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
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CHAPTER II

PREPARED OPENING TESTIMONY OF RODGER SCHWECKE ON BEHALF OF SOUTHERN CALIFORNIA GAS COMPANY (U 904 G)

(SOCALGAS IMPLEMENTED REASONABLE AND PRUDENT INCIDENT RESPONSE MEASURES)

November 22, 2019

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CHAPTER II
SOCALGAS IMPLEMENTED REASONABLE AND PRUDENT INCIDENT RESPONSE MEASURES

I. INTRODUCTION.

From the day the leak at Well Standard Sesnon 25 ("SS-25") was discovered until it was extinguished, Southern California Gas Company ("SoCalGas") acted expediently and undertook extensive and reasonable efforts to control the leak while maintaining safety.

SoCalGas acted reasonably with respect to the initial well top kill effort, and, when that was unsuccessful, immediately hired one of the preeminent well kill experts in the world and appropriately oversaw the well kill contractor's well control operations with safety at the forefront. Out of an abundance of caution and prudence, within two days of discovering the leak, SoCalGas began considering and preparing a contingency plan for a relief well in case a top well kill was not successful. SoCalGas' early efforts to prepare for a relief well expedited the later drilling of the relief well to intercept the leaking well over 1.5 miles underground and stop the leak.

In parallel to the well kill efforts, SoCalGas undertook extensive efforts to maintain site safety and security, and plan and develop efforts to mitigate leak impacts. In undertaking these efforts, SoCalGas managed challenges related to weather and site conditions that changed on a daily basis (even multiple times a day), as well as the uncertainty associated with addressing an unobservable leak, hundreds of feet below the surface, and the complexity and precise nature of drilling the relief well. Managing these activities entailed procuring dozens of vendors for services and materials, having hundreds of people on site who in turn also had to be managed and coordinated, and working closely with numerous agencies, including the California Public Utilities Commission ("CPUC") and Division of Oil, Gas, and Geothermal Resources ("DOGGR").

SoCalGas acted reasonably in administering these efforts simultaneously at the site and ultimately killing the leaking well in 111 days. Notably, despite the significant risks associated with this leak, and the hundreds of visitors to the site, SoCalGas completed the operation without fire or reportable incidents of significant injury or harm at the site.

II. <u>SOCALGAS REASONABLY AND PRUDENTLY RESPONDED TO DISCOVERY OF THE SS-25 LEAK</u>.

On October 23, 2015, an employee of The Termo Company, which operates native oil production wells within the Aliso Canyon area, smelled gas near the SS-25 well pad and alerted SoCalGas personnel. SoCalGas personnel were quickly dispatched to the site to investigate the source of the odor. At the time, SS-25 was injecting gas into the underground gas reservoir. SoCalGas personnel immediately stopped injection by closing the wellhead valves. However, SoCalGas personnel could still hear gas moving through the assembly. The personnel reported the unusual observation to a SoCalGas drilling manager, who instructed his drilling crew to mobilize the necessary equipment to stop the flow of gas from the reservoir, or “kill” the well. SoCalGas crews mobilized resources, including wireline trucks, pump trucks, and vacuum trucks, which were on site or mobilized to the facility.

Top well kills (also referred throughout this testimony as “well kills”) are common procedures at natural gas storage fields. They are performed when a well is suspected of having a leak, and also more commonly to kill a well for purposes of a workover in connection with conducting routine inspections and maintenance activities. To perform a well kill, weighted fluid (typically a brine solution) is pumped down the well. As the fluid fills the wellbore, the weight of the fluid overcomes the pressure of the gas being pushed up from the reservoir. When the downward force of the fluid weight, known as a hydrostatic head, balances the upward force of the pressurized gas, the well becomes isolated from the reservoir and stops any flowing gas, and the well is “killed.” Well kills are typically performed by pumping fluid into a well’s tubing, which is the smaller steel pipe within the well’s production casing that extends from the surface to nearly the depth of the reservoir. During a tubing kill procedure, fluid is pumped down the tubing, then exits through ports in the bottom of the tubing into the production casing, just above the reservoir depth.

On October 24, 2015, SoCalGas conducted a tubing kill on SS-25. While the tubing kill was occurring, the tubing pressure began to increase rapidly, indicating a possible blockage in the tubing at a relatively shallow depth. Accordingly, the tubing kill attempt was aborted, and SoCalGas then attempted to pump fluid directly into the annular space between the production casing and tubing to bypass the potential tubing blockage. This operation also failed to stop the leak. While executing that procedure, SoCalGas observed fractures in the earth spreading out from the wellhead, and additional gas flow was noted through the cracks in the ground. SoCalGas personnel immediately shut down the well kill attempt and evacuated to a safe area.

Based on the outcome of the initial well kill attempt, SoCalGas determined it would require the assistance of specialized well control experts.[1] On Saturday October 24, 2015 SoCalGas contacted Boots & Coots to evaluate SS-25 and assist with the well control operation. Boots & Coots is among the world's foremost well control specialists and emergency well responders. Boots & Coots is particularly well known in the oil and gas industry for extinguishing several hundred oil well fires intentionally set by Iraqi soldiers during the Persian Gulf War. SoCalGas provided Boots & Coots personnel with information regarding the SS-25 well and the pending situation before they traveled so they were familiar with the well design on arrival and prepared to take action. Boots & Coots' team arrived from their headquarters in Texas the following day, October 25th, to evaluate SS-25 and develop a plan to control the well.

III. SOCALGAS SAFELY AND PRUDENTLY MANAGED THE LEAK RESPONSE.

Facilitating the well kill efforts required the procurement, coordination, and management of numerous activities, materials, and people. These needs evolved over time, and SoCalGas undertook tremendous efforts under these extraordinary circumstances.

SoCalGas officers were engaged immediately and were present throughout the incident to provide leadership and oversight. The personal involvement of the highest levels of SoCalGas management provided safety oversight, expertise, support, and resources. Executive leadership established safety as the paramount consideration in all activities related to the leak response.

A. Institution of Formal Emergency Response System.

On October 31, 2015, SoCalGas executive leadership instituted a formal emergency response system to enable effective, timely, and efficient management of the response to the leak. This system was staffed with executives and senior personnel. Later, SoCalGas converted this system to an incident command system ("ICS") to provide a common organizational

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[1] To the best of my knowledge and based on my experience in gas storage operations at SoCalGas, well control efforts by "top kill" are typically successful in controlling leaking wells. SoCalGas employs personnel who are equipped to perform routine well kills. On rare occasions, however, SoCalGas must engage well control specialists when it encounters a well control issue that presents a unique challenge. To my knowledge, SoCalGas has required the assistance of a well control specialist on only one prior occasion that occurred in the 1970s. However, unlike the SS-25 leak, that incident involved a failure of surface piping near the wellhead, not a below-ground leak in the production casing.

structure modelled after FEMA's Incident Command System to manage all aspects of the incident response.[2] Through the ICS, SoCalGas centralized processes for responding to the incident, identified individual responsibilities, and established a dedicated team with authority and resources to address the leak response. Throughout SoCalGas' incident response, there was significant and regular engagement by regulatory agencies, local, state and federal elected officials, and first responders. The ICS established uniform communication standards and coordinated interagency and interdepartmental cooperation. The ICS held several daily meetings to coordinate activities and keep regulators and other agencies and officials informed of activities and status. SoCalGas held daily safety meetings with those on site to discuss site conditions and safety considerations, and held separate daily morning briefings with various governmental authorities, including: Los Angeles County Fire, Los Angeles County Department of Health, Los Angeles City Fire, California Office of Emergency Services, South Coast Air Quality Management District ("SCAQMD"), Environmental Protection Agency Region 9, Department of Transportation Pipeline and Hazardous Materials Safety Administration, and others to discuss the work planned for the day. SoCalGas provided regular updates to a wide range of agency and elected officials such as California Air Resources Board, City and County of Los Angeles, and former Governor Brown's Office. SoCalGas engaged in regular and detailed discussions with our regulators, first responders, and elected officials to promote safety, transparency, and understanding of SoCalGas' undertakings.

SoCalGas later formed a Unified Command with Los Angeles County Fire Department and Los Angeles County Department of Public Health to help manage the response to the incident. Each morning the Unified Command held a meeting to update agencies, first responders, and contractor personnel on the occurrences at the facility, with subsequent meetings held throughout the day.

B. <u>Safe Management of Operations Across the Aliso Canyon Facility</u>.

SoCalGas' foremost concern was to safely manage the Aliso Canyon field and the activities conducted there so that each person who arrived at the site also left the site safely. The leak response involved an unprecedented level of activity at the site, with hundreds of

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[2] ICS is an approach to incident management that provides an integrated organizational structure designed to better enable a multi-level emergency response.

contractors, regulators, agency personnel, and other public officials coming and going on a daily basis, often with equipment and supplies.

i. Maintaining Site Safety.

In order to promote site safety, SoCalGas established restricted areas, site security and safety protocols, and evacuation plans. Its efforts entailed deploying appropriate safety and security personnel on site and in the surrounding community. This included engaging private security, paramedics, and fire control services. A certified industrial hygienist was engaged to oversee multiple safety and health representatives to continuously monitor gas at certain designated areas and periodically check gas levels at other areas near the SS-25 well site. Security personnel established multiple security checkpoints within the facility and restricted and controlled access to various points throughout the storage field, including the SS-25 site. As an extra level of precaution, SoCalGas constructed a helicopter pad to enable rapid emergency response.

Newly Constructed Helipad

These measures promoted the safety of employees, contractors, regulatory agency personnel, and first responders who arrived at the site to assist with and monitor well control efforts.

ii. Managing Access to the Well Site.

The Aliso Canyon storage facility is located on approximately 3,600 acres in the Santa Susana mountains. There is only one main road within the facility, with the remaining terrain largely rugged. Wells are located throughout the facility and can be miles away from the entrance gate at elevations exceeding 3,300 feet. The SS-25 well pad site is relatively small and located at the end of a narrow road at the top of a large hill, about one mile from the entrance gate at an elevation of about 2,920 feet. Due to the narrow one-way roads and many locations of single vehicle passage throughout the field, and to promote safety and avoid disturbing and damaging the fauna living outside the roadway, the speed limit on internal roads is 15 miles per hour.[3] These conditions make moving personnel and equipment around the site challenging.

The Aliso Canyon Facility

The leak response resulted in a significant and regular presence of regulatory agency personnel, state and federal elected officials, and first responders, and brought hundreds of people to the storage facility.[4] For example, DOGGR, SCAQMD, and Los Angeles County Fire Department and other first responder representatives were regularly on site and assisting with the incident. DOGGR's presence was significant, as the agency with the most operational expertise, and included reviewing several of the well kill plans prior to the work being performed.

SoCalGas retained traffic control specialists and implemented traffic control operations to maintain safety and manage significant traffic loads, including emergency response vehicles and

[3] SoCalGas is not the only operator within this location – there are two unaffiliated oil companies that also work within the boundaries of the Aliso Canyon area and share the same roads.

[4] Well control efforts were also impacted when regulators or officials visited the site. Separately, on at least one occasion, work was impacted when a plane performed an unauthorized fly-over and flew too close to the leaking well, creating an additional safety risk.

heavy well kill and relief well equipment over rugged terrain. In addition to facilitating safe access to the well site, SoCalGas undertook efforts to provide work areas to stage equipment and hold daily morning meetings to discuss site conditions and plan the daily activities for hundreds of workers, including first responders and agency representatives. Office trailers and parking lots were installed for use by emergency responders, governmental agencies, and operations personnel. They were installed incrementally because, as the well control efforts continued longer than expected, additional regulators, agencies, and officials came to the site, requiring increasing accommodations. Cellular capabilities in the remote area were limited, so SoCalGas built out additional communication infrastructure, including running fiber optic cables to key points around the facility.

iii. Challenging Weather Conditions.

SoCalGas' foremost consideration was to maintain the safety of the site and on-site personnel. Weather conditions, which were generally rainy, cold, and windy, presented additional challenges that had to be overcome. As the storage facility is in the mountains, it is prone to extreme weather conditions, particularly in the late autumn and winter months. Wind gusts in the area made conditions challenging, with windspeeds regularly reaching 60-70 miles per hour, and on some days being as high as 90 miles per hour.

In addition to the wind, on-site personnel contended with rain and heavy fog that impacted site safety, stability, and visibility. One particular rainfall necessitated bringing 1,000 sandbags to the SS-25 well site in one day in order to mitigate the impacts of the rain and allow continued work. When rain was anticipated, SoCalGas took steps to reduce erosion, address road and site stability, and install sandbags and catch-basins to prevent water influx into the area immediately around SS-25 and water discharge off the site.

By my best estimate, these weather conditions caused the delay or cessation of well control operations at the site on 38 days of the 111-day period. However, even while active well kill efforts were suspended, ancillary activities and planning continued. Additionally, work on the relief well continued 24 hours a day, 7 days a week, provided conditions were safe for such operations.

iv. Mitigation Efforts.

Also during the pendency of the leak, SoCalGas took reasonable and prudent action to implement other measures to reduce leak impacts and comply with the requests of regulators.

SoCalGas ceased injection into the Aliso Canyon storage facility and initiated withdrawals to lower reservoir pressure to support well kill efforts and reduce the amount of gas released.

At the direction of regulators, SoCalGas considered whether Aliso Canyon inventory could be more expeditiously reduced by flaring or venting; however, it was determined that site and safety factors undermined the reasonableness of pursuing either. SoCalGas also submitted a Proposed Methane Mitigation Measures Plan to the SCAQMD which explored blending a food-grade biodegradable odor suppressant ("ODEX") to mist in the immediate vicinity of the SS-25 well site; after demonstrating the misting at SoCalGas' Pico Rivera facility, however, SCAQMD conveyed it would not issue a permit for its use. SoCalGas engaged experts, prepared engineering drawings, obtained incinerators, began fabricating piping, and worked with regulators on gas capture opportunities; however, these efforts were abandoned because of the risk of ignition. CNG trailers were also considered to capture gas, but were determined not to be viable due to the possibility of oxygen entrainment in the gas stream, the complexity of multiple stages of compression, horsepower requirements, and pipeline capacity.

IV. SOCALGAS REASONABLY AND PRUDENTLY MANAGED ITS WELL KILL EXPERT AND OVERSAW THE WELL KILLS.

SoCalGas' priority was to safely and quickly kill the leaking well. To this end, SoCalGas engaged and oversaw Boots & Coots and other on-site contractors with specialized and technical expertise.[5] SoCalGas' management of the well kill operation, based on what was known to it at the time, was reasonable and prudent: SoCalGas maintained a safe site, engaged contractors with demonstrated expertise, provided necessary information, reviewed Boots & Coots' well kill plans, and engaged with regulators on proposed facility and well control activities.

A. Well Control Operations Could Only Proceed After Appropriate Safety Measures.

The foremost concern during a gas leak is the risk of ignition due to the presence of methane. As a result, adherence to safety protocols is paramount, even if it delays operations.

SoCalGas implemented affirmative on-site safety measures to control the risk of ignition at the leaking well pad, including eliminating ignition sources such as vehicle engines, cell phones, cameras, and other electronic equipment. SoCalGas also managed and timed operations

[5] During the incident, SoCalGas oversaw and managed numerous contractors, with approximately 15-20 independent contractors working on SS-25 alone, to provide trucking services, wireline services, well kill services, vacuum trucks, pump trucks, cranes, safety services, etc.

activities to mitigate safety and ignition risks. While these efforts successfully minimized ignition sources and enhanced safety, they also created time consuming work processes and resulted in necessary delays.

Each day, a health and safety specialist assessed the well site before work began and monitored gas concentrations throughout the day to determine if safety risk (i.e., explosive levels) had been exceeded and work should be delayed. For all operations on the SS-25 well pad, work was limited to daylight hours for safety reasons. When daily well kill operations were complete, provided safety allowed, personnel would prepare for the next work day. At the end of each work day, the site was swept to confirm all personnel had left and overnight conditions were safe.

Even when conditions were deemed safe enough to conduct operations, all work had to be undertaken with extreme caution. Equipment that posed an ignition risk could not be used when gas concentrations were too high, which delayed work. For example, SoCalGas and contractor personnel would remove equipment at the end of the workday to mitigate ignition risk and secure the site, only to have to transport and reassemble the equipment back at the site the next day. Another example: when a wireline truck was required for diagnostic work, personnel had to carefully move the truck on site, install a lubricator to feed the wireline downhole, and transport and erect a crane to set the lubricator and run the wireline through the lubricator. This process was precise and methodical and, as a result, preparation for well site work could take half the day or longer, and could only be pursued if sufficient time remained after these activities to conduct the operation during daylight hours.

With this focus on safety, SoCalGas and Boots & Coots completed multiple well kill attempts.

B. Initial Assessment (October 25, 2015 – November 6, 2015).

Boots & Coots spent its first days on site evaluating the downhole blockage, determining that the blockage was a hydrate, and working to clear the hydrate, while minimizing ignition risk, in order to allow it to proceed with the well kill attempt.

On October 25, 2015, Boots & Coots began assessing SS-25 and determined that the obstruction in the SS-25 tubing was a hydrate. Boots & Coots further determined that the hydrate should be cleared so that additional diagnostic testing could be conducted by lowering sensors and other measurement tools through the tubing and so a well kill attempt could be undertaken through the tubing.

Procuring the necessary equipment to clear the hydrate was a logistical and regulatory challenge. On October 29, 2015, Boots & Coots advised that the best tool for clearing the hydrate was a specialized piece of heavy machinery known as a coiled tubing unit that has the capability to snake a flexible tubing tool down the length of tubing. Coiled tubing units typically operate with internal combustion engines. That was not a viable option at the SS-25 well site because of ignition risk. Even an electricity-powered coiled tubing unit would need to be designed in such a way as to eliminate any possibility of ignition, e.g., by insulating electrical connections. Boots & Coots was able to locate a specialized unit with the necessary specifications and safety features in Louisiana.

Transporting the unit from Louisiana to the SS-25 site at Aliso Canyon was challenging. Shipping the unit across state lines required special permits that had to be obtained from the California Governor's office on an expedited basis. Moving the large unit through the winding roads at Aliso Canyon to the SS-25 site was also extremely difficult and dangerous work—the SS-25 wellhead is located on a small ridgeline, and the site itself has little room for large equipment. Finally, because of the specialized nature of the equipment and work, it required an additional permit from DOGGR.

Coiled Tubing Unit on SS-25 Well Site

Crane on SS-25 Well Site

The process of procuring the specialized coiled tubing unit to clear the hydrate was time-consuming but essential. On November 1, 2015 (nine days after the leak was discovered and seven days after Boots & Coots arrived on site), the specialized coiled tubing unit arrived at Aliso Canyon. On November 4, 2015, the DOGGR permit to operate the unit was received, and on November 6, 2015, Boots & Coots used the coiled tubing unit to successfully clear the hydrate from the SS-25 tubing.

While Boots & Coots was preparing to clear the hydrate, SoCalGas performed other activities around the field to prepare for the commencement of the well kill operation. SoCalGas killed the other wells on the well pad, SS-25A and SS-25B (and covered them with fire shields to protect them), performed barholes and gas leak surveys throughout the field to further investigate the leak,[6] and performed a site stability assessment around the well site to confirm the safety of the slopes surrounding SS-25. SoCalGas also began preparing the relief well (discussed further below) and continued to procure resources and perform tasks needed to support the well kill operation, including additional wireline trucks, cranes, pump trucks, and associated personnel and materials to hold on standby and to support future operations.

[6] Due to the unusual nature of the incident, additional data was attempted to be obtained with respect to the location and extent of the damage to SS-25 to help inform the well kill. The exact depth and size of the damage to SS-25 was unknown throughout the 111 days of the leak and did not become apparent until the well was killed and operations were performed during the Root Cause Analysis by Blade Energy Partners.

C. **Sequential Top Kill Attempts (November 7, 2015 – December 22, 2015).**

From November 7, 2015 through December 22, 2015, Boots & Coots implemented six well kill attempts on SS-25 (while the relief well was planned, spudded, and underway). During this period, the nature of the leak appeared to change, as did the conditions at the site. While the incident and site changed, SoCalGas' primary objective remained the same–to safely kill the well.

SoCalGas consulted with Boots & Coots and provided input in the development and review of well kill plans, along with various agencies and other outside experts and consultants, including additional well control specialists who were retained and the Department of Energy's National Laboratories. Throughout this process, SoCalGas reasonably relied on Boots & Coots' (and others') considerable experience and specialized expertise with complex well kill operations.

After the hydrate was removed on November 6, 2015, Boots & Coots was able to perform additional testing with diagnostic equipment, including temperature and noise tests through the tubing, to assess the conditions in the well. These tests identified the presence of cooling and temperature anomalies, which could be indications of locations of casing damage along the upper portion of the well casing. The cooling zones in the casing complicated and constrained well kill options because the introduction of fluid into the well could cause the formation of another hydrate.

While Boots & Coots was diagnosing SS-25, SoCalGas continued to provide oversight and support. On November 11, 2015, in order to decrease the pressure in the reservoir and potentially enhance the ability to conduct a successful well kill attempt, SoCalGas purposefully began withdrawing gas from the field (even before either the CPUC or DOGGR directed SoCalGas to do so).[7]

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[7] SoCalGas reduced the flow from the SS-25 leak immediately following discovery of the leak by ceasing to inject gas into the well, then ceased Aliso Canyon field injections altogether; and subsequently began to aggressively withdraw gas from the facility on November 11, 2015 to draw down the gas stored in the facility and decrease the pressure in the field and the velocity of gas flowing through the SS-25 leak. SoCalGas prioritized the use of gas from the Aliso Canyon facility to supply customer demand and, as a result, withdrew natural gas from the field at higher rates than typical for that time of year and weather conditions. This withdrawal effort reduced the amount of gas that was released into the air. SoCalGas ceased these withdrawals when SoCalGas received a letter on or about January 21, 2016 from the CPUC directing SoCalGas to maintain 15 billion cubic feet of natural gas in the Aliso Canyon storage facility due to reliability concerns.

The weather complicated the kill attempts and delayed several days of activity during well kills 2-7. The extremely high wind conditions noted in Section II, in combination with gas emitted from the leak, could elevate ignition risks associated with operating equipment and pose safety risks while operating the cranes and wirelines necessary to perform diagnostic work on the well. In addition to the wind, on-site personnel had to contend with rain and heavy fog that impacted site stability, visibility, and safety, as noted in Section II.

On November 13, 2015, Boots & Coots executed its first kill attempt through the coil tubing unit (the second kill attempt overall), but the operation did not stop the flow of gas up the well. Fluid pumped into the well appeared to escape into the surrounding subsurface formation and fluid appeared at the surface of the well pad rather than remaining in the wellbore, where it could build sufficient weight to counterbalance the upward force of the gas.

After two days of further planning and diagnostic work, on November 15, 2015, Boots & Coots conducted the third overall well kill attempt at SS-25, which was also unsuccessful in stopping the flow of gas up the well. During this third well kill attempt, kill fluid began returning to the surface through the soil, and a crater began forming around the SS-25 wellhead. The crater around the wellhead introduced new complications in planning and carrying out subsequent well kill attempts. Personnel could no longer easily access the wellhead, and the heavy equipment that is typically used in such operations could not be placed near the wellhead due to the instability of the soil. The crater increased the difficulty and danger involved in well control activities and required additional precautions to maintain safety. In order to keep the area safe and workable, SoCalGas took action to manage the fluid discharge once it reached the surface with on site vacuum trucks and pumps.

Subsequent well kill attempts were made on November 18, 2015, November 24, 2015, and November 25, 2015. With each successive kill attempt, the crater expanded in both width and depth. Following each kill attempt, Boots & Coots performed diagnostic work to understand and assess the well. Weather continued to create challenges, with wind conditions hampering or delaying activities and creating unsafe site conditions that had to be mitigated. A pumping location was constructed away from SS-25 to avoid further delays related to weather and methane levels exhibited at SS-25, which included installation of piping down from the SS-1 well site located typically upwind from SS-25. Additionally, SoCalGas designed and constructed (with Boots & Coots) a bridge to span the crater, help manage fluid discharge, allow easier and safe access to the wellhead, and help stabilize the wellhead, which had moved during the kill attempts. The bridge was engineered, constructed, moved onto the location, and maintained in a particular manner not only to facilitate future well kill and mitigation efforts but also to comply with unforeseen requirements imposed by OSHA, which added to the time and complexity needed to complete this task.

On December 22, 2015, Boots & Coots, with the assistance of the additional well kill experts and the National Laboratories, conducted the seventh top well kill attempt. The kill attempt was, again, unsuccessful. At this point, given the wellhead and site conditions, and the size of the crater around Well SS-25, we had safety concerns about proceeding with any further top kill attempts. After discussions and collaboration with Boots & Coots, other experts and consultants, and the various agencies involved in overseeing efforts to control the well, SoCalGas made the decision to cease further top kill attempts at SS-25 due to safety concerns. SoCalGas transitioned all its efforts to the relief well and potential leak mitigation measures.

V. SOCALGAS REASONABLY AND PRUDENTLY PLANNED AND PREPARED A RELIEF WELL TO STOP THE LEAK (OCTOBER 25, 2015 – FEBRUARY 18, 2016).

SoCalGas' approach to the leak was diversified.[8] Even in the earliest stages, SoCalGas worked on parallel tracks to develop contingency plans in the event top kill efforts were unsuccessful. On October 25, 2015—two days after the leak was discovered—SoCalGas directed drilling rig operators who had just finished drilling a separate well at the field to keep the workover rig on site, rather than demobilizing the rig and removing it from Aliso Canyon, in case it was needed to drill a relief well to stop the SS-25 leak. Ultimately, it was this rig that was used to drill the relief well that successfully killed the SS-25 leak. SoCalGas also held additional crews and equipment (including wirelines, cranes, and bulldozing equipment for site preparation) on standby to avoid any delay. By having maintained the correct resources and capabilities on site, SoCalGas was able to start drilling the relief well quickly.

[8] Each well kill attempt was expected to control the well. Nevertheless, even while top kill efforts were proceeding and the relief wells were being pursued, SoCalGas was considering other alternatives in the event that both relief wells and top kill efforts were not effective: (a) pumping operations from SS-25; (b) using coiled tubing to kill the well from the surface; (c) engaging in surface intervention with a snubbing unit; and (d) continuing withdrawal from the field as needed until the well leak stopped from fluid loading.

SoCalGas started considering a relief well (e.g., re-drilling wells to intersect SS-25 and identifying well sites for relief wells) in late October. SoCalGas later worked with a contractor team on two relief wells—one primary and one backup. The relief wells were arranged to be drilled near the SS-25 site at an appropriate distance and location. These wells would intercept the SS-25 wellbore at the depth of the reservoir and then pump drilling mud through the relief well to kill the well below ground near the bottom of the well bore—a "bottom kill." The second relief well was intended be used only in the event the first relief well was not successful.

Detailed site planning for Relief Well 1 began in early November 2015. The relief well needed to be sited at a location with certain specific characteristics to navigate the other wells intersecting the facility and to intercept SS-25 while maintaining a safe distance from SS-25 to avoid safety risks. Locating an appropriate spot on the surface to drill the relief well was time-consuming and challenging because (1) Aliso Canyon's hilly terrain limits where a drilling rig can be accommodated, (2) the relief well would need to be sited close enough to SS-25 to intercept the damaged well, but not so close as to raise safety concerns, and (3) the path of the relief well would need to account for Aliso Canyon's complex subsurface geology, including the presence of many other underground wells.

Furthermore, it takes time to plan and drill relief wells. A relief well is a complex and challenging process. Drilling a relief well requires extreme precision, as the drill bit must intercept the rounded side of the leaking casing on a target area the size of the side of a dinner plate, more than 8,000 feet below the surface of the earth. Drilling a relief well proceeds in incremental steps because drilling and identifying the proximity of the drill bit in a three-dimensional space can occur neither simultaneously nor quickly. Instead, the drilling tool must be pulled out of the hole so that ranging equipment can be run in its place; then, once the precise location of the drill bit is known, the ranging equipment is removed, the drill bit is re-inserted, and it can proceed slightly further; and the process is repeated many times over.

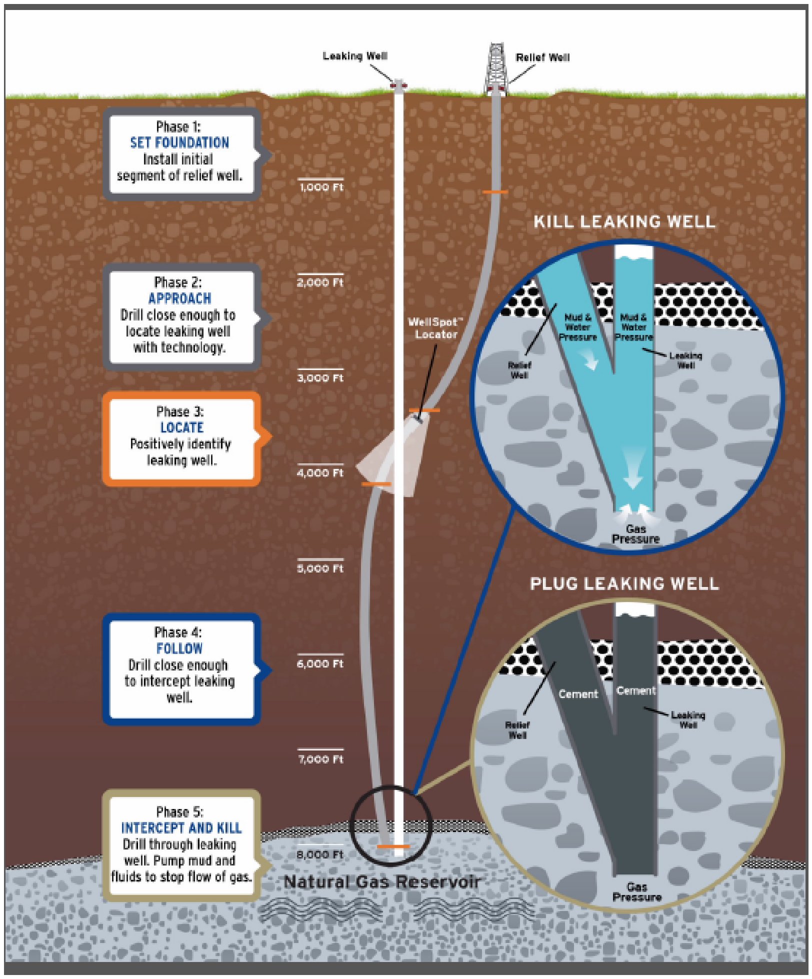
After a site for the first relief well had been selected, on November 17, 2015, two days after the third well kill attempt, SoCalGas filed a Notice of Intention with DOGGR to drill a relief well. In anticipation of DOGGR's approval, SoCalGas directed Boots & Coots to dispatch relief well personnel to Aliso Canyon. Boots & Coots' relief well personnel arrived at Aliso Canyon to review directional data and prepare a specific drilling plan. On November 23, 2015, SoCalGas received a permit from DOGGR to drill relief well P-39A. Two days later, Boots &

Coots presented its relief well drill plan. SoCalGas built a well pad (approximately 1,500 feet from SS-25), which entailed grading, compaction, and leveling to support the weight of the rig. From November 30 through December 3, SoCalGas, Boots & Coots, and other contractors moved and erected the drilling rig on to the newly built well site, installed the conductor needed to drill the hole, and began final preparation to start drilling the relief well.

Initial drilling rig setup, spudding, cementing activities, and logging runs occurred between December 3 and December 14, 2015. On December 4, 2015 SoCalGas began drilling Relief Well 1. The relief well operation included the drilling, running, and cementing of the surface casing. After that, efforts began to drill to the depth of approximately 8,600 feet and set a second string of casing. From December 15 to December 21, 2015, Boots & Coots and other contractors drilled to approximately 3,800 feet, where they installed intermediate casing. From December 22, 2015 to January 16, 2016, numerous "ranging" runs occurred to determine the geo-spatial position of the well and to make sure no other underground wells were intersected during the process.[9] From January 17 to February 10, 2016, when the relief well was approximately 600 feet from the interception point and the drilling approached the interception point, the number of "ranging" runs increased as it is necessary for the trajectory of the well to be within very tight parameters for an appropriate intercept.

[9] A ranging run is a necessary but time-consuming process. For each ranging run, we had to "trip in" and "trip out," which means we would remove the drill string from the hole and then lower the drill string back to the hole bottom. This was a prerequisite step so we could measure the amount of progress made, run any diagnostic tools to understand location and orientation (this entailed attempting to run a gyro tool down SS-25 and nearby SS-25B), and then decide how to proceed to intersect SS-25 safely and accurately at the appropriate angle and depth. As a result of this unavoidable process, a ranging run could take an entire day. As the relief well got closer to its target, the drilling work slowed as more precision was required to avoid intercepting the well too early, drifting away from the target, or hitting other well bores. Twenty-nine separate ranging runs were undertaken as part of the relief well interception effort. See Exhibit 1.

The relief well process is depicted below.



Throughout this timeframe, and following cessation of top well kill attempts, SoCalGas worked to monitor and maintain the SS-25 well site and make the site ready for intervention and the bottom kill. Boots & Coots continued to run diagnostic tools in SS-25 to prepare for the bottom kill. SoCalGas continued to work to manage site risks, including managing erosion and site and soil stability. SoCalGas also secured the SS-25 wellhead, cleaned and maintained the site, and installed piping in preparation for the intercept and bottom kill.

While work was proceeding on Relief Well 1, SoCalGas began grading and site preparation for the second relief well as an additional contingency. Relief Well 2 also faced siting constraints and required the procurement of a specialized drilling rig.

On February 10, 2016, Relief Well 1 successfully made a "soft touch" on the SS-25 wellbore at a depth of approximately 8,600 feet underground. The next day, after 69 days of drilling, performing ranging runs, and analyzing data, Relief Well 1 intercepted and brought the leak in SS-25 under control by pumping heavy fluids directly into the bottom of SS-25's wellbore. At this time, DOGGR declared the well temporarily killed.

From February 12, 2016 through February 15, 2016, Boots & Coots pumped cement from Relief Well 1 into SS-25 to plug the well. In addition, wireline logging of SS-25 was conducted to validate the well had been killed and sufficient depth of cement was placed at the base of SS-25 to permanently seal the well. At this time, Relief Well 2 was in the initial stages of commencing drilling, but work was stopped with the successful intercept and killing of SS-25 by Relief Well 1.

On February 18, 2016, DOGGR certified that Well SS-25 was permanently sealed.

VI. CONCLUSION.

The SS-25 leak required a coordinated and careful response to safely kill the leaking well. SoCalGas dedicated senior leadership and resources at the site and responded reasonably and prudently to this event. SoCalGas worked as quickly as possible to kill the well while maintaining safety, identified alternative options to kill the well, and ultimately killed the well without ignition or significant injuries. Because of the multiple complexities involved in the well kill operations—the need to safely clear the hydrate, the inability to understand complexities of a leak occurring below the surface, the significant safety risk associated with weather, ground instability, and other conditions, and the ultimate need to drill a relief well—the well control operations reasonably took 111 days to be completed safely and successfully. Throughout the incident, based on the information known to it at the time, SoCalGas reasonably and prudently endeavored to identify options to kill the well expeditiously, and ultimately killed the well within a reasonable time.

WITNESS QUALIFICATIONS

My name is Rodger R. Schwecke. My business address is 555 West Fifth Street, Los Angeles, California 90013-1011.

I am the Senior Vice President of Gas Operations and Construction for Southern California Gas Company and San Diego Gas & Electric. In that capacity, I am responsible for overseeing overall gas system operations and construction projects. I served as the incident operations commander leading efforts surrounding the Aliso Canyon SS-25 gas leak. My duties included overseeing the Aliso Canyon facility's compliance with all directives of DOGGR and CPUC.

From October 2017 to April 2019, I served as Senior Vice President of Gas Transmission and Storage. In that role, I was responsible for overseeing transmission and storage operations.

Prior to that, from March 2017 to October 2017, I served as Senior Vice President of Gas Transmission, Storage, and System Operations. In that role, I was responsible for overseeing transmission and storage and overall system operations.

From 2012 to 2016, I served as Vice President of Customer Solutions. In that role, I oversaw major customer-related activities for SoCalGas, including account executives, customer communications and e-services. I was also responsible for customer programs promoting energy efficiency, sustainability, low-income assistance and the development of new emerging technologies, including clean transportation, distributed energy, in-home services and biofuels.

From 2010 through 2012, I was Director of Storage, managing underground storage field operations that support the daily and seasonal operational flexibility for the gas transmission and distribution system for SoCalGas. Prior to that position, I was Director of Energy Markets and Capacity Products from 2007 to 2010. In that role, I led the development, marketing, and capacity planning for products and services using existing pipeline and storage assets, developing regulatory cases involving those assets, and exploring expansion of the assets. Prior to 2007, I served in increasingly responsible management positions in business development, operations, marketing, engineering and project management for SoCalGas and Sempra Energy affiliates.

I graduated in 1983 from California State University, Long Beach, with a Bachelor of Science in Chemical Engineering.

I have previously testified before the California Public Utilities Commission, State of Maine Utilities Commission, and the North Carolina Utilities Commission.

CHAPTER II
PREPARED OPENING TESTIMONY OF RODGER SCHWECKE

EXHIBIT 1

Ranging	Phase	Relief Well Ranging Dep		Target Well Deptl		Horizontal Plane Approximi				High Side to Targe		Survey Shift		Note
Run		MD, ft	TVD, ft	MD, ft	TVD, ft	C-to-C Disance, ft	Uncertainty, ft	Azimuth, °	Uncertainty, °	Azimuth, °	Uncertainty, °	N, ft	E, ft	
1	Detection	3765.00	3330.86	3642.96	3643.10	19.0	+/- 10	314.0	+/- 15	-18.17	+/- 15	-3.55	34.39	
2	Follow	3848.00	3413.63	3725.80	3725.70	10.8	+/- 5	316.0	+/- 15	-50.70	+/- 15	-6.44	35.91	
3	Follow	3948.50	3514.00	3826.26	3826.10	10.4	+/- 3	298.8	+/- 15	298.80	+/- 15	-4.96	34.97	
4	Follow	4100.00	3664.82	3977.69	3976.91	12.0	+/- 3	273.1	+/- 12	-165.90	+/- 15	-4.97	35.04	
5	Follow	4180.00	3744.36	4057.34	4056.45	13.0	+/- 3	267.0	+/- 15	177.90	+/- 15	-5.88	34.77	
6	Follow	4480.00	4043.40	4358.00	4355.49	9.8	+/- 3	211.8	+/- 15	130.20	+/- 15	-5.69	35.13	
7	Follow	4858.60	4421.10	4736.90	4733.19	14.9	+4 / -3	177.5	+/- 15	103.20	+/- 15	-6.42	36.47	
8	Follow	5367.00	4928.75	5244.78	5240.84	18.4	+/- 5	213.5	+/- 15	136.10	+/- 15	-5.90	34.81	
9	Follow	5881.00	5442.37	5758.41	5754.46	22.0	+/- 5	231.5	+/- 15	127.50	+/- 15	-5.79	34.85	
10	Follow	6592.00	6153.00	6469.50	6465.17	22.0	+/- 5	267.5	+/- 15	126.30	+/- 15	-5.79	34.85	
11	Follow	7077.00	6637.86	6954.30	6949.95	17.5	+8 / -4	280.7	+/- 15	79.20	+/- 15	-5.81	34.86	
12	Alignment	7598.00	7158.61	7475.30	7470.70	8.7	+4 / -2	294.5	+/- 15	NA	NA	-5.80	34.82	Near estimate
						~~26.0~~	~~+/-5~~	~~290.5~~	~~+/-15~~	~~NA~~	~~NA~~	~~-3.01~~	~~34.26~~	Far estimate
13	Alignment	7707.00	7267.55	8493.00	8481.04	5.1	+2 / -1	280.5	+/- 15	NA	NA	-5.71	34.78	Near estimate
						~~23.4~~	~~+/-5~~	~~287.2~~	~~+/-15~~	~~NA~~	~~NA~~	~~-3.01~~	~~34.20~~	Far estimate
14	Alignment	7797.00	7357.41	7674.20	7669.50	3.2	+/- 5	275.0	+/- 15	13.90	+/- 15	-5.50	34.44	
15	Alignment	7857.00	7417.39	7734.30	7729.48	2.4	+/- 0.4	247.9	+/- 15	-9.10	+/- 15	-5.68	34.72	
16	Alignment	7947.60	7507.98	7825.00	7820.07	4.8	+/- 1.0	212.0	+/- 15	-16.70	+/- 15	-0.15	7.61	Ran gyro in SS 25
17	Alignment	8067.00	7627.12	7944.30	7939.21	6.8	+/- 1.5	210.5	+/- 15	28.30	+/- 15	-1.11	7.32	
18	Alignment	8157.00	7716.20	8034.35	8028.29	4.8	+/- 1.0	196.5	+/- 15	22.30	+/- 15	-1.27	7.46	
19	Alignment	8237.00	7795.51	8114.40	8107.60	5.2	+/- 1.0	168.0	+/- 15	-12.50	+/- 15	-1.20	7.52	
20	Alignment	8337.00	7894.14	8214.30	8206.23	5.1	+/- 1.0	142.5	+/- 12	-28.80	+/- 12	-1.28	7.92	
21	Alignment	8400.00	7956.17	8277.10	8268.26	4.2	+/- 0.8	152.0	+/- 12	-5.90	+/- 12	-1.34	7.99	
22	Alignment	8447.80	8003.27	8326.50	8315.27	4.2	+/- 0.8	156.3	+/- 12	-12.10	+/- 12	-1.49	8.14	
23	Alignment	8499.20	8053.60	8376.50	8366.38	2.7	+/- 0.5	152.6	+/- 10	-10.60	+/- 10	-1.51	8.21	2.0' Projected E-to-E Distance
24	Alignment	8529.20	8083.10	8406.50	8395.89	2.5	+/- 0.5	157.0	+/- 10	-4.00	+/- 10	-1.56	8.13	1.8' Projected E-to-E Distance
25	Alignment	8559.20	8112.58	8436.50	8424.58	1.90	+/- 0.3	166.0	+/- 10	7.10	+/- 10	-1.33	8.18	1.2' Projected E-to-E Distance
26	Alignment	8584.20	8137.13	8461.50	8449.92	1.65	+/- 0.25	162.5	+/- 10	-3.70	+/- 10	-1.37	8.16	11.8" Projected E-to-E Distance
27	Alignment	8599.20	8151.83	8476.50	8464.62	1.20	+/- 0.20	161.5	+/- 10	-1.20	+/- 10	-1.30	8.13	6.5" Projected E-to-E Distance
28	Alignment	8610.00	8162.41	8486.50	8474.41	0.85	+/- 0.10	158.5	+/- 10	-5.60	+/- 10	-1.28	8.10	2.8" Projected E-to-E Distance
29	Final Alignment	8615.20	8167.50	8492.50	8479.50	0.65	+/- 0.05	155.0	+/- 10	-8.50	+/- 10	-1.26	8.11	Final Alignment

Exhibit 1