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Pipeline Safety: Assessing the San Bruno, California Explosion
and Other Recent Accidents
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Chairman Lautenberg, Ranking Member Thune, Members of the Subcommittee, thank you for the opportunity to address you today on the pipeline rupture in San Bruno, California. This accident is truly a tragedy, and I would like to begin by expressing condolences on behalf of the National Transportation Safety Board (NTSB) to the families and friends who lost loved ones in this accident. For those who were injured, we offer our hopes for a speedy recovery, and we extend our thoughts to those whose suffered loss or damage to their homes and property.

San Bruno

At approximately 6:11 pm Pacific Daylight Time on September 9, a pipeline rupture occurred in a residential area in San Bruno, California. On September 10, the NTSB launched a team to California to investigate this tragedy. I was the NTSB Board Member on scene in San Bruno.

Pacific Gas and Electric Company's (PG&E) 30-inch diameter pipeline (Line 132), with 0.375 inch steel thick wall, ruptured at the intersection of Earl Avenue and Glenview Drive in the city of San Bruno, CA. This line is regulated by the California Public Utilities Commission (CPUC). Approximately, 115 million cubic feet of natural gas were released. The released natural gas was ignited sometime afterwards with the resultant explosion and fire destroying or damaging nearby homes. The rupture created a crater approximately 72 feet long by 26 feet wide, and a pipe segment approximately 28 feet long was blown about 100 feet away from the crater.

Seven people were fatally injured in this tragedy. Additionally, numerous people were injured, and many more were evacuated. Ultimately, 37 homes were destroyed and 18 more were damaged. The immediate response by local emergency responders, as well as three strategic drops of fire retardant and water by airplane and helicopter before dark, assisted in stopping the spread of the fire.

PG&E personnel responded to the scene and isolated the ruptured pipe section by closing the nearest mainline valves. The upstream valve was closed at about 7:20 pm and the downstream valve at Healy Station was closed at about 7:40 pm. The distance between these two valves is approximately 2 ½ miles. Once the ruptured section was isolated, the gas flow stopped, and the resulting fire from the ruptured line self extinguished. Later that evening, PG&E isolated the natural gas distribution system serving residences in the area, and within a minute of stopping the gas flow in the distribution system (about 11:30 pm), fires from escaping natural gas at damaged houses went out.

At about the same time as the rupture, in the Control Center in San Francisco, controllers observed an increase in pressure on Line 132. This increase was observed to occur at the Martin Station, which is downstream of the rupture location. A "Hi-Hi" pressure alarm indicating 386 pounds per square inch (psig) was received on line 132 at Martin Station.

Subsequently, at 6:15 pm a "Lo" pressure alarm was received on line 132 at Martin Station indicating 186 psig and within the same minute, a "Lo-Lo" alarm was received indicating 144 psig. At approximately the same time that the pressure drop was noticed, calls came in to the Control Center with reports on television and radio of a potential plane crash in the city of San Bruno. Within minutes, people realized that there was no plane crash but that the fire was due to a large release of gas.

PG&E dispatched their crew at 6:45 pm to isolate the transmission line. Some PG&E personnel arrived at the site before they were requested to respond, and they offered their services to the Incident Commander at the Incident Command trailer, set up by the local fire department. The CPUC engineer arrived at the Incident Command by 9:00pm on September 9.

When the NTSB arrived on scene, the investigation began immediately with visual examination of the pipe and the surrounding area and through discussions with first responders, PG&E and CPUC personnel, and others. The investigators measured, photographed, and secured the 28-foot ruptured pipe segment. On Monday, September 13, the ruptured pipeline and two 10-foot sections of pipe from either side of the rupture were crated for transport to an NTSB facility in Ashburn, VA. An initial examination of the ruptured pipe started at the Ashburn facility on September 23, and will continue with a detailed laboratory examination this week.

As data analysis begins, if investigators identify a systemic problem that should require immediate attention, the NTSB is prepared to issue urgent safety recommendations. Regardless, our goal is to produce the final report in 12 months.

There are several recommendations the NTSB has issued previously regarding gas pipelines which I will outline for the Subcommittee.

Integrity Management Programs for Distribution Systems and the Use of Excess Flow Valves

The Pipeline, Inspection, Protection and Enforcement and Safety (PIPES) Act of 2006 mandates that the Department of Transportation (DOT) prescribe minimum standards for integrity management programs for distribution pipeline systems. On June 25, 2008, the Pipeline Hazardous Materials and Safety Administration (PHMSA) published a notice of proposed rulemaking (NPRM) entitled, "Integrity Management Program for Gas Distribution Pipelines," with proposed regulations that would require operators of gas distribution pipelines to develop and implement integrity management programs with the same objectives as the existing integrity management programs for hazardous liquid and gas transmission pipelines.

Integrity management programs for hazardous liquid and gas transmission pipelines typically require operators to assess the condition of their pipelines by using "in-line" inspection tools that travel through the pipeline to determine the nature and extent of any defects, or pressure testing that yields information about the integrity of the pipeline. Such techniques are not feasible for typical distribution pipeline systems because of the differences in the design and operating parameters between distribution pipeline systems and hazardous liquid and gas transmission pipelines.

Further, the failure of a distribution pipeline is often initially detected from reports of a gas leak. As a result, development and implementation of an effective leak management program is an important element of an integrity management program for a distribution pipeline.

PHMSA acknowledged these differences in the NPRM and properly emphasized the importance of various leak detection methods as essential elements of an integrity management program for distribution pipeline systems.

In its comments on the NPRM, the NTSB emphasized that while an effective leak detection program is a crucial element of the overall leak management program, the use of equipment that prevents or mitigates leaks is equally important. One such device that mitigates a gas pipeline leak is an "excess flow valve." An excess flow valve is a device installed on the distribution line that detects an abnormally high flow rate on a line usually serving a user residence or facility. When an excess flow is detected, the valve automatically closes, thus shutting off the flow of gas through the distribution line. The NPRM did not adequately address this aspect of leak management, other than incorporating the mandate for PHMSA to require excess flow valves on new or replacement distribution lines serving single family residences. PHMSA complied with this provision of the PIPES Act on December 4, 2009, when it published the final rule on integrity management programs for distribution pipeline systems.

The NTSB has long advocated the use of excess flow valves in gas distribution pipeline systems as an effective means of preventing explosions caused by natural gas leaking from distribution systems. On July 7, 1998, a natural gas explosion and fire destroyed a newly constructed residence in South Riding, Virginia. The accident caused one fatality and one serious injury. The NTSB determined that the gas service line to the home had failed and that an uncontrolled release of gas had accumulated in the basement and subsequently ignited. The NTSB concluded from its investigation that had an excess flow valve been installed in the service line, the valve would have closed shortly after the hole in the service line developed and the explosion likely would not have occurred. The NTSB recommended that PHMSA require excess flow valves be installed in all new and renewed gas service lines, regardless of a customer's classification, when the operating conditions are compatible with readily available valves. The NTSB believes that apartment buildings, other multifamily dwellings, and commercial properties are susceptible to the same risks from leaking gas lines as single-family residences, and we believe this gap in the law and the regulations should be eliminated.

Oversight of Integrity Management and Other Risk-Based Pipeline Safety Programs

Over the past decade or more, PHMSA has adopted a risk-based assessment approach for regulating the DOT pipeline safety program. PHMSA has successfully built a partnership with various facets of the pipeline industry to develop, implement and execute a multi-part pipeline safety program. All stakeholders, including PHMSA, have, in the NTSB's view, come to rely heavily upon this approach. The NTSB believes that a risk-based approach can be an effective method to develop and execute the pipeline safety program, and there are many positive elements to PHMSA's approach.

The DOT pipeline safety regulations based on risk assessment principles provide the structure, content, and scope for many aspects of the overall pipeline safety program. Within this regulatory framework, pipeline operators have the flexibility and responsibility to develop their individual programs and plans, determine the specific performance standards, implement their plans and programs, and conduct periodic self-evaluations that best fit their particular pipeline systems. PHMSA likewise has the responsibility to review pipeline operators' plans and programs for regulatory compliance and effectiveness.

The NTSB believes that along with the risk-based assessment there should be increased responsibilities on both the individual pipeline operators and PHMSA. Operators must diligently and objectively scrutinize the effectiveness of their programs, identify areas for improvement, and implement corrective measures. Likewise, PHMSA, as the regulator, must also do the same in its audits of the operators' programs and in self-assessments of its own programs. In short, both operator and regulator need to verify whether risk-based assessments are being executed as planned, and more importantly, whether these programs are effective.

In its recent pipeline investigations in Kingman, Kansas, Carmichael, Mississippi, and Palm City, Florida, the NTSB discovered indications that PHMSA and operator oversight of risk-based assessment programs, specifically integrity management programs and public education programs, has been lacking and has failed to detect flaws and weaknesses in such programs. As a result of these investigations, the NTSB is concerned that the level of self-evaluation and oversight currently being exercised is not adequately applied by some pipeline operators and PHMSA to ensure that the risk-based safety programs are effective. The NTSB believes that to ensure effective risk-based integrity management programs are employed throughout the pipeline industry, PHMSA must establish an aggressive oversight program that thoroughly examines each operator's decision-making process for each element of its integrity management program.

Recent Pipeline Accidents

In addition to the accident in San Bruno, the NTSB has been investigating three other pipeline accidents that occurred this summer. In Cleburne, Texas, a 36-inch natural gas pipeline was struck by a contractor excavating the area. One person was killed and 6 others were hospitalized.

In July, a 30-inch diameter crude oil pipeline operated by Enbridge Energy Partners ruptured in Marshall, Michigan, spilling between 800,000 to 1,000,000 gallons of oil into Talmadge Creek and the Kalamazoo River. The NTSB dispatched a team of more than 10 investigators to the scene. This investigation is continuing and we are examining the pipe segment in our Materials Laboratory.

In September, another Enbridge crude oil pipeline ruptured in Romeoville, Illinois. A segment of this pipeline was recently transported to our facilities in Ashburn, Virginia for testing and further study.

The NTSB is in the early stages of our investigations in each of these accidents. We have much information to collect and analyze, but areas of interest to investigators may include:

- **Supervisory Control and Data Acquisition (SCADA) operations.** As a result of the NTSB's 2005 Safety Study, *Supervisory Control and Data Acquisition (SCADA) in Liquid Pipelines*, the NTSB issued Safety Recommendations P-05-1 through -3 which called on PHMSA to: (1) require hazardous liquid pipeline operators to follow the American Petroleum Institute's recommended practice for the use of graphics on SCADA computer screens, (2) require pipeline companies to have a policy for the review and audit of SCADA alarms, and (3) require training for pipeline controllers to include simulator or non-computerized simulations for controller recognition of abnormal operating conditions, particularly leak events. These three recommendations were also incorporated directly into the PIPES Act. PHMSA published a final rule on December 4, 2009 that included the recommended requirements and applied them to all pipeline systems.

- **Pipeline controller performance.** NTSB investigators are examining the work experience, health, work/rest schedule, qualification, training, and activities of each control room operator involved in the accidents.

- **Operator notification and spill response.** The NTSB is gathering and evaluating information from interviews and electronic sources to further determine the timeline of events. This information will accurately reflect when the spill occurred, when notification was made, and how the operator responded.

- **Emergency response and oil spill response.** The team will review the notifications and actions of emergency responders and the pipeline operators to the release of natural gas in San Bruno and the oil spill in Marshall

- **Inspection and Maintenance History.** The NTSB will review and evaluate the pipeline inspection and maintenance history of the operators, including but not limited to integrity management plans, risk-based programs, and inspection history.

- **Oversight Activities and Actions.** Federal and state regulators have a role in overseeing the integrity of the pipeline system and ensuring the safety of our national pipeline system. The NTSB will evaluate the oversight exercised by state regulators and PHMSA of the pipeline operators in the San Bruno and Marshall accidents.

- **Aging Pipelines.** The NTSB has noted that the many of the major pipeline accident investigations it has conducted in recent years have involved pipeline systems that exceed

30 years or more of age. The NTSB is uncertain whether this is a trend, but will examine the issue in on-going investigations and pursue this issue with PHMSA.

- **Urban Development.** Hand-in-hand with aging pipelines is urban development. At the time of pipeline installation, an area may not have been developed. Today, however, many areas have realized population growth. The NTSB will evaluate notification, location, integrity management, and other factors impacted by urban development.

Closing

The accident in San Bruno is a tragic event, and the NTSB dedicates itself to determining the cause of the accident and proposing recommendations to prevent these types of accidents from happening in the future.

This concludes my testimony and I would be happy to answer any questions you may have.