NATIONAL TRANSPORTATION SAFETY BOARD

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Testimony of the Honorable Christopher A. Hart
Chairman
National Transportation Safety Board

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United States Senate

on

Pipeline Safety: Oversight of our Nation's Pipeline Network

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Good afternoon Chairman Fischer, Ranking Member Booker, and Members of the Subcommittee. Thank you for inviting the National Transportation Safety Board (NTSB) to testify before you today.

The NTSB is an independent federal agency charged by Congress with investigating every civil aviation accident and significant incidents in the United States and significant accidents and incidents in other modes of transportation—railroad, highway, marine and pipeline. We determine the probable cause of accidents and other transportation events and issue safety recommendations aimed at preventing future accidents. In addition, we carry out special studies concerning transportation safety and coordinate the resources of the federal government and other organizations to provide assistance to victims and their family members impacted by major transportation disasters.

Since its inception, the NTSB has investigated more than 140,500 aviation accidents and thousands of surface transportation accidents. On call 24 hours a day, 365 days a year, our investigators travel throughout the country and internationally to investigate significant accidents and develop factual records and safety recommendations with one aim—to ensure that similar accidents don't occur in the future. To date, we have issued over 14,000 safety recommendations to nearly 2,300 recipients, including 77 recommendations to the Pipeline and Hazardous Materials Safety Administration (PHMSA) since 2000.[1] Because we have no formal authority to regulate the transportation industry, our effectiveness depends on our reputation for conducting thorough, accurate, and independent investigations and for producing timely, well-considered recommendations to enhance transportation safety.

Each year, the NTSB releases its Most Wanted List, highlighting safety-critical actions that the US Department of Transportation (DOT), United States Coast Guard, other federal entities, states, and transportation industry organizations need to take to help prevent transportation accidents and save lives. We base our Most Wanted List, which focuses on our top 10 areas for transportation safety improvements, on safety issues we have identified as a result of our accident investigations. Although the 2015 Most Wanted List did not include a pipeline-specific issue, the 2014 most Wanted List included "Enhance Pipeline Safety." Safe operation of natural gas and hazardous liquid transmission pipelines is a shared responsibility among the operator, government oversight agencies, and local communities. As we pointed out,

> Oversight agencies also play a role, especially when operators are reluctant to initiate safety improvements. Regulators can mandate specific safety program improvements to ensure pipeline operators adopt and improve practices that reduce the risk and consequences of pipeline failures. For example, given the gas industry's reluctance to expand the use of automatic shutoff valves and remote controlled valves, the Pipeline and Hazardous Materials Safety Administration

[1] Nine of the recommendations were made to PHMSA's predecessor, the Research and Special Programs Administration.

should require this technology, which can isolate a rupture within minutes and reduce the volume of gas released and the duration of a fire. [2]

Pipeline safety remains a priority for the NTSB. Just last week we launched an investigative team to a pipeline accident in Centreville, Virginia, in which a pipeline released an estimated 4000 gallons of gasoline. Some of the liquid had accumulated in a stormwater retention pond near the pipeline right-of-way. Fortunately, the spill did not result in fatalities or injuries, and precautions were taken to ensure that nearby residents and businesses were not adversely affected by the released gasoline.

Recent Investigations

Two recent NTSB pipeline investigations involved natural gas explosions. On March 12, 2014, in East Harlem in New York City, two multi-use, five-story buildings were destroyed by a natural gas explosion and subsequent fire. Eight people died, more than 50 people were injured, and more than 100 families were displaced from their homes.

On December 17, 2013, natural gas leaking from a cast iron distribution pipeline resulted in the explosion of a two-story apartment building in Birmingham, Alabama. One person was killed and eight people were injured.

These explosions are a grim reminder that efforts to improve pipeline integrity management practices must continue, particularly for pipelines located in high consequence areas.

The NTSB issued its final accident report on the East Harlem explosion last June,[3] and the Birmingham investigation is still underway. The East Harlem accident investigation focused on the following safety issues:

- Adequacy of the Consolidated Edison Company of New York, Inc. (Con Edison) quality assurance and quality control procedures for joining plastic pipes;
- Effectiveness of Con Edison's public awareness program;
- Adequacy of Con Edison's gas odor report response;
- Effectiveness of the New York City Department of Environmental Protection sewer integrity program; and
- Effectiveness of federal and state natural gas pipeline oversight.

[2] NTSB, 2014 Most Wanted List: Enhance Pipeline Safety (2014), http://www.ntsb.gov/safety/mwl/Pages/mwl5_2014.aspx.

[3] NTSB, *Natural Gas-Fueled Building Explosion and Resulting Fire, New York City, New York on March 12, 2014*, Rpt. No. NTSB/PAR-15/01 (June 9, 2015).

The investigation found that a Con Edison contractor had installed a plastic gas main and service "tee joint" in 2011 using a Con Edison heat fusion procedure for plastic pipe. Post-accident examination showed that the surfaces of the service tee and the gas main had not adequately been prepared before the tee was fusion welded to the gas main, resulting in a defective joint that contained an area of incomplete fusion.

The investigation also found a large hole in a sewer main in the vicinity of the gas main, which had been identified by the New York City Department of Environmental Protection in 2006 and again in 2011 but was not repaired. The supporting soil under the gas main was washed into the sewer through the sewer wall breach over the course of many years when groundwater accumulated in the area. Consequently, the soil supporting the gas main had washed away in the vicinity of the service tee, which caused the gas main to sag and overstressed the defective service tee fusion joint. A crack opened in the defective joint, allowing natural gas to escape into the subterranean area and migrate into one of the nearby buildings.

Con Edison had conducted an extensive public awareness program that included urging the public and gas customers to call Con Edison in the event of a suspected gas leak. This information was included in customer billings, in newspaper advertisements, and in flyers posted in apartment buildings. However, the investigation found that people smelled gas the day before the accident but had not called Con Edison, the fire department, or 911.

About 25 minutes before the accident, Con Edison received a call from a resident of an adjacent building who reported a gas odor both inside and outside of his residence. The gas was coming from one of the buildings that was later destroyed in the explosion. During the call, the Con Edison customer service representative's computer stopped responding, which delayed the notifications. Although a gas service mechanic was dispatched, the fire department was not notified as required by Con Edison's response procedure.

The NTSB determined that the probable cause of the accident was (1) the failure of the defective fusion joint at the service tee that allowed natural gas to leak from the gas main and migrate into the building where it ignited and (2) a breach in the sewer line that went unrepaired since at least 2006, allowing groundwater and soil to flow into the sewer, leading to a loss of support for the gas main, which caused the line to sag and overstressed the defective fusion joint.

As a result of this investigation, the NTSB made six safety recommendations: one to the New York State Public Service Commission, one to the City of New York, and four to Con Edison.[4] The safety recommendation to the New York State Public Service Commission called upon that agency to ensure that its 5-year audit plan for pipeline operators effectively addresses all aspects of the state pipeline regulations. The safety recommendation to the City of New York, if acted upon, will result in better reporting of sewer line breaches and better coordination among city agencies to identify and address soil disruption and voids. We recommended that Con Edison better adhere to standard practices for heat fusion joining of polyethylene pipe, promptly notify the New York City Fire Department in the event of a gas emergency, and perform more extensive and appropriate installation of gas main isolation valves.

[4] P-15-33 through -38.

While the East Harlem accident investigation did not result in our issuing a safety recommendation to PHMSA, the NTSB pointed out in its accident investigation report that PHMSA had failed to identify deficiencies in the New York state pipeline safety regulations. The state pipeline safety program certifications in Title 49 *United States Code* section 60105(a) allow states to inspect and enforce intrastate pipeline safety, provided the state adopts at least the minimum federal pipeline safety regulations. Our examination of the New York state pipeline safety regulations revealed that they did not meet federal regulations in two areas: definition of service line and pipeline pressure testing. These deficiencies had not been identified by PHMSA during state program recertifications. In response to the NTSB's investigation findings, the New York State Public Service Commission corrected these deficiencies.

Pipeline Safety: Natural Gas Pipelines

Three types of pipeline systems are used to transport natural gas from the source to end users; gathering, transmission, and distribution systems. Gathering lines transport gas from a production facility to a transmission line, and transmission lines transport gas from a gathering line to a distribution facility.[5] The United States has approximately 298,000 miles of onshore natural gas transmission pipelines. Compared to gas distribution pipelines, transmission pipelines typically have larger diameters and significantly higher operating pressures. Therefore, the potential impact of a transmission pipeline incident on its surroundings is high.

Since 2004, PHMSA has required the operators of these pipelines to develop and implement integrity management (IM) programs to ensure the integrity of their pipelines in populated areas (defined as high consequence areas [HCAs]) to reduce the risk of injuries and property damage from pipeline failures.[6] An operator's IM program is a management system designed and implemented to ensure the operator's pipeline system is safe and reliable. It consists of multiple components, including procedures and processes for identifying HCAs, determining likely threats to the pipeline within the HCA, evaluating the physical integrity of the pipe within the HCA, and repairing or remediating any pipeline defects found. These procedures and processes are complex and interconnected. Effective implementation of an IM program relies on continual evaluation and data integration. The IM program is an ongoing program that PHMSA and state regulatory agencies should periodically inspect to ensure operator compliance with regulatory requirements.

In the last six years, the NTSB has completed three major gas transmission pipeline accident investigations in which deficiencies with the operators' IM programs and PHMSA oversight were identified as a concern.[7] These three accidents—located in Palm City, Florida;

[5] Title 49 *Code of Federal Regulations* (CFR) 192.3.

[6] PHMSA's gas transmission IM regulations are found at 49 CFR Part 192, Subpart O.

[7] NTSB, *Columbia Gas Transmission Corporation Pipeline Rupture Sissonville, West Virginia on December 11, 2012*, Rpt. No. NTSB/PAR-14/01 (February 19, 2014); NTSB, *Rupture of Florida Gas Transmission Pipeline and Release of Natural Gas Near Palm City, Florida*, Accident Brief No. NTSB/PAB-13/01 (August 13, 2013); NTSB, *Pacific Gas and Electric Company Natural Gas Transmission Pipeline Rupture and Fire San Bruno, California on September 9, 2010*, Rpt. No. NTSB/PAR-11/01 (August 30, 2011).

San Bruno, California; and Sissonville, West Virginia—resulted in eight fatalities, more than 50 injuries, and 41 homes destroyed, with many more damaged. We are also evaluating IM oversight in the ongoing Birmingham investigation.

Earlier this year, the NTSB's Safety Research Division conducted a safety study using the results from the completed investigations and additional research to identify weaknesses in the implementation of gas transmission pipeline integrity management programs in HCAs. The study, *Integrity Management of Gas Transmission Pipelines in High Consequence Areas,* found that, although PHMSA's gas IM requirements have kept the rate of corrosion failures and material failures of pipe or welds low, no evidence exists to show that the overall occurrence of gas transmission pipeline incidents in HCA pipelines has declined.[8] Rather, the study identified areas where improvements need to be made to further enhance the safety of gas transmission pipelines in HCAs.

We recognize that IM programs are complex and require expert knowledge and integration of multiple technical disciplines including engineering, material science, geographic information systems, data management, probability and statistics, and risk management. This complexity requires pipeline operator personnel and pipeline inspectors to have a high level of practical knowledge and skill to adequately perform their functions. This complexity can make IM program development and implementation, and the evaluation of operators' compliance with IM program requirements, difficult. The study illustrated the need to expand and improve PHMSA resources in guiding both operators and inspectors.

The effectiveness of an IM program depends on many factors, including how well threats are identified and risks are estimated. This information guides the selection of integrity assessment methods that discover pipeline system defects that may need remediation. The study found that aspects of the operators' threat identification and risk assessment processes require improvement. Further, the study found that of the four different integrity assessment methods (pressure test, direct assessment, in-line inspection, and other techniques), in-line inspection yields the highest per-mile discovery of pipe anomalies, and the use of direct assessment as the sole integrity assessment method has numerous limitations. Compared to their interstate counterparts, intrastate pipeline operators rely more on direct assessment and less on in-line inspection.

As a result of the safety study, the NTSB issued 28 new recommendations.[9] Of these, 22 were issued to PHMSA and one previous recommendation issued to PHMSA was reiterated.[10] The recommendations include developing expanded and improved guidance for operators and inspectors for—

[8] NTSB, *Integrity Management of Gas Transmission Pipelines in High Consequence Areas*, No. NTSB/SS-15/01 (January 27, 2015).

[9] P-15-1 through -28.

[10] P-15-1 through -22, reiterated P-11-7.

- The development of criteria for threat identification and elimination;
- Consideration of interactive threats; and
- Increased knowledge of the critical components associated with risk assessment approaches.

The NTSB also recommended that PHMSA evaluate and improve gas transmission pipeline integrity assessment methods, including increasing the use of in-line inspection and ensuring that direct assessment is not the sole integrity assessment method. Other recommendations include evaluating the effectiveness of the approved risk assessment approaches for IM programs; developing minimum professional qualification criteria for all personnel involved in IM programs; and improving data collection and reporting, including geospatial data, to support the development of probabilistic risk assessment models and the evaluation of IM programs by state and federal regulators.

All of the recommendations to PHMSA resulting from the safety study are classified as open with an acceptable response, with the exception of P-15-14. This recommendation asked PHMSA to revise Title 49 *Code of Federal Regulations* (CFR) 192.915 to require all personnel involved in integrity management programs to meet minimum professional qualification criteria. PHMSA responded that operator personnel involved in integrity management programs receive on-the-job training (OJT) under the supervision of a qualified person and that OJT is an integral component of integrity management training. PHMSA further stated that operators should establish personnel qualification criteria that are applicable to their unique operating environment and managers should have the discretion to determine what minimum qualifications are needed. To address the recommendation, PHMSA proposed to review options for setting qualification criteria based on PHMSA and NTSB evaluations, and to use this information and current regulations to issue an advisory bulletin to clarify and reiterate the importance of the requirements and place renewed emphasis on compliance in future IM inspections. Although PHMSA's intended course of action may constitute an improvement, it falls short of revising the regulations as recommended. Accordingly, we requested that PHMSA reconsider the current plan in order to adequately address the NTSB recommendation.

The Pipeline Safety, Regulatory Certainty, and Job Creation Act of 2011[11] (the 2011 Act) requires PHMSA to conduct an evaluation on (1) whether IM should be expanded beyond current HCAs and (2) whether doing so would mitigate the need for class location requirements for gas transmission pipelines. Consequently, PHMSA began a series of rulemaking activities to consider whether IM requirements should be changed, including adding more prescriptive language in some areas, and whether other issues related to system integrity should be addressed by strengthening or expanding non-IM requirements. Among the specific issues PHMSA is considering concerning IM requirements are whether the definition of an HCA should be revised and whether additional restrictions should be placed on the use of specific pipeline assessment methods.[12] The NTSB provided comments and will monitor these rulemakings to ensure that PHMSA has the full benefit of the lessons learned through our investigations and safety study.

[11] Public Law No. 112-90, section 5 (2012).

[12] The two relevant notices are: (1) Pipeline Safety: Safety of Gas Transmission Pipelines -Advance Notice of Proposed Rulemaking, 76 Fed. Reg. 5308 (Aug. 25, 2011); and (2) Pipeline Safety: Safety of Gas Transmission

Pipeline Safety: Hazardous Liquid Pipelines

As we learned from the July 25, 2010, pipeline rupture in Marshall, Michigan, and the subsequent release of more than 840,000 gallons of crude oil into nearby wetlands, Talmadge Creek, and the Kalamazoo River, ensuring adequate integrity management programs for pipelines transporting hazardous liquids remains critically important. No fatalities were reported from the crude oil spill; however, local residents self-evacuated from their houses and more than 300 people reported symptoms consistent with crude oil exposure.[13] The Marshall, Michigan, spill is the costliest onshore oil spill ever to occur in the United States, with current cleanup costs exceeding $1 billion.

The NTSB determined that the probable cause of the pipeline rupture was corrosion fatigue cracks that grew and coalesced from crack and corrosion defects under disbonded polyethylene tape coating, producing a substantial crude oil release that went undetected by Enbridge Incorporated's control center for more than 17 hours. The rupture and prolonged release were made possible by pervasive organizational failures at Enbridge, and PHMSA's weak regulation for assessing and repairing crack indications. Contributing to the accident was PHMSA's ineffective oversight of pipeline integrity management programs, control center procedures, and public awareness. The investigation also determined that contributing factors to the severity of the environmental consequences were (1) Enbridge's failure to identify and ensure the availability of well-trained emergency responders with sufficient response resources, (2) PHMSA's lack of regulatory guidance for pipeline facility response planning, and (3) PHMSA's limited oversight of pipeline emergency preparedness that led to the approval of an inadequate facility response plan.

As a result of this investigation, the NTSB made safety recommendations to the US Secretary of Transportation, PHMSA, Enbridge, the American Petroleum Institute, the Pipeline Research Council International, the International Association of Fire Chiefs, and the National Emergency Number Association.[14] The NTSB also reiterated a previous recommendation to PHMSA.[15] All of the recommendations to PHMSA are currently classified as not yet completed but thus far acceptable.

The NTSB is pleased that PHMSA has made progress in implementing the recommendations from this investigation, including that agency's development of a Notice of Proposed Rulemaking (NPRM) titled *Pipeline Safety: Safety of On-Shore Hazardous Liquid Pipelines.* Among other things, the NPRM proposes to incorporate, by reference, consensus

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Pipelines -Advance Notice of Proposed Rulemaking; Extension of Comment Period, *76 Federal Register* 70953 (Nov. 16, 2011).

[13] NTSB, *Enbridge Incorporated Hazardous Liquid Pipeline Rupture and Release Marshall, Michigan on July 25, 2010,* Rpt. No. NTSB/PAR-12/01 (July 10, 2012).

[14] P-12-1 through P-12-19.

[15] P-11-8.

standards governing conduct of assessments of the physical condition of in-service pipelines using inline inspection, internal corrosion direct assessment, and stress corrosion cracking direct assessment.

PHMSA is also considering revisions to the Control Room Management regulations of the Pipeline Safety Regulations to more explicitly require team training, through its NPRM titled *Pipeline Safety: Operator Qualification, Cost Recovery, and Other Proposed Changes.* This NPRM was published on July 10, 2015.[16]

In addition, PHMSA issued two advisory bulletins. The first, Advisory Bulletin 2014-01, published on January 28, 2014,[17] notified pipeline operators (1) of the circumstances of the Marshall, Michigan, pipeline accident, and (2) of the need to identify deficiencies in facility response plans and to update these plans as necessary to conform with the non-mandatory guidance for determining and evaluating required response resources as provided in Appendix A of 49 *CFR* Part 194, "Guidelines for the Preparation of Response Plans." The second, Advisory Bulletin 2014-02, published on May 6, 2014,[18] was directed to all hazardous liquid and natural gas pipeline operators, describing the circumstances of the accident in Marshall, Michigan—including the deficiencies observed in Enbridge's integrity management program—and asking them to take appropriate action to eliminate similar deficiencies.

Conclusion

Since 2000, the NTSB has made 77 safety recommendations to PHMSA; only one of these has been closed in an unacceptable status.[19] We recognize the progress PHMSA has made over the past 15 years; yet, there will always be room for improvement, and the accidents and incidents that the NTSB investigates attest to the fact that safety improvements are still necessary to prevent future accidents.

Thank you for inviting me to testify today. I am happy to answer your questions.

[16] 80 Fed. Reg. 39916 (Jul. 10, 2015).

[17] 79 Fed. Reg. 4532 (Jan. 28, 2014).

[18] 79 Fed. Reg. 25990 (May 6, 2014).

[19] P-15-14, discussed above at page 7.