower & Stinson Testimony, p. 28, lines 10-12.

According to Hower & Stinson: "SED's Opening Testimony alleges, 'SoCalGas did not *have* any form of risk assessment focused on wellbore integrity management, including lack of assessment of qualitative probability and consequence of production casing leaks or failures." SoCalGas footnote 113 for this passage references SED Opening testimony on page 12, but Hower & Stinson do not make clear which exact violation they are talking about. However, the closest violation of the three to which SoCalGas refers in this passage (74, 75, and 78) is violation 74. In contrast to Hower & Stinson's statement, SED Opening Testimony violation 74 states, "Failure to *implement* a risk or integrity management program for Aliso Canyon storage facility (Aliso)." (Emphasis added.) Violation 74 on the table of page four of Opening Testimony references to section II.B.2.a, and that section is found on page 13; not page 12.

Again without clearly stating which exact violation they are talking about, Hower & Stinson say that "SED further criticizes SoCalGas for not initiating a storage integrity management program in 2009, even though such a program was recommended by Mr. James Mansdorfer, who was the Storage Engineering Manager at the time."[123] Hower & Stinson then claim to have reviewed SoCalGas records and determined that SoCalGas had a wellbore integrity management program as early as 2007.[124] They did not say that SoCalGas *implemented* the integrity management program. Among violations 74, 75, and 78 referenced in this passage, violation 75 seems to be closest. This one is for SoCalGas ' failure to detect corrosion on well SS-25 resulting in part from lack of risk assessment at Aliso. Other than statements by Hower & Stinson and Kitson, the testimony provides no evidence in the documents provided to SED in response to discovery questions that prove there actually was a SoCalGas wellbore integrity management program prior to 2016, and certainly not back to 2007.

Due to this lack of evidence in Hower & Stinson's testimony, I found that SoCalGas witness, Ms. Amy Kitson, also made a similar assertion on page 3 of her

[123] Hower & Stinson Testimony, p. 28, lines 6-9.

[124] Hower & Stinson Testimony, p. 28, lines 10-16.

testimony. She claimed that in 2007 SoCalGas began a well integrity program to inspect, evaluate, and mitigate downhole integrity issues. SED requested that SoCalGas provide the documentation supporting that statement.[125] In response, SoCalGas stated, "SoCalGas interprets this request to seek an example supporting the statements quoted from Chapter VI Prepared Reply Testimony of Amy Kitson on Behalf of Southern California Gas Company. For an example well, please see electronic documents with Bates range:

> I1906016_SCG_SED_DR_59_0000001 through
> I1906016_SCG_SED_DR_59_ 0000003."

This "example" consisted of one document that SoCalGas provided to DOGGR entitled, "History of Oil or Gas Well". It shows what appears to be operations and maintenance efforts on one well, Fernando Fee 32E, from June 8, 2007 to May 18, 2008,"[126] and a document that has the words, "Ultrasonic Imager Gama Ray-Neutron" also on Fernando Fee 32E, dated June 2, 2007.[127] These documents do not show anything that would indicate that SoCalGas had a SIMP-like integrity management program in 2007. SoCalGas did not provide a standard for the claimed program.

In 2014, SoCalGas began the process of designing the SIMP Program for the purposes of requesting funding in the 2016 Rate Case. SoCalGas did run some trial investigations in a pilot program to select the tools they wanted to use for the SIMP program and, in the course of that process, ran the tools on FREW 2, which was found to be seriously corroded.[128]

Prior to these pilot SIMP investigations, SoCalGas ran limited surveys on wells when the tubing was pulled for other purposes. These activities were not part of a planned integrity management program to inspect Aliso wells and had occurred on various wells

---

[125] SED Data Request 59, pdf p. 2, Question 1a.

[126] SoCalGas Response to SED Data Request 59, Question 1a, I1906016_SCG_SED_DR_59_0000001 to 0000002.

[127] SoCalGas Response to SED Data Request 59, Question 1a, I1906016_SCG_SED_DR_59_0000003.

[128] Well Frew 2. SED Reply Testimony, pp. 8-10.

since SoCalGas acquired the Aliso UGS area. Those actions were reactive and implemented only when a well was down for some specific maintenance or because a leak was indicated by surveys or well behavior, and the leak was to be repaired.[129] SoCalGas has provided no evidence of a formal risk assessment or integrity management program. Had there been such a program in place, SoCalGas would have identified the problems with SS-25 before it failed. Hower & Stinson cite to a "Replace & Inspect" program, which makes no sense in title alone. This seems to suggest that when SoCalGas replaces casing, it then inspects the casing. Maybe they mean Inspect & Replace. They mention what would be routine inspections of well hardware such as wellhead valves, well tubing and packer, not casings. However, there is no violation in my Opening Testimony regarding the maintenance of the internal components of wells.

I acknowledge that the SoCalGas SIMP model investigation of FREW 2 occurred just prior to the 2015 failure of well SS-25. SoCalGas personnel were just beginning to draft the SIMP Plan in December 2014.[130] Actions under the new SIMP program did not begin until 2016. In fact, SoCalGas management took steps to prioritize and speed up implementation in December 2015, during the SS-25 failure event.[131] Nevertheless, it took SoCalGas 42 years to develop a plan to inspect wells that were 20 years old when they purchased Aliso. During that time, all of the Aliso wells were subject to corrosion and were deteriorating, as shown by the number of wells plugged and isolated after the 2016 SIMP investigations. [132]

Finally, violation 78 is for the operation of Aliso without internal policies that required well casing wall thickness inspection and measurement. In a short statement

---

[129] Direct Testimony of Phillip E. Baker, Underground Storage, November 2014 (2016 General Rate Case) p.PEB.5, "While we have historically managed risk at our storage facilities by relying on more traditional monitoring activities and identification of potential component failures, we believe that it is critical that we adopt a more proactive and in-depth approach. . . SoCalGas proposes to manage and approach the integrity of its storage well assets . . . in a manner consistent with the approach adopted for distribution and transmission systems." (emphasis added)

[130] I1906016_SCG_SED_DR_59_0000058.SIMP.

[131] Pgs.from.2018.0824.EUO-04_SELGA_0000001-0000923.

[132] 2016.1001.AC_CPUC_0014708.SIMP.10.2016.Status.

directed at violation 78, Hower & Stinson point out that California is one of several states requiring periodic mechanical integrity testing on gas storage wells with tubing and packer completion.[133] Hower & Stinson then reason that since other States do not have this requirement, and by following DOGGR requirements, SoCalGas exceeded national standards by conducting annual temperature surveys on all Aliso Canyon storage wells. Recall, however, that Hower & Stinson originally argued that there are no industry standards, other than the ones they personally designed specifically for their testimony and after the incident occurred.[134] Following DOGGR requirements is not an option for SoCalGas; they are required to do so. Despite following DOGGR requirements, which only call for annual temperature surveys, SoCalGas should know from its own experiences with temperature surveys that the data can be severely erroneous and misleading. For example, on Well FREW 3, temperature and noise survey results showed two casing leaks at 1000 ft and 1060 ft. After down-hole inspections, a casing leak was found at 3240 ft and repaired.[135] A 2000 foot difference between the depths of two leaks detected and the one confirmed is a significant error in initial temperature survey results.

Hower & Stinson fail to provide sufficient arguments to prove SoCalGas acted reasonably. Therefore, violations 74, 75, and 78 should stand.

VI. SOCALGAS OPERATED WELLS WITHOUT DUAL BARRIERS KNOWING THAT THIS WAS AN UNSAFE PRACTICE FOR ALISO GAS STORAGE WELLS

Violation 77 is for the operation of well SS-25 without backup mechanical barrier to 7-inch production casing.[136] As shown here, Hower & Stinson failed to prove that SoCalGas operated SS-25 safely without a dual barrier. Hower & Stinson title their Section VI "Dual Mechanical Barriers are not Industry Standard and Single Barrier Well

[133] Hower & Stinson, Testimony, p. 30, lines 10-12.

[134] Hower & Stinson Testimony, p. 7, fn. 29.

[135] SCG DR 83, FREW 3.

[136] Opening Testimony of Margaret Felts, p. 3.

Completions are Industry Standard." Of course, this title has no bearing on violation 77, which is a 451 safety violation.

I assume it is Hower & Stinson's personal industry standards that they rely on to make these statements since they have said that there are no industry standards other than those they devised.[137]

Hower & Stinson cite to the *Underground Natural Gas Storage – Integrity & Safe Operations* ("JITF Report"), report as a source of their standard, quoting: "[o]perators have designed and installed a number of different well completions depending on their historical experiences, practices, and site-specific conditions. A common well completion case referenced herein contains production casing without tubing." The JITF Report goes on to state that "10-25 percent of natural gas storage wells have a full tubing string set into an 8 isolation packer."[138] Aliso wells were all completed with tubing, therefore, Hower & Stinson conclude by this quote that Aliso Canyon's single barrier well completion (completed with tubing set in a packer) is consistent with the 'industry standard' of approximately 87% of all gas storage wells in operation in the US. But Hower & Stinson fail to note that SS-25, as well as most of the Aliso wells, were used for injection and production of high pressure gas via the 7-inch casing, not just the tubing, which is not common for any single barrier well.[139] In fact there were holes in the bottom of well SS-25 that connected the casing with the tubing, so both tubing and casing operated at the same pressure all of the time.[140] For most wells the 7 inch casing would provide a second barrier to the tubing. [141] In fact, after the SS-25 well incident, SoCalGas

[137] Hower & Stinson Testimony, p. 7, fn. 29.

[138] Hower & Stinson Testimony, p. 31, lines 3-9.

[139] AC_CPUC_SED_DR_27_0000117.

[140] SED SCG - DR 89.cross-over.ports.

[141] How_a_Well_is_Built-1 From IADC web site: http://drillingmatters.iadc.org/wp-content/uploads/2016/09/How_a_Well_is_Built-1.pdf.

stopped using casings for injection and production, presumably because it was not a safe practice.[142]

Hower & Stinson fail to prove that SoCalGas was operating SS-25 safely without a dual barrier. Therefore, violation 77 should stand.

VII. SOCALGAS 'LACKED INTERNAL POLICIES THAT REQUIRED WELL CASING WALL THICKNESS INSPECTION AND MEASUREMENT.

Violation 78 is for Aliso's operation without internal policies that required well casing wall thickness inspection and measurement.[143] Hower & Stinson's reply testimony to this is flawed for several reasons.

First, Hower & Stinson state, "Further, as already noted, the SoCalGas monitoring program met and exceeded industry standards."[144] As stated numerous times above, Hower & Stinson say that there are no industry standards. Therefore it would be impossible for SoCalGas to comply with them.

Second, Hower & Stinson say that "DOGGR approved SoCalGas's monitoring program as being in regulatory compliance."[145] DOGGR required temperature surveys, which SoCalGas adhered to, but have nothing to do with the measurement of wall thickness. SoCalGas measured wall thickness on occasion in some wells, but it lacked any program that would direct routine inspection and measurement of wall thickness for the purposes of preventative maintenance. The multi-finger Caliper Log performed in January 2016 on SS-25 shows the type of information SoCalGas could have had on Aliso wells if it had a program for such investigations.[146] High Resolution (HR) Vertilog can

---

[142] Pages 56-57 EUO-08.DR01.01.JM0400-JM0555.

[143] Opening Testimony of Margaret Felts, p. 3, 25, fn 153, citing Blade Report, p. 5.

[144] Hower & Stinson testimony, p. 32, lines 13 to 14.

[145] Hower & Stinson testimony, p. 32, lines 12 to 13.

[146] 2016.0121.I1906016_SCG_SED_DR_67_0000004.SS-25.wall.loss.

provide even more detail regarding the condition of the casing.[147] SoCalGas provided an example of how to read HR Vertilog images (in part).[148]

Third, Hower & Stinson say that "SED's testimony creates the inference that SoCalGas could have, and should have, done better than simply running temperature surveys and periodic noise logs." Hower & Stinson then claim that this criticism is myopic, ignoring lessons learned by industry over more than 60 years.[149] But, as noted above, SoCalGas already had proof from well Frew 3 that reliance on temperature surveys was not the best option for maintaining safe well conditions.[150] In that case, a temperature survey on Frew 3 indicated two leaks that turned out to be one leak about 2000 feet deeper in the well than the survey indicated.[151]

Fourth, SoCalGas has hundreds of Standards, yet, it failed to write one for the very basic survey that could have made their wells safe. Hower & Stinson also argue that running a casing inspection log in a well such as SS-25 requires conducting a workover of the well.[152] This requirement is a non-issue for SoCalGas because they do this all of the time. SoCalGas has a standard for the routine killing of wells for maintenance.[153] This is part of the process required to maintain wells and SoCalGas and its contractors are competent to do this. In addition, when SS-25 failed, SoCalGas immediately recognized the importance of inspecting all of the Aliso wells. They managed to inspect them under their new SIMP program within a year after the SS-25 incident,[154] something that could have been spread out over many years if SoCalGas had implemented a program for inspection and measurement of wall thickness years ago to protect the integrity of its

---

[147] I1906016_SCG_SED_DR_59_0000060.BH.Vertilog.

[148] DR25.01 SCG files_0000001-0001537 p.793.Corrosion.

[149] Hower & Stinson Testimony, p. 32.

[150] DR 83, Well Frew 3.

[151] DR 83, Well Frew 3.

[152] Hower & Stinson Testimony, p. 32, lines 20, 33, line 1.

[153] Well Standards DR 17.Well.Kills.

[154] Pgs.from.2018.0824.EUO-04_SELGA_0000001-0000923.

wells and to provide safe systems. Hower & Stinson fail to show that SoCalGas 'failure to devise and implement a plan was a safe approach. Therefore violation 78 should stand.

VIII. FAILURE TO HAVE CONTINUOUS PRESSURE MONITORING SYSTEM FOR WELL SS-25.

Violation 87 is the failure to have continuous pressure monitoring system for well surveillance because it prevented an immediate identification of the SS-25 leak and accurate estimation of the gas flow rate.[155] Hower & Stinson claim, "SED's testimony regarding real time pressure monitoring ("RTPM") is unclear. At deposition, SED's witness clarified that the reason RTPM was important was that it could have enabled SoCalGas to identify and remediate the leak at SS-25, which she believes had been present for years, at an earlier point in time."[156] As shown by the reference of this violation to the Blade Report, this violation is based on Blade's analysis, not my deposition.

At the time of the event, SoCalGas reported that there were "no anomalous pressure readings" from the previous day, which was not helpful in analyzing the immediate problem on SS-25 when gas was detected.[157] As stated in my opening testimony and the Blade Report, the lack of real-time pressure measurements prevented the immediate identification of the SS-25 7-inch casing failure.[158] As also noted by Blade, the constant monitoring of the tubing, production casing, and surface casing pressures will provide better insight into operational deviations in all wells.[159] If this type of system had been installed on SS-25, it would have provided insight into the time of the leak, the opportunity to shut in the well immediately, size of the leak, and the extent of the problem.[160] Furthermore, the information could have been used during well-control

---

[155] Opening Testimony of Margaret Felts, pp. 4. 47 fn. 348, citing Blade Report at p. 5.

[156] Hower & Stinson, p. 35, line 21 - p. 36, line 1.

[157] Pages.113-115.DR33.01 SCG files 0000001-0163.

[158] Opening Testimony of Margaret Felts, p 47 Section 8 and Blade Report at p. 5.

[159] Blade Report at p. 233.

[160] Blade Report at p. 233.

efforts improving the chances of early success.[161] I agree with Blade and adopted their analysis, which is based on sound engineering principles.

One of the first things SoCalGas did in response to the incident was to install real-time pressure monitoring on SS-25.[162] Real-time pressure information was clearly deemed by SoCalGas and Boot & Coots to be critical to well kill efforts.

Information gathered by SoCalGas during the incident supports this violation because it shows an unusual variance of pressure readings from normal.[163] If SoCalGas had real-time pressure monitoring, prior to the casing failure, they would have seen normal operating casing and tubing pressures of 2700 psig, and the surface casing should be zero. Then, as the leak evolved, pressures would have changed and, presumably, SoCalGas personnel who monitor instrument readings would have noticed something was wrong. By the time the casing had already failed, on October 23, 2015, pressures were 270 psig on the casing, 1700 psig on the tubing, and 140 psig on the surface casing.[164] If the pressures had been continuously monitored, there would be no debate as to how the casing failure progressed.[165] Pressure instruments provide vital information when a system is failing, allowing personnel to take immediate steps to shut in the system. Because SoCalGas did not have the instruments in place, we will never know what SoCalGas could have known before the pipe failed, or if that information would have caused them to shut in the well prior to failure, averting the entire incident.

---

[161] Blade Report at p. 233.

[162] Find reference. SoCalGas was in the process of installing these pressure monitoring systems throughout their UGS units, but had not gotten to Aliso yet.

[163] AC_CPUC_SED_DR_30_0000776.event.pressures.

[164] AC_CPUC_SED_DR_30_0000776.event.pressures.

[165] Example of chart: AC_CPUC_SED_DR_17_0001784.Surface.Casing.Pressure.

A. Whether or not there is an industry standard for real-time pressure monitoring is irrelevant.

Hower & Stinson state that, "real-time pressure monitoring systems are not industry standard in gas storage fields."[166] SoCalGas is familiar with Supervisory Control and Data Acquisition (SCADA) systems common in natural gas pipelines.[167] So, speculation about whether or not industry standards exist is pointless. SoCalGas must know how useful real-time data is and how it can make operations of their facilities safer because they use it. Hower & Stinson even admit that SoCalGas was installing real-time pressure monitoring on its wells at the time of the SS-25 incident.[168] SoCalGas just had not managed to get the instrumentation installed on the Aliso wells before SS-25 failed. SoCalGas installed the instrumentation on SS-25 on October 28, 2015.[169]

B. Blade's findings regarding real-time pressure monitoring are correct and relevant

Hower & Stinson take exception to Blade's findings quoted in SED's testimony, as follows:

- "The lack of real-time pressure measurements prevented the immediate identification of the SS-25 7-inch casing failure."[170]
- [i]f this type of system had been installed on SS-25, it would have provided insight into the time of the leak, the opportunity to shut in the well immediately, size of the leak, and the extent of the problem."[171]

---

[166] Hower & Stinson testimony, p. 36, Section VIII, heading A. They qualify that installing SCADA on existing gas storage wells was not an industry standard practice in the U.S. gas storage industry in October 2015.

[167] 2009 Biennial Cost Allocation Proceeding A.08-02-001. SoCalGas Response to California Gas Corporation (SCGC) data request, Q 7.1.1. Question was to provide the name of each major organization unit making up the Pipeline System and Planning Department that conducts activities considered to be those of the System Operator. The first organization listed by SoCalGas is "SCADA – maintain the primary data acquisition & control (SCADA) system for gas transmission and storage system."

[168] P. 37, lines 16-18.

[169] AC_CPUC_SED_DR_17_0001726.pressure.transmitter.

[170] Hower & Stinson Testimony, p. 38, lines 5-8.

[171] Ibid.

Hower & Stinson call these findings incorrect and irrelevant.[172] They believe a few hours difference in the initial identification of the gas leak and the closing of the well would have made absolutely no difference to the actions and outcome at the well SS-25.[173] But they provide no evidence to support this statement. As mentioned above, we will never know what SoCalGas could have known between the time of the day-before pressure readings and the time of the incident.

Hower & Stinson provide no evidence to support their claims that real-time pressure monitoring should not have been installed on SS-25 prior to the incident. Thus, violation 87 should stand.

IX. SOCALGAS ADMITS THAT IT DID NOT PROVIDE ORGANIZED WELL FILES TO SED FOR REVIEW

Violations 327 through 329 say that SoCalGas had imprudent and unreasonable recordkeeping practices. Hower & Stinson testify that they believe the well files are well organized and contain appropriate and necessary information.[174] I do not doubt Hower & Stinson believe this, but it is highly likely that they were not present in late 2015 to view well files at Aliso. I will address the condition of the well files in Chapter VII.

When I first became involved in this case as a consultant, the first file I had access to and reviewed was the first SS-25 well file provided to SED. It contained pdfs – one for each page in the file – of all pages in the SS-25, SS-25A, and SS-25B well files. These sets were mixed together. The pages were in no particular order and not collected in any groupings. There were no obvious folders. I based my opening testimony on this file. SED asked SoCalGas if the files were incomplete, inaccurate, or otherwise not reflective of the actual well files. SoCalGas responded that they were not incomplete or inaccurate. To the third question, they said "The electronic well files provided to SED are exact copies of the documents in the hard-copy well files. However, it seems the organization of the hard-copy well files (including that the files had pockets, fasteners, and additional

[172] Hower & Stinson, p. 38, lines 9-10.

[173] Hower & Stinson Testimony, pp. 38-39.

[174] Hower and Stinson Testimony, p. 40, lines 14-16.

file folders) may not have been captured in the electronic well files provided to SED, as reflected in SED's Opening Testimony (SED Opening Testimony at page 72: "The Well File for SS-25 is not kept in any particular order.")[175]

In 2020, when I was in Los Angeles, I initially asked to view the Aliso files. But, after thinking about this, I realized that SoCalGas had five years to put the files in order and that the files that were scanned in late 2015 or January 2016 were more likely to accurately represent the condition of the files during the SS-25 failure event.

X. ADDITIONAL CLARIFICATIONS FROM BLADE IN RESPONSE TO HOWER & STINSON'S TESTIMONY

Hower & Stinson make a number of assertions about Blade's RCA. To clarify the record, SED data requested Blade to give Blade an opportunity to respond to Hower & Stinson's assertions. I provide brief descriptions of Hower & Stinson's assertions, and Blade's responses to help clarify the record. These descriptions are merely summaries, but references to the details of Blade's data responses that support these summaries are provided as Exhibits with this testimony.

- Assertion 1: Hower & Stinson claim that SED and Blade over counted leaks. Blade and I both disagree and maintain that the count number is accurate.

In Hower & Stinson's words,

> Moreover, SED and Blade mischaracterize the 60 or 63 well casing issues of varying cause and degree as "leaks". [Footnote omitted] Indeed, the number of actual casing leaks is less than half that number, and only two of those (FF - 34A and Frew 3) were of the scale where gas migrated some distance in the subsurface away from the wellbore.[176] . . .
>
> There were 31 casing "leaks" documented by Blade which were not leaks at all, were double or triple counted leaks from the same event, or did not occur during the conversion of the field to underground gas storage, initial drilling of a new storage well, routine casing

[175] SoCalGas Response to SED DR 77.

[176] Hower & Stinson Testimony, p. 8.

> repairs of stage collars, and a water shut - off test. Further, only two of the actual casing leaks documented by Blade (FF - 34A and Frew 3) involved situations where gas was known to have mitigated some distance in the subsurface away from the wellbore.[177]

SED asked Blade if Blade disagreed with any part of this statement. Blade stated that it did indeed disagree with the statement, and offered a correction to the statement as shown below. There were 31 casing "leaks" documented by Blade which were not leaks at all, were double or triple counted leaks from the same event, ~~or did not occur~~ occurred during the conversion of the field to underground gas storage, initial drilling of a new storage well, routine casing repairs of stage collars, and a water shut - off test.

Blade then explained in detail why its initial count of leaks at Aliso Canyon natural gas storage facility was accurate.[178] Blade's answer addresses and responds to each bullet point in Hower & Stinson's testimony, pages 13-16, under the sentence on page 13 where Hower & Stinson assert, "Blade's list of 63 relevant casing failures incorrectly includes the following:"[179] SED continues to agree with Blade's observed leak count.

- Assertion 2: Hower & Stinson state on pages 11 and 12,

> It is also critical to note that of the casing failures documented by Blade, which provide the basis for SED's alleged violations, there was no pattern identified that would have led SoCalGas staff to determine that there was any sort of systemic issue that would have indicated that an SS25 type failure was likely. According to Blade:
>
> Wells with casing failures were distributed throughout the Aliso Canyon Field. Nothing seems unusual regarding the casing failures

[177] Hower & Stinson testimony, p. 16.

[178] Blade Response to SED Data Request 69, Question 1, June 9, 2020, pp. 5-17.

[179] Blade's responses to Hower & Stinson's bullet points can be found in Blade Response to SED Data Request 69, Question 1, pp. 8 through 17.

near SS-25 when comparing them to casing failures in the rest of the field. The depths of casing failures ranged from the wellhead to below 8,000 feet, and no general pattern is apparent [Footnote omitted] [Emphasis removed from Hower & Stinson testimony, as no emphasis in original.)

Further, Blade stated that '52% of the leaks were between surface and 4,000 ft. with no trend of leak count vs. depth." [Footnote omitted]. Finally, Blade stated that '[t]he failure and casing leak rate for the gas storage wells is around 50%, implying that well age does not correlated with casing failures. [Footnote omitted.]

SED asked Blade a data request about its views regarding this passage from Hower & Stinson's testimony.In response, Blade stated,

> As described in the Blade reports, no patterns of casing failures were identified, based on the data available. However, it is not known if a pattern might have been identified if failure investigations had been undertaken." Blade added that, "A failure investigation of casing OD corrosion in other wells might have directed attention to SS-25 and other similar wells. As was stated in Section 5.2.2, page 216 in Blade's Main Report, *"Despite the number of casing failures that had occurred in the field, no failure analysis or subsequent risk assessment was done that may have led to an awareness that corrosion was a potential problem."* (Emphasis in original.)[180]

- Assertion 3: Hower & Stinson stated on page 22 that, "Knowledge of the hydrogeology and groundwater is only relevant for the design and implementation of the surface casing."

SED asked whether Blade agreed with this. Blade stated it did not agree with this view, reasoning in part that, "The corrosion resulting from groundwater outside the production casing represented a threat to the integrity of the production casing. In addition, many of the Aliso Canyon wells had uncemented production casing in the vicinity of the groundwater."[181]

[180] Blade Response to SED Data Request 69, Question 2, June 9, 2020, p. 19.

[181] Blade Response to SED Data Request 72, Question 1, June 10, 2020, p. 5.

Also in response to a request from SED regarding this passage from Hower & Stinson, Blade answered that it does not accept as true that knowledge of hydrogeology and groundwater is irrelevant for operations and maintenance of: 1) The production casing that is at the same depth and covered by the surface casing; or 2) The production casing that is at lower depths and not covered by the surface casing.[182]

[182] Blade Response to SED Data Request 72, Question 1, June 10, 2020, p. 5.

Docket:	:	I.19-06-016
Exhibit Number	:	
Commissioner	:	Cliff Rechtschaffen
Admin. Law Judge	:	Tim Kenney
	:	Marcelo Poirier
	:	

SAFETY ENFORCEMENT DIVISION
CALIFORNIA PUBLIC UTILITIES COMMISSION

CHAPTER TWO

PREPARED SUR-REPLY TESTIMONY

OF

MARGARET FELTS IN RESPONSE TO

REPLY TESTIMONY OF ROBERT A. CARNAHAN

San Francisco, California
June 30, 2020

TABLE OF CONTENTS

I. INTRODUCTION

The purpose of the following prepared Sur-Reply testimony, submitted on behalf of the California Public Utilities Commission's ("Commission") Safety Enforcement Division ("SED") is to reply to statements made by Robert A. Carnahan. In summary, Mr. Carnahan rephrases the violations of Section 451 of the California Public Utilities Code identified in my Opening Testimony:

- For failure to follow the company's internal 1988 plan to check casing of 12 wells for metal loss (violations 61-72),[1] and failure to follow the company's internal 1988 plan to check casing of well SS-25 for metal loss (violation 73).[2] These violations are incorrectly restated by Mr. Carnahan in his introduction as "SoCalGas should have used the Vertilog technology to check the casing on 13 wells. (Violations 61-73)."[3] However, after the introduction, Mr. Carnahan's testimony does not state which part addresses these violations.
- For failure to have a systematic practice to protect surface casing strings against external corrosion and failure to employ a proper understanding of the consequences of corroded surface casings and uncemented production casings (violation 86).[4] Mr. Carnahan restates this in the introduction of his testimony as "[SoCalGas] should have used cathodic protection to prevent the corrosion that led to the SS-25 leak (violation 86). . ."[5] However, after the introduction, Mr. Carnahan's testimony does not state which part addresses this violation.
- For failure to have a continuous pressure monitoring system for well surveillance because it prevented an immediate identification of the SS-25 leak and accurate estimation of the gas flow rate (violation 87).[6] In the introduction, Mr. Carnahan restates this violation as: "[SoCalGas] not having a continuous

---

[1] See my Opening Testimony, p. 3.

[2] See my Opening Testimony, p. 3.

[3] Carnahan Opening Testimony, p. 1, lines 8-9.

[4] See my Opening Testimony, p. 3.

[5] Carnahan Opening Testimony, p. 1, lines 9-10.

[6] See my Opening Testimony, p. 3.

pressure monitoring system for well surveillance prevented the immediate identification of the SS-25 leak and accurate estimation of gas flow rate (violation 87)."[7] Also, after the introduction, Mr. Carnahan's testimony does not state which part is addressing this violation.

Mr. Carnahan also alleges, without reference to my Opening Testimony, that I contended, without support, that "the" leak existed prior to October 23, 2015.[8]

My Opening Testimony states, "Also, well patches were documented for SS-25A and SS-25B, but there was no mention of such, or the potential for one, in the Well File record for SS-25, even though there was an ongoing leak in well SS-25 documented in Temperature Surveys from the late 1978 to the late 1990s.[9] There is no mention of repair in Well File SS-25, so presumably, this leak still existed at the time of the well failure in October 2015."[10] While the support for my statement is provided again in the footnote for this quote, this is not listed as a violation.

Although Mr. Carnahan links his testimony to specific violations identified by my Opening Testimony, Sections II-IV of his testimony responds to the Public Advocates Office (PAO) opening testimony, which is separate and unrelated to the violations in my Opening Testimony. I will leave it up to PAO to reply to Mr. Carnahan's testimony in Sections II-IV. Section V specifically addresses violation 87, and I will address those comments. Hower & Stinson also addressed all of the violations that Mr. Carnahan's testimony has, as well as my alleged contention that the leak existed prior to October 23, 2015.

---

[7] Carnahan Opening Testimony, p. 1, lines 10-12.

[8] Carnahan Opening Testimony, p. 1, lines 19-20.

[9] Footnote 448, citing SS-25 Well File, Supporting Attachments SED, Examples: 01686-01702, 01711-01713, 01639-01645, 01544-01545, 01554-01556, 01592-01594, 01621-01622, 01627-01631, 01636-01638, 01717-01719.

[10] See my Opening Testimony, p. 71.

II. VERTILOG TECHNOLOGY

The first sentence in Section I of Mr. Carnahan's testimony, beginning on page 1, shows that Mr. Carnahan is replying to Public Advocates Office's (PAO) opening testimony, stating PAO alleges that "SoCalGas management failed to deal with integrity management issues by taking prudent action in response to 'Vertilog testing conducted at Aliso Canyon circa 1988.'"[11] Because Mr. Carnahan says in Section I of his testimony that he is replying to Public Advocates Office's Opening Testimony, I understand this section of his testimony does not address any of the violations in my Opening Testimony. However, Mr. Carnahan's introduction also links the PAO and SED allegations that SoCalGas should have used Vertilog technology to check the casing on 13 wells (SED violations 61 to 73).[12] If it is Mr. Carnahan's intent to address his discussion of Vertilog technology in this section to violations 61 to 73, then my reply to Hower & Stinson in section in Chapter 1, Section IV.A above also addresses Chapter I of Carnahan's testimony here. My Opening Testimony says that violations 61-72 are for failure to follow company's internal 1988 plan to check casing of 12 wells for metal loss, and violation 73 is for failure to follow the company's internal 1988 plan to check casing of well SS-25 for metal loss.[13]

III. VERTILOG TECHNOLOGY

In this section, Mr. Carnahan replies to PAO's Opening Testimony; not my Opening Testimony, which is not related to violations. I defer to PAO to reply to Mr. Carnahan's testimony.

---

[11] Carnahan Opening Testimony, p. 1, line 23 to page 2, line 1.

[12] Carnahan Opening Testimony, p. 1, lines 7 to 9. "Specifically, SED alleges violations of Section 451 of the California Public Utilities Code because SoCalGas should have used the Vertilog technology to check the casing on 13 wells (Violations 61-73). . ."

[13] See my Opening Testimony, p. 3.

IV. PRESSURE TESTING IN 1988

In this section, Mr. Carnahan replies to PAO's opening testimony, not my Opening Testimony. This testimony is not related to the violations in my Opening Testimony and does not appear to have any relationship to those violations identified in Carnahan's introduction. I defer to PAO to reply to this section of Mr. Carnahan's testimony.

V. CATHODIC PROTECTION WOULD HAVE PROTECTED THE 11 ¾-inch SURFACE CASING

Mr. Carnahan states in Section IV of his testimony that "PAO further states '[i]f cathodic protection were applied to SS-25 prior to the invasion of groundwater, the resulting corrosion would not have occurred.' [Footnote omitted] SED makes a similar contention."[14] [15] Similar to the incorrect restatement of SED violation 86 in his introduction, the title of Section IV of Mr. Carnahan's testimony states, "PAO and SED both incorrectly assume that cathodic protection (CP) would have prevented the leak."[16] I defer to PAO to reply to the parts of Mr. Carnahan's testimony that are directed to PAO.

Mr. Carnahan's restatement of violation 86 is incorrect or unsupported for several reasons. First, violation 86 is for failure to have a systematic practice to protect surface casing strings against external corrosion and failure to employ a proper understanding of the consequences of corroded surface casings and uncemented production casings.[17] Mr. Carnahan incorrectly suggests that violation 86 is specific to SS-25. Violation 86 includes SS-25 but is not limited to it.

Second, in alleged support of his restatement of violation 86, Mr. Carnahan said that "SED makes a similar contention" and he then notes footnote 56, which refers to my

---

[14] Carnahan Opening Testimony, p. 21, lines 23 to 25.

[15] As noted earlier, Mr. Carnahan incorrectly restates Violation 86 in his introduction as "[SoCalGas] should have used cathodic protection to prevent the corrosion that led to the SS-25 leak." Carnahan Opening Testimony, p. 1, lines 9-10.

[16] Carnahan Opening Testimony, p. 21, line 18.

[17] See my Opening Testimony, p. 4.

Opening Testimony at 45, and states "A cathodic protection system would have provided corrosion protection to the 11 ¾-inch casing."[18] Mr. Carnahan states in the next sentence on the next page that "This is not so. Cathodic protection (CP) does not protect production casing where it is contained within surface casing." The disconnect between the statement he quotes from my testimony and his statement is obvious. My comment was that CP would have protected the 11 ¾-inch casing, because the 11 ¾-inch casing touches soil, and could lose metal without CP. In contrast, Mr. Carnahan says CP would not protect the production casing within the surface casing.[19] These are two different issues. Mr. Carnahan's testimony claims to refute my statement but does not. He merely builds on his statement, which I have never disputed.

Third, Mr. Carnahan says that "[t]here is no conclusive evidence that there were holes in the 11 ¾-inch surface casing prior to rupture of the production casing."[20] Whether he is correct that there were no holes in the surface casing of SS-25 has nothing to do with violation 86, because that violation focuses on corrosion (not holes) related to surface casings, such as SS-25. There is overwhelming evidence of corrosion on the surface casing, which failed under the pressure from the production casing failure event.[21] Mr. Carnahan quotes Blade on this point: "[t]he gas flowing through the axial rupture on the 7-inch production casing caused an increase in pressure on the 11¾-inch surface casing. This caused several of the surface casing corroded regions to fail, creating holes and thus providing a pathway for gas to escape. Over 50 such holes provided a pathway for the gas to surface."[22] (Emphasis added) Had the 11 ¾-inch surface casing been protected by CP, it would not have been corroded, and therefore the pressure would not have caused it to fail, resulting in over 50 holes.

---

[18] Carnahan testimony, p. 21, lines 24-25, and fn 56.

[19] Carnahan testimony, p.22 lines 1-2.

[20] Carnahan testimony, p.22 lines 10-11.

[21] Blade Report at 3, 119, 120 and 121.

[22] P.22 Lines 18-20.

Mr. Carnahan's testimony fails to provide sufficient arguments to prove that SoCalGas could not have protected the surface casing with CP. Therefore violation 86 should stand.

VI. CONTINUOUS PRESSURE MONITORING

Violation 87 is for failure to have a continuous pressure monitoring system for well surveillance because it prevented an immediate identification of the SS-25 leak and accurate estimation of the gas flow rate. Carnahan claims in his Section V heading that, "SED is Incorrect that Continuous Pressure Monitoring and Temperature/Noise Surveys Should Have Alerted SoCalGas to the SS-25 Leak Prior to October 23, 2015." Hower & Stinson also make assertions about violation 87, which I address in Chapter 1.[23] I also address Carnahan's assertions regarding violation 87 here.

A. Analysis of the Failure Event

Mr. Carnahan contends that "The Blade main report and various supplementary reports assert that the SS-25 7-in. casing's vertical rupture and circumferential parting were two separate events, with the circumferential parting occurring some period of time after the initial vertical rupture, but while the well was still on injection. To the contrary, it is evident the SS-25 7-in. casing vertical rupture and circumferential parting occurred as a single event, as illustrated in Figure 12 and Figure 13, and for the reasons described below:"[24]

When SED asked whether Blade agreed or disagreed with this statement, Blade stated that it disagreed.[25] Blade explained, "Mr. Carnahan's statement does not take into consideration all of the facts provided in Blades' Main and Supplementary reports. Central to the argument are two facts. First, there are arrest turning points on both ends of the axial rupture. Second, there is no continuity of chevron marks from the axial rupture

---

[23] Section VIII of Chapter 1 above

[24] Carnahan testimony, pp. 24-25.

[25] Blade Response to SED Data Request 58, Response 2.7.1, May 15, 2020, pp. 15-16.

to the circumferential parting."[26] Blade added detail to this explanation. In conclusion of their statement, Blade stated that "Blade does not accept any part of Mr. Carnahan's statement as true. If Blade were to accept Mr. Carnahan's primary assertion that the vertical rupture and the circumferential part were one event, it would only change Blade's interpretation of the failure sequence. However, it would not change the failure analysis conclusions."

Statements in my Opening Testimony on this issue rely on Blade's RCA, which I support. Mr. Carnahan's testimony fails to provide sufficient arguments to prove that a continuous pressure monitoring system for well surveillance would not have provided SoCalGas immediate identification of the SS-25 leak and accurate estimation of the gas flow rate. Therefore violation 87 should stand.

B. Prior Leaks in SS-25 Casing Existed

Mr. Carnahan challenges statements I made in my Opening Testimony regarding indications of prior leaks in SS-25 that went unaddressed by SoCalGas.[27] My Opening Testimony did not identify any violations having to do with failure to respond to prior indications of leaks. I testified in my Reply Testimony to the OSC that SS-25 temperature and noise surveys indicated leaks in the well casing from 1978 to 2012.[28] Exhibits were provided. The primary leak was just above the shoe and was noted many times in the records, and exhibits were provided to show that as well.[29] Blade acknowledged the cooling indication deep in well SS-25 but discounted it as not relevant to their RCA, and I agree with their assessment.[30] My point in showing these exhibits is not that it was a cause of the SS-25 failure, but that these indications on temperature and noise surveys

---

[26] Blade Response to SED Data Request 58, Response 2.7.1 May 15, 2020, p. 16.

[27] Carnahan testimony, p. 28, lines 8-11.

[28] Reply Testimony to the OSC, p. 13-14

[29] Reply Testimony to the OSC, p. 13-14

[30] Blade Report, pp30. "A cooling feature was found below approximately 8,200 ft related to gas injection and withdrawal, but it was not related to a casing integrity issue."

went unaddressed by SoCalGas and that there were no interoffice memos in the file that discussed these survey results as I found in other well files, which is a recordkeeping issue.

Mr. Carnahan is incorrect in stating that SS-25 surveys did not identify any leaks prior to October 23, 2015.[31] For example, the SS-25 temperature survey from November 7, 1991, which Carnahan identifies in the second bullet on page 29 of his testimony,[32] shows a noise (gas leaking) was heard above 500 ft.[33] Specifically, it says under Results and Remarks "Heard distant noise above 1200'. At 500', bled casing kill line on well 25 A and heard even higher activity."[34] If SoCalGas really believes temperature and noise surveys are the tools to rely on to discover casing leaks, it should have investigated the indications on this survey, especially since this apparent leak appears on subsequent surveys through 2012.[35] As it turns out, 500 ft is the same well depth that SoCalGas personnel estimated to be the depth of the leak on SS-25 before they knew the casing had split and before they had any specific down-hole information about the October 23, 2015 leak.[36] For surveys in later years 2000-2014, Blade suggests "likely interpretations" of cooling shown on SS-25 temperature surveys is that they show ingress of groundwater into the surface casing annulus," concluding that "[t]he surface casing fluid level is consistent with the presence of OD corrosion."[37]

---

[31] Carnahan testimony, p. 28 line 7.

[32] Carnahan testimony p.29 lines 6-17.

[33] Page 1171 from DR30_0000001- 1177 All.1992.

[34] Page 1171 from DR30_0000001- 1177 All.1992.

[35] 1995.1030.SS25.Temp.Survey.Leak.AC_CPUC_0000294.1995 TempSurvey, 2000.1017.AC_CPUC_0206642.2000.Ss-25.shallow.anomolies, 2001.0807.AC_CPUC_0206641.SS-25.shallow.anomolies, 2012.0601.SS25.Noise.Survey.AC_CPUC_0000186.2012.

[36] 2015.1110.AC_CPUC_SED_DR_17_0046340.Suspected.hole.2015Nov10.

[37] Blade Main Report p. 100.

Mr. Carnahan argues that the cooling at the bottom of the well was not an indication of a leak, but gas movement into or out of the storage zone.[38] I agree with Mr. Carnahan that shoe leaks seem to be fairly common in wells at Aliso. However, if his explanation is correct, SoCalGas wasted a lot of ratepayer money over the years repairing shoe leaks in wells where they saw similar results on temperature surveys. Although these surveys are interesting and subject to interpretation, as well as highly susceptible to error, my Opening Testimony did not identify any violations having to do with failure to respond to prior indications of leaks, so the discussion here is academic.

VII. BLADE DISAGREED WITH MANY OF MR. CARNAHAN'S STATEMENTS –SUCH STATEMENTS, IF TRUE, WOULD NOT CHANGE BLADE'S RCA CONCLUSIONS

SED requested that Blade provide its expert opinion as to whether it agreed or disagreed with a number of Mr. Carnahan's statements. Mr. Carnahan's statements with Blade's comments are listed below.

- Carnahan Statement 1: "[Public Advocates Office's] allegations presuppose that the Vertilog technology at that time [1988] was reliable and accurate. That is not the case."[39]

In response to an SED Data Request, Blade disagreed with this statement,[40] with a detailed explanation, including:

> Although Mr. Carnahan describes the working principles of the Vertilog, he fails to provide the context that MFL and eddy current technology for the use of corrosion inspection were well established in oil and gas pipeline operations.
>
> Blade continues,
>
> Mr. Carnahan's assertion is that Vertilog was unreliable and inaccurate and combined with other factors, would not have prevented the SS-25 incident. His basis for finding the Vertilog unreliable and inaccurate is derived from

[38] Carnahan testimony, p. 28, line 23 to p. 29, line 2.

[39] Carnahan testimony, pp. 1-2.

[40] Blade Response to SED Data Request 58, Response 2.1.1, May 15, 2020 p. 6

his numerical comparison of five (5) Vertilogs from 1988-1990 to various HRVRT and USIT logs run in 2013 and 2016-2018. This is an approach that would not have been available to SoCalGas in the late 1980s or early 1990s. Certainly, logging technology of 2010s would be expected to be more accurate than that of late 1980s and early 1990s. However, this does not mean that the older logging tools did not provide useful or actionable information.[41]

Blade also noted that "Even if Blade accepted Mr. Carnahan's statement as true, it would not change any of the conclusions Blade reached in its Root Cause Analysis (RCA)."[42]

- Carnahan Statement 2: "While useful to a certain extent, the Vertilog technology circa 1988 suffered from certain substantial deficiencies."[43]

In response to an SED Data Request, Blade stated it disagreed with this statement,[44] explaining that, "The Vertilog circa 1988 was useful because it could be used to assess casing integrity in terms of the location and severity of metal loss."[45] Blade also stated that Mr. Carnahan's statement does not change the conclusions of the RCA, even if accepted as true.[46]

- Carnahan Statement 3: "For example, the Vertilog technology did not provide a method for differentiating isolated pitting from general corrosion."[47]

When SED asked Blade a data request about this statement, Blade stated that it disagreed with it.[48] When asked to explain, Blade stated, "The Vertilog was capable of differentiating general corrosion from isolated pitting." Blade provided

---

[41] Blade Response to SED Data Request 58, Response 2.1.1 May 15, 2020 pp. 6-8.

[42] Blade Response to SED Data Request 58, Response 2.1.1, May 15, 2020 p. 10.

[43] Carnahan testimony, pp. 3 to 4.

[44] Blade Response to SED Data Request 58, Response 2.2.1, May 15, 2020, p. 11.

[45] Blade Response to SED Data Request 58, Response 2.2.1, May 15, 2020, p. 11.

[46] Blade Response to SED Data Request 58, Response 2.2.1, May 15, 2020, p. 11.

[47] Carnahan testimony, p. 4.

[48] Blade Response to SED Data Request 58, Response 2.3.1, May 15, 2020, p. 11.

further support for this statement.[49] Blade added that even if accepted as true, Mr. Carnahan's statement does not change Blade's RCA conclusions.[50]

- Carnahan Statement 4: "Another problem with Vertilog is that there are multiple permutations associated with the analysis of metal loss at any given depth, resulting in inherent uncertainty when interpreting the results."[51]

When SED asked Blade a data request about this statement, Blade stated that it disagreed with it.[52] Blade explained in part that,

> Casing inspection logs of all types can be processed and analysed using different criteria and assumptions. There is inherent uncertainty in interpreting all casing inspection logs. The process is not automated with only one set of answers. Log analysts use their best judgement to provide most probable interpretations.[53]
>
> Blade added that even if it accepted any part of the statement as true, it would not have changed any of Blade's RCA conclusions.[54]

Carnahan Statement 5: "Additional flaws of Vertilog were its inability to distinguish between defects and hardware (such as centralizers and scratchers) and its difficulty interpreting corrosion located near the surface casing shoe."[55]

When SED asked Blade a data request about this statement, Blade stated that it disagreed with it. When asked to explain, Blade stated as follows:

> Blade would agree that the tool will have difficulty interpreting corrosion above, but not below, the shoe. Blade agrees with ". . .flaws of Vertilog were its inability to distinguish between defects and hardware (such as centralizers and scratchers)…". However, there is a key omission in Mr. Carnahan's testimony regarding the method in which the tool designers had

---

[49] Blade Response to SED Data Request 58, Response 2.3.1, May 15, 2020, p. 11.

[50] Blade Response to SED Data Request 58, Response 2.3.1, May 15, 2020, p. 12.

[51] Carnahan testimony, p. 5.

[52] Blade Response to SED Data Request 58, Response 2.4.1, May 15, 2020, p. 12.

[53] Blade Response to SED Data Request 58, Response 2.4.1, May 15, 2020, p. 13.

[54] Blade Response to SED Data Request 58, Response 2.4.1, May 15, 2020, p. 13.

[55] Carnahan testimony, p. 7.

envisioned solving this issue. References [5, 6] describe the use of accurate casing records to address the interpretation of centralizers and scratchers.[56]

Blade added more detail and documentation to this explanation. Blade added that even if it accepted Mr. Carnahan's statement as true, it would not have changed any of Blade's conclusions in the RCA.[57]

- Carnahan Statement 6: "The SS-25 fracture surface exhibits clear chevron marks at a number of locations. Chevron marks denote the direction of propagation of cracks in steels – the apex of the chevron points toward the fracture origin (Figure 14). Chevron marks on the SS-25 fracture surface show clearly that the circumferential fracture is an extension of the axial fracture (Figure 15). This interpretation is consistent with remarkably similar chevron marks shown in a textbook on failure analysis (Figure 16).71."[58]

SED asked Blade if Blade agreed with this statement or not, and Blade stated that it disagreed, explaining,

Blade disagrees with Mr. Carnahan's testimony because he does not show with metallurgical evidence, the extension of the axial fracture to the circumferential parting. Therefore, there is no metallurgical evidence to support the interpretation that axial rupture and circumferential parting are one event."[59]

At SED's questioning, Blade said it does not accept any part of Mr. Carnahan's statement as true. Blade added that if it accepted the statement as true, then it would only change Blade's interpretation on the failure sequence, but not the failure analysis conclusions.[60]

- Carnahan Statement 7: "Blade's contention that a separate fracture origin exists on the circumferential portion of the fracture is incorrect (Figure 17). Rather than a fracture origin, this area is merely a continuation of the circumferential portion of the fracture. Fracture surface markings within the

---

[56] Blade Response to SED Data Request 58, Response 2.5.1, May 15, 2020, p. 13.

[57] Blade Response to SED Data Request 58, Response 2.5.1, May 15, 2020, p. 13.

[58] Carnahan testimony, p. 24, lines 7-11.

[59] Blade Response to SED Data Request 58, Response 2.8.1, May 15, 2020, p. 20.

[60] Blade Response to SED Data Request 58, Response 2.8.1, May 15, 2020, p. 23.

hypothesized origin are the same as or similar to those outside of the origin." [61]

SED asked Blade if it agreed or not with this statement, and Blade stated it disagreed, explaining as follows:

> An examination of the chevron marks in Figure 17 (i.e., Figure 68 in Blade's Main Report, page 72), showed that the features inside the origin were different from chevron marks outside the origin. The examination identified an area (the origin) that was absent of chevron marks but had chevron marks on either side pointing towards it. For clarity, white dashed lines have been added to outline the chevron marks that point back towards to the origin from either side of the origin. This observation is consistent with the illustration, Figure 14, provided by Mr. Carnahan.[62]

Blade also said it does not accept any part of Mr. Carnahan's statement as true. If Blade were to accept Mr. Carnahan's primary assertion that the vertical rupture and the circumferential part were one event, then it would only change Blade's interpretation on the failure sequence. However, it would not change the failure analysis conclusions.[63]

- Carnahan Statement 8: "The Blade report says nothing about how this alleged fracture origin came into existence. If the origin was created during the casing manufacturing process or by a sub-critical crack growth mechanism such as fatigue or stress-corrosion, the surface of the origin would appear distinctly different."[64]

SED asked Blade if it agreed or disagreed with this statement, and Blade said it disagreed, explaining that:

> Blade disagrees with Mr. Carnahan's testimony because there is a SEM micrograph in the Blade supplementary report that clearly identifies the

---

[61] Carnahan testimony, p. 24, lines 11-14.

[62] Blade Response to SED Data Request 58, Response 2.9.1, May 15, 2020, pp. 23-24.

[63] Blade Response to SED Data Request 58, Response 2.9.1, May 15, 2020, pp. 24.

[64] Carnahan testimony, p. 24, lines 15-17.

circumferential fracture origin. This has not been referenced or discussed in Mr. Carnahan's testimony."[65]

In this data response, Blade added significant detail and documentation referencing its Root Cause Analysis in further support of its reasoning. While Blade stated it did not accept any part of Mr. Carnahan's statement to be true, Blade also noted that even if true, Mr. Carnahan's statement would not change any of the RCA conclusions. [66]

- Carnahan Statement 9: "Blade's inability to determine the size of alleged fracture original (they report it as 5.22 mm deep and either 14.54 mm long or 21.72 mm long [footnote omitted]) is inconsistent with the absence of features identifying it as an origin."[67]

When SED asked Blade if it agreed or disagreed with this statement, Blade stated that it disagreed, explaining that:

> Blade did identify two semi elliptical areas as possible critical crack sizes (origin) for the circumferential parting based on thorough examination with the stereo microscope and SED; it was 5.22 mm deep and either 14.54 mm long or 21.72 mm long. The exact length is later established in the Blade report as 21.72 mm long."[68]

Blade provides additional detail and documentation in further support. When SED asked, Blade also answered that it does not accept any part of Mr. Carnahan's statement as true, but even if Blade were to accept the statement as true, it would not change any of the RCA conclusions.[69]

- Carnahan Statement 10: "Blade's scanning electron microscope (SEM) photos of the hypothesized origin show predominantly cleavage features. [Footnote omitted.] Blade reported that no noticeable changes in fracture mode were observed outside of the origin [Footnote omitted.] and their SEM photographs corroborate this. As such, the hypothesized origin must

---

[65] Blade Response to SED Data Request 58, Response 2.10.1, May 15, 2020, pp. 24-25.

[66] Blade Response to SED Data Request 58, Response 2.10.1, May 15, 2020, pp. 24-25.

[67] Carnahan testimony, p. 24, lines 18-19.

[68] Blade Response to SED Data Request 58, Response 2.11.1, May 15, 2020, pp. 27.

[69] Blade Response to SED Data Request 58, Response 2.11.1, May 15, 2020, pp. 27.

have been created by mechanical force in the same manner as the circumferential parting."[70]

SED asked Blade if Blade agreed or disagreed with this statement, and Blade said it disagreed, explaining that,

> Because the circumferential parting had initiated from a crack-like surface flaw at a temperature below the steel ductile to brittle transition temperature (DBTT), the micro fracture mode would be cleavage. . .As discussed previously, data from all aspects of the failure (metallurgical, loads, temperatures) should be integrated to deliver a precise interpretation. Just interpreting metallurgical data alone is inadequate. A comprehensive interpretation is crucial to identifying the fracture sequence.[71]

Blade added more detail to support this answer. Blade also was asked and responded that, "Blade does not accept any part of Mr. Carnahan's statement as true. . .However, it would not change the failure analysis conclusions. . .It would not change any of the RCA conclusions."[72]

- Carnahan Statement 11: "Blade's analysis of the circumferential parting is logically flawed. According to Blade's analysis and calculations, the origin was required for circumferential parting to occur as a separate event. But the fracture mode of the origin is the same as that of the circumferential parting, begging the question as to how the origin came into existence since mechanical loads were insufficient to cause a separate circumferential parting in the absence of the origin."[73]

When SED asked Blade whether it agreed or disagreed, SED stated it disagreed, explaining that

> Blade's analysis of the circumferential parting followed well-established guidelines for determination of the failure origin, and the evidence of discontinuity of chevron marks between circumferential parting and axial rupture provide a sound scientific basis to conclude that the circumferential parting occurred as a separate event. The circumferential fracture mode was

---

[70] Carnahan testimony, p. 24, lines 20-23.

[71] Blade Response to SED Data Request 58, Response 2.12.1, May 15, 2020, p. 29.

[72] Blade Response to SED Data Request 58, Response 2.12.1, May 15, 2020, p. 30.

[73] Carnahan testimony, pp. 24 line 24 to 25, line 2.

a temperature driven process, consequently, the origin has cleavage features that is consistent with fracture under low temperatures."[74]

Blade added detail to this answer, including reference to its main and supplementary reports.

Blade was asked by SED, and answered that it does not accept any part of Mr. Carnahan's statement as true. However, Blade said it would not change the failure analysis conclusions even if it was true.[75]

- Carnahan Statement 12: "For there to have been a circumferential fracture separated in time from the vertical fracture, the vertical fracture would have to arrest (stop). There is no fractographic evidence showing arrest of the vertical fracture extending upward from the area of the burst. The vertical fracture extending downward from the area of the burst arrested most likely because it was approaching thicker material at the casing threaded connection."[76]

When asked whether it agreed or disagreed with this statement, Blade said it disagreed, explaining that despite Mr. Carnahan raising that there is no fractographic evidence showing arrest of the vertical feature extending upward from the area of the burst, Blade did provide extensive macro and micro fractographic evidence showing arrest of the vertical feature extending upward from the area of the burst.[77] Blade noted that Mr. Carnahan raised an issue stating that, "the vertical fracture extending downward from the area of the burst arrested most likely because it was approaching thicker material at the casing threaded connection."[78] Blade stated and explained why it disagreed with this statement as well, citing extensively to its RCA documents.[79] When asked, Blade added that it does not accept any part of Mr. Carnahan's statement as true and added, "If Blade

---

[74] Blade Response to SED Data Request 58, Response 2.13.1, May 15, 2020, pp. 30-31.

[75] Blade Response to SED Data Request 58, Response 2.13.1, May 15, 2020, p. 31.

[76] Carnahan testimony, p. 25, lines 2-6

[77] Blade Response to SED Data Request 58, Response 2.14.1, May 15, 2020, pp. 32-36.

[78] Blade Response to SED Data Request 58, Response 2.14.1, May 15, 2020, p. 36.

[79] Blade Response to SED Data Request 58, Response 2.14.1, May 15, 2020, p. 36.

were to accept Mr. Carnahan's assertion then it would only change Blade's interpretation on the failure sequence. However, it would not change the failure analysis conclusions."[80]

- Carnahan Statement 13: "The 7-in. casing did not have to become cold for the circumferential fracture to occur. The fracture that extended vertically upward from burst area did not require cooling of the material. Similarly, no further cooling would be required for this fracture to change direction and propagate circumferentially."[81]

When asked whether Blade agreed or disagreed with the statement, Blade disagreed, explaining that,

> Mr. Carnahan's testimony 'The 7-in. casing did not have to become cold for the circumferential fracture to occur' ignores the evidence provided in Blade's Main Report, is subjective, and without any basis. The fact is, as stated on page 55 in Blade's Main Report, that 'the circumferential parting was brittle, which was different from the axial rupture." Blade agrees with Mr. Carnahan's statement that "The fracture that extended vertically upward from burst area did not require cooling of the material." However, Blade stated that it, "disagrees with Mr. Carnahan's statement 'Similarly, no further cooling would be required for this fracture to change direction and propagate circumferentially'. This statement is not relevant to the failure at SS-25."[82] Blade stated that "Blade does not accept any part of Mr. Carnahan's conclusion in the above statement. . .Mr Carnahan's testimony, if accepted to be true in its totality, it would not change the failure analysis conclusions."[83]

- Carnahan Statement 14: "There is no mechanical reason for the upward extending vertical fracture to arrest. The stress intensity at the tip of the fracture, essentially the driving force for fracture, was increasing as the fracture became longer."[84]

SED asked Blade whether it agreed or disagreed with this statement, and Blade said it disagreed, providing a detailed explanation in support, complete with

---

[80] Blade Response to SED Data Request 58, Response 2.14.1, May 15, 2020, pp. 36-37.

[81] Carnahan testimony, pp. 25, lines 6-9.

[82] Blade Response to SED Data Request 58, 2.15.1, May 15, 2020, pp. 37 to 38.

[83] Blade Response to SED Data Request 58, Response 2.15.1, May 15, 2020, p. 38.

[84] Carnahan testimony, p. 25, lines 9-11.

reference to the RCA Reports, and scholarly articles. Blade added that it does not accept any part of Mr. Carnahan's statement as true. Blade stated that even if it were to accept Mr. Carnahan's statement as true, then it would only change Blade's interpretation on the failure sequence, but it would not change the failure analysis conclusions.[85]

- Carnahan Statement 15: "Some temperature surveys over the years reported possible slight leakage in the vicinity of the production casing shoe and noise logs were run following a number of these temperature surveys. SoCalGas performed noise logs in SS-25 on the following ten dates: September 8, 1978, December 11, 1978, August 8, 1979, November 24, 1981, February 23, 1983, April 11, 1984, July 27, 1984, November 7, 1991, November 7, 2006, and June 1, 2012. None of these noise logs indicate a gas leak in the production casing. None of these noise logs indicate a gas leak in the production casing or at the production casing shoe."[86]

When SED asked Blade if it agreed or disagreed with this statement, Blade said that it agrees with the part of the statement that said, "None of these noise log indicate a gas leak in the production casing." However, Blade disagreed with the part of the statement that said, "None of these noise logs indicate a gas leak. . .at the production casing shoe."[87] At SED's prompting, Blade explained that "One of the noise logs, performed on April 11, 1984, identified a possible leak near the production casing shoe."[88] Blade added more detail to this response. When asked if any of the statements it accepted as true changed the conclusions Blade reached in its Root Cause Analysis, Blade said no.[89]

- Carnahan Statement 16: "The same six logs also measured noise across all four frequency ranges slightly above the packer and completion equipment at the base of the well, and across the storage formation. Such noise is expected and is associated with movement of gas in the storage formation

---

[85] Blade Response to SED Data Request 58, Response 2.16.1, May 15, 2020, pp. 38-40.

[86] Carnahan Testimony, p. 29, lines 5-10.

[87] Blade Response to SED Data Request 58, Response 2.19.1, May 15, 2020, p. 43.

[88] Blade Response to SED Data Request 58, Response 2.19.1, May 15, 2020, p. 43.

[89] Blade Response to SED Data Request 58, Response 2.19.1, May 15, 2020, p. 43.

and through the completion equipment. The 1991 log includes operator comments regarding noise interpreted as "bubbling" at a depth of about 7,500 ft., which is shown in the excerpt of the log in Figure 22. As can be seen in the figure, the noise log was repeated over the depth range of 7,200 ft. to 7,600 ft. and the indicated bubbling noise was not detected."[90]

When SED asked Blade if it agreed or disagreed with this statement, Blade stated that it disagreed with the first sentence in this quoted passage.[91] Blade explained that "Not all the logs were run across the packer, completion equipment and storage formation."[92] Blade added more detail to this explanation. Blade also responded to SED that the statement would not have changed any of the conclusions to Blades RCA Report.[93]

VIII. BLADE ACCEPTED CERTAIN OF CARNAHAN'S STATEMENTS AS TRUE, BUT SUCH STATEMENTS WOULD NOT CHANGE BLADE'S RCA CONCLUSIONS

While accepting certain of Mr. Carnahan's other statements as true, Blade said it would not change any conclusions reached in its Root Cause Analysis. Such statements are listed here.

- "Pressure testing is intended to detect existing casing leaks, not wall loss."[94]
- "The cooling shown on the SS-25 temperature logs at this depth was not indicative of a leak. The movement of gas into or out of the storage zone always causes localized cooling; indeed, cooling behavior where a storage well meets the reservoir has been well known for many years, as can be seen in Figure 19."[95]

---

[90] Carnahan Testimony, p. 30 lines 6-11.

[91] Blade Response to SED Data Request 58, Response 2.25.1, May 15, 2020, p. 45.

[92] Blade Response to SED Data Request 58, Response 2.25.1, May 15, 2020, p. 49.

[93] Blade Response to SED Data Request 58, Response 2.25.1, May 15, 2020, p. 50.

[94] Carnahan Testimony, p. 20; Blade Response to SED Data Request 58, Response 2.6.1, May 15, 2020, p. 14-15.

[95] Carnahan Testimony, pp. 28-30; Blade Response to SED Data Request 58, Response 2.17.1, May 15, 2020, p. 41.

- "All storage wells at Aliso Canyon exhibit the same or similar cooling at that depth. For example, Figure 20 shows that Fernando Fee 32A and Porter 72A both exhibit cooling at the bottom of the wells, and the same is true for SS-25A and SS-25B (Figure 21)."[96]
- "A radioactive tracer survey performed on July 29, 1984 reported possible slight leakage behind pipe from top perf at 8510 ft up to around 8430 ft and 8190 ft. This survey indicates gas flowing up to the bottom of the cap rock at approximately 8182 ft and into the permeable S1 formation."[97]
- "The noise logs display four curves, representing sound at frequencies of 200 Hz, 600 Hz, 1,000 Hz, and 2,000 Hz, respectively. Low frequency noise (200 and 600 Hz) is usually indicative of surface noise or low rate flow of fluids behind casing. High frequency noise (1,000 and 2,000 Hz) is usually indicative of the flow of gas, bubbling of gas in liquids, or high-rate gas flow. The interpretation of noise logs is well-established: a sharply-defined, high-frequency noise over a short length of casing is an indication of a gas leak."[98]
- "There are no such sharply-defined, high-frequency noises over short lengths of casing in the SS-25 noise logs that would indicate the presence of a gas leak. In some of the logs, there is a noticeable sharp peak in noise, but these were caused by the operators testing the noise logging tool prior to entering the completion equipment at or below 8,000 ft., and these operator tests are clearly labelled on the logs (see, e.g., November 24, 1981 log)."[99]
- "SoCalGas performed the noise log of December 11, 1978 from 5,800 to 7,770 ft., and that log measured no anomalous noise. The logs of November 7, 2006 and June 1, 2012 were performed for the entire length of the well and measured no anomalous noise."[100]

---

[96] Carnahan Testimony, p. 29 lines 3-5; Blade Response to SED Data Request 58, Response 2.18.1, May 15, 2020, pp. 42-43.

[97] Carnahan Testimony, p. 29 lines 10-13; Blade Response to SED Data Request 58, Response 2.20.1, May 15, 2020, pp. 45-46.

[98] Carnahan Testimony, p. 29 lines 13-17; Blade Response to SED Data Request 58, Response 2.21.1, May 15, 2020, pp. 46.

[99] Carnahan Testimony, p. 29, lines 18-21; Blade Response to SED Data Request 58, Response 2.22.1, May 15, 2020, pp. 46-47.

[100] Carnahan Testimony, p. 29, line 22 to 30 line 2; Blade Response to SED Data Request 58, Response 2.23.1, May 15, 2020, p. 47.

"SoCalGas performed the remaining noise logs performed in 1978, 1979, 1981, 1984 (2 runs), and 1991 to assess potential leaks. All logs measured generally shallow low frequency noise (200 to 600 Hz). These low-frequency measurements are interpreted to originate from surface noise at the Aliso Canyon site or operations in nearby wells, which is common and described by McKinley [1995].84 The 1978 log includes operator comments referencing surface noise."[101]

[101] Carnahan Testimony, p.30, lines 3-6 ; Blade Response to SED Data Request 58, Response 2.24.1, May 15, 2020, pp. 48.

Docket:	:	I.19-06-016
Exhibit Number	:	
Commissioner	:	Cliff Rechtschaffen
Admin. Law Judge	:	Tim Kenney
	:	Marcelo Poirier
	:	

SAFETY ENFORCEMENT DIVISION
CALIFORNIA PUBLIC UTILITIES COMMISSION

CHAPTER THREE

PREPARED SUR-REPLY TESTIMONY

OF

MARGARET FELTS IN RESPONSE TO

REPLY TESTIMONY OF L. WILLIAM ABEL

San Francisco, California
June 30, 2020

TABLE OF CONTENTS

I. INTRODUCTION

The purpose of the following prepared Sur-Reply testimony, submitted on behalf of the California Public Utilities Commission's ("Commission") Safety Enforcement Division ("SED"), is to reply to testimony of William Abel regarding violations 79-83 which are failure to successfully execute Well SS-25 kill attempts 2 through 7, due to lack of proper modeling (79), failure to provide well kill programs for relief well #2, well SS-25A and well SS-25B (80-82) and prevention of surface plumbing failures on SS-25 from enabling that well to be kept filled (83). Mr. Abel restates these violations collectively in the introduction of his testimony as "allegations that SoCalGas mismanaged the SS-25 well control efforts (Violations 79-83),"[1] but does not testify directly about issues related to violation 83.

As observed by Mr. Abel, these violations are based solely on the Blade RCA Report.[2] In light of Mr. Abel's statement that there is "little to no independent verification of Blade's findings and conclusions,"[3] I provide additional evidence in this reply.

II. SOCALGAS RESPONSE, INCLUDING ENGAGEMENT OF BOOTS & COOTS

Mr. Abel states that, ". . . SoCalGas displayed the necessary expertise to monitor and manage its well control experts."[4]

I agree that SoCalGas had the necessary in-house training, experience and knowledge to oversee their contractor Boots & Coots. This is not an issue that underlies violations 79-83. Violation 79 only goes to the issue of well kill modeling, which was lacking during well SS-25 kill attempts 2-6. For reasons discussed here, violation 79 should stand. Well kill modeling can be static (steady-state) or dynamic (transient).[5]

---

[1] Abel Testimony, p. 1, line 19.

[2] Abel Testimony, p. 1, lines 23-24.

[3] Abel Testimony, p. 1, lines 24-25.

[4] Abel Testimony, p. 4, lines 27-28.

[5] Abel Testimony, p. 5, lines 17-18

Transient modeling is dynamic. A model "run" is a simulation. Each simulation is based on a set of data and assumptions input to the model. Each simulation run generates a unique set of results. The dynamic model Mr. Walzel (Boots & Coots) used is called Drillbench,[6]

Evidence we have from the records provided by SoCalGas and the Boots & Coots daily reports suggest that there was not much difference between the kill attempts 2-6.[7] For this testimony, my analysis relates to the kill attempts that Blade modeled using SoCalGas data that was available to Boots & Coots during the event. Although SED asked SoCalGas for data and communications between SoCalGas and Boots & Coots regarding information that could be used as inputs to the models as well as results of the models and authorizations to go ahead with kill attempts, SoCalGas has produced thousands of documents containing no particularly relevant information other than brief one page plans for some of the kill attempts.[8] I have not been able to establish the origin of those summaries, who wrote them, who had them, or whether or not they were the basis of actual kill attempts.

Most concerning is that there were at least 23 days between SoCalGas first and fourth kill attempts (October 23, 2015 was Kill Attempt 1 and November 18, 2015 was Kill Attempt 4). Boots & Coots was on site by October 25, 2015.[9] Between SoCalGas Kill Attempt numbers 1 and 2, a 20 day period of time could have been used to plan Kill Attempt 2 by running multiple simulations on information that SoCalGas provided about the well, as well as field data that was collected.[10] Walzel and Haghshenas testimony *say*

---

[6] A product created and marketed by Slumberger, Inc, this model applies engineering calculations to simulate changes in pump rates, well pressures and other parameters, during the kill event. As in any model, the key to getting accurate results is to input accurate data and assumptions.

[7] Boots&Coots Daily Reports (reply testimony exhibit FN.30.Boots&Coots.DailyReports.

[8] Well.Kill.Plans.AC_CPUC.0206050-206058.

[9] The Blade Report at page 13 stated that "A well-control company arrived onsite on October 25, 2019." SED infers that was Boots & Coots.

[10] Based on the Blade Report, pp. 125-126, Table 15, the first attempt was October 24, 2015 and second attempt was November 13, 2015.

that Boots & Coots performed their first transient modeling after November 15, 2015 and before November 18, 2015.[11] As shown in the Blade RCA November 15, 2015 was the date of SoCalGas Well Kill Attempt 3, and November 18, 2015 was the date of SoCalGas Well Kill Attempt 4.[12] SoCalGas concedes no modeling was done until the 4th kill attempt.[13] SoCalGas did not produce any evidence that Boots & Coots actually ran transient models for kill attempts 4-6, even though Walzel and Haghshenas say they did.

III. TRANSIENT MODELING

A. Because Boots & Coots Say They Chose to Do Transient Kill Modeling for their Well Kills, Whether or Not It is Standard Practice Is Irrelevant

Mr. Abel testifies from his substantial personal experience that, "[w]hile transient kill modeling may be useful in certain instances, it is not well-accepted industry practice for all well control efforts by top kill."[14] He also discusses stead state modeling.[15] There is no reason to dispute Mr. Abel's testimony. However, Mr. Walzel said he used transient modeling to prepare SoCalGas well kill plans 4 through 6 for SS-25, which Mr. Abel acknowledges.[16] Therefore, whether or not transient modeling is standard in the industry is a moot point because Mr. Walzel said that he used it after SoCalGas third well kill attempt.[17]

---

[11] Walzel and Haghshenas testimony, p. 3, lines 8-11. My testimony will discuss the lack of evidence to support Walzel and Haghshenas statements later.

[12] See Blade Report, pp. 125-126, Table 15.

[13] The dates showing this are explained in more detail in my response testimony to Walzel and Haghshenas, Sec II.

[14] Abel Testimony, p. 6, lines 8-9.

[15] Abel Testimony, p. 5, line 18 to p. 6 line 4.

[16] Abel Testimony, p. 6, lines 17-18.

[17] See Testimony of Walzel and Haghshenas, p. 3, lines 8-11. Mr. Walzel actually said here that he used modeling before November 18, 2015. As shown in Blade's RCA, pp. 125-126, Table 15, the attempt on November 18, 2015 was SoCalGas fourth kill attempt.

B. Mr. Abel Testifies that Boots & Coots Did in Fact Perform Transient Modeling for SoCalGas Well Kill Attempts 4 to 6. But He Relies Solely on Boots & Coots to Make that Statement, and Does Not Provide Any Evidence to Show It to Be True.

Mr. Abel claims that Boots & Coots performed transient modeling for well kill attempts 4 through 6 multiple times. For example, he states, "[a]t a February 21, 2020 deposition that I attended, Boots & Coots senior well control specialist engineer, Danny Walzel, clarified that after Boots & Coots' second well kill attempt (SoCalGas' fourth well kill attempt),[18] Boots & Coots performed transient modeling to help inform the SS-25 well control operations. Based on Mr. Walzel's testimony, it is my understanding that the computer containing the transient modeling prepared by Mr. Walzel was later stolen from Mr. Walzel's truck, and never recovered."[19] As another example, Mr. Abel states that, "Boots & Coots *did* in fact perform transient modeling after its second well kill attempt (only in time for SoCalGas' fourth well kill attempt) on SS-25 and before each subsequent attempt. . ."[20] (Emphasis in original.)

Although Mr. Walzel claims he chose to use transient modeling, there is no evidence of this, no paper trail that it was done with valid data and reasonable assumptions, and there is no record of the results. A number of points show lack of evidence of transient modeling, and some suggest that transient modeling actually was not used in designing kill attempts, as shown by the bullets below.

- I have found no evidence of transient modeling results specifically for SoCalGas kill attempts 2-6 despite extensive review. I have looked through documents provided in response to data requests for evidence that SoCalGas and Boot & Coots engaged in some level of planning for well kills 2-6. Since SoCalGas says they turned over primary operation of the well kill effort to Boots & Coots after the first well kill attempt

[18] Again, Walzel says he modeled after Boots & Coots' second attempt, but this meant he actually modelled only in time for SoCalGas' fourth attempt.

[19] Abel Testimony p. 6, line 20 to p. 7 line 4.

[20] Abel Testimony, p. 5, lines 10-11; See also Abel Testimony, p. 6, lines 17-18. "Nevertheless, here, Boots & Coots did in fact employ transient kill modeling after it determined modeling was appropriate."

failed,[21] I would expect to see data provided to Boots & Coots by SoCalGas, such as emails providing inputs to models and calculations or model simulation results provided to SoCalGas for review and concurrence by SoCalGas for Boots & Coots to use the simulation results for the specified well attempt.[22] I combed through thousands of emails and documents provided by SoCalGas and found none of this evidence. Instead, we have a few one page kill plans that were written by someone we do not know; certainly not Mr. Walzel.[23]

- Blade also stated in a data response to SED that, "There was no evidence provided to Blade that kill modeling or other analytical approaches were undertaken for kill attempts #1 through #6."[24]
- Blade said it ran its own transient model simulation using the same data that were available to onsite well control personnel during the time of well kill operations, but Blade found that all the SS-25 kill attempts were predicted to be unsuccessful.[25]
- Mr. Abel himself admitted that he had not seen Boots & Coots transient models. SED asked, "Please state how Mr. [Abel] knows that Boots & Coots' transient modeling estimated and modeled gas flow rates range from 15-70 MMscf/d." SoCalGas answered, "Mr. Abel based his response on the testimony of Boots & Coots personnel. Please see SoCalGas' Reply Testimony Chapter III (Abel), Ex. III-4 (Danny Walzel Depo. Tr. 134:18-135:7. (Feb. 21, 2020)), and SoCalGas Reply Testimony Chapter IV (Walzel/Haghshenas) at 6."[26] SED also asked, "Has Mr. [Abel] seen Boots & Coots's transient models that were on the computer allegedly stolen from Mr. Walzel in late December, 2015?" SoCalGas responded, "No. As described in SoCalGas' Reply Testimony Chapter IV (Walzel/Haghshenas), Mr. Walzel's laptop was stolen from Mr. Walzel's vehicle in or around Houston, TX, and never recovered. (See, SoCalGas Reply

[21] SoCalGas Response to DR33 Q.2.

[22] AC_CPUC_0206050-206056.

[23] The documents provided as Well Kill plans are all authored on the dates of the well kills by Erle P. Halliburton (under details of each document). Erle Palmer Halliburton, 1892-1957, founded Halliburton.

[24] Blade Response to SED Data Request 63, Response 2.1.1, p. 6, May 5, 2020.

[25] Blade Response to SED Data Request 63, Response 2.1.1, p. 6, May 5, 2020.

[26] SoCalGas Response to SED Data Request 61, Question 7a, pdf p. 11.

Testimony Chapter III (Abel) Ex. III-4 (Danny Walzel Depo. Tr. 77:1-78:14)"[27]

- SED requested documents showing all kill modeling that SoCalGas and Boots & Coots performed, including inputs, outputs, the name of the models, etc.[28] To date, we have 5 one page "plans" that do not indicate how they were generated or who wrote them.[29] These are the same plans that Mr. Abel reviewed to arrive at his opinions.[30]
- SoCalGas admitted that it never reviewed the transient modeling that Boots & Coots allegedly did, and does not know whether the model actually informed the kill plans.[31]
- Mr. Walzel never mentioned transient modeling to SED during an Examination Under Oath before the opening of the OII, despite extensive questioning about the method for calculating mud weight, the name of that calculation, and the method for calculating kill rate.[32]

---

[27] SoCalGas Response to SED Data Request 61, Question 7b, pdf p. 11, also See, SoCalGas Reply Testimony Chapter III (Abel) Ex. III-4 (Danny Walzel Depo. Tr. 77:1-78:14.

[28] DR 61 Q.7 Abel could not come up with any data that Walzel used in his models.

[29] AC_CPUC_0206050-206056.

[30] Abel Testimony, pp. 7-8.

[31] SoCalGas Response to SED Data Request 61, Question 3d and 3e.

- Question 3d: "Were Boots & Coots's recommended well kill plans based upon Boots & Coots's transient modeling?

  Answer: Based on information and belief, SoCalGas ***understands*** that the kill plan summaries prepared by Boots & Coots were informed, in part, by the transient kill modeling that Boots & Coots conducted, beginning after Boots & Coots' second well kill attempt. (Emphasis added.)

- Question 3e: If yes, did SoCalGas see the transient model prepared by Boots & Coots's that corresponded to each well kill plan?

  Answer: In the course of Boots & Coots' well control efforts, SoCalGas understood that Boots & Coots conducted modeling in connection with the SS-25 top kill operations. SoCalGas reviewed and discussed the kill plans with Boots & Coots, but ***SoCalGas did not review the model that may have informed the plans.*** (Emphasis added.)

[32] Transcript Walzel and Kopecky, p. 49, line 22 to p. 52, line 28.

(continued on next page)

- In the Walzel and Haghshenas reply testimony, it was disclosed for the first time that Mr. Walzel's transient modeling was done on his laptop, which was stolen from him.[33] The testimony says Mr. Walzel reported the theft to the police.[34] SED asked SoCalGas, "Provide the police report of the theft that Mr. Walzel reported to the police."[35] In response, SoCalGas stated, "The Houston Police Department provided Mr. Walzel with a document regarding the reported theft of Mr. Walzel's laptop and other belongings, provided here bearing the following bates number: AC_CPUC_SED_DR_57_0000001."[36] However, the document provided by SoCalGas is the size of a post-it note, and says, "Burglary Motor Vehicle", with the date December 26, 2015, not a report. The document does not corroborate that any laptop was stolen, and says nothing about a model that was on a laptop.[37] Mr. Walzel testifies that his transient modeling was not saved anywhere else, and was not sent to anyone else.[38]
- SED asked SoCalGas, "Did SoCalGas review Mr. Walzel's transient models?" SoCalGas responded in part, ". . .SoCalGas did not review the transient modeling that resided only on Mr. Walzel's laptop and required licensed software to review."[39]

Rather than paying attention to the actual dialogue of the EUO transcripts cited here, and Mr. Walzel's failure to tell SED about the transient model that Mr. Walzel now claims was stolen, Mr. Abel instead suggests his surprise at SED for not asking Mr. Walzel about transient modeling, stating:

> I find it unusual SED asserts violations against SoCalGas for not employing transient kill modeling without first having verified this fact during SED's August 8, 2018 examination of Mr. Walzel. While SED asked Mr. Walzel about the formulae and calculations used in Boots & Coots' dynamic kill of SS-25, none of SED's five questioners asked Mr. Walzel whether the dynamic kill of SS-25 involved transient modeling. (See Abel Testimony, p. 7, fn 16, citing SED-'s Opening Testimony, SED 000635-000786 (D.Walzel and J. Kopecky EUO Examination Under Oath (EUO) Tr.(Walzel and Kopecky) p. 49 line 52 to p 52 line 28 (Aug. 8, 2018)).)

[33] Walzel and Haghshenas Testimony, p. 3, lines 30-31.

[34] Walzel and Haghshenas Testimony, p. 3, line 32.

[35] SoCalGas Response to SED Data Request 57, Question 3, p. 4 of 27, May 7, 2020.

[36] SoCalGas Response to SED Data Request 57, Question 3, p. 4 of 27, May 7, 2020.

[37] I1906016_SCG_SED_DR_57_0000001.

[38] Testimony of Walzel and Haghshenas, p. 3, lines 32-33.

[39] SoCalGas Supplemental Response to SED Data Request 57, Question 25, dated, May 19, 2020.

- In a follow up data response, SoCalGas stated that the transient model used was Drillbench,[40] which can be purchased from Schlumberger.[41] This is a product that performs dynamic well kill simulations, which would be the same as transient modeling as opposed to static modeling. The model used by Mr. Walzel was apparently purchased software licensed for use on his computer.[42]
- On December 14, 2015, Boots & Coots prepared a document that states on its title page that it was prepared for SoCalGas, and is entitled "Dynamic Kill Analysis SoCalGas Porter 39A".[43] This report states that it "covers dynamic kill analysis for Southern California Gas Company, Porter 39A".[44] The listed contact information is Mr. Arash Haghshenas, with a Boots & Coots email.[45] The report states, "This report presents the key results from a blowout and dynamic kill analysis performed for SoCalGas, Porter 39A well as part of relief well planning.[46] (Emphasis added, and in original.) I have not observed any document like this one showing transient kill modeling related to the top kill attempts that Boots & Coots allegedly performed for SoCalGas.

[40] During my review of data responses, I saw images among emails provided by SoCalGas that appear to be from Drillbench simulations, but are not represented as such by SoCalGas or Boots & Coots in response to data requests link to simulation video: HYPERLINK https://www.software.slb.com/products/drillbench https://www.software.slb.com/products/drillbench.

[41] 2015. June. Drillbench_Blowout_Control_Web.

[42] SoCalGas Response to DR 57

[43] AC_CPUC_SED_DR_16_0019665. The entire document spans from AC_CPUC_SED_DR_16_0019665 to 19680.

[44] AC_CPUC_SED_DR_16_0019666.

[45] AC_CPUC_SED_DR_16_0019666.

[46] AC_CPUC_SED_DR_16_0019668.

C. Mr. Abel's Statement that "SoCalGas' Operating Standards for Well Kill Operations Were Reasonable and Consistent with Industry Standard Practice" Is Not Applicable to the SS-25 Failure Event.

In section C of his testimony, Mr. Abel states that, "SoCalGas' Operating Standards for Well Kill Operations Were Reasonable and Consistent with Industry Standard Practice."[47]

I do not disagree with Mr. Abel. However, the standards SoCalGas has for well kill operations do not apply to the SS-25 emergency situation, other than to provide a roadmap regarding who to contact and a process for responding in general to a well emergency.[48] Another standard for well kills provides a procedure for routine well kills for well maintenance when the well is not out of control and there is no emergency.[49] This standard is not applicable to the SS-25 well failure event because it only applies to routine well kills, not emergencies when the well is out of control.[50]

IV. BLADE'S WELL KILL MODELING WAS DONE USING THE SAME INFORMATION THAT WAS AVAILABLE AT THE TIME OF THE WELL KILLS

Mr. Abel claims that "SED's well kill modeling derives from perfect hindsight fails to consider safety, and is entirely speculative."[51] He specifically alleges that I have made "speculative assertions, particularly in support of SED's allegation that transient kill modeling would have resulted in an earlier well kill. . ."[52] In support of this allegation, he cites several conclusions in my opening testimony.[53] Each of the statements Mr. Abel cites were made by Blade in their RCA Report. It is true that Blade's analysis

---

[47] Abel Testimony, p. 8, lines 6-7, Subheading C.

[48] DR 35 Emergency.Plan.2008.

[49] Well Standards DR 17.Well.Kills.

[50] Walzel and Haghshenas Opening Testimony, p. 3, lines 9-11.

[51] Abel Testimony, p. 10, lines 20-21, Heading IV.

[52] Abel Testimony, p. 10, lines 22-23.

[53] Pp.10-11 bullet points.

occurred after the SS-25 well kill attempts failed. However, Mr. Abel fails to consider that Blade accounted for what he calls the "perfect hindsight" problem. In response to an SED data request, Blade explained that it used the same information that was available at the time of the kills, but that Blade's modeling still predicted unsuccessful kill attempts. In Blade's own words:

> Blade conducted a transient kill simulation study to evaluate the likelihood of success of the actual kill attempts. Blade intentionally used the same field data that were available to the onsite well control personnel during the time of well kill operations for this evaluation. According to Blade's modelling, all the SS-25 kill attempts were predicted to be unsuccessful.
>
> It is not clear to Blade how Boots and Coots selected the pump rates and kill fluid densities for each kill attempt. The kill fluid densities did not change materially until kill attempt #7.[54]

However, a Root Cause Analysis (RCA) always occurs after an event occurs and looks back at the events as they unfolded as part of the RCA process. Especially considering the lack of data provided by SoCalGas and Boots & Coots regarding data and assumptions they used in their simulations, Blade developed reasonably designed models with the data they could find or develop and used reasonable assumptions. As Blade explained to SoCalGas in response to SoCalGas' data request "[a]n outcome of the RCA process was that the lack of understanding of the well deliverability was a root cause and affected the well-control planning as discussed in the Blade Report on pages 132 – 133—Section 3.2.1. Well gas flow rate is a key parameter used in dynamic kill modeling and in estimating the total gas leak volume."[55] In my Opening Testimony, I adopted Blade's well kill modeling, findings and conclusions, and I continue to find them valid.

[54] Blade Response to SED Data Request 63, Response 2.1.1, p. 5, May 5, 2020.

[55] 2020-02-14 Blade Response to SoCalGas Data Request Jan 23, 2020 Rev 1-Feb 14, 2020.

V. I AM WITHDRAWING VIOLATIONS 80-82

Mr. Abel's testimony responds to violations 80-82,[56] which are "failure to provide well kill programs for relief well #2, well SS-25A and well SS-25B."[57] I agree with Mr. Abel's testimony regarding violations 80-82. Blade included in its RCA Report a suggestion that well kill programs for Aliso wells might be useful in the event of well failure incidents. SoCalGas has a standard for Emergency Well Kills.[58] This standard is not specific to any well, but provides response guidelines. Because every incident is different even on the same well, it would be difficult to develop a useful well kill plan for each well that would go beyond the general emergency well kill standard already in place. With this, I am withdrawing violations 80-82.

VI. MR. ABEL FAILS TO ARGUE AGAINST SED'S VIOLATION 83

Mr. Abel mentions violation 83 only in his introduction in a way that is grouped with violations 79 through 82.[59] Other than making general allegations in his introduction about that violation, Mr. Abel provides no specific discussion in his testimony or evidence against violation 83. Violation 83 is for failure to prevent surface plumbing failures on SS-25 from enabling that well to be kept filled.[60] As Blade discusses, SoCalGas facilities at the surface of the well system failed, pumps went down and well kill efforts that might have been successful were discontinued because fluids could not be pumped.[61] This problem on kill attempt 6 could have been averted by having back up capacity.[62] Violation 83 should stand.

---

[56] Abel Testimony, p. 15.

[57] See my Opening Testimony, p. 3.

[58] DR 35 Emergency.Plan.2008.

[59] Abel Testimony, p. 1, lines 18-20.

[60] See my Opening Testimony, p. 4.

[61] Blade Main Report at p. 151.

[62] Blade Main Report at p. 151.

VII. BLADE RESPONSES TO ALLEGATIONS FROM MR. ABEL'S TESTIMONY

Mr. Abel makes a number of assertions in his testimony. To clarify the merits of six of these assertions, SED asked Blade for its views regarding them, and the fact-based reasons for those views. Six of Mr. Abel's assertions and Blade's responses are shown in this section.

Abel Assertion 1 and Blade Response: Mr. Abel stated that "Blade's modeling simply represents an academic exercise to calculate the kill fluid density and pump rate that theoretically could have killed SS-25, and fails to account for several important safety considerations that impacted Boots & Coots' well kill efforts. First, as Boots & Coots explained to SED during SED's August 2018 examination, the first step upon arriving at a well control event is to secure the area and ensure the safety of personnel. [Footnote omitted.]. Indeed, as discussed in SoCalGas' opening testimony, safety is a paramount consideration in any well control operation, and the response to the SS-25 leak was no different—extensive measures were implemented to mitigate the risk of ignition. [Footnote omitted]. Second, in designing a well kill plan, a well control company must take extreme caution not to implement a well kill operation that may worsen the leak, and thereby increase the risk of ignition, or jeopardize the success of subsequent kill attempts. Boots & Coots appropriately considered these factors, and made adjustments to its kill operations accordingly."[63]

When SED asked whether Blade agreed that, "Blade's modelling simply represents an academic exercise to calculate the kill fluid density and pump rate that theoretically could have killed SS-25." Blade said no. Blade explained that its efforts to model kill operations were: [S]pecifically to ascertain why the top kill well-control efforts were unsuccessful and why it took 111 days to stop the gas from the Aliso Canyon gas storage reservoir from escaping to the atmosphere. As discussed in the Blade Report [1] (page 229), Blade conducted a transient kill simulation study to evaluate the

[63] Abel Testimony, p. 12.

likelihood of success of the actual kill attempts. Blade intentionally used the same field data that were available to the onsite well control personnel during the time of well kill operations for this evaluation. According to Blade's modelling, all of the SS-25 kill attempts were predicted to be unsuccessful.

Blade explained it was not clear to Blade how Boots and Coots selected the pump rates and kill fluid densities for each kill attempt. The kill fluid densities did not change materially until kill attempt #7.[64]

Abel Assertion 2 and Blade Response:

Mr. Abel stated, "Mr. Walzel testified that while the SS-25 wellhead equipment was rated to 5,000 PSI, given the unknown condition of the leak, Boots & Coots set a "safety limit" or "safety factor" well below the working pressure of the equipment. [Footnote omitted]. I believe that it was prudent for Boots & Coots to have set a safety factor so as not to risk damaging the wellhead."[65]

SED requested Blade to weigh in about the merits of this statement. In response to SED's questions, Blade answered: 1) Blade's modeling considered the wellhead rated working pressure of 5,000 psi and all simulations stayed below that. Blade's highest kill simulation in kill attempt #2 had a maximum predicted pump pressure of 3,644 psi, with decreasing maximum pump pressure for subsequent kill attempts;[66] 2) Blade agreed with using a wellhead safety factor, and Blade's model results honored that wellhead safety factor;[67] and 3) using data available at the time of the kill attempts, well kill modeling would have demonstrated that the pump rate and fluid density were inadequate to kill well SS-25.[68]

[64] Blade Response to SED Data Request 63, Response 2.1.1, p. 5, May 5, 2020.

[65] Abel Testimony, p. 12.

[66] Blade Response to SED Data Request 63, Response 2.2.1, p. 10, May 5, 2020.

[67] Blade Response to SED Data Request 63, Response 2.2.1, p. 10, May 5, 2020.

[68] Blade Response to SED Data Request 63, Response 2.2.1, p. 10, May 5, 2020.

Abel Assertion 3 and Blade Response:

Mr. Abel stated, "[f]urther, Boots & Coots' pumping operations were implemented not only in consideration of the pressure rating of the surface equipment, but also based on observation of the wellhead's physical response to pumping operations. Mr. Walzel described that during certain pumping operations, the SS-25 wellhead was 'moving around a lot,' which at times caused Boots & Coots to slow or stop pumping operations an [sic], in one case, broke the flow lines on the 7 inch tubing and casing, and the nipple on the wellhead. [Footnote omitted] While it does not appear that Blade's modeling accounted for these safety considerations, Boots & Coots appropriately tailored its kill operations—in real-time—to limit the potential risk of further damaging the well and compromising safety."[69]

SED asked Blade to respond to Mr. Abel's assertion that "it does not appear that Blade's modeling accounted for these safety considerations" that Abel identified in this passage. Blade provided a detailed response, including the following statements:

- "Although requested, Blade did not have direct access to the Boots & Coots personnel to determine what Boots & Coots had considered and the rationale for kill operations.";[70]
- Information that Boots & Coots appropriately tailored to its kill operations-in real-time-to limit the potential risk of further damaging the well and compromising safety was not provided to Blade. . .Blade requested data regarding kill planning, modeling, and operations many times, but such data were not provided.";[71]
- "Blade made multiple data requests for data related to kill operations and kill modeling in addition to a request for a face-to-face meeting with the Boots & Coots personnel with firsthand knowledge of the SS-25 kill operations. A meeting with Blade and Boots & Coots could not be arranged."[72]

---

[69] Abel Testimony, p. 13.

[70] Blade Response to SED Data Request 63, Response 2.3.1, p. 12, May 5, 2020.

[71] Blade Response to SED Data Request 63, Response 2.3.1, pp. 12-13, May 5, 2020.

[72] Blade Response to SED Data Request 63, Response 2.3.1, p. 13, May 5, 2020.

- Blade data requests to SoCalGas related to killing the SS-25 well includes the following:
  - Data Request February 11, 2016 [11]
  - Data Request May 4, 2016[12]
  - Data Request June 29, 2018[13]
  - Data Request August 29, 2018[14]
  - Data Request October 26, 2018[15]
  - Data Request December 19, 2018[9]
  - Data Request January 2, 2019[16][73]
- "Safety considerations always take precedence when carrying out the field operations."[74]

Abel Assertion 4 and Blade Response:

Mr. Abel stated, "[s]econd, Blade had the benefit of gathering more precise data points that were not available to Boots & Coots while planning, modeling, and executing its well kill attempts: 1) the precise depth and severity of damage to the production casing, and 2) the flow path of the gas from the 7" casing leak to the surface. Indeed, computer modeling is sensitive to the well geometry (i.e., leak depth, severity, and flow path), which means that more precise information will produce more accurate modeling outputs. However, precise flow path geometry is typically unavailable during an active leak response. . .While Blade was able to determine that the production casing had completely parted 892 feet after extracting and examining the 7" casing, Boots & Coots could only estimate the flow path geometry based on real-time observation and analysis of pumping operations. Second, after extracting the 7" casing, Blade had the advantage of using a video camera to analyze the 11-3/4" casing an observe holes—which Blade determined were the "likely consequence of the axial rupture" of the 7" casing. [Footnote omitted.]. The existence of holes in the surface casing is significant because it impacts the flow path of the leak and, in turn, the accuracy of the transient modeling. Accordingly,

[73] Blade Response to SED Data Request 63, Response 2.3.1, p. 13, May 5, 2020.

[74] Blade Response to SED Data Request 63, Response 2.3.1, p. 13, May 5, 2020.

while Blade was able to extract the 7" casing to gather additional data to incorporate into its modeling, Boots & Coots could not have done the same. The practical impact of this disparity in information is that Blade's modeling was refined by additional data points that were not available to Boots & Coots."[75]

SED's asked Blade whether Blade agreed that Boots & Coots could not have gathered the information that Abel listed in this passage at the time it was attempting the well kills of SS-25. In response, Blade stated it did not agree.[76] When asked about which of the data points Boots & Coots could have attained at the time of its well kill attempts, Blade provided an extensive list of data points available at the time of the well kills, stating,

Assumptions regarding the leak path and leak depth were made within a few days of the leak event on October 23, 2015, and likely within hours because a wellbore schematic (WBS) with well details information was needed for kill planning. Examples of the evolution of wellbore schematics prepared post October 23, 2015, include wellbore schematics from SoCalGas, a Boots & Coots WBS from a December 16, 2015, presentation, a WBS from an Add Energy Report released in February, 2016 (work done prior to February), and a Blade WBS with final data. Log surveys run on November 8, 2015, were also available that indicated possible leak depths. A review of these documents shows there were no material changes to the leak path and there would be no impact on modeling results. . .[77]

Precise data of the leak location and leak path were not needed for transient kill modeling."[78]

Per SED's request, Blade also explained why Boots & Coots could have attained these data points at the time of the well kill.[79]

---

[75] Abel Testimony, p. 13.

[76] Blade Response to SED Data Request 63, Response 2.4.1, p. 14, May 5, 2020.

[77] Blade Response to SED Data Request 63, Response 2.4.1, p. 14, May 5, 2020.

[78] Blade Response to SED Data Request 63, Response 2.4.1, p. 14, May 5, 2020.

[79] Blade Response to SED Data Request 63, Response 2.4.1, p. 21, May 5, 2020.

SED also asked, with the data that Boots & Coots had at the time it was attempting to kill well SS-25, could Boots & Coots successfully have killed well SS-25?

Blade answered, "Yes, assuming that available data and reasonable assumptions had been used for the kill modeling (and assuming that the pumping was carried out according to plan developed through modeling), Boots & Coots could likely have killed SS-25. By 'reasonable' we mean that assumptions were made based on engineering analysis, experience, and judgment. In addition, uncertainties in the input data should have been evaluated using the modeling to determine the sensitivities to a given parameter. Conservative assumptions are normally made in designing kill plans to improve the chances for a successful outcome."[80]

SED also asked Blade, on which attempt Boots & Coots could have successfully killed well SS-25. Blade answered in part:

Kill attempt #2 (the first Boots & Coots attempt) or kill attempt #3 were possible to achieve a successful kill assuming proper modeling was done with valid input data and a successful pumping operation according to the modeling results. This is discussed in the Blade Report [1] (page 4).[81]

Abel Assertion 5 and Blade Response:

Lastly, Mr. Abel asserts that "Blade's model disregarded other key variables in pertinent well control operations. Blade's primary design variables were fluid density and pump rate. Other parameters such as viscosity, fluid stability, availability, and toxicity must also be considered. Further, not only must a kill operation stop the gas flow, the well must be stable when the kill fluid column is in a static state (i.e., after pumping stops). The pressure profile and corresponding tubular and wellbore integrity (which changes with depth) must also be considered and not exceeded. Because the Blade Report

[80] Blade Response to SED Data Request 63, Response 2.4.1, pp. 21-22, May 5, 2020.

[81] Blade Response to SED Data Request 63, Response 2.4.1, p. 22, May 5, 2020.

did not analyze these additional parameters, it is unknown if the fluid characteristics proposed by Blade (and alleged by SED) would have killed the well."[82]

SED asked Blade if it agreed that its model disregarded other key variables in pertinent well control operations. Blade answered, "No.",[83] explaining in part, "[t]he parameters, fluid stability, availability, and toxicity are not input data to a kill model. Blade used fluid viscosity in the modeling analysis. Fluid viscosity is an important parameter used to estimate the friction pressure calculations which affect the pressure profile in the fluid flow path in the wellbore and the surface pump pressure."[84]

Abel Assertion 6 and Blade Response:

Mr Abel states "[i]n sum, Blade's post-hoc transient modeling was an academic exercise that cannot fairly be compared to Boots & Coots' task of working on site under real-time constraints, and dealing with practical, field-level concerns (e.g., severe weather, wellhead condition, and safety of personnel). Even assuming Blade's transient modeling generated reasonable outputs, there is no basis for SED to claim that Boots & Coots should have killed SS-25 sooner—particularly as early as the second attempt (on November 13, approximately 3 weeks after the leak commenced)—when Blade needed 5-6 weeks to model a well kill, [Footnote omitted] not including time spent on the investigation and casing removal. Boots & Coots' approach of increasing pump rate and fluid density over well kill attempts 2 through 7 reflects a measured and logical process that did not compromise the safety in the process of bringing the well under control.[85]

SED asked Blade to identify the portions of Mr. Abel's statement with which it disagrees, and why. In response, Blade stated it disagreed with the following statements,

- "In sum, Blade's post-hoc transient modeling was an academic exercise that cannot fairly be compared to Boots & Coots' task of working on site under real-time constraints, and dealing with

[82] Abel Testimony, p. 14.

[83] Blade Response to SED Data Request 63, Response 2.5.1, p. 23, May 5, 2020.

[84] Blade Response to SED Data Request 63, Response 2.5.1, p. 23, May 5, 2020.

[85] Abel Testimony, pp. 14-15.

practical, field-level concerns (e.g., severe weather, wellhead condition, and safety of personnel)."[86]

- "Even assuming Blade's transient modeling generated reasonable outputs, there is no basis for SED to claim that Boots & Coots should have killed SS-25 sooner—particularly as early as the second attempt (on November 13, approximately 3 weeks after the leak commenced)—when Blade needed 5-6 weeks to model a well kill, [Footnote omitted] not including time spent on the investigation and casing removal." [87]
- "Boots & Coots' approach of increasing pump rate and fluid density over well kill attempts 2 through 7 reflects a measured and logical process that did not compromise the safety in the process of bringing the well under control." [88]

SED also asked Blade why it disagreed with these points. Blade answered as follows:

Regarding bullet 1, Blade said: "Blade's efforts to model the kill operations were not an academic exercise—it was specifically to ascertain why the top kill well-control efforts were unsuccessful and why it took 111 days to stop the gas from the Aliso Canyon gas storage reservoir from escaping to the atmosphere. As discussed in the Blade Report, Blade conducted a transient kill simulation study to evaluate the likelihood of success of the actual kill attempts. Blade intentionally used the same field data that were available to the onsite well control personnel during the time of well kill operations for this evaluation. According to Blade's modeling, all the SS-25 kill attempts were predicted to be unsuccessful."[89]

Regarding bullet 2, Blade said: "[t]he statement that Blade needed 5 to 6 weeks to model a well kill was taken out of context. The accurate statement is "So for us [Blade] it took much longer; four, five, six weeks to analyze all of the seven kills" [21] (page 1058:14-16). Blade modeling included a detailed assessment of gas flowrates

[86] Blade Response to SED Data Request 63, Response 2.6.1, pp. 25-26, May 5, 2020.

[87] Blade Response to SED Data Request 63, Response 2.6.1, p. 26, May 5, 2020.

[88] Blade Response to SED Data Request 63, Response 2.6.1, p. 26, May 5, 2020.

[89] Blade Response to SED Data Request 63, Response 2.6.1, p. 26, May 5, 2020.

and history matching. This level of accuracy was not required for kill modeling prior to kill attempts.

"Blade believes that more accurate kill modeling, using data available as early as the second kill attempt, would have led to a better well kill plan. Such modeling would have taken less than a week to complete. Drillbench software is intended to be used prior to well kill operations. A properly designed well kill plan, if implemented correctly, would have increased the chances of success. However, operational uncertainties are not reflected in the modeling."[90]

Regarding bullet 3, Blade said: "[b]ased on kill attempt data and reports provided to Blade, the fluid density did not increase during kill attempts #2 through 6. The majority of the kill fluid pumped was 9.4 ppg brine and 8.34 ppg fresh water with some 18 ppg barite pills. This assertion is supported by Mr. Walzel with Boots & Coots. He stated ". . . I think the fluid weights stayed the same." in the SED CPUC Opening Testimony Supporting Attachments document [8] (page SED 00717:18 – 19). The fluid density did increase to 15 ppg for kill attempt #7. The data does show the pump rate increased from 8 to 9 bpm for kill attempts #2, 3, and 4 to 13 bpm for kill attempts #5 and 6. The pump rate for kill attempt #7 was 5.8 bpm.

'As discussed in the Blade Report [1] (page 4), Based on the data reviewed by Blade, the well control company appeared to have designed the kill attempts solely by calculating a kill fluid density that was higher than the static bottom hole pressure. The result was that the well was not killed and the surface conditions continued to deteriorate. The well was brought under control in February 2016 from the relief well, not from top kill attempts in November and December of 2015.'[91]

SED also asked Blade, "Does Blade view that its transient modeling generated reasonable outputs?" Blade answered, "Yes." When asked why, Blade explained that, "Blade used available data (as described in response to Question 2.c.) to construct its model. This model demonstrated that the well could be killed using 12 ppg or 15 ppg fluids pumped at reasonable rates.[92]

---

[90] Blade Response to SED Data Request 63, Response 2.6.1, pp. 24-25, May 5, 2020.

[91] Blade Response to SED Data Request 63, Response 2.6.1, pp. 24-25, May 5, 2020.

[92] Blade Response to SED Data Request 63, Response 2.6.1, p. 24, May 5, 2020.

Docket:	:	I.19-06-016
Exhibit Number	:	
Commissioner	:	Cliff Rechtschaffen
Admin. Law Judge	:	Tim Kenney
	:	Marcelo Poirier
	:	

SAFETY ENFORCEMENT DIVISION
CALIFORNIA PUBLIC UTILITIES COMMISSION

CHAPTER FOUR

PREPARED SUR-REPLY TESTIMONY

OF

MARGARET FELTS IN RESPONSE TO

REPLY TESTIMONY OF

DANNY WALZEL AND ARASH HAGHSHENAS

San Francisco, California
June 30, 2020

TABLE OF CONTENTS

Pages

I. INTRODUCTION

The purpose of the following prepared Sur-Reply testimony, submitted on behalf of the California Public Utilities Commission's ("Commission") Safety Enforcement Division ("SED"), is to reply to the testimony of Danny Walzel and Dr. Arash Haghshenas, both employees of Boots & Coots. The Walzel and Haghshenas testimony states, "The purpose of our prepared joint reply testimony is to answer certain questions so as to correct and rebut certain inaccuracies and assumptions which serve as the factual basis for SED violations 79-83."[1]

Violations 79 through 83 are stated in my Opening Testimony as follows:

Violation	Violation Summary
79	"Failure to successfully execute well SS-25 kill attempt numbers 2 through 7, due to lack of proper modeling."[2]
80 – 82	"Failure to provide well kill programs for relief well #2, well SS-25A and well SS-25B."[3]
83	"Prevention of surface plumbing failures on SS-25 from enabling that well to be kept filled."[4]

As noted in my sur-reply testimony to Mr. Abel, I am withdrawing violations 80 through 82 from my Opening Testimony.[5] Also, although the Walzel and Haghsenas testimony mentions violation 83 in the introduction, it does not explicitly say where it addresses violation 83, and there is nothing apparent in the testimony that addresses violation 83. Therefore, the rest of my sur-reply will respond to Walzel and Haghshenas as it relates to violation 79.

[1] Walzel and Haghshenas testimony, p. 1, lines 7-9.

[2] See Opening Testimony of Margaret Felts, p. 3.

[3] See Opening Testimony of Margaret Felts, p. 4.

[4] See Opening Testimony of Margaret Felts, p. 4.

[5] See Sur-reply testimony of Margaret Felts, Chapter 3, Section V.

II. WALZEL AND HAGHSHENAS TESTIFY THAT BOOTS & COOTS PERFORMED TRANSIENT KILL MODELING AFTER NOVEMBER 15, 2015 BUT BEFORE NOVEMBER 18, 2015 (4TH KILL ATTEMPT)

According to the Walzel and Haghshenas testimony, "Boots & Coots attempted its second well kill attempt on November 15, 2015, and before its well kill attempt on November 18, 2015, and for additional kill attempts thereafter, Boots & Coots performed transient modeling."[6] As discussed in my testimony in Chapter 3 (Abel), the result of this statement is that the 4th kill attempt was the first one that Boots & Coots modeled.[7] Even though Walzel and Haghshenas say they did not begin modeling kill attempts until after kill attempt 3, SED's violation 79 includes the first two attempts. As an aid to match up the dates Boots & Coots use with SoCalGas' well kill attempts, an excerpt from Blade's RCA Table 15 is below, and shows each well kill attempt, and the date it occurred.

Blade RCA Table 15: Chronology of Key Events During the SS-25 Incident[8]

Date	Day	Event(s)
October 23, 2015	1	SS-25 leak was discovered at 3:15 PM and injection header valve was closed at 3:30 PM.
October 24, 2015	2	Kill attempt #1. Failed. Tubing plugged.
November 13, 2015	22	Kill attempt #2. Failed. Relief well planning started.
November 15, 2015	24	Kill attempt #3. Failed.[9]
November 18, 2015	27	Kill attempt #4. Failed.[10]
November 24, 2015	33	Kill attempt #5. Failed
November 25, 2015	24	Kill attempt #6. Failed

[6] Walzel and Haghshenas Testimony, p. 3, lines 9-11.

[7] Felts Sur-Reply, Chapter 3, Section III

[8] Blade RCA, pp. 126-127, Table 15.

[9] Walzel and Haghshenas testimony, p. 3, lines 20-8-11, call this attempt the Boots & Coots second well kill attempt.

[10] Walzel and Haghshenas testimony, p. 3, lines 9-11, merely refer to a well kill attempt on November 18, 2015 without describing which one it is.

Date	Day	Event(s)
December 22, 2015	61	Kill attempt #7. Failed
February 11, 2016	112	Relief well intersected with SS-25 and brought it under control. Leak was stopped.
February 14-17, 2016	115-118	SS-25 was permanently isolated from the gas storage reservoir with cement

III. SOCALGAS PRODUCED NO DATA TO SHOW MODELING BEFORE ITS LAST KILL ATTEMPT

The Walzel and Haghshenas testimony acknowledges, "Mr. Walzel's transient modeling was not saved anywhere else, nor was it sent to anyone else."[11] In Section III of my sur-reply to Mr. Abel's testimony, I provide multiple points that show that, despite Boots & Coots statement that they did modeling, Boots & Coots provide no evidence to show that to be true. I do not repeat those points, but incorporate all of them by reference into this section.

IV. BOOTS & COOTS WAS TOLD BY SOCALGAS 'COUNSEL TO PRESERVE ALL DOCUMENTS RELATED TO WELL SS-25 AND TO SOCALGAS' AND ITS CONSULTANTS' RESPONSE TO THE LEAK AT ALISO

Latham & Watkins wrote a letter to Boots & Coots entitled, "Aliso Canyon Storage Facility Leak Response".[12] The letter instructed Boots & Coots to preserve records related to the leak, stating specifically,

> As you know, Boots & Coots ("B&C") has been retained to assist the Southern California Gas Company ("SoCalGas") in its response to the gas leak at one of its gas storage wells (SS-25) located at the Aliso Canyon Storage facility. Because the incident may lead to legal or regulatory proceedings, on behalf of SoCalGas, we request that B&C take steps to preserve all documents and other evidence that relates to well SS-25 and to SoCalGas' and its consultants' response to the leak. This request includes electronic documents, such as e-mails, Microsoft Word documents,

[11] Walzel and Haghshenas testimony, p. 3, lines 31-33.

[12] See AC_CPUC_SED_DR_16_0043472-0043473; Latham & Watkins Letter to Boots & Coots, dated November 12, 2015.

spreadsheets, databases, etc. Please make sure that document retention policies relating to relevant documents are suspended, including any automatic e-mail deletion protocols.[13]

This letter also stated that Latham & Watkins, "has also been retained to assist SoCalGas in these efforts."[14]

V. SOCALGAS DOES NOT HOLD BOOTS & COOTS RESPONSIBLE FOR ITS BEHAVIOR RELATED TO SS-25

An agreement between SoCalGas and Halliburton (Boots & Coots subsidiary), stated, "Boots & Coots have been requested by SoCalGas to submit a proposal for the evolving well control situation on Standard Sesnon 25."[15] The Agreement executed by SoCalGas, includes the following indemnity clause:

> Customer [SoCalGas] agrees to release, protect, defend, indemnify and hold harmless HALLIBURTON, its parent, subsidiary and affiliated companies and subcontractors and its/their officers, directors, employees, servants and agents (hereinafter "HALLIBURTON Group") from and against any and all liability, claims, losses, lawsuits, demands, causes of action and other litigation, including all costs and attorneys' fees of every kind and character, including but not limited to personal injury, illness, death, property damage or loss, arising in favor of any persons, companies, or other legal entities, including but not limited to, members of the HALLIBURTON Group, CUSTOMER, CUSTOMER'S employees, contractors and subcontractors and third parties regardless of cause, even if such is contributed to or caused by any act or omission, negligence (active, passive, sole, joint or concurrent), fault or strict liability of any member(s) of HALLIBURTON Group, or any defect in the data, products, supplies, , materials or equipment of any members of Halliburton Group, whether in the preparation, design, manufacture, distribution or marketing thereof. . .CUSTOMER'S release, defense, and indemnity obligations set forth in this article do not apply to the extent that any claims, losses, liability, or lawsuits are caused by the gross negligence or willful

[13] See AC_CPUC_SED_DR_16_0043472-0043473; Latham & Watkins Letter to Boots & Coots, dated November 12, 2015.

[14] See AC_CPUC_SED_DR_16_0043472-0043473; Latham & Watkins Letter to Boots & Coots, dated November 12, 2015.

[15] See AC_CPUC_0164723; Southern California Gas Company Standard Services Agreement Number 5660044243 (AC_CPUC_0164695-0164723).

misconduct of any member(s) of HALLIBURTON Group. For the purposes of this Contract, "gross negligence" shall mean "willful and wanton disregards for the harmful, avoidable and foreseeable consequences of its actions."[16]

As a result, even though Boots & Coots was directed to preserve evidence related to the SS-25 incident, there would be no consequences if they failed to do so.

[16] AC_CPUC_0164709; Southern California Gas Company Standard Services Agreement Number 5660044243, p. 7 of 21.

Docket:	:	I.19-06-016
Exhibit Number	:	
Commissioner	:	Cliff Rechtschaffen
Admin. Law Judge	:	Tim Kenney
	:	Marcelo Poirier
	:	

SAFETY ENFORCEMENT DIVISION
CALIFORNIA PUBLIC UTILITIES COMMISSION

CHAPTER FIVE
PREPARED SUR-REPLY TESTIMONY
OF
MARGARET FELTS IN RESPONSE TO
REPLY TESTIMONY OF TRAVIS SERA

San Francisco, California
June 30, 2020

TABLE OF CONTENTS

I. INTRODUCTION

The purpose of the following prepared Sur-Reply testimony, submitted on behalf of the California Public Utilities Commission's ("Commission") Safety Enforcement Division ("SED"), is to reply to testimony of Travis Sera regarding violations 1-60. Mr. Sera restated these violations as follows: "SED alleges SoCalGas violated California Public Utilities Code (Section 451) because it failed 'to investigate the blowout from well FF-34A and other instances of supposed leaks (Violations of 1-60)."[1] As listed in the Table of Violations of my testimony, these violations are:[2]

Violation Number	Summary of Violation
1	"No investigation of blowout from well Frew 3."
2	"No investigation of blowout from well FF-34A."
3	"No investigation of one of four parted well casings."
4 - 6	"No investigation of any of three parted well casings."
7 - 60	"No investigation of 54 well leaks."

Collectively, these violations are stated with more specificity on page 7 of my Opening Testimony: "SoCalGas failed to perform failure investigations, failure analyses or root cause analyses on failed Aliso Canyon wells despite more than 60 well casings experiencing leaks, four having parted casings, and several wells having casing corrosion identified. Therefore, SoCalGas lacked important information and background that they could have used to anticipate the extent and consequences of corrosion in its other wells, including well SS-25."[3]

These violations arose because SoCalGas did not investigate the *cause* of casing failures.

---

[1] Sera Testimony, p. 1, lines 8-10.

[2] Opening Testimony of Margaret Felts, p. 3.

[3] Opening Testimony of Margaret Felts, p. 7.

II. LEAKS DISTINGUISHED FROM RUPTURES – MR. SERA'S TESTIMONY DEFINES LEAKS DIFFERENTLY THAN THE PIPELINE HAZARDOUS MATERIALS AND SAFETY ADMINISTRATION, BLADE'S ROOT CAUSE ANALYSIS, AND THE OIL AND GAS INDUSTRY

Mr. Sera is Director of Integrity Management, which includes oversight of the transmission and distribution integrity management programs.[4] His testimony presents basic engineering principles,[5] and PHMSA requirements applicable to SoCalGas 'TIMP (Transmission) and DIMP (Distribution) integrity management programs, which enforce 49 CFR Part 192. However, Mr. Sera makes this unusual statement, without any reference, that strays from PHMSA definitions:

> Wall loss anomalies in pressure-containing tubular structures like pipes can fail by either leak or rupture once they grow to a critical size – i.e., a size that reduces the failure pressure equal to or below (≤) the operating pressure. Whether the structure fails by leak or rupture depends upon 1) the material properties of the structure, 2) the 1 [sic] size, shape, and orientation of the flaw, and 3) the level of stress applied to the flaw. *As a general matter with regard to corrosion related wall loss, leaks are typically associated with deeper flaws that do not propagate in length after initial perforation of the full wall thickness. In contrast to leaks, ruptures are typically longer in axial length to a degree sufficient to promote a localized elevated stress state (often resulting in bulging) and eventual through-wall failure. Ruptures are distinguished from leaks in that the flaw propagates or extends beyond the initial dimension of the perforation, and typically in the axial direction for hoop stress-related failures.*[6] (Emphasis added.)

This elaborate explanation of leak vs rupture, quoted in italics, goes well beyond standard definitions in the industry as illustrated by PHMSA's glossary definitions: "A **leak** is a small opening, **crack**, or hole in a **pipeline** allowing a release of oil or gas."[7]

---

[4] Sera Testimony, p. 6, Witness Qualifications, line 2-3.

[5] See for example, p. 1, Section II beginning line 17, "Leaks Distinguished from Ruptures".

[6] Sera Testimony, p. 2, lines 2-8.

[7] https://primis.phmsa.dot.gov/comm/glossary/index.htm#Leak

A **rupture** is the process or instance of breaking open or bursting, as in the rupture of a pipe.[8] (Emphasis added.)

SED also asked Blade whether this quote from Mr. Sera's testimony defined the term "leak" the same way as the RCA did. Blade answered, "No.",[9] and explained as follows:

> The term "leak" in the first passage of Question 2 (from Mr. Sera's testimony) indicates a failure mode. The Blade reports generally used the word "leak" to indicate a flow path or hole that allowed fluid flow from inside the casing to the outside. When the SS-25 casing failure was discussed, the word "rupture" was used to describe the type or mode of failure. Obviously, a rupture in the casing is also a leak that allows flow, but the converse is not always true. A leak is not necessarily a rupture. The two definitions of the word "leak" as discussed are consistent with commonly used definitions in the oil and gas industry for casing failure and failure analysis depending on the context.[10]

SED then asked Blade how the term "leak" is defined in the Blade RCA. Blade answered as follows:

> The term "leak" as used in the Blade Root Cause Analysis is consistent with the definitions commonly used in the oil and gas industry for failure and failure analysis, and is used appropriately throughout the Blade Main Report and Supplementary Reports. The term "rupture" was used in the discussion of the failure mode in the RCA. For example, the first paragraph of the Executive Summary on page 1 of the Blade Main Report, states: "The Standard Sesnon 25 (SS-25) well was shut in at 3:30 PM on October 23, 2015; a leak was discovered at 3:15 PM. The 7 in. production casing had axially ruptured and circumferentially parted. This resulted in a blowout and gas release into the atmosphere, which lasted for 111 days, until the well was eventually killed via a relief well on February 11, 2016." Here the term "a leak" is the general term indicating a flow path from inside the casing to the atmosphere while the terms "axially ruptured and circumferentially parted" defined specific failure modes.

---

[8] https://primis.phmsa.dot.gov/comm/glossary/index.htm#Rupture

[9] Blade Response to SED Data Request 82, Response 2.2.1, pp. 6-7, June 12, 2020.

[10] Blade Response to SED Data Request 82, Response 2.2.1, pp. 6-7, June 12, 2020.

> The discussion of failed casing in the Blade Main Report and Supplementary Reports used the general term "leak" to reflect the fact that casing leaks were identified but no details regarding the nature or cause of these leaks and failures were available because no failure analyses were done based on the data available to Blade. For example, the fourth paragraph of the Executive Summary on page 2 of the Blade Main Report, states: "The Aliso Canyon storage wells had numerous casing leaks. Blade reviewed 124 gas storage wells and identified 63 casing leaks, 29 tight spots, 4 parted casings, and 3 other types of failures. Based on the data available to Blade, no details regarding the nature or cause of these leaks and failures were available because no failure analyses were done.[11]

Mr. Sera goes on to explain the importance of recognizing leakage vs. rupture in the process of evaluating overall risk.[12] However, he does not explain how this discussion absolves SoCalGas of investigating the causes of well casing leaks or parted casings.

III. SOCALGAS CANNOT IGNORE LEAKS AND JUST WAIT TO INVESTIGATE A RUPTURE

Mr. Sera refers to my testimony as characterizing historical casing issues as primarily leaks, not rupture.[13] He notes that prior to the SS-25 casing rupture, failure history at Aliso canyon did not represent or suggest the risk of release that occurred at SS-25.[14] Mr. Sera fails to consider the age of the Aliso wells, the lack of inspections, the absence of corrosion control on many of the wells, and the increasing frequency of leaks identified by SoCalGas engineers who were familiar with Aliso wells.[15] Mr. Sera has failed to consider the age of the Aliso wells despite the fact that SoCalGas' recent General Rate Case testimony recognizes the possibility of a well related incident, given the age of the wells and their heavy utilization.[16]

---

[11] Blade Response to SED Data Request 82, Response 2.2.1, p. 7, June 12, 2020.

[12] Sera Testimony, p. 3, lines 7-14

[13] Sera Testimony, p. 3, lines 17-19.

[14] Sera Testimony, p. 3, lines 19-21.

[15] 1985.0402.F-3 All-5.Delay.in.Repairs.Several.Wells

[16] "SoCalGas Direct Testimony of Phillip E. Baker Underground Storage, November, 2014", PEB-18, lines 15-17.

Mr. Sera quotes a 2016 PHMSA report regarding the difficulty of predicting catastrophic events.[17] Although this report is about pipelines, not gas wells, the basic statement is applicable. The solution implemented for pipelines is rigorous inspection, monitoring and documentation.[18] Under 49 CFR Part 192, pipeline operators are required to be investigate pipeline failures to determine the cause of the failures.[19] SoCalGas is familiar with the process because it operates pipelines under 49 CFR Part 192 regulations and has TIMP and DIMP Integrity Management programs, which Mr. Sera manages.

Mr. Sera notes that in the case of the SS-25 failure, no known examples of this type of well casing failure associated with microbially influenced corrosion (MIC) attack exist in the industry record.[20] However, despite the exact source, corrosion of any type could have been detected if SoCalGas had made the effort to inspect the casing prior to the failure.

Another example of failure to act proactively with inspections, is Well FF-34. A casing blowout at FF-34A probably could have been avoided if SoCalGas had inspected it proactively.[21] Apparently, after the blowout and during the workover, SoCalGas

---

[17] Sera Testimony, p. 4, lines 2-8.

[18] 49 CFR Part 192. See for example, 49 CFR Section 192.917(b). "*Data gathering and integration*. To identify and evaluate the potential threats to a covered pipeline segment, an operator must gather and integrate existing data and information on the entire pipeline that could be relevant to the covered segment." In performing this data gathering and integration, an operator must follow certain requirements, and "consider both on the covered segment and similar non-covered segments, past incident history, corrosion control records, continuing surveillance records, patrol records, maintenance history, internal inspection records and all other conditions specific to each pipeline." This is prescribed in answer to the question raised in this section of the regulations: "How does an operator identify potential threats to pipeline integrity and use the threat identification in its integrity program?"

[19] See for example, 49 CFR Section 192.617. "Each operator shall establish procedures for analyzing accidents and failures, including the selection of samples of the failed facility or equipment for laboratory examination, where appropriate, for the purpose of determining the causes of the failure and minimizing the possibility of a recurrence."

[20] Sera Testimony, p. 4, lines 13-14.

[21] See Opening Testimony of Margaret Felts, p. 8, "Additionally, the FF- 34A Well File mentioned a study of possible external casing corrosion problems in the southeastern portion of the field, but Blade was not able to locate any documentation related to this study." Also see, footnote 27, referencing Blade RCA, p. 2. Blade noted there that well FF-34A experienced an underground blowout in 1990, and that was one of the well incidents in which SoCalGas did not perform an investigation. Blade highlighted

discovered external corrosion and decided to put Cathodic Protection on the well casing in 1992.[22]

Inspections performed over time will provide a picture of what is happening to wells in a well field such as Aliso. Preventative maintenance plans can be developed based on that information, which would theoretically find and/or prevent corrosion before leaks occur, thus minimizing long term costs.

Mr. Sera states "a pinhole leak and a "SS-25-like" release are not equivalent in terms of likelihood of failure, consequence of failure, or overall risk, and they should not be considered to be the same,"[23] suggesting that violations 1-60 somehow should not be considered violations because they are leaks, not ruptures like SS-25. He misses the point of the violations completely.

IV. BLADE DISAGREES WITH THE CONCLUSION OF MR. SERA'S TESTIMONY

Mr. Sera's testimony concludes, "For the foregoing reasons, a failure analysis of any of the historical leaks described in the Blade Report would very likely not have informed or predicted the SS-25 incident."[24] SED asked Blade if it agreed with this conclusion. Blade answered, "No.",[25] and explained as follows:[26]

> One cannot conclude that the analysis of the historical leaks would not inform or predict the SS-25 incident because the historical leaks were not analyzed by SoCalGas according to data provided to Blade.
>
> In the Executive Summary of Blade's Main report, page 2, Blade stated, "Based on the data available to Blade, no details regarding the nature or cause of these leaks and failures were available because no failure analyses were done. Forty percent of the gas storage wells

---

well FF-34A as one of the wells that experienced a leak because the well file for that well mentioned a study of possible external casing corrosion problems. Blade said it could not find the study.

[22] AC_CPUC_0022178.FF34-A.CP

[23] Sera Testimony, p. 3, lines 13-14

[24] Sera Testimony, p. 5, lines 11-12.

[25] Blade Response to SED Data Request 82, Response 2.1.1, p., June 12, 2020.

[26] Blade Response to SED Data Request 82, Response 2.1.1, pp. 5-6, June 12, 2020.

reviewed by Blade had casing failures with an average of two casing failures per well. The FF-34A well file mentioned a study of the possible external casing corrosion problems in the southeastern portion of the field, but Blade was not able to locate any documentation related to this study [reference omitted]".

Prior to October 23, 2015, none of the historical leaks caused a release of gas into the atmosphere similar to SS-25. However, to conclude that the failure in the SS-25 production casing was somehow different from every other leak in the field requires an investigation and evaluation of historical leaks. In other words, the consequence of the SS-25 7 in. casing failure was different and much more severe, but the underlying cause may have been similar, or not, to previous casing failures. The data provided to Blade indicated casing failures were investigated to determine their location in the well; in almost all cases, the question of where did the casing failure occur was answered. But Blade did not find the answers to questions such as: why did the casing failure occur, when will it occur again, and how can we prevent these failures. Because of this information gap, any comparison of the SS-25 failure to other Aliso Canyon casing failures was partial and lacking.

The occurrence of casing corrosion was recognized by SoCalGas. As discussed in Blade Main Report on page 239 "The limitations of this reactive approach to well integrity management was identified by SoCalGas in 2014 as evidenced by the SIMP proposal in the 2016 General Rate Case Submission. OD [Outside Diameter] corrosion on production casing was identified as a threat". The following statements are from that testimony [1, pp. PEB 18 - PEB 19] (verbatim):

> The primary threats to the SoCalGas well facilities that SIMP will address are internal and external corrosion, and erosion. [footnote omitted] Once an issue is identified, the initiation of critical repair work identified will immediately minimize safety risks.
>
> Presently, most major O&M and capital funded activities conducted on storage wells are typically reactive-type work, in response to corrosion or other problems identified through routine pressure surveillance and temperature surveys. . . . In most cases, situations like this can be indicative of production casing leaks from either internal or external corrosion where high pressure gas can migrate to the surface in a matter of hours.

> External corrosion has also been observed in other wells at the field.[27]

Presently, most major O&M and capital funded activities conducted on storage wells are typically reactive-type work, in response to corrosion or other problems identified through routine pressure surveillance and temperature surveys.

Furthermore, in their rate case testimony (page 17), SoCal Gas stated the following (verbatim):

> A proactive, methodical, and structured approach, using state-of-the-art inspection technologies and risk management disciplines to address well integrity issues before they result in unsafe conditions, or become major situational or media incidents, is a prudent operating practice.[28]

[27] See "SoCalGas Direct Testimony of Phillip E. Baker Underground Storage, November, 2014", p. PEB-18, lines 20-22, and PEB-18 line 24 to PEB-19 line 2.

[28] See "SoCalGas Direct Testimony of Phillip E. Baker Underground Storage, November, 2014", p. PEB-17, lines 7-10.

Docket:	:	I.19-06-016
Exhibit Number	:	
Commissioner	:	Cliff Rechtschaffen
Admin. Law Judge	:	Tim Kenney
	:	Marcelo Poirier
	:	

SAFETY ENFORCEMENT DIVISION
CALIFORNIA PUBLIC UTILITIES COMMISSION

CHAPTER SIX
PREPARED SUR-REPLY TESTIMONY
OF
MARGARET FELTS IN RESPONSE TO
REPLY TESTIMONY OF AMY KITSON

San Francisco, California
June 30, 2020

TABLE OF CONTENTS

Pages

I. INTRODUCTION

The purpose of the following prepared Sur-Reply testimony, submitted on behalf of the California Public Utilities Commission s (Commission") Safety Enforcement Division (SED"), is to reply to testimony of Amy Kitson regarding violations 74, 75, 76 and 78. Ms. Kitson restated these violations as follows: SED alleges SoCalGas violated California Public Utilities Code Section 451 (Section 451) because SoCalGas failed to implement a risk assessment program at the Aliso Canyon storage facility prior to October 23, 2015 (Violations 74, 75, 76, and 78)."[1] As listed in the Table of Violations of my testimony, these violations are:[2]

Violation Number	Summary of Violation
74	Failure to implement a risk or integrity management program for Aliso Canyon storage facility (Aliso)."
75	Failure to detect corrosion on well SS-25 resulting in part from lack of risk assessment at Aliso."
76	Failure to start well integrity program in 2009 because of inability to collect recovery for it in rates."
78	Operation of Aliso without internal policies that required well casing wall thickness inspection and measurement."

II. MS. KITSON S TESTIMONY SAYS SOCALGAS IMPLEMENTED A WELL EVALUATION PROGRAM IN 2007,[3] BUT SOCALGAS PROVIDED NO EVIDENCE OF CREATING A FORMAL WELL

[1] Kitson Testimony, p. 1, lines 8-10.

[2] Opening Testimony of Margaret Felts, p. 3.

[3] Kitson Testimony, p. 1, line 15, subheading II.

INTEGRITY MANAGEMENT PROGRAM UNTIL DECEMBER, 2014.

Ms. Kitson's testimony states, "In 2007, SoCalGas began a well integrity program to inspect, evaluate, and mitigate downhole well integrity issues."[4] The program allegedly added an inspection of casing to normal maintenance that occurred during rework of a well.[5] Her testimony does not specify, but it appears that this section of Ms. Kitson's testimony attempts to rebut violations 76 and 78.

Ms. Kitson's testimony provides no evidence in support of any of her statements in testimony. SED asked SoCalGas to provide the lacking evidence. For example, SED asked SoCalGas to provide the documents that support the statement, "In 2007, SoCalGas began a well integrity program to inspect, evaluate, and mitigate downhole integrity issues." In response, SoCalGas stated, "SoCalGas interprets this request to seek an example supporting the statements quoted from Chapter VI Prepared Reply Testimony of Amy Kitson on Behalf of Southern California Gas Company. . . For an example well, please see electronic documents with Bates range I1906016_SCG_SED_DR_59_0000001 through I1906016_SCG_SED_DR_59_0000003."[6]

The first document provided by SoCalGas is entitled "Resources Agency of California Department of Conservation Division of Oil, Gas, and Geothermal Resources, History of Oil or Gas Well." This document states that the only well of focus is Fernando Fee 32-E. The document describes work done on that well from May 18, 2007 to June 7, 2007.[7] The second document provided by SoCalGas also shows only Fernando Fee 32-E, dated June 2, 2007. The document says on it, "Ultrasonic Imager Gama Ray-Neutron".[8]

---

[4] Kitson Testimony, p. 1, lines 16-17.

[5] Kitson Testimony, p. 1, lines 17-19.

[6] SoCalGas Response to SED Data Request 59, Question 1a, pdf pp. 2 and 4.

[7] I1906016_SCG_SED_DR_59_0000001-0000002.

[8] I1906016_SCG_SED_DR_59_0000003.

These documents are typical documents found in many well files, documenting regular maintenance or responses to equipment failures or casing leaks. Nothing in the first two documents proves the existence of an integrity management program in 2007.

Another piece of evidence that suggests no such program is that SoCalGas mixed up the name of its own alleged program dating back to 2007. In one data response to SED SoCalGas calls this the "Inspect and Replace Program."[9] In a later question to the same data response to SED, SoCalGas calls it the "Replace and Inspect initiative."[10] In their testimony, Hower & Stinson call it the *"Replace and Inspect"* initiative.[11]

SoCalGas permanently removed six wells of approximately 30 wells that were inspected as part of this "Replace and Inspect" initiative,[12] The six wells identified were abandoned for various reasons. There is no evidence in these well files that the wells were inspected for the purpose of determining well casing integrity under a 2007 Inspect and Replace Program or Replace and Inspect Initiative. The timing of the review of 30 wells is not stated, but based on some well files that SoCalGas provided in response to a data request regarding the above statement from the Hower & Stinson testimony, it appears to be seven years, 2007-2014, which would be about 4 wells per year, if there had indeed been a program.[13] I reviewed several of the 30 well files SoCalGas identified as part of what Hower and Stinson called the "Replace and Inspect" initiative, and found no evidence of a formal or informal integrity management program or initiative, and certainly no evidence that a new program began in 2007 that was different from typical well maintenance over the life of Aliso Canyon.[14] These files are similar to other well

---

[9] SoCalGas Response to SED Data Request 90 Question 7a, pdf p. 12, May 29, 2020.

[10] SoCalGas Response to SED Data Request 90 Question 15a, pdf p. 25, May 29, 2020. In fact, in Hower & Stinson testimony, the two names are used interchangeably. See p.6 under Risk management Plan, p.28, lines 16-17 and p.29. line 4 and 19.

[11] Hower & Stinson Testimony, p. 28 line 21 to p. 29, line 3.

[12] Hower & Stinson Testimony, p. 28 line 21 to p. 29, line 3.

[13] SoCalGas Response to SED Data Request 90 Questions 15a, 15b, and 15c, pdf pp. 25 to 28.

[14] Reviewing SoCalGas well files is not easy. On average, they are typically 1500 pages. The documents are in no particular order and cannot be searched. Relevant inspection results for 2014 might appear in the

files that I reviewed that were not on their list of 30. The six wells that were permanently removed had histories of casing problems before 2007, so it is not surprising that these wells were abandoned.[15]

Ms. Kitson says "SoCalGas Implemented a Well Evaluation Program in 2007".[16] In support of this statement, her testimony mentions doing a "re-work", where SoCalGas apparently replaced tubing, sealing element, wellhead valve, and inspect casing.[17] Regarding this "re-work" she says, "[t]his well inspection re-work initiative was the precursor to the formalized Storage Integrity Management Program ("SIMP").[18] SED asked SoCalGas to produce the documentation showing this alleged "re-work initiative". In response, SoCalGas referred SED generally to the 2016 General Rate Case (A.14-11-004) testimony and accompanying workpapers of SoCalGas witness Phillip E. Baker.[19] Mr. Baker's testimony was published in November 2014; not 2007. There is no mention of a "re-work initiative" in Mr. Baker's testimony.[20]

Ms. Kitson's testimony provides no evidentiary exhibits whatsoever to support her testimony.[21] And, I did not find a SoCalGas standard for the referenced program or initiative among the many standards SoCalGas has provided to SED.

III. MS. KITSON SAYS SOCALGAS INITIATED A LONG TERM STORAGE INTEGRITY MANAGEMENT PROGRAM (SIMP) IN 2014, PRIOR TO THE SS-25 INCIDENT, BUT THE EVIDENCE

---

middle of the set, between original 1945 documents and 1986 documents. There is no way to verify SoCalGas' claims without looking at each page of each well file. SoCalGas made no effort to identify relevant documents.

[15] For instance SoCalGas had identified corrosion and holes in the shallow (1000' – 1500' depth) casing of well MA-5A well before 2007. Workovers were planned, but cancelled. Eventually, the well was abandoned. This had nothing to do with a program as described by Kitson in her testimony.

[16] Kitson Testimony, p. 1 Line 15.

[17] Kitson Testimony, p. 1, line 17.

[18] Kitson Testimony, p. 2, lines 1-2.

[19] SoCalGas Response to SED Data Request Data Request 59, Question 2a, pdf pp. 2 and 4.

[20] See SoCalGas Direct Testimony of Phillip E. Baker Underground Storage, November, 2014.

[21] Ms. Kitson's testimony does reference to SED's Opening Testimony, and the Prepared Testimony of Public Advocates Office, as well as a Commission decision, but her testimony does not offer documented evidence in support of the statements.

SHOWS THAT SOCALGAS DID NOT BEGIN IMPLEMENTING ITS SIMP UNTIL 2016, AFTER THE SS-25 INCIDENT.

In Section III of Ms. Kitson s testimony appears to rebut violations 74 and 75, but the specific purpose of the section is not stated. Ms. Kitson claims that in 2014, SoCalGas proposed a SIMP, a forward-looking plan to assess and enhance the safety and integrity of SoCalGas storage wells in its Test Year 2016 General Rate Case (2016 GRC).[22]

I do not dispute Ms. Kitson s claim that SoCalGas began creating a SIMP in 2014. In 2014, SoCalGas proposed SIMP in its Test Year 2016 General Rate Case (2016 GRC).[23] However, the evidence shows that SoCalGas did not begin actually implementing its SIMP program until January 2016, after well SS-25 failed, and before well SS-25 was killed. A chronology of related events is provided below.

- The SIMP pilot program, which allowed SoCalGas to test casing inspection tools,[24] was initiated in 2014.[25]
- Projects that were supposed to be part of the 2014 "pilot SIMP program" were actually not scheduled until 2016, when funding was anticipated to be in place. An email dated August 7, 2014 suggests 3 additional wells (P42B, SS44A and SS9) would be moved into the pilot SIMP program and laid out the work that should be completed in preparation.[26] Although the August 7, 2014 email mentioned that 3 additional wells would go into the pilot SIMP program, each appears on a SIMP Status Report, but their dates are not until 2016.[27] So none of these wells was part of the SIMP pilot program. [28]

---

[22] Kitson Testimony, p. 2, lines 6-8.

[23] Kitson Testimony, p.2, lines 6-8, D.16-06-054.

[24] Kitson Testimony, p. 3. Lines 4-10.

[25] Kitson Testimony, p. lines 2-4.

[26] DR25.01 SCG files_0000001-0001537 p.1321.email.

[27] 2016.1001.AC_CPUC_0014708.SIMP.10.2016.Status Note: P-42B appears with dates March – May 2016; SS-44A is April-May 2016; and SS-9 is March-June 2016.

[28] 2016.1001.AC_CPUC_0014708.SIMP.10.2016.Status.

- The final HR Vertilog report for the Pilot SIMP Investigation of well FREW 2 is dated October 22, 2014.[29] FREW 2 appears to be the only well included in the Pilot SIMP.
- Specifically, as part of the SIMP pilot program, SoCalGas ultimately selected the High Resolution (HR) Vertilog as the tool they would use for the SIMP.[30]
- The Baker Testimony for the 2016 GRC is dated November 2014.[31] In this proceeding (2016 GRC), SoCalGas is seeking the inclusion of SIMP costs in the rate base beginning January 2016.
- The first draft of the SIMP policy is dated December 19, 2014.[32]
- SoCalGas provides no evidence of SIMP inspections of Aliso wells during 2015, suggesting that SoCalGas intended to wait for the program to be included in rates ~~base~~ before it would begin inspecting wells under the new program.
- The SIMP program was at least partially staffed on December 15, 2015, 54 days after SS-25 failed, and 57 days before SS-25 was killed with a relief well.[33] In his email that made personnel assignments, Mr. Baker states "Ramping-up SIMP throughout Storage is a high priority. I will be assisting Tom immediately in this effort.[34]
- The SIMP program was implemented in 2016 and by October 2016, about 114 wells had been inspected.[35] Of those inspected, 81 wells were taken out of service, plugged and isolated.[36] SoCalGas does not indicate how many of these wells were officially abandoned under DOGGR rules, but the DOGGR database shows most of them abandoned as of June 2020.[37] However, the number of inspections and number of wells plugged and isolated in 10 months is an indication of the decaying condition of Aliso wells by the time SoCalGas got around to inspecting

---

[29] 2014.1022.FREW 2 2014 Model SIMP.Report.

[30] Kitson Testimony, p. 3 lines 10-12.

[31] SCG-06_P__Baker_Testimony Nov 2014.

[32] I1906016_SCG_SED_DR_59_0000058.SIMP.

[33] Phil Baker email Dated Dec 20, 2015: AC_CPUC_SED_SELGA_0000648.Staffing.changes.Ded2015.

[34] Phil Baker email Dated Dec 20, 2015: AC_CPUC_SED_SELGA_0000648.Staffing.changes.Ded2015, 10th bullet.

[35] 2016.1001.AC_CPUC_0014708.SIMP.10.2016.Status.

[36] 2016.1001.AC_CPUC_0014708.SIMP.10.2016.Status.

[37] https://secure.conservation.ca.gov/WellSearch, (search tabs: Ventura County, Los Angeles, Aliso, Southern California Gas Company).

them. It is probably a good thing that the inspection rate was increased from the original plan to inspect 50% of the storage wells over a three-year rate case period.[38]

Ms. Kitson says that SoCalGas began installing real-time pressure monitors at its La Goleta storage facility during the summer of 2015, prior to the SS-25 incident.[39] However, there is no mention of pressure monitors in the August 7, 2014 email that discussed the SIMP pilot program. There is also no mention of pressure monitors in the SIMP policy.[40] The installation of real time pressure monitors was a much needed capital project that was underway in late 2015 but appears to be unrelated to the SIMP program as Ms. Kitson states.[41]

Ms. Kitson also states that SoCalGas initiated a database called WellView as part of a "data digitization component of SIMP" in 2015.[42] This program transfers file data about the construction of each well into a program that exhibits a sketch of the well. Again, SoCalGas provides no evidence that this upgrade to software is part of the SIMP program in 2015, or later. Two documents, a summary of 2014 Gas Storage Performance Goals, and a 2017 Storage Update both fail to mention software programs related to the pilot SIMP program.[43]

SoCalGas had authorization to track its SIMP related expenses beginning in 2016, a date that aligns with SoCalGas' lack of SIMP work during 2015. Since SoCalGas would not begin receiving General Rate Case funding until January of 2016, and clearly intended to wait until funding for SIMP was available to begin inspecting wells, it is reasonable to assume that SoCalGas did not implement an integrity management program

---

[38] Kitson Testimony, p.2, lines 15-17.

[39] Kitson Testimony, p.3, lines 13-16.

[40] I1906016_SCG_SED_DR_59_0000058.SIMP.

[41] In response to DR 25.01, SoCalGas provided 1537 pages of documents in response to a request regarding the SIMP pilot program. All 1537 appear to be related to the FREW 2 pilot investigation. SoCalGas also provided reference to the 2016 GRC Baker Testimony.

[42] Kitson Testimony, p. 4, lines 3-7.

[43] DR25.01 SCG files_0000001-0001537 p.1506 and DR25.01 SCG files_0000001-0001537 p. 1534.

in 2007, and did not actively begin investigating wells until after January 2016 at the expense of the shareholders.

SoCalGas Storage Engineering Manager from 1998 to 2013 was Mr. James Mansdorfer.[44] Mr. Mansdorfer confirmed that SoCalGas waited to actually start its SIMP until it could collect for it in rates, confirming as follows:

> Q: This was a concern of mine for a long time, and I had recommended a storage well integrity program to put a rig on each of the storage wells and run casing inspection logs, and ironically, SoCalGas recently got CPUC approval to include this program and associated costs in rates charged ratepayers, but the authority to include rates hasn't taken effect yet and so they have been waiting to start it. In other words, they knew it was needed but haven't started it because they couldn't yet collect it in rates!" You wrote that; correct?
>
> A. Yeah."[45]

Underlying Mr. Mansdorfer s point is the timing showing when SoCalGas could track its expenses in the 2016 GRC. In A.14-11-004, SoCalGas' own witness, Mr. Phil Baker, testified that he anticipated funding in the balancing account related to SoCalGas' Storage Integrity Management Program to begin in 2016.[46]

---

[44] Examination Under Oath Transcripts (Tr.), Mansdorfer, p. 61, lines 9-14.

[45] EUO Tr. Mansdorfer, p. 124, lines 10-27.

[46] SoCalGas Direct Testimony of Phillip E. Baker Underground Storage, November 2014, p. PEB-8, Table PEB-4, line 13-18.

Docket:	:	I.19-06-016
Exhibit Number	:	
Commissioner	:	Cliff Rechtschaffen
Admin. Law Judge	:	Tim Kenney
	:	Marcelo Poirier
	:	

SAFETY ENFORCEMENT DIVISION
CALIFORNIA PUBLIC UTILITIES COMMISSION

CHAPTER SEVEN

PREPARED SUR-REPLY TESTIMONY

OF

MARGARET FELTS IN RESPONSE TO

REPLY TESTIMONY OF DAN NEVILLE

San Francisco, California
June 30, 2020

TABLE OF CONTENTS

I. INTRODUCTION

The purpose of the following prepared Sur-Reply testimony, submitted on behalf of the California Public Utilities Commission's ("Commission") Safety Enforcement Division ("SED"), is to reply to testimony of Dan Neville regarding violations 327, 328, 329 and 330. Mr. Neville restated these violations as follows: "SED alleges SoCalGas had "imprudent and unreasonable record keeping practices associated with" [footnote omitted] wells SS-25, SS-25A, and SS-25B, and that the failure to record continuous wellhead pressure constituted an imprudent and unreasonable well practice associated with well SS-25 (Violations 327, 328, 329, and 330)."[1] As listed in the Table of Violations of my opening testimony, these violations are:[2]

Violation Number	Summary of Violation
327	"Imprudent and unreasonable recordkeeping practices associated with well SS-25."
328	"Imprudent and unreasonable recordkeeping practices associated with well SS-25A."
329	"Imprudent and unreasonable recordkeeping practices associated with well SS-25B."
330	Imprudent and unreasonable recordkeeping practices associated with well SS-25: Failure to record continuous wellhead pressure.

After his introduction, Mr. Neville does not specifically refer to violations 327, 328, or 329 again in the discussion his testimony. His testimony only mentions violation 330 on page 14 when he asserts in heading C that "SoCalGas' Monitoring of Wellhead Pressures Was Appropriate."[3]

Mr. Neville added into his introduction that he has experience in Vertilog technology,[4] but does not address violations related to this issue in his testimony.

---

[1] Neville Testimony, p. 1, lines 8-11.

[2] Opening Testimony of Margaret Felts, pp. 3-6.

[3] Neville Opening Testimony, p. 13, line 25 to p. 14, line 1.

[4] Neville Testimony, p. 1, lines 16-17.

However, Mr. Carnahan's introduction (Chapter II) links SED's allegations that SoCalGas should have used Vertilog technology to check the casing on 13 wells with Violations 61 to 73.[5] Chapter II of my Sur-Reply testimony responds to Mr. Carnahan's testimony, noting that my Opening Testimony says that violations 61-72 are for failure to follow company's internal 1988 plan to check the casing of 12 wells for metal loss, and violation 73 is for failure to follow the company's internal 1988 plan to check the casing of well SS-25 for metal loss.[6] I incorporate by reference into this Chapter my sur-reply testimony in Chapter 2 regarding Violations 61 to 73.

II. SOCALGAS HAS PROVIDED NO EVIDENCE THAT ITS WELL RECORDS WERE ORGANIZED IN 2015.

A. Hard Copy Records

I appreciate the description by Mr. Neville of the well-organized well files as they look when he wrote his testimony in 2020.[7] When there was an opportunity in 2020 to view the hard copy well files, I did not do that. My reasoning for not viewing the 2020 well files was that SoCalGas had 5 years since the SS-25 incident to clean up and organize the files, so whatever I saw would not be useful in my testimony regarding the condition of the files in 2015. Instead, I choose to assume the condition of the files in late 2015 are best represented by records scanned by SoCalGas in 2015 and early 2016.

I have reviewed many of the well files produced by SoCalGas since my first viewing in 2019 of the initial file produced in January 2016 for well SS-25, which was the basis for my comments in my opening testimony.[8] My opinion of SoCalGas' recordkeeping prior to the SS-25 incident has not changed. Scanned well files produced by SoCalGas are generally a mess. I can either assume the files were scanned in the

---

[5] Carnahan Opening Testimony, p. 1, lines 7 to 9. "Specifically, SED alleges violations of Section 451 of the California Public Utilities Code because SoCalGas should have used the Vertilog technology to check the casing on 13 wells (Violations 61-73). . ."

[6] See my Opening Testimony, p. 3.

[7] Neville Testimony, p. 3, line 1 to p. 4 line 7.

[8] SED Opening Testimony, pp. 68-69.

condition that existed, or SoCalGas purposely scrambled the contents of the files and inserted numerous duplicate records sometimes doubling the size of a well file. I choose to believe the former.[9] None of the scanned well files are searchable, thus reviewing is tedious. Records are not organized by date or category.[10] To review a well file, every page must be looked at because, for instance, a 2014 Notice to Abandon the well might be found between 1982 redrilling documents and 2006 permit documents.[11]

File folders with labels were included in most well files that were scanned. However, the files that follow a folder do not necessarily belong in that folder. It is common to find two file folders with the same label in a well file, but the contents that follow the two folders are not the same. Assuming the scanned records for SS-25 actually represent the condition of the records in October 2015, even if SoCalGas personnel and Boots & Coots had access to the hard copy, it would not have been easy to find important information about the well.[12]

In apparent reference to SoCalGas' well files, Mr. Neville also says, "[i]n the early 2000s, SoCalGas also began to use a software application called WellView for purposes of maintaining these documents."[13] I was briefed about this new data base when I visited SoCalGas on February 6, 2020. At that time, I understood that a complete set of data had been moved into this database in 2019. I also learned that complete well files were not moved to WellView, a data base that contains important information about the design and construction of the well. In an Examination Under Oath in 2018, SED read into the record, and SoCalGas' Underground Storage Data Manager recognized the following excerpt related to WellView.

---

[9] See also discussion of well files and SoCalGas explanation and admission discussed in my sur-Reply testimony to Hower & Stinson, Section IX.

[10] An average well file is 1600 pages. It takes about 6 hours to look at all of the pages of a well file this size.

[11] Example: MA-5A well files (image file).

[12] AC_CPUC_SED Kitson_0002207.SS25.WellHead1950s.p.1679.

[13] Neville Testimony, p. 3, lines 15-17. See also Neville Testimony, p. 3, lines 7-15.

"In the past 40 to 75 years some wells may have been modified and historical well work records are in paper format. In 2001 the company initiated using WellView as its main repository to capture and store well history data and well schematics. To date the company is primarily using paper well files and DOGGR records to track well data. The creation of a WellView database containing the desired well data will reduce the effort required to locate key well information and therefore improve data access, data quality, performance, analyzation, well integrity monitoring, and decision making.

At the start of the project, all well schematic paper documents were scanned into WellView as simple attachments. However, approximately 95 percent of the actual critical well data remains outside of the WellView database. The majority of the well files within the database are either entirely or partially incomplete. Therefore, the integrity of the well cannot be properly monitored. Nor can the well data be analyzed within the powerful WellView application. Well Lifecycle Resources, LLC (WLR) outlines the following phases as necessary to correct the well data within the company's WellView database bringing the data accuracy to as near 100 percent as possible using the available historical data." Do you see that passage I just read?

A Yes.[14]

Therefore, WellView could not have been available in either accurate or complete form at the time of the 2015 SS-25 incident. Regarding the lack of accurate and complete information in WellView and well files, SoCalGas' ~~had its~~ Underground Storage Data Manager, dating back to May, 2016, testify under oath as to what her role was. She stated, "I manage the governance of records and data and managing the technology piece databases. And I also have the compliance reporting piece."[15] This individual provided the following statements under oath with regards to WellView and SoCalGas' well files.

[14] Examination Under Oath (EUO.) Transcripts (Tr.), Razavi and Kitson, September 25, 2018, p. 67, line 22 to p. 68, line 28.

[15] Examination Under Oath (EUO.) Transcripts (Tr.), Razavi and Kitson, September 25, 2018, p. 11, lines 1-11.

- Between January 1, 2015 and October 22, 2015, someone had to check hard copy well files to confirm that well file data viewed in WellView was accurate and complete.[16]
- When asked whether the well file for SS-25 was missing information that was required to be present by SoCalGas's internal policies, procedures or other requirements as of October 23, 2015, she stated she was not aware of any.[17]
- SED asked, "When you say you don't know if there were missing files from 2014 to 2016, if there were missing files, would those have been documented?" Both of SoCalGas' witnesses answered, "I don't know."[18]
- SED clarified with SoCalGas' Underground Storage Data Manager under oath,

  "Q: How would one know if data was missing from a well file?

  A: We're speaking of hard copy records?

  Q: Prior to October 23, 2015?

  A: I don't know."[19]

B. Electronic Databases in Use During the Incident

According to Mr. Neville, to the extent this proceeding is focused on the SS-25 incident, this testimony describes the relevant electronic databases that were in full use as of October 23, 2015.[20] SoCalGas utilized PI Historian (PI) for collecting and maintaining operational data for the entire Aliso Canyon facility, including for the individual storage wells. It served as a single source for personnel to access operating data at the facility, including on/off times of storage wells, gathering line flowing pressures, weekly pressure readings on storage wells, daily reservoir pressures, gas inventory, expected flow by well,

[16] EUO. Tr. Razavi and Kitson, September 25, 2018, p. 73, line 15 to p. 74, line 19.

[17] EUO Tr. Razavi and Kitson, September 25, 2018, p. 57, lines 10-15.

[18] EUO Tr. Razavi and Kitson, September 25, 2018, p. 57, lines 16-25.

[19] EUO Tr. Razavi and Kitson, September 25, 2018, p. 58, lines 3-7.

[20] Neville Testimony, p. 4, lines 10-12.

choke type and size. PI provided users the opportunity to track or trend operating data over time.[21]

Also during my February 6, 2020 visit to SoCalGas, I was briefed on the various electronic databases. After hearing descriptions and viewing data with SoCalGas personnel at the time, and after viewing records provided in response to data requests, I came to the conclusion that the earliest data entries in these databases are from 2006. Other databases do not go back that far. Real-time data in the PI Historian, that Mr. Neville's testimony discusses, would only have been recorded beginning sometime after 2015 because there were no instruments transmitting real-time data at Aliso prior to that time.

For most operational purposes, this more recent data set may suffice. However, they do not adequately record the history of operation and maintenance of a well that was put into gas storage service in the 1970's. Apparently, there are no hard copy records of this information so one cannot recover historical information about the performance of wells unless it happens to be in the well file.[22]

C. SED's Review of Records

Mr. Neville asserts that it is his understanding that SED's testimony is not predicated on a complete review of SoCalGas' electronic databases or hard copy well files for SS-25.[23] Mr. Neville also repeats SoCalGas' witness, Mr. Healy, Chapter IX, saying "it appears that these and other records were provided by SED to its witness in a manner [footnote omitted] that does not reflect the organization and accessibility of the electronic or hard copy records maintained at SoCalGas."[24] The files that SED provided to me were the exact files provided to SED by SoCalGas.[25] Over time, I have

---

[21] Neville Testimony, p. 4, lines 10-18.

[22] Such information would only be in a well file if it was recorded in conjunction with an investigation or maintenance related to a problem with the well, such as a failed valve of casing leak.

[23] Neville Testimony, p. 5, lines 13-15.

[24] Neville Testimony, p. 5, lines 18-21.

[25] Downloaded from the CPUC main frame computer database where the files from SoCalGas were

(continued on next page)

accumulated into one folder, several different SS-25 well files that SoCalGas provided in response to data requests. These various versions contain some records that are the same, but the files are not alike.[26] Thus, in addition to being disorganized and containing a mix of records from 3 wells, SS-25, SS-25A and SS-25B, the initial SS-25 file I reviewed was also incomplete – estimated to be short by about 13,490 pages, although that number probably includes many duplicates. A quick look at the images of the Aliso Canyon Well cabinet, drawers and files provided by Mr. Neville[27] suggests there are no well files in the file cabinet that contain 14,000 pages, including the SS-25 file.

1. SoCalGas Complicated my Review of Documents by Providing Misleading Responses to SED Data Requests

SoCalGas stated in some data responses to SED that its well files contained certain types of records, which it did not disclose in other data responses regarding the general contents of well files.

In its first and several other data responses to SED related to the Aliso incident, SoCalGas represented to SED that, "The hard copy well file consists of the following: (1) histories, (2) logs, (3) surveys, and (4) invoices."[28]

However, in other data responses to SED, SoCalGas disclosed that its well files included types of records that were not disclosed in the statement shown immediately above. Examples of such SoCalGas' data responses included.

---

uploaded from media sent to SED.

[26] SS-25 Well File Records provided by SoCalGas: AC_CPUC_0000001-1587 initial file (1,587 pgs); AC_CPUC_0206158-0208846 (2,688 pgs) AC_CPUC_SED_DR_27_0004206-4430 (224 pgs); AC_CPUC_SED_DR_30_0000476-1176 (700 pgs); AC_CPUC_0001633-0006635 (5,002 pgs); AC_CPUC_0002779-3045 (266 pgs); AC_CPUC_0006636-11937(5,301 pgs) (pp.6636 to 6720 missing); AC_CPUC_0011938-12007 (69 pgs).

[27] Neville Testimony, p. 6, Figure 2—Aliso Canyon Well File Drawer (picture). Also see, Neville Testimony, p. 7, Figure 3, Aliso Canyon Well File Drawer.

[28] SoCalGas Supplemental Response to SED Data Request 1, Question 4, March 11, 2019; See also SoCalGas Response to SED Data Request 32, Questions 1, 2 and 3, November 7, 2018; See also SoCalGas Response to SED Data Request 30, Question 13, November 30, 2018.

- "SoCalGas previously provided the well files for SS-25, SS-25A, and SS-25B on February 5, 2016 and June 3, 2016. These well files include daily operations summaries for SS-25, SS-25A, and SS-25B."[29]

- "In general, SoCalGas documents well work electronically. Documentation of work performed on a well is also retained in well files, as appropriate."[30]

- "SoCalGas documents valve maintenance and inspection activities in Maximo and well work activities in WellView. Documentation of work performed on a well is also retained in well files, as appropriate."[31]

- "The documentation stored for work done at our storage fields is stored in digital format. Documentation of work performed on a well is also retained in well files, as appropriate."[32]

- "On October 23, 2015, SoCalGas' working definition of the 'well file' included records relating to well design, historical testing, workover, and other information pertinent to the operation of an underground storage well."[33]

- "SoCalGas' practice is to include the following types of documents in the "well history file": DOGGR Form OG-103 (Well History Report), DOGGR Form OG-100 (Well Summary), Notices of Intent (NOI), Permits to Drill/Rework, and Workover Programs. Operators are required to submit OG-103 and OG-100 to DOGGR within 60 days after the drilling completion, suspension, or abandonment of a well."[34]

---

[29] SoCalGas Response to SED Data Request 10, Question 3, November 7, 2016.

[30] SoCalGas Response to SED Data Request 17, Question 34, April 27, 2018. (In response to SED Question: "How does SoCalGas document work at Aliso in general?").

[31] SoCalGas Response to SED Data Request 17, Question 35, April 27, 2018. (In response to SED Question: "Where does SoCalGas keep documentation about work done at Aliso Canyon?").

[32] SoCalGas Response to SED Data Request 17, Question 35, April 27, 2018. (In response to SED Question: "In what form does SoCalGas keep documentation about work done at Aliso Canyon?").

[33] SoCalGas Response to SED Data Request 17, Question 15, May 11, 2018. (In response to SED Question: Please provide SoCalGas's working definition of the term 'well file' used on October 23, 2015.").

[34] SoCalGas Response to SED Data Request 27, Question 38, October 5, 2018. (In response to SED Question: Please identify all records that must be kept in SoCalGas's job history and well history files as of October 23, 2015.).

- As of October 23, 2015, SoCalGas' well file had four components – (1) well history file, (2) log file, (3) survey file, and (4) invoice file. There was no "job history file." However, the "well history file" included DOGGR Form OG-103 (History of Oil and Gas) which details the rig work performed on a well during drilling, abandonment and workover operations."[35]

- "The testimony refers to 229 aging storage fields and some can exceed 13,000 feet in depth. The three storage field wells that exceed 13,000 feet in depth are the WEZU 13A, WEZU 23, and WEZU 25C wells at the Honor Rancho storage field. In November 2014, this information was contained in the well file."[36]

SoCalGas has also referred me to the Boots and Coots Daily Reports in many data responses for information about well kills that is in fact absent from those Daily Reports.

III. BETTER RECORDS MAY HAVE IMPROVED THE SS-25 WELL CONTROL EFFORTS

In response to my Opening Testimony statement that, "the failure and inability to immediately kill Well SS-25 was the most visible and alarming result of SoCalGas' inadequate record keeping, Mr. Neville States,

> SED's position is unsupported and belied by the well file for SS-25 and the statement of Boots & Coots, the third party who executed all but the first of the well control efforts. In response to questioning by SED, Boots & Coots stated that it had all the records that it required in order to plan and execute its well control efforts [Footnote omitted].[37]

---

[35] SoCalGas Response to SED Data Request 27, Question 1, October 5, 2018. (In response to SED Question: Please provide SoCalGas's definition of job history and well history files as of October 23, 2015.).

[36] SoCalGas Response to SED Data Request 24, Question 4, September 14, 2018. (In response to SED Question: In A.14-11-006, Exh. SCG_06, p. 77 of 156 states, "Safety and/or integrity conditions that are presently unknown may exist within the high pressure (up to 3,600 psig) above ground pipe laterals and below ground facilities that comprise of 229 aging gas storage field wells that can exceed 13,000 feet in depth." 1. Please list the '229 aging storage field wells that can exceed 13,000 feet in depth', which were noted in that statement. 2. Please provide the document that was available in November 2014, the date shown on Exh. SCG-06 that shows these '229 aging storage field wells that can exceed 13,000 feet in depth.").

[37] Neville Testimony, p.9, lines 15-19.

I acknowledge that Boots & Coots personnel believed they had all of the records they required in order to plan and execute its well control efforts. But then, each of their well kill attempts failed. The question is whether the information Boots & Coots was provided was actually accurate and complete. Certainly, Blade was of the opinion that SoCalGas provided an Inflow Performance Relationship (IPR) flowing pressure[38] that was almost a 1000 psig too low, which could have led to faulty calculations as described by Blade.[39]

Although Mr. Neville states that the records required to kill SS-25 were in the well file at the time of the kill attempts, SoCalGas personnel were actually searching for data during the kill attempts.[40] Had the well files contained complete and accurate information, this information may have led to a successful well kill attempt. (For example, see paragraph immediately above.)

IV. SED'S CONCLUSIONS ARE NOT SPECULATIVE AND ARE SUPPORTED BY EVIDENCE

A. Well file Records Appear to be Missing

Neville claims,

> Although SED makes the blanket assertion that there were missing or lost records, [footnote omitted] SED does not provide any examples of what record(s) it believes may have been lost. SS-25 was originally constructed/drilled in 1954 and then modified (re-worked) in 1973, 1976, and 1979. The records associated with this work are in the well history file.[41]

After reviewing many well files, I stand by my comments that the well file for SS-25 appears to be missing, for example, Inter-Office memos. In other well files, an odd result on a survey or on field data would result in one or more SoCalGas Inter-Office

---

[38] Inflow Performance Relationship (IPR) is defined as the well flowing bottom-hole pressure (Pwf) as a function of production rate. It describes the flow in the reservoir.

[39] Blade Main Report, p. 131.

[40] AC_CPUC_SED Kitson_0002207.SS25.WellHead1950s.p.1679.

[41] Neville Testimony, p. 10, lines 18-21.

memos, or even short white papers, which are included in the well file. For example, a temperature survey that showed a shoe leak would garner some discussion about the result, if it should be investigated, repaired or if the value of the lost gas was less than the cost of repair.[42] There may be one Inter-office memo in the entire SS-25 well file. Given the number of anomalous temperature records, this seems extraordinarily unusual for SoCalGas.

Regarding ground water records, Blade sets out a good discussion of this issue and my testimony relies on Blade's RCA.[43] I also discussed this issue in Chapter 1, Section IV.

B. Leak Records in SS-25 Well Files

Mr. Neville's testimony claims, "SED states that data in the SS-25 well file reveals an ongoing detection of leaks at the bottom of the well. [footnote omitted]."[44] Mr. Neville then claims that SED's position is a "misinterpretation of the well file."[45] I addressed my position on the indications in well file records of well leaks in SS-25 in my Opening Testimony, my Reply Testimony to the OSC, and in Chapter 2 of my Sur-Reply testimony. Regarding my Opening Testimony, noting casing erosion measurements, SoCalGas subsequently explained that at some point erosion data was moved from well files to a separate data base and provided records. The January 21, 2016 Multifinger Imaging Caliper (24 MAC) log of the inside of SS-25 production casing showed up to 39% internal wall loss, suggesting more aggressive monitoring of inside erosion and corrosion should have occurred, because internal wall loss plus external wall loss from corrosion will lead to casing integrity failure, i.e. leaks. My opening testimony did not

[42] Footnote purposely left blank.

[43] Blade Main Report P. 87 Section 2.7 Groundwater.

[44] Neville Testimony, p. 12, lines 26-27.

[45] Neville Testimony, p. 12, lines 26-27.

include a violation related to erosion data. However, this makes the point that not all data is kept in the well file.[46]

C. SoCalGas Monitoring of Wellhead Pressures was Inadequate

Mr. Neville's Testimony characterizes SED's position as,

> SED makes the assertion that SoCalGas' recordkeeping practices associated with well SS-25 were imprudent and unreasonable because it failed to continuously record the wellhead pressure for SS-25 (Violation 330). [Footnote omitted] SED contends that because SoCalGas was not monitoring wellhead pressure continuously, or even daily, it did not have the bottomhole pressure, which was a key piece of data for the well kill attempts. [Footnote omitted.][47]

Mr. Neville then alleges this is incorrect.[48]

I addressed the issue of continuous pressure monitoring in Chapter I, Section VIII of my Sur-Reply testimony. Violation 330, in my Opening Testimony, is for failure to record continuous well head pressures on SS-25. Continuous pressure readings are typically recorded for a period of time so that an operator can see a record over time of how the pressure changes. The most recent documented well head pressure record for SS-25 prior to October 23, 2015 was on September 25, 2015, 27 days earlier.[49] While there may have been visual readings of pressure instruments between September 25 and October 23, 2015, no one wrote down those readings, so there is no way to confirm what the pressures in the SS-25 tubing, production casing or surface casings were during the week prior to the SS-25 well failure. It is possible that the pressures were stable. It is equally possible that there might have been an indication in the change in pressure at some point prior to the catastrophic casing failure that might have given someone at SoCalGas reason to take a look at the well before the failure.

---

[46] For further discussion on this point, refer to Section II.D.

[47] Neville Testimony, p. 13, line 24 to p. 14, line 3.

[48] Neville Testimony, p. 14, line 3.

[49] AC_CPUC_0011618.well pressures.

Mr. Neville fails to justify the approach to monitoring wellhead pressure as a policy for safe operation of its Underground Storage (UGS) wells. Violation 330 should stand.

Docket:	:	I.19-06-016
Exhibit Number	:	
Commissioner	:	Cliff Rechtschaffen
Admin. Law Judge	:	Tim Kenney
	:	Marcelo Poirier
	:	

SAFETY ENFORCEMENT DIVISION
CALIFORNIA PUBLIC UTILITIES COMMISSION

CHAPTER EIGHT
PREPARED SUR-REPLY TESTIMONY
OF
MARGARET FELTS IN RESPONSE TO
REPLY TESTIMONY OF DARREL JOHNSON

San Francisco, California
June 30, 2020

TABLE OF CONTENTS

Pages

I. INTRODUCTION

The purpose of the following prepared Sur-Reply testimony, submitted on behalf of the California Public Utilities Commission s (Commission") Safety Enforcement Division (SED"), is to reply to the testimony of Darrell Johnson on behalf of Southern California Gas Company.

II. WITHDRAWAL OF VIOLATION 88 AND REASON 16

Mr. Johnson states that I allege in my opening testimony that, SoCalGas is in violation of California Public Utilities Code Section 451 (Section 451) because SoCalGas did not disclose to the Department of Public Health that the natural gas released from October 23, 2015 to February 12, 2016 contained crude oil, thereby impairing the Department of Public Health s ability to timely study the associated health impacts" (Violation 88)."[1] I am withdrawing violation 88 from my Opening Testimony, and Reason 16 from my Reply Testimony. Both of these items are related to SoCalGas failure to disclose to Los Angeles County Department of Public Health known facts that crude oil was released from well SS-25 during the incident.

However, I have recently discovered evidence that shows SoCalGas purposely extracted oil and vented it into the atmosphere during the SS-25 incident. Because of this recent discovery and the importance of it related to public health, I am adding a violation related to it, violation 331.

III. VIOLATION 331: SOCALGAS PURPOSELY EXTRACTED AND VENTED OIL INTO THE ATMOSPHERE DURING THE SS-25 INCIDENT ON NOVEMBER 13, 2015, WHICH IS A 451 VIOLATION BECAUSE IT EXPOSED PEOPLE NEAR

[1] Johnson Testimony, p. 1, lines 8-12.

THE WELL AND THE PUBLIC, TO HAZARDOUS SUBSTANCES

On November 13, 2015, SoCalGas sent an internal message that stated,

> Per Incident commander Glenn La Fever. During the repair process to mitigate the Leak at the well head in Aliso Canyon, oil was extracted and was vented into the atmosphere. There is an oily mist that may potentially be moving into the Porter Ranch area. Customer Service Field, Distribution and Meter Reading employees who are or may be headed to work in the area have been given instructions to avoid the Porter Ranch area until further notice. The Customer Contact Center has been notified.[2] [3]

November 13, 2015 was the date of the second well kill attempt.[4] During that well kill attempt SoCalGas records show the tubing pressure popped up to over 4000 psig briefly, then dropped to zero.[5] Halliburton shows pump pressures exceeding 2000 psi around 4 PM were used to pump viscous fluids into well SS-25 in an attempt to overcome the gas flow and bottom-hole pressures to kill the well.[6] Apparently, during the day, and before 5:26 PM, which is the time stamp for the text message that went out, there was a release of gas, oil and brine that shot feet into the atmosphere and covered the surroundings with oil.[7]

A review of emails and documents provided by SoCalGas in response to SED data requests did not turn up a description of this event. Specifically, there is no mention in either the SoCalGas daily report or the Boot & Coots daily report for November 13,

---

[2] AC_CPUC_SED_SELGA_0000965.

[3] Because I have just recently found this evidence, on behalf of Safety and Enforcement Division, I would support SoCalGas' request to produce additional testimony for purposes of responding to this one violation.

[4] For the list of kill attempts identified by Blade in the RCA, see Chapter 4, Section II.

[5] Page 9 from AC_CPUC_SED_DR_17_0002635.

[6] 2015.1113.Halliburton.Pump.Pressures SS-25.

[7] Based on oral comment that I recall hearing in a non-related meeting around the time of the incident. I have not been able to confirm this fact with SoCalGas documentation.

2015.[8] A search of the California Geologic Energy Management Division (CalGEM)[9] web site records for underground storage and the SS-25 well failure event turned up no mention or report on the incident even though it appears that a representative may have been present that day.[10] There is another email message from C. Brandy to Bret Lane asking about the text message quoted above, but there are no email responses from Bret Lane regarding the subject.[11] In this email, Brandy states

> Elaine got this as a text at 3:00 but seems strange neither Todd or I got it. Just want to make sure this isn t something fishy especially since it isn t even accurate. Brine is not oil.[12] [this message is followed by the one quoted above][13]

In a document titled Standard Sesnon 25 Chronology of Events," sent from SoCalGas to California Geologic Energy Management Division (CalGEM) the last item on page 1 states:

> November 13, 2015 - The third well control attempt was made but with much more heavy mud. During the attempt ground surface vent opened up about 20 feet to the north of the well emitting high volume of gas. All other gas leaks around the well ceased.[14]

I assume this is a description of the event that was documented in the text messages noted above. It downplays the sequence of events, failing to report the purposeful release. In addition, based on dates of kill events identified by Blade,[15] the kill attempt on November

---

[8] Page.32.from AC_CPUC_SED_DR_16_0000649-1026.Incident.Day and Report#20 from Boots&Coots.DailyReports.

9 Formerly known as the Division of Oil & Gas (DOGGR).

[10] AC_CPUC_SED_DR_17_0002068.shallow.gas.recovery – this memo discusses other issues related to the SS-25 situation, but puts a representative at the well site on 11/13/2015.

[11] AC_CPUC_SED_DR_17_0002072.

[12] AC_CPUC_SED_DR_17_0002072.

[13] AC_CPUC_SED_SELGA_0000965.

[14] AC_CPUC_SED_DR_17_0022682 and AC_CPUC_SED_DR_17_0022683. Note that the email, doc 22682, is a response "Thanks" to Mr. Van de Putt for sending the Timeline.

[15] For the list of kill attempts identified by Blade in the RCA, see Chapter 4, Section II.

13, 2015 was the second kill attempt, so, based on this memo, it is possible that another attempt was tried by SoCalGas or Boots and Coots.[16]

Finally, in a response to SED s data request DR 33[17] SoCalGas provided a Draft Timeline of Events. The entry for November 13, 2015 states:

> November 13 - Tubing perforation activities performed and attempted stop the flow of gas by putting fluids down the well. During this operation, there was a release of a mist into the air. Based on the information at this time, it is not believed that these materials pose a threat to public health. Out of an abundance of caution, residents were notified to stay inside. Once determined that the mist was contained to our facility, residents were again notified that there was no reason to remain inside. Office of Emergency Services and National Response Center were notified of the release. They were updated at 3:14 pm that flow was reduced.

SoCalGas provided no evidence to support the statements regarding reporting the incident or notifying the residents.[18]

This response was provided in the text of a supplemental response to the data request and is therefore not stamped with a SoCalGas bates number. No supporting documents were provided with the response. The Draft Timeline of Events provided to SED conflicts with the internal text message sent to SoCalGas personnel on November 13, 2015[19] and states facts that were not included in the Standard Sesnon 25 Chronology of Events that appears within SoCalGas documents.

In conclusion, records suggest that a purposeful release of oil and gas occurred and that SoCalGas subsequently attempted to cover up the facts surrounding this release in violation of 451.

---

[16] My review of records provided in response to SED DRs suggests there may have been additional well kill attempts.

[17] DR33.01 SCG memo - Q12f amend 7-Dec-18.

[18] DR33.01 SCG memo - Q12f amend 7-Dec-18.

[19] AC_CPUC_SED_SELGA_0000965.

Docket:	:	I.19-06-016
Exhibit Number	:	
Commissioner	:	Cliff Rechtschaffen
Admin. Law Judge	:	Tim Kenney
	:	Marcelo Poirier
	:	

SAFETY ENFORCEMENT DIVISION
CALIFORNIA PUBLIC UTILITIES COMMISSION

CHAPTER NINE

PREPARED SUR-REPLY TESTIMONY

OF

MARGARET FELTS IN RESPONSE TO

REPLY TESTIMONY OF GREG HEALY

San Francisco, California
June 30, 2020

TABLE OF CONTENTS

Pages

This part of my testimony addresses Chapter 9, the testimony of Mr. Greg Healey. Mr. Healey's testimony states that it responds to my Opening Testimony violations 89, 90, 91, and 92; 95-320; and 327, 328, and 329.[1] For reference, immediately below, these violations are summarized, as shown in my Opening Testimony, Table 1: Summary of Violations.

Violation	Summary of Violation
89	Lack of Cooperation: Failure to completely respond to Blade Root Cause Analysis related data requests on January 31, 2016 until no sooner than March 1, 2019.
90	Lack of Cooperation: Failure to completely respond to Blade Root Cause Analysis related data requests on February 19, 2016 until no sooner than March 1, 2019.
91	Lack of Cooperation: Failure to completely respond to Blade Root Cause Analysis related data requests on April 7, 2016 until no sooner than March 1, 2019.
92	Lack of Cooperation: Failure to completely respond to Blade Root Cause Analysis related data requests on February 18, 2018 until no sooner than March 1, 2019.
95 through 189	Lack of Cooperation: Refusal to release 95 pages of communications based assertion of attorney-client and/or attorney work product privilege.
190 through 284	Lack of Cooperation: Misleading SED by representing to SED that 95 pages of documents are protected by an attorney-client/attorney work product privilege, when they are not.
285 through 302	Lack of Cooperation: Refusal to release 18 additional communications based upon assertion of attorney-client and/or attorney work product privilege.
303 through 320	Lack of Cooperation: Misleading SED by representing to SED that 18 additional communications were protected by attorney-client or attorney work product privilege, when they were not.
327	Imprudent and unreasonable recordkeeping practices associated with well SS-25-A.

[1] Healy Testimony, p. 1, lines 9-18.

328	Imprudent and unreasonable recordkeeping practices associated with well SS-25-B.
329	Imprudent and unreasonable recordkeeping practices associated with well SS-25: Failure to record continuous wellhead pressure.

I. WITH REGARDS TO SECTIONS III AND IV OF MR. HEALY'S TESTIMONY, SHAREHOLDERS SHOULD BE REQUIRED TO PAY FOR BLADE'S REVIEW OF SOCALGAS' SUPPLEMENTAL RESPONSES, BUT I WITHDRAW VIOLATIONS 89-92.

Mr. Healy's testimony claims that "SED asserts four violations of Section 451, one for each of the data request responses which were 'supplemented 'on February 26, 2019 and March 1, 2019.[2] He adds the following:

> SoCalGas 'February and March 2019 supplemental responses to Blade's data requests were provided at Blade's specific request, so that Blade had the most complete records and to allow it to complete its commissioned root cause analysis. In about January 2019, Blade and SoCalGas had ongoing discussions (including at an in-person meeting) regarding whether Blade had been provided with the entire universe of documents that could inform its RCA investigation, including documents and data that had not specifically been asked for in a written data request. [3]. . .
>
> As noted in the written supplemental responses themselves, the process chosen for production does not indicate that SoCalGas 'prior responses to these four data requests were incomplete; rather, tying the documents to formal data requests was simply a means to keep track of the documents provided to Blade, which, over the course of Blade's 3+ year investigation, was significant. The prior responses provided to the data requests were already complete.[4] . .
>
> "IV. SOCALGAS 'SUPPLEMENTAL RESPONSES DID NOT SUBSTANTIALLY IMPACT BLADE'S RCA REPORT."[5]

[2] Healy Testimony, p. 2, lines 3-4.

[3] Healy Testimony, p. 3, lines 5-11.

[4] Healy Testimony, p. 4, lines 12-17.

[5] Healy Testimony, p. 5, lines 1-2.

SED quoted these passages and asked Blade about each of the SoCalGas supplemental data responses that prompted violations 89 through 92. That is, did Blade use the information in SoCalGas 'supplemental responses to confirm any facts or conclusions in its Root Cause Analysis or Supporting Reports?[6] Also, did Blade use the information in SoCalGas 'supplemental responses to change any facts or conclusions in its Root Cause Analysis or Supporting Reports?[7] With regards to each of these supplemental responses, Blade stated that the data provided was:

> ". . .related to wells SS-25, SS-25A and SS-25B. The bulk of the data had already been provided previously in 2016 and 2017. There was minimal new data provided during February/March 2019. Blade did conduct a detailed review of the supplemental responses for information to confirm existing data and to check for new data that may further inform or change the RCA conclusions. The supplemental responses were consistent with the data already provided and consequently confirmed our interpretation. The supplemental responses did not change any of the RCA conclusions."[8]

These data responses suggest two things. First, because of SoCalGas 'data dump on Blade, Blade was required to do a detailed review of the supplemental responses to check for new data to further inform or change the RCA conclusions. Therefore, SoCalGas shareholders should be required to pay for Blade's extra work related to SoCalGas 'supplemental responses. I am noting this in the record now for consideration in Phase II of this proceeding.

Second, the supplemental responses provided minimal new data, and did not change any of the RCA conclusions. Given this new data, it appears SoCalGas 'initial responses to Blade's data requests were sufficiently complete. Therefore, I withdraw violations 89-92.

---

[6] See Blade Response to SED Data Request 107, Questions 2.1(a.i), 2.2(a.i), and 2.3(a.i).

[7] See Blade Response to SED Data Request 107, Questions 2.1(a.ii), 2.2(a.ii), and 2.3(a.ii).

[8] See Blade Response to SED Data Request 107, Blade Response 2.1.1 (p. 5), 2.2.1 (p. 6), and 2.3.1 (pp. 6-7).

II. MR. HEALY'S ASSERTION THAT "THE ELECTRONIC WELL FILES PROVIDED TO SED REPRESENTED COMPLETE AND ORGANIZED VERSIONS OF THE HARD COPY WELL FILES" (SECTION V) IS CONTRADICTED BY THE EVIDENCE. (VIOLATIONS 327, 328, AND 329)

Mr. Healy's testimony states that, "SoCalGas carried out a deliberate process to produce accurate and complete electronic versions of the hard copy well files to SED and produced them in an organized manner."[9]

He also claims,

> The well file documents were then produced to SED in the order scanned. This process was followed so that the electronic well files were produced to SED consistent with the way the hard copy well files were found, which is also further described in Chapter VII (Neville). [Footnote omitted.]
>
> Based on my review of the well files in the format in which they were produced by SoCalGas to SED, the electronic well files were provided to SED in an organized and accessible format consistent with the hard copy versions of the well files.[10]

These statements are undermined by the evidence regarding SoCalGas's well files. Two points show this. First, I provide a section at the end of this chapter that shows the ordering in which SoCalGas initially provided the well file for SS-25. Second, I incorporate by reference my testimony in response to Mr. Neville (Chapter VII). Violations 327, 328 and 329 should stand.

III. MR. HEALY'S TESTIMONY CLAIMS SOCALGAS' DOCUMENT REVIEWS WERE REASONABLE (SECTION VI), BUT DOES NOT EXPLAIN WHY SOCALGAS WITHHELD MORE THAN 1,200 DOCUMENTS FROM SED FOR APPROXIMATELY TWO YEARS. (VIOLATIONS 95-320)

In response to SED's Opening testimony that asserted 226 violations for withholding documents from SED, Mr. Healy's testimony asserts that "SoCalGas ' Document Reviews Were Reasonable".[11] SoCalGas 'suggestion of reasonableness boils

---

[9] Healy Testimony, p. 5 lines 9-10.

[10] Healy testimony, p. 6 line 16 to p. 7, line 5.

[11] SoCalGas Reply Testimony of Greg Healy, p. 8.

down to three things. First, its initial review of documents was long and complex.[12] Second, "SoCalGas Expressly Qualified Its Responses and Appropriately Supplemented Its Production to SED."[13] Third, "SED Has Also Withdrawn Assertions of Privilege."[14]

The first two of Mr. Healy's arguments suggested SoCalGas would release documents if it had sufficient time. But SoCalGas continued to withhold 1,208 documents that responded to this question for approximately two years, spanning from the time SoCalGas updated its privilege log with 1,262 entries May 24, 2018,[15] to the time SoCalGas finally released 1,208 documents to SED on May 15, 2020.[16] [17] SoCalGas provided SED with an updated privilege log on May 24, 2018, which showed 1,262 entries.[18]

SED reminded SoCalGas to turn over the documents SoCalGas withheld before SoCalGas tardily did so. SED specifically quoted the entire passages of SoCalGas ' testimony in support of these two points, and asked whether SoCalGas continued to assert privilege over all of these communications. SED then prompted SoCalGas to turn over the documents over which SoCalGas no longer asserted attorney-client privilege.[19] SoCalGas responded that it "will be de-designating additional communications from the privilege log most recently produced to SED on March 15, 2019, in response to SED Data Request 16 (the March 15, 2019 data request), and that it "will provide them in a

---

[12] SoCalGas Reply Testimony of Greg Healy, p. 8.

[13] SoCalGas Reply Testimony of Greg Healy, p. 8.

[14] SoCalGas Reply Testimony of Greg Healy, p. 9.

[15] SoCalGas provided SED with privilege logs on March 5, 2018 (See March 5, 2018 email from Greg Healy showing privilege log as attachment and corresponding privilege log), and May 24, 2018 (See May 24, 2018 email from Greg Healy showing privilege log as attachment and corresponding privilege log), and March 15, 2019 (See March 15, 2019 email from Greg Healy showing privilege log as attachment and corresponding privilege log). To err on the conservative side, SED is using the May 24, 2018 date as the start date of its count because it contained the 1,262 entries.

[16] To view SoCalGas' most recent updated privilege log, See SoCalGas Response to Data Request 64, Question 2 Supplemental, May 15, 2020.

[17] SED asked Data Request 64 Question 2 on April 6, 2020.

[18] See May 24, 2018 updated privilege log in response to SED Data Request 16, Question 10.

[19] SoCalGas Response to SED Data Request 64, Question 2 shows that SED asked Data Request 64, Question 2 on April 6, 2020.

supplemental response the week of May 4, 2020."[20] Despite SoCalGas 'representation to SED that it would release these documents by May 8, 2020, SoCalGas did not actually turn over 1,208 documents from its two year old privilege log until May 15, 2020.[21]

On May 19, 2020, four days after receiving the 1,208 documents that SoCalGas had withheld for approximately two years, SED issued a data request intended to discern whether SoCalGas had validly asserted attorney-client privilege over these documents before releasing them.[22] Questions from this data request included such objective questions as: a) whether SoCalGas had released an allegedly privileged document to an outside entity;[23] and, b) the name of the attorney who provided the legal advice that was the basis for the privilege assertion, as many of the entries on the initial log lacked the name of an attorney in the actual log entries.[24] SED's Data Request May 19, 2020 Data Request explicitly instructed SoCalGas that, "If SoCalGas does not intend to provide a complete substantive answer to a question, objections to each such question are due May 22, 2020."[25] However, SoCalGas waited until June 8, 2020, before providing a Data Response containing only objections and no substantive answers.[26] SED met and conferred with SoCalGas to ask SoCalGas to re-consider answering the questions. As of the date this testimony was served, SoCalGas still had not provided SED with any information in response to this data request.

SoCalGas 'third argument is that "SED Has Also Withdrawn Assertions of Privilege."[27] This attempted analogy ignores several differences. First, SoCalGas ' privilege log was in response to SED's question, "Please provide any and all

---

[20] SoCalGas Response to SED Data Request 64, Question 2, dated April 27, 2020.

[21] See FTP email from SoCalGas to SED, entitled, " SoCalGas Supplemental Response to Question 2b of I1906016 Safety and Enforcement Division Data Request 64", dated May 15, 2020.

[22] SED Data Request 93.

[23] SED Data Request 93, Question 23.

[24] SED Data Request 93, Question 16.

[25] SED Data Request 93, Question 3.

[26] SoCalGas Response to SED Data Request 93, June 8, 2020.

[27] SoCalGas Reply Testimony of Greg Healy, p. 9.

communications relating to Aliso Canyon between SoCalGas and Boots and Coots for the time period between October 1, 2015 – January 31, 2018.[28] This safety related question was intended to understand the communications between both entities related to efforts to kill well SS-25. In contrast, SoCalGas asked for communications between SED and the Los Angeles Department of Public Health.[29] Such a request was of the regulatory agencies, which was not focused on the actual safety problems with killing the well. Moreover, SED had initially understood that there was a common interest privilege with DPH at the time DPH requested party status. Once DPH withdrew its request of party status and it became clear there was no such privilege, SED released the documents. Regarding the workpapers of Margaret Felts 'opening testimony, SED released those documents quickly, and provided Ms. Felts for a thorough deposition well before SoCalGas 'reply testimony was due. In contrast, SoCalGas withheld over 1,200 documents for approximately two years, waiting until May 15, 2020 to release them, a date after the OII was opened, and after SED's opening and reply testimony due dates had passed.

Mr. Healey's testimony also suggests a discrepancy in the method SED uses to tabulates the violations, one using the number of withheld pages (80), and another using number of documents withheld (48).[30] SoCalGas 'alleged this discrepancy in this testimony regarding these relatively low numbers, even though it continued to withhold the 1,207 documents from SED, only to release them approximately two years after asserting privilege over them. In light of this, both methods in the Opening Testimony of counting SoCalGas 'withholding of documents are both valid and extremely conservative.

Violations 95 through 320 should stand.

---

[28] SED Data Request 16, Question 10.

[29] SoCalGas Reply Testimony of Greg Healy, p. 10.

[30] SoCalGas Reply Testimony of Greg Healy, p. 7.

IV. EVIDENCE SHOWING THE FASHION IN WHICH SOCALGAS PROVIDED WELL FILES TO SED

As is shown by the document footnoted in this section, when SoCalGas first provided the electronic version of the well file for SS-25 as it existed just after the incident, it was disorganized. As can be seen by the footnoted document, the types or records and dates of documents were out of order.[31]

[31] Combined SS-25 Well File as initially received by Safety and Enforcement Division from Southern California Gas Company.