

Home > Accident Investigations > Reports

PIPELINE ACCIDENT REPORT

Pacific Gas and Electric Company Natural Gas Transmission Pipeline Rupture and Fire

San Bruno, California
September 9, 2010

NTSB Number: PAR-11-01
NTIS Number: PB2011-916501
Adopted: August 30, 2011
PDF

EXECUTIVE SUMMARY

On September 9, 2010, about 6:11 p.m. Pacific daylight time, a 30-inch-diameter segment of an intrastate natural gas transmission pipeline known as Line 132, owned and operated by the Pacific Gas and Electric Company (PG&E), ruptured in a residential area in San Bruno, California. The rupture occurred at mile point 39.28 of Line 132, at the intersection of Earl Avenue and Glenview Drive. The rupture produced a crater about 72 feet long by 26 feet wide. The section of pipe that ruptured, which was about 28 feet long and weighed about 3,000 pounds, was found 100 feet south of the crater. PG&E estimated that 47.6 million standard cubic feet of natural gas was released. The released natural gas ignited, resulting in a fire that destroyed 38 homes and damaged 70. Eight people were killed, many were injured, and many more were evacuated from the area.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the Pacific Gas and Electric Company's (PG&E) (1) inadequate quality assurance and quality control in 1956 during its Line 132 relocation project, which allowed the installation of a substandard and poorly welded pipe section with a visible seam weld flaw that, over time grew to a critical size, causing the pipeline to rupture during a pressure increase stemming from poorly planned electrical work at the Milpitas Terminal; and (2) inadequate pipeline integrity management program, which failed to detect and repair or remove the defective pipe section.

Contributing to the accident were the California Public Utilities Commission's (CPUC) and the U.S. Department of Transportation's exemptions of existing pipelines from the regulatory requirement for pressure testing, which likely would have detected the installation defects. Also contributing to the accident was the CPUC's failure to detect the inadequacies of PG&E's pipeline integrity management program.

Contributing to the severity of the accident were the lack of either automatic shutoff valves or remote control valves on the line and PG&E's flawed emergency response procedures and delay in isolating the rupture to stop the flow of gas.

INVESTIGATION SYNOPSIS

The National Transportation Safety Board's investigation found that the rupture of Line 132 was caused by a fracture that originated in the partially welded longitudinal seam of one of six short pipe sections, which are known in the industry as "pups." The fabrication of five of the pups in 1956 would not have met generally accepted industry quality control and welding standards then in effect, indicating that those standards were either overlooked or ignored. The weld defect in the failed pup would have been visible when it was installed. The investigation also determined that a sewer line installation in 2008 near the rupture did not damage the defective pipe.

The rupture occurred at 6:11 p.m.; almost immediately, the escaping gas from the ruptured pipe ignited and created an inferno. The first 911 call was received within seconds. Officers from the San Bruno Police Department arrived on scene about 6:12 p.m. Firefighters at the San Bruno Fire Department heard and saw the explosion from their station, which was about 300 yards from the rupture site. Firefighters were on scene about 6:13 p.m. More than 900 emergency responders from the city of San Bruno and surrounding jurisdictions executed a coordinated emergency response, which included defensive operations, search and evacuation, and medical operations. Once the flow of natural gas was interrupted, firefighting operations continued for 2 days. Hence, the emergency response by the city of San Bruno was prompt and appropriate.

However, PG&E took 95 minutes to stop the flow of gas and to isolate the rupture site—a response time that was excessively long and contributed to the extent and severity of property damage and increased the life-threatening risks to the residents and emergency responders. The National Transportation Safety Board found that PG&E lacks a detailed and comprehensive procedure for responding to large-scale emergencies such as a transmission pipeline break, including a defined command structure that clearly assigns a single point of leadership and allocates specific duties to supervisory control and data acquisition staff and other involved employees. PG&E's supervisory control and data acquisition system limitations caused delays in pinpointing the location of the break. The use of either automatic shutoff valves or remote control valves would have reduced the amount of time taken to stop the flow of gas.

PG&E's pipeline integrity management program, which should have ensured the safety of the system, was deficient and ineffective because it -

- Was based on incomplete and inaccurate pipeline information.
- Did not consider the design and materials contribution to the risk of a pipeline failure.
- Failed to consider the presence of previously identified welded seam cracks as part of its risk assessment.
- Resulted in the selection of an examination method that could not detect welded seam defects.
- Led to internal assessments of the program that were superficial and resulted in no improvements.

Several deficiencies revealed by the National Transportation Safety Board investigation, such as PG&E's poor quality control during the pipe installation and inadequate emergency response, were factors in the 2008 explosion of a PG&E gas pipeline in Rancho Cordova, California. (See *Explosion, Release, and Ignition of Natural Gas, Rancho Cordova, California, December 24, 2008*, Pipeline Accident Brief NTSB/PAB-10/01 [Washington, DC: National Transportation Safety Board, 2010].) This 2008 accident involved the inappropriate installation of a pipe that was not intended for operational use and did not meet applicable pipe specifications. PG&E's response to that event was inadequate; PG&E initially dispatched an unqualified person to the emergency, causing an unnecessary delay in dispatching a properly trained and equipped technician. Some of these deficiencies were also factors in the 1981 PG&E gas pipeline leak in San Francisco, which involved inaccurate record-keeping, the dispatch of first responders who were not trained or equipped to close valves, and unacceptable delays in shutting down the pipeline. (See *Pacific Gas & Electric Company Natural Gas Pipeline Puncture, San Francisco, California, August 25, 1981*, Pipeline Accident Report NTSB/PAR-82/01 [Washington, DC: National Transportation Safety Board, 1982].) The National Transportation Safety Board concluded that PG&E's multiple, recurring deficiencies are evidence of a systemic problem.

The investigation also determined that the California Public Utilities Commission, the pipeline safety regulator within the state of California, failed to detect the inadequacies in PG&E's integrity management program and that the Pipeline and Hazardous Materials Safety Administration integrity management inspection protocols need improvement. Because the Pipeline and Hazardous Materials Safety Administration has not incorporated the use of effective and meaningful metrics as part of its guidance for performance-based management pipeline safety programs, its oversight of state public utility commissions regulating gas transmission and hazardous liquid pipelines could be improved. Without effective and meaningful metrics in performance-based pipeline safety management programs, neither PG&E nor the California Public Utilities Commission was able to effectively evaluate or assess PG&E's pipeline system.

RECOMMENDATIONS

As a result of its investigation of this accident, the National Transportation Safety Board makes the following safety recommendations:

NEW RECOMMENDATIONS

To the U.S. Secretary of Transportation:

Conduct an audit to assess the effectiveness of the Pipeline and Hazardous Materials Safety Administration's oversight of performance-based safety programs. This audit should address the (1) need to expand the program's use of meaningful metrics; (2) adequacy of its inspection protocols for ensuring the completeness and accuracy of pipeline operators' integrity management program data; (3) adequacy of its inspection protocols for ensuring the incorporation of an operator's leak, failure, and incident data in evaluations of the operator's risk model; and (4) benefits of establishing performance goals for pipeline operators. (P-11-4)

Include in the audit conducted pursuant to Safety Recommendation P-11-4 a review of the Pipeline and Hazardous Materials Safety Administration's enforcement policies and procedures, including, specifically, the standard of review for compliance with performance-based regulations. (P-11-5)

Conduct an audit of the Pipeline and Hazardous Materials Safety Administration's state pipeline safety program certification program to assess and ensure state pipeline safety programs and Federal pipeline safety grants are used effectively to conduct oversight of intrastate pipeline operations, including an evaluation of state inspection and enforcement activities. (P-11-6)

Ensure that the Pipeline and Hazardous Materials Safety Administration amends the certification program, as appropriate, to comply with the findings of the audit recommended in Safety Recommendation P-11-6. (P-11-7)

To the Pipeline and Hazardous Materials Safety Administration:

Require operators of natural gas transmission and distribution pipelines and hazardous liquid pipelines to provide system-specific information about their pipeline systems to the emergency response agencies of the communities and jurisdictions in which those pipelines are located. This information should include pipe diameter, operating pressure, product transported, and potential impact radius. (P-11-8) This recommendation supersedes Safety Recommendation P-11-1.

Require operators of natural gas transmission and distribution pipelines and hazardous liquid pipelines to ensure that their control room operators immediately and directly notify the 911 emergency call center(s) for the communities and jurisdictions in which those pipelines are located when a possible rupture of any pipeline is indicated. (P-11-9) This recommendation supersedes Safety Recommendation P-11-2.

Require that all operators of natural gas transmission and distribution pipelines equip their supervisory control and data acquisition systems with tools to assist in recognizing and pinpointing the location of leaks, including line breaks; such tools could include a real-time leak detection system and appropriately spaced flow and pressure transmitters along covered transmission lines. (P-11-10)

Amend Title 49 Code of Federal Regulations 192.935(c) to directly require that automatic shutoff valves or remote control valves in high consequence areas and in class 3 and 4 locations be installed and spaced at intervals that consider the factors listed in that regulation. (P-11-11)

Amend Title 49 Code of Federal Regulations 199.105 and 49 Code of Federal Regulations 199.225 to eliminate operator discretion with regard to testing of covered employees. The revised language should require drug and alcohol testing of each employee whose performance either contributed to the accident or cannot be completely discounted as a contributing factor to the accident. (P-11-12)

Issue immediate guidance clarifying the need to conduct postaccident drug and alcohol testing of all potentially involved personnel despite uncertainty about the circumstances of the accident. (P-11-13)

Amend Title 49 Code of Federal Regulations 192.619 to delete the grandfather clause and require that all gas transmission pipelines constructed before 1970 be subjected to a hydrostatic pressure test that incorporates a spike test. (P-11-14)

Amend Title 49 Code of Federal Regulations Part 192 of the Federal pipeline safety regulations so that manufacturing- and construction-related defects can only be considered stable if a gas pipeline has been subjected to a postconstruction hydrostatic pressure test of at least 1.25 times the maximum allowable operating pressure. (P-11-15)

Assist the California Public Utilities Commission in conducting the comprehensive audit recommended in Safety Recommendation P-11-22. (P-11-16)

Require that all natural gas transmission pipelines be configured so as to accommodate in-line inspection tools, with priority given to older pipelines. (P-11-17)

Revise your integrity management inspection protocol to (1) incorporate a review of meaningful metrics; (2) require auditors to verify that the operator has a procedure in place for ensuring the completeness and accuracy of underlying information; (3) require auditors to review all integrity management performance measures reported to the Pipeline and Hazardous Materials Safety Administration and compare the leak, failure, and incident measures to the operator's risk model; and (4) require setting performance goals for pipeline operators at each audit and follow up on those goals at subsequent audits. (P-11-18)

(1) Develop and implement standards for integrity management and other performance-based safety programs that require operators of all types of pipeline systems to regularly assess the effectiveness of their programs using clear and meaningful metrics, and to identify and then correct deficiencies; and (2) make those metrics available in a centralized database. (P-11-19)

Work with state public utility commissions to (1) implement oversight programs that employ meaningful metrics to assess the effectiveness of their oversight programs and make those metrics available in a centralized database, and (2) identify and then correct deficiencies in those programs. (P-11-20)

To the Governor of the State of California:

Expediently evaluate the authority and ability of the pipeline safety division within the California Public Utilities Commission to effectively enforce state pipeline safety regulations, and, based on the results of this evaluation, grant the pipeline safety division within the California Public Utilities Commission the direct authority, including the assessment of fines and penalties, to correct noncompliance by state regulated pipeline operators. (P-11-21)

To the California Public Utilities Commission:

With assistance from the Pipeline and Hazardous Materials Safety Administration, conduct a comprehensive audit of all aspects of Pacific Gas and Electric Company operations, including control room operations, emergency planning, record-keeping, performance-based risk and integrity management programs, and public awareness programs. (P-11-22)

Require the Pacific Gas and Electric Company to correct all deficiencies identified as a result of the San Bruno, California, accident investigation, as well as any additional deficiencies identified through the comprehensive audit recommended in Safety Recommendation P-11-22, and verify that all corrective actions are completed. (P-11-23)

To the Pacific Gas and Electric Company:

Revise your work clearance procedures to include requirements for identifying the likelihood and consequence of failure associated with the planned work and for developing contingency plans. (P-11-24)

Establish a comprehensive emergency response procedure for responding to large-scale emergencies on transmission lines; the procedure should (1) identify a single person to assume command and designate specific duties for supervisory control and data acquisition staff and all other potentially involved company employees; (2) include the development and use of trouble-shooting protocols and checklists; and (3) include a requirement for periodic tests and/or drills to demonstrate the procedure can be effectively implemented. (P-11-25)

Equip your supervisory control and data acquisition system with tools to assist in recognizing and pinpointing the location of leaks, including line breaks; such tools could include a real-time leak detection system and appropriately spaced flow and pressure transmitters along covered transmission lines. (P-11-26)

Expedite the installation of automatic shutoff valves and remote control valves on transmission lines in high consequence areas and in class 3 and 4 locations, and space them at intervals that consider the factors listed in Title 49 Code of Federal Regulations 192.935(c). (P-11-27)

Revise your postaccident toxicological testing program to ensure that testing is timely and complete. (P-11-28)

Assess every aspect of your integrity management program, paying particular attention to the areas identified in this investigation, and implement a revised program that includes, at a minimum, (1) a revised risk model to reflect the Pacific Gas and Electric Company's actual recent experience data on leaks, failures, and incidents; (2) consideration of all defect and leak data for the life of each pipeline, including its construction, in risk analysis for similar or related segments to ensure that all applicable threats are adequately addressed; (3) a revised risk analysis methodology to ensure that assessment methods are selected for each pipeline segment that address all applicable integrity threats, with particular emphasis on design/material and construction threats; and (4) an improved self-assessment that adequately measures whether the program is effectively assessing and evaluating the integrity of each covered pipeline segment. (P-11-29)

Conduct threat assessments using the revised risk analysis methodology incorporated in your integrity management program, as recommended in Safety Recommendation P-11-29, and report the results of those assessments to the California Public Utilities Commission and the Pipeline and Hazardous Materials Safety Administration. (P-11-30)

Develop, and incorporate into your public awareness program, written performance measurements and guidelines for evaluating the plan and for continuous program improvement. (P-11-31)

To the American Gas Association and the Interstate Natural Gas Association of America:

Report to the National Transportation Safety Board on your progress to develop and introduce advanced in-line inspection platforms for use in gas transmission pipelines not currently accessible to existing in-line inspection platforms, including a timeline for implementation of these advanced platforms. (P-11-32)

PREVIOUSLY ISSUED RECOMMENDATIONS

As a result of this accident investigation, the National Transportation Safety Board previously issued the following safety recommendations:

To the Pipeline and Hazardous Materials Safety Administration:

Through appropriate and expeditious means such as advisory bulletins and posting on your website, immediately inform the pipeline industry of the circumstances leading up to and the consequences of the September 9, 2010, pipeline rupture in San Bruno, California, and the National Transportation Safety Board's urgent safety recommendations to Pacific Gas and Electric Company so that pipeline operators can proactively implement corrective measures as appropriate for their pipeline systems. (P-10-1) (Urgent)

Issue guidance to operators of natural gas transmission and distribution pipelines and hazardous liquid pipelines regarding the importance of sharing system-specific

information, including pipe diameter, operating pressure, product transported, and potential impact radius, about their pipeline systems with the emergency response agencies of the communities and jurisdictions in which those pipelines are located. (P-11-1)

Issue guidance to operators of natural gas transmission and distribution pipelines and hazardous liquid pipelines regarding the importance of control room operators immediately and directly notifying the 911 emergency call center(s) for the communities and jurisdictions in which those pipelines are located when a possible rupture of any pipeline is indicated. (P-11-2)

To the California Public Utilities Commission:

Develop an implementation schedule for the requirements of Safety Recommendation P-10-2 (Urgent) to Pacific Gas and Electric Company (PG&E) and ensure, through adequate oversight, that PG&E has aggressively and diligently searched documents and records relating to pipeline system components, such as pipe segments, valves, fittings, and weld seams, for PG&E natural gas transmission lines in class 3 and class 4 locations and class 1 and class 2 high consequence areas that have not had a maximum allowable operating pressure established through prior hydrostatic testing as outlined in Safety Recommendation P-10-2 (Urgent) to PG&E. These records should be traceable, verifiable, and complete; should meet your regulatory intent and requirements; and should have been considered in determining maximum allowable operating pressures for PG&E pipelines. (P-10-5) (Urgent)

If such a document and records search cannot be satisfactorily completed, provide oversight to any spike and hydrostatic tests that Pacific Gas and Electric Company is required to perform according to Safety Recommendation P-10-4. (P-10-6) (Urgent)

Through appropriate and expeditious means, including posting on your website, immediately inform California intrastate natural gas transmission operators of the circumstances leading up to and the consequences of the September 9, 2010, pipeline rupture in San Bruno, California, and the National Transportation Safety Board's urgent safety recommendations to Pacific Gas and Electric Company so that pipeline operators can proactively implement corrective measures as appropriate for their pipeline systems. (P-10-7) (Urgent)

To the Pacific Gas and Electric Company:

Aggressively and diligently search for all as-built drawings, alignment sheets, and specifications, and all design, construction, inspection, testing, maintenance, and other related records, including those records in locations controlled by personnel or firms other than Pacific Gas and Electric Company, relating to pipeline system components, such as pipe segments, valves, fittings, and weld seams for Pacific Gas and Electric Company natural gas transmission lines in class 3 and class 4 locations and class 1 and class 2 high consequence areas that have not had a maximum allowable operating pressure established through prior hydrostatic testing. These records should be traceable, verifiable, and complete. (P-10-2) (Urgent)

Use the traceable, verifiable, and complete records located by implementation of Safety Recommendation P-10-2 (Urgent) to determine the valid maximum allowable operating pressure, based on the weakest section of the pipeline or component to ensure safe operation, of Pacific Gas and Electric Company natural gas transmission lines in class 3 and class 4 locations and class 1 and class 2 high consequence areas that have not had a maximum allowable operating pressure established through prior hydrostatic testing. (P-10-3) (Urgent)

If you are unable to comply with Safety Recommendations P-10-2 (Urgent) and P-10-3 (Urgent) to accurately determine the maximum allowable operating pressure of Pacific Gas and Electric Company natural gas transmission lines in class 3 and class 4 locations and class 1 and class 2 high consequence areas that have not had a maximum allowable operating pressure established through prior hydrostatic testing, determine the maximum allowable operating pressure with a spike test followed by a hydrostatic pressure test. (P-10-4)

Require your control room operators to notify, immediately and directly, the 911 emergency call center(s) for the communities and jurisdictions in which your transmission and/or distribution pipelines are located, when a possible rupture of any pipeline is indicated. (P-11-3)

PREVIOUSLY ISSUED RECOMMENDATIONS CLASSIFIED IN THIS REPORT

Safety Recommendations P-11-1 and P-11-2 to the Pipeline and Hazardous Materials Safety Administration are classified "Closed-Superseded" by Safety Recommendations P-11-8 and P-11-9, respectively, in this report (section 2.4.2, "Notifying Emergency Responders").

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 Glossary of Terms
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 FAQs
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 Accident Animations
 Accident Reports
 Annual Review of Aircraft
 Accident Data





National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: January 3, 2011

In reply refer to: P-10-1 (Urgent)

The Honorable Cynthia L. Quarterman
Administrator
U.S. Department of Transportation
Pipeline and Hazardous Materials Safety Administration
East Building, 2nd Floor
1200 New Jersey Ave., SE
Washington, D.C. 20590

On September 9, 2010, about 6:11 p.m. Pacific daylight time,¹ a 30-inch-diameter natural gas transmission pipeline (Line 132) owned and operated by Pacific Gas and Electric Company (PG&E) ruptured in a residential area in the city of San Bruno, California. The accident killed eight people, injured many more, and caused substantial property damage. The rupture on Line 132 occurred near milepost 39.33, at the intersection of Earl Avenue and Glenview Drive in San Bruno. About 47.6 million standard cubic feet of natural gas were released as a result of the rupture. The rupture created a crater about 72 feet long by 26 feet wide. A ruptured pipe segment about 28 feet long was found about 100 feet away from the crater. The released natural gas was ignited sometime after the rupture; the resulting fire destroyed 37 homes and damaged 18.

When the National Transportation Safety Board (NTSB) arrived on scene on September 10, the investigation began with a visual examination of the pipe and the surrounding area. The investigators measured, photographed, and secured the ruptured pipe segment. On September 13, the ruptured pipe segment and two shorter segments of pipe, cut from the north and south sides of the ruptured segment, were crated for transport to an NTSB facility in Ashburn, Virginia, for examination.

According to PG&E as-built drawings and alignment sheets, Line 132 was constructed using 30-inch-diameter seamless steel pipe (API 5L Grade X42) with a 0.375-inch-thick wall. The pipeline was coated with hot applied asphalt and was cathodically protected. The ruptured pipeline segment was installed circa 1956. According to PG&E, the maximum allowable operating pressure (MAOP) for the line was 400 pounds per square inch, gauge.

The NTSB's examination of the ruptured pipe segment and review of PG&E records revealed that although the as-built drawings and alignment sheets mark the pipe as seamless API

¹ All times mentioned in this letter refer to Pacific daylight time, unless otherwise specified.

5L Grade X42 pipe, the pipeline in the area of the rupture was constructed with longitudinal seam-welded pipe. Laboratory examinations have revealed that the ruptured pipe segment was constructed of five sections of pipe, some of which were short pieces measuring about 4 feet long. These short pieces of pipe contain different longitudinal seam welds of various types, including single- and double-sided welds. Consequently, the short pieces of pipe of unknown specifications in the ruptured pipe segment may not be as strong as the seamless API 5L Grade X42 steel pipe listed in PG&E's records.² It is possible that there are other discrepancies between installed pipe and as-built drawings in PG&E's gas transmission system. It is critical to know all the characteristics of a pipeline in order to establish a valid MAOP below which the pipeline can be safely operated. The NTSB is concerned that these inaccurate records may lead to incorrect MAOPs.

The MAOP for a pipeline can be established by conducting a hydrostatic pressure test that stresses the pipe to 125 percent of the desired MAOP without failure. In a hydrostatic pressure test, a pipe segment is typically filled with water at a specific pressure for a specific period of time to test the strength of the pipe. Hydrostatic testing requirements and restrictions for natural gas pipelines are specified in Title 49 *Code of Federal Regulations* (CFR) Part 192, Subpart J. The spike test is a variation of the hydrostatic pressure test in which a higher hydrostatic pressure, usually 139 percent of the MAOP, is applied for a short period of time (typically about 30 minutes). The spike test is intended to eliminate flaws that may otherwise grow and cause failure during pressure reduction after the hydrostatic test or resulting from normal operational pressure cycles. It is advantageous to include a spike test because it limits the time the line is at the higher pressure to reduce the potential amount of crack growth. Although hydrostatic testing is recognized to be a direct and effective methodology for validating an MAOP, its implementation requires that operating lines be shut down, which may adversely affect customers dependent on the natural gas supplied by the pipeline, particularly if the pipe fails during the test, which could necessitate a protracted shutdown. Consequently, it is preferable to use available design, construction, inspection, testing, and other related records³ to calculate the valid MAOP.

The NTSB is concerned that other pipeline operators, including interstate operators regulated by the Pipeline and Hazardous Materials Safety Administration, may have discrepancies in their records as well. Therefore, the NTSB makes the following safety recommendation to the Pipeline and Hazardous Materials Safety Administration:

² PG&E's records identify Consolidated Western Steel Corporation as the manufacturer of the accident segment of Line 132. However, after physical inspection of the ruptured section, investigators were unable to confirm the manufacturing source of some of the pieces of ruptured pipe. Determining the identity of the manufacturer of these pieces of pipe is an ongoing part of the investigation.

³ Some relevant records may not currently be in PG&E's possession, such as those that may reside with the city of San Bruno, San Mateo County, the state of California, or former employees or contractors of PG&E. During the investigation of the collapse of the I-35W Highway Bridge in Minneapolis, Minnesota, on August 1, 2007, NTSB investigators interviewed retired engineers and other technical personnel who had worked on the design of the bridge in the early 1960s. In the course of their interviews, NTSB investigators were provided with critical engineering records related to the bridge design that had been personally retained by one of the retired employees of the company that had designed the bridge. See *Collapse of I-35W Highway Bridge, Minneapolis, Minnesota, August 1, 2007*, Highway Accident Report NTSB/HAR-08/03 (Washington, DC: National Transportation Safety Board, 2008), pp. 78, 103, on the NTSB website at <<http://www.nts.gov/publictn/2008/HAR0803.pdf>>.

Through appropriate and expeditious means such as advisory bulletins and posting on your website, immediately inform the pipeline industry of the circumstances leading up to and the consequences of the September 9, 2010, pipeline rupture in San Bruno, California, and the National Transportation Safety Board's urgent safety recommendations to Pacific Gas and Electric Company so that pipeline operators can proactively implement corrective measures as appropriate for their pipeline systems. (P-10-1) (Urgent)

The NTSB also issued safety recommendations to the California Public Utilities Commission:

Develop an implementation schedule for the requirements of Safety Recommendation P-10-2 (Urgent) to Pacific Gas and Electric Company (PG&E) and ensure, through adequate oversight, that PG&E has aggressively and diligently searched documents and records relating to pipeline system components, such as pipe segments, valves, fittings, and weld seams, for PG&E natural gas transmission lines in class 3 and class 4⁴ locations and class 1 and class 2⁵ high consequence areas⁶ that have not had a maximum allowable operating pressure established through prior hydrostatic testing as outlined in Safety Recommendation (P-10-2) (Urgent) to PG&E. These records should be traceable, verifiable, and complete; should meet your regulatory intent and requirements; and should have been considered in determining maximum allowable operating pressures for PG&E pipelines. (P-10-5) (Urgent)

If such a document and records search cannot be satisfactorily completed, provide oversight to any spike and hydrostatic tests that Pacific Gas and Electric Company is required to perform according to Safety Recommendation (P-10-4). (P-10-6) (Urgent)

Through appropriate and expeditious means, including posting on your website, immediately inform California intrastate natural gas transmission operators of the circumstances leading up to and the consequences of the September 9, 2010, pipeline rupture in San Bruno, California, and the National Transportation Safety Board's urgent safety recommendations to Pacific Gas and Electric Company so that pipeline operators can proactively implement corrective measures as appropriate for their pipeline systems. (P-10-7) (Urgent)

The NTSB also issued safety recommendations to the Pacific Gas and Electric Company:

⁴ Class 3 refers to any location unit that has 46 or more buildings intended for human occupancy. Class 4 refers to any class location unit where buildings with four or more stories above ground are prevalent.

⁵ Class 1 refers to an offshore area or any class location unit that has 10 or fewer buildings intended for human occupancy. A class 2 location is any class location unit that has more than 10 but fewer than 46 buildings intended for human occupancy.

⁶ A high consequence area is any class 3 or 4 location or any area where a potential impact radius of 660 feet would contain more than 20 buildings intended for human occupancy.

Aggressively and diligently search for all as-built drawings, alignment sheets, and specifications, and all design, construction, inspection, testing, maintenance, and other related records, including those records in locations controlled by personnel or firms other than Pacific Gas and Electric Company, relating to pipeline system components such as pipe segments, valves, fittings, and weld seams for Pacific Gas and Electric Company natural gas transmission lines in class 3 and class 4 locations and class 1 and class 2 high consequence areas that have not had a maximum allowable operating pressure established through prior hydrostatic testing. These records should be traceable, verifiable, and complete. (P-10-2) (Urgent)

Use the traceable, verifiable, and complete records located by implementation of Safety Recommendation P-10-2 (Urgent) to determine the valid maximum allowable operating pressure, based on the weakest section of the pipeline or component to ensure safe operation, of Pacific Gas and Electric Company natural gas transmission lines in class 3 and class 4 locations and class 1 and class 2 high consequence areas that have not had a maximum allowable operating pressure established through prior hydrostatic testing. (P-10-3) (Urgent)

If you are unable to comply with Safety Recommendations P-10-2 (Urgent) and P-10-3 (Urgent) to accurately determine the maximum allowable operating pressure of Pacific Gas and Electric Company natural gas transmission lines in class 3 and class 4 locations and class 1 and class 2 high consequence areas that have not had a maximum allowable operating pressure established through prior hydrostatic testing, determine the maximum allowable operating pressure with a spike test followed by a hydrostatic pressure test. (P-10-4)

In response to the recommendation in this letter, please refer to Safety Recommendation P-10-1 (Urgent). If you would like to submit your response electronically rather than in hard copy, you may send it to the following e-mail address: correspondence@ntsb.gov. If your response includes attachments that exceed 5 megabytes, please e-mail us asking for instructions on how to use our secure mailbox procedures. To avoid confusion, please use only one method of submission (that is, do not submit both an electronic copy and a hard copy of the same response letter).

Chairman HERSMAN, Vice Chairman HART, and Members SUMWALT, ROSEKIND, and WEENER concurred in these recommendations.

[Original Signed]

By: Deborah A.P. Hersman
Chairman