

CALIFORNIA PUBLIC UTILITIES COMMISSION

**Safety and Enforcement Division
Gas Safety and Reliability Branch**

Incident Investigation Report

Report Date: 06/23/2021

Investigator: Jason R. McMillan

Incident Number: G20210127-3173

Utility: Pacific Gas and Electric Company (PG&E)

Date and Time of the Incident: 01/27/2021, 0950 hours

Location of Incident: [REDACTED] Lakeview Drive, Carmichael, Sacramento County

Summary of Incident: On January 27, 2021, during a severe thunderstorm a gas leak which occurred at [REDACTED] Lakeview Drive in Carmichael migrated into the wall of the home and ignited. The explosion caused damage to the interior of the house, but the house was left standing. Although the precise cause of the leak and source of ignition are unknown, a small hole was found on the steel service line which exhibited signs of an electric arc damage. SED did not find any evidence of violation on the part of PG&E.

Fatality/Injury: None.

Property Damage: PG&E estimates the damage to their facilities is \$50,000. Damage to the customer's home was \$71,988.

Utility Facilities Involved: 3/4-inch steel distribution service line (50 psi MAOP).

Witnesses/Person(s) Involved:

[REDACTED] Gas Safety Representative; PG&E

[REDACTED], Regulatory Compliance; PG&E

[REDACTED], Field Service Supervisor; PG&E

██████████, Field Service Supervisor; PG&E

██████████, Engineer; Exponent Inc.

██████████, homeowner, and resident.

Evidence:

Photographs of Incident Scene taken by Jason McMillan of California Public Utilities Commission; January 27, 2021.

CPUC File No. 420 Final filed 08/16/2017; ██████████ of PG&E; February 24, 2021.

PHMSA 7100 Incident Report numbered 20210024- 34914; PG&E; February 25, 2021.

Examination Protocol for Incident Service Line Pipe and Riser Collected at ██████████ Lakeview Dr, Carmichael, CA 95608 on 1/27/2021; Exponent Inc.; February 22, 2021

Incident Report: Carmichael, California, Gas Event; Exponent Inc.; April 2021

Root Cause Evaluation: Lakeview Drive Carmichael Incident; PG&E; Undated

Leak Repair, Inspection, Gas Quarterly Incident Report (A-Form): Leak# 120469081; February 18, 2021

SMUD reports outages affecting thousands during storm; Fox 40 Web Desk; January 27, 2021; <https://fox40.com/news/smud-reports-outages-affecting-thousands-during-storm/>

SMUD [@SMUDUpdates]. "Crews are working to restore power to about 6,000 customers largely impacting the Florin and Carmichael areas. Thank you for your patience as we work to restore power safely and quickly..." *Twitter*, January 26, 2021. <https://twitter.com/SMUDUpdates/status/1354266325108068352>

SMUD [@SMUDUpdates]. "Mother nature is dealing us a rough hand tonight. ~50K customers out of power right now. We've got all hands on deck to restore power as quickly and safely as possible...." *Twitter*, January 26, 2021. <https://twitter.com/SMUDUpdates/status/1354295680295178241>

SMUD [@SMUDUpdates]. "Last night's storm caused wide-spread damage throughout our service area and we're working with all hands on deck to restore your power. We

now have ~106K customers impacted...” *Twitter*, January 27, 2021.

<https://twitter.com/SMUDUpdates/status/1354421069856256001>

SMUD [@SMUDUpdates]. “Here’s why. We have 388 current outages. Some fixes are quick and restore power to thousands and others can be a full-day job that impact a few customers. Once we get to the site and assess the damage, we can give an accurate restoration time for each outage.” *Twitter*, January 28, 2021.

<https://twitter.com/SMUDUpdates/status/1354959646759391233>

Email from [REDACTED]. [EXTERNAL] Re: Gas Incident January 27, 2021., September 15, 2021.

Observations and Preliminary Findings: The Safety and Enforcement Division (SED) visited the incident site at [REDACTED] Lakeview Drive, Carmichael On 01/27/2021 at approximately 1430 hours. It was raining and very windy that day. The electric utilities in the neighborhood were down because on the night prior a tree limb had contacted overhead powerlines approximately two blocks from the incident site.

When SED arrived, they observed that a PG&E crew had shut the gas service to the house at the curb valve, had excavated the service line adjacent to the home and the service tee at the curb valve, and had removed the gas meter. There was a strong smell of gas around the home; it was especially strong where PG&E had excavated the service line adjacent to the home.

SED interviewed [REDACTED], the homeowner, at the incident site on 01/27/2021.

SED interviewed [REDACTED] the Gas Safety Representative who first responded to [REDACTED]’s home, on 02/09/2021 during a conference call. The following narrative uses information from both interviews. Figure 1 is an approximate floorplan of the home.

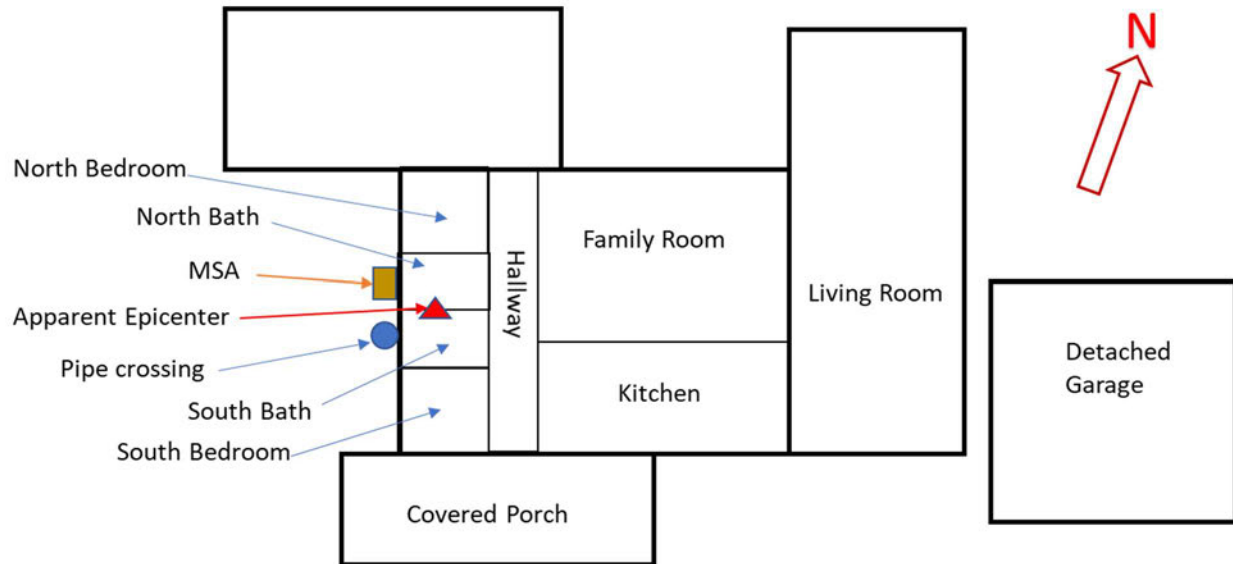


Figure 1: Floorplan (not to scale) of █████ Lakeview. The yellow box represents the gas meter set assembly. The red triangle represents the apparent epicenter of the explosion. The blue circle represents the area where the 3/4-inch gas service line and the sewer drain cross.

On 01/27/2021, █████ █████ was performing his morning routine. The electricity was not working, as it had blacked out the night before during a storm. He had turned on a gas fireplace in the living room for light and warmth before taking his dog for a short walk. █████ █████ claims he smelled gas faintly around 0930 hours, but he did not call the utility. He left home to get some coffee at a nearby restaurant and returned shortly. When he returned, he noticed the smell of gas again.

At approximately 0950 hours, █████ █████ was sitting in a chair in the living room drinking his coffee when he heard a loud boom. He believed the noise was from his attic furnace, which he was sitting directly under. He turned off the fireplace, evacuated himself and his dog to the neighbor's house, and called PG&E.

████████████████████ a Gas Service Representative (GSR) was the first PG&E employee to respond to the call. He arrived at 1007 hours; █████ █████ was waiting in his driveway. █████ █████ explained the noise and reported where he believed it had come from. █████ █████ began to sweep the home with his gas detector, starting in the living room and proceeding to the kitchen. █████ █████ claims the gas levels in the room he started the sweep were between 0.04% and 0.07% gas-in-air. █████ █████ noticed the gas levels were stronger in the kitchen. As he entered the family room, █████ █████ noticed several framed photos lying on the ground. The gas level readings increased as █████ █████ entered the hallway where he noticed fresh plaster dust on the floor. █████ █████ continued his gas readings into the master bedroom and bathroom. █████ █████ claims the readings on this side of the home were between 0.2% and 0.3% gas-in-air. He saw

the bathroom medicine cabinet had fallen out of the wall, and the wall studs were visible in the bathroom behind the toilet. [REDACTED] also saw smoke somewhere outside the bedroom and bathroom windows.

[REDACTED] ran outside to the gas meter and saw smoke billowing from the crawlspace under the house, and flames coming from the ground under the home. [REDACTED] claims the flames were emanating from below the home, and although he observed them touching the gas meter he did not believe they originated from the gas meter. He retrieved a fire extinguisher from his work truck and called 911 at 1017 hours, according to his phone's call log. He discharged the extinguisher into a crawlspace vent near the gas meter and extinguished the flames. He then closed the gas service riser valve and noticed that there were bubbles rising in the small puddles around the gas meter, indicating a possible leak in the area.

The fire department arrived, and [REDACTED] walked them to the back of the home, where smoke was still flowing from the crawlspace. While the fire department opened the vents and investigated under the house, [REDACTED] called his supervisor and PG&E dispatch to report a potential leak at the service riser.

The fire department could not find any more flames under the home, but applied fire retardant to smoldering spots on the ground. The fire department asked [REDACTED] to remove the gas meter, and he did so. The fire department departed when they deemed the area safe at approximately 1415 hours.

A PG&E work crew arrived at approximately 1100 hours and began excavating in the road to control the gas at the curb valve. They had the valve accessible and had closed the valve by 1333 hours. After shutting the curb valve in, PG&E cut out a 12-inch section of the service line and welded caps to make service stubs. The gas crew also excavated the service line adjacent to the home to investigate the possible leak that [REDACTED] had observed. The soil covering the pipe near the home was pungent with odorant.

While the crew uncovered the service line, [REDACTED] visited the two homes on either side of [REDACTED]' house and the three across the street from the house to sweep for gas.

SED was allowed inside the house to inspect the damage. The apparent epicenter of the explosion was the wall between adjacent bathrooms. The sheetrock had separated from the studs, insulation had blown out of the wall cavity, and the sewer drainpipe was visible. The walls in both the North and South bathrooms exhibited significant damage (Figures 2 and 3). There was minimal damage to the rest of the home. [REDACTED] [REDACTED]

pointed out a few places in the family room where the built-in shelves and crown molding had separated from the wall slightly.

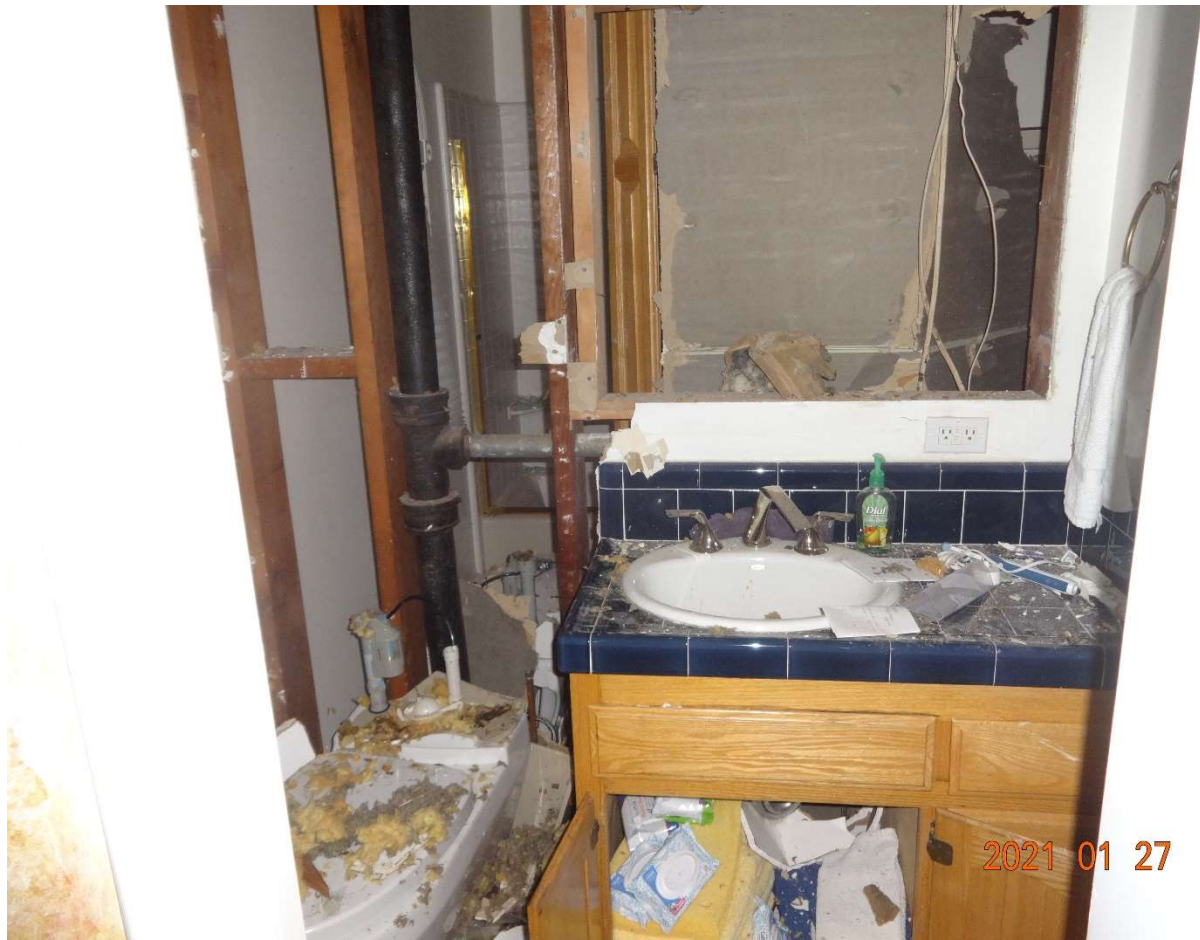


Figure 2: The damage to the South bathroom. The sheetrock and insulation had blown out from the wall. The toilet tank was shattered.



Figure 3: The damage to the North bathroom. The sheetrock and insulation had blown out from the wall. The wall mirror and the sliding glass doors around the tub were shattered.

After inspecting the inside of the home, SED went out and observed the area where the meter service assembly had been. PG&E had removed the meter and excavated the service line adjacent to the house. The excavated area and the dirt which was removed was pungent with odorant. The gas line was approximately 12" below grade. There was a sewer drain lateral pipe in the excavated trench in contact with the 3/4-inch gas service. The sewer lateral ran under and parallel to the gas service line (Figure 4). The dirt in the area around the sewer lateral was dried out, although the rest of the dirt in the trench was moist. During a conversation with the Field Service Supervisors on site, SED learned that a portion of the dirt that was removed from the trench was also dried out. This dried section of soil is indicative of an underground natural gas leak.



Figure 4: Excavated trench next to the house with 3/4-inch gas service line and sewer lateral. The red circle highlights where the two pipes are in contact. The soil near the intersection of the pipes was dry, although most of the soil brought up from the pit was wet.

PG&E proceeded to leak test the isolated section of service line with compressed air, from the curb valve to the service riser termination. The air test revealed a leak on the underside of the service line where the gas service line was in contact with the sewer lateral. The section was cut out and retained by Exponent, a third-party forensic engineering contractor.

On February 25, 2021, Exponent performed materials testing on the service line at their lab. SED was able to view the testing remotely. Exponent reported that they found a hole on the service line, approximately 3/8 inches in diameter, at the six o'clock position. The hole was located approximately 4 feet from the riser, where the gas service line had been in contact with the sewer lateral. The section near the hole was devoid of pipe coating, but Exponent was unsure if that had been removed during the excavation or if it had been missing coating before that.

PG&E states in their Root Cause Evaluation report that Exponent found “the damage to the incident pipe was consistent with an electrical arc event between the service line and the sewer lateral.” According to the report, “Sacramento Municipal Utility District (SMUD) experienced a wire down event of a 12.47kV overhead electric primary distribution circuit due to a storm. This downed line was located approximately 300 feet northeast of the incident leak location.” SED observed the clean-up from that downed line event on January 27, 2021. Although the precise current path is not known, it is possible that the downed electric wire contacted and energized the secondary neutral, which would have allowed current to flow onto the ground wiring of the homes and the sewer pipes.

A storm on January 26, the night prior to the gas incident, caused substantial damage to the Sacramento Area. The Sacramento Municipal Utility District (SMUD), which provides electrical utility service to Sacramento County, reported on January 26, 2021, that “Crews are working to restore power to about 6,000 customers largely impacting the Florin and Carmichael areas.” Later that night, SMUD reported approximately 50,000 customers were without power. On the morning on January 27, 2021, SMUD reported that approximately 106,000 customers were without power. The storms caused 388 separate power outages, and SMUD was unable to give estimates on restoring the power to its customers.

PG&E’s construction records show that the main on Lakeview Drive was installed in September 1953, and the steel service line which failed was installed in November 1954. At the time of installation, it was under 12-inches below grade. Records on file with Sacramento County indicate that the sewer mains and laterals on Lakeview Drive were originally installed in between 1966 and 1967, but records do not indicate when the sewer lateral which was in contact with the gas service line was installed, or if there was a septic system connected to the home prior to the sewer mains and laterals being installed. Although current PG&E standards and Federal Code would not allow any gas service installation to be contacting a sewer lateral, there were no such codes or standards in place when the service was installed in 1954. It is also unclear if the sewer lateral was in place when the gas service was installed.

According to the Exponent report the two most recent compliance leak surveys of the Lakeview Drive (July 2020 and February 2016) found eight leaks within a 1,200-foot radius of the incident house, with the closest ones being approximately 300 feet away. All leaks, except one Grade 3 leak, that was approximately 1100 feet from the incident house, were repaired prior to the incident. The cathodic protection area which covers this area had been operating within compliance for several years, but PG&E found reads below -850 mV a pipe-to-soil survey of the area on the day of the incident. PG&E investigated the low reads and found damaged anodes in the area, which they believe

may have been affected by the same electrical event which caused the gas leak. PG&E's Root Cause Evaluation states that they installed four new anodes on February 5, 2021, and the cathodic protection area was back within compliance levels.

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

California Public Utilities Commission General Order Number 112-F, §144.3(b)(1) states, in part:

“Gas pipelines, when independently installed, shall be separated, where practicable from electrical supply systems, water, oil, communication, or other pipe systems or other foreign substructures, by a clearance of at least 12 inches when paralleling and by at least 6 inches when crossing. New gas pipelines inserted within, and utilizing as conduit, pipeline facilities installed prior to the effective date of this rule are exempt from the paralleling requirements of this paragraph but not the requirements related to crossings.”

California Public Utilities Commission General Order Number 112-F, §143.2 states, in part:

“(a) A ‘Grade 1 leak’ is a leak that represents an existing or probable hazard to persons or property and requiring prompt action, immediate repair, or continuous action until the conditions are no longer hazardous.

(1) Prompt action in response to a Grade 1 leak may require one or more of the following:

- (i) Implementation of the gas pipeline company's emergency plan pursuant 49 CFR § 192.615;*
- (ii) Evacuating the premises;*
- (iii) Blocking off an area;*
- (iv) Rerouting traffic;*
- (v) Eliminating sources of ignition;*
- (vi) Venting the area;*
- (vii) Stopping the flow of gas by closing valves or other means; or*
- (viii) Notifying police and fire departments.”*

Title 49 CFR §192.13(a) states, in part:

“No person may operate a segment of pipeline listed in the first column that is readied for service after the date in the second column, unless:

- (1) *The pipeline has been designed, installed, constructed, initially inspected, and initially tested in accordance with this part; or*
- (2) *The pipeline qualifies for use under this part according to the requirements in § 192.14.*

<i>Pipeline</i>	<i>Date</i>
<i>Offshore gathering line</i>	<i>July 31, 1977.</i>
<i>Regulated onshore gathering line to which this part did not apply until April 14, 2006.</i>	<i>March 15 2007.</i>
<i>All other pipelines</i>	<i>March 12, 1971.</i>

Title 49 CFR §192.361(a) states:

“Depth: Each buried service line must be installed with at least 12 inches (305 millimeters) of cover in private property and at least 18 inches (457 millimeters) of cover in streets and roads. However, where an underground structure prevents installation at those depths, the service line must be able to withstand any anticipated external load.”

Title 49 CFR §192.361(b) states:

“Support and backfill. Each service line must be properly supported on undisturbed or well-compacted soil, and material used for backfill must be free of materials that could damage the pipe or its coating.”

Title 49 CFR §192.463(a) states:

“Each cathodic protection system required by this subpart must provide a level of cathodic protection that complies with one or more of the applicable criteria contained in Appendix D of this part. If none of these criteria is applicable, the cathodic protection system must provide a level of cathodic protection at least equal to that provided by compliance with one or more of these criteria.”

Title 49 CFR §192.467 states, in part:

“(a) Each buried or submerged pipeline must be electrically isolated from other underground metallic structures, unless the pipeline and the other structures are electrically interconnected and cathodically protected as a single unit.

(b) One or more insulating devices must be installed where electrical isolation of a portion of a pipeline is necessary to facilitate the application of corrosion control.”

Preliminary Conclusion:

Based on the investigation, SED does not find PG&E in violation of General Order 112-F of Title 49 CFR Part 192.

The pipeline which failed was installed prior to the established pipeline codes and cannot be held to the current spacing requirements, design requirements, or construction requirements. PG&E reacted promptly and appropriately to the report of a possible leak, and reacted appropriately to the cathodic deficiencies and leaks discovered during the subsequent surveys of the area.