



The Commonwealth of Massachusetts

DEPARTMENT OF PUBLIC UTILITIES

PIPELINE ENGINEERING AND SAFETY DIVISION

INCIDENT REPORT

93 New York Avenue, Somerset, Massachusetts
February 19, 2009

PIPELINE ENGINEERING AND SAFETY DIVISION

Accident File

Location: 93 New York Avenue, Somerset, Massachusetts

Date of Accident: February 19, 2009

Gas Company: New England Gas Company

Estimated Property Damage: Over \$1,100,000

Injuries: One Fatality

Report Issued – December 30, 2010

* Estimated by the Somerset Fire Department

Table of Contents

I.	INTRODUCTION	1
A.	Scope of Investigation.....	1
B.	Overview of Incident	2
II.	THE DEPARTMENT’S INVESTIGATION.....	3
A.	Description of the Site	3
B.	Emergency Response.....	3
C.	Drug and Alcohol Testing Report.....	4
D.	93 New York Avenue	4
1.	Service Installation and Description	4
2.	Leak Survey and Repair Records for 93 New York Avenue.....	5
E.	The Gas Main Under New York Avenue.....	5
1.	Description of the Main Under New York Avenue.....	5
2.	Description of the Damaged Main	5
3.	History of Repairs on the Main	6
4.	Leakage Surveys on the Main and Services after the Incident	6
5.	Replacement of the Main following the Incident	6
6.	Odor Testing.....	7
7.	Sewer Installation on New York Avenue	8
III.	ANALYSIS OF THE PIPE SEGMENT	9
IV.	FINDINGS	11
A.	The Incident.....	11
B.	The Gas Main Under New York Avenue.....	11
C.	The Recovered Pipe	12
D.	The Sewer Installation under New York Avenue	12
E.	The Service to 93 New York Avenue	13
F.	The House at 93 New York Avenue.....	13
G.	The Release of Gas from the Broken Pipe.....	14
V.	CONCLUSIONS	14

I. INTRODUCTION

A. Scope of Investigation

The Massachusetts Department of Public Utilities (“Department”), Pipeline Engineering and Safety Division (“Division”), pursuant to G.L. c. 164, § 105A and a Federal Certification Agreement as provided for in 49 U.S.C. § 60105, has investigated a natural gas (“gas”) release at 93 New York Avenue, Somerset, Massachusetts on February 19, 2009 (“Incident”).¹ The release of gas contributed to an explosion, fire and over \$1,000,000 in property damage to the dwelling, as estimated by the Somerset Fire Department (Exh. 2). The operator of the natural gas facilities at the Incident is New England Gas Company (“NEGC” or “Operator”). There was one fatality as a result of the explosion.

As part of the Department’s annual certification process by the United States Department of Transportation (“U.S. DOT”), the Department must report to the U.S. DOT

each accident or incident . . . involving a fatality, personal injury requiring hospitalization, or property damage or loss of more than an amount the Secretary establishes... and any other accident the [Department] considers significant, and a summary of the investigation by the [Department] of the cause and circumstances surrounding the accident or incident. 49 U.S.C. § 60105(c).

The purpose of this report is to inform the U.S. DOT as to the cause and circumstances surrounding the Incident.

¹ Incident means any of the following events:

1. An event that involves a release of gas from a pipeline or liquefied natural gas or gas from an LNG facility and,
 - a. A death, or personal injury necessitating in-patient hospitalization; or
 - b. Estimated property damage, including cost of gas lost, of the operator or others, or both, of \$50,000 or more.
2. An event that results in an emergency shutdown of an LNG facility.
3. An event that is significant in the judgment of the operator, even though it did not meet the criteria of paragraphs (1) or (2). 49 C.F.R. Part 191, § 191.3.

The Department has established procedures for determining the nature and extent of violations of codes and regulations pertaining to the safety of pipeline facilities and the transportation of gas, including but not limited to, 220 C.M.R. §§ 101.00 through 113.00. See 220 C.M.R. § 69.00 et seq. The Division also enforces the U.S. DOT safety standards for gas pipeline systems as set forth in 49 C.F.R. Part 192 ("Part 192").

G.L. c. 164, § 105A.

B. Overview of Incident

On February 19, 2009, at 5:16 p.m., the Somerset Fire Department ("Somerset FD") reported to NEGC a strong smell of gas at 30 New York Avenue, Somerset Massachusetts (Exh. 1). At 5:25 p.m. NEGC dispatched a service technician (id.). Several members of the Somerset FD were on site (id.). The service technician stated that he arrived at the scene at approximately 5:40 p.m. (id.). At 5:50 p.m., a Company supervisor and a second service technician arrived (id.). At approximately 6:15 p.m., an explosion occurred at 93 New York Avenue (id.).

The Somerset FD stated that the building at 93 New York Avenue was on fire and completely leveled (Exh. 2). The Somerset FD estimated the property damage to 93 New York Avenue to be \$1,000,000, and the contents loss to be \$100,000 (id.). Three other homes sustained serious damage (id.).

The Somerset FD stated that it found a deceased woman lying in the Northwest corner of the debris at 93 New York Avenue (id.). Two firefighters suffered minor injuries, and the Somerset FD recovered a deceased small dog in the neighboring yard (id.).

The Pipeline Engineering and Safety Division (“Pipeline Division”) of the Department of Public Utilities (“Department”) sent two investigators to the scene.

II. THE DEPARTMENT’S INVESTIGATION

A. Description of the Site

New York Avenue is located in a residential area of Somerset, Massachusetts. The structure at 93 New York Avenue was a five room single-family home with a poured concrete foundation (Exh. 3). The house was built in 1965, and had a total inside finished area of 1,120 square feet (id.) The lot size is 0.22 acres (id.).

Photos of the foundation taken after the incident, show that it was cracked in some places (id.). Although the Somerset Assessor’s property card for 93 New York Avenue indicates sewer and water service, there is no record from the Somerset Water and Sewer Department that 93 New York Avenue was connected to the Somerset sewer system (id.). The house was connected to town water service (id.).

B. Emergency Response

At 5:25 p.m., NEGC dispatched a service technician to 30 New York Avenue (Exh. 1). The service technician arrived at the scene at approximately 5:40 p.m. (id.). At 5:50 p.m., a Company supervisor and a second service technician arrived (id.). The three NEGC personnel detected gas blowing from a crack or cracks in the pavement in the area in front of 73 New York New York Avenue (id.).

One of the NEGC emergency responders proceeded to check in front of houses for gas using bar holes (id.). NEGC stated that its emergency responder placed three bar holes outside

the foundations of 93 and 73 New York Avenue (id.). NEGC reported negative readings for the presence of gas in these areas (id.).

NEGC reported that its emergency responder knocked on the doors of 73 and 93 New York Avenue and no one responded (id.). NEGC reported that at 6:15 p.m., an explosion occurred at 93 New York Avenue (id.).² The three leak responders assisted evacuation of nearby homes (id.).

In order to isolate the leaking section of pipe, NEGC turned off the gas main valve at the corner of New York and Reagan Road at approximately 6:30 (id.). NEGC turned off the valve at the corner of New York and Rounseville at approximately 7:15 p.m. (id.).

C. Drug and Alcohol Testing Report

NEGC stated that there was no evidence or indication that any of the Company's three employees who responded to the odor report on New York Avenue caused or contributed to the cause of the incident (Exh. 4). As such, NEGC reported that it did not require any of its employees to undergo drug and alcohol tests (id.).

D. 93 New York Avenue

1. Service Installation and Description

Records indicate that NEGC installed a one-inch coated steel service line to 93 New York Avenue on September 30, 1964 (Exh. 5). The customer meter was inside the basement.

NEGC reported that it buried the service line three feet deep (id.). The service line extended 29.5 feet from the house to the curb, and another twelve feet under New York Avenue to the gas main (id.).

² Across the street from 72 New York Avenue is 73 New York Avenue (Exh. 13). The lot next to 73 New York Avenue and to its west, is 93 New York Avenue (id.).

2. Leak Survey and Repair Records for 93 New York Avenue

The Operator presented records indicating that, on June 14, 2005, and May 20, 2008, NEGC conducted leak surveys and corrosion inspections of the service to 93 New York Avenue (Exh. 6). The Operator determined that there were no leaks, and that the service pipe was in good condition (id.).

E. The Gas Main Under New York Avenue

1. Description of the Main Under New York Avenue

The Operator installed a two inch coated steel gas main³ underlying New York Avenue in October, 1964 (Exh. 7). The maximum operating pressure (“MAOP”)⁴ of the main is 60 pounds per square inch gauge (“PSIG”) (id.).⁵ NEGC reported that operating pressure of the main at the time of the Incident was 49.5 PSIG (id.).

2. Description of the Damaged Main

NEGC recovered a piece of the two-inch coated steel main from in front of 72 New York Avenue (Exh. 8). The piece was approximately 50 inches long, and wrapped on the outside with a yellow coating (id.). The pipe was bent, and the coating was torn in a number

³ A main is a distribution line that serves as a common source supply for more than one service line. Part 192, § 192.3.

⁴ MAOP means the maximum pressure at which a pipeline or segment of a pipeline may be operated. Part 192 § 192.621.

⁵ PSIG refers to the pressure expressed in pounds exerted on one square inch of surface area. The designation “gauge,” indicates the readings are already adjusted to ignore the surrounding atmospheric pressure, which is 14.7 psi at sea level. If psig gauge were not connected to any pressure source, it would read zero even though it is actually sensing 14.7 psi at sea level.

of places (id.). The pipe had a semi-circumferential crack at one of the areas where the yellow coating was torn off (id.).

3. History of Repairs on the Main

On March 26, 1974, NEGC repaired a section of the New York Avenue main in front of 90 New York Avenue (Exh. 7; see Exh. 11). On March 23, 1985, NEGC repaired a cracked main approximately twenty-five (25) feet east of 10 New York Avenue (Exh. 7). The Operator reported no leak repairs on New York Avenue from February 19, 2004 to February 19, 2009 (id.).

4. Leakage Surveys on the Main and Services after the Incident

Following the Incident, on February 19, 2009, the Operator shut off the gas on New York Avenue from Rounseville Avenue to Regan Road (Exh. 9). Prior to shutting the gas off, the Operator reported a reading of 100 percent gas above the main in front of 72 New York Avenue (id.). NEGC cut off and capped a 200 foot section of the main in front of 72 New York Avenue (id.).

The Operator performed leak surveys on all mains and services on Rhode Island Avenue and Eastern Avenue (id.). NEGC found no leaks (id.).

On February 20, 2009, the Operator pressure tested the main and services on the east and west sections of New York Avenue, at 72 pounds, for one hour (id.). The main and services held the pressure (id.). The operator restored gas service to the area (id.).

5. Replacement of the Main following the Incident

On February 20, 2009, the Operator isolated an approximately 200-foot section of the New York Avenue gas main (id.). NEGC removed an approximately 50-inch section of the

main that was damaged described above (id.). On March 23, 2009, NECG installed 197 feet of two-inch plastic main in the public way from 72 to 110 New York Avenue (id.). The Operator also installed a one-half inch service pipe to 90 New York Avenue (id.).

6. Odor Testing

The state regulation, 220 C.M.R. § 101.06(20), requires operators to odorize gas in their distribution systems. Gas must be “readily perceptible to the normal or average olfactory senses of a person coming from fresh uncontaminated air into a closed room containing 0.15 percent gas and air.” Id. The state regulation, 220 C.M.R. § 101.06(20)(a), requires operators to conduct periodic sampling of odorant concentrations throughout their system.

On January 13, 2009, the operator conducted an odor level test in Somerset, on Kenmar Drive (Exh. 10). On February 19, 2009 the operator conducted seven odorant tests, following the incident (id.). The results of the tests are as follows:

January 13, 2009

Kenmar Drive, Somerset – 12:33:48 - TDL Result 0.06%
RDL Result 0.10%⁶

February 19, 2009

County Street, Somerset Plaza – 19:54:36 - TDL Result 0.07%
RDL Result 0.09%
County Street, Somerset Plaza – 20:02:29 – TDL Result 0.07%
RDL Result 0.07%
County Street, Somerset Plaza – 20:04:10 – TDL Result 0.03%
RDL Result 0.06%
Whetstone School 20:12:03 - TDL Result 0.05%
RDL Result 0.11%
Whetstone School 20:17:23 TDL Result 0.07%
RDL Result 0.09%

⁶ TDL means Threshold Detection Level, RDL means Readily Detectable Level.

Chace School	20:27:28	TDL Result 0.03 % RDL Result 0.06 %
Chace School	20:28:48	TDL Result 0.03 % RDL Result 0.06 %

(id.).

The odor detect ability levels of gas in air ranged from 0.03 percent to 0.11 percent gas in air, indicating that the odorant levels were within the limit prescribed in the state regulation. The odorant levels also met the federal pipeline safety requirement, contained in Part 192, § 192.625, which requires that gas be odorized so that it can be detected at a level of one percent gas in air.

7. Sewer Installation on New York Avenue

The Town of Somerset (“Town”) informed the Operator that, during a sewer main installation on New York Avenue in 1974, the Town’s contractor also installed laterals, or stubs, from the sewer main to the edge of the right-of-way (Exh. 11). The plan provided by the Town indicates that one of these sewer laterals passes under the section of the gas main that failed, and was recovered from the Incident (id.).

On or about March 25, 1974, the Town’s records on the sewer main installation notes a broken gas main in front of 90 New York Avenue (Exh. 11, see Exh. 7). The Town’s record also notes “foreign pipe . . . three-inch gas,” buried at a depth of 2.8 feet in front of 72 New York Avenue (Exh. 11). The Town’s records also indicate that the elevation of the street rises from 72 New York Avenue to 93 New York Avenue (id.).

The plan for the Town’s 1974 sewer project illustrates a 19.5 foot sewer pipe lateral that extends from the sewer pipe under New York Avenue to under the curb in front of 72 New York Avenue (id.). The plan demonstrates that the lateral sewer pipe crossed under the

NEGC coated steel main in approximately the southwest corner of 72 New York Avenue (id.).

The plan notes that depth of this sewer lateral, apparently where the pipe meets the property line of 72 New York Avenue, is 7.7 feet (id.).

On September 30, 1964, NEGC reported that the depth of the gas main in front of 72 New York Avenue was three feet (Exh. 12). In 1974, the Town reported that the depth of the “foreign” gas pipe it encountered in front of 72 New York Avenue was 2.8 feet (Exh. 11).

III. ANALYSIS OF THE PIPE SEGMENT

Altran Solutions (“Altran”) performed the analysis of a cracked segment of two inch coated steel main underlying New York Avenue. On October 26, 2010, Altran issued a report on the results of the analysis (“Altran Report”).⁷ The Report finds the following.

- The pipe section was deformed by bending in situ. Damage to the plastic coating and pipe indicate the force to bend the pipe was applied at approximately the 9 O’clock position. The pipe deflection was measured to be 0.48 inches over a length of 49 inches.
- Corrosion was noted under the plastic coating in the area of the fracture. The plastic coating was found loosely adhered to the pipe wall.
- Physical measurements taken did not show any inconsistencies within the pipe section. Except for the area of deformation noted in the 9 O’clock position.
- Non destructive testing confirmed the extent of the cracking and did not detect any other cracks.
- The visual and SEM examinations of the fracture surface of the east side revealed a cleavage (brittle) type fracture around the entire circumference, although some locations were mostly obscured due to corrosion and/or rubbing damage.

(Altran Report at 19).

⁷ Copies of the Altran Report may be obtained by contacting Van Christie, at Altran Solutions, 451 D Street, Boston, MA 02210, (617) 204-1011.

The Altran Report concludes that:

Based on the results of laboratory tests allowed by the agreed upon protocol, it is concluded that the subject pipe cracked in brittle fashion, which is evident by the cleavage (brittle) morphology exhibited by the fracture surface. The likely cause for the failure was the bending of the pipe and local damage noted at the 9 O'clock location. This localized damage caused initial cracking of the pipe wall, which did not propagate through wall. Although it is not clear how far around the circumference the crack initially propagated, it is clear it later grew around almost the entire pipe circumference, leaving only the small ligament noted at the 12:30 to 3:00 O'clock positions intact. This small ligament also failed in a brittle manner during the pipe separation in the laboratory, confirming the lack of ductility exhibited by the pipe material.

Of particular interest is the fact that the cleavage (brittle) features exhibited less damage along the ID wall, even in the most corroded locations. This indicates the cracking likely initiated at the OD of the pipe wall at the 8 - 10 O'clock position, where the deformation of the pipe wall was present and the bending was prominent. The crack then propagated toward the ID wall but did not crack entirely through wall. The examinations showed the ID edge of the pipe wall was the last to crack, and hence the fracture surface is relatively newer as compared with the rest of the fracture. It is unknown what specific event caused the remaining portion to crack and the final failure to occur.

In summary, it is concluded that the pipe fracture initiated in the location of observed local damage, and over time, propagated through wall and around the perimeter. The pipe material itself may also have low ductility, which would likely facilitate the propagation of the crack. This low ductility is most likely a property of the pipe and not due to environmental conditions that could have embrittled the material. However, this cannot be confirmed without further testing of the pipe material.

(id. at 19-20).

IV. FINDINGS

A. The Incident

1. On February 19, 2009, at 5:16 p.m., the Somerset Fire Department reported to NEGC a strong smell of gas at 30 New York Avenue, Somerset Massachusetts.
2. At 5:25 p.m., NEGC dispatched a service technician to 30 New York Avenue.
3. Members of the Somerset Fire Department were present when the service technician arrived at the scene at approximately 5:40 p.m., and requested a crew.
4. At 5:50 p.m., NEGC reported that a Company supervisor and a second service technician arrived.
5. Three NEGC personnel detected gas blowing from a crack or cracks in the pavement in the area in front of 73 New York Avenue.
6. Prior to the Incident, NEGC reported negative readings for the presence of gas outside the foundations of 93 and 73 New York Avenue.
7. Prior to the Incident, NEGC reported that its emergency responder knocked on the doors of 73 and 93 New York Avenue and no one responded.
8. NEGC reported that at approximately 6:15 p.m., an explosion occurred at 93 New York Avenue.
9. The Somerset Fire Department estimated the property damage to 93 New York Avenue to be \$1,000,000, and the contents loss to be \$100,000. Three other homes sustained serious damage.
10. The Somerset Fire Department found a deceased woman lying in the Northwest corner of the debris at 93 New York Avenue.

B. The Gas Main Under New York Avenue

1. NEGC installed a two inch coated steel gas main beneath New York Avenue in October, 1964.
2. On September 30, 1964, NEGC reported that the depth of the gas main in front of 72 New York Avenue was three feet.

3. On March 26, 1974, NEGC repaired a section of the New York Avenue main in front of 90 New York Avenue.
4. On March 23, 1985, NEGC repaired a cracked main approximately twenty-five (25) feet east of 10 New York Avenue.
5. The MAOP of the main is 60 PSIG.
6. The operating pressure of the main at the time of the Incident was 49.5 PSIG.

C. The Recovered Pipe

1. Following the incident, NEGC removed an approximately 50 inch section of coated steel main from under the street in front of 72 New York Avenue.
2. The piece of main was wrapped on the outside with a yellow coating.
3. The pipe was bent, and the yellow outside coating was torn in a number of places.
4. The pipe had a semi-circumferential crack at one of the areas where the yellow coating was torn off.
5. Altran measured the bend in the pipe to be 0.48 inches over a length of 49 inches.
6. The Altran Report's findings that the likely causes for the failure of the pipe were the bending of the pipe, and local damage located at the 9 O'clock position, are reasonable.

D. The Sewer Installation under New York Avenue

1. During a sewer main installation on NY Avenue in 1974, the Town's contractor installed laterals from the sewer main to the edge of the right-of-way on New York Avenue.
2. On or about March 25, 1974, the Town's records on the sewer main installation notes a broken gas main in front of 90 New York Avenue.
3. The same record notes that the depth of "foreign" gas pipe it encountered in front of 72 New York Avenue was 2.8 feet.

4. The plan for the Town's 1974 sewer project illustrates a 19.5 foot sewer lateral that extends from the main sewer pipe under New York Avenue, to under the curb in front of 72 New York Avenue.
5. The plan demonstrates that the sewer lateral crossed the NEGC coated steel main in approximately the southwest corner of 72 New York Avenue.
6. The sewer lateral passes under the section of the damaged gas main that was recovered in front of 72 New York Avenue.
7. The plan notes that depth of this sewer lateral, apparently where the pipe meets the property line of 72 New York Avenue, is 7.7 feet.

E. The Service to 93 New York Avenue

1. The service line to New York Avenue extended 29.5 feet from the house to the curb, and another twelve feet under New York Avenue, to the gas main.
2. On June 14, 2005 and May 20, 2008, NEGC conducted leak surveys and corrosion inspections of the service to 93 New York Avenue.
3. During those visits, the Operator determined that there were no leaks, and that the service pipe was in good condition.
4. Following the incident, NEGC pressure tested the service line to 93 New York Avenue and the line held pressure.

F. The House at 93 New York Avenue

1. The structure at 93 New York Avenue was a five room single-family home with a poured concrete foundation.
2. The house was built in 1965, and has a total inside finished area of 1120 square feet.
3. The lot size is 0.22 acres.
4. A lateral from the sewer line runs to the property line of 93 New York Avenue.
5. The Town of Somerset property card for 93 New York Avenue states that the residence was connected up to the town's sewer line and water service.

6. The Town of Somerset's Water and Sewer Department has no record that 93 New York Avenue was tied into the town's sewer system.
7. The structure at 93 New York Avenue was tied into the Town of Somerset water system.

G. The Release of Gas from the Broken Pipe

1. The source of the release of gas was the cracked pipe recovered from the main under the street in front of 72 New York Avenue.
2. Prior to the incident, NEGC detected 100 percent gas above the main in front of 72 New York Avenue.
3. Prior to the incident, the NEGC technician did not report any gas readings outside the foundation of 93 New York Avenue.
4. The residence at 93 New York Avenue had natural gas service.
5. The foundation to the house was cracked in a number of locations.

V. CONCLUSIONS

The crack in the damaged main recovered from the street in front of 72 New York Avenue was the source of the release of gas. The released gas entered 93 New York Avenue accumulated, and was ignited by an undetermined source. The Pipeline Division is unable to ascertain the path of the gas from the broken main to the basement of 93 New York Avenue.

The findings and conclusions in the Altran Report are reasonable, and based upon substantial and specific evidence.

The damage to the yellow coating on the pipe, and the bend in main, was caused by a third party. The excavator installing the sewer and sewer laterals under New York Avenue in 1974 may have damaged the coating and pipe. The NEGC repairs to the main under New York Avenue in 1974 in front of 90 New York Avenue were most likely too far away to have exposed the damaged pipe recovered from the street in front of 72 New York Avenue.

Similarly, the NECG repairs to the main located in front of 10 New York Avenue in 1985 were most likely too far away to have exposed the damaged the pipe recovered from the street in front of 72 New York Avenue.