SoCalGas-12

Prepared Reply Testimony of Travis Sera (March 20, 2020)

I.19-06-016

ALJs: Hecht/Poirier

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Order Instituting Investigation on the Commission's Own Motion into the Operations and Practices of Southern California Gas Company with Respect to the Aliso Canyon storage facility and the release of natural gas, and Order to Show Cause Why Southern California Gas Company Should Not Be Sanctioned for Allowing the Uncontrolled Release of Natural Gas from Its Aliso Canyon Storage Facility. (U904G).	I.19-06-016 (Filed June 27, 2019)

CHAPTER V

PREPARED REPLY TESTIMONY OF TRAVIS SERA ON BEHALF OF SOUTHERN CALIFORNIA GAS COMPANY (U 904 G)

March 20, 2020

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CHAPTER V

I. INTRODUCTION.

The purpose of my prepared reply testimony on behalf of Southern California Gas Company (SoCalGas) is to address the testimonies of Margaret Felts on behalf of the California Public Utilities Commission Safety and Enforcement Division (SED)[1] and Mina Botros, Alan Bach, Matthew Taul, Pui-Wa Li, and Tyler Holzschuh on behalf of the Public Advocates Office (Cal Advocates). SED alleges SoCalGas violated California Public Utilities Code Section 451 (Section 451) because it failed "to investigate the blowout from well FF-34A" and other instances of supposed leaks (Violations 1-60).[2] Cal Advocates alleges further that SoCalGas should have utilized the knowledge gained from the failure analyses to identify systemic risks and adopt mitigation measures to prevent failures.[3] However, these positions ignore the differences between leaks and ruptures, and the important fact that there was no history of release on the scale of SS-25 occurring at the Aliso Canyon storage facility – and thus the risk of a low probability/high consequence event like SS-25 was not reflected in the operational history of the field.

II. LEAKS DISTINGUISHED FROM RUPTURES.

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

[1] SED's Opening Testimony was served on parties to I.19-06-016 on November 22, 2019 without an identified witness, and remains so. Pursuant to SoCalGas Data Request 2 to SED, SED identified Margaret Felts as the sponsoring witness for the entirety of SED's Opening Testimony.
[2] SED Opening Testimony at 9.
[3] Prepared Testimony on the Order Instituting Investigation (OII) into SoCalGas' Practices and Operations of the Aliso Canyon Storage Facility and the Uncontrolled Release of Natural Gas (Botros / Bach / Taul / Li / Holzschuh) (Cal Advocates Opening Testimony) at 13-15.

depends upon 1) the material properties of the structure, 2) the 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.

Various combinations of defect depth and length can be associated to predicted failure pressure, and the relationship of depth/length combinations to the potential for leak versus rupture can be modeled as shown in the generic example in Figure 1 below.

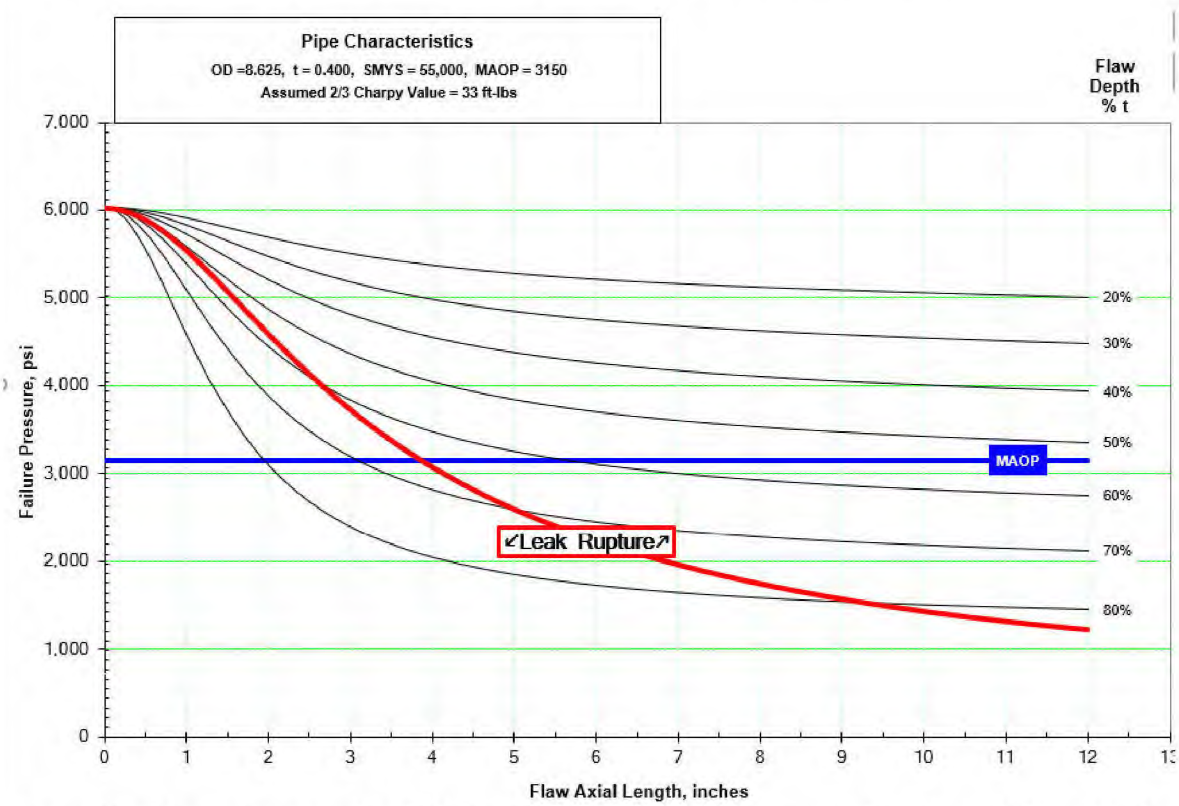

Figure 1 – Generic example of defect failure curves demonstrating the relationship between combinations of defect axial length, depth, predicted failure pressure, and leak versus rupture.

As shown in these families of constant depth, shorter flaws exhibit higher predicted failure pressures with a greater propensity for leakage; and longer flaws exhibit lower predicted failure pressures and have a greater propensity for rupture. Given the contrast in both the nature of a wall loss-related failure and the potential consequences, the leak versus rupture context is an important differentiating factor when comparing defects (i.e. comparing Aliso Canyon leakage history to SS-25).

The importance of recognizing leakage versus rupture is all the more important when evaluating overall risk. Risk is commonly defined as the product of the likelihood of failure (LOF) multiplied by the consequence of failure (COF).[4] Not all leaks are similar in terms of specific factors such as flaw size, shape, and failure mode. Similarly, consequences can vary widely depending on the nature of the failure, its impact to structural integrity, and a variety of factors related to the efficacy of mitigative measures once it has initiated: a pinhole leak and a "SS-25-like" release are not equivalent in terms of LOF, COF, or overall risk, and they should not be considered to be the same.

III. THE OPERATIONAL HISTORY AT ALISO CANYON DOES NOT REFLECT OR SUGGEST A RUPTURE ON THE SCALE OF SS-25 OCCURRING.

Even accepting SED's characterization of the 63 historical casing issues as "leaks" (which we dispute – see Chapter I (Hower/Stinson)), they are primarily *leaks*, not ruptures, and do not significantly contribute to an understanding of the *rupture* that occurred on SS-25. Prior to the rupture of SS-25, the failure history at Aliso Canyon did not represent or suggest the risk of release that occurred at SS-25. Catastrophic events such as SS-25 are typically quite rare and can be described as low-probability/high-consequence events. Low probability/high

[4] Ms. Felts agreed that a "risk assessment should include both the likelihood of a given event and the consequence of the event." See Ex. I-10 (Tr. 265:8-14 (Felts)).

consequence events are notoriously difficult to predict given that the catastrophic event is missing from the data used as input for risk models. As noted in a 2016 report to the Pipeline Hazardous Safety Administration,

> Catastrophic events are notoriously hard to predict and prepare for. These are low-probability high-impact events that do not "behave" well with standard probabilistic tools. They are rare and thus cannot properly inform a probability distribution function. They are also unique, offering only limited learning opportunities from one such event to the next. [5]

With regard to such events, understandably the operational record often does not contain any history of failure due to the rarity of such events, and given that failure modeling and risk modeling are reliant upon representative data, an alternative engineered solution is often required. As a result, industry-wide failure data are often used as a proxy for direct experience. However, in the case of the SS-25 failure, no known examples of this type of well casing rupture associated with microbially influenced corrosion (MIC) attack exist in the industry record.

The documentation of the casing corrosion leak of FF-34A describes the flowing condition with a statement that "the leak was verified," [6] and the observation of "severe metal loss at 2104 based on the inspection data." [7] It is evident that the wall loss was severe given that the leak occurred; however, the nature of the leaking flaw in terms of axial or circumferential dimensions, or mode of failure (i.e., leak versus rupture) is unavailable, presumably due to the limitations of inspection technology at the time. Given the available information, it is difficult (if not impossible) to relate the nature of the failure of FF-34A to the nature of the failure of SS-25 (though it should be noted that FF-34A did not result in a parted casing like SS-25). It is

[5] Ex. V-1 at 8 (*Approaches to Preventing Catastrophic Events*, Ernest Lever, June 15, 2016. GTI report to the Pipeline Hazardous Materials and Safety Administration).
[6] Ex. V-2 (Southern California Gas Company Interoffice Correspondence, Workover Recommendation for Fernando Fee 34A, Aliso Canyon, Richard L. Adamcyzk and L. D. Krohmer, November 30, 1990).
[7] Ex. V-3 (Southern California Gas Company Interoffice Correspondence, FF-34A Casing Corrosion, Aliso Canyon, Richard L. Adamcyzk, August 20, 1991).

speculative, at best, to posit that modeling the leakage history at Aliso Canyon would have represented the potential rupture failure to a degree that would have predicted an "SS-25 like" event. Further, even hypothetically allowing for the possibility that certain of the historical leaks at Aliso Canyon may have the characteristics of a rupture, the data do not support a COF estimate that would have reflected a duration of release on the scale of SS-25, particularly given that prior history at the field demonstrated typical and successful well control operations. Acknowledging the difficulties inherent in predicting low probability/high consequence events, it is doubtful that a risk model would have reasonably anticipated or predicted a COF on the scale of SS-25.

IV. CONCLUSION.

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.

This concludes my prepared reply testimony.

WITNESS QUALIFICATIONS

My name is Travis T. Sera. My business address is 555 West Fifth Street, Los Angeles, California, 90013-1011. My current position is Director – Integrity Management. I joined SoCalGas in 1995 and have held various positions of increasing responsibility within the Gas Engineering and System Integrity department. I left SoCalGas briefly, from 2003 to 2005, and during this time held the title of Senior Consulting Engineer for Structural Integrity Associates, an engineering consulting firm to the nuclear, petro-chemical, and pipeline industries. I have been in my current position at SoCalGas since 2019. My responsibilities include oversight of the transmission and distribution integrity management programs. I have a Bachelor of Science degree in Materials Engineering from California Polytechnic State University - San Luis Obispo, and I am a registered Professional Metallurgical Engineer in the State of California.

I have previously testified before the Commission.