CALIFORNIA PUBLIC UTILITIES COMMISSION
Safety and Enforcement Division
Gas Safety and Reliability Branch
Gas Engineering and Compliance Section

Incident Investigation Report

Report Date: 05/29/2024

Incident Number: G 20220607-3387

Utility: Southern California Gas SoCalGas

Date and Time of the Incident: 6/7/2022, 9:35:00 AM

Location of the Incident: [redacted] TELEGRAPH RD
Commerce ,CA
County: Los Angeles

Summary of Incident:

On June 7, 2022, at approximately 0918 hours, a SoCalGas 12.75-inch steel high pressure distribution pipeline Supply Line (SL 30-02) ruptured at [redacted] Telegraph Road, Commerce in Los Angeles County resulting in damage to the supply line and a service interruption. There were no injuries, fatalities, fire, or third-party property damage. The incident was initially CPUC reportable due to media coverage but became both DOT and CPUC reportable due to the cost of repairs exceeding $122,000. SED's investigation found that the rupture was caused by the SoCalGas' SL 30-02 suffering from an overpressure event in an encased segment of pipe compromised by long term near-neutral stress corrosion cracking (SCC). In total, approximately 11.26 miles of distribution main and services feeding 103 customers were impacted by the incident. SED's investigation also found that the overpressure event was caused by liquid intrusion into pressure regulators at an upstream District Regulating Station (DRS) ID6589P due to shifted liquids from its Transmission Line 2000's In-Line Inspection/pigging operations. Therefore, SED finds SoCalGas in violation of General Order 112-F, Reference Title 49 Code of Federal Regulations (CFR), Part 192, §192.605(a) for failing to prepare an adequate written procedure/plan to prevent liquid intrusion into its distribution pipeline prior to its In-Line Inspection on its transmission pipeline.

In addition, SED also found that SoCalGas had not assessed an encased segment of its SL 30-02 since installation in 1952. The segment subsequently developed some

near-neutral pH stress corrosion cracks and eventually ruptured in the incident. In order to prevent reoccurrence of a similar incident, SED requests SoCalGas to develop an adequate plan to assess and mitigate all SoCalGas' pipelines that have similar pipeline characteristics and operating conditions. SoCalGas should include, at a minimum, the distribution pipeline segments which were affected by the overpressure event on June 7, 2022.

Casualties: ***Fatalities:*** 0 ***Injuries:*** 0

Property Damage: $414,142.00

Utility Facilities involved:

Pipe Material = Steel, Pipe Size = 12.75 (inches), MAOP = 125 (psi), Operating Pressure = 121 (psi)

Witnesses:

	Name	*Title*	*Phone*
1	Gordon Huang	CPUC Investigator	N/A
2	[redacted]	Watch Desk Specialist, SoC	(213) 244-3070
3	[redacted]	PSCA, SoCalGas	(310) 970-4854
4	[redacted]	PSC Manager, SoCalGas	(213) 671-1344
5	[redacted]	M&R Team Lead, SoCalGas	
6	[redacted]	PSCA, SoCalGas	(818) 618-2564
7	[redacted]	PSCA, SoCalGas	(978) 719-3485
8	[redacted]		(626) 893-4536
9	[redacted]	IM Construction Manager, S	
10	[redacted]	Director, SoCalGas	
11	[redacted]	Technical Consultant, Baker	

Evidence:

	Source	*Description*
1	[redacted]	Initial Report on 6/7/2022
2	[redacted]	Responses to SED data requests on 6/7/2022

[redacted]	Site investigation questions on 6/8/2022
4 [redacted]	Site investigation questions on 6/8/2022
5 [redacted]	Site investigation questions on 6/8/2022
6 [redacted]	Initial CPUC 420 Report on 6/8/2022
7 [redacted]	Responses to SED data requests on 6/9/2022
8 [redacted]	Responses to SED data requests on 6/10/2022
9 [redacted]	Responses to SED data requests on 6/22/2022
10 [redacted]	Responses to SED data requests on 6/24/2022
11 [redacted]	Interview on 6/29/2022
12 [redacted]	DOT 7100 Report on 7/7/2022
13 [redacted]	Responses to SED data requests on 7/13/2022
14 [redacted]	Responses to SED data requests on 7/19/2022
15 [redacted]	Supplemental DOT 7100 Report on 8/5/2022
16 [redacted]	Responses to SED data requests on 9/8/2022
17 [redacted]	Responses to SED data requests on 11/8/2022
18 [redacted]	Responses to SED data requests on 2/6/2023
19 [redacted]	Responses to SED data requests on 2/13/2023
20 [redacted]	Responses to SED data requests on 5/13/2023
21 [redacted]	Responses to SED data requests on 8/18/2023
22 [redacted]	Interview on 10/31/2023

Observations and Findings:

On June 7, 2022, at approximately 0918 hours, a SoCalGas 12.75-inch steel high-pressure distribution pipeline Supply Line (SL 30-02) ruptured at [redacted] Telegraph Road, Commerce in Los Angeles County resulting in damage to the supply line and a service interruption to approximately 103 customers for 49.4 hours. There were no injuries, fatalities, fire, or third-party property damage. The incident was initially CPUC reportable due to media coverage but became both DOT and CPUC reportable due to the cost of repairs exceeding $122,000. The DOT incident number is 1338079.

This incident involved SoCalGas' 26-inch transmission Line 2000 Phase 6 (L2000 P6) and high-pressure distribution pipeline Supply Line (SL) 30-02. Installed in 1952, L2000 P6 runs northwest from Santa Fe Springs Station towards Spence Street Station. L2000 P6 has several connection points with SoCalGas' natural gas distribution pipeline system in Commerce, including at Spence Street District Regulator Station (DRS) ID6589P and DRS ID2085A at [redacted] Telegraph Road. SL 30-02 was installed in 1952 and composed of 12.75-inches diameter by 0.250-inches wall thickness API 5L Grade B steel with a low frequency electric resistance welded (LF ERW) longitudinal seam. SL 30-02 had a maximum allowable operating pressure (MAOP) and maximum operating pressure (MOP) of 125 psig at the time of the incident.

On June 7, 2022, at 0900 hours, SoCalGas' field personnel and their contractors were on standby for the receipt of the ILI tool (known as a "pig" in the industry) at Spence Street station. SoCalGas received the pig shortly after in the temporary ILI receiver at Spence Street Station and prepared to retrieve the pig from the receiver barrel. At approximately 0918 hours, SL 30-02 ruptured at [redacted] Telegraph Road in Commerce near DRS ID2085B.

SoCalGas initially notified the California Public Utilities Commission's Safety Enforcement Division (SED) at 1313 hours on June 7, 2022 due to media coverage of the incident and a possible overpressure of SL 30-02. SoCalGas determined at 1707 hours that the recovery costs could potentially exceed $122,000 per Title 49 Code of Federal Regulations (CFR) §191.3. Accordingly, SoCalGas later notified the National Response Center (NRC# 1338079) at 1753 hours.

On June 7, 2022, at 1844 hours, [redacted] of SoCalGas confirmed the gas leak was under control via upstream valve actuation at 1535 hours. As a result, approximately 140 services (including 8 high priority commercial customers) remained offline as of 1600 hours. SoCalGas' personnel from the Belvedere distribution district, Juanita M&R distribution district, contractor, and surrounding distribution districts' personnel were rallied for the recovery efforts. To coordinate efforts, SoCalGas deployed an incident command center trailer at the incident site and corporate security to secure the area.

On June 8, 2022, SED arrived at the incident site at 0700 hours and began its field investigation. While on-site, SED met with SoCalGas representatives [redacted]

[redacted]. According to [redacted], SoCalGas' director for Distribution Operations and Construction, excavation had begun shortly after the incident to expose the ruptured pipeline segment for recovery and replacement. Due to the depth of the pipeline, shoring was installed to prevent collapse of the surrounding soil when excavation was in progress. As excavation continued, SoCalGas, and its contractors SE Pipeline, TechCorr, and Akri Hydrotest were preparing weld caps and production welding for the cut out and eventual replacement of the damaged section of SL 30-02. SED verified TechCorr and Akri Hydrotest personnel's operator qualifications on-site were current and valid. SoCalGas' M&R technicians were also on-site and performed an inspection of the pressure regulating equipment for DRS ID2085B. SoCalGas M&R supervisor, [redacted]. explained that similar inspections were being performed at other DRSs along SL 30-02 to diagnose any equipment affected by the overpressure. [redacted] also mentioned that the DRS ID6589P at Spence Station had been found with liquid clogging up the station equipment and required extensive cleaning and replacements. SoCalGas later submitted its CPUC 420 initial form confirming no injuries, fatalities, fire, or third-party property damage were caused by the incident. SoCalGas estimated 200 customers were impacted by the system outage at the time.

On June 10, 2022, SED visited the incident site again with SoCalGas representatives [redacted] and [redacted]. SED observed the exposed casing and pipeline section removal and retrieval from in situ. The recovered pipeline segment where the failure occurred exhibited a fish mouth rupture (~ 31.5-inches by 1.5-inches around the 4 or 8 o'clock position) typically associated with overpressure failures. Per SoCalGas, the pipe appeared to previously have coal tar coating which degraded over time. The recovered casing did not show any signs of damage from the exterior. SoCalGas later sent the recovered pipeline and casing segments to SoCalGas' Engineering Analysis Center's (EAC) Pico lab for storage before transferring to another facility for engineering analysis and testing. SED observed the pipeline recovery, loading, custody transfer, and transportation process with no issues (sling replacement, Form 4002 typo) noted. SoCalGas' correspondence later that day reported approximately 59,455 feet (~11.26 miles) of main and services were impacted by the overpressure. All affected services were restored as of June 9, 2022.

On June 29, 2022, SED interviewed several members of SoCalGas' departments and field personnel # 66904, #59560, and #55853. M&R technicians #66904 and #59560 did not notice any issues or abnormal operating conditions (AOCs) while monitoring their shut-in DRS ID 2085A during the June 7, 2022 ILI run. They heard downstream SL 30-02 rupture behind them, near DRS ID2085B, and observed natural gas blowing loudly into the atmosphere. However, they continued to see no pressure changes on their gauges.

According to SoCalGas' Construction Manager (CM) #55853, prior to the incident, SoCalGas had installed a temporary In-Line Inspection (ILI) receiver station at Spence Street station which had both permanent gas transmission and gas

distribution pipeline in the area. L2000 is physically connected to DRS ID6589P at Spence Street Station where it feeds downstream to SL 30-02. Approximately 5 miles southeast from Spence Street Station, DRS ID2085A similarly connects L2000 to SL 30-02 at [redacted] Telegraph Road, Commerce.

In addition, CM #55853 also stated that SoCalGas had planned to conduct an ILI run with specialized tools in its 26-inch cathodically protected steel natural gas transmission line, L2000. This ILI run was part of a phased inspection as part of SoCalGas' regular integrity management compliance activities for its transmission system. The project details had been reviewed by SoCalGas' Integrity Management workgroup and local stakeholder departments including its internal Gas Transmission, Gas Distribution District M&R, and Gas Engineering departments. The workplan, "PIGGING PROCEDURE (TIMP) LINE 2000 P6 In-Line Inspection (ILI) RA", was approved by all departments on June 3, 2022 following several project planning meetings. On June 6, 2022, SoCalGas and its contractors (Rosen, Diamond Edge) conducted a preliminary test run with a cleaning pig in preparation for the next day's activities. This test run was completed without any abnormalities.

During a separate interview that day with SoCalGas Integrity Management Construction Manager (CM) #55853, SED learned the CM was at the Spence Station pig receiver station monitoring the receipt point on the incident date. They believed that several planning meetings involving Engineering, M&R, Transmission, Distribution, and other departments had reviewed and approved the pigging procedure prior to the project start. Their role on the incident date was to oversee the ILI receipt and help coordinate with other SoCalGas teams for the project. They noted no leaks, excessive fluid, abnormal operating pressures, or other AOCs during the pig run and receipt. Following receipt at 0900 hours, the receiver crew began valve operations. At approximately 0905 hours (5 minutes after receipt) on June 7, 2022, they received a call regarding high pressure alarms and halted receiver valve operations. They spoke to their coordination team and learned that DRS ID6589P was leaking downstream. After evacuating the area, they coordinated with Distribution and Transmission departments to throttle downstream pipeline pressures to Distribution MAOP via Transmission 10" tap valve 765-12.36-4 at Spence Street. The situation was handled after a few minutes of valve operation and pigging operations were paused for several hours before continuing with retrieval after it was determined to be safe. Per the CM, there was some, but not a large amount of solid and liquid debris during pig recovery. However, the CM had heard that M&R found a significant amount of debris clogged in DRS ID6589P's components. In their closing remarks, the CM noted that the tap valve had been observed to be in the open position prior to the incident. In retrospect, the CM believed that the tap valve should have been shut-in or isolated which could have prevented liquid from entering the DRS ID6589P thus overpressure event to SL 30-02.

Between June 2022 through August 2023, SoCalGas provided written responses, maps, compliance records, program documents, and other supporting documentation for SED's investigation. SoCalGas submitted its final PHMSA Form F 7100.1 on August 5, 2022 which revised the number of affected customers to 103. SED's investigation found that the encased segment of SL 30-02 where the rupture occurred had not been replaced since its initial installation in 1952 nor had it been exposed. SL 30-02 had three leaks prior to the incident, but only one leak in 2016 was detected in the immediate vicinity in the past for a valve stem leak. SL 30-02 did not have a history of other AOCs. The involved segment did not have cathodic protection installed prior to the incident and pipe-to-soil readings were not taken for the segment. As a result, SoCalGas was not aware of any coating or material conditions for the involved segment prior to the incident. A component manifest for the failed DRS ID6589P listed Mooney Flowgrid Regulators "4" MOONEY FG-FLANGD-300". Based on its position numbers and regulator function codes per SoCalGas' Gas Standard (GS) 184.0195 – Regulator Control Piping And Settings, DRS ID6589P was in a parallel monitor upstream – service downstream configuration. SoCalGas confirmed that field employees were submitted for drug & alcohol testing per 49 CFR §199.105(b) with no issues found. The alarm data log for Electronic Pressure Monitoring (EPM) gauge 43281 upstream of the rupture site corroborated with SoCalGas' and interviewee's accounts with an increase in pressure between 0905 hours to 0919 hours from a nominal pressure of 121 psig to a maximum of 223.58 psig. SoCalGas clarified in a later data request response that the highest recorded pressure during the overpressure event was 299 psig.

Through repeated data requests, SED learned that SoCalGas had made a logistical oversight during the planning stages for pigging operations. The Pipeline Integrity Management planning team had originally misidentified the 10" tap valve 765-12.36-4 to be in the closed position. Liquid mitigation planning proceeded without incorporating the 10" tap valve. Following an interdepartmental SoCalGas planning meeting on May 24, 2022, the decision was made to leave the 10" tap valve open to maintain feed in Gas Pressure Zone (GPZ) 3023. However, SoCalGas failed to revise its Request for Engineering Review (RER) document RER-22-1317 for liquid mitigation planning with the changed 10" tap valve position. At the time of the incident, there was no written procedure or process requiring SoCalGas to consider liquid mitigation planning for in-line inspections. Since the incident, SoCalGas has revised its pigging procedure to include a liquid mitigation plan under RER-22-2459 and RER-22-2463.

On July 13, 2022, SoCalGas and Det Norske Veritas (DNV) signed a contract authorizing DNV to conduct a metallurgical analysis of the recovered pipeline segments. Between August 31, 2022, September 2, 2022, September 8, 2022, September 13 to 16, 2022, October 14, 2022, and September 24, 2022, SED remotely observed DNV's metallurgical analysis protocol for various segments of recovered pipeline such as sample preparation, impact testing, and scanning electron microscopy. No significant deviations from the testing protocol agreement were observed. On November 22, 2022, DNV published its Final Report stating

that a colony of axial, near-neutral pH stress corrosion cracks (SCC) compromised the wall thickness (90.8% maximum flaw depth) such that the failure pressure calculated by DNV was reduced to 289 psig. DNV concluded that it was "consistent with the reported failure pressure of 299 psig". DNV also noted two aspects of this failure were atypical of other instances of SCC-related failures: its low operating stress (>10% SMYS) and failure in a casing. SoCalGas provided DNV's Final Report to SED on February 6, 2023.

After several previous attempts, SED spoke with [redacted] of Baker Hughes on October 31, 2023. Baker Hughes is the manufacturer of the Mooney regulators used at DRS ID6589P. [redacted] is their technical support representative regarding regulator function and knowledgeable of fluid flow mechanics in regulators. [redacted] stated multiphase flows (simultaneous fluid phase flow, i.e., gas & liquid) would cause regulator diaphragm issues. In addition, if the pilot became clogged by high viscosity liquid or debris, it could potentially impair the regulator diaphragm's functionality and ability to control pressure. Depending on flow factors (flow regime, diameter, density, fluid velocity) liquid slugs could cause a compressive force leading to transient pressure surges, pipeline bulging, or a shut-in.

Following the incident, SoCalGas replaced or cleaned out DRS ID6589P components impacted by the liquid intrusion. In addition, SoCalGas installed a temporary filter separator to support pigging operations for L2000 and noted no issues since then. Permanent repair via abandonment to the failed segment of SL 30-02 was completed as of June 9, 2022 (LRO# 520003072055) and subsequent cylindrical pipe replacement as of June 23, 2022. SoCalGas also opened additional internal review into pipeline integrity for impacted segments of SL 30-02 for future testing and replacement under RER-22-3459.

G.O, 112-F, Reference Title 49 of Code of Federal Regulation (CFR), Part 192, §192.605(a) states in part:

"General. Each operator shall prepare and follow for each pipeline, a manual of written procedures for conducting operations and maintenance activities and for emergency response. For transmission lines, the manual must also include procedures for handling abnormal operations. This manual must be reviewed and updated by the operator at intervals not exceeding 15 months, but at least one each calendar year. This manual must be prepared before operations of a pipeline system commence. Appropriate parts of the manual must be kept at locations where operations and maintenance activities are conducted."

SED found SoCalGas in violation of General Order (G.O.) 112-F, Reference Title 49 Code of Federal Regulation, part 192, Section 192.605(a) for failing to prepare an adequate written procedure/plan to prevent liquid intrusion into its distribution pipeline prior to its ILI run on its transmission pipeline.

In addition, SED also found that SoCalGas had not assessed an encased segment of its SL 30-02 since installation in 1952. The segment developed some near-neutral pH stress corrosion cracks and eventually ruptured in the incident. In order to prevent reoccurrence of a similar incident, SED requests SoCalGas to develop an adequate plan to assess and mitigate all SoCalGas' pipelines that have similar pipeline characteristics and operating conditions. SoCalGas should include, at a minimum, the distribution pipeline segments which were affected by the overpressure event on June 7, 2022.

Preliminary Statement of Pertinent General Order, Public Utilities Code Requirements, and/or Federal Requirements:

	General Order	*GO Rule*
1	GO112F	§192.937(c)(1)(i)
2	GO112F	§192.605(a)
3	GO112F	§192.493
4	GO112F	§192.615

Conclusion:

Based on the investigation, SED found that the pipeline rupture was caused by SoCalGas' high pressure distribution pipeline, Supply Line 30-02, suffering from an overpressure event in an encased segment of pipe compromised by long term near-neutral stress corrosion cracking (SCC). In total, approximately 11.26 miles of distribution main and services feeding 103 customers were impacted by the incident. SED's investigation also found that the overpressure event was caused by liquid intrusion into pressure regulators at an upstream District Regulating Station (DRS) ID6589P due to shifted liquids from its Transmission Line 2000's In-Line Inspection (ILI)/pigging operations. Therefore, SED finds SoCalGas in violation of General Order 112-F, Reference Title 49 Code of Federal Regulations (CFR), Part 192, §192.605(a) for failing to prepare an adequate written procedure/plan to prevent liquid intrusion into its distribution pipeline prior to its ILI run on its transmission pipeline.

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