

CALIFORNIA PUBLIC UTILITIES COMMISSION

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

Incident Investigation Report

Report Date: 03/16/2017

Investigator: Jason McMillan

Incident Number: G20160810-2059

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

Date and Time of the Incident: 08/10/2016, 1311 hours.

Location of Incident: [REDACTED], Deer Park, Napa County.

Summary of Incident: On August 10, 2016 two PG&E employees were dispatched to [REDACTED] Deer Park to perform maintenance on a Nordstrom-type customer service valve that was stuck in the open position. During an attempt to free the stuck valve, the valve came apart forcefully and gas began flowing through openings in the valve body. The gas flow ignited on the pilot light of a nearby water heater, and the resulting fire burned two utility workers, and caused severe damage to the house. SED found that PG&E personnel did not follow utility procedures, and this directly contributed to the incident. SED also determined that deficiencies within PG&E's maintenance procedures and Operator Qualification program contributed to the incident.

Fatality/Injury: Mr. Tim Fenzel, a utility employee, received 1st and 2nd degree burns to his hands and arms. Mr. Ian Fuller, a utility employee, received 1st degree burns on his arms and face. Both were treated and released from the hospital the same day.

Property Damage: The house at [REDACTED] was significantly damaged by the fire. The minimum estimate of the fire damage to the home, according to the homeowner's insurance claim, is \$407,649.55. The utility's service valve and pipes were also damaged by the fire. PG&E estimates the damage to the gas facilities, including the cost of repair, to be \$5,000.

Utility Facilities Involved: PG&E North Bay Division, ¾-inch Nordstrom service valve, ¾-inch steel riser, and gas meter assembly (60 psig MAOP)

Witnesses/Person(s) Involved:

Dennis MacAleese; Director Of Gas M&C/PG&E North; 925-244-3119

Alan Nadell; Quality Control Specialist/PG&E; 707-765-5123

Ramon Muller; Gas M&C Supervisor/PG&E Napa and North Bay

Tim Fenzel; Gas Mechanic/PG&E; 707-346-7484

Ian Fuller; Fitter Arc/PG&E; 209-505-8972

Mike Lang; Regulatory Compliance/PG&E; 209-601-9853

██████████ Homeowner and resident of ██████████, Deer Park; ██████████

██████████; Homeowner and resident of ██████████, Deer Park; ██████████

Alison E. Cordova; Associate/Cotchett, Pitre, & McCarthy. LLP; 650-697-6000

Evidence:

Photographs of Incident Scene taken by Jason McMillan of California Public Utilities Commission; August 10, 2016.

Incident Photographs, and Post Incident Photographs; PG&E; August 10, 2016.

Employee Qualification Transcript for Mr. Timothy Fenzel; PG&E; August 25, 2016.

Employee Qualification Transcript for Mr. Ian Fuller; PG&E; August 25, 2016.

CPUC File No. 420 Final filed 09/09/2016; Richmond, Susie of PG&E; September 09, 2016.

PHMSA 7100 Incident Report numbered 20160085-16385; PG&E; September 09, 2016.

Alcohol Testing Form and Results for Mr. Ian Fuller, collected by Dependable Occupational Testing Services 2; August 10, 2016.

Drug Testing Form for Mr. Ian Fuller, collected by Dependable Occupational Testing Services 2; August 10, 2016.

Drug Testing Results for Mr. Ian Fuller, reviewed by Dr. Stephen Kracht of Overland Park, KS; August 12, 2016.

Alcohol Testing Form and Results for Mr. Timothy Fenzel, collected by Napa Valley Drug & Alcohol Testing; August 10, 2016.

Drug Testing Form for Mr. Timothy Fenzel, collected by Napa Valley Drug & Alcohol Testing; August 10, 2016.

Drug Testing Results for Timothy Fenzel, reviewed by Dr. Stephen Kracht of Overland Park, KS; August 12, 2016.

Leak Survey and Field Inspections for the 5 year Survey performed 1/22/15 – 1/26/15; PG&E; January 26, 2015.

Leak Survey and Inspection Record for the Special Survey (post-incident); PG&E; August 10, 2016.

Atmospheric Corrosion Records for [REDACTED]; PG&E; June 28, 2010

Atmospheric Corrosion Records for [REDACTED]; PG&E; March 19, 2014

Response 10595.1 [explanation of atmospheric corrosion record codes]; PG&E; March 07, 2017.

Root Cause Evaluation Report: SIF Potential – Deer Park Incident; PG&E; December 31, 2016.

Structural Fire Investigation, Incident Number 16CALNU007432; Timothy J. Erskine of Cal Fire; October 01, 2016.

Observations and Preliminary Findings:

On August 10, 2016, at 1433 hours, SED was notified of a gas incident and structure fire located at [REDACTED], Deer Park. SED arrived at the incident scene at approximately 1710 hours. When SED arrived, the fire had been extinguished and the fire department (CAL FIRE) was leaving the scene.

The house was severely damaged by fire, but still standing. SED began photographing the damage starting where the gas service was located, and proceeded clockwise around the house.

The customer's gas service riser, meter, and valve were located against the north side of the house in a small, roofless enclosure, along with a water heater, an electrical service panel, and an air conditioning unit. The enclosure area was blackened, and the house's stucco exterior was damaged (Figure 1). PG&E had removed the gas meter and regulator by the time SED had arrived. The house's eaves above the gas service and hot water heater were burned away, and the attic's interior was exposed (Figure 2).



Figure 1: The roofless enclosure that contained the gas meter, a water heater, an electrical service box, and an air conditioning unit. The red circle represents where the gas meter had been.



Figure 2: The eaves above the gas meter and water heater burned away, exposing the interior of the attic. This picture is taken outside the small roofless enclosure, facing south.

Along the eastern side of the house, SED was able to view spots of extensive damage to the roof and interior of the home. The ceiling in the home had been burned, and in some places the roof had either been burned away or had collapsed (Figures 3, 4, and 5). There was a great deal of furniture and other things that had been pulled out of the home; the homeowners had been renovating and remodeling when the fire occurred, so most of their furniture was out of the house when the fire occurred.



Figure 3: A view of the interior ceiling as seen from the outside.



Figure 4: The east side of the house; severely burned, with part of the roof burned away, or collapsed. The furniture had been removed for a remodeling project and is sitting on an outside porch.



Figure 5: A different angle of the east side of the house; severely burned, with part of the roof burned away, or collapsed. The furniture had been removed for a remodeling project and is sitting on an outside porch.

At the southeast corner of the house (the furthest point from the gas service) there was damage to the roof from where the attic fire had burned through (Figure 6 and 7).



Figure 6: The southeast corner of the house. Notice the blackened spots on the roof.



Figure 7: A close-up of a damaged piece of roof on the southeast corner of the house.



Figure 8: A bird's eye view of the house at [REDACTED] with photo index. The circles correspond to the placement of the photographer in the corresponding preceding figures, and the arrows show the angle of the viewer. The orange boxed area on the northeast corner is the walled enclosure that contained the gas service.

SED interviewed Dennis MacAleese (PG&E; Director of Gas Maintenance & Construction, Northern Region), Alan Nadell (PG&E; Quality Control Specialist), and Ray Muller (PG&E; Gas M&C Supervisor for Napa and North Bay) who were at the incident scene when SED arrived. SED interviewed [REDACTED] and [REDACTED], the homeowners and residents of the house, on the night of August 10, 2016. SED interviewed Tim Fenzel and Ian Fuller, the two PG&E employees affected by the incident, on August 11, 2016 at the PG&E service center in Napa. Mr. Fenzel and Mr.

Fuller were interviewed separately. The following narrative is a composition of those various interviews:

Two PG&E employees, Mr. Timothy (Tim) Fenzel and Mr. Ian Fuller, had been assigned to change out the Nordstrom service valve at the home located at [REDACTED] on August 10, 2016. The valve had been reported as inoperable by another PG&E employee earlier in the week; specifically the valve was missing the tang used to operate it. A valve similar to the one at [REDACTED] is shown below, in figures 9 and 10.



Figure 9: A typical Nordstrom valve. The packing nut is on the left of the valve body, and the tang is to the right. The tang of the valve at [REDACTED] had been broken off, and the valve was inoperable.



Figure 10: The various parts of a typical Nordstrom valve, from left to right: packing nut, spring, valve core (with tang on the right-hand side), and valve body. When the nut, spring, and core are removed, there are 2 openings on the sides of the valve body that gas can flow out from.

Mr. Fenzel and Mr. Fuller are experienced gas employees; Mr. Fenzel has been a gas mechanic for approximately 10 years, and Mr. Fuller has been an arc fitter for 2 years. Both Mr. Fenzel and Mr. Fuller claim the task they were performing that day was routine for them.

The customer's gas service riser, meter, and valve were located against the north side of the house in a small, roofless enclosure, along with a water heater (equipped with a standing pilot light), an electrical service panel, and an air conditioning unit. The walls of the enclosure were approximately 6-feet tall. The eaves of the roof were positioned above the gas valve and meter, and extended approximately 2-feet from the house's exterior wall (Figure 11).

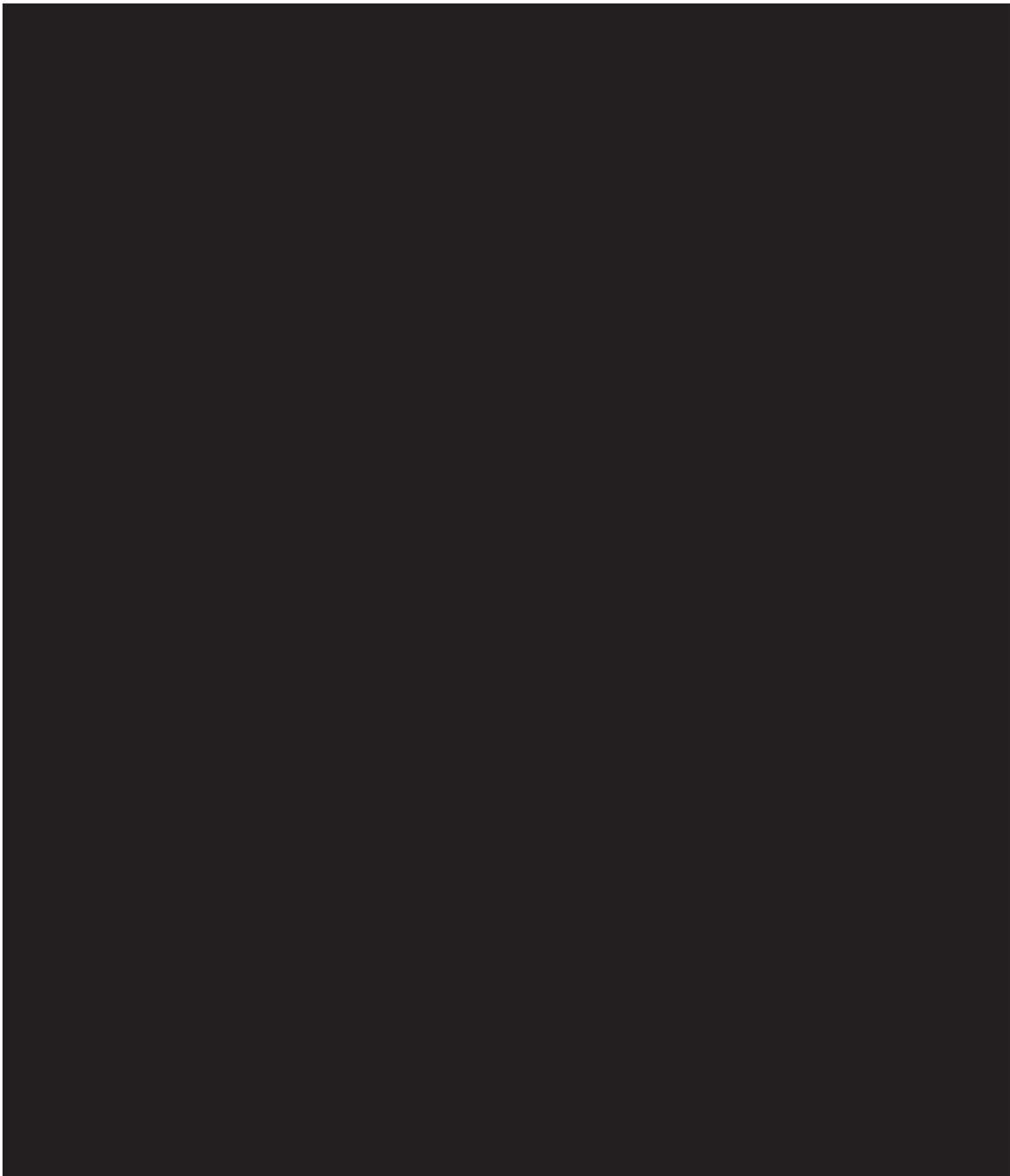


Figure 11: The layout of the small, roofless enclosure adjacent to the house where the gas meter was located. The gray lines show the approximate location of the roof eaves that overhang the enclosure. Diagram is not to scale.

Mr. Fenzel and Mr. Fuller performed a safety tailboard meeting together when they arrived at the house. Mr. Fenzel retrieved some “basic tools” (Channel-lock pliers, a large crescent wrench, a valve changer, a drift pin, and a brass hammer) from his truck and approached the service valve to assess the situation. Mr. Fenzel claims he did see the water heater, but he “did not register” it as a possible hazard because the valve change-out task does not normally involve escaping gas. Mr. Fuller claims he did not notice the water heater because he was shuttling tools from the truck to Mr. Fenzel, and had not assessed the area by the time Mr. Fenzel started the work.

Mr. Fenzel knocked on the door to alert the customer that they would be performing maintenance, but there was no answer (██████████, the homeowner, was in the backyard at the time and did not hear the knocking). Mr. Fuller brought tools from the truck to the work site as Mr. Fenzel was preparing to free the stuck valve. Mr. ██████████ approached Mr. Fenzel and Mr. Fuller before work had started, and they spoke a while about the nature of the task that day. After their talk, Mr. ██████████ left them to their work, and entered his house.

While Mr. Fuller kept shuttling the additional tools necessary to replace the valve to the job site, Mr. Fenzel attempted to free the stuck Nordstrom valve. Mr. Fenzel loosened the packing nut of the Nordstrom valve slightly, and tapped against the broken tang with a brass hammer to loosen the valve core. After Mr. Fenzel tapped the tang, the Nordstrom valve came apart forcefully; the packing nut, valve core, and the spring came out of the valve body. Gas began flowing through two openings on either side of the valve body and ignited (Figure 12).

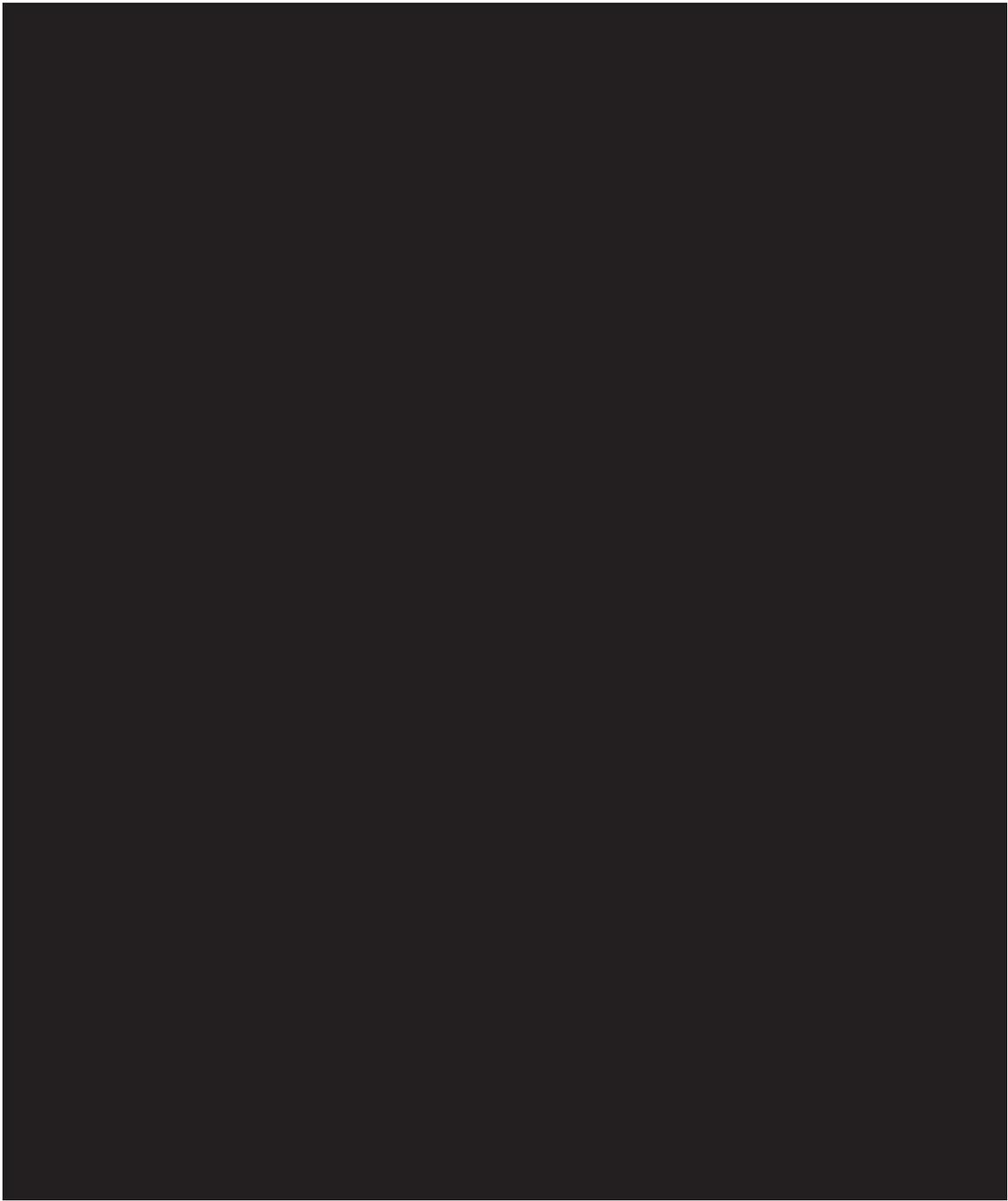


Figure 12: The layout of the small, roofless enclosure adjacent to the house where the gas meter was located. The orange lines show the most likely path of gas flow when the service valve forcefully disassembled. Diagram is not to scale.

According to Mr. Fenzel, the forceful disassembly of the valve and the ignition of the gas happened “instantly” after he tapped it with the brass hammer. One of the openings in the disassembled valve was pointed directly at the water heater, located 6-feet, 4-inches from the gas service valve. Mr. Fenzel leapt away from the fire quickly, but still suffered second degree burns on his hands and arms, and first degree burns on his face.

██████████ and ██████████ were in their house when the gas ignited outside. They both report hearing a percussive “boom” and Mr. ██████████ went outside to investigate. Mr. ██████████ witnessed a fire emanating from the gas service valve at the north side of the house, and heard a “loud hissing” noise. Mr. ██████████ went back inside the house to retrieve fire extinguishers and relate the issue to Ms. ██████████. ██████████ called 911 at approximately 1235 hours from inside his house, while Mr. ██████████ brought the fire extinguishers outside.

Mr. Fuller was shuttling a fire extinguisher to the job site when the fire occurred, and attempted to extinguish the fire. When he exhausted that fire extinguisher, he returned to the truck to retrieve a second one, and called 911 on his way. Mr. Fuller returned with a second fire extinguisher and continued the attempts to get the fire under control. Mr. ██████████ and Mr. Fenzel were using the extinguishers that Mr. ██████████ brought. When those were exhausted, Mr. Fenzel claims they attempted to use a garden hose to fight the fire. Mr. Fenzel claims that at some point, the fire had been put out; but the flowing reignited on the standing pilot light in the water heater.

It became apparent to Mr. Fenzel, Feller, and Mr. ██████████ that they would not be able to control the fire, and they retreated from the scene. Mr. ██████████ called 911 at approximately 1240 hours to report the fire. The fire had spread to the eaves above the gas riser, and then quickly through the attic of the house. Mr. ██████████ and Ms. ██████████ moved two cars out of the garage (which was on the opposite side of the house from the genesis of the fire) and then stood aside to wait for the emergency responders.

Cal Fire was the first to respond, at approximately 1250 hours. According to the Fire Investigation Report, the fire fighters observed a fire at the northwest corner of the house, and “smoke and fire venting out of the center of the structure’s roof.” The fire crews worked to keep the fire from spreading to the surrounding area, but waited for the gas to be shut in before they attempted to extinguish the fire.

Mr. Fenzel was transported to a hospital as soon as an ambulance arrived. Mr. Fuller was also transported to the hospital, but at a later time that day. Both Mr. Fenzel and Mr. Fuller were treated for their injuries, subjected to DOT drug and alcohol testing, and released the same day.

PG&E reports that they were notified of the incident on August 10, 2016 at 1311 hours and responded immediately. A PG&E crew excavated near the front of the property to expose the gas service line, and squeezed off the ¾-inch steel line (Figure 13). The service line was installed in 1949, and has had no reconstructive work done on it since the installation. The gas flow was stopped at 1400 hours. The fire was extinguished at approximately 1430 hours.



Figure 13: The clamp squeezing the ¾-inch steel line shut at the front of the property.

PG&E performed a special leak survey throughout the neighborhood, and found no other points of gas release.

After the fire was extinguished, the attending fire department performed their investigation. The scene was then turned over to SED for their investigation. After SED had completed the investigation, the scene was turned over to PG&E to conclude their repair work. SED ensured that the service line was exposed at the main, cut, abandoned, and capped (Figure 14) before departing the scene on August 10, 2016 at approximately 2145 hours.



Figure 14: The service line at the main; cut and capped.

PG&E collected the Nordstrom valve to have it analyzed for mechanical damage and corrosion. Their report shows that there was no mechanical damage to any component of the valve, except the broken tang, which was “almost completely absent”. Moderate corrosion was found on the interior of the valve body, but no indication of corrosion was found on the threads. The valve plug was severely corroded, including the broken surface of the small remaining tang section. The packing nut showed moderate interior and exterior corrosion. The spring was covered in dry grease and debris, but showed no signs of mechanical damage. The threads on the body and the packing nut were continuous and showed no signs of mechanical damage. All components of the valve fit together well when reassembled. 4 turns were needed to fit the packing nut properly in the body, and a ¼-turn is the minimum thread engagement needed before the packing nut falls out of the body, when the spring is in place.

Atmospheric corrosion survey records for the previous two survey cycles were collected from PG&E. The records for the survey performed on June 28, 2010 do not indicate

any anomalies for the service at [REDACTED]. The records for the survey performed on March 19, 2013 indicate that the external surfaces of the wrap protecting the riser were beginning to deteriorate. No observable corrosion was indicated on the Nordstrom valve, regulator, meter body, or pipe downstream of the valve.

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

U.S. Department of Transportation Chapter 49 CFR §192.605(a): *“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.”*

U.S. Department of Transportation Chapter 49 CFR §192.805(f): *“Each operator shall have and follow a written qualification program. The program shall include provisions to...communicate changes that affect covered tasks to individuals performing those covered tasks”*

U.S. Department of Transportation Chapter 49 CFR §192.805(b): *“Each operator shall have and follow a written qualification program. The program shall include provisions to...ensure through evaluation that individuals performing covered tasks are qualified [from §192.803: Qualified means that an individual has been evaluated and can: (a) Perform assigned covered tasks; and (b) Recognize and react to abnormal operating conditions.]”*

U.S. Department of Transportation Chapter 49 CFR §192.801(b): *“For the purpose of this subpart, a covered task is an activity, identified by the operator, that: (1) Is performed on a pipeline facility; (2) Is an operations or maintenance task; (3) Is performed as a requirement of this part; and (4) Affects the operation or integrity of the pipeline.”*

U.S. Department of Transportation Chapter 49 CFR §192.481(a): *“Each operator must inspect each pipeline or portion of pipeline that is exposed to the atmosphere for evidence of atmospheric corrosion, as follows: If the pipeline is located onshore, then the frequency of inspection is at least once every 3 calendar years, but with intervals not exceeding 39 months.”*

Preliminary Conclusion:

1. U.S. Department of Transportation Chapter 49 CFR §192.605(a): *“(a) 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.”*

The procedures that address how to maintain and change customer service valves are TD-6100P-11, and TD-4150P-01. Neither of the procedures involve using a brass hammer to loosen a frozen valve.

SED found that the practice of attempting to “free” an inoperable valve by loosening the packing nut and tapping the tang with a hammer is included in an obsolete procedure (TD-6436P-27). The practice was eliminated by PG&E procedure TD-6100P-11, Rev. 0; which was published on 07/30/14, and made effective on 09/01/14. The revision notes state:

“Removed guidance from the previous procedure TD-6436P-27 to use a brass hammer to hit the valve stem (tang) to loosen core. Added requirement to repair frozen core by lubrication or replace valve.”

Procedure TD-6100P-11 states that potential hazards include “explosion or igniting of escaping gas.” Procedure TD-4150P-01 states in several notes that gas may be “exhausted” from the valve body during the operation of the valve changer. Section A2 of PG&E’s procedure TD-6100P-01 requires field service personnel to inspect any job site for workplace hazards.

Both procedures that outline service valve maintenance and replacement state the possibility of gas release. PG&E personnel should have been more diligent in examining the work area to identify possible sources of ignition.

When PG&E personnel performed the “hammer tap” practice to free a stuck valve, they were not following their procedure TD-6100P-01 for maintaining and repairing or replacing valves. This failure to follow procedure violates Chapter 49 CFR §192.605(a) and directly contributed to the incident.

2. U.S. Department of Transportation Chapter 49 CFR §192.605(a): *“(a) 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.”*

PG&E’s current Meter Valve Maintenance procedure (TD-6100P-11) states that valves with a frozen core, or a broken tang should be replaced. Valves that cannot be replaced must be referred to dispatch, and a repair crew must be requested. The current Service Valve Replacement procedure (TD-4150P-01) states that the “service valve must be operational to perform [valve replacement]”. The procedure requires that gas flow be stopped before the valve change tool is attached, but assumes that the service valve is operable. Neither TD-6100P-11 nor TD-4150P-01 provides guidance on pressure control for valves

that are frozen in the open position. Moreover, neither procedure provides guidance on how to proceed with the replacement of a valve which is frozen open.

In its procedures, PG&E does not address how to safely replace frozen valves, or valves that are inoperable due to broken tangs. By not addressing this maintenance issue within its procedures PG&E is in violation of Chapter 49 CFR §192.605(a). The absence of a proper, safe procedure to address these situations contributed to the incident.

3. U.S. Department of Transportation Chapter 49 CFR §192.805(f): *“Each operator shall have and follow a written qualification program. The program shall include provisions to...communicate changes that affect covered tasks to individuals performing those covered tasks”*

Mr. Fenzel stated he was not aware of any procedure that did not involve tapping the valve with a hammer to free it from a frozen position. Both Mr. Fenzel and Mr. Fuller claim that they perform the “hammer tap” procedure often; they were not aware that it was an obsolete procedure, and were not aware it had been superseded by a different procedure. PG&E reports that the procedural change was not formally communicated to the Maintenance and Construction (M&C) crews and supervisors, because those target audiences were listed as “informational only”. TD-6100P-11 is a procedure targeted primarily at Gas Service Representatives (GSRs). TD-4150P-01, which is targeted at M&C personnel, does not reference TD-6100P-11, which contains the note about removing the “hammer tap” guidance.

The elimination of the “hammer tap” procedure without proper communication to the individuals responsible for performing the task is a violation of Chapter 49 CFR §192.805(f), and contributed to the incident.

4. U.S. Department of Transportation Chapter 49 CFR §192.805(b): *“Each operator shall have and follow a written qualification program. The program shall include provisions to...ensure through evaluation that individuals performing covered tasks are qualified [from §192.803: Qualified means that an individual has been evaluated and can: (a) Perform assigned covered tasks; and (b) Recognize and react to abnormal operating conditions.]”*

Mr. Fuller stated in the interview on August 11, 2016 that he did not recall receiving formal training through the Operator Qualification (OQ) training process on “unsticking” a frozen valve; most of his training regarding frozen valves was

“on-the-job”. He stated that more formal training on how to perform maintenance on frozen valves would be helpful. Mr. Fuller also stated that he did not recall being trained on Nordstrom valves at all during his OQ training.

The OQ task identified by PG&E to perform valve replacement is 06-10, “Operate Riser Valve Changer Equipment and Service Riser Thread Replacement (3/4” to 2”)”. Mr. Fenzel had most recently obtained the qualifications to perform that task on 06/16/2016, approximately 2 months before the incident. Mr. Fuller had most recently obtained it on 06/01/2016. Neither Mr. Fenzel nor Mr. Fuller had been informed that the “hammer tap” procedure was obsolete during this training, and had not been trained on how to change a valve that was stuck in the open position. PG&E reported that “valve changer training does not address replacing inoperable valves,” and “Valve changer OQs (OQ 06-10 & OQ 06-23) do not address changing valves that are damaged, e.g. broken tang.”

Both a frozen valve, and a valve with a damaged tang are abnormal operating conditions (AOCs) that effect how maintenance tasks are performed. By failing to train its personnel on how to react to these AOCs, and by failing to evaluate how its personnel react to these AOCs, PG&E was not ensuring that its employees were qualified to perform tasks involving service valve maintenance. This failure to train and to evaluate its employees violates Chapter 49 CFR §192.805(b), and contributed to the incident.

5. U.S. Department of Transportation Chapter 49 CFR §192.801(b): *“For the purpose of this subpart, a covered task is an activity, identified by the operator, that: (1) Is performed on a pipeline facility; (2) Is an operations or maintenance task; (3) Is performed as a requirement of this part; and (4) Affects the operation or integrity of the pipeline.”*

Procedure TD-6100P-11 (Valve Maintenance) states that OQ Requirements do not apply to the procedure, but the GSRs are required to complete training course CSV-0032. TD-6100P-11 includes maintenance tasks like valve inspections, service valve lubrication, and changing valve components.

SED believes that the tasks included in TD-6100P-11 meet the 4 requirements of 49 CFR §192.801(b), and should be considered covered tasks, and therefore would require qualified personnel to perform the tasks. This violation of 49 CFR §192.801(b) did not contribute to the incident, but SED believes it is a deficiency in PG&E’s procedures and their OQ program, and should be addressed.

6. U.S. Department of Transportation Chapter 49 CFR §192.481(a): *“Each operator must inspect each pipeline or portion of pipeline that is exposed to the atmosphere for evidence of atmospheric corrosion, as follows: If the pipeline is located onshore, then the frequency of inspection is at least once every 3 calendar years, but with intervals not exceeding 39 months.”*

The most recent atmospheric corrosion survey records show that the service at [REDACTED] was last inspected on March 19, 2013. The incident occurred on August 10, 2016, approximately 41 months after the last survey. Although the root cause analysis claims that no indication of corrosion was found on the Nordstrom valve threads, there was general corrosion observed on the packing nut, valve plug, and on both the exterior and interior of the valve body. The valve plug, in particular was severely corroded, and the broken surface of the small remaining tang section showed signs of corrosion. Corrosion is a time dependent threat that causes metal loss, and compromises structural integrity if it is left unchecked. The risk of failure due to corrosion increases as time passes without some type of recognition and reaction to the threat. PG&E violated 49 CFR §192.481(a) by failing to perform the atmospheric corrosion survey within 39 months of the previous survey, and that failure increases the risk of failure on their pipeline.