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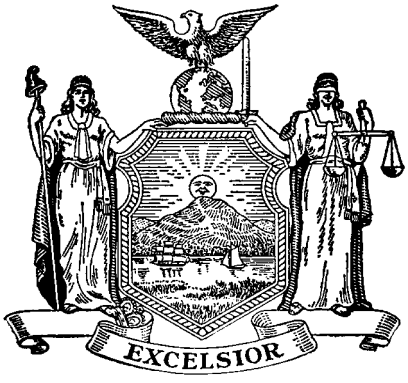
STATE OF NEW YORK
DEPARTMENT OF PUBLIC SERVICE



Case 09-G-0380

80-50 260th Street, Queens
Natural Gas Explosion
April 24, 2009
Consolidated Edison Company of New York, Inc.

Safety Section
Office of Electric, Gas & Water
November 2009

Summary

At approximately 4:50 p.m. on Friday, April 24, 2009 an explosion and subsequent fire occurred at a private residence located at 80-50 260th Street in Queens. The house was completely destroyed. A 40-year-old woman was inside the house at the time of the explosion and died as a result. There were reported injuries to several other people, including a resident of 80-54 260th Street and the first Consolidated Edison Company of New York, Inc. (Con Edison or the company) mechanic who arrived at the scene. There was also heavy damage to adjacent homes on either side and behind the incident building.

At the time of the explosion, Con Edison personnel were on site at 260th Street, having responded to investigate a report of a gas odor in the area.

Department of Public Service (DPS) Safety Section Staff (Staff) was notified of the incident by Con Edison at approximately 5:00 p.m. and arrived on site at 5:50 p.m. Staff's investigation of this incident included on-site observations of the scene and company facilities, interviews with Con Edison dispatching and leak response personnel, review of audio recordings and transcripts of telephone and radio communications, and review of pertinent gas and electric system operating and maintenance records, as well as Con Edison's gas leak response procedures.

A brief summary of the incident follows:

At 3:22 p.m. on April 24, Con Edison received a report of a partial electric outage from 80-46 260th Street, which is next door to the incident building (house 80-50). At 3:34 p.m. a resident at the same location, house 80-46, called Con Edison and reported an outside gas odor.

A Con Edison mechanic was dispatched at 3:56 p.m. and arrived at the location at 4:05 p.m. The mechanic noticed a

strong odor of gas as soon as he drove onto the block and immediately began investigating for a leak. He tested two sewer manholes in the street near 80-46, and got positive gas-in-air readings (20% gas) in each. He then contacted his dispatcher and requested that additional personnel respond to assist him. At about 4:13 p.m., the mechanic entered house 80-46 and found no indications of gas with his detection instrument in the atmosphere on the main floor or in the basement. He obtained a reading of 10% gas-in-air in the electric pull box (the entry point of the electric service into the basement). In post-incident interviews with Staff, he also said he detected slight gas odors inside the house. The mechanic returned outside and during the next approximately 26 minutes tested several sewer manholes along 260th Street in both directions from house 80-46. He obtained readings of 20% gas-in-air in all the sewer manholes tested. During this time he also identified an electric service box in the street in front of house 80-53, across the street from house 80-50. The service box cover was solid which prevented him from testing for the presence of gas in the service box. He did not attempt to lift the cover. Instead he tested for gas in a grass area beyond the curb line but near the service box and obtained very high gas-in-air readings (90%) at three points along the curb line.

At approximately 4:42 p.m., an additional Con Edison mechanic and a helper arrived at the location. At the request of the first responding mechanic, they partially lifted the cover on the electric service box and got a very high gas-in-air reading (80%) within it. They had fully removed the cover to vent it, while the first responding mechanic was checking electric service records to identify buildings connected to that manhole, when the explosion occurred at 4:50 p.m.

Immediately after the explosion the Fire Department responded and assisted Con Edison personnel in evacuating the buildings on 260th Street between 80th and 81st Avenues. Con Edison personnel closed gas main valves in the area to cut-off gas service to the block, and cut-off electric service as well. Appropriate actions were taken to clear any buildings and make the area safe before residents were allowed to return to their homes.

On the following day, investigation for the source of the leaking gas led to discovery of a hole in the two-inch high-pressure steel gas distribution main near the connection of the gas service for house 80-50. The 2-inch main was installed in 1950 and was operating at 53 pounds-per-square-inch-gauge (psig) at the time of the incident. The investigation also revealed a metal conduit containing the electric service to house 80-50 in direct contact with the gas main. The electric service was installed in 1951.

Examination of the electric conduit and cable, in the area where it contacted the gas main, revealed indications of failure, with some of the insulation completely melted off and the cable melted in spots. Another area of damage to the electric conduit was found approximately 19 feet west (towards 80-50 260th Street) of the crossing of the electric conduit and gas main. The steel conduit was bent upward, and a coupling connecting two sections of conduit had been compromised by corrosion and conduit deformation. The bend in the conduit appeared consistent with previously unreported contact by machinery during past excavation activities. The investigation found that construction projects had occurred on 260th Street in 1987 (to install water and sewer mains) and 2000 (to reconstruct the roadway). The damage to the electric conduit might have occurred during either of these construction projects.

The damaged sections of the gas main and electric cable and conduit were carefully removed and sent to an independent laboratory for testing and failure analysis. The preliminary results indicate that the hole in the gas main was a result of arcing from the electric conduit.

Staff's investigation of this incident addressed issues concerning the receipt and handling of the gas odor report; Con Edison's level of staffing and availability of on-duty personnel at the time; the process to dispatch a qualified Con Edison first responder; the on-site actions of the first responder and whether those actions conformed to the company's leak investigation, emergency response and building evacuation procedures; and the facility failure mechanism, including separation of gas and electric facilities.

In Staff's opinion, the procedures in place at the time of the incident were adequate and contained the necessary information for the Con Edison first responder to react appropriately. However, based on Staff's investigation, he failed to follow certain provisions of the procedures critical to the protection of life and property.

Since the incident, Con Edison has implemented several actions to enhance its applicable procedures. These procedural enhancements provide for identifying situations that require enhanced emergency response, getting more personnel on the scene quickly in such situations, venting subsurface structures, and checking and evacuating nearby buildings if necessary.

In addition to those enhancements, Staff makes several recommendations for further changes to policies and procedures related to receiving odor reports from the public, dispatching personnel, leak investigation and emergency response, equipment carried by mechanics and separation of electric and gas facilities.

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Description of Con Edison Facilities

Natural Gas System

In this area of Queens (Floral Park), Con Edison operates a high pressure natural gas distribution system, with a maximum allowable operating pressure (MAOP) of 80 psig. Typical system pressures average 60 psig. The gas main on the impacted block of 260th Street is two-inch nominal diameter steel, installed in 1950. Company records indicate that the system was operating at approximately 53 psig on April 24, 2009. The main is located on the east side of 260th Street, approximately four feet west of the east curb (see Figure 1). Gas services to houses on this block vary in material and age. The service to 80-50 260th Street was 1/2-inch plastic, which was inserted into a previously existing steel pipe in 1985.

Electric System

The buildings located at 80-46, 80-50, and 80-54 260th Street were each supplied electric service via a common two-inch steel conduit, installed in 1951 (see Figure 1). The conduit originated in a service box (identified as EMH-54080) located in the street in front of 80-53 260th Street. The service conduit extended north from the service box for approximately 20 feet, turned west and entered house 80-50. The conduit also branched in front of house 80-46 to serve the adjacent homes on each side - houses 80-46 and 80-54 260th Street.[1] Electric power was supplied through three individual lengths of #2 copper cables.

[1] Service Box EMH-54080 also supplied houses 80-49 and 80-53 260th Street via separate service conduits.

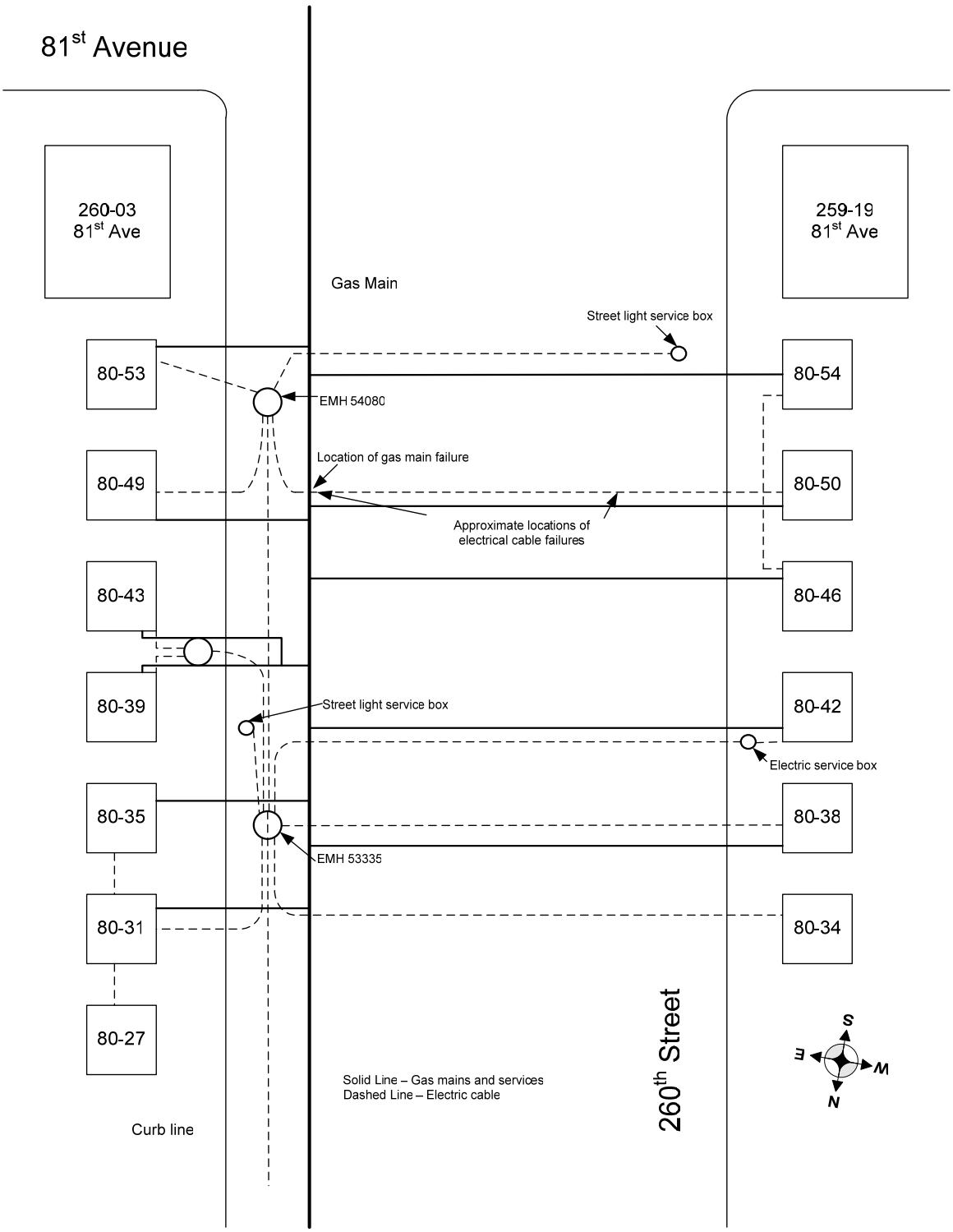

Figure 1 – Gas & Electric Facilities on 260th Street
Note: This diagram is not to scale and is intended only to show the relative position of facilities

Incident Investigation

Staff developed a chronological sequence of events for the date of the incident based on the review of records and audio recordings, and interviews with involved parties, including Con Edison personnel and the residents of 80-46 260th Street. The following represents the events of April 24, 2009, as ascertained by Staff.

Prior to the Explosion

At 3:22 p.m. Con Edison received a report of a partial electric outage from 80-46 260th Street. This report was received and recorded via an automated electric outage phone system. At 3:34 p.m. a resident at the same location called Con Edison to report a gas odor. That call was processed by a Customer Service Representative (CSR). The customer noted that "half the lights in my house went out" and that he had already reported that to Con Edison. The CSR obtained the pertinent information about the customer's name, phone number, address and cross streets. The CSR confirmed that the customer was reporting an outside gas odor, and asked if he considered the odor to be strong or faint.

- Customer: "in between… not faint but it's not tremendous."
- CSR: "where is the location exactly?"
- Customer: "It's someplace on the block here … anybody who comes down the block is saying, you know, they have a gas smell."
- CSR: – "the entire block I'll put, just in case."
- Customer: "Yes. Cause, I don't know exactly where it is, but we smell it. Not only me. Other neighbors smell it someplace."

- CSR: "OK. At this time I'm going to ask you to stand away from that area and leave the premises immediately, do not strike any matches, switch on or off any electrical appliances or lights around that area. I'm going to send somebody out there immediately…"

The conversation continued, with the CSR asking whether the customer could be available to point the responding crew to the area, and the customer said he would. The CSR then put the caller on hold while he transmitted the information to the Gas Emergency Response Center (GERC) and called there to verify it was received.[2] The CSR then returned to the caller from house 80-46 to complete the call, informing him that Con Edison personnel would be responding to the gas odor report, and that the report of the electric outage had been received and a crew would respond when available.

Typically after receiving a gas odor complaint, the GERC dispatcher first locates the nearest qualified and available mechanic using GPS-based mapping equipment. The dispatcher then attempts to contact the mechanic to confirm his availability to respond. If available, the dispatcher electronically transmits the job assignment to the mechanic. It is also important to note that (1) in Con Edison's Queens territory, the Gas Distribution Services (GDS) mechanics and Emergency Response Force (ERF) crews are based in the College Point yard, which is in the central-north area of Queens, while Floral Park is at the eastern end; and (2) the availability and location of mechanics and crews are visible on large LCD screens, through GPS technology, to the dispatchers at the GERC. The dispatchers also have a copy of a Daily Route Sheet which indicates the on-duty employees and their general daily assignments.

[2] Time stamped recordings indicate that the GERC received the information at approximately 3:36 p.m.

At the time (3:36 p.m.) the dispatcher received the notice of the gas odor report at 80-46 260th Street, he was communicating (3:36:06 to 3:36:49) with an ERF crew that had finished a repair of a gas main damaged by third-party excavation at a different location. As explained more fully below, for the next seven minutes the dispatcher had several conservations with mechanics and a supervisor. He had two conversations (3:36:59 to 3:38:28 and 3:38:40 to 3:39:33) with a mechanic (Mechanic A) who had been assigned to gas service restorations at several buildings on 170th Street (near 45th Avenue, roughly mid-way between College Point and Floral Park). The conversations were about this work being postponed to the following Monday. From 3:40:14 to 3:41:49 the dispatcher had two conversations with another mechanic,[3] also pertaining to service restoration jobs that had been postponed. From 3:43:17 to 3:45:34 p.m. the dispatcher had a conversation with a supervisor regarding the postponed work of these two mechanics, both of whom had been held over from the work shift that ended at 3:00 p.m. The dispatcher indicated his intent to assign the leak report from 260th Street to Mechanic A, and the Supervisor agreed.

From 3:45:47 to 3:45:51 p.m. the dispatcher attempted to page Mechanic A but got no reply. Between 3:46:30 and 3:49:20 p.m., the dispatcher had an unrelated conversation with a CSR and two unrelated conversations with another GDS mechanic[4] on another assignment.

At 3:51:17 p.m. the dispatcher attempted to page another mechanic (Mechanic B), who at the time was a few blocks away from 260th Street at 250-05 Elkmont Avenue, where he was

[3] This mechanic was farther away from 260th Street than Mechanic A, and ended up returning to College Point.
[4] This mechanic later re-enters this narrative as Mechanic D.

assigned to restore gas service to a customer after repairs. Mechanic B did not reply. From 3:51:38 to 3:51:56 the Dispatcher tried to reach Mechanic B and Mechanic A again, but still got no reply.

At 3:52:07 the dispatcher paged a third mechanic (Mechanic C - who eventually was the first responder) and discussed the odor call from 260th Street, noting "it's 15 minutes old." Mechanic C was working the 3:00 to 11:00 p.m. shift and was heading east from the College Point yard toward his first assignment in the vicinity of Marathon Parkway and Northern Boulevard. Mechanic C indicated "I'll do what I can" but the job was not officially assigned to him at this time.

From 3:53:23 to 3:53:31 p.m. the dispatcher again tried to reach Mechanic A, with no answer, and then Mechanic B from 3:53:41 to 3:53:45 p.m., who did answer at 3:53:55 p.m. The dispatcher mentioned the odor report in the 80's and 260th Street – "It's got about 20 minutes on it. I need your response ASAP please." Mechanic B replied that he was on site with a plumber to restore gas service. The dispatcher said – "is there any way you could just respond to this leak and ask the guy if we can get back to him. I have nobody else out that way where you are." Mechanic B indicated that leaving the site would cause issues[5] with the customer. The dispatcher said "alright… stay there."

At 3:55 p.m. the dispatcher again contacted Mechanic C, and said: "I've got nobody else. (Mechanic B) is on a turn on with a plumber with sick people in the house and they are screaming

[5] On the audio recording, he appears to say the customer "is very sick" but background noise makes it difficult to make out the exact words. In post-incident interviews, Mechanic B recalled it as saying the customer "is very upset."

and hollering." Mechanic C said "I'll see what I can do, just drop it on me (electronically transmit the assignment)."

At 3:58 p.m., Mechanic A called in to the dispatcher, who assigned him to another job at 169-24 21st Road. The dispatcher did not question why Mechanic A had not answered the previous pages.

Between 4:02 and 4:04 p.m., the dispatcher handled brief calls from two other mechanics regarding other unrelated assignments. At 4:04 p.m. Mechanic C informed the dispatcher that he was about two minutes away from 260th Street.

Between 4:05 and 4:15 p.m., the dispatcher had conversations with other mechanics regarding other assignments, including one at 4:10 p.m. with a mechanic (D) who was also assigned to gas service restorations at several buildings on 170th Street near 45th Avenue. This mechanic had finished his last job of the day, which was a gas service restoration that could not be completed because the house piping did not pass an integrity test. Mechanic D requested an electronic meter exchange form for one of the addresses where he had been working and said "if you got anything else you want me to take care of, ah, I'll take care of it. If not I'll take a ride in and I'll be on my 10." The dispatcher responded that he was transmitting the electronic meter exchange form. Mechanic D responded "Alright, I fill this out, I'll send it back. I have a few jobs on my screen. If you would be so kind to pull them back and I'll take my 10." In a post-incident interview with Mechanic D, he stated that he and his helper had stopped at a convenience store for beverages on their way back to College Point. Based on this, Staff interpreted the references to "be on my 10" and "take my 10" to refer to taking a break. Con Edison contends that this refers to a "Signal 10," which is its radio code for "return to your reporting location."

Mechanic C arrived at 80-46 260th Street at approximately 4:05 p.m. As he turned onto the block of 260th Street, he noticed a strong odor of gas, which he thought may be attributed to a large leak or a damaged gas facility. He proceeded towards house 80-46 while looking for signs of road construction activity. He did not see any, but did notice a roofing contractor working at house 80-39, and a flooring contractor in front of house 80-46. He parked his vehicle in front of house 80-46, and asked the flooring contractor if he had called in the gas odor. The flooring contractor said he did not, but that the resident had. Mechanic C asked the contractor to have the resident come out. While waiting for the resident, Mechanic C commenced an outside leak investigation by taking readings at two sewer manholes located in the street in the vicinity of house 80-46. He inserted the combustible gas indicator (CGI) probe through small openings in the manhole covers, and detected readings of 20% gas-in-air in both manholes.

At 4:12 p.m. Mechanic C informed the GERC dispatcher of the 20% gas-in-air readings in the two sewer manholes, that he will need some help checking houses, that there was a very strong odor of gas on the block, and that he will need a (ERF) crew. He also stated that the customer at house 80-46 complained that half of their house is out of electricity.[6] The dispatcher instructed Mechanic C to "take care of the leak first, then we'll worry about her electricity." Mechanic C also told the dispatcher "I think it might be a burnout[7] somewhere…"

The residents of 80-46 informed Mechanic C that they had smelled gas in their living room and basement. In post-incident interviews, Mechanic C also said he detected slight gas odors

[6] At some point prior to 4:12 p.m., the resident had come outside to speak to him.
[7] A burnout refers to an electric cable failure.

inside. Mechanic C entered the residence with the CGI unit continuously sampling the atmosphere, and obtained no gas readings in the kitchen/foyer area or the basement. In the basement, Mechanic C checked the gas and electric points-of-entry (POE), located within close proximity to each other along the east-facing basement wall. The only positive gas reading obtained was 10% gas-in-air in the electric pull box. In post-incident interviews Mechanic C claimed to have no access to the sewer line POE due to ongoing flooring work in the basement. In a post-incident interview, the residents of house 80-46 stated that access to the sewer line was unobstructed and that the mechanic never asked about its location.

At 4:15 p.m. the dispatcher again contacted Mechanic D, and said "listen, when you are done with that, head over to 260th and 80th and give (Mechanic C) a hand. He's got 20% in two sewer heads, and a strong odor of gas in the area. He needs an assist." Mechanic D replied "I'm on my way."

At 4:16 p.m., Mechanic C informed the dispatcher of the 10% gas-in-air reading in the electric pull box, and asked "you got a crew and some guys helping me, right?" The dispatcher responded that another mechanic (D) was on the way, and that he was going to get a crew.

At 4:17 p.m. the dispatcher notified an ERF crew of the leak at 80-46 260th Street. The crew responded that "…it's going to be awhile, there's a lot of traffic and right now I'm on Shore Boulevard. I'll be there."

Meanwhile, Mechanic C resumed the outside leak investigation on 260th Street by going to his vehicle to check Byers[8] for the location of electric structures on the street. He

[8] Byers is the computer-based electric, gas and steam facility mapping system, which can be accessed from the company vehicle via a laptop.

then proceeded to check additional sewer manholes - two to the south and four to the north of the manholes he checked before entering house 80-46 - by inserting the CGI probe through openings in the manhole covers. Readings of 20% gas-in-air were detected in all the manholes tested. While doing so he briefly spoke to the roofing contractor working on the block, inquiring whether a dumpster was covering any sewer manholes, and verifying that it was not.

Mechanic C identified an electric service box (EMH-54080 on Figure 1) in the street, near the east curb-line, in front of house 80-53, with a solid cover (no access holes to take readings). Rather than prying the cover open, Mechanic C took barhole[9] readings nearby in the grass area just inside the east curb-line. He registered a 90% gas-in-air reading in that barhole, and two additional 90% gas-in-air readings in barholes 20 feet to the north and 20 feet to the south. He took one additional barhole reading 10-feet further south and registered 0.7% gas-in-air. He also obtained a 0.7% gas-in-air reading within a vented electric service box (EMH-53335 on Figure 1) located north of the solid covered electric service box. At this time (approximately 4:42 p.m.), he believed he had established the extent of the gas migration to the north and south.

At 4:33 p.m., Mechanic B called the dispatcher to request a high pressure inspection form. Con Edison's procedure[10] states that "a service regulator shall be inspected when it is newly installed, at the time of a periodic meter exchange, at the time of a turn-on due to an interruption, and at the time the gas service is reactivated after being inactive for a period of two

[9] A bar is used to drive a hole in the ground, into which the CGI probe is inserted.
[10] G-11838-10 High Pressure Gas Service Inspection.

years or more."[11] The dispatcher sends the form electronically and the mechanic completes it. The mechanic's request for this form was an indication that the turn-on was complete. The service regulator inspection was routine work that could have been set aside if necessary.

Mechanic C moved his vehicle to in front of house 80-50, and as he was checking Byers to determine which homes were served by the electric service box (EMH-54080), Mechanic D and a helper arrived on location at approximately 4:42 p.m. Mechanic C requested that they open the electric service box to take a gas reading. They did so and obtained an 80% gas-in-air reading. Mechanic C directed them to vent it by fully removing the cover.

At 4:48 p.m. Mechanic C had the following conversation with the dispatcher:

- Mechanic C: "We have a water main break right in the middle of the block too. I don't know if that has anything to do with the electric and the gas. But we have a water main break too."

- Dispatcher: "Is it an active one? Or is it past, present?"

- Mechanic C: "It's active. It's coming out of the block pretty damn good."[12]

Mechanic C stated that he noted from Byers that house 80-50 was served by the service box, and that he was just about to exit his vehicle to approach house 80-50 when the explosion occurred.

[11] 16 NYCRR 255.744(a) states "Each operator shall inspect each service regulator when it is installed, at the time of periodic meter change, and at the time a service which has been inactive for a period of two years or more is reactivated to service."
[12] This leak was determined to be a leak on a water service, well removed from and unrelated to the incident house.

After the Explosion

At 4:50:04 p.m. Mechanic C reported to the dispatcher:

> The house next door to 80-46 just took off. I got three houses involved. I need Fire Department now. I think the house is occupied.

All available mechanics and supervisors were dispatched to the site, in addition to the Fire Department. Mechanic B arrived at 4:54:43 p.m. and assisted Mechanic C and Mechanic D in isolating the gas main on 260th Street. Four valves were closed by 5:05 p.m., interrupting 21 customers on 260th Street. At 6:10 p.m. the gas main on 259th Street was also isolated by closing two valves, interrupting another 29 customers.

Fire responders arrived at 4:54 p.m. and together with Con Edison responders evacuated both 260th Street and 259th Street between 80th Avenue and 81st Avenue. DPS Staff was notified at 5:00 p.m. and arrived at approximately 5:50 p.m.

At 6:17 p.m., all sewer manholes were found to be gas free. At 7:25 p.m., electric crews completed the isolation of the electric supply on both affected streets. At 12:01 a.m. on April 25, electric service was restored to all customers on 259th Street and all customers on 260th Street except for the homes at 80-46, 80-50 and 80-54. All buildings on the affected blocks were rechecked to confirm that there was no gas present, and the evacuation ended at 12:18 a.m.

The gas services to the three damaged homes, 80-46, 80-50 and 80-54, and the section of gas main supplying these services, were pressure tested by Con Edison in the presence of the Fire Department and Staff. The tests on the service lines (from gas main to foundation wall) to houses 80-46 and 80-54 found no leakage. The gas service to house 80-50 had been damaged inside the foundation wall, either due to the explosion or the

subsequent fire-fighting and demolition activities. The section of service line from the main to the curb was pressure tested in place and held pressure.

An excavation over the gas main revealed that the conduit containing the electric service to house 80-50 was in close proximity to, and in contact with, the gas main (see Photo 1).

Photo 1 - Electric conduit in contact w/gas main

A dime-sized hole was found at the 12 o'clock position on the two-inch gas main, at a point where it passed directly under the two-inch steel electric conduit (see Photo 2).

Photo 2 - Hole in the gas main

The electric conduit had a corresponding hole in the 6 o’clock position where it crossed over the steel gas main (see Photo 3).

Photo 3 - Hole in electric conduit
Note: conduit had been cut out and turned over

Examination of the electric conduit and cable, in the area where it contacted the gas main, revealed indications of failure, with the cable melted in spots, and some of the insulation also completely melted off. Another area of damage to the electric conduit was found approximately 19 feet west (towards 80-50 260th Street) of the crossing of the electric conduit and gas main. The damage appeared consistent with contact during past excavation activities. The steel conduit was bent upward, and a coupling connecting two sections of conduit had been compromised by corrosion and conduit deformation.

Sections of the two-inch gas main, gas service to house 80-50, the two-inch steel electric conduit and the electric service cables supplying houses 80-46, 80-50 and 80-54 were recovered from the location for forensic analysis at an independent laboratory, Lucius Pitkin, Inc. (LPI).

Gas restoration efforts continued over the weekend of April 25 and 26. On Saturday the 25th, the gas main and all services to accessible buildings on 259th Street were restored. Services to locations that were inaccessible were cut and capped for safety. The mains and services were surveyed for leaks and none were found. On the 25th to 26th, approximately 635 feet of 1-1/4-inch plastic main was inserted into the two-inch bare steel gas main on 260th Street between 80th and 81st Avenues, and gas service was restored to all customers on 260th Street, except for houses 80-46, 80-50 and 80-54.

Review of Applicable Records

Gas Operations

Operator Qualifications / Drug Testing

The Operator Qualification records were reviewed for all GDS mechanics and ERF crews on duty in Queens at the time of the incident, which would include anyone who responded to the incident. All were found to be up-to-date and in compliance with 16 NYCRR §255.604. In addition, post-accident drug tests were administered in the evening of April 24th to Mechanic C, Mechanic D and the helper, in accordance with 16 NYCRR Part 262.105(b),[13] and no issues were found.

Leakage Surveys

Part 255.723 requires pipeline operators to perform leakage surveys of their distribution systems, in areas outside of business districts, every five years, or at three-year intervals if the operator employs leakage history to determine areas of active corrosion. Con Edison exceeds these requirements by surveying mains annually and services at three—year intervals.

Prior to the incident, the latest leakage surveys of the gas services and main on 260th Street had been conducted on May 15, 2007 and March 6, 2009 respectively, with no leaks found in the vicinity of the incident location.

A review of gas odor complaint records found that on July 13, 2007, Con Edison responded to an inside gas odor call at 80-54 260th Street. The responding mechanic found an inside house piping leak and turned off the gas at the meter. The mechanic

[13] *Post-accident test.* As soon as possible but no later than 32 hours after an accident, an operator shall drug test each employee whose performance either contributed to the accident or cannot be completely discounted as a contributing factor to the accident.

documented that the portion of the gas service visible inside the house, while not leaking, was notably corroded and should be replaced. On August 14, 2007 a partial replacement of the service line was performed. The service was copper from the main to the curb valve, and steel from the curb valve to the house. Only the steel portion was replaced, via insertion. However, the house piping still did not pass inspection. The gas was left off at the meter, and a post-incident inspection found it still in this condition.

Electric Operations

Records pertaining to the maintenance of the secondary electric facilities in and around the incident location were reviewed. These records consist of results of the manual stray voltage testing program, documentation of targeted inspections of underground electric structures, documentation of inspections conducted as part of routine work, and a review of emergency work.

The New York Public Service Commission's Electric Safety Standards [14] require the company to manually test electric facilities for stray voltage by making physical contact with streetlights and accessible utility facilities using specialized equipment. Con Edison's records indicate that no stray voltage was found on the service box from which 80-50 260th Street is supplied (EMH-54080) within the four years preceding this incident. In addition, no stray voltage was found on the streetlight connected to this service box or on the immediately adjacent service box (EMH-53335).

[14] See Case 04-M-0159 – Proceeding on Motion of the Commission to Examine the Safety of Electric Transmission and Distribution Systems.

The Electric Safety Standards also require the company to access and visually inspect all of its facilities at least every five years. Service box 54080 was last visually inspected on May 17, 2008, at which time "improperly sealed end caps" were found and corrected. The adjacent service box (EMH-53335) was last inspected October 25, 2005, in conjunction with scheduled maintenance, with no defects noted.

Documentation of emergency conditions was reviewed for the immediate vicinity of 80-50 260th Street for the five-year period preceding the incident. On March 16, 2009 there was a smoking structure condition at EMH-53335. The cause was determined to be a defective connector, which was replaced.

Discussion and Analysis

Applicable Gas Safety Regulations and Con Edison Procedures

The Commission's gas safety regulations are contained in 16 NYCRR Part 255 – Transmission and Distribution of Gas. This Part contains requirements that gas system operators, such as Con Edison, must conform with. It includes a requirement to prepare and file written procedures for responding to emergencies, such as gas detected inside or near a building. The sections of Part 255 that are relevant to the investigation of this incident are shown in Appendix A.

Con Edison has two written procedures relevant to these code requirements and this investigation – one for outside leaks and one for inside leaks. The relevant excerpts from the procedures in place at the time of the incident are included in Appendix B.

To assist in understanding the gas safety regulations and Con Edison's leak investigation procedures, some background on the properties and behavior of natural gas is provided here.

The explosive range of natural gas is a concentration of approximately 5% to 15% gas-in-air. Below and above that range, gas will not ignite. However, when a reading above the upper explosive limit (UEL) is found, it is possible that somewhere in the vicinity the gas-air mixture is within the explosive range. In addition, as the gas dissipates, the gas-air mixture must pass through the explosive range before it gets below the lower explosive limit (LEL). Natural gas is also lighter than air, meaning that it will rise into the atmosphere when freely venting. When leaking from a buried pipe, the rising gas will follow the path of least resistance. If it finds a path into subsurface structures, such as sewer and electric conduits, vaults, manholes, etc., it can migrate significant distances from the leaking sources, including into buildings connected to these subsurface structures. A gas company employee investigating an outside gas leak will not know the layout or paths of all the underground conduits, or which nearby buildings may have connecting migration paths. Con Edison's procedure for outside leak investigation includes the following for leaks judged to require immediate and continuous action to protect life and property until the condition is no longer hazardous: "Determining the migration of leaking gas into or near buildings and/or underground facilities"; and "Establishing a made-safe condition by venting enclosed spaces including removing manhole covers where gas is entering sewer or duct systems."

Receipt of Odor Report from 80-46 260th Street

While handling the gas odor report from the resident of 80-46 260th Street, the Customer Service Representative (CSR) obtained pertinent information, including the customer's name, phone number, address and cross streets. The CSR confirmed that

the customer was reporting an outside gas odor, asked several questions regarding the severity of the gas odor, and provided instructions on getting away from the area and avoiding ignition sources.

These questions and instructions are contained within a script delivered verbally by the CSR and they reflect actions routinely utilized in the industry to help protect life and property. Staff's review of the audio recording noted that the recital of the instructions by the CSR was cursory and failed to emphasize the potential hazards. The conversation turned to whether the customer could stand by to direct the responding Con Edison personnel to the area of the gas odor, and then included a period with the caller on hold while the CSR contacted the GERC. When the CSR returned to the caller, it seemed the earlier instructions were forgotten. The instruction to vacate the premise was not acknowledged and/or acted upon by the occupants of house 80-46. In addition, upon reviewing the audio-tape, Staff believes that an instruction to vacate the area, followed by a discussion about standing by to direct the responding crew to the area, could be contradictory and confusing.

Con Edison has made revisions to the scripts its CSR's use when taking gas leak/odor reports to emphasize the potential hazard and provide more detailed information to the caller. The revised script for outside gas odors states "this is a potentially hazardous condition. For your safety, you must leave the premises immediately and tell others to leave also. Get well away from where you suspect the gas is leaking and wait for the arrival of a trained mechanic who should arrive within 45 minutes. You should not do anything to create a spark that could cause an explosion, such as light a match, turn appliances or lights on or off, use a telephone or cell phone, ring a

doorbell or start a car." The script for inside gas odors is the same, but includes a statement to "open windows if possible" if the odor is described as faint. The revised procedures also require the CSR to notify 911 if the caller indicates they are unable to leave the premises without assistance.

Staff believes the script should be modified to have the CSR obtain a confirmation that the caller understands the instructions and intends to evacuate. If the caller does not answer affirmatively, the CSR should re-emphasize the hazard posed by the gas leak.

Staffing Levels and Availability of Personnel

As part of the investigation, Staff reviewed Con Edison's staffing levels in general and focused on the number of qualified Con Edison first responders available in Queens at the time of the initial leak call for 80-46 260th Street. Qualified first responders for gas leaks are generally pulled from Con Edison's GDS mechanic pools, but can also include specialized ERF crews, construction crews and supervisors. The GDS mechanics conduct routine service, operation and maintenance work such as gas turn-offs, reinstatement, meter installs, main valve inspections, etc. ERF crews are essentially two-person crews that can be utilized as first responders and are also equipped to perform gas leak repairs. Supervisors do spend time in the field checking on the personnel and assisting, where necessary, with problems that arise.

The review of staffing levels found that during the 3 p.m. to 11 p.m. shift in Queens there were typically one supervisor, four or five GDS mechanics and one ERF crew on duty. From November 15 through April 15 an additional ERF crew would be on

duty due to the historically busier workload during those months (e.g. more leak repairs).

The gas odor report from 80-46 260th Street was received at 3:34 p.m. on April 24, 2009, shortly after the shift change. At the time the Queens Division had four GDS mechanics and one ERF crew assigned to the 3 p.m. to 11 p.m. shift. However, due to the assignment of overtime work, and because some crews from the 7 a.m. to 3 p.m. shift were in transit returning to the College Point yard, there were actually 11 GDS mechanics and 2 ERF crews available at that time. In addition, further qualified resources were available from Con Edison's Construction Department, with one crew in eastern Queens, as well as a GDS supervisor.

Since the incident, Con Edison has made changes in staffing levels, including overlapping shifts and increasing the number of crews, mechanics and supervisory personnel on duty during certain shifts. See Appendix C for further details.

Dispatch of Qualified Personnel

The gas odor report at 80-46 260th Street was received in GERC at 3:36 p.m. The dispatcher first attempted to assign the 260th Street gas odor report to Mechanic A (at 3:45:47 p.m.), apparently because at the time he had no assigned work due to the postponement of service restorations he had been assigned to on 170th Street. The dispatcher's intent to contact Mechanic A had also been acknowledged by the supervisor. Mechanic A did not respond to several pages, and did not make contact with the dispatcher again until 3:58 p.m., after the 260th Street job had been assigned to Mechanic C. The GPS records indicate his vehicle remained stationary on 170th Street from 2:53 to 4:02 p.m. In a post-incident interview Mechanic A stated that during

the time the dispatcher was trying to reach him he had left his radio in the vehicle and was talking to plumbers on-site about the pending gas service restorations. The inability to contact Mechanic A for an extended period of time is of concern to Staff. Con Edison should take appropriate action to address this issue with the employee and review its policy regarding the ability to immediately contact all on-duty employees whose duties include responding to gas leak reports.

Given the lack of response by Mechanic A, the dispatcher then reached out to Mechanic B, who was close to 260th Street and 80th Avenue, restoring service to a customer. However, Mechanic B also did not respond to the initial pages. In post-incident interviews, Mechanic B indicated he had left his radio in the vehicle because it does not work inside building basements, where he was working at the time.

At the time of the incident, Con Edison did not have a specific policy requiring its personnel to have their radios on their persons at all times. It did have a policy about leaving radios unattended, but this was more for theft prevention. Staff finds it unacceptable that Con Edison did not have policies to ensure that personnel who are required to be available to respond to emergency situations have their communication devices with them at all times while on duty. Staff recommends that Con Edison institute such a policy. Since this incident Con Edison has verbally instructed its personnel to have radios with them at all times, and it intends to put the policy in writing and obtain employee signatures acknowledging that they have received and understood the instructions. Staff also recommends that Con Edison equip its personnel with communication devices that provide better coverage in “blind spots” such as basements. Con Edison is performing research and

testing to determine which manufacturers and models have the appropriate features and coverage.

With the lack of responses by Mechanics A and B, the dispatcher then reached out to Mechanic C. Based on a review of the GPS records, Staff estimates that sometime between 3:42 to 3:45 p.m., Mechanic C passed 170th Street heading east, making him closer to Floral Park than Mechanic A. The dispatcher made first contact with Mechanic C at 3:52 p.m., approximately 16 minutes after the odor report was received by dispatch, and officially assigned the 260th Street leak to him at 3:56 p.m.

Staff considered the 20 minutes from receipt of the leak report in GERC (3:36 p.m.) to the actual dispatch of a mechanic (C at 3:56 p.m.) to be unusual. Because Mechanic C had been driving east from College Point during the entire time the dispatcher was attempting to find a mechanic to dispatch to 260th Street, it is unlikely an earlier arrival time would have occurred if Mechanic C had been officially assigned sooner. However, during the initial minutes after receipt of the 260th Street gas odor report, the dispatcher was involved in several other calls. Some were relevant to this incident to the extent they involved selecting Mechanic A to assign to respond to the 260th Street call, and the dispatcher did indeed take a few seconds (3:45:47 to 3:45:51 p.m.) to try to reach Mechanic A. However, other calls pertained to routine assignments going on elsewhere in Queens. It was not until approximately 15 minutes had passed (at 3:51 p.m.), when the dispatcher attempted first to reach Mechanic B, and then Mechanic A for the second time, that he began to earnestly concentrate on assigning a mechanic to the 260th Street odor report. When he spoke to Mechanic C at 3:52 p.m., he noted “it’s 15 minutes old,” indicating that he was starting to become concerned about the delay.

Even though Mechanic B was physically the closest to 260th Street, the dispatcher (with a Supervisor's agreement) first went to Mechanic A because he had no work assigned at the time. This indicates that a bias may exist in favor of assigning emergency calls to who is free rather than who is close to the emergency situation. In addition, the dispatcher telling Mechanic B to "stay there," because of the issue with the customer, indicates a failure to apply a higher priority to emergency situations over routine work.

At the point in time where the dispatcher had the conversation with Mechanic B about possibly leaving Elkmont Avenue and the sick/upset customer (3:53:55 p.m.), Mechanic B claimed (in a post incident interview) that he would have needed approximately 15 minutes to secure his tools and equipment, which suggests that he would not have arrived at 260th Street any sooner than Mechanic C actually did. However, Staff notes that if, instead of Mechanic A, the dispatcher had first attempted to reach Mechanic B at 3:45:47 p.m., or even sooner if he had not been involved in unrelated calls, Mechanic B might have been at a point in the job that would take less time to secure his tools and equipment, and therefore able to respond to 260th Street sooner than Mechanic C. This requires an assumption that Mechanic B would have heard his radio.

At 4:10 p.m. the dispatcher and Mechanic D had a conversation in which Mechanic D requested a meter exchange form, the dispatcher indicated he was sending it, and Mechanic D replied "Alright I fill this out, I'll send it back. … I'll take my 10." At 4:12 p.m. Mechanic C made his first on-site report from 260th Street to the dispatcher, reporting the strong gas odor on the block and the 20% gas readings in sewers. At this time he also requested help to check houses as well as a crew. At 4:15 p.m. the dispatcher again spoke to Mechanic D, saying

"listen, when you're done with that, head over to 260th Street and 80th Avenue and give … a hand…" Mechanic D responded "I'm on my way." In post-incident interviews the dispatcher claimed not to remember what Mechanic D was doing when he said "done with that." As discussed previously, Staff interpreted "on my 10" or "take my 10" to refer to taking a break, and accordingly understood "done with that" to refer to Mechanic D's break. Con Edison claims the mechanic was referring to a "signal 10" which means returning to the reporting location (College Point in this case), and the dispatcher's "done with that" comment referred to completing the meter exchange form. Regardless of how "done with that" is interpreted, the dispatcher's comment suggests that emergency response is not given higher priority than routine matters.

At 4:17 p.m. the dispatcher assigned an ERF crew to respond to 260th Street This crew expressed concerns about traffic. The dispatcher did not have further contact with this crew on their progress towards 260th Street. Staff believes the dispatcher should have monitored the crew's progress and/or sought other resources to send to 260th Street.

At 4:33 p.m. Mechanic B contacted the dispatcher to request a high pressure inspection form. As explained above, the request for this form was an indication that the turn-on work at Elkmont Avenue was complete. By this time, the dispatcher had already sent Mechanic D and the ERF crew (4:15 p.m. and 4:17 p.m. respectively) to assist Mechanic C at 260th Street, but the ERF crew had expressed concerns about traffic and travel time. Since Mechanic B was a short distance from 260th Street and since his request for an inspection form should have signaled the dispatcher that his work was apparently complete except for completing forms, the 4:33 p.m. conversation was an opportunity to send Mechanic B to assist Mechanic C. This is another

example of the dispatcher not giving the emergency situation at 260th Street a higher priority than routine matters.

The issues discussed above indicate that improvements are needed in Con Edison's policies and procedures for dispatching personnel to emergencies to give higher priority to emergencies as compared to routine matters. For example, there should be a means for dispatchers to filter out unrelated calls while attempting to deal with an emergency, such as asking other dispatchers in the GERC to assist with routine calls, alerting a GERC Supervisor that assistance is needed in dispatching a mechanic, etc. In addition, Con Edison should review its policies for determining which mechanic(s) are dispatched to emergencies based on assigned work versus location. For example, the company should perform an analysis of the approach of having personnel strategically placed throughout the territory during each shift who are assigned routine work that can be set aside if an emergency arises. Staff recommends that the company conduct an analysis of its operations in these areas, and provide the analysis and results to the Department with a description of recommended changes.

Actions of the First Responder (Mechanic C)

This section of the report will examine in more detail the actions of Mechanic C in relation to Con Edison's inside and outside leak investigation procedures (see Appendix B). Since this originated as an outside leak/odor call, procedure G-11809-24 would have applied upon arrival at the scene. However, during the course of the investigation, the procedure for inside investigations (G-11837-19) would have been invoked as well.

Upon arriving at 260th Street at 4:05 p.m., Mechanic C noticed a strong odor of gas, and commenced an outside leak

investigation registering readings of 20% gas-in-air in two sewer manholes (Type 1 leak conditions, per G-11809-24 paragraph 10.1(D) include “Any reading of 4% or more on a leak detection device in a manhole, vault or catch basin…”). Within minutes of arrival, he recognized that additional resources were needed and appropriately contacted the dispatcher to request support (see G-11809-24 paragraph 6.2 “Gas leaks found by Company forces qualified in Outside Leak Investigation/Classification shall be reported to the Gas Emergency Response Center (GERC) as follows: A. For Type 1… leaks: As soon as practical.”). He then entered house 80-46 and registered 0% gas in the free air and 10% gas in the electric pull box. He again notified the dispatcher of his findings, and again requested additional support.

Mechanic C did not check the sewer POE while inside house 80-46 in accordance with G-11809-24 paragraph 6.7 (“When a leak investigation leads inside to the basement, check all POE’s in the vicinity of the outside readings.”). As mentioned previously, in post-incident interviews Mechanic C claimed to have no access to the sewer POE due to ongoing flooring work in the basement, but the residents stated that access was unobstructed and that the mechanic never asked about its location. Mechanic C had already obtained positive gas readings in sewer manholes in the street, and noticed an odor of gas inside house 80-46. Had he checked the sewer POE in the basement of 80-46 and obtained positive readings, it should have prompted him to check adjacent buildings in accordance with G-11837-19 paragraph 5.3(B) (“Check adjacent and adjoining buildings or other buildings in the vicinity, where appropriate, for entry of gas”).

Upon exiting house 80-46, Mechanic C checked Byers for the location of electric structures on the street. However, he did not at this time determine which buildings were connected to the

electric subsurface structures in accordance with G-11809-24 paragraph 6.5 (“Any gas leak in a manhole, sewer manhole or in an electric manhole/service box must be investigated for gas migration into adjacent/connected manholes/service boxes and buildings. Check Byers or contact the GERC to determine buildings and subsurface structures (SSSs) connected to electric SSSs”).

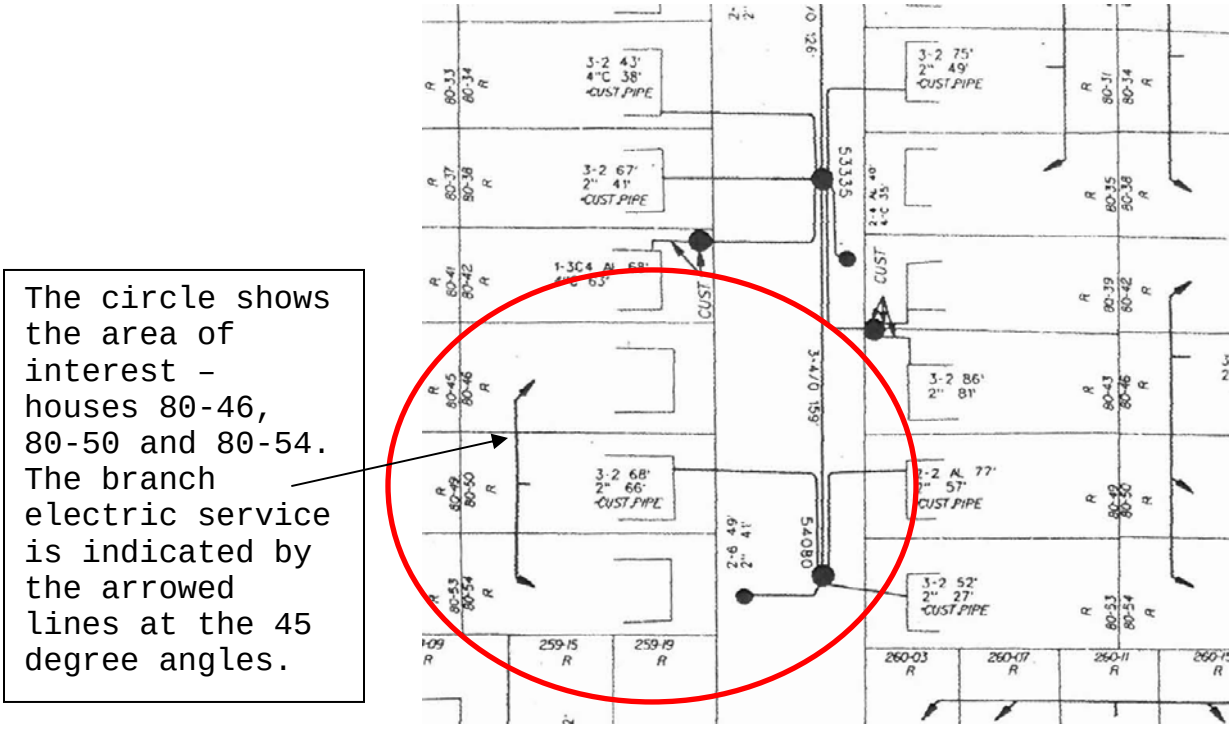

Figure 2 - Byers Image of Electric Facilities on 260th Street

Had he done so, he would have determined that the electric service to house 80-46 branched from house 80-50, as did the service to house 80-54. As shown in Figure 2, information on the service boxes and connections to buildings are shown on the same screen in Byers. Since these three buildings shared a common electric conduit, and since a positive gas reading had been found in the electric pull box in house 80-46, this would have prompted the mechanic to check the interior of those homes

(80-50 and 80-54) in accordance with G-11837-19 paragraph 5.3(B).

As a result of this incident, Con Edison has implemented a procedure whereby GERC will access Byers and provide guidance to field crews regarding buildings and structures connected through subsurface electric facilities, in order to allow the responders to devote their time to performing the investigation. Staff believes this procedure should be further enhanced by specifying that GERC have this information early in the dispatching process, so that it is available to the responder upon arrival at the scene. This would enable the first responder to more quickly understand the layout of underground facilities in the area, and identify buildings that should be checked for possible gas migration.

Staff also believes that Con Edison's leak investigation procedures should be enhanced to provide better clarity and direction regarding which and how many buildings on both sides of the street adjacent to a manhole in an urban setting will be checked in the event of positive gas readings found within a subsurface structure.

Based on his training and experience, and confirmed by his comments to the dispatcher noted above, including "I'm going to need some help down here checking some houses" and "I'm going to check further. I got a nice leak here. You got a crew and some guys helping me right?" Mechanic C was aware of the need to check the interior of other homes.

However, rather than checking inside other buildings upon exiting house 80-46, Mechanic C spent approximately 26 minutes[15] checking for gas readings in additional sewer manholes in the

[15] Calculated from the time he notified the dispatcher of the 10% gas reading in house 80-46's pull box (4:16 p.m.) to the arrival of Mechanic D (4:42 p.m.).

street, and taking barhole readings in the vicinity of an electric service box with a solid cover. In post-incident interviews Mechanic C stated that his reasoning was that he needed to establish the extent of the gas migration, and he expected that the additional personnel who were on the way would assist in checking buildings.

Another area of concern to Staff is that Mechanic C did not take any action to ventilate manhole structures as required by Procedure G-11809-24 paragraphs 6.8 ("…immediate and continuous action to protect life or property until the condition is no longer hazardous. Actions shall include: "(B) establishing a made-safe condition by venting enclosed spaces, including removing manhole covers where gas is entering sewer or duct systems) (sic), sealing points off gas entry and shutting of gas service, if appropriate."

In post-incident interviews, Mechanic C was asked why he did not open any manhole covers. He stated that he did not do so because one was under a car, and he had no means to safely secure the others because his vehicle did not carry barricades or waffles.[16] He contended that he expected that the additional personnel he requested would assist with ventilating the manholes once they arrived.

Mechanic C did have four traffic cones in his vehicle, which at the time was the minimum number required to be carried. At the time, company procedures did not require mechanics to carry a minimum number of waffles or barricades in their vehicles. Mechanic C did have a device that enables a single person to lift a manhole cover with minimal effort in his vehicle. At the time of the incident, these devices were available to mechanics but company procedures did not require

[16] Waffles are grates that are placed over open manholes for pedestrian and vehicle safety.

the devices to be carried in the vehicles. The alternative means of removing manhole covers would have been hooks and pry bars, which require more manual effort.

Since this incident, Con Edison has changed its procedures to require Mechanic vehicles to be equipped with the manhole cover lifting device and at least four cones, two waffles and two barricades. In addition to this, Staff recommends that Con Edison create a first responder checklist of required tools and equipment, including but not limited to those mentioned in this report such as radios, cones, waffles, barricades and manhole cover lifting devices, etc. The list should be reviewed and updated as needed, and the company should periodically verify that all mechanics are properly equipped.

Staff believes that with four cones, Mechanic C could have secured at least one sewer manhole, allowing him to remove a sewer manhole cover. Since the sewers were connected, this would have had a beneficial effect in ventilating them. The decision of Mechanic C not to pry open the solid electric service box cover to obtain gas readings and/or remove sewer manhole covers to ventilate is of concern to Staff. Further investigation revealed that this individual had been on medical leave from December 15, 2008 until March 29, 2009. He returned to work, on restricted duty, on March 30, 2009. The restrictions were that he could only occasionally push, pull or lift up to 10-20 pounds and he was not to drive a commercial vehicle. These restrictions were removed on April 17, 2009.[17]

[17] When returning to duty from medical leave, the employee's personal doctor completes a Con Edison form that indicates whether the employee may return to full or restricted duty. Con Edison's doctor reviews the records and assesses whether the employee can return to duty, and if so, with what restrictions. Staff's investigation confirmed that these procedures were followed.

He stated in post-incident interviews that he was experiencing no physical restrictions on the day of the incident.

Staff believes that the GDS mechanic exercised poor judgment by focusing on determining the outside gas migration pattern rather than implementing the provisions of the procedures more critical to the protection of life and property. As discussed above, while inside house 80-46, he failed to check for gas at the sewer POE. In addition, after exiting house 80-46 and informing the dispatcher of the 10% gas reading in the electric pull box (at 4:16 p.m.),[18] he did not check Byers to determine the routing of the electric service to 80-46.[19] Either of these actions should have prompted checking adjacent buildings, especially when factoring in the information already gathered: strong odor of gas in the street; the 20% gas-in-air readings in sewer manholes in the street; slight odor of gas inside house 80-46; and the 10% gas reading in the electric pull box in house 80-46.

The leak investigation procedures are not considered step-by-step, ordered instructions. When combined with appropriate operator qualified training, experience and knowledge of the behavior and properties of natural gas, the procedures provide the necessary instructions enabling the responder to investigate the leak call, take the steps needed to protect life and property, and mitigate the immediate hazard. The responders assess the situation and implement the appropriate sections of the procedures to investigate and mitigate the hazard while ensuring the protection of life and property. The procedures that were in place at the time of the incident were adequate and

[18] Even before entering house 80-46, he had told the dispatcher at 4:12 that he suspected an electric burnout somewhere.
[19] He did check Byers, but for the purpose of identifying gas and electric structures on the street, not for determining which houses were supplied by specific structures.

contained the necessary information for the first responder to react appropriately. Although the investigation began as an outside leak investigation, Section 6.7 of the outside leak investigation procedure (G-11809-24) states that "Any indication/reading of gas found inside a building shall require *immediate and continuous action until the hazard is eliminated* (refer to Specification G-11837)." (emphasis added). Specification G-11837 is the procedure for inside leak investigations. Although the procedure is not step-by-step instructions, the italicized language elevates the condition of an indication/reading of gas inside a building, as was the case in house 80-46. It then cross-references Specification G-11837, which contains requirements for checking adjacent and adjoining buildings (Section 5.3(B)) and evacuation of buildings when gas readings in the general atmosphere cannot be quickly brought down below 0.5% (Section 5.3(C)). The 10% gas-in-air reading in the electric pull box of house 80-46 should have triggered application of the provisions of Procedure G-11837 requiring checking adjacent and adjoining buildings. Based on Staff's investigation, the first responder did not follow these procedures. However, evacuation of house 80-46 was not required because the 10% gas reading was not in the general atmosphere.

Failure Mechanism of Steel Gas Main

The following gas and electric facilities were recovered from the incident site and sent to the laboratory of Lucius Pitkin, Inc. (LPI) an independent failure analysis engineering consultant, for analysis:

- A 33-inch section of the two-inch, high pressure gas main
- The gas service line supplying 80-50 260th Street

- The two-inch steel electric conduit
- The electric service cables supplying 80-46, 80-50, and 80-54 260th Street.

Damage to the electric conduit was found approximately 19 feet west (towards 80-50 260th Street) of the crossing of the electric conduit and gas main (see Photo 4).

Photo 4 – Electric conduit and cables 19 feet from gas main crossing
Note: taken at LPI facility

The damage appeared consistent with contact during past excavation activities. The steel conduit was bent upward (see Photo 5), and a coupling connecting two sections of conduit had been compromised by corrosion and conduit deformation (see Photo 6).

Photo 5 – Bend in Electric Conduit
Note: taken at LPI Facility

Photo 6 – Damaged conduit and coupling 19 feet from gas main crossing
Note: taken at LPI facility

The gas main was found to be in good condition, with no corrosion, and suitable for high pressure gas service.

LPI's preliminary[20] determination is that a fault in the electric service cables most likely originated in the area where the conduit was damaged (near the west curb line), causing fault current to flow into the steel electric conduit and arc onto the two-inch gas main at the point where they crossed. The arcing created holes in both the electric conduit and the gas main. The arcing also caused localized damage to the insulation and one conductor of the electric service cables. Once the arc created the hole in the gas main, the escaping gas migrated through routes in the soil and subsurface facilities, ultimately accumulating in the house at 80-50 260th Street.

In areas unaffected by the original fault or the arcing, the electric service cables were in acceptable condition, adequate for electric service to the homes.

Staff expects that these preliminary determinations will be confirmed by the laboratory testing, and therefore the delay in laboratory testing has minimal impact on Staff's investigation. Staff also expects that the testing will indicate that the burn through of the steel gas main, from the electric arcing, occurred fairly rapidly (i.e. within a few hours at most). In a post-incident interview a resident of 80-46 260th Street stated that she noticed no gas odor when leaving the house the morning of April 24, 2009, which further supports the likelihood that the leak originated a short time prior to the incident.

The fact that the resident of 80-46 260th Street reported that half the lights were out in the house, prior to reporting the outside gas odor, also supports the preliminary determination that a fault in the electric service cables was

[20] Laboratory testing has been delayed due to pending litigation, until various involved parties reach agreement on matters such as testing protocols, schedules, who will observe the testing, etc.

involved. Staff recommends that Con Edison implement a process to identify reports of electric and gas problems at approximately the same time in close geographic proximity. As a result of this incident, Con Edison has implemented such a process and revised its procedures so that additional company personnel and the Fire Department will be immediately dispatched in such situations.

Con Edison Construction Management records indicate that the electric and gas facilities on 260th Street were exposed in 1987 as part of a water and sewer main installation project. The electric and gas services on 260th Street were exposed a second time in 2000, when the roadway was excavated to a depth of approximately five feet by an independent contractor reconstructing the roadway. The damage to the electric conduit closer to 80-50 260th Street could have occurred during either of these construction projects. Similarly, the gas and electric facilities may originally have had adequate clearance but may have been left in a condition of inadequate clearance during either the 1987 or 2000 construction projects. The records do not indicate whether the gas and electric crossing location (on the east side of the street) was exposed during either of these projects, and if so, if Con Edison had an opportunity to observe it.

Separation of Facilities

Current Gas Safety regulations, 16 NYCRR Part 255, as well as the current National Electric Safety Code (NESC) have requirements regarding the separation of facilities.

Paragraph 255.325(b) of the Gas Safety regulations requires that “each distribution main shall be installed with at least 6 inches of clearance from any other underground structure to

allow proper maintenance and to protect against damage that might result from proximity to other structures. If this clearance cannot be attained, the main may be installed with a minimum clearance of 2 inches, provided the main is suitably protected from damage that might result from the proximity of the other structure."

Section 320(b)(5) of the NESC states that "conduit should have sufficient separation from gas and other lines that transport flammable material to permit the use of maintenance equipment."

The gas main and electric service conduit were installed in 1950 and 1951 respectively. The gas safety regulations were originally adopted in 1952, but did not include clearance requirements until some time later. The NESC rule quoted above was adopted July 20, 1973.

Con Edison Electric Distribution Engineering has a construction specification which provides minimum clearance/separation between gas facilities and other subsurface structures and facilities. The specification, E0-5570 titled TYPICAL GAS MAINS AND ELECTRIC SUBWAY INSTALLATION was originally implemented in June 1950. At that time, it did not address separation of gas and other facilities. The current version of this specification (December 1990) states:

> Minimum clearances from any pipe or subsurface structure not directly associated with the gas main shall be as follows:
> 12" for gas mains operating at or greater than 125 psi
> 6" for gas mains operating at less than 125 psi
> Contact Division Gas Engineering Departments for gas main pressure and if clearances cannot be maintained.

Con Edison Gas Operations was not in the practice of documenting discovered instances of insufficient clearance. Staff's understanding is that when Con Edison personnel discover

instances of insufficient clearance, they either correct it to achieve adequate separation, or insert a protective board between the facilities. However, these actions were not documented in the past. Staff recommends that such activities be documented in the future. Going forward, Con Edison has reinforced with construction crews the need for installation of protective boards when inadequate clearance is discovered between gas and electric facilities, and will require documentation of such locations. In addition to this, Staff recommends that when exposed electric conduit is found in a deteriorating condition, proximity to gas facilities should make it a priority for replacement.

Recommendations

Staff makes the following recommendations:

Customer Service Representative (CSR) Scripts

Con Edison should modify the script used by CSR's when handling gas leak/odor reports to have the CSR obtain a confirmation that the caller understands the instructions and intends to evacuate. If the caller does not answer affirmatively, the CSR should re-emphasize the hazard.

Ability to Contact Personnel

Con Edison should take appropriate action with Mechanic A to address the inability of the dispatcher to reach him because he had left his radio in his vehicle, and review and revise, as necessary, its policies regarding the ability to immediately contact all on-duty employees whose duties include responding to emergency situations, including provisions that such personnel have their communication devices with them at all times while on

duty. Con Edison should also equip its personnel with communication devices that provide better coverage in "blind spots" such as basements.

Dispatching Policies and Procedures

Con Edison should conduct an analysis of its policies and procedures for dispatching personnel to emergencies with emphasis on giving higher priority to emergencies than to routine matters. The analysis should examine, but not be limited to, the issues discussed earlier in this report such as minimizing distractions due to unrelated routine calls, and balancing employee proximity to the emergency versus routine matters. For example, the company should perform an analysis of the approach of having personnel strategically placed throughout the territory during each shift who are assigned routine work that can be set aside if an emergency arises. The company should respond in writing to the Department providing its analysis and results and a description of recommended changes.

Identification of Buildings Connected to Subsurface Structures

Con Edison should enhance the procedure by which GERC will access Byers to identify buildings and structures connected through subsurface electric facilities and provide guidance to field crews, by specifying that GERC have this information available early in the dispatching process, so that it is available to the responder upon arrival at the scene.

Leak Investigation Procedures

Con Edison should add provisions to its leak investigation procedures to provide better clarity and direction regarding

which and how many buildings on both sides of the street adjacent to a manhole in an urban setting will be checked in the event positive gas readings are found within subsurface structures.

Equipment

Con Edison should create a first responder checklist of required tools and equipment, including but not limited to those mentioned in this report such as radios, cones, waffles, barricades and manhole cover lifting devices, etc. The list should be reviewed and updated as needed, and the company should periodically verify that all mechanics are properly equipped.

Combined Gas and Electric Events

Con Edison should implement a process to identify reports of electric and gas problems at approximately the same time in close geographic proximity. In such situations, additional company personnel and the Fire Department will be immediately dispatched.

Electric and Gas Facility Separation

Con Edison should document discovered instances of insufficient clearance between facilities, and the actions taken to correct the situation.

Facilities Replacement

Con Edison should make proximity to gas facilities a priority for replacement when exposed electric conduit is found in a deteriorating condition.

Con Edison has implemented many of the above enhancements to its policies and procedures as a result of the lessons learned in the investigation of this incident, some based on input and discussion with Staff (see Appendix C for a summary).

Conclusion

As a result of the lessons learned from this incident, many procedure and policy enhancements have been implemented by Con Edison. In addition, Staff makes several recommendations for improvements in Con Edison's gas leak/odor response procedures.

Staff's investigation and analysis identified several issues involving receipt of the gas odor report and the dispatching process. These procedural enhancements provide for identifying situations that require enhanced emergency response, and quickly getting more personnel on the scene to investigate, vent subsurface structures, and check and evacuate nearby buildings if necessary. Rather than having the first company responder arrive, assess the situation, and then call for assistance, the revised procedures get more personnel on the scene sooner to perform the actions necessary to protect life and property. The revised procedures call for dispatch of additional personnel (Con Edison and/or FDNY) based on reported conditions such as: a strong gas odor from emergency responders; two or more gas leak/odor reports in close proximity; or electric and gas trouble reports in close proximity. The revised procedures also emphasize that checking buildings and ventilating subsurface structures take priority over establishing the outside gas migration pattern.

Staff believes that the leak investigation procedures in place at the time of the incident were adequate and had the necessary information for the first responder (Mechanic C) to

react appropriately. However, Mechanic C failed to follow several important provisions of the procedures. The basic criticism of Mechanic C's actions is that after observing a strong gas odor upon first turning onto 260th Street, obtaining positive gas readings within outside sewer manholes and the electric pull box inside house 80-46, and contacting the dispatcher for assistance, he then spent approximately 26 minutes concentrating on establishing the outside gas leakage migration pattern rather than following other provisions of the procedures more critical to protecting life and property.

After noticing a slight inside gas odor and obtaining the 10% gas-in-air reading in the electric pull box inside house 80-46, he failed to check adjacent and adjoining buildings for entry of gas in accordance with G-11837-19 Section 5.3(B).

Also after obtaining the 10% gas-in-air reading in the electric pull box in house 80-46, and considering that he had already expressed suspicion of an electric burnout, he failed to check Byers or contact GERC to determine buildings and subsurface structures (SSS) connected to electric SSSs in accordance with G-11809-24 Section 6.5.

While inside house 80-46, he failed to check the sewer POE in accordance with G-11809-24 Section 6.7. In post-incident interviews he claimed no access to the sewer POE due to the flooring work in the basement. The residents stated that access was not obstructed and the mechanic never asked about its location.

The 20% gas-in-air readings obtained in the sewer manholes upon first arrival constituted a Type 1 leak condition according to G-11809-24 Section 10.0(D). Section 6.8(A) of G-11809-24 requires "determining the migration of leaking gas into or near buildings and/or underground facilities" in the case of Type 1 leak conditions.

Mechanic C did not enter any buildings other than house 80-46. Following any one or combination of the procedure sections cited above would have led him to check inside house 80-50. Section 5.3(C) of G-11837-19 would have required evacuation for any inside reading that could not quickly be brought below 0.5% gas-in-air.

Also in the event of Type 1 leak conditions, Section 6.8(B) of G-11809-24 requires “establishing a made-safe condition by venting enclosed spaces, including removing manhole covers where gas is entering sewer or duct systems.” Mechanic C did not remove any manhole covers to ventilate.

Appendix A

Excerpts from 16 NYCRR Part 255 Transmission and Distribution of Gas

255.603 – General Provisions
(b) Each operator shall prepare and file a detailed written operating and maintenance plan for complying with all the provisions of this Part…
(d) Each operator shall satisfactorily conform with the program submitted.

255.615 – Emergency Plans
(a) Each operator shall establish written procedures to minimize the hazard resulting from a gas pipeline emergency. At a minimum, the procedures must provide for the following:

(1) receiving, identifying, and classifying notices of events which require immediate response by the operator;
(3) prompt and effective response to a notice of each type of emergency, including the following:
(i) gas detected inside or near a building;
(4) the availability of personnel, equipment, tools, and materials, as needed at the scene of an emergency;
(5) actions directed toward protecting people first and then property;
(7) making safe any actual or potential hazard to life or property;

255.811 – Leaks: Type 1 Classification
(a) A Type 1 leak is one which, due to its location and/or relative magnitude, constitutes a potentially hazardous condition to the public or buildings.
(b) A Type 1 leak requires an immediate effort to protect life and property.
(c) Continuous action shall be thereafter taken until the condition is no longer hazardous.
(e) Type 1 leaks include, but are not limited to:

(2) any indication on a combustible gas indicator (CGI) of natural gas entering buildings or tunnels;
(3) any reading on a CGI within five feet of a building wall;
(4) any reading of four percent or greater gas-in-air on a CGI within manholes, vaults or catch basins

(sampling will be conducted with the structure in its normal condition as nearly as physically possible); or (5) any leak which, in the judgment of the operating personnel at the scene, is regarded as potentially hazardous.

Appendix B

Excerpts from Con Edison Leak Investigation Procedures

G-11809-24 PROCEDURE FOR OUTSIDE GAS LEAK REPORTING, CLASSIFICATION, SURVEILLANCE, REPAIR AND FOLLOW-UP INSPECTION

6.0: **REPORTING AND RESPONDING TO GAS LEAKS**

6.1: Any report of a gas leak, gas odor or damage to facilities from the public, either from outside sources or from Company personnel shall be responded to promptly by qualified personnel.

Based upon the severity of the condition described by outside sources (e.g. Fire Department) or Company personnel, additional qualified personnel shall be dispatched by the Gas Emergency Response Center (GERC) to the reported location. (Added as per PSC Case 08-G-0415)

6.2 Gas leaks found by Company forces qualified in Outside Leak Investigation/Classification shall be reported to the Gas Emergency Response Center (GERC) as follows:

A. For Type 1 and 2M leaks: As soon as practical.

6.5: Any gas leak in a manhole, sewer manhole or in an electric manhole/service box must be investigated for gas migration into adjacent/connected manholes/service boxes and buildings. Check Byers or contact the GERC to determine buildings and subsurface structures (SSSs) connected to electric SSSs. Refer to Section 12.0 for buildings and subsurface structures with suspected gas migration that cannot be accessed.

Note: If gas readings are found in Con Edison SSSs by the FD or other agency prior to arrival of Company personnel, the GERC shall provide the location of connected buildings and SSSs to those agencies when requested. (Added as per PSC Case 08-G-0415)

When access can not be made to buildings with suspected gas migration, request assistance from the Fire/Police Departments to gain access. Continue investigation of connected manholes and service boxes until readings of 0% gas are obtained. Establish the complete migration pattern, which includes areas outside the manholes, service boxes, etc. (e.g. behind curb

lines). All work performed during the investigation shall be shown on the LHR. This includes documenting subsurface structures within the migration pattern regardless of whether a 0% reading is obtained. If the investigation involves several leaks, separate ticket numbers and LHR may be issued.
In the event of a broken cast iron main or other serious leak conditions, there are subsurface structures with suspected gas migration that cannot be accessed. Every attempt shall be made to gain access. This may include using go-jacks to move vehicles, requesting additional company resources for assistance, installing an air mover on an adjacent subsurface structure, or excavating a vent hole to remove the hazard. If necessary, additional assistance from Police or Fire Departments shall also be requested. In the event that this requested, assistance is unavailable or slow to respond, every possible effort shall be made to remove the hazard. (Added as per PSC Case 08-G-0415)

6.6: Preliminary steps to be taken when responding to a reported gas leak are as follows:

A. Report the time of arrival at the location of reported leak to the GERC as soon as practical.

B. Zero out the Leak Detection Device in a non-gaseous atmosphere.

C. If possible, learn the nature of the problem from the caller.

D. Do not operate any electrical switches, including doorbells.

6.7: Any indication/reading of gas found inside a building shall require immediate and continuous action until the hazard is eliminated. (Refer to Specification G-11837). When a leak investigation leads inside to the basement, check all POE’s in the vicinity of the outside readings.

6.8: A qualified Company representative shall “stand by” Type 1 leaks (see Section 10.0) which are judged to require immediate and continuous action to protect life or property until the condition is no longer hazardous. Actions shall include:

A. Determining the migration of leaking gas into or near buildings and/or underground facilities.

B. Establishing a made-safe condition by venting enclosed spaces, including removing manhole covers where gas is entering sewer or duct systems), sealing points of gas entry and shutting off gas service, if appropriate.

C. Evacuating buildings when gas readings in the general atmosphere cannot be quickly brought down below 0.5%. Request assistance from the Fire Department, if necessary. (Added as per PSC Case 08-0415)

Note: For multi-family or large commercial buildings, evacuate the affected area(s) when gas readings in the general atmosphere cannot be quickly brought down below 0.5%. Request assistance from the Fire Department, if necessary. (Added as per PSC Case 08-G-0415)

D. Report information and actions taken to the Supervisor, to the GERC and the relieving crew.

Note: When Company personnel and the Fire Department (or other agencies) respond to the location of a reported gas leak or odor, they shall exchange specific information regarding buildings and other structures investigated for the presence of gas and the severity of the findings. (Added as per PSC Case 08-G-0415)

E. Request continued assistance from the Fire Department or other agencies (if already on location) as long as needed to protect the safety or residents, the public, Company personnel, other responders and property until the full extent of the leak hazard has been assessed and the situation has been made safe. (Added as per PSC Case 08-G-0415)

F. Request assistance from additional Company forces via the GERC if gas readings are found in multiple subsurface structures or buildings and cannot be quickly reduced or eliminated. (Added as per PSC Case 08-G-0415)

G. Request assistance from the Fire Department (if not already on location) to evacuate buildings if atmospheric readings that cannot be quickly reduced to below 0.5%, or eliminated are found in multi-family buildings or atmospheric readings are found in more than one building. (Added as per PSC Case 08-G-0415)

H. Periodically check buildings and SSSs where gas readings have been found and not immediately eliminated. (Added as per PSC Case 08-G-0415)

I. In the event of a broken cast iron main or other serious leak condition, periodically check buildings and SSSs in the area, as conditions can rapidly change. This includes checking buildings and SSSs where no gas readings were originally found. (Added as per PSC Case 08-G-0415)

10.0: **TYPE 1 LEAKS**

10.1: A Type 1 leak is one which, due to its location and/or relative magnitude, constitutes a potentially hazardous condition to the public or buildings. A Type 1 leak requires an immediate effort to protect life and property. **Immediate and continuous** action shall be taken until the condition is no longer hazardous. Once the hazard is removed, completion of repairs shall be scheduled on a regular day-after-day basis, **or** the condition kept under daily surveillance until the source of the leak has been corrected. Type 1 leaks include, but are not limited to:

A. A leak resulting from contractor or outside source damage to a service or main shall require access to investigate the affected building(s). Immediate and continuous action shall be taken to check for gas leakage/migration from the damage. There is a possibility of multiple leaks and the underground migration of gas into nearby buildings including the possibility of broken pipes in foundation walls or basements due to the force of the damage. Establish the complete migration pattern. Test Point shots shall encompass the point of damage for main and service lines to ensure no leak migration has occurred and document all findings on LHR. For the damage to a service refer to OJT GAS0139.

B. Any indication on a Leak Detection Device of gas entering a building or a tunnel.

C. Any reading on a Leak Detection Device within 5 feet of a building wall (including buildings with basements vaulted to the curb). A check at the outside

foundation wall is required and shall be documented as a protection test point on the LHR.

D. Any reading of 4% or more on a Leak Detection Device in a manhole, vault, or catch basin. Sampling shall be conducted with the structure in its normal condition (as nearly as physically possible).

E. Any leak which in the judgment of qualified personnel at the scene is regarded as potentially hazardous.

F. If, during an investigation, a condition is found which in the opinion of the qualified personnel may require immediate attention, they are to take appropriate action and notify their supervisor as soon as possible.

G-11837-19 PROCEDURE FOR THE INVESTIGATION OF AN INSIDE GAS LEAK OR ODOR CALL AND ISSUANCE OF A WARNING TAG

5.0: **REPORTING AND RESPONDING TO GAS LEAKS**

5.1 Any report of a gas leak of odor complaint shall be responded to promptly by qualified personnel.

Based on the severity of the condition described by outside sources (e.g. Fire Department) or Company personnel, additional qualified personnel shall be dispatched by the Gas Emergency Response Center)GERC) to the reported location. (Added as per PSC Case 08-G-0415)

5.3: Any indication of gas or odor found inside a building shall be given immediate and continuous attention until the hazard is eliminated. Where appropriate:

A. Establish a made-safe condition by venting enclosed spaces, sealing points of gas entry, shutting off gas service, and verifying that gas is no longer entering building piping:

B. Check adjacent and adjoining buildings or other buildings in the vicinity, where appropriate, for entry of gas:

C. Evacuate buildings when gas readings in the general atmosphere cannot be quickly brought down below 0.5%. Request assistance from the Fire Department, if necessary. (Added as per PSC Case 08-G-0415)

Note: For multi-family or large commercial buildings, evacuate only the affected area(s) when gas readings in the general atmosphere cannot be quickly brought down below 0.5%. Request assistance from the Fire Department, if necessary. (Added as per PSC Case 08-G-0415)

D. Request continued assistance from the Fire Department or other agencies (if already on location) as long as needed to protect the safety of residents, the public, Company personnel, other responders and property until the full extent of the leak hazard has been assessed

and the situation has been made safe. (Added as per PSC Case 08-G-0415)

E. Request assistance from additional Company forces via the GERC if gas readings are found in multiple subsurface structures or buildings and cannot be quickly reduced or eliminated. (Added as per PSC Case 08-G-0415)

F. Request assistance from the Fire Department (if not already on location) to evacuate buildings if atmospheric readings that cannot be quickly reduced to 0.5%, or eliminated are found in multi-family buildings or atmospheric readings are found in more than one building. (Added as per PSC Case 08-G-0415)

H. The service person must call the GERC for police or Department assistance if it is suspected that a gas leak or CO condition exists in a building or area where access is otherwise unavailable.

Appendix C

Con Edison's Procedure and Policy Enhancements

As a result of its own investigation and analysis of this incident and discussions with Staff, Con Edison has implemented a number of enhancements to its procedures and policies, as described below. Some of these involve improved coordination with the New York City Fire Department (FDNY) at emergency sites. Con Edison met with the FDNY on May 15, 2009, and Con Edison reported to Staff that the FDNY's input is included in these changes.

(A) 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 strong outside odor of gas from company personnel, fire department, police department, emergency responders or school officials.
- A report of two or more gas leaks on the same block at approximately the same time.
- Reports of gas and electric problems at approximately the same time in close geographic proximity.
- Gas readings of 4% or greater are detected in a subsurface structure after venting, or the structure cannot be vented.
- Gas readings of 4% or greater are detected in two or more subsurface structures prior to venting.

(B) The following additional procedures for first responders (company and/or fire department) and the GERC have been implemented:

- When additional company crews and the fire department are dispatched in response to the situations described above,

they will be instructed to check inside nearby buildings and assist in pulling manhole covers.

- Company responders will evacuate buildings, including themselves, when gas readings in the general atmosphere cannot quickly be brought down below 0.5%.

- The fire department will be instructed to evacuate residents if an odor of gas or any instrument reading is obtained.

- In multi-family and large commercial buildings, the Con Edison responder and/or fire department may limit the evacuation to the affected area.

- GERC will use Byers to provide guidance to field crews on buildings and structures connected through subsurface electric facilities.

- Any outside gas reading within five feet of a building wall requires an inside investigation.[21]

- Subsurface structures with gas readings of 4% or greater will be vented immediately, prior to completing the leak investigation to establish the migration pattern.[22] If gas readings do not quickly fall below 4%, buildings adjacent to and connected to the structure will be investigated prior to completing the migration pattern.

- First responders will report significant carbon monoxide (CO) readings to the dispatcher, who will request assistance from electric operations. CO is often an indicator of an electric cable failure and burn-out.

- The fire department's public address system or Con Edison megaphone will be used to assist with evacuations. The evacuation message will advise people to proceed to the next street.

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[21] This is consistent with the Type 1 leak condition defined in §255.811(e)(3) (See Appendix A).

[22] Con Ed procedure G-11809-25 defines "Migration pattern" as "test points indicating the perimeter of the area where 0% gas is obtained on a leak detection device. All subsurface structures (SSS) within the migration pattern shall be tested…"

(C) Con Edison has also implemented the following actions:

- Require mechanic vehicles to be equipped, at a minimum, with a single-person manhole cover lifting device and at least four cones, two waffles and two barricades.

- Created a process to identify emergency tickets for gas and electric events close in time and proximity, so that additional company crews and the fire department can be requested.

- Revised the call center emergency scripts to emphasize the potential hazard and provide more detailed information to the caller regarding vacating the premises immediately, telling others to do so also, getting away from the area of the suspected gas leak, waiting for the arrival of a trained mechanic, and avoiding creation of any sparks or ignition sources. See the Receipt of Odor Report from 80-46 260th Street section above for details.

- Revised customer education material to include steps to take when a gas leak is suspected. The following material has been included in bill inserts and on Con Edison's internet site:
  - Leave your home immediately and take others with you. If outside, get well away from where you suspect the gas is leaking.
  - Open windows before you leave if the odor is faint
  - Tell us if there is also a problem with your electric service.
  - Follow directions from emergency responders who are on site.
  - Avoiding ignition sources.

- Added a separate "If you smell gas" safety message to Con Edison's summer subway and print education ads, which advises to call Con Edison and "don't light matches or use any electrical device."

- Enhanced procedures and training for dispatchers, including a daily checklist to ensure, amongst other things, that mechanics are signed on and viewable on GPS and that applications such as Byers are running, and newly created reports to track items such as the time from receiving a call to dispatching a responder. Procedures have been established to have Supervisors interact with on-site mechanics in non-routine situations, relaying information

from Byers, making decisions on what resources and personnel to deploy, etc.

- Developed new communication strategies between dispatchers and mechanics/crews, including full time use of “group mode.” This allows personnel in the field to overhear conversations and offer assistance if appropriate.

- Employees have been instructed to keep their radios on their person at all times.

- Con Edison intends to purchase and deploy new radios. The company is performing research and testing to determine which manufacturers and models have the appropriate features and coverage (such as in common “blind spots” like basements).

- Made changes in staffing levels, including overlapping shifts and increasing the number of crews, mechanics and supervisory personnel on duty during certain shifts. Prior to the incident, the typical staffing levels for the Queens Division were as follows:

  - 7 AM to 3 p.m. Monday to Friday: 9 to 13 mechanics, 2 to 3 ERF crews, 3 to 4 supervisors.
  - 7 AM to 3 p.m. weekends and holidays: 6 to 7 mechanics, 1 ERF crew, 1 supervisor.
  - 3 p.m. to 11 p.m., 7 days per week: 4 to 5 mechanics, 1 ERF crew, 1 supervisor
  - 11 p.m. to 7 a.m., 7 Days per week: 1 mechanic, 1 ERF crew, 1 supervisor.

  Since the incident, Con Edison has implemented the following staffing level enhancements:

  - Created a 2 p.m. to 10 p.m. Monday-to-Friday shift with 2 Mechanics.
  - Added an ERF crew on the 3 p.m. to 11 p.m. Monday-to-Friday shift from April 15 to November 15.
  - Created an 11 a.m. to 7 p.m. Monday-to-Friday shift with a construction crew.
  - Added an additional supervisor to the Queens Division and modified their schedules to include an additional supervisor on duty for the 3 p.m. to 11 p.m. Monday-to-Friday shift. Also on Saturdays, an additional supervisor will be on duty 11 a.m. to 7 p.m. To overlap with these shifts, an additional supervisor

will be on newly created 7 a.m. to 7 p.m. and 7 p.m. to 7 AM shifts seven days a week.
  - Added a Field Operations Planner to staff a 3 p.m. to 11 p.m. Monday-to-Friday shift. This position is above the supervisor level and provides an added level of management oversight.

- Conducted training/drills for GERC, Con Edison first responders and the fire department.

- Reinforced with construction crews the need for installation of protective boards when inadequate clearance is discovered between gas and electric facilities, including documentation of such locations.