



Line 3001-01 in Lafayette

Risks and Risk Mitigation and Controls

September 4, 2019

Line 3001-01 Overview

Distribution Feeder Main (DFM) 3001-01 connects to Line 191-1 at Reliez Station Road Regulator Station and flows gas from Line 191-1 to distribution centers that feed gas to homes and businesses in parts of Lafayette and Moraga. Figure 1 below shows the location of Line 3001-01 within Lafayette. Line 3001-01 is predominantly 12 inches in diameter and operates at a Maximum Allowable Operating Pressure (MAOP) of 170 psig. The section of Line 3001-01 within Lafayette is approximately 2.8 miles long.

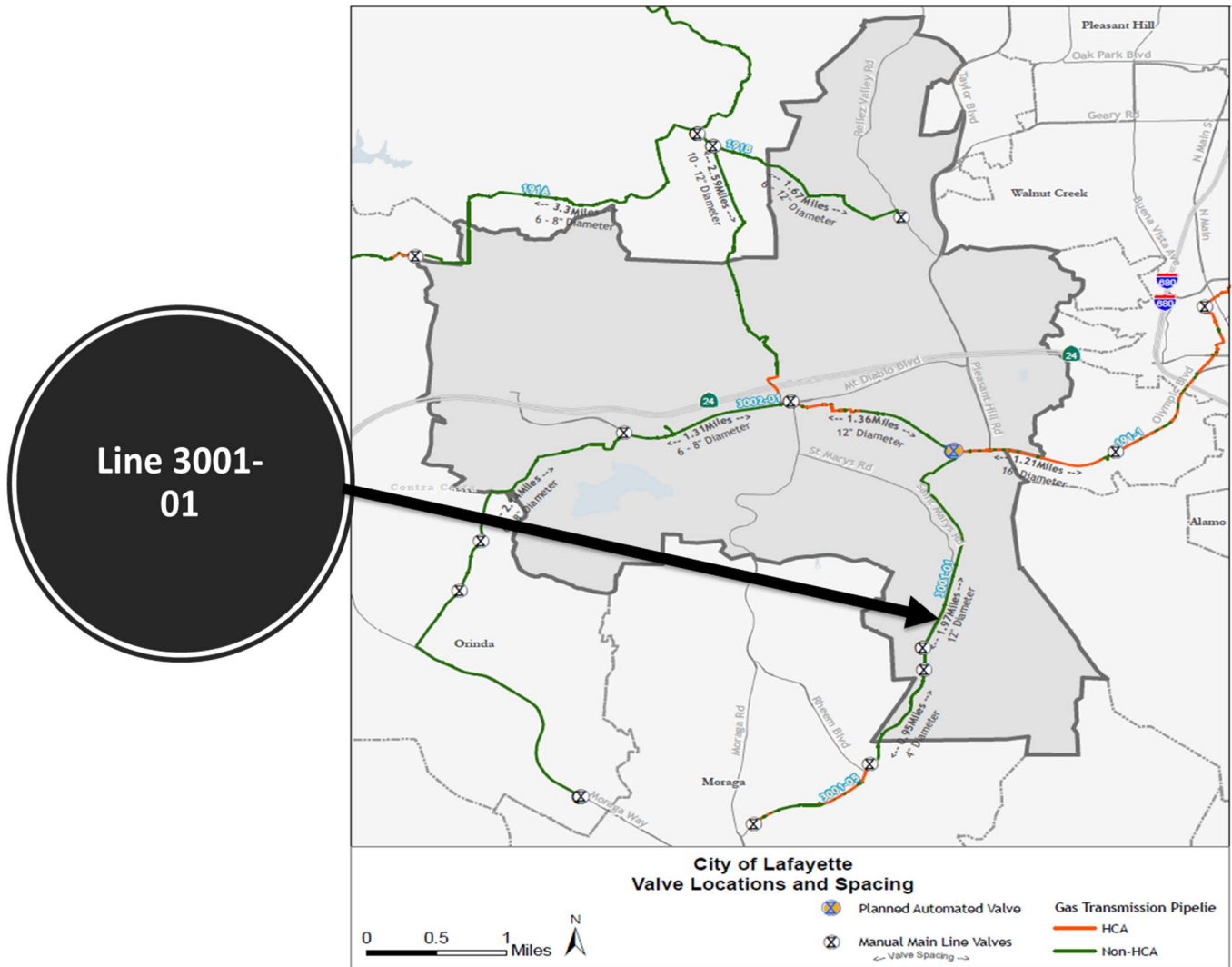


Figure 1. Location of Line 3001-01 within Lafayette.

Pipeline Safety Risks on Line 3001-01 in Lafayette

PG&E aligns its threat analysis with that of the industry standard, ASME B31.8S, which breaks threats into three major groupings of Time-Dependent, Stable or Resident, and Time Independent threats. Within those major groupings are a total of nine threat categories of external corrosion, internal corrosion, stress corrosion cracking, manufacturing related defects (manufacturing), welding/fabrication defects (construction), equipment, third party/mechanical damage (third party), incorrect operation, and weather-related and outside force (WROF).

PG&E applies a risk algorithm to determine the likelihood of failure (LOF) for each of these threats along its pipeline system. The LOF is calculated using a length weighted average with units of significant incidents (SIF) per mile-year. Figure 2 below shows the relative weighting of LOF's for each of the nine threat categories for the portion of Line 3001-01 in Lafayette. The top risks in Lafayette are external corrosion, WROF, and third party damage.

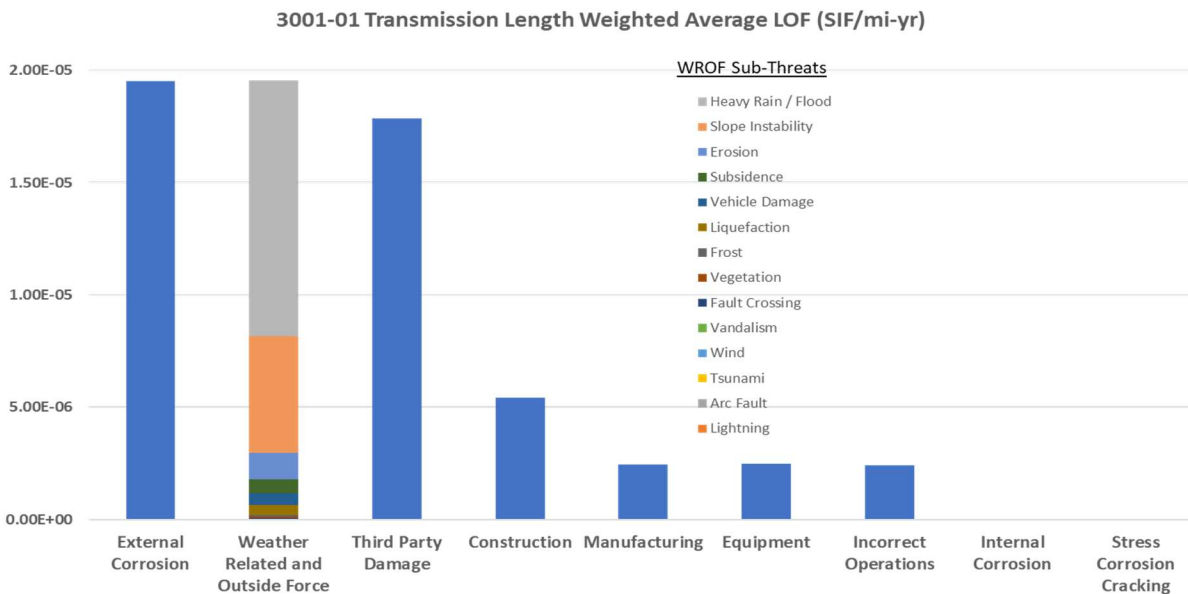


Figure 2. Likelihood of Failure (LOF) for Line 3001-01 within Lafayette.

How Pipeline Safety Risk Reduction Programs Align with Threats

PG&E has multiple programs and processes that address the nine threat categories in different ways. The chart in Table 1 below shows those key programs that are targeted at pipeline safety risk reduction on Line 3001-01. The large green dots signify the primary threats that a program is targeting. The small blue dots signify that there are other threats that are addressed by the program but are not the primary pipeline safety threats that the program is meant to target. The greyed boxes signify that the program does not normally address these threats.

Table 1. Key programs that are targeted at pipeline safety risk reduction and risk control on Line 3001-01 within Lafayette.

	Loss of Containment Threats									Emergency Response	System Reliability
	External Corrosion	Weather Related and Outside Force Damage	Third Party Damage	Construction	Manufacturing	Equipment	Incorrect Operations	Internal Corrosion	Stress Corrosion Cracking		
Key Risk Mitigation Programs Associated with Line 3001-01											
Vintage Pipe Replacement	•	●	•	●	•			•	•		•
Capacity Upgrade	•	•	•	•	•			•	•		●
Valve Automation										●	•
Station Rebuilds	•			•	•	●	●	•	•	•	•
In Line Inspections (Traditional and Non-Traditional)	●	•	•	•	●			●	●		•
Direct Assessments	●	•	•	•	•			●	●		•
Hydrostatic Testing - Pipe Lacking TVC Record of a Test	●		•	●	●	•	•	●	●		•
Hydrostatic Testing - Integrity Management Assessment	●		•	●	●	•	•	●	●		•
Earthquake Fault Crossings		●								●	•
Geo-Hazard Threat Identification and Mitigation		●		•							•
Shallow and Exposed Pipe	•	●	•	•	•			•	•		•
AC Interference (Arc Fault Investigations)	●										•
Close Interval Survey	●		•								•
Key Preventative Maintenance Programs Associated with Line 3001-01											
Pipeline Patrols	•	●	●	•	•	•	•	•	•	•	•
Locate and Mark (811 line locates)			●								•
Leak Surveys and Repairs	●	●	●	●	●	●	•	●	●		•
Cathodic Protection Test Point Readings	●							•			•
Valves Safety and Reliability						●				●	•
Community Pipeline Safety Initiative (CPSI)	•	●	•	•				•		●	•
Other Pipeline Safety and Reliability Pipe Replacements	●	●	●	●	●			●	●		•

Key Preventative Maintenance Programs Associated with Line 3001-01

PG&E has a comprehensive inspection, maintenance and monitoring program to ensure the longevity and safe operation of its natural gas transmission pipeline system. The key preventative and corrective maintenance programs associated with pipeline safety on Line 3001-01 include those listed in Table 2 below. Please note, this is not a comprehensive list of all routine preventative and corrective maintenance done on Line 3001-01. Other programs or routine preventative and maintenance activities that influence pipeline safety risk reduction or controls may also include, for example, gas quality assessment, station over pressure protection enhancements, atmospheric corrosion inspections, locate and mark (811), routine pipeline maintenance, right-of-way maintenance, and SCADA reliability and network improvements, to name a few.

Table 2. Key preventative and corrective maintenance programs associated with pipeline safety on Line 3001-01 within Lafayette.

Key Preventative Maintenance Programs Associated with Line 3001-01		
Pipeline Safety Risk Reduction Programs	Risk Reduction Objectives for Time Period	Frequency
Pipeline Patrols	Identify construction activity and other factors affecting pipeline safety and operation	At least Quarterly
Leak Surveys	Identify leaks	Semi-annually
Cathodic Protection Test Point Readings	Identify and correct locations of low cathodic protection levels, which indicates the potential for external corrosion	Annually
CP System Rectifier Verifications and Maintenance	Verify rectifiers operating properly and correct as necessary	Bi-monthly
Valves Safety and Reliability	Inspect isolation valves and remove or replace inoperable or hard-to-operate valves or leaking valves, as necessary as a result of inspection findings.	Annual Inspections <i>(removed 3 valves in 2018)</i>
Other Pipeline Safety and Reliability Pipe Replacements	Replace pipe due to leaks, dig-ins, corrosion integrity issues, overbuilds and encroachments, and other pipeline safety and reliability issues as these issues arise.	As needed

Key Risk Mitigation Programs Associated with Line 3001-01 within Lafayette

In addition to routine preventative and corrective maintenance, PG&E also has programs that produce planned projects that are targeted at reducing specific risks. Table 3 below lists PG&E's completed projects between 2016 and 2018 and planned projects between 2019 and 2021 for targeted risk reduction in Lafayette on Line 3001-01. Please note that the planned projects are based on current plans and current assessment of risks. Project plans may be subject to change due to a range of factors (e.g. permitting, material availability, availability of new technologies, outcomes of PG&E's Gas Transmission & Storage Rate Case, changes in risk factors, etc.). In addition, in the event that any of these programs discover a condition that

may affect pipeline safety, unplanned, emergent work may be necessary to remedy the condition.

Table 3. Key Risk Mitigation Programs/Projects Associated with Line 3001-01 within Lafayette (2016-2021)

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Pipeline Safety Risk Reduction Programs	Risk Reduction Objectives for Time Period	Lafayette Project or O&M Program	Year Completed or Planned (2016-2021)
Capacity Upgrade	Increase reliability when demand growth may constrain capacity.	Replace approximately 1 mile between South Lucile Lane and Rheem Boulevard	2018
		Replace approximately 450 feet at St. Marys Road between South Lucille Lane and Rohrer Drive and 2nd Street and Golden Gate Way	2019
Vintage Pipe Replacement	Replace vintage fabrication/construction threat locations that interact with high land movement risk areas, and are in close proximity to people.	Being completed as part of Capacity Upgrade projects above.	2018 and 2019
Close Interval Survey (CIS)	Identify the lowest levels of CP between test points, providing increased confidence that the readings obtained at test stations reflect conditions along the pipeline.	CIS Line 3001-01	2019
Valve Automation	Enhance emergency response in the event of a gas transmission pipeline rupture.	Automate Valve at Reliez Station Road Regulator Station (valve on Line 191-1 feed, Olympic Boulevard and Reliez Valley Road)	2020
Station Rebuilds	Mitigate equipment related threats related to age and obsolescence, maintenance difficulties, configuration, and liquid and debris impacts on equipment operation	Reliez Station Road Regulation Station Rebuild	2020
AC Interference (Arc Fault Investigations)	Assess the potential for fault currents from electric assets in close proximity to gas pipelines to cause AC interference with the cathodic protection system.	Investigate 2 power poles for potential arc fault on Line 3001-01	2021

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Pipeline Safety Risk Reduction Programs	Risk Reduction Objectives for Time Period	Lafayette Project or O&M Program	Year Completed or Planned (2016-2021)
Non-Traditional In Line Inspections	Assess threats in each of the threat groupings in ASME B31.8S by using non-traditional ILI technologies for HCAs in the top two thirds of Likelihood of Failure (LOF).	<i>None in this time period - all in lower third of LOF</i>	Beyond 2021
Direct Assessments	Identify and assess time dependent threats, including external corrosion, internal corrosion and SCC, when ILI or hydrostatic testing is not feasible, with primary assessment focus within an HCAs.	ECDA in HCAs	Beyond 2021, Before 2026
Hydrostatic Testing for Pipe Lacking TVC Record of a Test	Strength test to assure a margin of safety for those gas transmission pipelines that lack a documented strength test record that is traceable, verifiable or complete (TVC), with primary focus on pipe that is in HCA and Class 3 and 4, non-HCA locations.	Strength test approximately 2 miles <i>(MAOP met through pipe design records, with all but one joint with a prior test higher than MAOP - after capacity upgrade projects completion, the length to be tested will reduce by approximately 0.7 miles)</i>	Beyond 2021, Before 2026
Hydrostatic Testing for Integrity Management Assessment	Validate the integrity of pipe that is located in HCAs, Class 3 and 4, non-HCA for manufacturing threats and/or stress corrosion cracking.	<i>Assessment via Hydrostatic Testing for Pipe Lacking TVC Record of a Test Program</i>	Beyond 2021, Before 2026
Earthquake Fault Crossings	Mitigates the risk posed by earthquakes and land movement caused by seismic activity.	<i>None - no active earthquake fault crossings in Lafayette - continue to monitor for changes</i>	Monitoring
Geo-Hazard Threat Identification and Mitigation	Identification and mitigation of elevated risk due to landslides, subsidence, and erosion.	<i>None - no elevated risk locations - continue to monitor for changes</i>	Monitoring
Shallow and Exposed Pipe	Identify, prioritize, and mitigate shallow/exposed pipe in HCAs or Class 3 or 4 locations where shallow or exposed due to natural forces and is in agricultural area or navigable water way or there is evidence of third-party damage (TPD).	<i>None - continue to monitor for changes</i>	Monitoring

Table 3. Key Risk Mitigation Programs/Projects Associated with Line 3001-01 within Lafayette (2016 - 2021)			
Pipeline Safety Risk Reduction Programs	Risk Reduction Objectives for Time Period	Lafayette Project or O&M Program	Year Completed or Planned (2016-2021)
Traditional In Line Inspection Upgrades and Inspections	Assess threats in each of the threat groupings in ASME B31.8S for pipe that is in generally in populated areas and operates greater than 20% SMYS, by using different traditional ILI technologies in lines with flows and pressures that can accommodate a traditional ILI tool.	<i>Not applicable - Low pressures</i>	Not Applicable
Community Pipeline Safety Initiative	Remove trees or structures that pose a safety risk to the pipeline	Remove 31 trees along Line 3001-01	As soon as possible