

CALIFORNIA PUBLIC UTILITIES COMMISSION

Safety and Enforcement Division Gas Safety and Reliability Branch

Incident Investigation Report

Report Date: 10/28/19

Incident Number: G 20171127-2428

Utility: Pacific Gas and Electric PG&E

Date and Time of the Incident: 11/27/2017, 10:20:00 AM

Location of the Incident: 3971 Mission Street
San Francisco, CA
County: San Francisco

Summary of Incident:

On 11/27/2017 at approximately 10:14 am, an explosion occurred at 3971 Mission Street, San Francisco. Prior to the explosion, San Francisco Fire Department and PG&E responded to a gas odor complaint. After stopping the flow of gas, PG&E located the source of the leak: a previously abandoned service tee for 3976 Mission Street coming off a 6-inch steel main. The service tee was found to have not been properly sealed during its abandonment during 2003. During the abandonment in 2003 an expander plug was inserted into the service tee to temporarily halt the flow of gas. The service tee was not permanently capped after the customers service line was disconnected. The expander plug contained gas from 2003 to 2013 while the main functioned as a low-pressure distribution main. In 2013 the main was uprated to high-pressure distribution and the plug did not dislodge until 2017. After the failure of the expander plug, gas was able to migrate from the abandoned service tee into the structure at 3971 Mission Street which later resulted in an explosion. The estimated cost of property damage is \$409,000. There were no injuries or fatalities as a result of this incident. Safety and Enforcement Division's (SED) investigation found that PG&E violated Title 49 of the Code of Federal Regulations (49 CFR) Part 192 Sections 621(a)(1) and 605(a) when the service tee was improperly abandoned.

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

Property Damage: \$409,000.00

Utility Facilities involved:

Pipe Material = Steel, Pipe Size = 2 (inches), MAOP = 60 (psi), Operating Pressure = 50 (psi)

Witnesses:

<i>Name</i>	<i>Title</i>	<i>Phone</i>
1 Nathan Sarina	CPUC Investigator	N/A
2 Alan Bach	CPUC Investigator	N/A

Evidence

<i>Source</i>	<i>Description</i>
1 PG&E	Initial 420 Report
2 PG&E	Final 420 Report
3 PG&E	Data Request 11503
4 PG&E	Data Request 11503 Supp 01
5 PG&E	Data Request 11507
6 PG&E	Data Request 11507 Supp 01
7 CPUC	CPUC Field Notes
8 PG&E	Data Request 11503 Supp 02

Observations and Findings:

At 0957 hours on November 27, 2017 PG&E (Pacific Gas and Electric) received a call regarding gas odor on the 3900 block of Mission Street, San Francisco and dispatched a Gas Service Representative (GSR) at 1004 hours. PG&E was notified of an explosion in the vicinity at 1016 hours that had blown out windows and caused additional property damage. PG&E's GSR arrived at 1020 hours and by 1033 hours multiple PG&E gas crews arrived and began work to make the situation safe. PG&E crews shut off gas to the location by closing two valves and squeezing in two locations by 1250 hours with the shut-in causing loss of service to 464 gas customers. PG&E activated an Operations Emergency Command (OEC) in order to restore service to affected customers. The crews tied the main back in at Mission and College and Mission College Terrace. The next day on 11/28/2017, PG&E pressure tested the 6-inch main at 1345 hours and re-pressurized the line at 1515 hours. By 11/29/2017, 448 customers had service restored. The police, fire department, and media were reported onsite. There were no reports of injuries, fatalities, or ignition (beyond the explosion) associated with this incident. The incident was reported to the DOT (DOT# 1198192) and to the CPUC due to the unintentional release of gas and damages over \$50,000.

History of pipeline facilities in the area and source of leak

PG&E, after determining the source of the leak and excavating the location, found an

abandoned service tee shown in Figures 1 and 2. Figures 1 and 2 show that the service tee was not capped by a mechanical fitting, fusion fitting or weld cap.



Figure 1. Source of the gas leak¹



Figure 2. Photo of abandoned service tee location looking northwest towards 3976

¹Data Request 11503-02_Photos (91)

Mission Street, San Francisco.²

PG&E hired Exponent to investigate the root causes of the incident. PG&E removed the service tee and transferred it to Exponent's lab. Figures 3-6 are photographs of the service tee at Exponent's lab. Figures 5 and 6 show closeups of the expander plug from the top and the bottom in a dislodged state similar to Figure 1.



Figure 3. Photograph of Mueller Tee after removal from scene.³



Figure 4. Mueller Tee after removal from scene.³



Figure 5. Top view of Mueller Tee showing top of X-Pando Plug.³



Figure 6. Bottom view of Mueller Tee showing bottom of X-Pando Plug.³

The abandoned service tee was located in front of 3985 Mission Street, San Francisco and on a 6-inch steel main running down the east side of Mission Street. This abandoned service tee originally supplied the building at 3976 Mission Street, San Francisco. The gas service record, shown in Figure 7, for 3976 Mission Street under PM No. 30267522 shows work being performed to transfer the service from the 6-inch steel main on the east side of Mission Street to the 6-inch plastic high pressure main closer to 3976 Mission Street on the west side of Mission Street. The gas service record shows that the replacement service for 3976 Mission Street was pressure tested

²Photo (DSC00478) taken on 12-9-2017.

³ Photographs taken at Exponent Labs 11/29/2017

on 10/30/2003.

Figure 7. Gas Service Record for 3976 Mission Street, San Francisco⁴

The construction timeline of facilities in the area around the incident location is shown in Table 1.

Table 1. Facilities construction timeline for the facilities around 3971 Mission Street.

In 1992, on job GM1611601, PG&E installed a 6-inch low pressure steel distribution main on the east side of Mission Street and provided service to 3971 Mission Street (incident house) and 3976 Mission Street.
In 1996, on Job GM 1670215, PG&E installed a 6-inch high pressure plastic distribution main along the west side of Mission Street.
In October of 2003, under Job 30267522, PG&E transferred the gas service for 3976 Mission Street from the 6-inch low pressure steel main to the 6-inch high pressure plastic main. During this transfer, procedures A-93.2 and C-36.1 were incompletely followed, when the X-pander plug was left in and the service tee on the 6-inch low-pressure steel main was not capped.
In 2013, under Job PM 30945050, the MAOP of the low pressure 6-inch steel main was raised from 10.5 inches water column to 60 psi. During this process the pressure was raised 4 times in approximately 15 psi increments according to PG&E procedure TD-4125P-03. In 2017, the X-pander plug became dislodged and a leak occurred on the now high pressure 6-inch steel main.

The plat map, provides information about the projects that occurred in the area of the

⁴Data Request Index 11507-06_GSR_Conf

incident location, as shown in Figure 8. Figure 9 shows the structure (green) that was previously serviced by the abandoned tee, as well as the location of the incident (yellow).

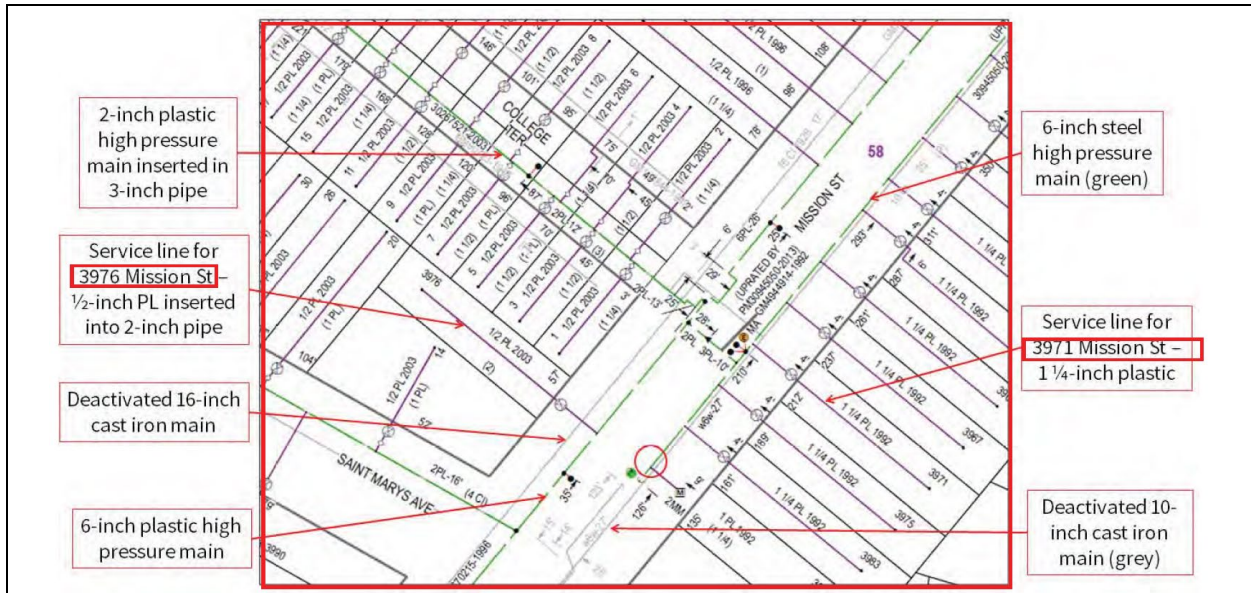


Figure 8. Exponent annotated plat map of area with leak location in red circle⁵

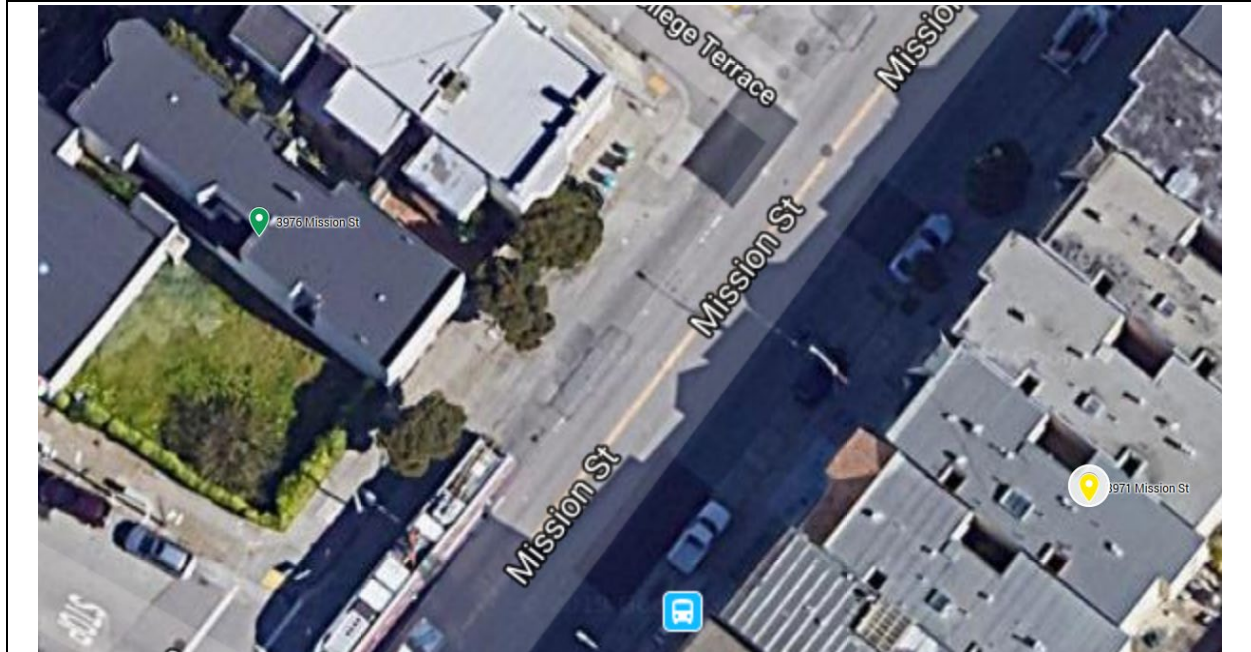


Figure 9. Google maps satellite view of 3971 Mission Street (incident house, yellow pin) and 3976 Mission Street (green pin).

Procedure for Deactivation of Plastic Services

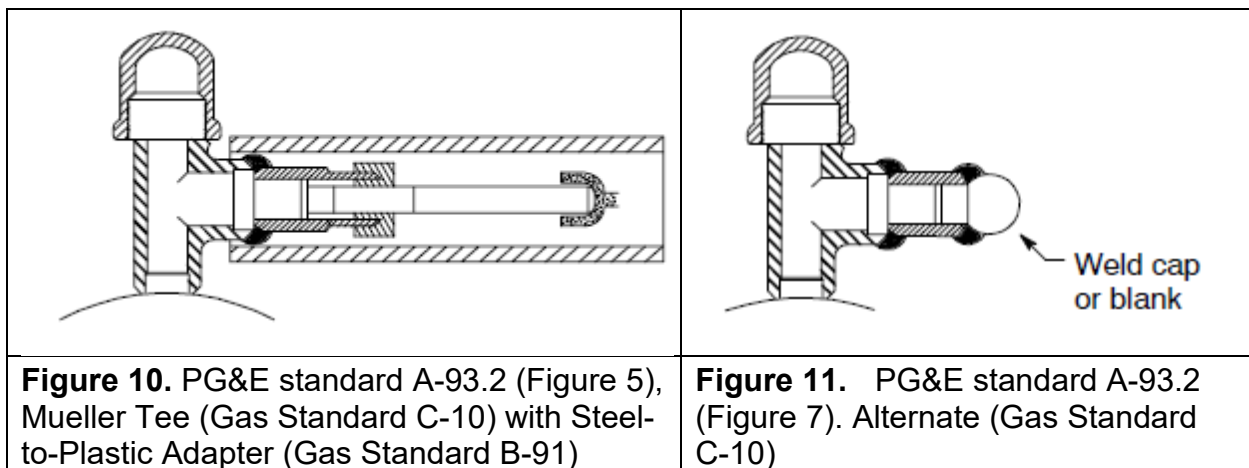
PG&E’s procedure governing the deactivation of plastic services is A-93.2. This

⁵Data Request 111503-01 Supp01_Mission Street Final Report Figure 28.

procedure is dated April 09, 2003. Procedure A-93.2 states, in part:

1. "Service tapping Tee (Steel or Plastic)
 - A. Stop off the service tapping tee per the requirements of Gas Standard C-10, or squeeze off the service per the procedures listed in Gas Standard A-93.1....
 - B. Cut the plastic service pipe 4" to 5" downstream from the service tee connection. Use approved mechanical or fusion end caps to seal the cut end.
 - (1) Follow the fusion joining methods prescribed in Gas Standard D-21 when installing fusion end caps.
 - (2) Follow the procedures listed in Gas Standard B-91.1
 - (3) If cutting the service 2' or more beyond the tee, follow the requirements listed in Item 4.
 - (4) Steel punch tee alternative: remove the comp.... Place wet rags around the tee if using a rubber stopper, and weld a cap or blank over the outlet....
2. Mueller Tapping Tee Follow applicable procedures listed in Item 1, except the "alternative" weld cap method specified in Item 1B(4) should only be used if capping a plastic cut-off pigtail is impractical. If the weld cap deactivation method is used, Mueller steel pin service tee shut-off procedures are recommended...."

Figures 5 and 7 from the procedure illustrate examples of how the service connection can be deactivated.



Procedure for Grunsky Bag Method for Stopping Off Low Pressure Service Tees

PG&E's procedure governing the use of Grunsky Bag Method for Stopping Off Low Pressure Service Tees is C-36.1. Procedure C-36.1 Rev. # 00 is dated 04-20-00 and states,

"Step 14. Now the service is ready for abandonment. Proceed with the required work."

Step 15. After the work has been completed, remove the completion cap and install the X-Pando wrench on the plug by gently pushing down and turning the wrench counterclockwise on the plug.

Step 16. Make sure the completion plug or cap is in the Grunsky Bag. Re-install the Grunsky Bag over the service tee.

Step 17. **Remove the X-Pando** by turning the wrench handle counterclockwise and raising the plug up and into the Grunsky Bag. [emphasis added]”

Leak Survey and Call Records Reviewed

PG&E conducted leak surveys⁶ of the surrounding area post-incident on November 27, 28 and 29th, 2017. No additional gas was detected around the incident location. Prior to the incident, leak surveys which included the main were conducted on July 2017 and September 2015. The leak surveys in 2017 and 2015 detected no leaks over the incident area. Call records of odor complaints from 7/14/2017 to 11/27/2017 did not reveal any indication from the public that a facility might be leaking.⁷

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

General Order	GO Rule
1. General Order 112F	49 CFR § 192.621(a)(1)
2. General Order 112F	49 CFR § 192.605(a)

Conclusion:

1. Title 49 CFR § 192.621 states in part:

“(a) No person may operate a segment of a high pressure distribution system at a pressure that exceeds the lowest of the following pressures, as applicable:

(1) The design pressure of the weakest element in the segment, determined in accordance with subparts C and D of this part.”

PG&E failed to properly abandon the service line to 3976 Mission Street during project 30267522X. The failure to permanently seal the still live service tee resulted in the X-Pando plug being used for longer than its typical temporary application, as well as being subject to pressures higher than the component is designed for, especially after the uprate project in 2013. Therefore, SED finds PG&E in violation of Title 49 CFR § 192.621(a)(1).

2. Title 49 CFR § 192.605(a) states in part:

⁶ Index 11503-04_Special LS_Dec 27_CONF.pdf, Index 11503-04_Special LS_Dec 28-29_CONF.pdf

⁷ Index 11507-05 Supp01 Q.05 Field Orders

*“General. Each operator shall prepare and **follow** for each pipeline, a manual of procedures for conducting operations and maintenance activities...”* [Emphasis added]

PG&E failed to follow Procedure C-36.1 Rev #00 Gransky Bag Method for Stopping Off Low Pressure Service Tees when it failed to remove the X-pando plug from the service tee. PG&E also failed to follow A-93.2 for failing to use approved mechanical or fusion end caps to seal the cut end. Therefore, SED finds PG&E in violation of Title 49 CFR §192.605(a).