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July 30, 2014

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City Administrator
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Carmel-by-the-Sea, CA 93921

Mike Calhoun
Chief of Police & Safety Officer
City of Carmel-by-the-Sea
P.O. Box 600
Carmel-by-the Sea, CA 93921

RE: PG&E Supplemental Information Report & Materials

Dear Mr. Stilwell and Chief Calhoun:

City officials have raised important questions related to the March 3, 2014 natural gas leak, which led to an explosion in Carmel-by-the-Sea. We thank you, and the community of Carmel-by-the-Sea, for your continued engagement and the opportunity to answer your questions about the incident including providing supplemental information related to the safety practices of Pacific Gas and Electric Company (PG&E).

In response to the incident, PG&E:

1. Immediately ceased all non-urgent tapping operations throughout our service area and developed and implemented enhanced safety protocols prior to resuming this work.
2. Hired a third-party firm to conduct a Root Cause Analysis of the incident and recommend corrective measures.
3. At the request of the city, continues to maintain a moratorium on all non-urgent tapping operations within the city limits of Carmel-by-the-Sea, until city officials and the public have the opportunity to review the third-party investigative report including the supplemental information.

PG&E hired a third-party firm, Exponent, to conduct a Root Cause Analysis of the incident, and develop recommended corrective actions. Aligned with one of the recommended corrective actions, PG&E established enhanced safety measures consisting of the Gas Carrier Pipe Verification protocol, which helps crews confirm the information on maps and records with the assets in the ground. This is known as "ground truthing." This protocol is carried out prior to any welding or tapping operations in PG&E's gas distribution system. While PG&E has safely resumed tapping operations throughout our service area, all non-emergency work within the city limits of Carmel-by-the-Sea temporarily remains on hold.

PG&E also shared the Exponent Report with the City on April 14, 2014. Upon review of the report, City officials raised additional questions that were not included in the original scope of Exponent's analysis. As a follow-up to these questions, PG&E has enclosed materials that reflect the specific questions asked on May 6, 2014. PG&E provided the City with the full list of questions for review on June 9, 2014 which is the basis for the scope of the attached, *PG&E Supplemental Information* document. On July 8, 2014 PG&E met with the City of Carmel and provided them with the attached PG&E Supplemental Information Document and a draft version of the Exponent Gas Incident Supplemental Report. PG&E is providing a finalized version of the Exponent Gas Incident Supplemental Report. Please note the only change between the two versions is in Appendix B the Extended Timeline is displayed in both a graphical summary and in tabular form.

To address the City's specific questions related to the above ground timeline and whether PG&E's business practices and goals limited the analysis of the April 2014 Report, PG&E requested Exponent to prepare an *Exponent Gas Incident Supplemental Report* to its April 2014 report. The *Exponent Gas Incident Supplemental Report* is attached as APPENDIX A as part of the enclosed materials. Exponent also conducted additional interviews at the request of the City, and the findings of those interviews are summarized in the Exponent Supplemental Report.

City officials have expressed a desire to improve PG&E's emergency response time through enhanced coordination with Carmel-by-the-Sea's first responders. We have taken this request very seriously and intend to develop a joint emergency response program in Carmel-by-the-Sea, in collaboration with Monterey Fire. We propose to develop a procedure with Monterey Fire to address call processing, dispatch, communications, multi-agency coordination and use of auto- and mutual-aid companies, similar to the pilot process that we are currently conducting with the City of San Francisco. To do so, PG&E has initiated discussions with the Monterey Fire Chief and other jurisdictions throughout the Monterey area. Because Monterey Fire provides fire service to more than just Carmel-by-the-Sea, we propose to develop a regional program with coverage throughout Monterey and the surrounding area.

This program will take some time to fully implement. In the meantime, it is essential for PG&E to get back to planned, non-urgent work in Carmel-by-the-Sea to continue to maintain the safety of the Carmel community gas facilities. This work includes resuming normal tapping activities.

PG&E is on a mission to build and maintain the safest, most reliable gas system in the United States. We thank the Carmel-by-the-Sea community for your continued partnership and commitment to helping us meet that goal. We look forward to continuing to work with Carmel-by-the-Sea.

Sincerely,



Kevin Knapp

Enclosures:
PG&E Supplemental Information document
Appendices A - I



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*Redactions have been implemented throughout the attachments if one or more of the following are present: critical infrastructure, employee names, and/or personal information.



Question 1: City requests interviews of individuals identified by the City, including interviews of Chief Calhoun and staff.

Please refer to APPENDIX A for the supplemental Exponent report dated July 29, 2014, which includes a list of additional interviews conducted to inform the supplemental report.

Question 2: Provide detailed "above ground" timeline.

Please refer to APPENDIX A for the supplemental Exponent report dated July 29, 2014, which includes the detailed timeline.

Question 3: What (emergency) tools and training did the crew have?

The five individuals that were on site at the time of the incident had all received Gas Emergency Response Program (GERP) Awareness Training. Three of them had also received GERP First Responder Training. Please refer to APPENDIX B for the GERP training records for the five individuals on site at the time of the incident as well as their supervisor.

PG&E crew trucks are equipped with a variety of tools and equipment that are used for normal day-to-day operations as well as for emergency response. The crew truck performing the tapping was a welding truck, and thus stocked for the assigned task associated with welding and tapping. However, the crew truck dispatched after the leak occurred was outfitted with the necessary equipment specifically for the purpose of responding to emergencies.

Question 4: Why didn't the (PG&E) crew call 911 immediately at time of leak?

The PG&E crew believed the leak was contained within the bellhole (venting into atmosphere). PG&E's procedures require the notification of a supervisor immediately upon the discovery of an abnormal operating condition (AOC). The crew believed the fastest method of containing the leak and repairing the pipe was to call for a separate crew with the required emergency response equipment to respond to the leak. In light of the events in Carmel-by-the-Sea PG&E is reevaluating the need for immediate notification to 911 (Emergency Services). These and other scenarios will be discussed during our pilot program in partnership with Carmel by-the-Sea. Details about the pilot can be found in our response to question 11.

Question 5: Why did PG&E call supervisor before 911? When is the City called, when is 911 called?

Please see the response to question 4. PG&E typically contacts city officials when an incident has been confirmed as significant and/or meets the criteria for a California Public Utilities Commission (CPUC) Reportable Incident. Per the Code of Federal Regulations (CFR) §191.3, the Definition of what constitutes a Reportable Incident is:

"An event that involves a release of gas from a pipeline, or of liquid natural gas, liquid petroleum gas, refrigerated gas, or gas from an Liquefied Natural Gas (LNG) facility, and that results in one or more of the following consequences:

- *A death, or personal injury necessitating in-patient hospitalization;*
- *Estimated \$50,000 or more including loss to the operator and others, or both, but excluding cost of gas lost;*
- *Unintentional estimated gas loss of three million cubic feet or more;*



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- *An event that results in an emergency shutdown of an LNG facility. Activation of an emergency shutdown system for reasons other than an actual emergency does not constitute an incident.*
- *An event that is significant in the judgment of the operator, even though it did not meet the criteria of paragraphs (1) and (2) of this definition.”*

However, as part of PG&E’s continuous improvement efforts, PG&E and the San Francisco Fire Department recently worked together to develop a pilot procedure (“Code MuRRI,” described in response to question 11) to enhance inter-agency notification of a potentially hazardous gas leak, and to identify tactical actions that can be taken to better protect the public and responders under such situations. PG&E believes Carmel-by-the-Sea and the Monterey Fire Department are important partners to apply this pilot procedure in a multi-jurisdiction, regional application such as Monterey County. The basic objectives of this pilot procedure are to recognize multiple indicators that, collectively, could:

- Indicate a serious or escalating hazard,
- Initiate earlier notification of Fire and Police by PG&E (or PG&E’s first responders by Fire/PD), and
- Provide tactical actions that may reduce developing hazards.

PG&E personnel had an initial meeting on June 5th with Monterey Fire Department administration to introduce the procedure currently being piloted with the San Francisco Fire Department. In support of the regional nature of Monterey County’s dispatch and automatic-aid response protocols, Fire Chief Panholzer will evaluate the pilot procedure elements and consider the value of this proposal, regional adjustments, and regional implementation strategy. PG&E personnel will also work with Carmel-by-the-Sea city officials, Carmel Police Department, Monterey Fire Department and regional public safety associations to implement this enhanced process if conceptually approved.

Question 6: Evacuations: why did we not knock on doors when there was a leak?

Please refer to the response to question 4. PG&E’s policy is to notify customers of a leak if it will affect service to their homes or businesses or is a significant event requiring evacuation. As noted in response to question 4, the crew believed this leak was contained within the bellhole and venting to the atmosphere.

Question 7: Welder and Canus inspector- report indicates a discussion regarding the change of the tie-in location, clarification needed.

The location of the new main installed on Redacted was changed because there were existing underground substructures (water main and sewers) in the path of the original design. This change was approved and construction was provided the go-ahead to proceed.

When the welders arrived to perform the tie-in, the site inspector briefed them about the change of tie-in location because the location of the main had been changed. The inspector showed the crew the drawing and discussed that the new main was not where it was shown on the construction drawing.

Question 8: Are there shut off valves that should have been closed; if not why not (...I have them on my water at home)?

PG&E’s gas distribution system has seven shutdown valves in the Carmel area. In this particular instance, the time to close the shutdown valves and rid the pipe of gas (draft the pipe) would have



taken hours. In addition, the closing of valves to isolate the main would have resulted in over 7,000 customers being without gas. The calling of a crew that had the appropriate emergency response tooling was the most expeditious method to stop the flow of gas.

Question 9: What was the pressure when gauge was installed in save-a-valve? What pressure was expected?

According to interviews with the crew, the pressure reading taken at the excavation was 48 pounds per square inch gauge (psig) at the installation of the save-a-valve. The normal operating pressure of the line was 52 psig. This less than 10% variance would have been within normal operating parameters depending on system conditions, and would not have alerted the crew to an abnormal operating condition (AOC).

Question 10: Provide copy of safety protocols & checklist for gas pipeline work.

Please refer to APPENDIX C for a copy of PG&E's "Gas Carrier Pipe Checklist."

Question 11: Besides safety protocol checklist, what is PG&E doing?

Please refer to APPENDIX C for the list of protocols developed to ensure Gas Carrier Pipe Verification takes place prior to any welding or tapping operations take place in PG&E's Gas Distribution system. Additionally, over the last several years, PG&E has worked diligently to enhance the safety of its operations and pipeline system. Below are major programs that pertain to the safety enhancement efforts of PG&E that relate to this incident.

Gas Distribution Clearance Process

The Gas Distribution Control Center (GDCC) in Bishop Ranch (San Ramon, CA) has introduced a new distribution clearance process analogous to an air traffic control operation. This process is a nationally benchmarked best practice that routes approval and monitoring of clearances through the control center to help us safely execute the distribution system work being done in the field.

The new clearance process requires notification and approval from the GDCC if a crew plans to perform work on a gas main, the new process requires the crew lead to call the GDCC and get clearance before starting that work. During this call, the control center team assesses overall system health and any factors potentially unknown to the crew that may affect safety—such as another crew working around the corner. The GDCC ensures there are no other emergencies, pipeline system activities or events that may impact the crew's ability to operate safely.

As the work progresses, the crews are required to report their progress. In addition, as AOC's are identified, GDCC is also notified. This provides a higher level of Emergency Response.

GERP Training

PG&E's Gas Emergency Response Plan (GERP) consolidates previously existing gas transmission and distribution emergency response plans. The PG&E GERP provides detailed information about PG&E's planned response to gas transmission and distribution emergencies. The purpose of the GERP is to assist PG&E personnel with safe, efficient, and coordinated response to emergencies affecting gas transmission and distribution systems. The GERP provides emergency response guidance consistent with the Incident Command System (ICS).

PG&E trains internal emergency responders (PG&E first responders and command center/emergency center employees) to know and understand the GERP. Internal training is implemented through specialized training classes and practical exercises. GERP training is



annual, and there are approximately 20 instructor-led classes per year. Web-based trainings are also available. PG&E also provides ICS training.

An essential component of GERP is the exercise program that allows for realistic testing and assessment of capabilities so emergency processes outlined in the GERP can be strengthened and lessons learned can be shared. The exercise program applies to both internal exercises and joint exercises conducted with external public safety agencies such as a local office of emergency services, police, fire departments, and state and federal agencies. After completion of the exercises, a Hotwash and After Action Review (AAR) are held to assess opportunities for improvement and areas of strength. Approximately 20 exercises of all types (tabletop and functional) are held during the year.

PG&E also employs Public Safety Specialists, who act as liaisons to external first responders during gas incidents, as well as provide training and education to public agencies and responders about PG&E gas and electric systems. A group of PG&E Emergency Preparedness Coordinators assist internal PG&E first responders in emergency response and reinforce the ICS, as well as provide training and facilitate exercises.

Code MuRRI

The Multiple-unit Resource Response Incident (MuRRI) procedure provides triggers and notification protocols for PG&E personnel faced with a potentially hazardous situation, and tactical actions for emergency responders arriving at the scene of a serious gas incident. PG&E has offered to provide the City of Carmel with information on the emergency response protocol we employ in San Francisco and discuss the possibility of developing a similar program here. As you may know, the program is a pilot developed jointly among PG&E and the San Francisco Fire Department.

Developing and operationalizing the program in the Carmel area would involve a series of working meetings (to tailor the program for Carmel), as well as trainings for local emergency response personnel. Since Monterey Fire Department provides fire service to multiple cities on the peninsula, PG&E proposes developing the program regionally, which could benefit not only Carmel-by-the-Sea but work well with the regional dispatch system and automatic-aid response system throughout Monterey County.

PG&E's Public Safety Specialist, who works with fire chiefs throughout our service area and leads the effort in our Code MuRRI Pilot Program in San Francisco, has already met with Chief Panholzer, Monterey Fire. In addition, to this effort PG&E's Public Safety Specialist is also reaching out to Carmel leadership to discuss the program.

For more details surrounding Code MuRRI, please refer to APPENDIX D (b)-(c).

First Responder Training

In order to provide outreach, training and incident management coordination to Emergency Response agencies, PG&E Public Safety Specialists present First Responder Workshops. The First Responder Workshop covers gas and electric utilities in a two-hour presentation that consists of an overview of gas transmission and distribution systems, electric transmission and distribution systems, responder safety, and on-scene considerations for emergency responders.

Since inception of the First Responder Workshop presentation, Emergency Preparedness & Public Awareness Public Safety Specialists have delivered more than 1,300 First Responder Workshops with more than 24,000 participants from emergency response agencies system-wide (as of June 2014).



A second important element available to public safety agency representatives is access to PG&E's First Responder Portal. Once access is requested and granted to the secure-side of our First Responder Portal, public safety personnel can view and download PG&E's Gas Emergency Response Plan (GERP) and download Gas Transmission Pipeline Maps with information tailored to emergency responders. Our Public Safety Specialists explain how to access these resources in every First Responder Workshop.

Please refer to APPENDIX D (d)-(f) for more detail surrounding PG&E's First Responder Workshops.

Gas Safety Excellence

Gas Safety Excellence is PG&E's Gas Operations strategic framework, which helps us achieve our vision of becoming the safest, most reliable gas company in the United States. It guides how we operate, conduct and manage all parts of our business. To demonstrate our achievement of gas safety excellence, we pursued a third-party certification built on a world class standard for Asset Management Excellence and continuous improvement. PG&E is one of the first utilities in the world to hold both the International Organization for Standardization (ISO 55001) and Publicly Available Specification (PAS 55) certifications. The certifications were awarded by a third-party, internationally recognized auditor, Lloyd's Register. During the first half of 2014, Lloyd's Register traveled throughout PG&E's 70,000-square-mile service area reviewing PG&E's safety practices, information and risk management policies, employee qualifications, emergency response protocols, and more than 20 additional critical areas of asset management. The certification process also involved a series of rigorous, audits and interviews of more than 150 PG&E management and field employees.

The requirements of the PAS 55 and ISO 55001 standards are the foundation of PG&E's safety management system. They require the highest level of rigor for managing the company's large number of physical assets, including transmission and distribution pipelines, pressure regulator stations, gas storage facilities, meters and more. PG&E's safety management system is designed to improve safety, manage risk, and drive continuous operational improvement. Please refer to APPENDIX D (a) "Certification Fact Sheet." for more information regarding these certifications.

**Please note that these attachments only include materials related to Gas Emergency Response.*

Question 12: Describe protocols to identify what is in the ground.

At PG&E, everyone has the authority to stop a job if the records don't match the job site. Please refer to Appendix C, which provides a form developed to assist in the process of confirming an inserted distribution pipe in the system prior to performing work. This form, the Gas Carrier Pipe Checklist, is designed to ensure crews take additional steps to confirm what is in the ground before commencing work and seek additional guidance when their inspection of the site doesn't match the job documents.

Question 13: Are there tools and equipment that can be/will be used to verify what is in the ground?

In addition to the Gas Carrier Pipe Checklist in APPENDIX C, please refer to APPENDIX E (a) for the continental steel to polyethylene (PE) mechanical bolt-on saddle punch tee procedure that establishes a uniform method for installing a steel to PE mechanical bolt-on saddle punch tee on a natural gas distribution system operating at or below 60 (psig).



PG&E has also initiated a project with the Gas Technology Institute (GTI), a major industry Research and Development association, to develop technologies to detect inserted plastic in steel mains. Please refer to APPENDIX E (b) for more details surrounding this joint PG&E-GTI project.

Question 14: What if the map and ground truthing don't match?

Please refer to response for question 11.

Question 15: Response time is very important - does PG&E have goals/metrics?

PG&E agrees that response time is very important and is continuing to work to improve average response times throughout its service area. PG&E tracks the response to each of the customer odor calls on a daily basis and has made significant progress in improving our performance over the past several years, improving from 3rd quartile to 1st quartile when benchmarked against industry performance. Specifically with regard to Carmel-by-the-Sea, PG&E looks forward to working collaboratively with the City and Monterey Fire to continue to improve gas incident response times, emergency response protocols and incident management coordination. Please see response to Question 11.

Question 16: Can PG&E provide a report of response times to the City

Please refer to APPENDIX F.

Question 17: How many pipe squeezers do we have in Carmel area?

PG&E currently has 50 pipe squeezers deployed in the Monterey Peninsula area. Please refer to APPENDIX G (a) and APPENDIX G (b) for photos of the types of pipe squeezers used by PG&E and the list of pipe squeezers, by type and quantity, deployed in the Monterey Peninsula area.

Question 18: Can squeezers be provided to the City?

PG&E feels that instituting Emergency Response Protocols on a Pilot basis will allow for collaborative efforts between PG&E and the City. This collaboration will allow for each of the respective groups to focus on their areas of expertise and ensure public safety. PG&E will be working directly with Fire Chief Panholzer to initiate this pilot program. Until this program is underway, PG&E does not propose to provide squeezers to the City of Carmel-by-the-Sea given that the inadvertent shut-off of a section of Distribution piping could have significant customer impacts ranging from loss of gas to potential safety issues. There are many dynamics to consider when squeezing off a gas main, such as understanding whether the main is backfed, how many customers will be shut-off from gas, could air be introduced into the main causing the gas to achieve the explosive limit, etc.

Question 19: Consider joint notification to PG&E and first responders. Consider training fire/police for gas emergency response.

PG&E is currently working with the city and county First Responder organizations to establish protocols similar to the San Francisco Code MuRRI program (please refer to question 11 for more details).

Question 20: Can PG&E provide the city with maps?

PG&E provides maps of its gas facilities to local jurisdictions that have emergency response responsibilities, such as the Fire Department, Police Department, etc. PG&E would be pleased to set up a meeting with the City of Carmel-by-the-Sea to review Distribution maps with non-emergency response personnel, as designated by the City. This will provide the City with an opportunity to view the maps and ask questions of PG&E's Engineers. As these maps constitute



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critical infrastructure, PG&E is currently unable to provide Non-Emergency Personnel City Officials with copies.

For critical infrastructure security reasons, PG&E does not distribute Distribution maps to external parties. Homeland Security and other federal, state and local agencies limits gas pipeline valve, regulator and station information from public disclosure for national security reasons pursuant to the Critical Infrastructures Information Act of 2002, 6 United States Code (U.S.C.) §§131-134 ("CIIA"). The CIIA defines Critical Infrastructures Information ("CII") as "information not customarily in the public domain and related to the security of critical infrastructure or protected systems."

Question 21: City requests PG&E provide assurances in writing that describe PG&E emergency response protocol and partnership with the City, including: (1)Telephone chain for emergency response (2)Description of safety protocols that will be in place.

Yes PG&E is willing to work closely with the city to accomplish this task.

Question 22: Are there changes to PG&E business practices and culture that could be made to protect public safety?

Please refer to the response for question 11, as well as the following appendices, for details surrounding PG&E's business practices related to ensuring public safety see APPENDIX H (a) – (b).

Question 23: Were there any recommendations taken off the table because they aren't cost effective?

Please refer to APPENDIX A for the supplemental Exponent report dated July 29, 2014.

Question 24: How is "cost-effective" weighed against public safety in the report? Please refer to APPENDIX A for the supplemental Exponent report dated July 29, 2014.

Question 25: Was anything ruled out of the report because of PG&E business goals/strategies?

Please refer to APPENDIX A for the supplemental Exponent report dated July 29, 2014.

Question 26: What happened with the [Redacted] gas leak? Why the long response time? Why was the [Reda] shutdown?

PG&E's Customer Contact Center received a call regarding a "slight" smell of gas odor on April 4, 2014 at 8:59am from the [Redacted] in Carmel-by-the-Sea. The call was logged as low priority due to the responses of the customer during the initial call. At 10:26am, a second call came in also indicating a "slight" odor and inquiring about an estimated time of arrival. At 11:28am, a third and final call came in from a different individual. Although Customer Care & Billing (CC&B) created and issued a tag for inspection after the first call (9:02am), the Gas Service Representative (GSR) was not dispatched until 1:39pm; the GSR was onsite at 1:48pm.

During the inspection, the GSR found a leaking appliance. The GSR disconnected and capped the line to the appliance. Following this temporary repair, the GSR performed a gas line pressure test of the house, per PG&E Standards. An unacceptable level of gas leakage rate (over 1.5 cubic feet of gas per hour) was discovered. At this point, the GSR was required to red tag the meter and shutoff the gas. The [Redacted] owners were advised of the leakage and that a plumber would



be required to make repairs and that following the repairs the city would need to sign off on the red tag, acknowledging the repairs were completed, and then the gas could be restored by PG&E.

The response time was primarily due to the leak being classified as a priority less than urgent. The leak was described as a slight odor, and there were no hissing or visual signs of a leak identified by the customer. Based on this description, PG&E established the leak priority was a "Priority 1," which requires a response from the next available GSR (as compared to an "Immediate Response" which requires a GSR to be dispatched immediately).

As of April 5, 2014, PG&E has directed all Dispatchers and Carmel area GSRs to treat all gas leak odors in the City of Carmel-by-the-Sea as "Immediate Response".

Question 27: Collapse of the sewer line, what really happened?

The main south of the Redacted manhole had a pre-existing collapse due to a non-PG&E underground utility, according to the Frontline Sewer Inspection Report.

Please refer to APPENDIX I for the report detailing Frontline Sewer's inspection.



APPENDIX A

Exponent Gas Incident Supplemental Report

Exponent[®]

Carmel Gas Incident

Supplemental Report



Carmel Gas Incident

Supplemental Report

Prepared for

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July 2014

Exponent, Inc.

Doc. no. 1401752.000 9111

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Limitations

At the request of PG&E, Exponent conducted an investigation of the gas leak and subsequent explosion on March 3, 2014 in Carmel-by-the-Sea (Carmel), California. Exponent investigated specific issues relevant to this incident, as requested by the client. Exponent submitted its report to PG&E on April 25, 2014. The scope of services performed during the investigation was focused on the cause of the incident and did not address actions taken by PG&E and other parties with respect to the incident.

At the request of PG&E, Exponent conducted additional interviews and developed a more detailed timeline of actions taken as a result of the incident. Exponent was also asked by PG&E to respond to questions raised by the City of Carmel with respect to the recommended corrective actions listed in our original report. The opinions and comments formulated during this supplemental effort are based on observations and information available at the time of the effort.

The comments presented herein are made to a reasonable degree of scientific and engineering certainty. If new data becomes available or there are perceived omissions or misstatements in this report regarding any aspect of those conditions, we ask that they be brought to our attention as soon as possible so that we have the opportunity to fully address them.

Background

Pacific Gas and Electric (PG&E) retained Exponent Failure Analysis Associates (Exponent) to conduct a failure analysis investigation of a gas leak and subsequent explosion on March 3, 2014 in Carmel-by-the-Sea (Carmel), California. Exponent's report was submitted to PG&E on April 25, 2014, and discussed at a City Council Meeting at Carmel city offices on May 6, 2014. Subsequent to that meeting, PG&E requested that Exponent supplement its report to address specific questions raised at the meeting. This supplemental report includes the following:

- The list of additional individuals interviewed who were present at the time of the incident to determine what they may have heard and/or seen before and after the explosion
- A more detailed timeline incorporating relevant input from additional interviews, including actions taken at the time of and in response to the incident
- Answers to questions raised as to the criteria used in developing the recommended corrective actions

Supplemental Interviews

PG&E provided Exponent with the names of individuals who were present at the time of the incident and requested that Exponent interview them to determine what they may have heard and/or seen before and after the explosion. Exponent attempted to contact all of the individuals on the list. In some cases, after repeated attempts and voice messages left, we were unsuccessful in reaching some of the individuals on the list. The list of individuals, with names omitted for privacy reasons, and status of the interviews is included as Appendix A. All relevant information obtained from these interviews was incorporated into the updated timeline.

Expanded Timeline

In addition to the interviews listed in Appendix A, Exponent conducted follow-up interviews of the crews performing the work at the time of the incident and those responding to the incident itself, as well. The purpose of these follow-up interviews was to determine the specific actions taken by both contractor crews and PG&E crews and responding personnel, and in what sequence the actions were taken.

Both a graphical summary of the timeline and the expanded timeline in tabular form are presented in Appendix B.

Discussion of Recommended Corrective Actions

As a result of its analysis, Exponent determined that the root cause of the incident was:

Inadequate verification of system status and configuration when performing work on a live line.

Based on the root cause, the following corrective actions were recommended to prevent recurrence of the problem:

1. Develop or revise existing procedures to require positive verification of the expected system status and configuration when working on a pipeline. These procedures should emphasize that plat maps should not be considered “as-builts” and are not to be used in lieu of other means of positive verification.
2. Develop or revise existing procedures to require, as part of the design process, further investigation (e.g., field verification) of the system configuration when estimating a job for which “as-builts” are not available.
3. With this event in mind, review the current process for receiving, approving and storing job folders, including “as-builts,” to assure that all job folders will be adequately filed and the necessary mapping changes made in a timely manner.
4. Develop and implement a process for a more detailed pre-job briefing, including a discussion of what can go wrong and who is responsible for taking what action if it does go wrong, and ensuring that the appropriate equipment is available to handle potential emergencies.

As was stated on page 65 of our report, effective corrective actions are those that address the root cause, are implementable by the organization, are cost effective, and are consistent with company business goals and strategies. These are generally accepted guidelines for developing effective corrective actions.

Following review of the Exponent report by Carmel city officials, questions were raised as to the extent the recommended corrective actions were influenced by how cost-effective they were. Those questions, and Exponent's responses, are as provided here.

Question 1:

Were there any recommendations taken off the table because they aren't cost effective?

Answer:

No recommendations were taken off the table because they weren't cost effective. To the contrary, the following recommendations were expanded or added during the review process, even though they likely represented increased cost to PG&E:

CA 1: Develop or revise existing procedures to require positive verification of the expected system status and configuration when working on a pipeline. These procedures should emphasize that plat maps should not be considered "as-builts" and are not to be used in lieu of other means of positive verification.

Prior to issuing the final report, this corrective action focused on work on pressurized lines only. In the interest of safety, it was revised to include work on all pipelines.

CA 2: Develop or revise existing procedures to require, as part of the design process, further investigation (e.g., field verification) of the system configuration when estimating a job for which "as-builts" are not available.

This corrective action was added as an extra step to ensure that the system configuration was verified as early in the design and modification processes as possible.

Question 2:

Was anything ruled out because of PG&E's business goals/strategies?

Answer:

Nothing was ruled out because of PG&E's Gas Operations business goals/strategies; which is to "become the safest, most reliable gas company in the United States." As shown in the answer to Question 1 above, corrective actions were expanded or added in support of PG&E's strategies.

Question 3:

How is cost-effectiveness weighed against public safety?

Answer:

Public and employee safety was the primary consideration in developing the corrective actions. Public safety was never weighed against cost-effectiveness in developing the recommended corrective actions presented in our report.

Appendix A

Interview List

Interview List

Resident	Status	Observation
House Guest 1	Interviewed	Witnessed Explosion
Resident 1	Not Interviewed □ 3 phone messages	
Resident 2	Interviewed	Did not witness explosion, came home shortly after
Resident 3	Interviewed	Did Not Witness
Resident 4	Interviewed	Witnessed Explosion
Resident 5	Interviewed	Witnessed Explosion
Resident 6	Interviewed	Did Not Witness
Resident 7	Interviewed	Witnessed Explosion
Resident 8	Interviewed	Did Not Witness
Resident 9	Interviewed	Did Not Witness
Resident 10	Interviewed	Witnessed Explosion
Resident 11	Interviewed	Did Not Witness
Resident 12	Interviewed	Witnessed Explosion
Resident 13	Not Interviewed □ 2 calls and 2 unsuccessful emails	
Resident 14	Not Interviewed □ 3 phone messages	
Resident 15	Interviewed	Did Not Witness
Resident 16	Not Interviewed □ 3 phone messages	
Resident 17	Interviewed	Did Not Witness
Resident 18	Interviewed	Witnessed Explosion
Resident 19	Interviewed	Witnessed Explosion
Resident 20	Interviewed	Did Not Witness
Resident 21	Interviewed	Did Not Witness
Resident 22	Not Interviewed □ No one home during scheduled interview time	
Resident 23	Not Interviewed □ Did not wish to be interviewed	
Resident 24	Interviewed	Witnessed Explosion
Resident 25	Interviewed	Did Not Witness

Resident	Status	Observation
Resident 26	Not Interviewed <input type="checkbox"/> 3 phone messages	
Resident 27	Not Interviewed <input type="checkbox"/> Wrong Number	
Resident 28	Interviewed	Did Not Witness
House Guest 2	Interviewed	Witnessed Explosion
Resident 29	Not Interviewed <input type="checkbox"/> 2 phone messages	
Police Chief	Interviewed	First Responder
Fire Chief	Interviewed	First Responder

Appendix B

Expanded Timeline

Expanded Timeline

The following timeline summarizes Exponent’s best understanding of the relevant times leading to and immediately following the subject explosion on March 3, 2014. The “Timeline Update Reference” indicates updates to the timeline originally published in the Exponent Report dated April 2014.

Timeline Update Reference	Time	Description
N/A	~8:30-9:00 a.m.	Welding crew arrived at job site.
N/A	~10:00-10:15 a.m.	Welding crew installed and tapped a save-a-valve.
N/A	~10:15-10:35 a.m.	Welding crew installed and tapped M/2 line stopper.
Interview/phone records of Gas Division Supervisor	10:38 a.m.	Field Inspector called Gas Division Supervisor to report gas leak. Supervisor did not answer. Inspector left message. ²
Interview/phone records of Field Inspector	10:39 a.m., 10:42 a.m.	Field Inspector made phone calls to locate Gas Division Supervisor. ²
Interview/phone records of Field Inspector	10:46-10:49 a.m.	Field Inspector spoke with Gas Division Supervisor on the phone. Informed him of gas leak. Requested that Supervisor’s crew come squeeze the pipe. Field Inspector confirmed with Gas Division Supervisor that the responding crew would have hydraulic squeezers. ²
Interview/phone records of Gas Division Supervisor	10:52 a.m.	Gas Division Supervisor called Gas Division crew that was working in Pacific Grove and informed them of leak. He instructed them to report to the leak site, assess the situation, make sure there is enough room, and squeeze the pipe. ²
Interview with Gas Division crew member	~10:52-11:07 a.m.	Gas Division crew packed up job in Pacific Grove. ³
Interview with Gas Division crew member	~11:07-11:22 a.m.	Gas Division crew traveled to leak site. ³
Interview/phone records of GC Central Coast Supervisor	11:12 a.m.	Welder called General Construction (GC) Central Coast Supervisor to inform him of the leak. ⁴

Timeline Update Reference	Time	Description
Interview with Field Inspector	~10:49-11:15 a.m.	Personnel on site waited for Gas Division crew to arrive with squeeze tools. They discussed potential options for aiding the Gas Division crew upon their arrival. Personnel did not smell a strong gas odor at the bell hole. Personnel did not check the house for occupants, nor did they alert any neighbors. They could smell gas west of bell hole. A truck was blocking that area from vehicle traffic. ²
N/A	~11:15 a.m.	Explosion.
Interview/phone records	11:16 a.m.	Field Inspector called Division Supervisor to inform him of the explosion. ¹
Neighbor Interview	11:16 a.m.	Neighbor calls 911. ⁵
Interview with Gas Division Supervisor	~11:17 a.m.	Division Supervisor left for site bringing a second set of hydraulic squeezers. ⁶
Interview/phone records of GC Central Coast Supervisor	11:17 a.m.	Welder called GC Central Coast Supervisor to inform him of the explosion. ⁴
N/A	11:17 a.m.	Field Inspector called 911. ¹
N/A	11:18 a.m.	Explosion reported to Monterey Fire Department. ⁷
Phone records of GC Central Coast Supervisor	11:18 a.m.	GC Central Coast Supervisor called GC Gas Superintendent to alert him of explosion. ¹²
Police Report	11:20 a.m.	Carmel Police Department arrived on scene. ¹⁰
N/A	11:23 a.m.	Monterey Fire Department arrived on scene. ⁷
Interview with Gas Division crew member	~11:23-11:25 a.m.	Gas Division crew arrived at site at same time, or just after, Monterey Fire Department. Traffic control was restricting access to the site. Crew on site had not cleared vehicles to allow Gas Division crew access. ⁹
Interview with Gas Division crew member	~11:25-11:40 a.m.	Approximately 10 to 15 minutes spent moving trucks blocking access to the bell hole and setting up to stop the gas flow. ⁹
A-Form	11:25 a.m.	"Time Reported" (i.e., time PG&E was notified) listed on PG&E leak repair form (A-Form). ⁸

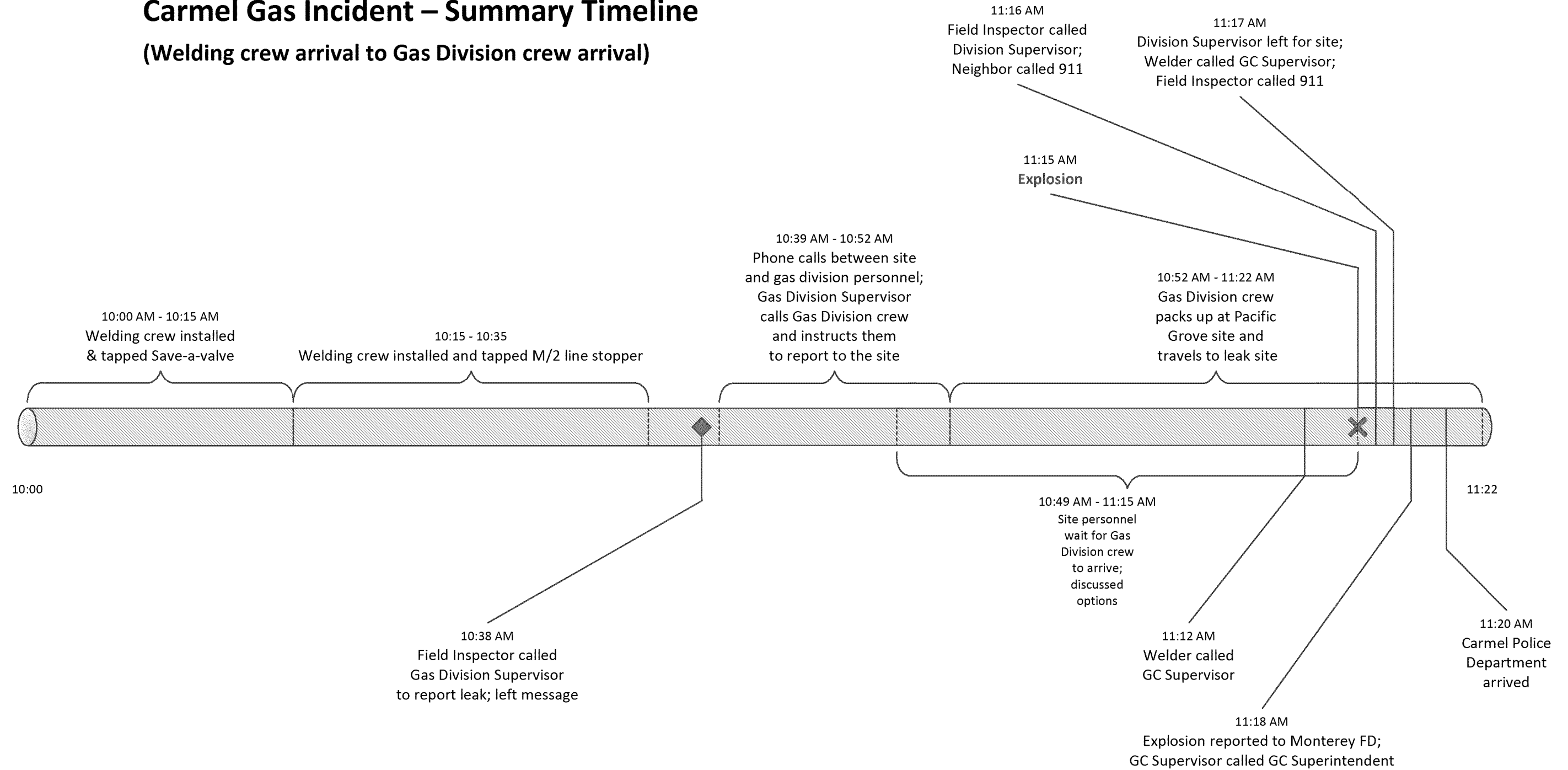
Timeline Update Reference	Time	Description
Interview with Field Services Member and GSR	11:35 a.m.	Field Services crew member was working in the area, heard the blast, and came to investigate. Crew member helped the emergency responders with safety sweeps of neighboring houses using the gas leak detector he brought with him. ¹¹
A-Form	11:38 a.m.	“Response Time” (i.e., arrival time to site) of PG&E response personnel listed on A-Form. ⁸
A-Form	11:45 a.m.	“Gas Flow Stopped Time” listed on A-Form. ⁸

Footnotes:

- ¹ Reported to Exponent by PG&E per cell phone call history, pg. 1, and per phone interview with Field Inspector on 5/19/14
- ² Per Field Inspector phone interview on 5/19/14
- ³ Per phone interview with Division Crew member on 5/14/14 and cell phone record (GJF5 Phone Record.csv)
- ⁴ Per phone interview with GC Central Coast Supervisor on 5/15/14 and cell phone record (TLCU Phone Record.csv)
- ⁵ Per interview with neighbor conducted by PG&E
- ⁶ Per phone interview with Division Supervisor on 3/13/14
- ⁷ Monterey Fire Department NFIRS report, FDID 27060, Incident number 14-0001163
- ⁸ PG&E A-Form, dated 3/3/14, leak number 07-14-70371-B; Estimated by the Division Crew and Supervisor after the fact per phone interview with Division Crew member on 5/19/14
- ⁹ Per phone interviews with Division Crew member on 5/29/14 and 6/23/14
- ¹⁰ Per Carmel Police Department report, Case number CG1400110
- ¹¹ Per phone interview with Field Service Crew member on 6/10/14 and Gas Service Record ID X100146124
- ¹² Per interview with GC Gas Superintendent on 6/10/14 and cell phone record (TLCU Phone Record.csv)

Carmel Gas Incident – Summary Timeline

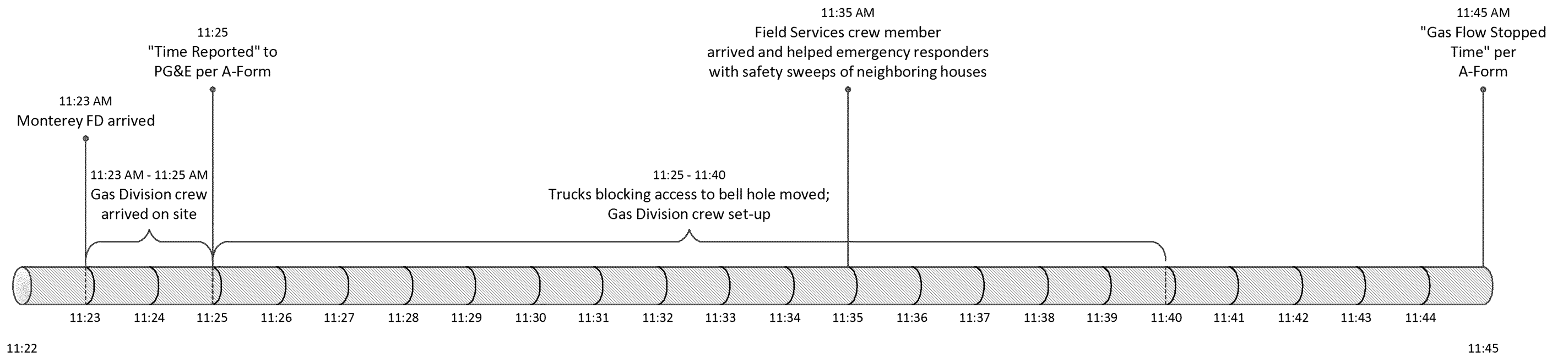
(Welding crew arrival to Gas Division crew arrival)



Note: The table in Appendix B provides a complete timeline and more detailed description of each activity

Carmel Gas Incident – Summary Timeline

(Monterey Fire Department arrival to Gas Flow Stopped)



Note: The table in Appendix B provides a complete timeline and more detailed description of each activity

Sheet 2 of 2



APPENDIX B

Carmel GERP Training Records

Data Assumptions

- Data source—Training Records pulled from My Learning/SAP personnel record of each employee
- Criteria – GAS-9006, GAS-9006WBT, GAS-9007, GAS-9008
- Time frame –Start of their employment until present for each LAN ID presented
- Assumption/Calculation – N/A if no record/completion exists for this course code on their training record, training date if they have completed the course code and multiple dates of same course code if applicable
- Compliance Level: Requested for specific incident in 2014
- GERP is an acronym for Gas Emergency Response Plan

SUMMARY

- Provides completion history of GAS course codes related to GERP
- GERP is a line of business run GAS training course owned by [REDACTED]
- PG&E Academy Gas Operations School does not conduct the Gas Emergency Response Plan (GERP) training. This training is conducted by Gas Operations.



			Course Code	GAS-9006	GAS-9006WBT	GAS-9007	GAS-9008
			Course Title	GERP Training-Awareness	GERP Training - Awareness	GERP Training -Command Center	GERP Training - First Responder
			Delivery Method	Instructor Led Training	Web Based Training (WBT)	Instructor Led Training	Instructor Led Training
Name	LAN	Personnel #					
				3/19/2014		N/A	12/10/2013
				11/13/2013			
					6/6/2013		
				3/19/2014		N/A	12/10/2013
				11/13/2013			
				3/19/2014		N/A	N/A
					12/13/2013		
				11/5/2013		N/A	N/A
				3/19/2014		N/A	12/10/2013
				N/A	11/4/2013	3/11/2014	
						2/23/2012	



APPENDIX C

Gas Carrier Pipe Checklist



This is an interim form to ensure the necessary steps are taken to help identify when a steel line has been inserted. It will be incorporated into the JSSA.

NOTES:

- Use non-erasable blue or black ink.
- Complete this form before welding or tapping on steel distribution lines.
- Attach this checklist to the supervisor’s JSSA that is submitted for each job.
- Perform both the Record/Jobsite Review and the Physical Verification to determine if the steel pipe is inserted.
- If the answer to ANY of the below questions is “NO”, **stop work** and contact your supervisor.

GENERAL INFORMATION			
Division/Area:		Date:	
Physical Work Location:		Person in Charge:	

<u>RECORD/JOBSITE REVIEW</u>		
Task	Question	Outcome
Review the job package	Is the job package current and complete?	YES or NO
Compare the documents in the package to each other	Do the facility construction details on the documents match each other?	YES or NO
Look for signs of insertion at risers (e.g. pre-fabricated, service-head adapters)	Do the existing adjacent risers match what is shown on the documentation?	YES or NO
Compare the documents to the jobsite	Does the facility construction type match what is shown on the records?	YES or NO
<u>PHYSICAL VERIFICATION</u>		
Look for signs of plastic insert in excavation	Have you determined that there are no signs of plastic inserts?	YES or NO
Utilize existing fitting in excavation	If you gauged pressure using an existing fitting at the work site, did you detect pressure in the steel line?	YES or NO



5 Minute Meeting

March 24, 2014

Gas Carrier Pipe Verification

AUDIENCE:

- All personnel performing welding and/or tapping on distribution facilities

Why It Matters To You

Safety:

As a result of a recent incident, the following measures must be taken to verify that steel pipe has not been inserted prior to welding and tapping. These measures are effective immediately.

Key Discussion Points

This 5MM outlines measures which must be taken to identify whether or not a steel pipe has been inserted with a plastic pipe.

Complete the attached "Gas Carrier Pipe Checklist" to document these steps.

Perform both record review and jobsite review prior to any physical work.

Record Review (Plat Sheets, Gas Service Records, As-builts)	Perform the following: <ul style="list-style-type: none"> <input type="checkbox"/> Review most current records to ensure that they match each other and jobsite conditions. <ul style="list-style-type: none"> a. Is the job package current and complete? b. Do the facility construction details on the documents match each other? <p>If any of the answers to the above are NO, then STOP and contact your supervisor for guidance.</p>
Jobsite Review	<ul style="list-style-type: none"> <input type="checkbox"/> "Read the Street." Check for signs of recent construction activity on gas facilities. <ul style="list-style-type: none"> a. Do the existing adjacent risers match the documentation? b. Does the facility construction type seen in the field match what is shown on the records? <p>If any of the answers to the above are NO, then STOP and contact your supervisor for guidance.</p>
Physical Verification	<ul style="list-style-type: none"> <input type="checkbox"/> If plastic is present, then STOP and contact supervisor. <input type="checkbox"/> If fittings are in the excavation, then utilize them for pressure check. If you detect no pressure or if there are no visible fittings, then STOP and contact your supervisor.



Guidance Tailboard

DOCUMENT NAME: **Gas Carrier Pipe Verification Talking Points**

TAILBOARD ISSUED: 03/21/14 TAILBOARD BY: Gas Methods and Procedures and Operations and Gas Construction

What is changing?

Due to the recent gas explosion in Carmel-by-the-Sea, as a result of welding on a control fitting and then tapping it out on a 2" steel main which was inserted with 1 1/4" plastic main several protocols have been developed to ensure Gas Carrier Pipe Verification takes place prior to any welding or tapping operations taking place on our Gas Distribution system. These protocols were developed by representation from management and IBEW subject matter experts.

Why does it matter?

To ensure we are providing personal safety to our employees and the public, these protocols must be implemented and followed immediately to prevent any further similar gas events such as the one in Carmel-by-the-Sea.

Required Action

1. Review the 5mm meeting attached to this e-mail along with the Gas Carrier Pipe Checklist and ensure you are familiar with how to check for completion of the checklist. Adherence to the checklist is mandatory.
2. Conduct a "Stand-up meeting" to train your teams about the new required checklist. All instructions are included in both the 5mm and on the checklist.
3. Direct any outstanding questions you have to the Gas Methods and Procedures team who are leading this effort and are the point of contact.
4. Additional information on fittings and tools will be forth coming once they have been validated and tested for safety and proper operation.

What's Next?

Gas Methods and Procedures and Operations and Construction are continuing to evaluate other work methods and technologies. Future improvements will be made to job packages and revisions to the JSSA. These will be announced in future communications.

If you have any questions, please contact the following:

██

██



PG&E Supplemental Information

Carmel-By-The-Sea

APPENDIX D



PG&E Supplemental Information

Carmel-By-The-Sea

APPENDIX D

(a) Certification Fact Sheet



We are on a mission to become the safest, most reliable gas company in the United States

Making progress toward gas safety excellence

PG&E's Gas Operations has achieved two international certifications that recognize its growing safety culture and world-class standards for asset management.



PAS 55 and ISO 55001 standards are the foundation of PG&E's safety management system.

Safety management systems are designed to improve safety, manage risk, and drive continuous operational improvement.

In May 2014, PG&E achieved two international certifications that recognize the Company's best-in-class operational standards for asset management. PG&E is one of the first utilities in the world to hold both the International Organization for Standardization (ISO 55001) and Publicly Available Specification (PAS 55) certifications. The certifications were awarded by the independent, internationally recognized auditor, Lloyd's Register.

During the first half of 2014, Lloyd's Register traveled throughout PG&E's 70,000-square-mile service area reviewing PG&E's safety practices, information and risk management policies, employee qualifications, emergency response protocols and more than 20 additional critical areas of asset management. The certification process also involved a series of rigorous, independent audits and interviews of more than 150 PG&E management and field employees.

The requirements of the PAS 55 and ISO 55001 standards are the foundation of PG&E's safety management system. They require the highest level of rigor for managing the company's large number of physical assets, including transmission and distribution pipelines, pressure regulator stations, gas storage facilities, meters and more. PG&E's safety management system is designed to improve safety, manage risk and drive continuous operational improvement.



Safety is at the heart of everything we do and our growing safety culture reflects that.

PG&E is strengthening its safety culture by investing in workforce development and supplying the latest tools and technology to enhance safety and reliability.

We are cultivating an environment of open and honest communication where employees are encouraged to speak up and report safety concerns.

Why did PG&E pursue these certifications?

PG&E is on a mission to become the safest, most reliable gas company in the country. These international certifications, which can only be achieved through a rigorous, independent audit, are proof of our progress. They demonstrate the growing strength of our safety culture, our rigorous approach to asset management and our unwavering commitment to gas safety excellence.

What do the certifications mean?

By way of independent audit, PG&E has successfully demonstrated its commitment to gas safety excellence with the implementation of industry best practices, strong corporate governance around asset management and a robust platform for continuous improvement.

The certifications also provide PG&E's customers, regulators and employees with assurance that the asset management policies and practices are effective and that a system is in place to identify areas that fall short of the industry standard. Continuous improvement is at the heart of a safety culture and PG&E encourages all employees to raise issues and submit them through the company's Corrective Action Program where issues are tracked until resolution.

Will the certifications expire?

To maintain the certifications, PAS 55 and ISO 55001 must be renewed every three years along with annual follow-up assessments. The need to renew frequently creates greater accountability for certified organizations as they are required to meet the requirements of the standards and demonstrate continuous improvement prior to renewal. As a result, PG&E's Gas Operations must both sustain the performance demonstrated at the time of the initial certifications and continue to improve in order to keep the certifications.

More about PAS 55 and ISO 55001

PAS 55 is a rigorous specification for optimized management of physical assets with widespread recognition among utilities, transport, mining, process and manufacturing industries worldwide. PAS 55 was developed by the Institute for Asset Management and published by the British Standards Institution.

ISO 55001 enables the development of an effective asset management system so that an organization can achieve its objectives consistently and sustainably over time. ISO consists of members from the national standards bodies of 162 countries and has published more than 19,500 international standards covering almost all aspects of technology and business performance.



PG&E Supplemental Information

Carmel-By-The-Sea

APPENDIX D

(b) PGE Emergencies Requiring Fire Department Support– PILOT PROCEDURE

PG&E Emergencies Requiring Fire Department Support – San Francisco Division – PILOT PROCEDURE

Description:

A procedure for requesting assistance from the San Francisco Fire Department (SFFD) for potential major gas emergencies where public and personnel safety or property is at risk. The SFFD has agreed to provide an enhanced response when PG&E Dispatch requests this assistance.

Target Audience:

Customer Field Service (CFS), Gas Maintenance and Construction (M&C), Gas Dispatch, Gas Distribution Control Center (GDCC).

When a release of gas creates a hazard, follow the tasks in Section 17, “Make Safe Actions” of Utility Procedure TD-6434P-01, “Gas Leak and Odor Investigation.” Pacific Gas and Electric Company (Company or PG&E) field personnel and first responders must perform the following actions:

If fire department (FD) is on-scene, make contact with the incident commander (IC) and describe severity of the situation and what FD actions would support controlling the incident.

If the FD is not on-scene, immediately contact gas dispatch personnel and request they notify SFFD Communications. Gas dispatch personnel must use SFFD direct-dial “Ring-down line” to request FD response in support of PG&E personnel on-scene.

Note: Explosions, building fires, and medical emergencies must be called directly into 9-1-1

In addition to existing PG&E procedures, when conditions warrant, consider use of fire department resources to:

1. Assist with any “Make Safe” actions not already accomplished
2. Assist with building/area evacuation(s)
3. Assist with evaluating atmosphere in other buildings and subsurface structures
4. Pull manhole covers (place warning devices on openings to protect public and responders)
5. Open electric vault doors after direction from PG&E
6. Ventilate buildings and sub-surface structures (SSS) when appropriate
7. Turn off gas service valves at meters or curbs
8. Direct evacuees away from scene and maintain perimeter control with Police Department

Examples of situations that may trigger a request for SFFD assistance:

1. Strong outside odor of gas from reliable reporting party (PG&E, FD, PD, DPW or school officials)

PG&E Emergencies Requiring Fire Department Support – San Francisco Division – PILOT PROCEDURE

2. Two or more reports of strong gas odor on the same block called in from the public
3. Continuous reading of 2% gas-in-air or greater inside a structure or within 5 feet from the structure
4. Continuous readings of 4% or greater in a subsurface structure after venting
5. Continuous readings of 4% or greater in multiple subsurface structures that may pose a migration of gas to enter a structure (sewer manholes, storm drains, communication boxes or vaults, water meter/valve boxes, electric manholes/vaults, etc.)
6. Damaged gas lines with blowing gas or gas that has ignited
7. Combined gas and electric incidents (underground manhole/vault explosions and fires, dig in's that have exposed underground electric facilities and a release of gas, etc.)
8. Sinkhole or other collapse situations where PG&E facilities are at risk, and if damaged could present a risk to the public, responders or property.

Notification Procedure; PG&E to SFFD Dispatch

- PG&E Responder will initiate request for SFFD support for these situations through PG&E Gas Dispatch
- PG&E Dispatcher will contact SFFD Communications via Ring-down Line [REDACTED] using the following example:
“This is [REDACTED] from PG&E Gas Dispatch. We are requesting Fire Department support with make safe actions related to a major gas incident at [REDACTED]”



PG&E Supplemental Information

Carmel-By-The-Sea

APPENDIX D (c) Code MuRRI Launch Briefing

**San Francisco Fire Department and Pacific Gas & Electric, San Francisco Division Gas
Pilot Project; Code MuRRI (Multiple-unit Resource Response Incident)
Project Launch Briefing, March 4, 2014**

Overview

On March 3, 2014, members of the San Francisco Fire Department and Pacific Gas & Electric met to define project launch details. Factors discussed during that meeting are contained in a separate revised agenda. This is an overview of items addressed in the meeting;

Proposed Launch Date: March 24, 2014

A March 24th launch date will allow;

- Programming of SFFD Computer Aided Dispatch (CAD) to create a “PGE” incident type code for assignment of SFFD resources when PG&E requests support for a gas leak
- Training for SFFD Communications Center Supervisors and Technical Advisors
- Training for PG&E Gas Dispatch Supervisors and Dispatchers
- Orientation of SFFD Field Command Personnel (Division Chiefs and Battalion Chiefs)
- Orientation of SFFD Hazardous Materials and Rescue Squad personnel
- Training for PG&E San Francisco Gas Division/Area Supervisors
- Training for Gas Service Representatives

Department-wide training for SFFD personnel will occur in August or September during the department’s training schedule covering utility emergencies.

Procedures

- PG&E has developed a pilot project procedure to guide employee training and actions
- SFFD Communications will train on the notification process and new CAD response code
- SFFD field operations will not require any immediate procedural change; tactical actions will be based upon existing incident management practices as well as acting on requests from PG&E personnel on-site

Triggers for PG&E personnel to recognize significant incident potential

The PG&E Pilot Project procedure contains a list of triggers that could indicate a gas (or dual commodity) incident has occurred having significant potential. These triggers are based on the ConEd Code MuRRE model and will be evaluated further as training occurs and with actual incident experience.

Request for SFFD assistance

- When a PG&E Responder recognizes that one or more triggers exist to warrant the assistance of SFFD, the responder will contact Gas Dispatch
- When Gas Dispatch receives a request from the field, or the Dispatcher recognizes one or more factors exist to request assistance, the Dispatcher will use the SFFD Ring-down line to request assistance at the gas incident
- When SFFD receives a 9-1-1 call, or a report from SFFD personnel in the field, SFFD Dispatch will use existing processes to assign SFFD resources to the incident

- PG&E personnel on-viewing a fire or requesting medical assistance will dial 9-1-1 and report these incidents directly to SFFD Communications and provide a follow-up call to Gas Dispatch
- SFFD requested that no special phrase or code word is used to request assistance; just describe the request to the SFFD Dispatcher

SFFD Response

San Francisco Fire Communications created a specific response configuration for use when PG&E reports a gas incident. The new configuration provides additional personnel and specialized tools for response to a gas incident;

- (1) Engine Company
- (1) Truck Company
- (1) Rescue Squad (carries four personal CGIs and one four-gas monitor/CGI)
- (1) Battalion Chief

In addition, SFFD Communications will advise B02 of the response (Hazardous Materials BC). B02 can then initiate a full HazMat response, which will add;

- Battalion 02 and Engine 36/HazMat Company
- (1) Medic Unit
- (1) Rescue Captain
- (1) Department of Public Health technical specialist

Tools/Hardware

Combustible Gas Indicators – It was determined that existing deployment of CGIs within SFFD and PG&E are adequate for this pilot. Consideration should be given to adding one four-gas monitor/CGI to each Rescue Squad (x2) and add one-four gas monitor to the HazMat unit for added flexibility once this pilot is finalized.

Manhole cover hooks/pullers – SFFD already carries hooks to pull sanitary sewer/storm drain covers, as well as some PG&E covers.

Locking manhole covers – It was decided that further research should be conducted prior to including locking manhole covers in this pilot. Consideration should be giving to the safety of pulling locking covers, which are predominately on electrical vaults, and what the proper indications and safety factors are in this process. Group recommendation is to defer inclusion of tools to pull locking manhole covers until involving electric department.

Review and Evaluation

Although PG&E and SFFD personnel can discuss this project at any time, it was determined that a meeting should be held in four months to discuss progress and adjustments of this pilot.



PG&E Supplemental Information

Carmel-By-The-Sea

APPENDIX D

(d) Training Resources for First Responders Booklet

Gas and Electric Hazards

Training Resources for First Responders



Pacific Gas and Electric Company (PG&E)



First Responder Website www.pge.com/firstresponder

- Order free educational program materials "Responding to Utility Emergencies"
- View the First Responder event calendar
- Sign up to receive email alerts about seminars and important updates
- Provide your input about our programs and activities

First Responder Portal (secure login required)

- Secure access to maps of gas transmission infrastructure within your jurisdiction, including PG&E gas transmission lines, valves, storage facilities, etc.
- Download or print read-only PDF maps
- Download GIS shape files for use on GIS applications
- Receive updates when new information is made available

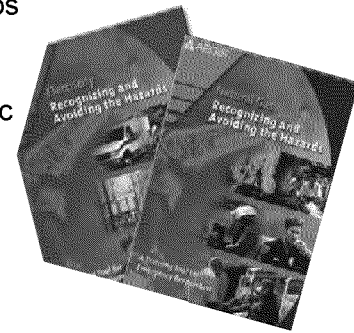
Natural Gas and Electricity: Recognizing and Avoiding the Hazards



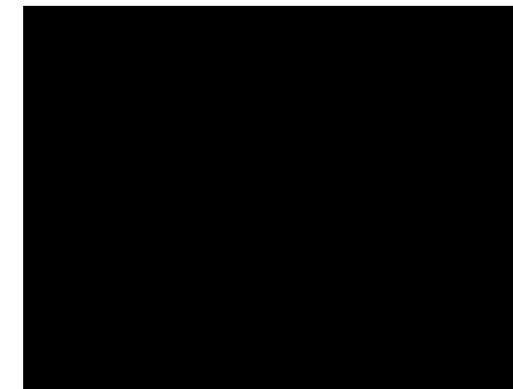
AEGIS Insurance Services

www.aegislink.com/portal/aegistv/loss_control.do

- Stream hazard awareness training videos
- Includes key safety messages and emergency response scenarios.
- Order DVD sets of these gas and electric safety videos for incorporation into your training programs.



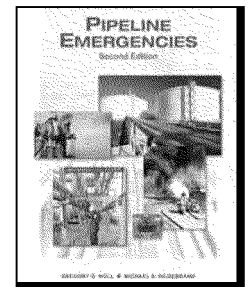
Pipeline Emergency Response: Training Videos and Scenarios



Pipeline Emergencies

www.pipelineemergencies.com

- Access free instructional materials designed for emergency responders, including books, facilitator guides, presentations, videos, scenarios, etc.
- Scenarios cover a variety of pipeline emergencies



Developed by the National Association of State Fire Marshals (NASFM) and the US Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA)

US DOT Pipeline and Hazardous Materials Safety Administration



DOT's National Pipeline Mapping System (NPMS)

www.npms.phmsa.dot.gov

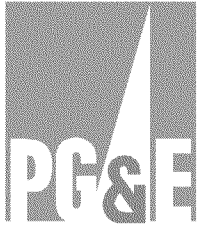
- View maps that include other pipeline operator facilities and infrastructure (e.g. natural gas, petroleum, oil, etc.)
- Download GIS shape files for use on GIS applications
- Access pipeline operator contact information.

Pipeline Association for Public Awareness (PAPA)

www.pipelineawareness.org

- View safety info for police, fire and 911 operators
- Access interactive web-based scenarios
- Stream Emergency Responder awareness videos
- Download "Pipeline Emergency Response Guidelines"







PG&E Supplemental Information

Carmel-By-The-Sea

APPENDIX D (e) Gas EFR Flipbook

FIRST RESPONDERS

Handling Gas and Electric Hazards

A Reference Guide for First Responders



THIS GUIDE INCLUDES:

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To order more FREE Reference Guides, go to www.pge.com/firstresponder.
For other inquiries email us at AgencyFirstResponder@pge.com.

PG&E EMERGENCY DISPATCH

or

Number for emergency responders only

DO

- Confirm your dispatch called PG&E (from a landline)
- Provide contact info (both agency and field personnel)
- Give closest address or nearest cross street
- Describe nature of emergency
- Provide relevant environmental factors
Example: If windy, provide wind direction

DON'T

- Don't bother with pole numbers (just use address)
- Don't assume "water" will resolve a gas or electrical fire
- Don't share number with non-emergency personnel

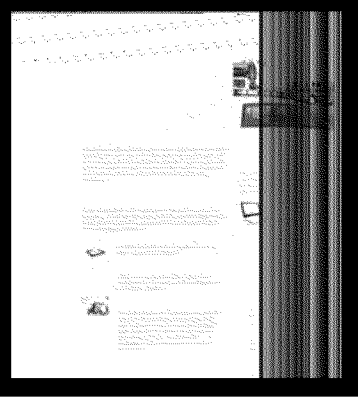
FOR NON-EMERGENCIES

DON'T use emergency dispatch number!

Call



FG&E FIRST RESPONDER WEBSITE

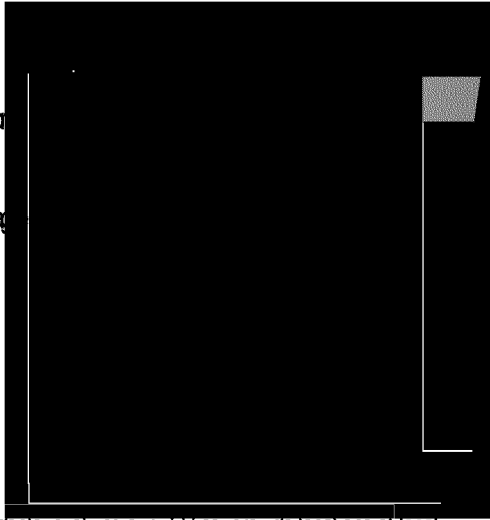


First Responder Website

- Order free educational program materials "Responding to Utility Emergencies"
- View First Responder event calendar
- Sign up to receive email alerts about seminars and important updates
- Provide feedback to improve FG&E emergency response activities

First Responder Portal

- Secure login required (identity verified)
- Secure access to gas transmission maps within your jurisdiction
- Access and view FG&E's gas transmission line, valve and storage facility maps on-line
- Download or print read-only PDF maps
- Download GIS shape files
- Receive updates



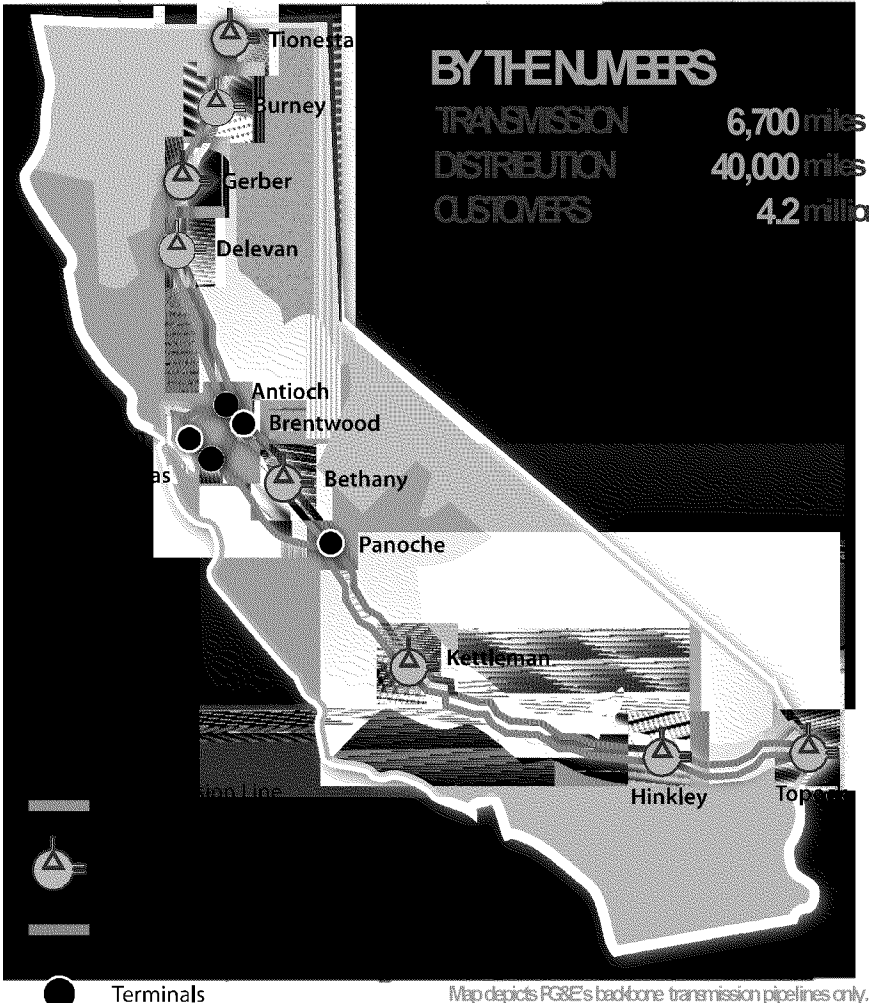
How to Reach Us

FG&E can help your agency prepare for incidents involving our utilities, provide locations of local infrastructure and schedule educational classes for your agency personnel.

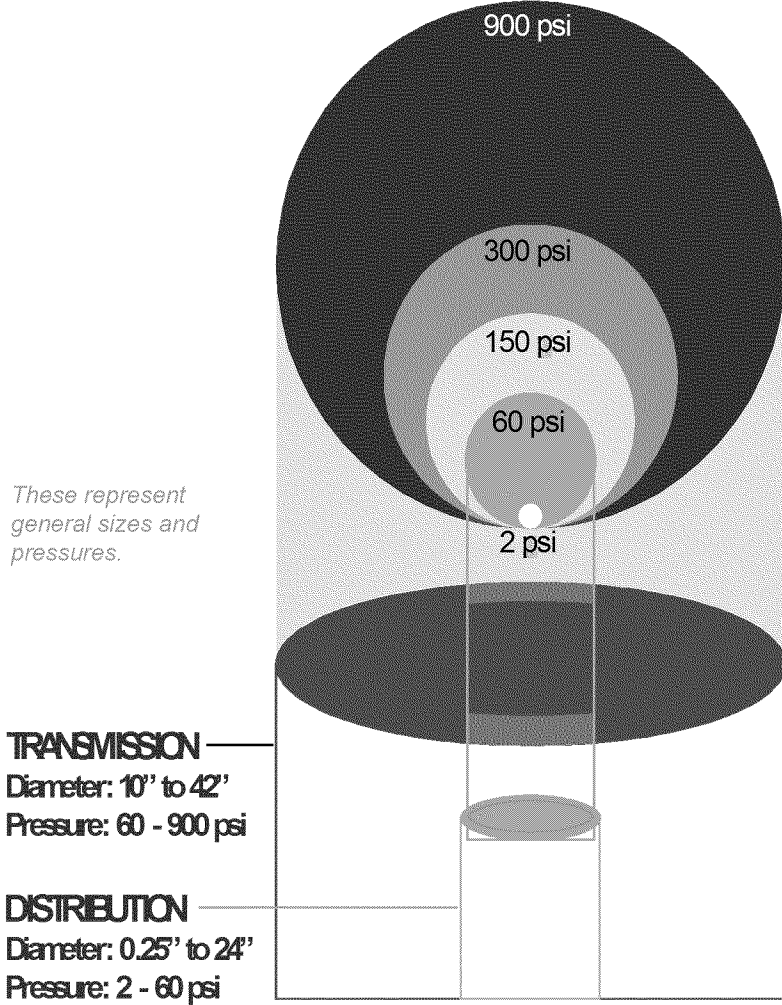
Handling Gas Hazards



PG&E NATURAL GAS DELIVERY SYSTEM

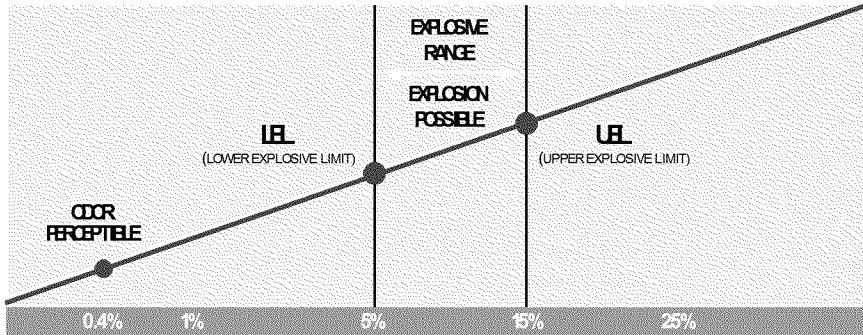


TRANSMISSION vs. DISTRIBUTION



PROPERTIES OF NATURAL GAS

- Lighter than air (migrates upward)
- Ignition temperature: 990-1,100° F
- Naturally odorless and colorless
- Mercaptan (an odorant added to natural gas) is perceptible at .04%



Reactivity

Natural gas is stable and rarely reacts with other chemicals. There are certain chemicals it does react with. In their gaseous states, oxygen-enriched atmospheres, fluorine, and chlorine can react with natural gas, creating the potential for an explosion.

Composition

Natural gas is a mixture of gases including methane, ethane, and other chemicals. PG&E stores, transports, and distributes gas within a pressurized system.

PROPERTIES OF NATURAL GAS

Health Hazards

Natural gas can cause asphyxiation by displacing oxygen in a confined area, creating an oxygen-deficient atmosphere.

Complete combustion of natural gas creates **carbon dioxide (CO₂)**. Incomplete combustion can create **carbon monoxide (CO)**.

Symptoms of Carbon Monoxide (CO) Poisoning:

- Headaches
- Nausea
- Dizziness
- Lethargy
- Flu-like symptoms

IGNITION SOURCES

Common Sources

- Vehicles, motors
- Power tools
- Radios, phones, cell phones
- Doorbells, light switches
- Flashlights
- Automatic timers (e.g., exterior lights)
- Static electricity

Beware of Static Electricity

Gas moving through a line creates static electricity. When the line is ruptured, the static is released.

When an unauthorized person squeezes the line to stop the flow of gas using crimping tools or clamps, that person's body becomes a grounding source. The static charge then arcs through the body, or metal of the crimping tool or clamps, creating an ignition source.

Another common source of static electricity is shoes rubbing on doormats. When responding to a gas leak call, don't step on the doormat and don't ring the doorbell. Knock instead.

GAS LEAK DETECTION

Sight

- Dirt being blown into the air
- Continuous bubbling in puddles
- Dead or dying vegetation
- Construction/excavation equipment
- Flames coming from the ground
- Signage or pipeline markings

Sound

- Roaring sounds:
 - Transmission: very loud (jet engine or locomotive)
 - Distribution: loud from several hundred feet
- Hissing and whistling sounds: Service and appliance releases

CAUTION! There may be no perceptible sound

Smell

- Mercaptan odorant smells like sulphur or rotten eggs.
- Caution: Odor fade may occur.
Odor may fade if gas filters up through soil. Prolonged exposure to gas may diminish one's ability to sense the presence of the odorant. Odor may also be masked by other odors.

Tools

Combustible Gas Indicators (CGIs):

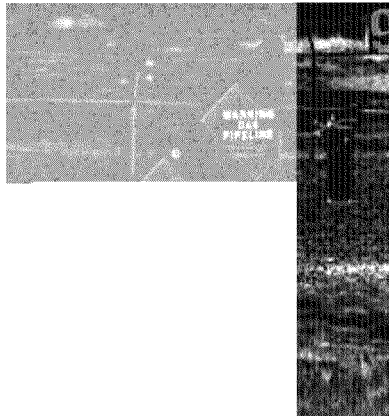
- Measure amount of combustible gas in the air
- Indicate concentration / flammability
- Require calibration **before each use**
- Require training and experience to operate properly

CAUTION! Some or none of these factors may be present. If unsure, do not approach area. Call PG&E.



GAS SIGNAGE & MARKERS

Transmission Gas Pipeline Marker

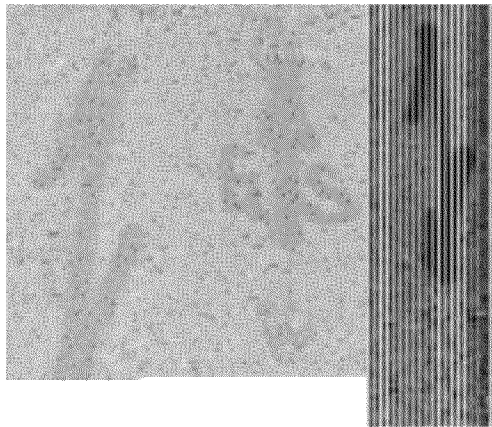








**WARNING
GAS
PIPELINE**

PACIFIC GAS & ELECTRIC CO.
2 WORKING DAYS BEFORE
EXCAVATING
CALL 811 – TOLL FREE

FOR EMERGENCIES CALL PG&E
1-800-547-5955 – TOLL FREE

Underground Facility Markings



-  Gas, Oil, or Steam Lines
-  Electrical Lines
-  Communications Lines
-  Potable Water Lines
-  Sewer and Drain Lines
-  Reclaimed Water, Irrigation
-  Temporary Survey Markings
-  Proposed Excavation

MINIMUM EVACUATION DISTANCES

For Distribution Gas Leaks

Federal DOT's Emergency Response Guidebook recommends as an immediate precautionary measure for flammable gases to isolate the spill or leak at **least 330 feet (100 meters)** in all directions.

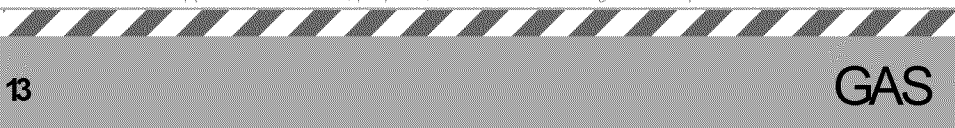
For Transmission Gas Leaks

EVACUATION DISTANCES IN FEET

	pipeline diameter (inches)											
	4	6	8	10	12	16	20	22	24	30	36	42
100	91	137	182	228	274	365	456	502	547	684	821	958
200	129	193	258	322	387	516	645	709	774	967	1161	1354
300	158	237	316	395	474	632	790	869	948	1185	1422	1659
400	182	274	365	456	547	730	912	1003	1094	1368	1642	1915
500	204	306	408	510	612	816	1020	1122	1224	1529	1835	2141
600	223	335	447	558	670	894	1117	1229	1340	1675	2011	2346
700	241	362	483	603	724	965	1206	1327	1448	1810	2172	2534
800	258	387	516	645	774	1032	1290	1419	1548	1935	2322	2709
900	274	410	547	684	821	1094	1368	1505	1642	2052	2462	2873
1000	288	433	577	721	865	1154	1442	1586	1730	2163	2596	3028
1100	302	454	605	756	907	1210	1512	1664	1815	2269	2722	3176
1200	316	474	632	790	948	1264	1580	1738	1896	2369	2843	3317
1300	329	493	658	822	986	1315	1644	1809	1973	2466	2959	3453
1400	341	512	682	853	1024	1365	1706	1877	2047	2559	3071	3583
1500	353	530	706	883	1060	1413	1766	1943	2119	2649	3179	3709
1600	365	547	730	912	1094	1459	1824	2006	2189	2736	3283	3830
1700	376	564	752	940	1128	1504	1880	2068	2256	2820	3384	3948
1800	387	580	774	967	1161	1548	1935	2128	2322	2902	3482	4063
1900	398	596	795	994	1193	1590	1988	2186	2385	2981	3578	4174
2000	408	612	816	1020	1224	1631	2039	2243	2447	3059	3671	4283
2100	418	627	836	1045	1254	1672	2090	2299	2508	3134	3761	4388
2200	428	642	856	1069	1283	1711	2139	2353	2567	3208	3850	4492

SOURCE: Pipeline Association for Public Awareness at www.pipelineawareness.org under "Emergency Response Resources," in the document "Pipeline Emergency Response Guidelines," pg 20 (Appendix A).

Not Applicable for butane, propane, or other hazardous gases or liquids.



GAS LEAKS OR FIRES

DON'T

- Extinguish a gas fire. Let it burn.
 - Extinguished gas is invisible and may migrate near an ignition source.
- Use unauthorized line stoppers or pipe squeezers to shut off gas supply.
- Operate main shutoff valves.
 - You may not shut off the gas at the correct location and impact important facilities nearby such as hospitals.
 - If not operated correctly, you may accidentally increase gas pressure instead of shutting off.
 - Operating a main shutoff valve requires personnel to meet Federal DOT Operator Qualifications.

DO

- Adopt defensive or non-intervention approach
- Confirm that dispatcher called PG&E
- Wait for PG&E to shut off gas supply
- Evacuate public to safe distance, if necessary
- Protect exposures

Construction Incidents

Construction or excavation accidents are the primary source of damage to underground gas facilities.

- Make safe - evacuate people and protect exposures
- Look for signage and markers to determine if other subsurface facilities are present
- Prevent ignition



811
Know what's below.
Call before you dig.

On the Scene: Safety Checklists



GAS EMERGENCY SAFETY CHECKLIST

PG&E EMERGENCY DISPATCH

or

Scene Control

- Establish an effective and safe perimeter
- Position apparatus out of harm's way
(Avoid front of building, manhole covers and lids, indicating subsurface infrastructure.)
- Evacuate the public to a safe distance
- If transmission lines (audible "roar"), evacuate larger area
- Coordinate with the utility company for large-scale evacuations
- Natural gas released inside buildings presents one of the greatest hazards to emergency responders. Buildings full of natural gas should only be approached when needed, with extreme caution, and with a minimum number of personnel

Hazard and Risk Assessment

- Wear full structural firefighter protective clothing, including positive pressure SCBA
- Listen for roaring (transmission) or hissing sounds (distribution).
CAUTION! There may also be no noise at all
- Monitor the atmosphere, using multiple monitors
- Determine if possible the source of the release, without risk to the responders
- Monitor for gas traveling away from source towards exposures
- Do not enter a manhole, sewer, or vault. It is a confined space
- Control ignition sources (smoking, open flames, internal combustion engines, and motors)
- Do not operate electrical devices (switches, etc.). Sparks could cause ignition
- Be cautious of contacting the piping system (a static spark may occur and result in ignition)

GAS EMERGENCY SAFETY CHECKLIST

PG&E EMERGENCY DISPATCH

██████████ or ██████████

Strategic Considerations

- Whenever possible, adopt a defensive or non-intervention mode and wait for the utility company to arrive
- Protect exposures
- Do not extinguish fire until the leak can be shut off and controlled
- With any leak, always anticipate and expect that ignition will occur

Tactical Considerations

- Stop or control of the gas release at the appliance or service meter
- If safely possible, ventilate the area, keeping in mind that during this process, if it was above the UEL, the gas may pass back through the flammable range
- Do not extinguish a gas-fed fire unless the flow can be controlled
- Shut the flow if possible and use protective hose streams to approach if necessary
- Do not close main valves or any other large transmission/distribution valves — this can lead to serious problems elsewhere in the system
- Closed valves should remain closed until opened by utility personnel
- Extinguish surrounding fires but not the gas fire itself

Other Considerations

- Decontaminate if necessary to remove the odorant
- Debrief all responders and schedule a critique with all involved

Copyright 2004 © Callan and Company All rights reserved. Emergency safety checklist card is a component of the Responding to Utility Emergencies training program consisting of Responding to Natural Gas Emergencies and Responding to Electrical Emergencies. This program is employed by Pacific Gas and Electric and is part of PG&E's learning resource center.

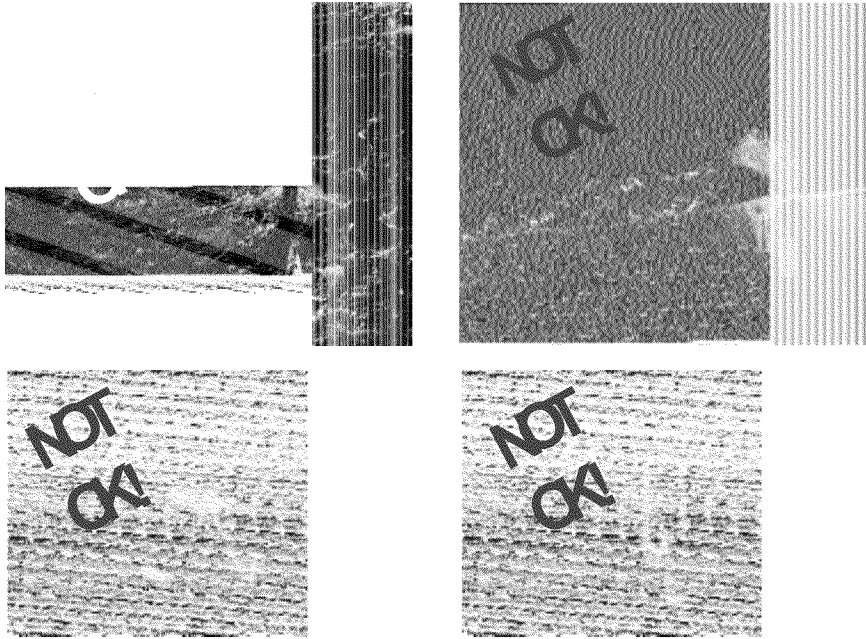
DANGERS OF USING UNAUTHORIZED TOOLS

Don't use line stoppers or pipe squeezers

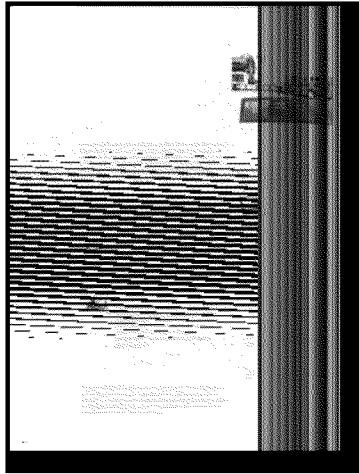
Use of crimping tools such as clamps, squeezers, etc. is EXTREMELY dangerous. Only Federal DOT Operator Qualified personnel may operate and maintain natural gas infrastructure. **Wait for PG&E to shut off gas supply.**

TWO KEY DANGERS EXIST:

1. **Static electricity** is present (created from gas rushing through line)
2. **No grounding** (Grounds prevent static electricity from passing to human body. Without proper grounding, your body increases the likelihood of an arc, which is an ignition source)

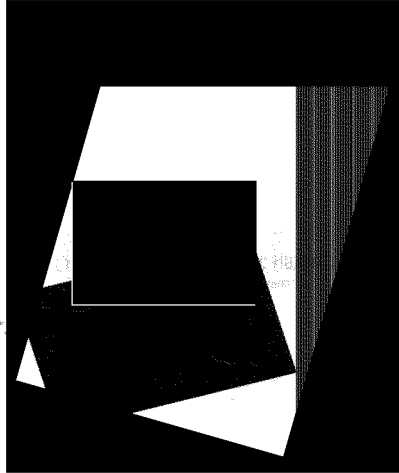


PG&E FIRST RESPONDER WEBSITE



First Responder Website

- Order free educational program materials "Responding to Utility Emergencies"
- View First Responder event calendar
- Sign up to receive email alerts about seminars and important updates
- Provide feedback to improve PG&E emergency response activities



To order more FREE Reference Guides, go to www.pge.com/firstresponder

How to Reach Us

PG&E staff are available to provide information and assistance to local utility agencies. Please contact your local PG&E representative for more information.



[Redacted]

[Redacted]

[Redacted]



PG&E Supplemental Information

Carmel-By-The-Sea

APPENDIX D (f) Emergency Preparedness Checklist



Electrical Emergency Safety Checklist

Always ensure your Dispatch has called PG&E from a landline at [REDACTED]
[REDACTED] (This number is for the exclusive use of firstresponders)

General Safety Precautions

- ⑥ Incident Commanders (IC) convey strategic decisions related to power line location to all suppression crews on the fire-ground.
- ⑥ IC and responders must continually reevaluate fire conditions and electrical hazards.
- ⑥ Keep bystanders well back.
- ⑥ Anything that can lower the resistance can increase the hazard of electrocution.
- ⑥ Given high enough voltage, anything can become a conductor.
- ⑥ Wear full protective clothing for the task at hand — Fire retardant clothing compliant with NFPA standard and SCBA when necessary.

Structure Fires and Downed Wires

- ⑥ All lines are hot — When in doubt, it is energized or “live.” Touch and step potential.
- ⑥ Always establish a safe clearance for downed lines — At a minimum of one full span / two structurally sound poles.
- ⑥ Position the apparatus safely. Watch for lines that could fail and hit the apparatus.
- ⑥ Keep aerial equipment a minimum of 10 feet from any distribution wires and more if high voltage.
- ⑥ Only properly utility trained and qualified personnel should use rubber gloves, dielectric overshoes and special equipment for handling energized equipment.
- ⑥ Do not pull meters.
- ⑥ Do not cut wires.

Tactical Use of Hose Streams

- ⑥ Have equipment de-energized by trained utility persons before any operations begin.
- ⑥ Avoid the use of water until advised by the power company personnel.
- ⑥ Protect exposures and let the fire burn. Monitor for runoff.
- ⑥ If any water is to be used, it must be fog at 30 degrees or wider (100 psi at the nozzle) applied from at least 33 to 35 feet or 10 meters.
- ⑥ Do not use straight streams.
- ⑥ Do not spray energized equipment.

Rescue

- ⑥ Whenever possible, have victims remain in the car if electrical hazards are present and await the utility company.
- ⑥ If the victims are free from life-threatening injuries they should stay in the care and remain calm.
- ⑥ If victims are exiting the vehicle the step potential safety procedures must be followed. Jump clear and use hop or shuffle methods to avoid step potential.
- ⑥ Ensure that protective shields, barriers, or alerting techniques are used to protect firefighters from electrical hazards and energized areas.

Transmission and Distribution

- ⑥ Do not fight substation, switchyards, or generation plant fires.
- ⑥ Transformers can explode.
- ⑥ Arcs can kill.
- ⑥ Maintain clearances from damaged or burning underground, pad-mounted transformers and switch cabinets. (Car/transformer pad collisions are like a car-pole. The vehicle chassis could be energized.)

Wild Land and Transmission Lines

- ⑥ Do not stand or work in areas of dense smoke around Transmission and Distribution lines.
- ⑥ In heavy smoke the step potential danger zone can extend as far as 100 feet on both sides of the right-of-way with voltages of 500 kV.
- ⑥ The safe zones should extend equally on both sides of the right-of-way.
- ⑥ Ground cover fires can be fought with conventional hose lines if the smoke, flame or fire's height is not reaching within 100 feet of the energized lines and the superstructure of the towers are intact. Maintain 35 feet safety distance from transmission tower.
- ⑥ If any water is to be used, it must be fog at 30 degrees or wider (100 psi at the nozzle) applied from at least 33 to 35 feet or 10 meters.
- ⑥ Do not use a solid stream nozzle in the right of ways or around transmission lines.
- ⑥ Do not drop water or retardant on the tower structure. It is corrosive and a conductor.
- ⑥ Pilots should try and drop parallel to the transmission lines or across the lines in the middle of the span or between the towers.



Natural Gas Emergency Safety Checklist

Always ensure your Dispatch has called PG&E from a landline at [REDACTED]
[REDACTED] (This number is for the exclusive use of firstresponders)

Scene Control

- ⑥ Establish an effective and safe perimeter.
- ⑥ Position apparatus out of harms way (avoid front of building or over manhole covers and sewers).
- ⑥ Evacuate the public to a safe distance.
- ⑥ If transmission lines or extreme "roar" evacuate a larger area if necessary.
- ⑥ Coordinate with the utility company for large scale evacuations.
- ⑥ Natural gas released inside buildings presents one of the greatest hazards to emergency responders.
- ⑥ Buildings full of natural gas should only be approached when needed, with extreme caution, and with a minimum number of personnel.

Hazard and Risk Assessment

- ⑥ Wear full structural firefighter protective clothing including positive pressure SCBA.
- ⑥ Listen for roaring (transmission) or hissing sounds (distribution). Caution there may also be no noise at all.
- ⑥ Monitor the atmosphere, using multiple monitors.
- ⑥ Determine if possible the source of the release, without risk to the responders.
- ⑥ Monitor for natural gas traveling away from source towards exposures.
- ⑥ Do not enter a manhole, sewer or vault. It is a confined space.
- ⑥ Control ignition sources (smoking, open flames, internal combustion engines and motors).
- ⑥ Do not operate electrical devices switches, etc. Sparks could cause ignition.
- ⑥ Be cautious of contacting the piping system a static spark may occur and result in ignition.

Strategic Considerations

- ⑥ Whenever possible adopt a defensive or non intervention mode and wait for the utility company to arrive.
- ⑥ Protect exposures.

- ⑥ Do not extinguish the fire until the leak can be shut off and controlled.
- ⑥ With any leak always anticipate and expect that ignition will occur.

Tactical Considerations

- ⑥ Stop or control of the gas release at the appliance, or service meter.
- ⑥ If safely possible, ventilate the area, keeping in mind that during this process, if it was above the UEL the gas may pass back through the flammable range.
- ⑥ Do not extinguish a gas fed fire unless the flow can be controlled.
- ⑥ Shut the flow if possible and use protective hose streams to approach if necessary.
- ⑥ Do not close main valves or any other large transmission / distribution valves— This can lead to serious problems elsewhere in the system.
- ⑥ Closed valves should remain closed until opened by utility personnel.
- ⑥ Extinguish surrounding fires but not the gas fire itself.

Other Considerations

- ⑥ Decontaminate if necessary to remove the odorant.
- ⑥ Debrief all responders and schedule a critique with all involved.



PG&E Supplemental Information

Carmel-By-The-Sea

APPENDIX E (a) TD-4150P-110

Continental Steel to PE Mechanical Bolt-on Saddle Punch Tee

SUMMARY

This utility procedure establishes a uniform method for safely installing a steel to polyethylene (PE) mechanical bolt-on saddle punch tee on a natural gas distribution system operating at or below 60 pounds per square inch gauge (psig). Procedures for tapping the Continental bolt-on saddle punch tee are the same as the weld-on punch tees, and can be referenced in Utility Procedure TD-4150P-109, "Steel Tapping Tee with Coupon Retaining Punch 1/2" and 3/4" Operation," Section 2, "Tapping."

Level of Use: Reference Use

TARGET AUDIENCE

Maintenance and construction (M&C) personnel qualified to install bolt-on saddle punch tees.

SAFETY

Bodily injury may occur if steps in this procedure are not followed. Fitting is pressurized at full line pressure when in use. Read, understand, and adhere to steps carefully. Proper training and periodic review regarding the use of fitting in this procedure is essential to prevent serious bodily injury or equipment damage.

BEFORE YOU START

- Ensure bolt-on saddle punch tee is not installed on a steel pipeline with a wall thickness greater than 0.280.
- Use appropriate personal protective equipment (PPE) at all times, including but not limited to:
 - Safety glasses
 - Long-sleeved shirt
 - Gloves
- Additional tools required:
 - Fire extinguisher
 - Pipe coating removal tools
 - Hand wire brush
 - Ultrasonic wall thickness tester
 - Leak detection soap solution

Continental Steel to PE Mechanical Bolt-on Saddle Punch Tee

- Pipe wrench
- Pipe thread sealant
- Wire crimp tool
- Thermite weld equipment
- 12" ratchet with 15/16" socket

OR

- 12" adjustable smooth faced wrench
- The following qualifications are required:
 - Operator Qualification (OQ) Task 03-05, "Pipe Inspection"
 - OQ Task 03-02, "Transmission Coatings"
 - OQ Task 06-17, "Tap a Service Tee w/Coupon Retaining Punch"
 - OQ Task 04-01, "Soap Test/Stand-up Test"

OR both of the following:

 - OQ Task 04-03, "Leak Test at Operating Pressure"

AND

 - OQ Task 04-04, "Pressure Testing For Facilities Operating Below 100 psi"
 - Gas Design Standard (GDS) D-34, "Mechanical Compression Coupling Qualification"

TABLE OF CONTENTS

SUBSECTION	TITLE	PAGE
1	Cleaning and Inspection of Steel Pipeline	3
2	Fitting Installation	4
3	Pressure Test	6
4	Tapping	7
5	Removal.....	8

Continental Steel to PE Mechanical Bolt-on Saddle Punch Tee

PROCEDURE STEPS

1 Cleaning and Inspection of Steel Pipeline

- 1.1 IF bolt-on saddle punch tee is used for the purpose of identifying an inserted steel pipeline prior to performing any weld operations,

THEN identify a location where the pipeline will be later depressurized to allow removal of the bolt-on saddle punch tee.
- 1.2 Remove pipeline coatings from the area the saddle punch tee will be installed around the entire circumference of pipe AND clean pipe to bare metal.
- 1.3 Inspect the area where the bolt-on saddle is to be installed AND ensure elastomer seal is not installed over pits or gouges in the pipe where the sealing integrity might be compromised.



CAUTION

Equipment damage may result if attempting to tap steel pipeline with a wall thickness greater than 0.280.

NOTE

It is recommended to clean steel pipeline in the area to be ultrasonic tested to bare metal AND perform multiple ultrasonic tests in various locations to insure accurate wall thickness measurements.

- 1.4 Check steel pipeline wall thickness with an ultrasonic tester. Ensure the wall thickness **does not** exceed 0.280. Refer to Figure 1; "Check Pipeline Wall Thickness" below.

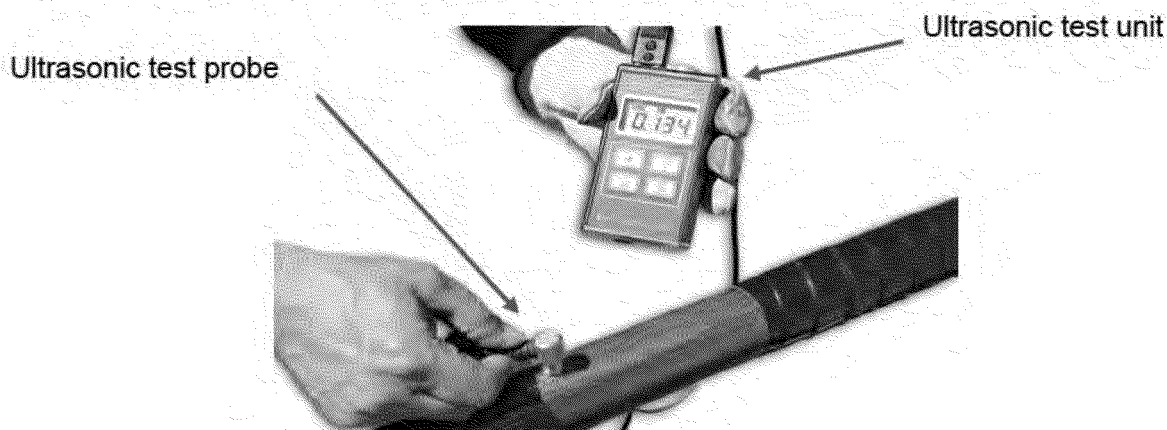


Figure 1. Check Pipeline Wall Thickness

Continental Steel to PE Mechanical Bolt-on Saddle Punch Tee

2 Fitting Installation

- 2.1 Inspect bolt-on saddle punch tee for damage to the fitting AND its components.
- 2.2 Remove saddle bolt AND inspect elastomer seal for damage OR dis-bonding from upper saddle.



CAUTION

Ensure coupon retaining punch is fully retracted within tee to avoid damage during installation.

- 2.3 Place saddle in the desired position on the pipe.

NOTE

It is recommended to use a torque wrench if available to achieve the 25 to 40 foot pound torque requirement. If a torque wrench is not available, then the required torque can be achieved using either a 12" ratchet or 12" smooth faced wrench.

- 2.4 Replace saddle bolt AND install Cathodic protection wire ring connector as follows (Figure 2):
 1. Crimp #10 wire to ring connector supplied with the fitting.
 2. Remove saddle bolt nut AND install ring connector over saddle bolt.
 3. Install saddle bolt with ring connector positioned between lower saddle AND saddle bolt.
 4. Install saddle bolt nut to saddle bolt AND tighten between 25 to 40 foot pounds of torque taking care not to rotate saddle on the steel pipeline.

Figure 2. Installation of Cathodic Protection Wire Ring

Continental Steel to PE Mechanical Bolt-on Saddle Punch Tee

- 2.5 For additional guidance, refer to Utility Procedure TD-4170P-52, Mechanical Fitting Connections for Polyethylene Pipe (Threaded Compression Transitions).
- 2.6 Cut PE tubing ends square.
- 2.7 Wipe the PE pipe end with a clean, dry cloth.
- 2.8 Establish the stab depth by measuring as follows:
IF fitting is ½" CTS using a line shield nut,
THEN measure 2-13/16" from end of PE pipe.
IF fitting is 1" CTS using a line shield nut,
THEN measure 3-1/8" from end of PE pipe.
- 2.9 Using a soft black felt tip pen, mark the PE pipe at the stab depth measurement (Figure 3).

Figure 3. PE Stab Depth Measurement

- 2.10 Loosen the line shield nut until the seal ring is no longer compressed.
- 2.11 Confirm that all internal components are present and loose.
- 2.12 Insert the PE tubing over the stiffener until it butts against the shoulder inside the compression fitting.
- 2.13 Tighten the line shield nut until it bottoms out against the fitting shoulder; do not over-tighten.
- 2.14 Visually examine and measure the completed connection as follows:
 1. Ensure that the line shield nut is bottomed out against the fitting shoulder.
 2. Measure to ensure that the stab depth mark is **no more** than 3/8" from the face of the line shield nut.
 3. IF any requirement in Step 1 or Step 2 above is not satisfied,
THEN perform the following tasks:

Continental Steel to PE Mechanical Bolt-on Saddle Punch Tee

2.14 (continued)

- a. Disassemble the connection.
- b. Correct the problem.
- c. Cut the PE pipe to remove any PE pipe defect left by the stiffener and seal ring.
- d. Reassemble the connection beginning at Step 2.5.

2.15 Install PVC schedule 80 nipple with moisture seal into the outlet of the line shield nut AND hand tighten (Figure 4).

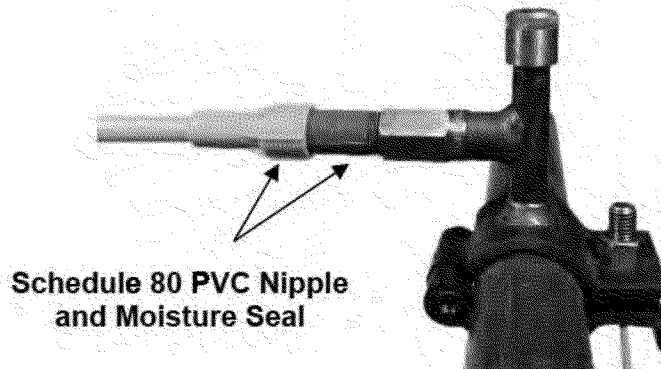


Figure 4. Installation of Schedule 80 PVC Nipple

3 Pressure Test

NOTE

Pressure can be gauged using either outlet of the tee. If using the top, remove the punch per steps 3.1 and 3.2.

- 3.1 Remove completion cap AND coupon retaining punch.
- 3.2 Inspect coupon retaining punch to ensure no coupon exists from prior use (Figure 5).
IF coupon is found,
THEN replace with new coupon retaining punch.

Continental Steel to PE Mechanical Bolt-on Saddle Punch Tee

Figure 5. Coupon Retaining Punch

- 3.3 Install pressure test assembly to either tee body or tee outlet (Figure 6).

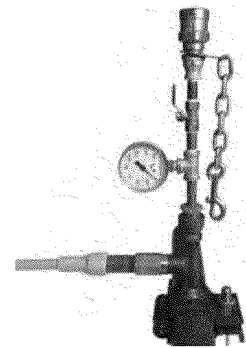


Figure 6. Typical Pressure Test Assembly Installed

- 3.4 Pressure test bolt-on saddle punch tee assembly. Refer to GDS A-34, "Piping Design and Test Requirements."

4 Tapping

- 4.1 Follow tapping procedure in TD-4150P-109, Section 2 "Tapping."

- 4.2 Verify line pressure at the service outlet.

1. IF line pressure is present,

THEN perform the following steps:

- a. IF steel pipeline is under Cathodic protection,

THEN bond end of #10 wire installed in Step 2.4 to steel pipeline.

IF steel pipeline **is not** under Cathodic protection,

THEN crimp end of #10 wire installed in Step 2.4 to a 5 lb. zinc anode AND place anode 2 feet from bolt-on saddle punch tee.

Continental Steel to PE Mechanical Bolt-on Saddle Punch Tee

4.2 (continued)

- b. Wrap steel pipeline AND fitting with approved wax tape. Refer to GDS E-35 "Selecting and Applying Coatings for Buried Transmission Pipe."
- c. Install EMS marker next to saddle punch tee prior to backfill AND follow the mapping requirements described in Utility Procedure TD-4461P-20, "As-Built Process for Distribution Mains and Services."

IF no line pressure is present,

THEN proceed to Section 5 "Removal" below to remove saddle punch tee.

5 Removal

- 5.1 Confirm steel piping AND bolt-on saddle punch tee assembly is depressurized.
- 5.2 Confirm coupon retaining punch is flush with the top of tee.
- 5.3 Loosen AND remove saddle bolt.
- 5.4 Remove bolt-on saddle punch tee from steel pipeline.
- 5.5 Remove coupon retaining punch from tee AND replace with new coupon retaining punch for future reuse of bolt-on saddle punch tee.

END of Instructions

DEFINITIONS

NA

IMPLEMENTATION RESPONSIBILITIES

Superintendents and supervisors ensure communication of this utility procedure to gas field personnel.

GOVERNING DOCUMENT

Utility Standard TD-4150S, "Pressure Control for Gas Transmission and Distribution Steel and Cast Iron Pipeline"

COMPLIANCE REQUIREMENT / REGULATORY COMMITMENT

DOT 49 CFR, PART 192, Subpart L—Operations

PG&E Gas Operator Qualification Plan

Continental Steel to PE Mechanical Bolt-on Saddle Punch Tee

REFERENCE DOCUMENTS

Developmental References:

GDS A-34, "Piping Design and Test Requirements"

GDS E-35 "Selecting and Applying Coatings for Buried Transmission Pipe"

Utility Procedure TD-4150P-109, "Steel Tapping Tee with Coupon Retaining Punch 1/2" and 3/4" Operations"

Utility Procedure TD-4170P-52, "Mechanical Fitting Connections for Polyethylene Pipe (Threaded Compression Transitions)"

Utility Procedure TD-4461P-20, "As-Built Process for Distribution Mains and Services"

Supplemental References:

NA

APPENDICES

NA

ATTACHMENTS

NA

DOCUMENT REVISION

NA

DOCUMENT APPROVER


Manager

DOCUMENT OWNER


Senior Specialist

DOCUMENT CONTACT


Senior Specialist

Continental Steel to PE Mechanical Bolt-on Saddle Punch Tee**REVISION NOTES**

Where?	What Changed?
NA	This is a new procedure.



PG&E Supplemental Information

Carmel-By-The-Sea

APPENDIX E

(b) Methods to Detect Inserted Plastic in Steel Mains

Methods to Detect Inserted Plastic in Steel Mains

OBJECTIVE

The objective of this work is to identify field-friendly methods to determine if a steel main is plastic inserted. The method needs to be external and not require a high level of training. If commercial devices are identified, initial/feasibility testing of these will be performed.

BUSINESS VALUE

There are safety implications to determining if a given steel main has an inserted plastic pipe or if the steel pipe is carrying gas pressure. This needs to be determined externally, prior to any welding or tapping operations on the steel pipe.

INDUSTRY NEED

In order for crews to conduct operations in a safe and efficient manner, it is necessary to know if an exposed steel main contains an inserted plastic pipe. Operations such as welding and/or tapping can be very hazardous if this identification is in error. The worst case scenario is that the internal plastic pipe is breached and the annular space between the plastic pipe and the steel main fills with natural gas. This may lead to the migration of gas over a large area with all the corresponding hazards.

BACKGROUND

The issues of identifying some types of facilities by an external device has been addressed in the OTD project "Tool for the External Classification of Pipe Contents". This project developed an ultrasonic technology that allows for the identification of liquids inside of steel mains. The "pipe contents" tool could measure water levels in partially filled gas mains; it could also differentiate

water mains and electrical conduits filled with dielectric oil from gas.

The case of a plastic inserted steel main differs in that there is generally no liquid in contact with the inner surface of the steel and the outer surface of the plastic pipe. A liquid in contact with the steel facilitates the transfer of ultrasonic energy into and out of the interior and allows information to be derived from echoes.

By contrast, the annular space between a plastic insert and the steel main will typically be filled with air. The points of contact between the plastic and the steel will be randomly distributed. There may be water in the annular space if the steel has been infiltrated, but this cannot be guaranteed.

Additional technologies need to be examined in order to address this specific need. In addition to technology issues, it is also necessary to address the practical issues of field use. A candidate technology will also need to be quickly applied under field conditions and not require a highly trained NDE technician (e.g., a Level II) to interpret the data.

SCOPE

The approach proposed for this work is to perform a study of technologies that may be able to identify the presence of a plastic pipe within steel gas main. There will be an emphasis on determining if there are commercial instruments that may be used. If commercial devices are identified, initial feasibility testing will be performed. If none are found, candidate techniques will be explored. In all cases, recommendations for the path forward will be made. The following tasks are proposed in support of this work.

Task 1. Technology Survey

A quick brainstorming session between the utility sponsor and GTI will be held to initially

discuss the potential technologies and pros and cons of each:

- Ultrasonic Inspection Techniques
- Thermography
- X-ray Imaging

The purpose of this task is to examine the feasibility of the techniques to address the issue. A technology and literature survey will be carried out to determine what other techniques may have been carried out in this space. An emphasis will be placed on identifying commercial devices that are a close fit for the requirements. If these do not exist, then the emphasis will be on examining feasible technologies that can determine the presence of plastic insertion, or conversely, positively prove its absence within a steel main.

Based on GTI's experience with these technologies, emphasis will be placed on Acoustic/Ultrasonic and Thermography/IR techniques. After focusing on these two areas and summarizing findings, a go/no-go meeting with PG&E will be conducted.



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Carmel-By-The-Sea

APPENDIX F

IR and Pri1 Response Time May 2014

Carmel-by-the-Sea May Immediate Response and Priority 1 Gas Odor Response Times

Address	Job Code Description	Completion Code 1 Description	Date Taken	Time Taken	Order Compl	Order Compl	Technician S	Dispatch Time	Wrap-Up Time	Travel Time	Response Time	Job Time	Manager's Review
	G Leak Outside-Unspecified	G Leak@Range-Full Leak Inv	5/12/2014	12:32	5/12/2014	15:32	GSR	0.00	4.63	17.72	22.35	155.40	Duplicate tag assigned to GSR 2 to assist GAS 1 whom was onsite conducting IR investigation and needed to clock customer piping
	G Leak Outside-Unspecified	G Leak-Outside-Full Leak Inv	5/22/2014	18:37	5/22/2014	20:38	GSR	9.68	13.20	14.77	37.65	81.45	Slightly longer dispatch times (9.68 min.) Wrap up longer than average due to call out of GSR. Dispatch had called 5 GSR's to find an available GSR unable to move, CO Call in Sea Side, inroute to IR in Marina, 212 list NR, 5th GSR called on 212 list Very good travel times
	G Unspecified-Outside	G Leak @ Sm-Md Std Mtr-Survey	5/21/2014	11:32	5/21/2014	12:22	GSR	2.63	1.20	8.02	11.85	36.60	Acceptable times
	G CO Investigation	G CO Invest-Cust Equip	5/23/2014	08:15	5/23/2014	09:23	GSR	2.38	1.58	2.98	6.95	60.80	Acceptable times
	G Dig In-Exposed Line	G Dig In-Exp Line Non Comp Eqp	5/5/2014	16:43	5/5/2014	17:16	GSR	1.83	0.27	10.02	12.12	20.48	Responding to Dig In. Acceptable times
	G Leak Inside-Unspecified	G Change SM SP Mtr-Unsched	5/26/2014	11:52	5/26/2014	14:55	GSR	3.53	1.85	10.68	16.07	166.97	Acceptable times
	G Leak Inside-Unspecified	G Leak-Inside-Full Leak Inv	5/31/2014	09:01	5/31/2014	11:47	GSR	6.82	0.28	25.85	32.95	131.03	Saturday coverage- Saturday traffic @ 25.85
	G Leak Inside-Unspecified	G Leak@Range-Full Leak Inv	5/27/2014	16:25	5/27/2014	17:49	GSR	3.83	2.20	18.18	24.22	59.70	Tuesday Tailboard Coverage Resource Sharing
	G Leak Inside-Unspecified	G Leak-Inside-Modified Leak	5/20/2014	16:11	5/20/2014	17:29	GSR	6.48	0.80	39.48	46.77	31.18	Evening employee traveling from Monterey to Carmel
	G Leak Outside-Unspecified	CGI Other	5/12/2014	11:32	5/12/2014	14:40	GSR	10.58	17.30	13.33	41.22	144.33	Original tag sent with Unknown premise Dispatch longer than average. Unknown location contributed to longer than average wrap time.
											25.21		



PG&E Supplemental Information

Carmel-By-The-Sea

APPENDIX G (a) Photos of Squeezers

MUSTANG 3"-4" PLASTIC MANUAL SQUEEZER

FOOTAGE 4"-8" PLASTIC HYDRAULIC SQUEEZER

MUSTANG "LONG HANDLE" ½" – 2" PLASTIC SQUEEZER

MUSTANG ½" – 2" STEEL SQUEEZER

POLLARD ½"-1" CU SQUEEZER



APPENDIX G

(b) PGE Inventory of Monterey Area Squeezers

PG&E Gas Monterey Division & General Construction Inventory of Squeezers for Gas Pipe

Squeezer Type	Quantity
Mustang ½"–2" Steel Squeezers	10
Mustang Long Handle ½"–2" Plastic Squeezers	7
Concetra ½"–1" Plastic Squeezers	12
Footage ¼" – 2" Plastic Squeezers	12
Pollard ½"–1" Copper Squeezers	3
Mustang 3"- 4" Plastic Manual Squeezers	4
Footage 4"–8" Plastic Hydraulic Squeezers	2

How They Are Distributed					
	MUSTANG ½"–2" STEEL SQUEEZERS	MUSTANG LONG HANDLE ½"–2" PLASTIC SQUEEZERS	CONCETRA ½"–1" PLASTIC SQUEEZERS	FOOTAGE ¼" – 2" PLASTIC SQUEEZERS	POLLARD ½"–1" COPPER SQUEEZERS
GAS CREW TRUCK	1	2	2	2	1
GAS CREW TRUCK	1	2	2	2	1
GAS WELDING TRUCK	1	2	2	2	1
FOREMAN PICK-UP	1	1	2	2	-
FOREMAN PICK-UP	-	-	2	2	-
GC CREW TRUCK	2				
GC CREW TRUCK	2				
GC CREW TRUCK	2				
	FOOTAGE 4"–8" PLASTIC HYDRAULIC SQUEEZERS	MUSTANG 3" - 4" PLASTIC MANUAL SQUEEZERS	CONCETRA ½"–1" PLASTIC SQUEEZERS	FOOTAGE ¼"–2" PLASTIC SQUEEZERS	
TOOL ROOM	2	4	2	2	



PG&E Supplemental Information

Carmel-By-The-Sea

APPENDIX H (a) Gas Operations See Our Progress



A Message from
Nick Stavropoulos
Executive Vice President, Gas Operations



Team:

In the last couple of weeks, your leadership team had the opportunity to come together to review and share all of our great accomplishments from 2013 and look ahead to 2014. It's clear that we have a lot to celebrate and you should be very proud of the incredible safety and reliability improvements we've accomplished toward our vision of becoming the safest and most reliable gas company in the nation. I can't thank you enough for all that you did last year and I look forward to what we can do together as a team this year.

See Our Progress

In 2013, our results were outstanding, and here is just a snapshot of what you have achieved:

You moved us into the top quartile for gas utilities nationwide for responding to gas odor calls by arriving, on average, in 21 minutes. Last year, you walked nearly every inch of our 6,750 miles of transmission system to obtain and record precise GPS data and identify potential problems in our rights-of-way. That's more miles than it would take you to walk from San Francisco to Boston and back—Lewis and Clark would be very proud. In 2010, it was taking us an average of 75 days to update our maps, and we do it in less than half that time now. You made 157 miles of transmission line piggable in 2013—that's equivalent to nearly six marathon races! You replaced 69 miles of distribution pipes throughout our system, which is the length of over 1,200 football fields. You built the best, most technologically-advanced control center of any gas utility out there.

You found ways to make our work more efficient, delivering our Pipeline Safety Enhancement Plan on time and on budget. You went out of your way to help our customers who stopped by your job sites. You attended countless community events and city council meetings. You answered questions from your neighbors, you jumped up when you saw the emergency alert come in, you raised your hand when you saw a problem, and you put in endless hours to get

the job done. And you embraced our mantra of “find it, fix it.”

We are making incredible progress but still have a long way to go

You can see more of the fruits of our labor in the new Gas Operations “See Our Progress” report card attached. Post the scorecard in the break room, leave a copy in your crew truck and share it with your fellow team members. I’m extremely proud of what we’ve accomplished and know we could not achieve these results without your dedication and the support and cooperation of the IBEW and ESC leadership. We are becoming the envy of every gas utility in the country and you are doing what critics said was impossible. In fact, this level of progress is unheard of in our industry. And you’re doing it because you know it is the right thing to do.

We can’t fix what we don’t know about

It’s critical that we continue to speak up when we spot an issue that stands in the way of our ability to operate the safest, most reliable and affordable gas system in the country. I’m counting on you to raise potential concerns immediately through the [Corrective Action Program \(CAP\)](#). And I need to pause here to acknowledge the hard work our teams along the Central Coast area are putting in. For those who don’t know, on Monday, a vacant home in Carmel was severely damaged due to an explosion following a natural gas leak. I am relieved to tell you that there were no injuries or fatalities. We are working diligently with local officials, the CPUC and a third party engineering firm to determine root cause. We’ll keep you updated as we learn more. This incident was a close call and a vivid reminder that we must keep our focus on safety. Thank you to the team for entering this into CAP. This demonstrates that all issues big and small need to be addressed by our CAP team to ensure the ongoing safety of the public and our employees.

Setting goals for another great year

One of the topics we discussed at the Gas Ops Extended Leadership Team (ELT) meeting was our [2014 Line of Sight goals and strategic actions](#). Click on these links to view the [ELT Meeting presentation](#) and [2014 Line of Sight booklet](#). In the coming weeks, your supervisor will discuss this year’s strategic objectives with you and explain how they guide your team’s goals and your personal development goals. By working together, I know we’ll make remarkable progress again this year. You are the reason we are on track to achieve gas safety excellence and steadily earning back the trust of our customers.

Thank you and stay safe,

Nick



PG&E Supplemental Information






Carmel-By-The-Sea

APPENDIX H (b) See Our Progress March 2014



Gas Operations "See Our Progress"

In 2013, Gas Operations employees went above and beyond to accomplish an unprecedented amount of work on our system. Our achievements last year compared to 2010 demonstrate our commitment to becoming the safest, most reliable gas company in the country.

	2010	2013
 GAS ODOR RESPONSE TIMES¹		
Average response time in minutes	33.3	21.3
Percent response within 60 minutes	94.4%	99.3%
 SCADA VISIBILITY AND CONTROL POINTS²		
Transmission pressures and flows	1,306	1,809
Distribution pressures and flows	293	735
 GAS TRANSMISSION³		
Miles of pipeline replaced	1	69
Miles of pipeline hydrotested	0	199
Miles of pipeline made piggable	131	157
Automated valves installed	0	75
Percent of system with GPS centerline data	0%	96.2%
 GAS DISTRIBUTION		
Miles of main replaced ³	27	69
Open Grade 2 and 2+ leak indications ⁴	12,203	151
 GAS MAPPING CYCLES¹ (construction complete to mapping complete)		
Average duration to update maps (days)	75 ⁵	34
Percent of jobs mapped within 90 days	16% ⁵	97%
OTHER³		
Pressure Exceedances	774 ⁵	31

¹Data represents year-to-date average

²Data represents year-end cumulative

³Data represents total for specified year

⁴Data represents total remaining at year end

⁵Data as of 2011

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PG&E Supplemental Information

Carmel-By-The-Sea

APPENDIX I FES Carmel Report



Crossbore Sewer Safety Inspection Status Report

March 18, 2014

PROBLEM/REQUEST

Raymond Thierry, Director of DIMP, PG&E, requested Frontline Energy Services (FES) assistance in performing an urgent sewer inspection for potential crossbores in the vicinity of [Redacted] in Carmel, CA. [Redacted] Manager, Quality Engineering & Improvement, Gas Operations, PG&E, coordinated the inspection. This inspection was prompted by an incident occurring at this location potentially stemming from a gas pipeline replacement program being conducted by a third party construction company (Underground Construction) on behalf of PG&E.

ACTION PLAN

Sewer main segments and the laterals connected to them were identified for inspection, encompassing the immediate neighborhood of the subject property. The inspection scope was adjusted on site after [Redacted] Senior Specialist, Work Procedure Errors, PG&E, gave FES information about the gas main installation. The small area scope facilitated the permitting process to get the inspections started quickly. This report of findings by FES is provided upon completion of sewer main inspections in the blocks adjacent to the property. After PM review, the scope can easily be expanded as required.

SCOPE

Scope of work has been defined by the incident investigation team comprised of PG&E and independent investigators, Exponent.

1. The entire sewer lateral, from residence to sewer main connection, of the residence where explosion occurred
2. Sewer main on [Redacted] a minimum of 200 feet West and a minimum of 100 feet East of the intersection with [Redacted]
3. Sewer main on [Redacted] a minimum 200 feet North and a minimum of 120 feet South of the intersection with [Redacted]

PROCESS

- [Redacted], VP of Operations, and [Redacted], PG&E Crossbore Safety Project Manager with FES oversaw contractors in conducting video/CCTV inspections of sewer mains and laterals

[Redacted]

- [Redacted] Managing Engineer representing Exponent, a third-party investigator, was present on site during the first day of video inspection and had the opportunity to recommend changes to the proposed video locations
- GPS locations indicate where video started, and the video recorded the complete interior of the sewer pipe
- FES Crossbore Team analysts conducted thorough quality checks of the inspection data and video and reported findings to the Project Manager and technical specialists

VISCINITY MAPS

Depictions of the sewer inspection area and the affected sewer main pipe segments in the blocks adjoining the intersection of [Redacted] in Carmel, CA

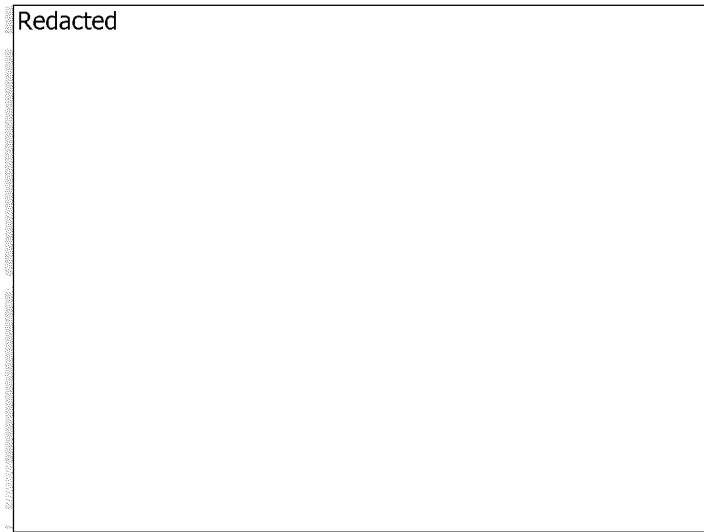


Figure 1. Street map



Figure 2. Aerial image

[Redacted]

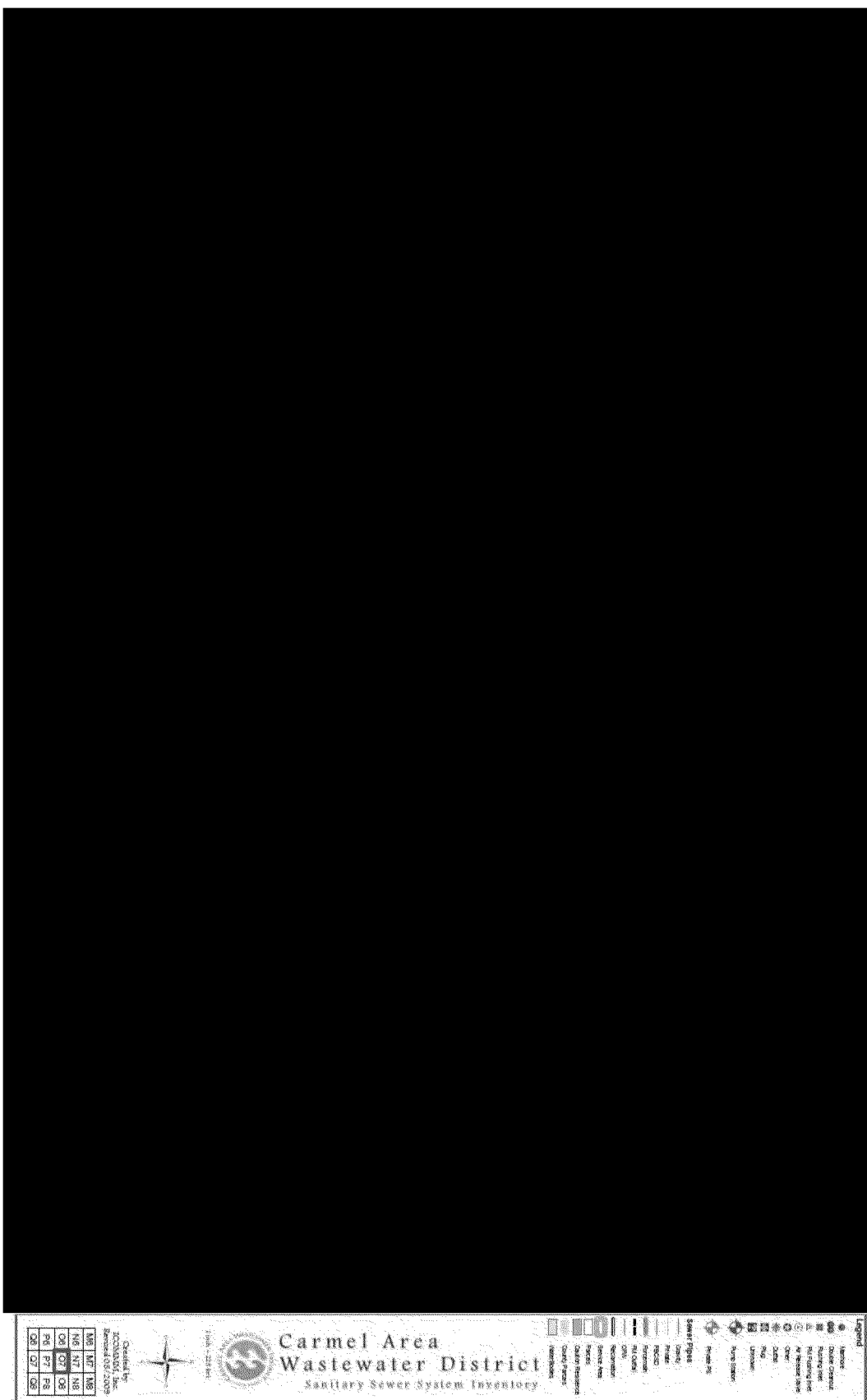


Figure 3. Carmel Area Wastewater District plat map with main segments and manholes indicated at [Redacted] intersection.

[Redacted]

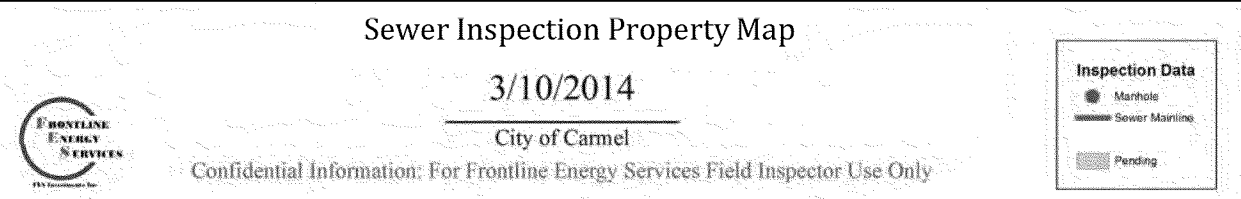
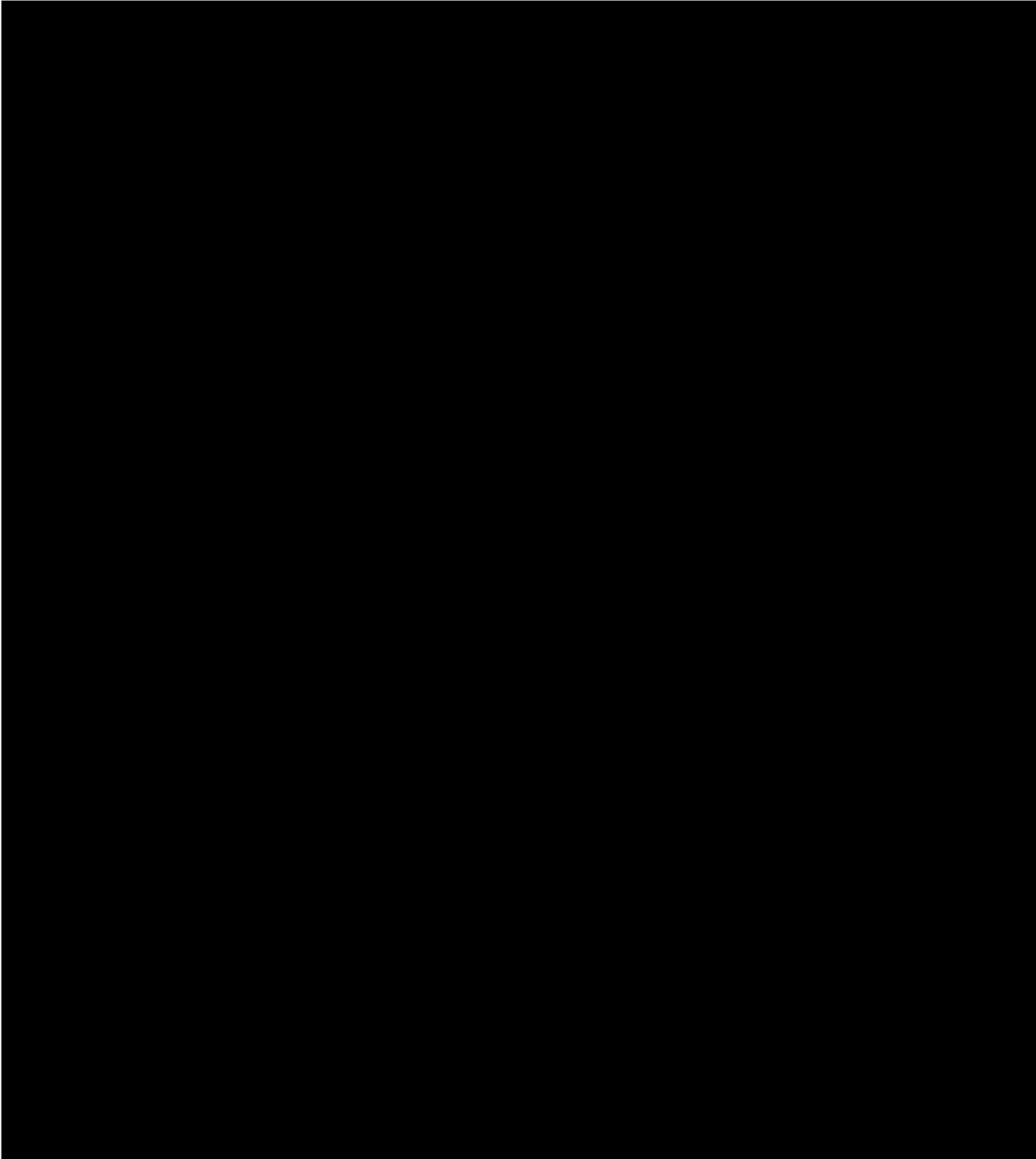


Figure 4. FES GIS reference map with sewer mains, manhole IDs, and property IDs (last 5 digits of the Parcel ID). Street number addresses are not commonly used in this neighborhood.



INCIDENT RESPONSE TIMETABLE

Day	Date	Action
Fri	3/7	Raymond Thierry requested FES perform urgent inspections. Gov-Rel and GC involved. PG&E notified City of Carmel of inspections.
Sat	3/8	[Redacted], Exponent and investigation team define the inspection scope
Mon	3/10	[Redacted] met with and obtained work permit from City of Carmel
Tue	3/11	Sewer Inspections begun at [Redacted]
Wed	3/12	Sewer Inspections completed on blocks adjoining [Redacted]
Thu	3/13	Inspection video QC and data analysis
Fri	3/14	Inspection video QC and data analysis
Mon	3/17	Data analysis and summary
Tue	3/18	Report delivery

DISCOVERY

Sewer inspections took place on the blocks connecting to the intersection of [Redacted] [Redacted] under the supervision of FES Project Manager [Redacted] and VP of Operations [Redacted] Exponent Managing Engineer [Redacted] and PG&E personnel [Redacted], [Redacted], and [Redacted] were present at the site on Tuesday March 11th.

The subject property, identified as [Redacted] on the southwest corner of the intersection of [Redacted], and the reference manhole IDs (MH#) are depicted on the FES map (Figure 4, above). Sewer pipe inspection video still images are included after the descriptions below.

Sewer line segments inspected Tuesday March 11th:

1. MH 710 to MH 707 on [Redacted] with lateral-launch camera
 - a. The full 247 ft. extent of the main East of the intersection was inspected and found to be clear of obstructions
 - b. 5 ft. of lateral on property [Redacted] up to an offset joint in lateral past which the camera could not pass due to restricted size (Figure 5)
 - c. The inspection team received permission to enter the property to insert a push camera from the toilet toward the main. It progressed 50 ft. through cast iron pipe to an offset joint with plastic pipe (Figure 6), then another 5 ft. through plastic pipe to a bend in the pipe (Figure 7)
 - d. 60 ft. of lateral pipe was inspected. One foot of lateral was not inspected because the camera was unable to pass the offset joint and bend in the pipe 5 ft. from the main
 - e. Four other 4 inch lateral taps on properties 86148 and 86876 could not be inspected with lateral-launch camera due to restricted size and/or vertical position. Structure access will be necessary to inspect these laterals
2. MH 710 to MH 715 on [Redacted] with lateral-launch camera
 - a. The full 242 ft. extent of the main West of the intersection was inspected and found to be clear of obstructions

- b. Two laterals on properties [Redacted] were inspected from main to foundation and found to be clear of obstructions
- 3. MH 710 to LH (lamp-hole) 711 on [Redacted]
 - a. Lateral-launch camera traverse blocked by collapsed main and standing water at 1 ft. from MH 710 (Figure 8)
- 4. MH 710 to MH 732 on [Redacted] was inaccessible to lateral-launch camera due to restricted size. It is an 8 inch pipe reduced in size with a secondary liner and further restricted by offset joints
 - a. Push camera and structure access will be necessary to inspect this main North of the intersection and the laterals on it.

Sewer line segments inspected Wednesday March 12th:

- 1. MH 710 to LH 711 on [Redacted]
 - a. A push camera entered LH 711 and extended 133 ft. toward MH 710
 - b. Residents of two adjacent properties cooperatively flushed toilets when asked, while the push camera was at taps 6.3 and 6.9 ft. from the entrance at LH 711. No water entered the main, supporting the observation that their laterals flowed Westward down to the sewer main on [Redacted] and are not connected to the inspected main
 - c. A push camera passed through the collapsed main obstruction at MH 710 and traversed underwater through 6 ft. of sagging line. Beyond the sag it continued South of the intersection to a distance of 67 ft. to the point reached by the camera put in at LH 711, completing a 200 ft. traverse of the full segment
 - d. The lateral located 32 ft. up the main South from MH 710 and oriented in the direction of the subject property was found to be blocked by root intrusion, and the lateral appeared to be capped (Figures 9 and 10)
 - e. Laterals tapped into the main vertically from above could not be inspected by push camera. Structure access will be necessary to inspect these 11 laterals and confirm whether they all are capped or abandoned

SEWER INSPECTION VIDEO STILLS

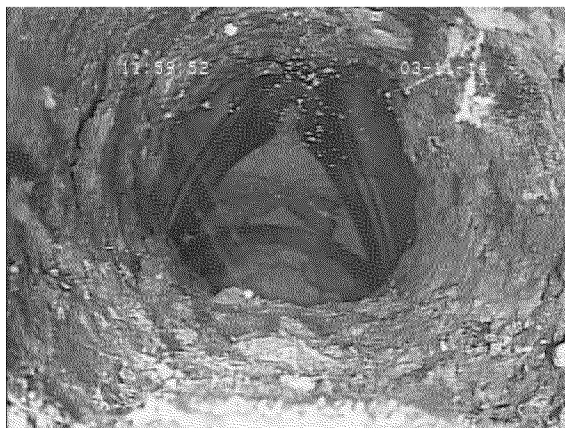


Figure 5. Collapsed main and offset joint



Figure 6. Offset joint 50 ft. from entry on property





Figure 7. Lateral bend 55 ft. from entry

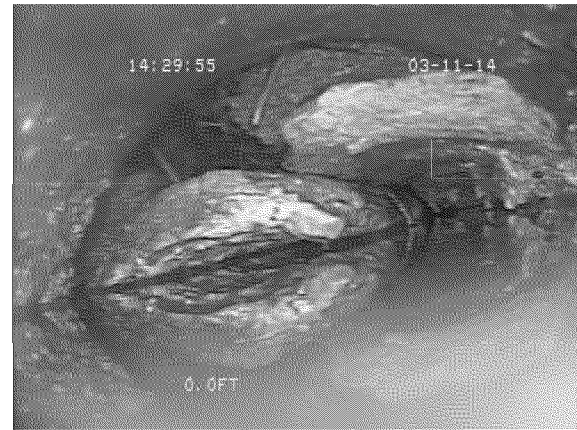


Figure 8. Collapsed main and water in sag



Figure 9. Lateral blocked by roots

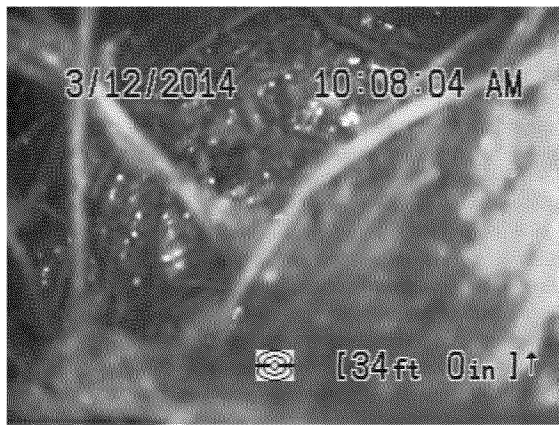


Figure 10. Roots over shiny apparent cap

RECOMMENDATIONS

Structure access will be necessary to complete sewer lateral inspections of the properties associated with the GPRP job under which the gas main was installed. In the reaches of sewer main traversed by video camera, 17 lateral taps were counted that could not be accessed with either lateral-launch or push camera equipment from the main due to the vertical orientation, small diameter, or intrusion of the taps into the mains.

CONCLUSION

Sewer main segments in three blocks of [Redacted], and the laterals serving parcels [Redacted] were inspected with video equipment. Based on FES's confidential assessment of the video, gas pipe does not disrupt the laterals or connected sewer mains. Visual inspection of the sewer mains adjacent to the gas mains shows no indication of disruption of sewer facilities by gas main or service in the subject property, or in any property that potentially could have been affected by the gas main installation in the immediate area.



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End of Report

