Submission by the

New York State Department of Public Service

to the

National Transportation Safety Board

Pipeline Accident
East Harlem, Manhattan, NY

March 12, 2014

Docket No. DCA14MP002

February 19, 2015

THE STATEMENTS MADE AND CONCLUSIONS DRAWN IN THIS SUBMISSION ARE BY THE NEW YORK STATE DEPARTMENT OF PUBLIC SERVICE TEAM SUPPORTING THE NTSB IN ITS INVESTIGATION INTO THE NATURAL GAS INCIDENT THAT OCCURRED ON MARCH 12, 2014, IN EAST HARLEM, NEW YORK. THE STATEMENTS AND CONCLUSIONS HAVE NOT BEEN APPROVED BY THE NEW YORK STATE PUBLIC SERVICE COMMISSION (COMMISSION), DO NOT REFLECT THE CONCLUSIONS OF THE COMMISSION OR THE DEPARTMENT'S STAFF TEAM PERFORMING ITS INDEPENDENT INVESTIGATION PURSUANT TO THE NEW YORK PUBLIC SERVICE LAW. THE DEPARTMENT STAFF TEAM'S INVESTIGATION IS CONTINUING, HAS NOT BEEN PROVIDED ACCESS TO THE NTSB'S INVESTIGATION EXCEPT WHERE SPECIFICALLY AGREED UPON WITH THE NTSB, AND MAY REVEAL ADDITIONAL FACTS NOT INCLUDED IN THIS REPORT. THE STATEMENTS IN THIS REPORT REFLECT THE TEAM'S UNDERSTANDING OF THE EVENTS AND FACTS LEARNED AND OBTAINED WITH THE NTSB DURING ITS INVESTIGATION AS OF THE DATE THE REPORT WAS PROVIDED TO THE NTSB.

Introduction

On March 12, 2014, at approximately 9:30 AM (EDT), an explosion occurred in the East Harlem neighborhood of Manhattan, along Park Avenue between 116th and 117th streets. The result of the incident was the collapse of two five story multiuse brick buildings (1644 and 1646 Park Avenue), eight fatalities, over 31 injuries, many displaced residences, damage to surrounding buildings, a gas fed fire lasting more than four hours, a large scale multi-agency search and rescue response, and the temporary stoppage of an elevated Metro-North rail line situated across the street from the incident site.[1] The infrastructure failures identified at the site include a partial failure of a brick combined storm and sanitary sewer and a reoccurring collapsed roadway in front of 1644 and 1646 Park Avenue, a 12-inch cast iron water main break in the street near the building line between 1642 and 1644 Park Avenue, a cracked two inch high density polyethylene (HDPE) service tee and a failed fuse between the service tee and an eight-inch HDPE main used for natural gas distribution in front of 1642 Park Avenue.

Root Cause and Contributing Factors

Based upon the totality of the NTSB investigation in which New York participated fully, the New York State Department of Public Service (NYSDPS) party representatives conclude that the root cause of the incident was long-standing City of New York infrastructure failures in front of 1644 and 1646 that caused the undermining of the natural gas system installed nearby. The continuous loading of asphalt from above and erosion of soil from beneath the gas system forced a plastic fusion joint installed in 2011 to separate and release the natural gas that ignited. The plastic fusion joint that failed had been contaminated during installation, which contributed to its failure; however, a contaminated plastic fusion joint would not have failed at the time under normal loading above and sufficient support below. The two feet of concrete and asphalt and normal roadway loading above the natural gas system at 1644 and 1646 Park Avenue, and the soil erosion that caused a sinkhole below the natural gas system would have eventually caused either another natural gas system failure of some kind, even one completed in accordance with all required specifications, or a massive water main break. While Con Edison's lack of compliance with pipeline safety regulations was not the root cause of this incident, it was a contributing factor.

New York State Department of Public Service Response

The NYSDPS responded to the incident location immediately after having been notified. By March 13, 2014, a NYSDPS Team signed on as a Party Representative to provide technical assistance to the NTSB. A separate NYSDPS Staff team performed its own, state, investigation into the incident. The NYSDPS remained divided into two groups throughout the investigation in order to adhere to the NTSB's Party Representative Guidelines - one Team dedicated to assist the NTSB in its investigation, and the second to perform the NYSDPS' own investigation pursuant to New York's concurrent pipeline safety jurisdiction and the general authority of the New York Public Service Commission (NYPSC) under the New York Public Service Law. The two groups, combined, provided at least seven trained, New York technical pipeline safety and public awareness personnel on the ground to assist the NTSB as needed. The simultaneous federal and state investigations into the East Harlem incident revealed, in addition to existing infrastructure failures at the site, related Consolidated Edison Company of New York, Inc. (Con Edison) field operations violations, which the NYPSC is pursuing as the jurisdictional regulator of gas

[1] "The site" described throughout this report refers to the area from the north-west intersection of 116th Street and Park Avenue to the northern end of 1646 Park Avenue.

utilities.[2] The NYSDPS appreciates the opportunity to work with the NTSB, and is confident its support contributed to the completeness of the NTSB's investigation.

Major Findings as Basis for Conclusions

The road in front of 1644 and 1646 Park Avenue was excavated following the incident. During that excavation, investigators on-site discovered that layers of the roadway's concrete and asphalt measured approximately two-feet thick. In comparison, in front of 1642 Park Avenue, the roadway was approximately 14 to 16-inches thick. Historical records obtained from the City of New York and interviews of New York City personnel during the investigation revealed that a sinkhole condition in front of 1644 and 1646 Park Avenue had persisted since 2004. New York City produced documentation showing that New York City Department of Transportation (NYCDOT) had informed the New York City Department of Environmental Protection (NYCDEP) of the sinkhole condition at the site in 2010 and 2012. While NYCDOT performed many road repairs at the site, the typical NYCDOT repair consisted of the addition of asphalt to the hole and rolling out the asphalt.

The Sewer

During 2011, the building at 1642 Park Avenue, next door to the collapsed buildings, was reconstructed. The work required installation of new water and sewer service lines. The plumber performing the water and sewer work said he spent an extended period of time at the site excavating down to the sewer. The plumber stated that the job took a long time because the depth of the sewer required significant shoring, and the number of large rocks in the excavation required non-vibratory methods to break and remove them. Because this water and sewer service line work caused undermining of the then-existing cast iron gas main in the street, on December 28, 2011, Con Edison replaced the section of cast iron main, as required under the New York State pipeline safety regulations pertaining to undermined cast iron pipe. HDPE pipe was installed to replace the cast iron gas main and service to 1642 Park Avenue, and was extended to the intersection of 116th St. and Park Avenue. The last documented City of New York roadway repair at the site occurred on March 9, 2014.

Following the incident, NYCDEP ran a camera inside the combined brick sewer and a breach was identified in front of 1644 and 1646 Park Avenue. The sewer is more than 20-feet below the road at the site. The NYCDEP removed debris from the sewer along Park Avenue between 116th and 117th Streets early in the investigation, and recovered an insignificant amount of debris. Other than some bricks, the debris was described while on site as what would normally be present in the sewer. This lack of significant debris indicates that the breach in the sewer had not been caused by the explosion but had been present for an extended period of time. According to NYCDEP workers operating the camera, if the breach had occurred recently, there should have been significantly more debris recovered, including more bricks. Records from New York City show that the NYCDEP had visual evidence dating back to 2006 of a breach in the sewer in front of 1644 and 1646 Park Avenue.

Upon further excavation of the water and natural gas infrastructure between 1642 and 1644 Park Avenue it was discovered that large voids existed underneath all of the facilities there. The excavation revealed that soil conditions under the street consisted of large rocks with sandy soil in the voids between the rocks. A dye test was conducted by pouring green dyed water into the area near the water main break while a camera in the combined sewer displayed the green dye draining into the sewer through the breach

[2] The NYPSC is a five member board made up of individuals appointed by the Governor and confirmed by the State Legislature. The NYPSC is the decision-making body within the NYSDPS. The Chairman of the NYPSC is also the Chief Executive Officer of the NYSDPS.

in front of 1644 and 1646 Park Avenue. This test demonstrated that the soil in between the large rocks had washed into the breach in the combined sewer, having been carried away from underneath the site.

The breach in the sewer is the only identified means of how soil could have left the site, leaving the large voids underground. Further supporting this conclusion is that the sewer was described by NYCDEP employees on site as an efficient sewer with a good flow rate, indicating that it was capable of carrying small rocks, bricks, and soil away from the site.

The Water Main

While the FDNY was suppressing the fire from the explosion, a hole opened in the street. The hole revealed a break in the 12-inch cast iron water main from which high pressure water was spewing, causing the roadway in front of 1642 and 1644 Park Avenue to collapse. The large hole created made it unsafe to continue search and rescue activities. The contractor assisting the FDNY removed the roadway over the unstable surface area. This removal process included breaking off and dropping large pieces of the unsupported asphalt and concrete into the hole, then adding gravel to the hole to provide a surface so the search and rescue effort could continue.

When the water was turned off and the main was excavated, investigators saw the water main sitting on a large rock at the point where a break in the water main had occurred. The break in the water main was in the street near the building line between 1642 and 1644 Park Avenue. The in situ condition, shown in **Figure 1,** shows notable iron oxide deposits immediately down gradient of the crack, and very little up gradient, which means the water had been flowing in the direction of 1646 Park Avenue for an extended period of time. As Party Representatives, we observed later, during laboratory testing, that the cast iron water main had indications of graphitic corrosion, and tubercle growth in areas of the crack. The tubercles on the crack surfaces indicate an extended period of time during which the crack had been exposed to water, which indicate leaking had been occurring for some time.

Figure 1 – Crack in cast iron water pipe and iron oxide deposits down gradient of crack (right)

Until the laboratory analysis on the water main was conducted, investigators had not yet confirmed the source of the water that had washed the sand into the combined sewer below. While a contributing factor to the erosion at the site may have been from the cycles of the sewer filling up, sewage escaping through the breach, and then subsequently draining back into the breach with neighboring sand pulled into the water, the water main leak, which had been there for an extended period of time, was the primary cause of the extensive erosion at the site. As such, the leak from the water main was the primary cause of the erosion of the soil under the water and natural gas infrastructure where the failures occurred in front of 1642 and 1644 Park Avenue. In addition, normal ground water flow acted as a contributing factor as it flowed north on Park Avenue (downhill) in the direction of the breach in the sewer.

While the City of New York had not identified the long term leak of the water main as a known problem, the sinkhole in the street in front of 1644 and 1646 Park Avenue that resulted from it was a known, documented, problem for nearly a decade. New York City records indicate road repairs at this location as early as 2004; NYCDEP provided visual evidence of the sewer breach in photos the NYCDEP identified as having been taken in 2006. NYCDEP representatives interviewed explained to us that inspection of water mains is a difficult task, and the leak detection equipment in use today requires years of practice before a person becomes proficient in its use. Further, there is no formal training program for the use of the leak detection equipment. Even though leak detection for the water main presents a challenge, however, visual indications that problems existed beneath the surface were evident both above ground with the reoccurring sinkhole, and below ground in the combined sewer, neither of which New York City agencies adequately addressed. Judging from the physical conditions investigators observed, including the cracked water main, the sinkhole above the sewer breach, and the layers of asphalt that had been applied over time on top of the sinkhole area, the breach in the combined sewer along with the lack of New York City inter-agency coordination and mitigation of the problem is the root cause of this incident.

NYCDEP, in particular, had not corrected a deteriorating condition of infrastructure over which NYCDEP had responsibility at this location. NYCDEP provided no evidence that it had taken action to mitigate the underlying infrastructure problems that compromised the integrity of the gas system located nearby.

Gas Facilities

The search and rescue effort continued for over six days. During that time, investigators pressure-tested the low pressure natural gas distribution system on Park Avenue between 116 and 117th Streets in segments to locate possible leaks. While the cast iron gas pipe remaining in the area after the explosion did show leakage, quantitative leakage analysis performed showed that the leakage rate from the cast iron pipe was significantly less than the amount of gas that would be needed to cause the explosion. The largest leak on the system was located near the HDPE service tee and fuse in front of 1642 Park Avenue, which had been installed on December 28, 2011. When the HDPE pipe at the service tee and fuse was excavated, investigators observed that the entire HDPE main running through the sinkhole area had decreased in depth from its original installation location. This sinking main was evident by the bow in the service pipe (**Figure 2**).

Once excavated, investigators saw the gas service tee had cracked, and the fuse between the tee and main had failed. Further supporting the conclusion that the largest gas leak originated near the location of the HDPE gas service tee and fuse, is a burn path and tunnel discovered underneath the sidewalk in front of 1642 Park Avenue. The tunnel and burn path originated near the building line between 1642 and 1644 Park Avenue and followed a diagonal path toward the location of the HDPE tee and fuse. It was also discovered while on site that a rat had created the tunnel because a rat remained on site during the investigation and recreated the tunnel in the days following the incident. See **Figure 3** for burn path and remaining tunnel. The sidewalk at this location was also lifted during the incident, indicating the ignition of a pocket of gas beneath it.

Figure 2 – Bend in HDPE gas service pipe to 1642 Park Avenue due to sinking main

Figure 3 – Charred concrete and tunnel under sidewalk in front of 1642 Park Avenue

A permanent deformation in the eight inch HDPE main became apparent after it was removed from the ground, as seen in **Figure 4**. HDPE pipe will not retain a deformed shape unless it is exposed to significant, continuous, bending forces. Our observations of the two feet of roadway above, extensive soil erosion on site, documentation of repeated roadway problems, and the lack of any other force that would cause the bending of the gas main, supports our conclusion that the HDPE pipe was bent due to the undermining conditions, or lack of support, beneath the HDPE pipe, combined with the roadway load above the pipe.

Figure 4 – Permanent deformation of eight inch HDPE main due to loading from above and lack of support (voids) beneath the pipe

Excavation also revealed that the fusion joint had separated and the service tee had cracked on the bottom of the service pipe outlet portion of the tee. See **Figure 5**.

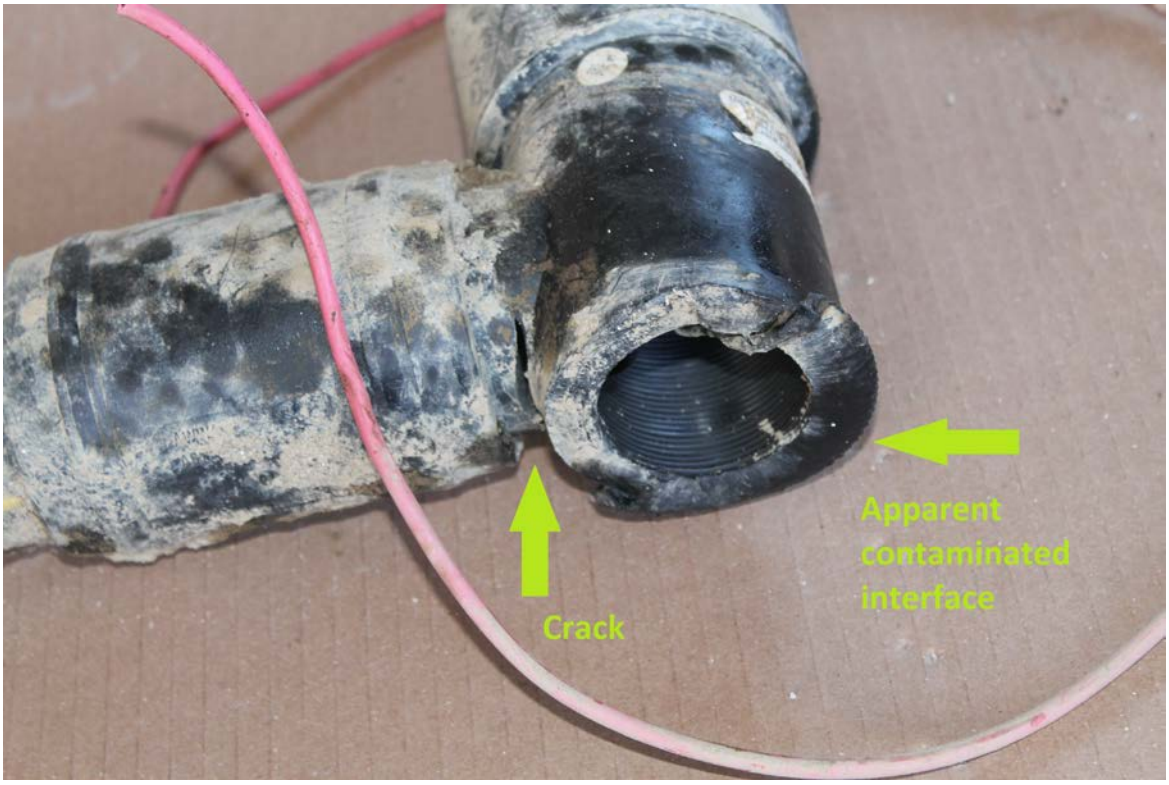

Figure 5 – Crack in HDPE gas service tee and failed fusion joint

The crack in the service tee and failure of the fusion raised the question: was it the crack in the HDPE tee or was it the fusion failure between the HDPE tee and the HDPE main that occurred first and released enough gas to ignite an explosion of this magnitude? Laboratory analysis has shown, by observing the contaminated section of the fusion, that the plastic fuse was not completed properly. Specifically, as seen in **Figure 5**, approximately half of the fusion interface appears to have been contaminated. This led investigators to theorize that the fuse ultimately failed due to the lack of sufficient fusion between the tee and main in the areas where the interface had been contaminated. To confirm this theory, investigators reproduced a contaminated fusion joint in the HDPE tee manufacturer's laboratory. The interface failure matched the joint found at the incident location. Proper fusions should be stronger than the surrounding pipe and not fail.

To determine the adequacy of Con Edison's procedures for performing plastic fusions, investigators made many sample fusions in the laboratory according to those Con Edison procedures. The sample fusions were then destructively tested. Con Edison's procedures produced properly fused joints, which did not fail destructive testing. The contaminated fusions did fail when subject to the same amount of force as the properly fused joints. Based upon this physical laboratory simulation and visual examination of the fuse at the site, the fusion performed on December 28, 2011 was contaminated during installation.

The NYSDPS' investigation discovered that the Con Edison worker who completed the fuse of the HDPE tee in front of 1642 Park Avenue was one month overdue in taking his required annual requalification test; therefore, the fuse at the incident site was performed by a person whose qualifications had lapsed. While a lapse in plastic fusion requalification would not necessarily lead to a contaminated fuse, the fusion involved in this incident had not been completed correctly due to the failure to follow Con Edison's fusion procedure, which requires steps to avoid contamination during the fusion process.

Regardless of the contamination, the fuse should not have been put into service because the fuser did not meet the requirements of 16 NYCRR §§255.285 [which requires that only Operator Qualified persons perform plastic fusions]. The NYPSC, in Case 14-G-0212, is investigating Con Edison's fusion training and operator qualification program, as well as any latent impacts on Con Edison's gas system due to Con Edison's inadequate training.[3] The investigation is also examining Con Edison's plastic fusion inspection practices to determine if someone other than the person who performs a fusion visually inspects it prior to placing the fuse into service and, if not, whether they should.

The crack in the HDPE service tee and the failed fuse led us to question whether the cracked tee occurred before or after the fusion failed. In laboratory testing intending to reproduce the crack in the HDPE tee, investigators created both an elastic failure and a brittle failure of equivalent service tees. The sample elastic failure was caused by a slow loading condition and the brittle failure was caused by an impact load. The physical characteristics of the brittle failure closely matched the physical condition of the cracked HDPE tee installed in front of 1642 Park Avenue in 2011. The steady sinking of the gas main would have caused a slower elastic failure, the physical condition of which would have looked more like the elastic failure created in the laboratory. In addition, there was evidence of at least two possible events that could have produced impact loads on the HDPE tee following the explosion, but there is no evidence of such an impact prior to the event.[4] Therefore, we conclude that an impact load on the service tee following the incident caused the tee to crack.

Based upon these factors, we conclude that the fusion failure occurred prior to the crack in the tee and that the external loading above and the lack of support below the fusion created the forces that caused the fusion to fail prior to the incident. In addition, flow calculation estimates indicate that a substantially higher amount of gas would escape from the fusion failure as compared to the crack. Considering these factors and the extent of the gas migration pattern underground along Park Avenue, and the magnitude of the explosion, the higher flow rate from the failed fuse was the source of the gas that ignited rather than the crack in the tee.

Another issue examined during the investigation of the cracked HDPE tee and failed fuse was whether any other type of gas infrastructure at the site would have failed given the undermining conditions and external loading of the roadway and additional asphalt in front of 1644 and 1646 Park Avenue. Even in the case of a properly fused HDPE joint, the extent of the loading on top of the gas main in front of 1644 and 1646 Park Avenue and the lack of support beneath it would have led to an eventual failure in the system, although not at the fuse. Simply put, the weakest link in a system will fail before stronger sections fail. If the fuse had been performed properly, the weakest link in the gas system in that area of Park Avenue would not have been the fusion joint but rather the smaller diameter gas service pipe off of the gas main. The HDPE service line in front of 1642 Park Avenue was fixed in solid ground, as seen in **Figure 2**. Given that the HDPE main had been sinking, it is not surprising that the failure occurred near the fixed portion of the service line. The gas main was sinking and the service line was not; therefore, the tremendous tension force and bending moment near the HDPE tee led to the fuse failure.

[3] Case 14-G-0212, Proceeding on Motion of the Commission to Investigate the Practices of Qualifying Persons to Perform Plastic Fusions on Natural Gas Facilities.

[4] Pieces of the roadway falling into the hole or excavation equipment used by the contractor assisting the FDNY.

Other Factors Considered

NYSDPS investigators reviewed Con Edison's records to see if the level of pressure at which Con Edison was operating the distribution system at the site could have caused the fusion failure. We found that the fuse and service tee would not have failed solely due to the operating pressure of Con Edison's gas system. HDPE is resilient material, as seen by the permanently deformed pipe in **Figure 4** that did not fail, and is capable of carrying high internal pressures. Con Edison's records indicate the service line in front of 1642 Park Avenue was pressure tested at 90 pounds per square inch gauge (psig) when it was installed, and operated at approximately one-quarter psig, which were appropriate pressures and would not have caused the fuse to fail.

While frost depth records for the site do not exist, the NYSDPS investigation obtained records from Con Edison showing frost was 12-inches to 18-inches in Westchester County, and the average temperature was warming in the weeks prior to the day of the incident. The frost depth in Manhattan would be less than in Westchester County, but we cannot rule out the timing of the incident and the impact of accelerated loading of the roadway on top of the pipes as the frost came out of the ground. A frost cap mitigates loading on infrastructure beneath it by providing support to the roadway during the winter months even as the deeper ground erosion was ongoing. The early Spring thaw removed this support.

Notably, the cast iron gas pipe, which is generally considered to be prone to leakage and catastrophic failure, did not crack or leak significantly prior to the HDPE fusion joint failure in this incident. In this instance, at least, the sinkhole covered such a large area that sufficient differential loading on the cast iron avoided a failure of the cast iron. The cast iron in the area also had encapsulated bell joints, which mitigated a potential failure mode. Even though a cast iron gas main did not contribute to this incident, cast iron mains in general are considered to be leak-prone, and programs to accelerate replacement of cast iron main with modern materials, which are more resilient and less prone to leakage, should continue.

Due to the extent of damage caused by the incident, examination of the inside natural gas piping that remained at 1644 and 1646 Park Avenue would have produced no useful information in determining causation. While a leak on inside piping may or may not have existed before the incident, all of the physical evidence gathered from the site and tested after the incident, in addition to the interviews the NYSDPS conducted describing when and where people reported smelling gas before the incident occurred, lead to the conclusion that the source of gas that ignited on March 12, 2014 was the failed fuse under the roadway.

Other Notable Findings

Following the incident, the natural gas flow was uncontrolled for over four hours. Con Edison had no valves in the immediate area that could have been used to shut off gas. Therefore, the company had to excavate what are called "fire banks" (discrete sections of pipe that are excavated, cut and capped to stop the flow of gas) in three nearby locations. Con Edison's procedure, however - "Installation of Valves on Gas Distribution Mains" - requires the following:

> Valves shall be installed on new/replaced mains in accordance with the following guidelines:
> A) Valves shall be installed at every street intersection or one per block, so that each block may be isolated.

When Con Edison replaced the section of cast iron gas main in front of 1642 Park Avenue, the new HDPE gas main was extended to the intersection of 116th Street. The Con Edison procedure above

required the installation of a valve at that intersection, yet Con Edison did not install a valve there. If a valve had been installed, two of the three fire banks would not have been needed to stop the flow of the gas feeding the fire. If valves had been installed in the area and those valves had been used, the fire suppression and search and rescue activities would not have been delayed while Con Edison worked to shut off the supply of gas to the area. Con Edison should examine its system for critical valves, and use such valves to accelerate the shutting down of its system in an emergency to mitigate the extent of property damage and potential harm to the public.

Con Edison Emergency Response

The information investigators obtained during the investigation supports the conclusion that Con Edison failed to comply with its elevated emergency response procedures, titled Multiple Resource Response Event (Code MuRRE, pronounced "mur-ee"). Circumstances warranting a Code MuRRE requires dispatching additional responders, including the fire department, to reported gas leaks and emergencies. Following the NYPSC's order and investigation into a natural gas incident in 2009,[5] Con Edison was required to modify its emergency response procedures related to Code MuRRe events. One specific ordering clause was for Con Edison to adopt the following language:

> Additional company crews and the fire department will immediately be requested by the Gas Emergency Response Center (GERC) in the following situations: A report of two or more gas leaks on the same block at approximately the same time.

Con Edison adopted the following language in its leak response procedures to implement Code MuRRe procedures:

> A Code MuRRE shall be declared by the GERC for the following conditions:
> - Two or more calls on the same block, in the same vicinity
> - Other situations requiring an escalated field response

First, the language in Con Edison's emergency response procedure states a Code MuRRe is warranted after "two or more calls" reporting gas odors are made. The NYPSC order required, "A report of two or more gas leaks." As was the case in this incident, two gas leaks can be reported on the same call; one odor was reported inside and one outside. Second, the final bullet under Code MuRRE in Con Edison's procedures refers to "Other situations requiring an escalated response," which relies on the training and ability of qualified personnel to recognize a potentially elevated hazardous situation that is not specifically outlined in the procedure to determine an appropriate company response.

Based upon the information Con Edison's call center provided to Con Edison's GERC, and relying on his training, the dispatcher in the GERC made a correct determination that the report of the gas leak for this incident was an elevated hazard and he required that an additional leak ticket be generated. Even though a second leak ticket was generated correctly by the call center, when Con Edison's GERC called the fire department, Con Edison said, "Hold up, no, sorry, hold on one second, hold on, hold on, I'll call you right back." The GERC did not request that the fire department dispatch a crew to the site of the odor reports. No other call was made from GERC to the fire department until after the incident had occurred.

[5] Case 09-G-0380 - Natural Gas Explosion at 80-50 260th Street, Queens, New York on April 24, 2009 within The Natural Gas Service Territory of Consolidated Edison Company of New York, Inc., Order Approving Joint Proposal (issued July 16, 2010).

Therefore, the Con Edison dispatcher correctly identified an "other situation requiring an escalated response" based upon the treatment of the two odor reports as two leaks, but failed to follow through on the Code MuRRE requirement that the fire department be dispatched to the location of the reported odors.

Con Edison Public Awareness

There were several reports of citizens who stated they smelled gas in the vicinity of the incident as early as midday March 11, 2014. An unfortunate, reoccurring concern discovered in many natural gas incidents is that citizens commonly fail to report the smell of gas. The lack of urgency exhibited by the public to report immediately upon noticing the smell of gas to either 911 or Con Edison is indication that Con Edison's public awareness program needs improvement. If someone had reported the smell of gas earlier to 911 or Con Edison, this incident may have been avoided. The NYPSC issued an Order prior to this incident, on February 20, 2014, in Case 11-G-0565, that required all local distribution operators in New York to collaborate in their efforts to develop best practices for enhancing and continuing public education on the reporting of natural gas odors.[6] The collaborative to establish best practices is ongoing.

NYPSC Actions

Both before and after the East Harlem incident, the NYPSC has taken action to promote pipeline safety through many efforts. Below, are several notable NYPSC initiatives to address known and potential pipeline safety risks and non-compliance by local distribution companies:

- Case 14-G-0212 - Proceeding on Motion of the Commission to Investigate the Practices of Qualifying Persons to Perform Plastic Fusions on Natural Gas Facilities. The NYPSC issued two orders initiating an investigation into Con Edison's and all other local distribution companies' programs regarding plastic fusion training, qualification, requalification, and related operator qualification procedures. The investigation is ongoing and operators are filing risk mitigation plans, where appropriate, with the NYPSC. Intermediary actions have been taken where concerns have been identified, e.g., the immediate stand down of fusion work, retraining of personnel, and enhanced leakage surveys of areas containing plastic fusion joints.

- Case 14-G-0357 - In the Matter of Revising 16 NYCRR Gas Safety Regulations for Consistent Application of More Stringent Federal Gas Safety Standards in 49 CFR. This rulemaking, with an expected imminent adoption, will modify the New York pipeline safety regulations by aligning the definition of Service Line with the federal definition of Service Line, eliminate the option of soap solution leak testing for short lengths of pipe in lieu of pressure testing requirements, eliminate the requirement to periodically increase operating pressure to maintain the established maximum allowable operation pressure, and eliminate an odorization requirement pertaining to intrastate pipelines going to storage facilities.

    - The NYPSC is modifying its regulations to align certain portions of its regulations with 49 CFR even though the existing overall framework provides a higher level of safety. The following are requirements that operators must follow beyond 49 CFR: enhanced odorization of gas in distribution and service lines such that gas is readily detectable at half the concentration of gas prescribed by federal regulation, leak classification system with required repair time frames, integrity tests of new and reactivated inside piping, requirements relating to deficiencies on customer owned piping, building of public

[6] Case 11-G-0565, In the Matter of a Natural Gas Incident at 198 Joseph Street, Horseheads, on January 26, 2011, in the Service Territory of New York State Electric & Gas Corporation.

assembly service line valve inspection requirements, and operator responsibility of service lines up to building wall.

- Case 11-G-0565 - In the Matter of a Natural Gas Incident at 198 Joseph Street, Horseheads, on January 26, 2011, in the Service Territory of New York State Electric & Gas Corporation. An order issued under this case on February 20, 2014, requires local distribution companies to:
    - Perform an extensive risk assessment of their entire distribution system to identify areas where municipal infrastructure and related work may have impacted, or may impact the future integrity of gas delivery systems. Operators are required to develop and follow plans to mitigate identified threats, and regularly report progress.

    - Create a collaborative to develop best practices for continuing public education on the reporting of natural gas odors. Included in the collaborative is the requirement to develop new ways to reach local governmental entities to educate them on the potential hazards associated with excavations near gas facilities.

- Case 13-G-0484 - In the Matter of Review of Gas Emergency Preparedness. Order Directing the Filing of Updated Gas Emergency Plans and Inviting Comments on Best Practices. This order required gas operators in New York to file Gas Emergency Plans with the NYPSC adopting 46 best practices jointly developed by NYSDPS staff and gas operators, or explain why such practices cannot be implemented.

- Leak-prone pipe replacement: In every gas rate case over the past decade involving a company with leak-prone pipe, gas companies have been required to maintain a defined level of leak prone pipe replacement; most have been required to make significant increases in targeted removal of such pipe. Since, due to cost and available resources, all leak-prone pipe cannot immediately be replaced, all gas companies are required to use a risk model to identify and risk rank pipe segments. These rankings prioritize pipe segments according to the highest risk of failure and steer the resources of companies toward removing the pipes with the greatest risk to the public. Failure to achieve set replacement targets results in negative revenue adjustments. Leak-prone pipe replacement requirements are expected to be further accelerated in future rate cases.

- Rate case performance measures: Failure to achieve targets in damage prevention, emergency response time to leak and odor calls, and minimizing year end leak backlogs also result in negative revenue adjustments.

- Violations performance measures in rate plans: NYSDPS staff perform annual record and field audits to determine operator compliance with pipeline safety regulations. Non-compliance findings in these audits result in negative revenue adjustments. The potential approximate exposure for Con Edison in 2014 is $14.5 million, in 2015, $24 million, and in 2016, $36 million. Note that the violation performance measure is a rate making tool to influence behavior toward improved compliance, and does not preclude the NYPSC from commencing separate enforcement actions under the Public Service Law.

Conclusion

As with most natural gas incidents the NYSDPS has investigated, it is usually a series of process failures that lead to an explosion. The incident on March 12, 2014 in East Harlem is no different. The root cause

of this incident was the failure of the combined municipal sewer, which the NYCDEP knew existed for years, and the abatement of which would have prevented the subsequent, nearby, infrastructure failures. The recurring sinkhole condition in the roadway above the failure in the sewer visibly indicated a latent problem existed underground. The City of New York did not take action to investigate or mitigate the underlying cause of the sinking roadway. This fact combined with the failure of the sewer enabled the undermining condition to continue.

Con Edison's plastic fuse at the service tee in front of 1642 Park Avenue failed because the gas distribution system had lost underlying ground support, had been subjected to continuous downward pressure from layers of asphalt above, and the fuse had not been completed correctly. Con Edison's failure to properly qualify its personnel installing company infrastructure and the lack of adequate inspection following the fusion work contributed to the failure of the fuse. The NYSDPS staff's investigation led to Con Edison coming forth with information about significant lapses in its operator qualification training program and its inadequate plastic fusion qualification and requalification procedures. The Con Edison worker who installed the gas service to 1642 Park Avenue in 2011 was not operator qualified when he installed an improper fuse, which subsequently failed. The primary source of the leaking gas was the failed HDPE fuse. While Con Edison's lack of compliance with pipeline safety regulations was not the root cause of this incident, it was a contributing factor. In addition, had Con Edison followed its Code MuRRE procedure, the fire department would have been dispatched at least 10 minutes prior to the incident occurring. Finally, the lack of public awareness to recognize the imminent danger of a gas leak and respond accordingly (call 911 or Con Edison) indicates Con Edison's public awareness plan should be improved.

Respectfully submitted,

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Party Representative to Docket No. DCA14MP002