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SED INCIDENT INVESTIGATION REPORTS

**CALIFORNIA PUBLIC UTILITIES COMMISSION
Safety and Enforcement Division
Gas Safety and Reliability Branch**

Incident Investigation Report

Report Date: 01/03/2012

Investigator: Terence Eng

Incident Number: G 20100917-01

Utility: Pacific Gas & Electric (PG&E)

Date and Time of the Incident: 9/17/2010, 10:19:00 AM

Location of the Incident: 19879 San Miguel Ave
Castro Valley, CA
County: Alameda

Summary of Incident:

On 9/17/10 at approximately 1019 hours, a third party contractor digging a new storm drain for the City of Castro Valley (Redgwick Construction Company), struck a 1-inch plastic service at [REDACTED] San Miguel Avenue which released gas into the atmosphere because Pacific Gas and Electric (PG&E) had delineated the pipe insufficiently due to a mapping error. The contractor had a valid USA ticket (#266353). PG&E gas crews arrived on site at approximately 1042 hours and gas flow was stopped at 1056 hours. Gas service to 4 customers was interrupted while repairs were made. Service restoration began at 1207 hours. There were no fatalities or injuries and costs were under \$50,000. The incident became reportable to the CPUC when TV Channels 2, 4 & 5 were observed on the scene. Based on my investigation, PG&E is in violation of Title 49 CFR §192.605(a), §192.605(b)(3), and §192.13(c).

Casualties: None

Property Damage: \$2,000.00

Utility Facilities involved:

Pipe Material = Plastic, Pipe Size = 1 (inches), MAOP = 60 (psi), Operating

Witnesses: None

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Evidence:

<i>Source</i>	<i>Description</i>
1 PG&E	CPUC File No. 420 Final
2 PG&E	30-day Supplemental Report
3 PG&E	Response to Data Request #1
4 PG&E	Corrected Plat Map [REDACTED]
5 PG&E	Gas Service Record
6 PG&E	Gas Dig-In Incident Report (Form "AI")
7 PG&E	USA Ticket
8 PG&E	Response to Data Request #2
9 PG&E	Response to Data Request #3
10 PG&E	Response to Data Request #4
11 PG&E	Response to Data Request #5
12 PG&E	Response to Data Request #6

Observations and Findings:

The pipe was struck because the pipe had not been delineated sufficiently by PG&E due to a mapping error. The mapping error was caused by incorrect field documentation from the historical gas service records.

Both 2005 and 2010 5-year leak surveys were conducted on the uncorrected maps.

PG&E's procedure states:

- A. The method for locating Company underground facilities is conductive (direct connect).
- B. If Company underground facilities cannot be located conductively, perform the following tasks:
 - 1) Review Attachment 2, "Non-Locatable PG&E Underground Facilities," for possible reasons the facility cannot be located.
 - 2) Contact other personnel (e.g., corrosion, electric) for assistance, as appropriate, to locate the facility.
- C. Use the alternate methods listed below in the following order:
 - 1) Inductive clamp
 - 2) Inductive
 - 3) Passive – 50/60 hertz (Hz)
 - 4) Passive – radio frequency (RF)

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5) Map records

PG&E claims that an induced voltage was put on the main, but the signal on a service line off of the main was not strong enough for the mark and locate employee to observe and recognize as a pipe that should be marked. Also, because the pipe was not suspected to be present at the dig-in location due to a map error, and no field evidence suggested a service existed, the locator had no other indications to help locate the service to [REDACTED] San Miguel Avenue using direct connection or passive means.

PG&E claims that the employee did check the surrounding area to look for service meters or other indications of underground facilities. The meter at [REDACTED] San Miguel Avenue is visible from the street and was easily located. In contrast, the gas meter at [REDACTED] San Miguel Avenue is set back behind other buildings and not visible from the street.

The mapping error has been corrected and PG&E claims that plat map errors are found throughout PG&E's service territory and each division is working to correct them as they are identified.

The USA ticket outlined that the contractor's work began on 9/13/10. The dig-in happened on 9/17/10.

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

<i>General Order</i>	<i>GO Rule</i>
1	None

Conclusion:

SED's investigation found PG&E in violation of the following:

Title 49 CFR §192.605(a), §192.605(b)(3):

PG&E did not make accurate construction records, maps, and operating history available to appropriate operating personnel.

Title 49 CFR §192.13(c):

PG&E did not adequately follow its UO Standard S4460 which states, in part, "Area and district superintendents and pipeline and facility engineers shall be responsible for ensuring that their assigned copies of the operating maps and operating diagrams are updated and accurate."

**CALIFORNIA PUBLIC UTILITIES COMMISSION
Safety and Enforcement Division
Gas Safety and Reliability Branch**

Incident Investigation Report

Report Date: 09/04/2014

Investigator: Sikandar Khatri

Incident Number: G 20120621-01

Utility: Pacific Gas & Electric (PG&E)

Date and Time of the Incident: 6/21/2012, 8:50:00 AM

Location of the Incident: [REDACTED] Main Street
Morgan Hill, CA
County: Santa Clara

Summary of Incident:

On 6/21/2012 at approximately 0850 hours, a third party contractor excavating to install a water line struck and damaged an unmarked 3/4-inch steel gas service line causing a release of gas. The third party contractor had a valid Underground Service Alert (USA) ticket (#184217). However, PG&E failed to locate and mark the 3/4-inch steel service. There were no injuries or property damage as a result of this incident. One customer lost gas service and two structures were evacuated as a precaution. The incident was reported to the CPUC due to media attention. Based on SED investigation, PG&E is in violation of California Government Code 4216.3(a)(1), 49CFR §192.605(b)(3), and 49 CFR §192.605(a) for not following its own procedures.

Casualties: None reported

Property Damage: \$2,000.00

Utility Facilities involved:

Pipe Material = Steel, Pipe Size = 0.75 (inches), MAOP = 60 (psi),
Operating Pressure = 56 (psi)

Witnesses: None

Evidence:

<i>Source</i>	<i>Description</i>
1 PG&E	420 - Initial
2 PG&E	420 - Final
3 PG&E	Email correspondence
4 Investigator	Pictures taken and conversation with PG&E employee
5 Investigator	Information gathered from newspaper reporting
6 PG&E	Event Report

Observations and Findings:

On 6/21/2012, a third party contractor, MGE Underground, Inc., was excavating to install a new water line when it struck the service line, partially pulling the 3/4-inch service tee off of its connection to the 4-inch steel main which resulted in a gas release. PG&E's Gas Service Representative responded and was on site at 0935 hours. PG&E gas crew stopped the flow of gas at 1307 hours by excavating and squeezing the gas main on either side of the service tee.

SED investigator visited the incident site on 06/22/2012 and met with PG&E personnel. PG&E employees confirmed that the excavator had a valid USA ticket (#184217) and that PG&E marked the 4-inch steel main; however, the 3/4-inch steel service line was not located and marked.

The PG&E Fieldperson assigned to conduct the mark and locate was operator qualified to perform the task. The representative of MGE Underground requested the USA ticket # 184217 on 05/25/2012. According to PG&E, a PG&E Fieldperson responded to the ticket on 06/07/2012. The Fieldperson met with the contractor and viewed the parameters of the job site. The proposed new water main was to be installed using directional boring and would cross all gas services within the delineated area. From the plat map, the employee noted the gas service in question; however, he did not find any gas riser. He tried to locate the service, but failed to do so and therefore assumed that the service has been deactivated at the main. PG&E further reported that it is unclear on what day the employee attempted to mark the service in question; there was the absence of notes in Irthnet database referring to difficulty locating a gas service. Records indicate the employee worked on and off at the site from 06/07/2012 through 06/13/2012. There was not an entry in Irthnet for ticket # 184217 from 06/13/2013 until 06/19/2012. The Irthnet records show that employee was there on 06/19/2012.

The PG&E "Event Report" for this incident shows that PG&E was at fault, and the employee did not mark a 3/4-inch steel gas service stub resulting in a dig-in incident. The following observations were identified in the "Event Report":

(1) Mapping issue

The damaged service line was built in 1951 and cut (deactivated) at the property line (P/L) in 1966. The crew at that time wrote only a note in "Remarks" section of the original 1951 Gas Service Record stating, "Service was cut back 8 feet out from P/L". The plat map was never updated to show it as a stub (with no riser) rather it remained as complete service. Hence, it was not visible in field and was difficult to locate and mislead the employee. For this reason this stub also did not appear on PG&E's five-year gas stub review program (Utility Procedure TD-9500P-16)

(2) Employees not following work procedure (TD-4412P-03) (this has been replaced now by Standard TD-5811P-104)

The concerned employee is a Fieldperson with 16 years of Company service and seven years of experience performing Locate and Mark. He was OQ'd for 05-01.00 Mark and Locate on 12/11/2009.

The employee did not contact mapping department before the incident when he failed to locate the stub. There was also inadequate documentation in Irthnet regarding the activity of the employee.

In addition, the employee did not communicate to the contractor that there is a possibility of gas line that appears in plat 3541-G1, block 12, and that he could not locate it.

During the investigation by PG&E, the employee mentioned to the PG&E investigator that pressure was felt from supervisor to complete work and assist a colleague with another USA ticket. Additionally, he expressed that at various tailboards, along with other employees, it was mentioned to the Supervisor that the current workload is extremely difficult to manage

(3) The Gas Foreman on repair crew, on the day of incident, did not submit new Gas Service Record indicating the damaged gas service was deactivated at the main after making the repairs. The PG&E investigator notified the Edenvale Gas Construction Supervisor on 08/02/2012 of the above issue and requested new Gas Service Record be submitted to local Gas Mapping.

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

General Order

GO Rule

1 GO 112E

Conclusion:

SED's investigation find PG&E in violation of the following:

- (1) PG&E failed to mark the service line that was hit, and therefore is in violation of California Government Code, §4216.3(a)(1)
- (2) PG&E failed to review its information and maps for accuracy. In addition, PG&E failed to provide its employees the accurate maps and available information in the Gas Service Record that contained the remarks of the PG&E Foreman noting the change made in 1966. This is a violation of 49 CFR §192.605(b)(3).
- (3) PG&E is also in violation of 49 CFR §192.605(a) for not following its own procedures:
 - (a) The mark and locate employee failed to follow the PG&E's procedure TD-4412P-03, and did not contact Mapping Department when he was unable to locate the service line that was struck.
 - (b) Because PG&E did not properly document the service line deactivation, PG&E failed to monitor stub services or to cut off at the main within 1 year of identifying that the stub will not be needed in the future as required by TD-9500P-16.
 - (c) The Gas Foreman on the repair crew that responded on the day of the incident failed to submit a new Gas Service Record to local Gas Mapping indicating that the damaged gas service was deactivated at the main after making repairs. This is a violation of PG&E's procedure S5458 (current version TD-9500P-14).

Corrective actions taken by PG&E, as indicated in "Event Report", include tailboard of concerned employee by Edenvale Damage Prevention Supervisor on TD-4412-03, and a reminder to Edenvale Gas Construction Supervisor to direct the Gas Crew Foreman to submit a new Gas Service Record showing the 3/4-inch steel service stub as deactivated.

A separate letter will be sent to PG&E to notify them of the violations and to obtain status of the proposed corrective actions.

**CALIFORNIA PUBLIC UTILITIES COMMISSION
Safety and Enforcement Division
Gas Safety and Reliability Branch**

Incident Investigation Report

Report Date: 09/11/2014

Investigator: Sikandar Khatri

Incident Number: G 20121010-01

Utility: Pacific Gas & Electric (PG&E)

Date and Time of the Incident: 10/10/2012, 12:45:00 PM

Location of the Incident: Montague Expwy and Great Mall Pkwy
Milpitas, CA
County: Santa Clara

Summary of Incident:

On 10/10/2012 at approximately 1245 hours, PG&E lost service to 987 customers while a gas construction crew was replacing a 6-inch steel gas distribution main with a new 4-inch plastic gas distribution main in the vicinity of Montague Expressway and Great Mall Parkway in Milpitas. Prior to performing the replacement work, PG&E ran an engineering model and determined that the system would have sufficient back feed to maintain service to customers. However, it was later determined that a non-emergency distribution main valve that the engineering model showed to be in the open position was actually in the closed position, preventing back feed to the affected customers. There was no ignition, no injuries and no fatalities as a result of this incident. There were no damages and no gas was released. This incident was reported to the CPUC based on PG&E's judgment due to the large customer outage.

SED found PG&E in violation of Title 49 of the Code of Federal Regulations (49 CFR) Part 192.605(a) for failing to monitor pressure gauges while the job was in progress as required by PG&E standards A-93.1 and D-S0454. Additionally, PG&E is in violation of 49CFR Part 192.605(b)(3) and PHMSA Advisory Bulletin ADB-02-03 because the operating position for valve 3352-E2A reflected on the map did not match the actual field operating position, and hence provided inaccurate information to its personnel. This resulted in inaccuracies in model prediction and thus the loss of service to 987 customers.

Casualties: None

Property Damage: None

Utility Facilities involved:

Pipe Material = Steel, Pipe Size = 6 (inches), MAOP = 60 (psi), Operating Pressure = 55 (psi)

Witnesses: None

Evidence:

<i>Source</i>	<i>Description</i>
1 PG&E	Phone and email contact
2 Media	Media report from internet
3 PG&E	420 Initial report
4 PG&E	420 Final report
5 PG&E	Event Report

Observations and Findings:

On the day of incident, a PG&E crew was preparing to conduct a distribution main transfer by replacing approximately 1600 feet of 6-inch steel main with a new 4-inch plastic main. During this process, the PG&E crew assumed that there would be no gas service disruption to customers based on PG&E's SynerGEE model which showed a back feed that was expected to maintain gas service to customers; however, a closed valve prevented the back feed system from providing continuous service which resulted in loss of gas service to 987 customers. The re-light was completed by 24:00 hours on 10/10/2012.

According to PG&E, the transfer of the distribution main involved tapping and plugging the northern and southern ends of the existing 6-inch steel pipeline. When the two-man tapping crew arrived at the job-site, the Foreman conducted a tailboard explaining that the northern end of the job was already tapped and only needed to be plugged, while the southern end of the job had to be tapped and plugged. The PG&E crew plugged the Pressure Control Fitting (PCF) on the northern end of the job at approximately 0930 hours. The ported plug stopped the flow of gas on the 6-inch steel main being fed from the southern end. The crew reported that there was no change in the gauge pressure north of the plugged PCF at that time. The southern end of line was tapped and plugged at approximately 1120 hours, which deactivated a 1600-foot section of the 6-inch steel main. The Foreman and other crew members stated that pressure gauge on the northern end of job was monitored from 0930 hours to 1120 hours without a drop in pressure. At approximately 1145 hours, with both ends of the 6-inch steel gas main plugged, the crew proceeded to cut and cap the main on both ends and started to tie-in

the new 4-inch plastic main on the southern end. At approximately 1245 hours, PG&E received notices of gas outages. PG&E Gas Construction Supervisor arrived on site around 1300 hours, and at that time, the pressure gauge installed on the northern end read zero. The pressure gauge was not monitored from 1145 hours to 1300 hours. PG&E later discovered that a 2-inch plug valve # [REDACTED], located about five blocks away from where the work was taking place, shown as "OPEN" in plat map [REDACTED] was in fact found "CLOSED" at the time of the incident.

The valve position was manually transcribed as 'OPEN' in the SynerGEE model based on the plat sheet, which resulted in the inaccuracy in the SynerGEE model conducted prior to the distribution main transfer. Since the valve was closed at the time of incident, it prevented gas from being fed from an alternate feed and resulted in the loss of gas service to customers.

PG&E reported that valve # [REDACTED] is a non-emergency gas main plug valve located near the intersection of Main Street and Cedar Way in Milpitas. There is no valve maintenance record available since PG&E considered the valve as a non-critical valve and it is not part of an Emergency Shut Down (ESD) zone [REDACTED]. However, PG&E has confirmed in email response that after the incident, the valve was left in open position, which is its normal position.

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

General Order

GO Rule

1 GO 112E

Conclusion:

SED find PG&E in violation of the following:

- (1) As required by Title 49 of Code of Federal Regulations (CFR) §192.605(a), each operator is required to prepare and follow a manual of written procedures for conducting operations and maintenance activities. PG&E's Gas Standard A-93.1, Section 24(B), "Gauging Requirements/Continuity of Services" states in part, "The pressure gauges shall be monitored by the responsible employee while the job is in progress to see that pressure levels remain satisfactory".

A similar requirement exists in PG&E Standard D-S0454 (Section II (B)). However, the PG&E crew performing the replacement work failed to monitor the gauge for more than an hour as required by Gas Standard A-93.1, during which the pressure dropped to zero.

- (2) Title 49 of the Code of Federal Regulations (49 CFR) Part 192.605(b)(3) states that, "making construction records, maps and operating history available to appropriate operating personnel"

Additionally, PHMSA ADB-02-03 states: "Owners and operators of gas distribution, gas transmission, and hazardous liquid pipeline systems should ensure that accurate construction records, maps, and operating history are available to appropriate operating, maintenance, and emergency response personnel ...", it further adds that, "RSPA urges every pipeline operator to ... (2) keep these maps and records up-to-date as pipeline construction and modifications take place; ..."

PHMSA ADB-02-03 also reminds Operators of their responsibility to maintain construction records, maps, and operating history and to make this information available to appropriate operating personnel to enable them to safely and effectively perform their duties.

PG&E plat map [REDACTED] showed the valve position as "OPEN", when in fact it was "CLOSED" at the time of event. This resulted in inaccurate output from the planning model which considered an "OPEN" valve position as shown on plat map.

In addition to the violations above, PG&E identified the following issues in its Event Report:

- (1) Both PG&E standards, A-93.1 and D-S0454 do not specify how long to monitor the gauge pressure before stopping the flow of gas or how often to monitor the gauge pressure after the pipe has been severed throughout the duration of the job.
- (2) As reported by PG&E, at the time of the event, there was no written clearance procedure in effect for facilities operating at and below 60 psig MAOP. This allowed the job estimate to go to construction without validating the position of the valves.

PG&E's Event Report outlines the corrective action plan to address the findings from this incident, including re-writing Gas Standards D-S0454 and A-93.1, and developing a "Distribution Clearance Procedure". The corrective action plan also requires the San Jose Gas Construction Supervisor to tailboard all construction personnel on monitoring the gas system for the entire duration of the job during a distribution shut down, and requires the Supervising Distribution Engineer for South Bay to tailboard all personnel in the Gas T&R Department to validate valve position prior to approving a job until the new "Distribution Clearance Procedure" is developed and approved.

A separate letter is being sent to PG&E to notify them of the probable violation and to obtain update on the completion of the corrective action plan.

**CALIFORNIA PUBLIC UTILITIES COMMISSION
Safety and Enforcement Division
Gas Safety and Reliability Branch**

Incident Investigation Report

Report Date: 09/25/2013

Investigator: Fred Hanes

Incident Number: G 20130304-01

Utility: Pacific Gas & Electric (PG&E)

Date and Time of the Incident: 3/4/2013, 1:30:00 PM

Location of the Incident: Great Mall Pkwy
Milpitas, CA
County: Santa Clara

Summary of Incident:

At approximately 1330 hours a third party contractor dug into a 2-inch plastic distribution main while excavating to install a storm drain. The contractor had a valid USA ticket (#27199) according to PG&E's own incident report. However, the facilities were not accurately marked within 24 inches of the buried pipeline. There were no injuries, fatalities, or ignition.

PG&E performed a root cause analysis on the mis-marking and found that the Nearest (Electronic Test Station) ETS that the locate crew should have used to connect the tracer equipment was not shown on the plat map. The locate crew used a remote ETS to attach their tracer equipment which produced an inaccurate measurement of the pipeline location. The nearest ETS had been installed in 1994 but was not indicated on the plat map used by the locate crew.

PG&E participates in the California One-Call program to fulfill the damage prevention requirements of 49 CFR 192.614. The PG&E crew marked the pipe location 6 feet away from the actual pipe location. The One-Call program requires that marks be made within 24 inches of subsurface installations (defined under CA Government Code 4216.3[a](1)). Thus, PG&E violated 4216.3[a](1).

Property Damage: \$2,000.00

Utility Facilities involved:

Pipe Material = Plastic, Pipe Size = 2 (inches), MAOP = 60 (psi), Operating Pressure = 57 (psi)

Witnesses: None

Evidence:

<i>Source</i>	<i>Description</i>
1 PG&E	420 Reports
2 CPUC Engineer	Site Photos

Observations and Findings:

SED arrived on site at about 5:00 PM on the day of the incident. The trench was still open and the replacement pipe had been laid in but not reconnected. The damaged pipe branched off a main running under Main Street near Great Mall Parkway. This pipe has only one service to a large apartment building at [REDACTED] Main Street.

SED observed locations of PG&E marks and took photos showing position of marks vs. location of pipe that was hit. The marks were six feet away from the pipeline. A contractor employee mentioned that they had hand dug around the mark but did not find pipe. They decided to expand the trench using a mechanical excavator, rather than contacting the utility for further assistance. The pipe was dug into by the mechanical excavator. Thus the contractor violated California Government Code 4216.4 (b), which requires them to contact the utility for assistance if they do not locate a marked installation by hand digging.

PG&E's incident report confirmed the contractor had a valid USA ticket #27199.

PG&E's Final 420 Report confirmed that the mark painted on the paving was 6 feet away from the actual pipeline location. PG&E participates in the California One-Call program to fulfill the damage prevention requirements of CFR 192.614. The One-Call program in accordance with CA Government Code 4216.3[a](1) requires that marks be made to indicate the "approximate location" of the buried pipeline. CA Government Code 4216(a) defines "approximate location" as within 24 inches of subsurface installations. PG&E has violated 4216.3[a](1).

PG&E conducted a root cause analysis for the mismarking and found that the ETS station for this buried pipeline was not marked on the plat map for the area, so that the mark and locate technician was not able to use the most accurate tracer wire lead point for his location survey. That ETS had been installed in 1994, but the information to include it in a plat map update was not delivered to PG&E's mapping department. After

the incident, PG&E processed a Map Change Request form to add the ETS to the plat map of the area.

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

<i>General Order</i>	<i>GO Rule</i>
1 GO112E	Incorporates CFR192

Conclusion:

The incident was caused by PG&E's failure to mark its facilities within 24 inches of its subsurface facilities, and the third party excavator's failure to contact the utility for assistance when they were unable to positively locate the subsurface facilities as marked by the utility. Thus, PG&E violated California Government Code 4216.3[a](1), which is a requirement from participation in the One-Call program to fulfill the Damage Prevention rules under CFR 49 192.614.

A separate letter will be sent to PG&E to notify them of the probable violation.

**CALIFORNIA PUBLIC UTILITIES COMMISSION
Consumer Protection and Safety Division
Utilities Safety and Reliability Branch**

Incident Investigation Report

Report Date: March 6, 2014

Investigator: Nathan Sarina

Incident Number: G20130730-01

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

Date and Time of Incident: 7/30/2013, 17:17

Location of Incident: [REDACTED] Charleston Road
Mountain View, CA
County: Santa Clara

Summary of Incident:

On 07/30/2013, a PG&E crew welded a tap fitting onto a 1 ¼ inch steel service line casing in Mountain View. The PG&E crew was not aware that the 1 ¼ inch steel service line casing had an inserted 1-inch plastic line. The 1-inch plastic insert melted causing a release of gas which went unnoticed due to the gas traveling down the steel service line casing away from the work area. There was no injury, fatality or property damage as a result of this incident. PG&E is in violation of 49 CFR Part 192.605(b)(3) which requires that construction records, maps and operation history be made available to appropriate operating personnel. The record provided to the PG&E crew did not accurately reflect the inserted plastic service line.

Fatality/Injury: None Reported

Property Damage: \$10,000.00

Utility Facilities Involved:

Pipe Material = Plastic, Pipe Size = 1 (inches), MAOP = 60 (psi), Operating Pressure = 57 (psi)

Witnesses/ Person(s) Involved:

- 1) [REDACTED], PG&E Welder

Evidence:

	Source	Description
1	PG&E	30 Day Supplemental Report
2	PG&E	Final 420 Report
3	PG&E	Data Request #4160
4	PG&E	Data Request #4221
5	PG&E	Data Request #4243

Observations and Findings:

On July 30, 2013 at approximately 12:30 pm, [REDACTED], a PG&E welder, welded a tap fitting onto a 1 ¼-inch steel service line casing at [REDACTED] Charleston Road, Mountain View. This work was done as part of a project to replace 1575 feet of 2-inch steel distribution main with 1300 feet of 2-inch plastic distribution main. Additionally the project included the transfer of three inserted gas service lines ([REDACTED] Charleston Rd) to the new plastic distribution main, the installation of one new gas service line and the replacement of four steel gas service lines ([REDACTED] Charleston Rd) to plastic line. The PG&E crew was not aware that the 1 ¼ inch steel service line casing had an inserted 1-inch plastic line. The 1-inch plastic insert melted causing a release of gas and the damage is shown in Figure 1.



Figure 1. Damaged plastic service line insert and the tapping fitting welded onto the steel casing.

The gas leak was not immediately detected because the leaking gas traveled down the 1 ¼-inch line, away from the work area, before escaping to atmosphere. PG&E Gas Dispatch was notified by the Mountain View Fire Department approximately 5 hours later at 17:17 of a gas odor and an area of the street where the pavement had risen around [REDACTED] Charleston Road. PG&E

noticed Major Bay Area news media (ABC 7) on site at 2130 hours, making this incident reportable to the California Public Utilities Commission (CPUC).

The 1 ¼-inch steel service line for address [REDACTED] Charleston Road, Mountain View was originally installed in 1947. The plastic pipe that melted is NIPAK TR 418 and the date of manufacture was June 21, 1972. PG&E identified the pipe material based upon a visual examination and the pipe is shown in Figure 2.



Figure 2. NIPAK TR-418 pipe with welding damage (Data Request #4160 "TR-418.pdf").

PG&E stated that the crew foreman typically uses the plat map to identify the facilities in the field. In this case, the crew foreman used construction documents for the replacement project as well as the plat map (Data Request #4160 "Plat_Map_CONF.pdf") neither of which indicated the presence of the plastic insert. The relevant portion of the Plat map is in Figure 3.

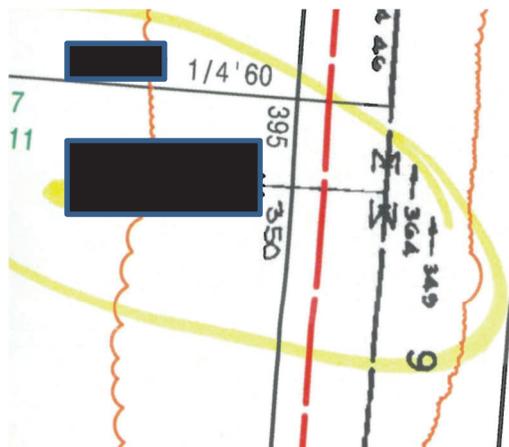


Figure 3. Plat map [REDACTED] showing address [REDACTED] Charleston Road and a 1 ¼ inch steel service line.

PG&E believes that sometime between 1972 and the mid 1980s the plastic line was inserted. The date of pipe manufacture does not narrow down the installation date, as PG&E Gas Standard A-93.1 Revision 1 dated 04-17-73 only limits the length of time that materials can be stored in direct sunlight to no more than one year and does not limit the length of time that polyethylene can be

stored. The plat map indicates a 1/2-inch plastic line inserted into a steel service adjacent to the incident location at [REDACTED] Independence Avenue in 1986.

The covered tasks required for this replacement project include Valve Tapping (OQ06-02) and Leak Test-Soap Test (OQ04-01). Additionally the project requires a welder qualification for welding tasks. The records for the PG&E crew working on the project were reviewed and found as current. (“OQ Record_CONF.pdf” and “Welder Qualification_CONF.pdf”)

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

49 Code of Federal Regulations (CFR) Part 192.605(b)(3) which states, *“Making construction records, maps, and operating history available to appropriate operating personnel.”*

Preliminary Conclusion:

This incident was caused by PG&E’s failure to provide accurate information about the service line to its workers. Therefore, I find PG&E in violation of Title 49 CFR § 192.605(b) which states in part: *“The manual required by paragraph (a) of this section must include procedures for the following, if applicable, to provide safety during maintenance and operations... (3)Making construction records, maps, and operating history available to appropriate operating personnel.”*

Additionally, PHMSA Advisory Bulletin (ADB-02-03) issued on June 13, 2002 further states: *“The maps or associated records should provide... (4)The diameter, grade, **type**, and nominal wall thickness of pipe... RSPA urges every pipeline operator to ... **keep these maps and records up-to-date as pipeline construction and modifications take place...**”* [Emphasis added]

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

Incident Investigation Report

Report Date: 11/13/2014

Investigator: Nathan Sarina

Incident Number: G 20140303-01

Utility: Pacific Gas & Electric (PG&E)

Date and Time of the Incident: 3/3/2014, 11:15:00 AM

Location of the Incident: [REDACTED] Guadalupe Street & 3rd Avenue
Carmel-by-the-Sea, CA
County: Monterey

Summary of Incident:

On 3/3/2014 at approximately 11:15 am, a natural gas explosion destroyed a house (Service Number [REDACTED]) located at the Southwest corner of Guadalupe Street and 3rd Avenue in the city of Carmel-by-the-Sea (Carmel). Prior to the explosion, a Pacific Gas and Electric (PG&E) welding crew was preparing to tie-in the gas distribution main along 3rd Avenue into the newly installed plastic main on Guadalupe Street. The PG&E welding crew welded a tapping tee onto a 2-inch steel distribution main on 3rd Avenue, when the welding crew discovered that the steel distribution main had an inserted 1 ¼-inch plastic line. The inserted plastic main was damaged by the welding and tapping process which caused the natural gas to escape the plastic main. Natural gas migrated into the residential structure and later resulted in an explosion. The estimated cost of the damage is \$302,000. There were no injuries or fatalities as a result of this incident. Safety and Enforcement Division's (SED) investigation found that PG&E's violations of Title 49 of the Code of Federal Regulations (49 CFR) Part 192 Sections 605(a) for failing to follow procedures to update records and 605(b)(3) for failing to provide PG&E's welding crew with accurate information, contributed to the incident. SED also found PG&E in violation of 49 CFR § 192.615(a)(7) for failing to make safe any actual or potential hazard to life or property. SED also found PG&E in violation of PU code 451. PG&E shall determine the need to provide its personnel with the equipment, tools, and materials to react to potential AOCs and emergencies that may be encountered while performing assigned tasks under 192.615(a)(4).

Casualties: None reported

Property Damage: \$302,000.00

Utility Facilities involved:

Pipe Material = Plastic, Pipe Size = 1.25 (inches), MAOP = 60 (psi), Operating Pressure = 50 (psi)

Witnesses:

<i>Name</i>	<i>Title</i>
1 [REDACTED]	Underground Construction
2 [REDACTED]	PG&E Journeyman Welder
3 [REDACTED]	PG&E Apprentice Welder
4 [REDACTED]	PG&E Apprentice Welder
5 [REDACTED]	PG&E Journeyman Welder
6 [REDACTED]	Canus Inspector
7 [REDACTED]	PG&E Foreman
8 [REDACTED]	Pedestrian, witness

Evidence

<i>Source</i>	<i>Description</i>
1 PG&E	Intial 420 Report
2 PG&E	Data Request 4859
3 PG&E	Data Request 4775
4 PG&E	Data Request 4870
5 PG&E	Data Request 4870 Supplemental
6 PG&E	Final Form 420 Report
7 PG&E	30 Day Supplemental Report
8 PG&E	Exponent Final Report

9 PG&E	PG&E Comments Exponent Report
10 Carmel Police Department	Timeline
11 Carmel Police Department	Incident Report - Case # CG1400110
12 Monterey Fire Department	Fire Report 14-0001163
13 PG&E	Data Request 4992
14 PG&E	Data Request 5049
15 PG&E	Data Request 5143
16 PG&E	Data Request 5307
17 PG&E	Data Request 5479
18 PG&E	Data Request 5528
19 PG&E	Data Request 5581
20 PG&E	Data Request 5793

Observations and Findings:

Background

On 11/18/2013, PG&E started its Aldyl-A replacement work in the City of Carmel under Project [REDACTED] which includes deactivation of the existing 2-inch Aldyl-A distribution main on Guadalupe Street from Ocean Avenue to 3rd Avenue, tie-in of the newly installed 2-inch plastic distribution main, and transfer or replacement of existing services. PG&E contracted with Underground Construction to install the new 2-inch plastic distribution main and hired Canus Inspection to oversee work performed by Underground Construction. Most of the new plastic pipe installation was installed using directional boring which was subcontracted by Underground Construction to California Boring Co.

On 3/3/2014, PG&E General Construction (GC) welders were assigned to tap and tie-in the existing steel main on 3rd Avenue into the newly installed plastic main on Guadalupe Street. When the PG&E welders arrived on-site, they met with the Canus Inspector, who provided the PG&E welders with Plat [REDACTED] showing the gas facilities in the area. According to PG&E, the plat is maintained by the Central Coast Division Mapping Department and was provided to the Canus Inspector by the PG&E General Construction Field Engineer 1¹. The PG&E welders were divided into two crews to work in two different locations. The first crew (Welding Crew 1) comprised of two PG&E crew members, Journeyman Welder 1 and Apprentice Welder 1. Welding Crew 1 was assigned to work in a bell hole at the intersection of 3rd Avenue and Guadalupe Street. The second crew (Welding Crew 2) comprised of two additional welders, Journeyman Welder 2 and Apprentice Welder 2. Welding Crew 2 worked further up on Guadalupe Street at another bell hole. Foreman 1 for these two crews would be performing the

¹ PG&E Data Request – Index No. 4775.03

final tie-in between the existing steel main and the recently installed plastic main.

Pre-incident Construction Work

At the beginning of the job that day, the welding crews had a meeting which included a tail board briefing and a review of the job print which showed the steel main on 3rd Avenue². The tailboard discussed 3 worksite hazards and 3 job specific tasks that would be performed. Plat [REDACTED] showed a 2-inch steel distribution main along 3rd Avenue and a 3/4-inch steel service to service number 19071³ as shown in Figure 1. The yellow box shows approximate PG&E work area and the green box shows the location of PG&E service number [REDACTED].

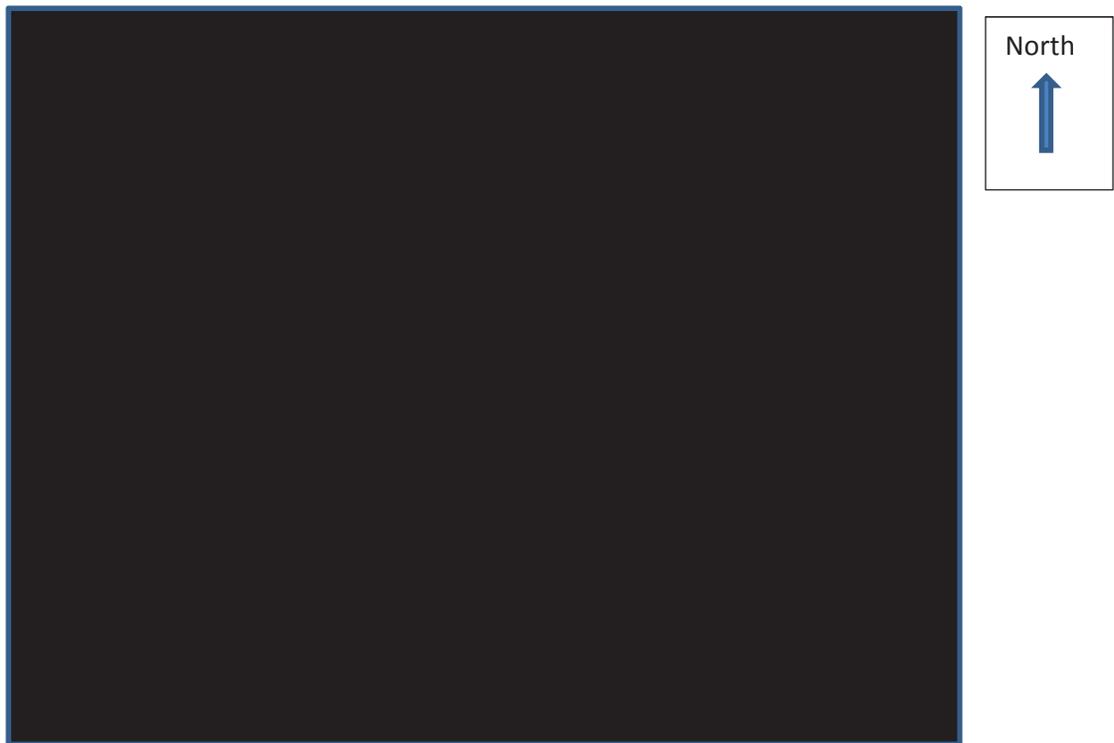


Figure 1: Section of Plat [REDACTED].

Welding Crew 1 welded and tapped a save-a-valve on the 2-inch steel pipe to install a pressure gauge and to verify presence of natural gas in the steel main. The pressure gauge reading was reported at 48 psig⁴ between 10:00 am and 10:15 am. Welding

² Exponent ([REDACTED]) interview notes on March 5, 2014 – [REDACTED]

³ Service number [REDACTED] is the service line to the residential structure damaged by the explosion.

⁴ The main has a normal operating pressure of 48 psig and a maximum allowable operating pressure (MAOP) of 52 psig.

Crew 1 then proceeded to weld and tap into the 2-inch steel pipe using a M2 line stopper between 10:15 am and 10:35 am. During the removal of the tapping tool for the M2 line stopper, a metal and plastic coupon were extracted. At this point, Welding Crew 1 realized that they were working on an inserted plastic main.

Emergency Response

After the extraction of the coupon, Welding Crew 1 realized that they had tapped into an inserted plastic main. Canus Inspector reported that when he returned to the site, he noticed the plastic coupon on the tapping machine and attempted first call to PG&E Central Coast Division Supervisor at 10:38 am and left a message as call was not picked up⁵. Canus Inspector was able to reach PG&E Central Coast Division Supervisor at 10:46 am. The PG&E GC welding crew did not have the tools necessary to shut off the gas⁶, thus Central Coast Division Supervisor dispatched a PG&E Central Coast division crew (Division Crew) to respond to the scene. The Division Crew⁷ had just finished a leak repair in Pacific Grove when they received the call from Central Coast Division Supervisor at 10:52 am and were en route by 11:07a m⁸. Canus Inspector stated that there was no smell of gas at the excavation site, but that gas could be smelled west of the bell hole at 3rd Avenue and Guadalupe Street. Pedestrian 1, a pedestrian walking by the area, stated that she noticed the gas odor before the explosion. The house exploded around 11:15 am, approximately half an hour after Welding Crew 1 realized that the inserted plastic distribution main had been breached.

After the house explosion, the first 911 call from a neighbor was recorded at 11:16 am. Canus Inspector called 911 at 11:17 am. Fire fighter engine 6415 was dispatched at 11:18 am and arrived on scene at 11:23 am. The fire department report notes that a small fire was extinguished. The fire department reports that, "*The Incident Command (IC), after conferring with PG&E supervisors, initiated an approximately 1 block evacuation zone around the explosion site because of concerns that there might be a buildup of natural gas in the area or another structure.*" Similarly, the Carmel Police report CG1400110 noted, "*During the initial assessment of the scene, PG&E requested we evacuate the residence nearby.*"

The division crew arrived at 11:38 am and stopped the flow of gas at 11:45 am. The division crew stopped the flow of gas by squeezing the steel casing down around the inserted plastic main at the east and west ends of the bell hole as shown in Figure 2. Additionally, PG&E conducted a special leak survey in the aftermath with no further indication of natural gas.

⁵ Exponent timeline using PG&E cell phone call history

⁶ Exponent () interview notes March 4, 2014 – ()

⁷ PG&E Central Coast Division crew: () (Apprentice Fitter), () (Apprentice Fitter), and () (Fitter)

⁸ PG&E Data Request Index #4992.

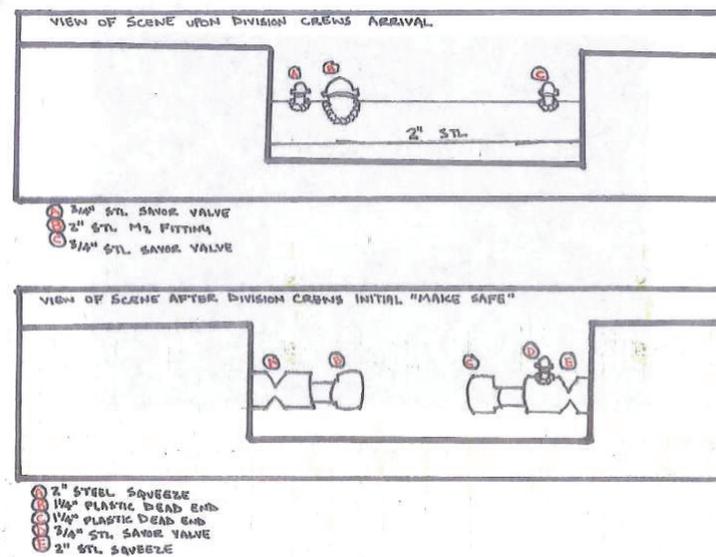


Figure 2: Sketch of how the division crew stopped the flow of gas⁹

In the event that the PG&E crew had been unable to reach the supervisor it is expected that the crew would then call their local operating clerk, who will then locate another supervisor or superintendent.

Records Review

Following the incident, PG&E conducted a record search for documents containing information about the inserted plastic main on 3rd Avenue, between Santa Rita and Guadalupe Streets. PG&E found the job package for the installation of the plastic main on Guadalupe Street, but there were no records found on the installation of the inserted plastic on 3rd Avenue. According to PG&E, the only available document containing information about the main was Plat [REDACTED] that was used by the PG&E GC welding crew on the day of the incident. Furthermore, the project documents issued for job [REDACTED] also showed 2-inch steel main as shown on Figure 3.

⁹ PG&E A-form Leak [REDACTED]



Figure 3: Issued for construction drawing.
The red circle shows a 2-inch steel main along 3rd Avenue.

The inserted plastic on 3rd Avenue has a stamp of “071797” which indicates a manufacturing date of 7/17/1997, as shown in Figure 4. PG&E believes that the 1- $\frac{1}{4}$ inch plastic main was inserted into the 2-inch steel main sometime in 1997-1998. Similarly, the service line for customer service number [REDACTED] 3rd Avenue and Guadalupe Street also had an inserted plastic service shown in Figure 5. However, Plat [REDACTED] shows a $\frac{3}{4}$ -inch steel service pipe instead of an inserted $\frac{1}{2}$ -inch plastic service. Figure 6 shows a stamped date on the inserted service as “052697” indicating a manufacture date of May 26, 1997.

Since PG&E was not able to find any records pertaining to the plastic insert on 3rd Avenue, it is not possible to determine what part of the PG&E process failed and resulted in an inaccurate map record. It is possible that the construction crew that performed the plastic insert failed to turn in the as-built documentation to PG&E’s mapping group or that the mapping group received the documentation, but failed to update the map records. Regardless of the specific process failure, PG&E did not have a formal Quality Assurance/Quality Control (QA/QC) process in place at the time to prevent recordkeeping errors from taking place. PG&E expected that mapping leads would review a mapper’s work prior to the map being accepted.



Figure 4. Date stamp on inserted plastic main indicating 071797



Figure 5: The service riser inserted with plastic.



Figure 6: Date stamp on inserted plastic for service of [REDACTED] indicating 052697.

Failure Analysis

In the aftermath of the incident, PG&E hired a third party company, Exponent Failure Analysis Associates (Exponent), to conduct a failure analysis investigation of the incident. Examination of the 1-1/4 inch plastic distribution main showed that the inserted plastic main was damaged in two sections during the welding and tapping process. The welding and tapping of the save-a-valve caused the smaller hole in the 1 1/4-inch plastic main. At this point, gas was flowing down the annular space between the plastic main and steel casing, as shown in Figure 7, which was why the PG&E welders reported reading 48 psig with the pressure gauge. A reading of 48 psi would not be an indicator that there existed a problem as it is close to the operating pressure of 50 psi that the main typically is at.

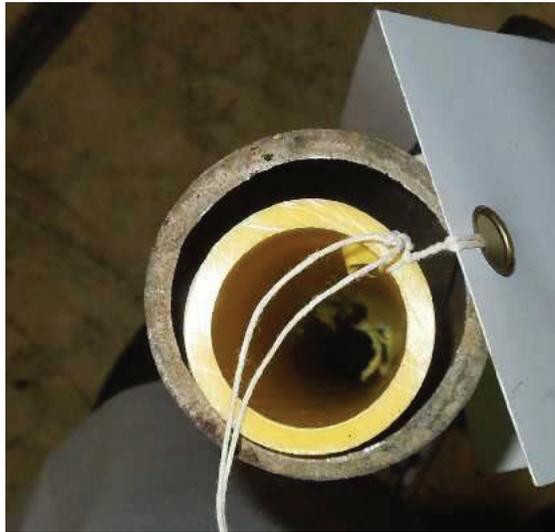


Figure 7: 1-1/4 plastic main inserted into 2 inch steel.

The welding and tapping of the M2 line stopper later caused a larger hole on the inserted plastic main causing further release of natural gas from the inserted plastic main. Figure 8 shows the smaller and larger holes caused by the installation of the save-a-valve and line stopper. The larger hole on the left was caused during the installation of M2 line stopper and the smaller hole on the right was caused by the save-a-valve installation.



Figure 8: Damaged plastic main insert and steel casing showing two damaged locations.

On 3/21/2014, SED witnessed Exponent perform a gas migration test using helium to investigate the likely gas migration path. The test demonstrated that it was possible for the gas to flow through the annular space between the plastic main and steel casing, and that gas escaped from the steel casing through the break, where the customer's service line was connected to the main. The natural gas migrated into the soil downwards to the sewer lateral, and through an opening in the sewer lateral. The break in the sewer lateral provided a migration path into the house. Natural gas accumulated inside the house until it reached the explosive limit around an ignition source, suspected to be the stove pilot light.

Operator Qualification

Records of Operator Qualification (OQ) for the PG&E GC welding crew were reviewed for the covered tasks of Tapping and Plugging. Welding Crew 1, Journeyman Welder 1 and Apprentice Welder 1, were both qualified to perform tapping for the Save-A-Valve (OQ-0601) and Operating Line Stop M2 (OQ-0602). Additionally, both had the necessary welder qualifications to weld on the tapping fittings.

The material used to train the Welding Crew 1 for tapping and plugging, Gas 0192 - Mueller Tapping and Plugging (Gas 0192), was reviewed. PG&E's Gas 0192 lists abnormal operating conditions (AOCs) that employees must recognize and react to while performing the covered tasks. Examples of AOCs listed included uncontrolled leakage of natural gas and pipeline system damage. PG&E's Gas 0192 did not include specific responses for the AOCs. However, PG&E personnel, including the welding crew on site, are trained in PG&E's Gas Emergency Response Plan (GERP) which requires that personnel must make the area safe and contact their supervisor for any potentially hazardous situation.

Prior to the explosion, PG&E GC welding crew attempted to “make the area safe” by preventing pedestrian and vehicular traffic from entering the area. Additionally, calls were made to two different supervisors informing them of the circumstances.

Alcohol and Drug Testing

PG&E performed drug and alcohol tests on the five PG&E employees involved in the accident. Results of the tests on all five employees returned negative for drugs and alcohol. Although the tests were not performed within two hours of the accident, PG&E has noted reasonable cause for not performing the tests promptly¹⁰. PG&E’s stated that the employees were involved in securing the site after the explosion, as well as shutting down the gas, which delayed the administration of the testing. SED finds this to be a valid reason to delay testing. The alcohol tests occurred between 14:27 and 15:03 well within the 8 hour time frame that would require PG&E to stop trying to test for alcohol. The drug testing occurred at that time as well.

Mapping Procedures

In 1997 and 1998, the applicable mapping procedure for PG&E was Mapping Standard 410.21-1. After the insertion of the plastic pipe into the main and service by field crews, a record of change is turned in to the PG&E’s mapping group. Mapping Standard 410.21-1 sections, “II. Gas Mains. 15. Insert Mains...” and “III. Gas Services. 9. Insert Service...” required an update of the existing maps to reflect the conditions that existed in the field. As of 08/15/2014 PG&E has been unable to find any record of the plastic insertions that took place along 3rd Avenue in Carmel.

PG&E is currently using SAP to manage jobs. The tasks needed to complete the job are assigned out to different individuals. Within the mapping process a “Mapper” would be assigned to map the job and a “Lead Mapper” will QA/QC the map prior to being posted and used as a live document. PG&E is running quarterly reports in SAP to ensure that a different mapper is completing each task within the mapping process. PG&E currently pre-maps work prior to construction starting, allowing for an additional opportunity for review.

Post Accident Actions

PG&E implemented new safety protocols for distribution tapping work. PG&E released 5 Minute Meeting to assist field personnel in identifying whether or not a steel pipe has been inserted with a plastic pipe. It involves a record review step, jobsite review, and a physical verification step. The jobsite review requires field inspection of the facilities to verify that the facilities in the field matches the records. The physical verification step is

¹⁰ Title 49 CFR 199.225(a)(2)(i) states, “If a test required by this section is not administered within 2 hours following the accident, the operator shall prepare and maintain on file a record stating the reasons the test was not promptly administered.....”

an additional step which utilizes existing fittings to check for presence of gas. The Gas Carrier Pipe Checklist was also developed and provided to field personnel to document actions required by the 5 Minute Meeting.

In order to track the success of the Gas Carrier Pipe Checklist PG&E's distribution Quality Control team will perform assessments of gas distribution construction work across PG&E's system to ensure that field personnel are properly using the Gas Carrier Pipe Checklist, and that work is performed in accordance to PG&E standards and procedures.

On 3/21/2014, PG&E published TD-4150P-110 – Continental Steel to PE Mechanical Bolt-On Saddle Punch Tee to supplement the physical verification step outlined in the 5 Minute Meeting. The purpose of the Bolt-on Saddle Punch Tee is to prevent failure of inserted plastic lines, as the Bolt-on Saddle Punch will not pierce into an inserted plastic. Additionally, in the aftermath of the incident, PG&E performed testing and determined that the heat from welding caused the plastic pipe to fail before the pipe was bored into¹¹. The use of the mechanical fitting would prevent failure of an unknown inserted plastic line caused by the heat generated from the welding process.

On 6/03/2014 SED engineers witnessed a test of the Continental Steel to PE Mechanical Bolt on Saddle Punch Tee on a 1 ¼-inch plastic inserted into 2-inch steel. The test demonstrated that when tapping, the punch goes through the pipe and that there is a taper down to the punch which provides a hard stopping point for the punch. The punch pushed the plastic insert down to the bottom of the casing and lightly scored it, without breaching the plastic pipe. PG&E also presented shop testing information that showed under what conditions weld heat would cause an inserted plastic pipe to leak.

Additionally PG&E has taken the following additional actions, some of these items will be applied system wide with others being applied to the city of Carmel specifically.

1. In addition to its distribution crews, PG&E has trained general construction employees working on gas projects in the city of Carmel on proper use of pipe squeezers. Additionally, all crews working in the city of Carmel have been equipped with the necessary emergency tools. PG&E will be expanding its training on the use of pipe squeezers and will equip all general construction employees system-wide with the necessary emergency tools.
2. PG&E requires that safety briefings be conducted prior to commencing work at a job site to review potential safety issue including emergency protocols pertinent to the specific activities performed. The Job Site Safety Analysis (JSSA) form will be modified to provide better guidance and ensure that the safety briefings are comprehensive.

¹¹ Data Request 5143.

3. PG&E is treating all odor calls in the city of Carmel as immediate response. This requires PG&E to immediately dispatch personnel to respond to a gas odor call in the city of Carmel. PG&E's goal for 2014 Immediate Response time is 21 minutes.
4. Coordinate with Carmel City Staff on Construction Projects. PG&E will have a designated Project Manager who will coordinate with the City of Carmel on permitting requirements and ensure that all work is performed in accordance with city requirements. A PG&E field inspector will also be assigned during construction to work closely with the City's inspector. PG&E will continue to engage the City staff throughout the construction project including but not limited to pre-construction walk through inspection, pre-construction tailboard training with PG&E crews, and regular site visits.

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

<i>General Order</i>	<i>GO Rule</i>
1. General Order 112E	49 CFR § 192.605(a)
2. General Order 112E	49 CFR § 192.605(b)(3)
3. General Order 112E	49 CFR § 192.615(a)(7)
4. General Order 112E	49 CFR § 192.615(a)(4)
5. Public Utilities Code	PU 451

Summary of Findings:

1. PG&E believes that the plastic pipe main on 3rd Avenue and the service line to the damaged house was inserted in 1997-1998. PG&E's Mapping Standard 410.21-1 in effect during this time period states in part, "*II. Gas Mains. 15. Insert Mains. When a main is installed within an old main, the original size shall follow the kind of pipe in parentheses...*" Additionally PG&E's Mapping Standard 410.21-1 states in part, "*III. Gas Services. 9. Insert Service. ...when a new service is installed within an old service, the new size...old size shall be shown beneath...*"

PG&E failed to follow Mapping Standard 410.21-1 and update records of the gas distribution system when the distribution main along 3rd Avenue in Carmel was inserted with 1 ¼-inch plastic. Similarly, PG&E failed to follow and update its records when the service line to the house damaged by the explosion was inserted with a ½-inch plastic. Therefore, SED finds PG&E in violation of Title 49 CFR § 192.605(a) which states in part:

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

2. PG&E did not find records pertaining to the inserted plastic on the main on 3rd Avenue. The plat provided to the contractors and PG&E welding crews contained historical information regarding the original installation of the 2-inch steel main, and did not reflect the plastic insertion work that occurred sometime in 1997-1998.

On 6/13/2002, Pipeline and Hazardous Materials Safety Administration (PHMSA) issued an Advisory Bulletin (ADB-02-03) which states in part: *"The maps or associated records should provide... (4)The **diameter**, **grade**, **type**, and **nominal wall thickness of pipe**... RSPA¹² urges every pipeline operator to ... keep these maps and records up-to-date as pipeline construction and modifications take place..."* [Emphasis added]

PG&E's failure to update its records led to the company providing incomplete information about the distribution main to its workers. Therefore, SED finds PG&E in violation of Title 49 CFR § 192.605(b) which states in part:

"The manual required by paragraph (a) of this section must include procedures for the following, if applicable, to provide safety during maintenance and operations ...

(3)Making construction records, maps, and operating history available to appropriate operating personnel."

3. PG&E's Gas Emergency Response Plan (GERP) defines a gas emergency as *"An actual or potential hazardous escape of gas."* Additionally, PG&E's GERP states that "Make Safe" activities are explicitly built into the Training Aids and that actions may include restricting access to the site, eliminating ignition source, closing valves, or engaging automatic shut-off switches¹³.

After the inserted plastic main was damaged, there was an uncontrolled release of gas and the gas had an unknown migration path, representing a potentially hazardous escape of gas. PG&E GC welding crew made the immediate excavation area safe by preventing vehicular and pedestrian traffic near the excavation site. The field crew also contacted the responsible supervisors and requested for assistance to shut off the gas flow.

On 5/16/2001, PHMSA released Advisory Bulletin (ADB-01-02) which states in part: *"Owners and operators of gas distribution systems should ensure that their emergency plans and procedures require employees who respond to gas leaks to consider the possibility of multiple leaks, to check for gas accumulation in nearby buildings, and, if necessary, to take steps to promptly stop the flow of gas."*

¹² Research and Special Programs Administration (RSPA) of the Office of Pipeline Safety

¹³ PG&E GERP Volume 1, Version 3, Page 1-4 and 2-12

PG&E's GERP Training Aid 13 – Outside Gas Leak and Odor Investigation in effect at the time of the incident requires an assessment of the situation and to check if people are in danger and if so, to get them out of danger. PG&E's GERP did not explicitly require checking for possibility of multiple leaks or gas accumulation in nearby buildings as stated in the PHMSA Advisory Bulletin, however an assessment of the condition implies the need to evaluate the extent of the leak. Prior to the explosion, PG&E reported that although they did not smell gas at the excavation site, there was a smell of gas coming west of the site¹⁴. Statement from a pedestrian walking by the area also mentioned smelling gas odor prior to the explosion. However, there were no additional actions taken to further assess the extent of the gas leak. With no additional actions taken to assess the extent of the gas leak the area was not made safe against hazards to life or property.

There were further steps that PG&E could have taken that would have provided additional levels of safety. While PG&E would not have been able to determine where all the gas was migrating to, there were indications of gas odor smell west of the excavation site. An additional step could have been going door to door to the west of the excavation site and checking customers who may be home. This would have provided PG&E the opportunity to inform and warn customers of the gas leak. Additionally, local first responders such as the fire department could have been contacted to assist in notifying nearby residents of the leak, including possible evacuation, prior to the explosion. It is imperative that PG&E trains its personnel on how to apply its GERP in emergencies.

Title 49 CFR § 192.615(a)(7) states:

“Each operator shall establish written procedures to minimize the hazard resulting from a gas pipeline emergency. At a minimum, the procedures must provide for...(7) Making safe any actual or potential hazard to life or property.”

4. PG&E's failure to adequately equip their GC welding and OQ qualified personnel with the tools necessary to stop the uncontrolled flow of gas especially in light of their recordkeeping deficiencies, 7/30/13 Mountain View incident, 2/27/14 near miss, constitutes a violation of PU code 451. Further Subpart N of 49 CFR 192, amongst other criteria, identifies OQ personnel as those who are trained to “recognize and react to abnormal operating conditions.” SED believes that reacting to such an AOC involves the utility equipping crews tapping into a live gas system with the tool necessary to “react” by promptly stopping the flow of gas and not merely cell phones.

¹⁴ Exponent () Interview Notes –

PU code 451 states:

“...Every public utility shall furnish and maintain such adequate, efficient, just, and reasonable service, instrumentalities, equipment, and facilities, including telephone facilities, as defined in Section 54.1 of the Civil Code, as are necessary to promote the safety, health, comfort, and convenience of its patrons, employees, and the public.

All rules made by public utility affecting or pertaining to its charges or service to the public shall be just and reasonable.”

Recommendations

1. Three of the PG&E GC personnel present at the incident site were qualified for squeezing steel pipe under PG&E's OQ-0203 Pipe Squeezing - Steel. Foreman 1, Journeyman Welder 1 and Journeyman Welder 2 had the training and qualifications to squeeze the steel main at the time of the incident if steel squeezers were available at the site. This would have allowed the crew already on-site to isolate the breached section at an earlier time if the equipment had been available. With the appropriate tools and training the leak could have been potentially shut off before the explosion.

Title 49 CFR § 192.615(a)(4) states:

“Each operator shall establish written procedures to minimize the hazard resulting from a gas pipeline emergency. At a minimum, the procedure must provide for... (4) The availability of personnel, equipment, tools, and materials, as needed at the scene of an emergency.”

In light of this incident, PG&E should evaluate the effectiveness of its emergency procedures and determine the need to provide its personnel with the necessary equipment, tools, and materials to react to potential AOCs and emergencies that may be encountered while performing various tasks.

2. When examining Gas 0192 - Mueller Tapping and Plugging (Gas 0192), PG&E's training for tapping, the possible AOCs that personnel would need to recognize are explicitly called out. The actions needed to be taken after the recognition that an AOC exists are not explicitly called out. PG&E has stated that the actions taken by its employees after recognition of an AOC are contained within its GERP. While there is no requirement that AOCs and the responses be contained in the same document, PG&E should make clear the interplay between the recognition of AOCs and the response dictated by PG&E's GERP.

3. In light of the recordkeeping error PG&E should take additional steps that would mitigate possible recordkeeping issues. These should be actions taken to either verify the material in the ground or testing that would confirm the accuracy of the available record.

Appendix A. Composition of Crew

Welding Crew 1: [REDACTED] (Journeyman Welder), [REDACTED]
(Apprentice Welder)

Welding Crew 2: [REDACTED] (Journeyman Welder), [REDACTED] (Apprentice
Welder),

Journeyman Welder 1: [REDACTED]

Apprentice Welder 1: [REDACTED]

Journeyman Welder 2: [REDACTED]

Apprentice Welder 2: [REDACTED]

Foreman 1: [REDACTED]

Construction Field Engineer 1: [REDACTED]

Canus Inspector: [REDACTED]

PG&E GC Supervisor: [REDACTED]

PG&E Central Coast Division Supervisor: [REDACTED]

Pedestrian 1: [REDACTED]

Appendix B. Timeline

Time (year/month/day):hour	Activity
1997-1998	2 inch main and ¾-inch service line inserted and is unmapped. ¹⁵
2014/03/03:(10:00-10:15 am)	Welding Crew 1 installed and tapped a save-a-valve ¹⁵ . Gas leak begins.
2014/03/03:(10:15-10:35 am)	Welding Crew 1 installed and tapped a M/2 line stopper. ¹⁵
2014/03/03:(10:38 am)	Canus Inspector called Central Coast Division Supervisor to report. Call was not picked up, so Canus Inspector left message. ¹⁵
2014/03/03:(10:39-10:42 am)	Canus Inspector made calls to locate Central Coast Division Supervisor. ¹⁵
2014/03/03:(10:46-10:49 am)	Canus Inspector spoke with Central Coast Division Supervisor. Central Coast Division Supervisor confirms that responding crew would have hydraulic squeezers. ¹⁵
2014/03/03:(10:52 am)	Central Coast Division Supervisor contacts Gas Division crew in Pacific Grove and informs them of leak. ^{7, 15}
2014/03/03:(10:52-11:07 am)	Gas Division Crew stops work in Pacific Grove and leaves. ^{7, 15}
2014/03/03:(11:07-11:22 am)	Gas Division Crew en route. ^{7, 15}
2014/03/03:(11:15 am)	Explosion occurs.
2014/03/03:(11:16 am)	Canus Inspector called Central Coast Division Supervisor informing him of explosion. ¹⁵
2014/03/03:(11:16 am)	Neighbor calls 911. ¹⁵
2014/03/03:(11:17 am)	Canus Inspector calls 911. ¹⁵
2014/03/03:(11:18 am)	Monterey Fire Department receives report of explosion. ¹⁶
2014/03/03:(11:23 am)	Fire Department arrives on scene. ¹⁶
2014/03/03:(11:25-11:40 am)	Time PG&E spent moving trucks and setting up to stop gas flow. ¹⁴
2014/03/03:(11:25 am)	Time reported (Time PG&E was notified) on A-form (PG&E leak repair form) for Gas Division Crew. ^{7, 17}

¹⁵ Data Request 5049, 5156 Timeline Update Carmel Supplemental Report

¹⁶ Monterey Fire Department Incident 14-0001163.

¹⁷ PG&E A-Form (leak repair form).

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2014/03/03:(11:38 am)	From A-form, time of arrival of Gas Division Crew. ^{7,17}
2014/03/03:(11:45 am)	From A-form, Gas Flow stopped. ¹⁷