

NATIONAL TRANSPORTATION SAFETY BOARD
Public Meeting of June 9, 2015
(Information subject to editing)

New York City, NY/Pipeline Explosion and Fire in Manhattan
March 12, 2014

This is a synopsis from the NTSB's report and does not include the Board's rationale for the conclusions, probable cause, and safety recommendations. NTSB staff is currently making final revisions to the report from which the attached conclusions and safety recommendations have been extracted. The final report and pertinent safety recommendation letters will be distributed to recommendation recipients as soon as possible. The attached information is subject to further review and editing.

Executive Summary

On March 12, 2014, about 9:30 a.m. eastern daylight time, two adjacent multiuse five-story buildings were destroyed by a natural gas-fueled explosion and resulting fire. The buildings were situated on the west side of Park Avenue between East 116th Street and East 117th Street in the East Harlem district of the Borough of Manhattan in New York City. The violent explosion damaged buildings on the east and west sides of Park Avenue and along East 116th and East 117th Streets. The Metro-North Railroad suspended rail service for about 7 1/2 hours on the elevated railway along Park Avenue because of debris from the explosion on the track. Eight people died, more than 50 people were injured, and more than 100 families were displaced from their homes as a result of this accident. The cost to Consolidated Edison Company of New York, Inc. (Con Edison), of equipment damages, emergency response activities, remediation, and replacement exceeded \$1.9 million.

The National Transportation Safety Board determines that the probable cause of the accident was (1) the failure of the defective fusion joint at the service tee, installed by Consolidated Edison Company of New York, Inc., in 2011, 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 by the New York City Department of Environmental Protection since at least 2006 that allowed groundwater and soil to flow into the sewer, resulting in a loss of support for the gas main, which caused the line to sag and overstressed the defective fusion joint.

The accident investigation focused on the following safety issues:

- **Adequacy of Con Edison's quality assurance and quality control procedures for joining plastic pipes.** A Con Edison contractor installed the service tee in 2011 using a Con Edison heat fusion procedure for plastic pipe.

Postaccident examination of the separated service tee joint showed fracture features indicating that the surfaces were contaminated, resulting in a weak joint. Review of the Con Edison plastic pipe fusion procedure revealed that some industry-standard steps, such as cleaning the surface with alcohol, were omitted. In addition, inspection of the fusion joint revealed inconsistent bead sizes.

- **Effectiveness of Con Edison’s public awareness program.** Con Edison had an extensive public awareness program that included informing 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 who said they smelled gas the day before the accident did not call Con Edison, the fire department, or 911.
- **Adequacy of Con Edison’s gas odor report response.** About 25 minutes before the accident, Con Edison received a call from a resident of an adjacent building who reported a gas odor inside and outside of his residence. He said the gas was coming from one of the accident buildings. 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.
- **Effectiveness of the New York City Department of Environmental Protection sewer integrity program.** Investigators discovered a large breach in the sewer main near the destroyed buildings that had gone unrepaired for more than 8 years. They also learned of recurring major street repair work in the vicinity of the sewer breach over several years. This work included a repair that was made a few days before the accident to correct significant ground settling below the pavement in the vicinity of the gas main and building service lines.
- **Effectiveness of federal and state oversight.** The state pipeline safety program certifications in Title 49 United States Code section 60105(a) allow states to inspect and enforce intrastate pipeline safety. The state must adopt the minimum federal regulations for pipeline safety. Examination of the New York state pipeline safety regulations revealed that they are less stringent than the federal regulations in two areas: definition of service line and pipeline pressure testing. These deficiencies were not identified by the Pipeline and Hazardous Materials Safety Administration during state program recertifications.

As a result of this investigation, the National Transportation Safety Board makes safety recommendations to the New York State Public Service Commission, the City of New York, and Consolidated Edison Company of New York, Inc.

Findings

1. The water main break was not a factor in the accident and the water main most likely failed some time after the explosion when the pipe, weakened by graphitic corrosion, was shaken by the natural gas explosion shock wave or from the increased loading from the incident response equipment on the street directly above the water main.
2. The supporting soil under the gas and water mains was washed into the sewer through the large hole in the sewer wall over many months or years when groundwater accumulated in the area.
3. As the soil washed away after the plastic gas main and service tee were installed in 2011, the gas main was no longer supported in the vicinity of the service tee for 1642 Park Avenue, which caused the line to sag and overstressed the defective fusion joint at the service tee.
4. Had the New York City Department of Environmental Protection repaired the breach in the sewer main after it was discovered in 2006, damage to the street in the vicinity of 1642, 1644, and 1646 Park Avenue would have been prevented by minimizing local soil movement and settlement caused by the localized groundwater movement.
5. Normal loads during operation, and the abnormal loads that resulted from the soil displacement around and below the gas main, were not sufficient to cause either the crack in the service tee outlet or the complete separation of the gas main-to-service tee fusion joint.
6. The complete separation of the fusion joint and the crack in the service tee resulted from damage sustained during the postaccident excavation work.
7. The surfaces of the service tee and the gas main were not adequately prepared before the tee was fusion welded to the gas main in 2011, resulting in a defective fusion joint that contained an area of incomplete fusion.
8. Visual inspection of the fusion joint to confirm only the required number of beads are present does not provide sufficient evidence of a properly welded joint.
9. Stresses created by the vertical displacement of the sagging gas main opened a crack in the defective service tee fusion joint, allowing natural gas to escape into the subterranean area and migrate into 1644 Park Avenue.
10. The defective service tee fusion joint was the only credible source of natural gas that could have provided a large enough flow rate to have fueled the building explosion.
11. The New York State Department of Public Service audit program for pipeline operators does not effectively address all aspects of the state regulations.
12. Had Consolidated Edison Company of New York, Inc., received a report of the gas odor on the evening of March 11, it likely would have found the gas leak and taken

appropriate corrective actions to prevent the accident. This accident highlights the critical importance for members of the public to notify 911 or the gas company when the odor of natural gas is first detected.

13. Had Consolidated Edison Company of New York, Inc., notified the New York City Fire Department at 9:12 a.m., when the call from the customer service representative ended, New York City Fire Department responders could have arrived at the gas leak location up to 15 minutes before the explosion; it is unclear, however, whether the emergency responders could have safely evacuated two 5-story buildings that were not equipped with elevators or fire alarm systems.
14. Had Consolidated Edison Company of New York, Inc., installed appropriately located isolation valves on the gas distribution main, the leaking gas main could have been isolated sooner after the explosion, minimizing both the danger to the first responders and the delay in recovery operations.
15. The Consolidated Edison Company of New York, Inc., public awareness and education program did not effectively inform customers and the public about both the importance of reporting a gas odor and the number to call to report a gas odor.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the accident was (1) the failure of the defective fusion joint at the service tee, installed by Consolidated Edison Company of New York, Inc., in 2011, 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 by the New York City Department of Environmental Protection since at least 2006 that allowed groundwater and soil to flow into the sewer, resulting in a loss of support for the gas main, which caused the line to sag and overstressed the defective fusion joint.

Recommendations

As a result of its investigation of the March 12, 2014, natural gas-fueled building explosion and resulting fire in New York City, New York, the National Transportation Safety Board makes the following safety recommendations:

To the City of New York:

1. Implement a written program or procedure to ensure the integrity of your sewer lines, repair breaches in a timely manner, and coordinate with other agencies to identify and address potential soil disruption and voids. (P-15-XX)

To Consolidated Edison Company of New York, Inc.:

2. Revise your plastic pipe fusion welding procedure to require cleaning of the surfaces to be welded with suitable solvents to remove all dirt, water, oil, paint, and other contaminants as recommended in ASTM F2620, *Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings*. (P-15-XX)
3. Revise your plastic pipe fusion welding procedure to specify that the solidified beads should be visually examined after completing a joint to ensure the beads are uniformly shaped and sized around the joint as recommended in ASTM F2620, *Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings*. (P-15-XX)
4. Provide clear written guidance to the Gas Emergency Response Center staff on the conditions for promptly notifying the New York City Fire Department, and provide additional staff training. (P-15-XX)
5. Extend your gas main isolation valve installation program to include strategic locations where long distribution mains currently cannot be isolated, giving priority to pipelines in more densely populated areas. (P-15-XX)

To the New York State Public Service Commission:

6. Revise your gas utility operator program to ensure all elements of the regulations are included in the 5-year audit plan. (P-15-XX)