

**TESTIMONY OF ROBERT E. CURRY, JR.**

**COMMISSIONER**

**NEW YORK STATE PUBLIC SERVICE COMMISSION**

**THE COUNCIL OF THE CITY OF NEW YORK**

**COMMITTEE ON CONSUMER AFFAIRS**

**January 22, 2008**

Good morning. My name is Robert Curry and I am a member of the New York Public Service Commission. I'd like to thank you for the opportunity to appear at this latest hearing on this important issue and applaud you for your diligence in reviewing this matter; I appreciate the dialogue and input generated in connection with these hearings.

For the record, as you are aware, this matter is still under investigation by the Department of Public Service and is pending before the Commission. Therefore, it would be inappropriate for me to attempt to answer specific questions that would require me to prejudge the outcome of these pending proceedings. I can assure you that these issues are being carefully addressed by the Department of Public Service and the Public Service Commission.

## **Introduction**

Within the New York State Department of Public Service, the Office of Electric, Gas and Water is responsible for steam generators; steam production planning; steam rates, charges, rules and regulations; steam transportation systems; and steam safety issues. These responsibilities include oversight and investigation of steam system accidents.

Public Service Law Article 4-A sets forth provisions relating to steam corporations. Section 79(1) requires every steam corporation to provide safe and adequate service, facilities and instrumentalities, while Section 80(2) authorizes the Public Service Commission to investigate and ascertain the methods used by steam corporations in manufacturing, distributing and supplying steam for heat or power.

Section 80(2) further authorizes the Commission to order 1) such reasonable improvements as will best promote the public interest, preserve the public health and protect consumers and corporation employees; and 2) improvements and extensions of pipes, lines, ducts and conduits and other devices, apparatus and property of the corporation.

The Commission's regulations found in Section 420.12 of Title 16 of the New York Code of Rules and Regulations (NYCRR) required that Con Edison to investigate and report to the

Department of Public Service the tragic steam rupture that occurred in New York City on July 18, 2007.

## **Steam Pipe Rupture Investigation**

The Public Service Commission's investigation of the steam pipe rupture began shortly after the incident occurred. Throughout the first few weeks, a critical time of any investigation, Staff maintained a constant presence at the failure site and they closely monitored clean-up, steam service restoration, and evidence retrieval efforts.

As part of its investigation, Staff has reviewed and continues to review records of Con Edison's operations and maintenance, as well as records of construction activity at or near the failure site. Con Edison has been cooperative and responsive to all Staff's requests for records, documents, and information, and kept Staff informed when important activities at the site occurred.

Con Edison recently released the results of its investigation into the incident, including reports completed by its consultants, and its own Recommendations and Action Plan dated December 17, 2007. Staff has also been conducting its own independent investigation of the incident.

A significant amount of work has been done to verify the material integrity of the pipe that ruptured, which was installed in 1924. Con Edison retained Lucius Pitkin, Inc. to evaluate pipe and material samples secured from the rupture site. The Department retained its own metallurgical consultant, Kiefner and Associates, Inc. to review the testing protocols, monitor the testing done by Lucius Pitkin, and advise staff regarding the appropriateness of the testing and analysis.

Metallurgical testing performed on samples of the ruptured pipe determined that the pipe was fit for the intended service, exhibiting adequate strength, ductility and toughness consistent with pipe manufactured in the 1920s. There is no indication that the pipe was deteriorated or weakened by corrosion. Kiefner and staff are satisfied that material preparation and testing were done according to accepted industry standards and the established protocols, and agree with the findings reported by Lucius Pitkin.

ABS Consulting was retained by Con Edison to conduct technical analyses to determine the cause of the rupture considering steam system operating conditions on the day of the incident and prior history.

On the morning of July 18, 2007, heavy rain occurred in Manhattan. This, in addition to a normally high water table, allowed water to accumulate within a manhole in the intersection of 41st Street and Lexington Avenue containing a flange joint in the 20-inch steam pipeline, and within the concrete housing that encased the steam main through the intersection. Water contacting the steam pipeline facilities caused rapid and excessive condensation inside the pipe, eventually filling the pipe section across the intersection with condensate. ABS determined that this is one of the primary causal factors that contributed to the pipe rupture.

Based on its analysis, ABS determined that the cause of the pipe rupture was an excessive internal pressure, the result of a condensation-induced water hammer. Some condensate is normally present in the steam pipeline system as the steam condenses into water due to heat loss. The condensate is removed by steam traps, which discharge into the sewer system.

Upon investigation after the incident, the steam traps were found to be nearly completely clogged with debris, severely reducing their ability to eliminate the condensate from the steam main. ABS determined that these compromised traps were the second primary causal factor that contributed to the event. The pipe section remained full of water until late that afternoon when routine steam system flow adjustments allowed steam to enter the pipe section, initiating the condensation induced water hammer. This occurs when a steam bubble becomes entrapped in the relatively cooler condensate. The steam bubble rapidly condenses to water, with the surrounding condensate rushing to fill the void, slamming into itself and generating a very high-pressure pulse, several times greater than the normal operating pressure of the steam system, and sufficient to rupture the pipe.

## Concerns Identified

Staff's investigation and analysis of Con Edison's operations and maintenance practices and procedures germane to this incident, and our evaluation of process and procedural improvements as identified in Con Edison's Recommendations and Action Plan is not yet complete. Staff's work to date has identified the following concerns:

- Con Edison did not appear to have a sufficient plan or procedure for a direct inspection of manholes subject to flooding. The manhole containing the flange at the intersection of 41st Street and Lexington Avenue has an extensive history of flooding subsequent to precipitation events. On many occasions over the four years prior to the incident, Con Edison had to pump water from the manhole to alleviate the condition conducive to excess condensate generation within the steam main. Despite this, Con Edison had no procedure in place to physically inspect this and similar locations following precipitation to determine if potentially unsafe conditions existed. The company instead relied on a procedure to visually patrol the steam system during and after significant precipitation events to identify active vapor conditions, indicating water contacting steam facilities, and requiring further investigation. On the morning of July 18, 2007, a visible steam vapor condition did exist at 41st Street and Lexington Avenue, but had disappeared before the company's patrol surveyed that location. Con Edison has since identified specific manhole locations, based on history, that are to be inspected by opening the manhole cover and observing the structure for water. This will be done during periods of heavy rain to determine if water is accumulating and the manhole needs to be pumped and possible other actions that are needed to alleviate unsafe conditions.
  
- Con Edison's procedures for evaluation of identified pipe damage appear to be deficient. A leak repair was made on a crack in a dent on the pipe within the flange manhole at 41st and Lexington Avenue more than two years prior to the incident. The pipe rupture did not initiate at this prior repair and it did not contribute to the failure. A Con Edison record indicates that the pipe needed to be replaced, but no investigation or analysis was conducted to determine the cause of this and other similar dents nearby within the

manhole. According to both ABS and Kiefner, it is likely that the dents resulted from a prior less-severe water hammer event at the location, which caused the pipe to jump or lift off its support and slam back down.

- Con Edison's control of the process for sealing flange leaks and replacing defective pipe appears to be lax. On several occasions over the two years prior to the incident, Con Edison injected sealant into the flange connection within the manhole at 41st Street and Lexington Avenue to stop steam leakage. The debris that clogged the steam traps was analyzed and found to contain the leak sealant material that had been injected into the flange. The company's contract with the vendor who performed the leak sealing procedure stated that the quantity of material injected must be minimized based on calculation of the volume needed to stop the leak. Con Edison could not produce any documentation to support that the amount of material injected into the flange on any occasion was appropriate based on the contract stipulation. The company relied on the advice of the vendor technician who performed the leak sealing procedure as to the acceptability of repeated attempts to seal the flange leak. Additionally, the leak-sealing process was sometimes done with the steam main in operation and sometimes not. On eight of the 10 occasions when the flange leak was sealed since July 2005, the section of 20-inch steam main at 41st St. and Lexington Ave. was shut down specifically to facilitate the leak sealing process. There is concern that these conditions can allow the sealant to enter the steam pipe. Occasions when the steam main was shut down also offered opportunities to make a permanent repair or eliminate the flange. According to Con Edison management, there were plans to do so on at least two occasions, but the work was delayed in favor of other work, and was never carried out.
  
- Con Edison's steam trap inspection procedure did not include a requirement to periodically verify that the traps are free of any debris. The procedure only verified that the trap was operating and removing condensate. Because the traps are significantly oversized for normal operation, they could be partially blocked by debris and still pass inspection based on observation of condensate being removed. Following the incident, the company replaced all of the 1,654 steam traps in its system with a different design

that is less susceptible to debris build up and clogging. However, the company's revised trap inspection procedure does not at any time verify that the traps are completely clear of debris.

## **Next Steps**

Department of Public Service Staff is completing its investigation and plans to report on this incident at the Commission session in February. The report will contain specific recommendations for improvements in Con Edison's procedures, programs, and training.

In the meantime, on January 16, 2008, the Commission required Con Edison to show cause why it should not initiate a prudence proceeding to determine whether the company was imprudent with respect to the management of its steam system prior to the July 18th steam pipe incident. The show cause order is designed to place an obligation on Con Edison to explain its actions in light of the concerns articulated in the order, which are based on the Commission's consideration thus far of the company's post-incident assessment reports. In light of the concerns raised and after considering the company's response the Commission will be in a position to determine whether there is a sufficient basis to initiate a prudence proceeding or take other enforcement or rulemaking actions.

The Commission also directed Con Edison to explain why additional procedures should not be implemented to improve the operation of the steam system, and to cease the use of a certain leak sealant procedure which contributed to the incident, unless the company can demonstrate why it should be permitted to continue the use of leak sealant injections.

More specifically, Con Edison has been directed to demonstrate:

- Why the visual inspections it conducted at the steam main flood areas were sufficient to determine the presence of dangerous levels of excess water in a manhole area;
- Why the timing and frequency of patrols under the company's procedures were sufficient to safely identify any dangerous subsurface conditions;

- Whether the company has in the past investigated practices beyond vapor patrols, such as the use of automatic pumps and water level detection monitors or other means of directly observing water levels, and if so, why those other practices were not employed at this site;
- Whether the company's inspection procedures and related record-keeping should have led to further analysis of the steam pipe indentations near the site of the incident so as to determine the cause and to implement necessary corrective actions; and
- What additional practices and procedures were in place and, if there were any, why such procedures failed to ensure the safe operation of the company's steam system.

To focus on the company's practices and procedures going forward, the Commission directed Con Edison to demonstrate that the scope, timing and frequency of its new vapor and manhole inspection procedures will be adequate to ensure the safety of the steam system.

Additionally, the Commission ordered Con Edison to demonstrate:

- Why the company's leak sealing procedures for flange repairs were safe and acceptable and in conformance with industry practices;
- Why the company's trap inspection procedures were adequate to identify traps which were compromised by sealant materials used nearby; and
- Whether the company's failure to timely replace the flange at issue was not unreasonable.

To improve the operation of the system, the Commission will also direct Con Edison to:

- Discontinue the use of leak sealant injections as a method to seal pipe leaks unless the company can demonstrate why it should be permitted to continue the use of leak sealant injections; and
- Demonstrate that its trap monitoring and inspection procedures are adequate to determine that the traps are working properly.

## **Conclusion**

In conclusion, our review of Con Edison's consultant reports regarding the steam incident raises concerns about the company's safe and adequate operation of the steam system prior to the incident.

While we await the results of the current investigation, the Commission is encouraging Con Edison to take all reasonable steps to ensure the steam system operates safely. The findings of Con Edison's consultants indicate that the company was, or should have been, aware of the existence of unsafe conditions, particularly at the location of the July 18 incident.

The issuance of a show cause order is only one aspect of our regulatory response. Our independent investigation of the steam incident may lead to further enforcement and/or rulemaking actions.

Thank you for this opportunity to update you on the status of the Commission's investigation.