The Commonwealth of Massachusetts

DEPARTMENT OF PUBLIC UTILITIES

PIPELINE ENGINEERING AND SAFETY DIVISION

INCIDENT REPORT

76 Eastern Avenue, Gloucester Massachusetts
January 25, 2009

PIPELINE ENGINEERING AND SAFETY DIVISION

Accident File

Location: 76 Eastern Avenue, Gloucester, Massachusetts

Date of Accident: January 25, 2009

Gas Company: Boston Gas Company d/b/a National Grid

Estimated Property Damage: Over $400,000*

Injuries: One

Report Issued – August 2, 2010

* Estimated by Boston Gas Company d/b/a National Grid

Table of Contents

EXHIBIT LIST

1. National Grid – DOT Incident Report
2. National Grid – DPU Incident Report
3. Gloucester Fire Department Report
4. DPU Investigator Notes
5. National Grid Leak Repair List
6. Photographs: 76 Eastern Avenue; Broken Main; House Heater and Water Heater
7. Gas Main Information
8. Gas Service Information
9. Photographs: 76 Eastern Avenue (post Incident); Excavation for Broken Main; Gas Service to 76 Eastern Avenue
10. Leak Survey Schedule
11. Leak Survey Summary
12. Photographs: State Fire Marshal Scene Investigation; Inside Service Piping; Service Shut Off; Gas Service Pressure
13. Homeowner Interview Memorandum
14. National Grid Work Orders
15. Odorant Inspection Report
16. Cast-Iron Main Replacement Program
17. National Grid Incident Investigation Report

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 76 Eastern Avenue, Gloucester on January 25, 2009 ("Incident").[1] The release of gas contributed to an explosion, fire and over $400,000 in property damage to the dwelling, as estimated by the Operator of the natural gas facilities, Boston Gas Company, d/b/a National Grid ("National Grid" or "Operator") (Exh. 1). One person was hospitalized as a result of the Incident.

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 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 January 25, 2009, at approximately 9:15 a.m., National Grid notified the Department of a house explosion at 76 Eastern Ave. Gloucester (Exh. 2).[2] The Department dispatched two investigators to the scene, and upon arrival, found that the reported address had been demolished by the blast and ensuing fire. The investigators reported to the Gloucester Fire Chief, Gloucester Police Lieutenant, and Massachusetts State Police detectives from the Fire and Explosion Investigation Section of the Office of the State Fire Marshal ("State Fire Marshal's Office") to provide their assistance in the investigation.

The State Fire Marshal's Office and the Gloucester Police and Fire Departments determined that the explosion was caused by escaping gas from the leak on the six inch gas main entering the structure at 76 Eastern Avenue, and that the source of ignition was unknown (Exh. 3).

The investigators met with National Grid management personnel to review the conditions present and the actions being taken as a result of the Incident. National Grid distribution personnel were in the process of pinpointing the gas leak, and were barring over

---

[2] In a letter to all operators, the Director of the Division has requested that operators inform the Department of any incident promptly, but no more than two hours after the incident.

the main in front of the Incident location. Service technicians had been dispatched across the neighborhood to perform a leak investigation of the area and inspect buildings to check for gas migration.

The Operator detected gas readings inside three locations, and vented and monitored these locations (Exh. 4). Two homes had been evacuated due to the damage sustained by the explosion (Exh. 3). Several manholes in streets within the neighborhood also had gas readings as gas had migrated via sewer lines, at these locations the Operator pried open manhole covers to allow gas to vent to the atmosphere (Exh. 4).

National Grid performed leak surveys of the area to monitor the gas mains and services. As a result of the surveys, the Operator identified and subsequently repaired two additional leaks (Exh. 5).

National Grid personnel pinpointed the leak on the gas main located in front of 76 Eastern Avenue and began to excavate. The Operator exposed the gas main and found a circumferential crack on the six inch cast-iron low pressure main at the 1¼" bare steel service tee supplying gas to 77 Eastern Avenue (Exh. 6). National Grid secured the leak by removing the service tee, and installing a Servi-Seal clamp on the gas main (Exh. 4).

II. THE DEPARTMENT'S INVESTIGATION

A. Description of the Site

Eastern Avenue is in a residential area of Gloucester. The area is comprised of single-family residences. The structure at 76 Eastern Avenue was a two-story house with a basement (Exh. 6). The foundation of the original structure was field stone, with a dirt floor crawl space on the left front corner of the home, and an addition at the rear of the house had a poured concrete foundation (photo of the house (id.). The oil fired house heater and gas fired water heater were located in the basement (id.).

In 1922, the Operator installed the six-inch cast-iron gas main[3] that underlies Eastern Avenue (Exh. 7) At the time of the incident, the operating pressure of the gas main was between nine and 9.5 inches water column (id.).[4] The 1½" coated steel gas service supplying 76 Eastern Avenue was installed in 1960, and the meter was located in the basement of the house (Exh. 8).

B. Description of the Scene

The house at 76 Eastern Avenue was destroyed by the explosion and ensuing fire (Exh. 6). The house collapsed into the foundation, debris had been blown onto the street and into adjoining properties (Exh.9).

---

3 "*Main*" means a distribution line that serves as a common source of supply for more than one service line.

4 Inches water column is a measurement of pressure with 27.71 inches of water column equal to one pound per square inch gauge. Pounds per square inch gauge refer 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.

National Grid dispatched technicians across the neighborhood to investigate the buildings in the area for gas migration. The Operator vented and monitored three homes that had gas entering the structures, and two additional locations were evacuated due to the damage sustained by the explosion (Exh. 4).

National Grid distribution personnel pinpointed a gas leak on the gas main in front of 76 Eastern Avenue, and began digging in the street to expose the gas main. When the Operator exposed the gas main, National Grid found a circumferential crack on the six inch cast-iron main at the 1¼" gas service tee supplying 77 Eastern Avenue (Exh. 6). The cracked cast iron main was in front of, and in proximity to, the left front corner of 76 Eastern Avenue (Exh. 9).

The Operator removed the service tee, cleaned the main, and installed a Servi-Seal clamp to both secure the leak and provide a temporary tap for the replacement service for 77 Eastern Avenue. To install the clamp, National Grid personnel had to clear away a large piece of ledge directly below the section of the cracked main (Exh. 4).

National Grid detected gas readings in several manholes in streets within the neighborhood, as gas had migrated via sewer lines. At these locations the Operator pried open the manhole covers to allow gas to vent to the atmosphere (id.).

The gas service to 76 Eastern Avenue had not been immediately shut off as there was no service valve installed, and fire fighting apparatus were blocking the street, preventing National Grid from excavating at the service location on the main. When access was available, a National Grid crew dug and exposed a 1½" coated steel service pipe (Exh. 9). The Operator cut and capped the service pipe, removed the tee, and plugged the main (Exh. 4).

National Grid also cut and capped the gas service to 74 Eastern Avenue, removed the tee and plugged the main as the building had been deemed uninhabitable.

C. Leak Detection

1. Post Incident

After the Incident, National Grid initiated leak surveys of the area (Exh. 5). On January 25, 2009, the Company identified and repaired a joint leak on the main in front of 79 Eastern Avenue (id.). In addition, National Grid initiated an extensive leak survey, which encompassed the surrounding streets of the Incident location, and all of the cast-iron mains within the Town of Gloucester (id.). The Operator also performed a walking survey on Eastern Avenue, and on eleven streets adjacent to the Incident area (id.). National Grid reported that the leak surveys it conducted from January 25 to February 2, 2009, identified a total of 47 leaks, of these, 32 were repaired, and 15 did not require immediate attention (Exh. 5).

2. Winter Patrol Survey

National Grid initiated the Winter Patrol Survey of its cast-iron mains in Gloucester during the winter of 2008/2009, and conducted a first pass of the area on January 15, 2009, ten days before the Incident occurred (Exhs. 10, 17). This Winter Patrol Survey detected no gas leaks on the cast-iron gas main located at Eastern Avenue, Gloucester (Exh. 17).

D. Pressure Test of the Service Line

On Monday January 26, 2009, National Grid personnel prepared to pressure test the gas service at 76 Eastern Avenue (Exh. 4). The State Fire Marshall's Office was conducting its investigation of the Incident scene, and did not allow access to the basement (Exhs. 4, 12).

The gas service, meter and inside piping were intact to the outlet of the meter. The inside piping was broken off at an elbow above the meter. The meter assembly and the inside service piping were bent over at a 90° angle as the tee on the service had been turned down by the falling debris (Exhs. 4, 12).

The service cock inside the basement was found in the on position (Exhs. 4, 12). In order to perform the pressure test, the service cock was shut off. The Operator introduced ten pounds of air pressure into the gas service to determine if the piping was tight (Exhs. 4, 12). The test did not hold, and the fittings in the basement were soap tested (Exh. 4). A leak was found on a nipple between the tee and service cock (id.).

The gas pipe above the service cock was cut (id.). The service cock was un-threaded from the tee, attached were the leaking nipple below the cock and the small section of pipe cut above the cock (id.). The service tee was plugged with a steel plug and again ten pounds of air pressure was introduced into the gas service (id.). The fittings, piping and pressure test assembly were soap tested and no leaks were present (id.). The gas service was pressure tested for 17 minutes and the test held (id.). The air pressure in the test was then increased to 90 pounds and again the fittings were soap tested, the test held for 18 minutes and the gas service to 76 Eastern Avenue was determined to not be leaking (id.).

E. 76 Eastern Avenue – Resident Interview

On March 10, 2009, Department investigators had an opportunity to interview the resident of 76 Eastern Avenue (Exh. 13). The resident was inside the house at 76 Eastern Avenue when it exploded. He described what had occurred on Sunday January 25, 2009, the date of the Incident (id.).

He stated that on January 25, 2009, he arrived home from work at approximately 8 a.m. and could see black smoke emanating from the house chimney (id.). He stated that he entered his home through the rear door, noticed a haze in the kitchen, and could also see small particles floating in the air (id.). He stated that the air had a garlic smell to it (id.).

He heard a humming noise coming from the house heater and opened the cellar door (id.). He recalls turning on a light switch at the top of the stairs, walking down the stairs and then turning on another light switch for additional lighting (id.).

He checked the house heater, and he knew that it was running, but not producing much heat, as the pipes were not hot - just warm - and the heater was making noise sounding like "jake braking" (id.). He recalled walking around the cellar and didn't notice a gas odor (id.). He remembered that the cellar was also filled with a heavier haze then had been present in the kitchen (id.).

He then walked up the stairs and into the kitchen, where he called the oil company to report the problem with his oil burner (id.). He spoke with an oil company employee and requested service for the burner (id.).

He hung up the phone, and walked to the cellar door (id.). As he stood at the open cellar door he saw a white flash at the bottom of the stairs and heard a loud noise (id.). He stated that he fell into the cellar along with the debris from the home and when he was able to stand he could see daylight where the house walls were once present (id.).

The resident provided sketches detailing the floor layout of his home (id.). He explained that the home had been built by his grandfather, and that an addition had been built in 2001 at the rear of the house (id.). The addition at the rear of the house had a poured

concrete foundation and floor, the remainder of the house foundation was constructed of stone and mortar with a cement floor (id.). A crawl space was located at the left front corner of the house that was constructed with concrete blocks, it had a dirt floor and approximately 3-4 feet of headroom (id.). No insulation or vapor barrier had been installed on the first floor joists inside the crawlspace (id.). Inside the basement, a window led into the remainder of the basement (id.). This window from the crawlspace had been framed, but no window had been installed (id.). The window opening was approximately five feet off the ground and served as an entrance to the crawlspace.

III. MAINTENANCE ACTIVITIES

A. Odor Calls and Leak Repairs

The Operator responded to a number of odor calls on Eastern Avenue from December 26, 2008 to the time of the Incident (Exh. 17). On December 26, 2008, National Grid received notification from the Gloucester Fire Department of an odor complaint at 75 Eastern Avenue (id.). On December 28, 2008, National Grid found that the six inch cast-iron main in front of 70 Eastern Ave had broken, and installed a clamp to secure the leak in the street. (Exhs. 14, 17).

On December 29-31, 2008, the Operator reported gas readings at 69 and 71 Eastern Avenue (Exh. 17). On January 1-2, 2009 the Operator reported gas readings at 69 Eastern Avenue only (id.). On January 2, 2009, National Grid repaired a leak on the main in front of 72 Eastern Avenue (Exhs. 14,17). On January 5, 2009, the Operator completed an installation of a full seal muff on a bell joint in front of 72 Eastern Avenue (Exhs. 14, 17).

On January 11, 2009, National Grid responded to an odor complaint at 70 Eastern Avenue (Exh. 17). The Operator found a ¼ percent gas reading inside the premise and purged gas from the ground (id.). The Operator returned on January 12, 2009 to the same location, and found no gas readings, but again purged gas from the ground (id.). On January 13, 2009, the Operator installed full seal muffs on three bell joints at the intersection of Eastern Avenue and Hartz Street (Exhs. 14, 17).

On January 15, 2009, the Operator responded to another odor complaint at 70 Eastern Avenue (Exh. 17). The Operator found no gas readings (id.). The following day, the Operator completed a routine mobile leak detection assessment of Gloucester and recorded no gas readings (Exh. 10).

On January 19, 2009, the fire department responded to an odor call at 70 Eastern Avenue (Exh. 17). The Operator reported no gas readings (id.). On January 20, 2009, National Grid investigated another odor call at 70 Eastern Avenue, but detected no gas readings (id.). On January 25, 2009, the Operator was contacted about the Incident at 76 Eastern Avenue (id.).

B. Records of Odorization

An operator must odorize the gas in its distribution system of sufficient intensity so that the gas is 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 in air. 220 C.M.R. § 101.06(20). An operator must also conduct periodic sampling of the gas to assure the proper concentration of odorant throughout its system. Id.

National Grid conducts odorant sampling throughout its system on a monthly basis. On January 25, 2009, National Grid personnel performed odorant measurements at three separate locations in the Town of Gloucester (Exh. 15). The results (in percent gas and air) are as follows:

1. 77 Eastern Avenue: Reading actual 0.035; 0.10; 0.09
2. 82 Eastern Avenue: Reading actual 0.04; 0.075; 0.075
3. 8 School Street: Reading actual 0.035; 0.09; 0.10

The odor detection levels indicate that the odorant was within the limit prescribed by 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 and air (Exh. 15).

C. Cast-Iron Main Replacement Program

The Operator stated that it performed an evaluation to select cast-iron main replacement candidates for the 2008 construction season (Exh. 16). National Grid reported that the six inch low pressure cast-iron main segment installed near 76 Eastern Avenue did not qualify as a condition based replacement in 2008 (id.).

The Operator added that, based upon the broken cast-iron main at 70 Eastern Avenue on December 28, 2008, and the broken cast-iron main at 76 Eastern Avenue on January 25, 2009 that this main segment would qualify for replacement under its replacement program for inclusion in the 2009 replacement program (id.). The Operator stated that it would replace the main (id.).

The Operator collects leak data from its leak management system ("LMS") which is linked to the Company's mapping system (id.). For all cast-iron mains that have a break in the main, the Operator creates a 200 foot arc around the location of the break (id.). Each instance where two or more arcs combine to indicate that two or more broken mains have been repaired within 400 feet of each other creates a base line candidate for replacement (id.).

IV. CONSTRUCTION ACTIVITY ON EASTERN AVENUE

National Grid reported that it received three Dig Safe requests for work to be performed on Eastern Avenue by Third Parties (Exh. 17). The scope of the work included blasting for a drainage ditch, a sewer connection, and an emergency utility pole replacement (id.). The blasting was proposed to have taken place approximately 1,800 feet away (id.). National Grid determined that the six inch cast-iron main had not been encroached as a result of third party construction during the last two years (id.). See 220 C.M.R. §§ 113.05; 113.06; 113.07.

V. ANALYSIS OF THE PIPE SAMPLES

Massachusetts Materials Research, Inc. ("MMR") performed an analysis of the cracked section of gas main, gas service tees and elbows supplying 76 and 77 Eastern Avenue, and inside service piping and meter for 76 Eastern Avenue. On April 27, 2010, it issued a report on the results of its analysis ("MMR Report").[5] The MMR Report concludes that

> the crack in the service main originated at the tapped hole [at twelve o'clock for the service pipe to 77 Eastern Avenue] and traveled to the 6 o'clock position in service where final fracture occurred. This accounts for the non-planar transverse crack profile. The cause of the crack appears to be the combination of graphitic corrosion at the tap location likely combined with differential frost heave effects between the pipe and the tap. Frost heave effects on the tap and connected service line would stress the threaded hole in the service main. The January, 2009, temperature profile contains numerous temperature plunges from at to slightly above freezing down into the teens and single digits.
>
> (MMR Report at 12)

VI. FINDINGS AND CONCLUSIONS

A. Findings

1. The structure at 76 Eastern Avenue was a two-story house with a basement.

2. The foundation of the original structure was field stone, with a dirt floor crawl space on the left front corner of the home, and an addition at the rear of the house with a poured concrete foundation.

3. The resident of 76 Eastern Avenue arrived home from work at approximately 8 a.m. on January 25, 2009.

4. The resident noticed black smoke emanating from the chimney, and a haze in the kitchen.

5. He recalled hearing a noise from the heater, opened the cellar door, and turned on the cellar lights.

---

[5] Copies of the MMR report can be obtained by contacting: Veda-Anne Ulcickas, Massachusetts Materials Research, Inc., P.O. Box 810, Century Drive, West Boylston, MA 01583.

6. He walked down to the cellar and turned on another cellar light.

7. He returned upstairs to call for service on the heater, hung up the phone and walked to the open cellar door.

8. As he stood at the open cellar door, he saw a white flash, heard a loud noise, and fell into the cellar.

9. On January 25, 2009, National Grid notified the Department of a house explosion at 76 Eastern Avenue, Gloucester.

10. The Operator found a circumferential crack on the six-inch cast-iron main at the 1¼" gas service tee supplying 77 Eastern Avenue.

11. The cracked cast iron main was in front of, and in proximity to, the left front corner of 76 Eastern Avenue.

12. Inside the basement, an open window faced the remaining basement from the crawlspace under the left front corner of 76 Eastern Avenue.

13. On January 25, 2009, the operating pressure of the National Grid Cast-iron gas main underlying Eastern Avenue was between 9 and 9.5 inches water column.

14. On January 25, 2009, the Gas odorant levels met state and federal regulations.

15. On December 28, 2008, National Grid repaired a break on the main in front of 70 Eastern Ave.

16. On January 2, 2009, National Grid repaired a leak on the main in front of 72 Eastern Avenue.

17. On January 5, 2009, the Operator sealed a bell joint in front of 72 Eastern Avenue.

18. On January 13, 2009, the Operator sealed three bell joints at the intersection of Eastern Avenue and Hartz Street.

19. For 2008, the Operator concluded that the six inch low pressure cast-iron main segment near 76 Eastern Avenue did not qualify for replacement.

20. Prior to the incident, Dig Safe requests for Eastern Avenue included blasting, a sewer connection, and a utility pole replacement.

21. The blasting was proposed to have taken place approximately 1800 feet away.

22. National Grid determined that the six inch cast-iron main had not been encroached as a result of Third Party excavation during the last two years.

B. Conclusions

The MMR Report's conclusions that cause of the crack in the main appears to be a combination of graphitic corrosion at the service tap location, combined with the effect of differential frost heaves between the pipe and the tap are reasonable, and based upon substantial and specific evidence.

The release of gas from the cracked gas main possibly traveled through voids in the ledge, the dirt floor in the crawl space under the left front corner of the house, and the field stone foundation walls. The gas accumulated in the basement. The ignition source for this gas could not be determined from the many electrical devices within the basement and the first floor.

EXHIBIT 1

National Grid – DOT Report

nationalgrid

Christopher Aronson
Senior Counsel

February 25, 2009

Via Facsimile 202-366-4566
Confirmatory Copy by U.S. Mail

February 25, 2009

Office of Pipeline Safety
Information Resource Manager
1200 New Jersey Avenue.,
SE East Building 2nd Floor (PHP-10),
Room E22-321
Washington, DC 20590

Re: 76 Eastern Avenue, Gloucester, Massachusetts

Dear Information Resource Manager:

Enclosed please find Incident Report-Gas Distribution System regarding the above-captioned matter.

Very truly yours,

Christopher S. Aronson

CSA
Enclosure

NOTICE: This report is required by 49 CFR Part 191. Failure to report can result in a civil penalty not to exceed $100,000 for each violation for each day the violation continues up to a maximum of $1,000,000 for any related series of violations as provided in 49 USC 60122. Form Approved OMB No. 2137-0522

U.S. Department of Transportation
Pipeline and Hazardous Materials Safety Administration

INCIDENT REPORT - GAS DISTRIBUTION SYSTEM

Report Date _____
No. _____ (DOT Use Only)

INSTRUCTIONS

Important: *Please read the separate instructions for completing this form before you begin. They clarify the information requested and provide specific examples. If you do not have a copy of the instructions, you can obtain one from the Office Of Pipeline Safety Web Page at http://ops.dot.gov.*

PART A – GENERAL REPORT INFORMATION Check: **x Original Report** ☐ **Supplemental Report** ☐ **Final Report**

1. Operator Name and Address

a. Operator's 5-digit Identification Number / 1 / 6 / 4 / 0 / /

b. If Operator does not own the pipeline, enter Owner's 5-digit Identification Number / / / / / /

c.

d. Name of Operator Boston Gas Company d/b/a National Grid

e. Operator street address 52 Second Avenue

f. Operator address Waltham, Middlesex County, MA 02451
City, County or Parish, State and Zip Code

2. Time and date of the incident

/ 0 / 8 / 3 / 0 / (hr.) / 0 / 1 / (month) / 2 / 5 / (day) / 0 / 9 (year)

3. Incident Location

a. 76 Eastern Avenue
Street or nearest street or road

b. Gloucester
City and County or Parish

c. Massachusetts 01930
State and Zip Code

d. Latitude: / / / / / / Longitude: / / / / / /
(if not available, see instructions for how to provide specific lo cation)

e. Class location description
O Class 1 X Class 2 O Class 3 O Class 4

f. Incident on Federal Land O Yes X No

4. Type of leak or rupture

O Leak: O Pinhole O Connection Failure *(complete sec. F5)*

Puncture, diameter or cross section *(inches)*____

OX Rupture (if applicable):
X Circumferential – Separation
Longitudinal
- Tear/Crack, length *(inches)* _____
- Propagation Length, total, both sides *(feet)* _____

O N/A
O Other:

5. Consequences *(check and complete all that apply)*

a. Fatality Total number of people: / / / /
Employees: / / / / *General Public:* / / / /
Non-employee Contractors: / / / /

b. ☐X Injury requiring inpatient hospitalization
Total number of people: / / / 1/
Employees: / / / / *General Public:* / / / /
Non-employee Contractors: / / / /

c. X Property damage/loss *(estimated)* Total $400,000
Gas loss $_____ Operator damage $_____
Public/private property damage $_____

d. ☐ Gas ignited X Explosion O No Explosion

e. Gas did not ignite O Explosion O No Explosion

f. X Evacuation *(general public only)* / / / / 5 / people
Evacuation Reason:
O Unknown
O Emergency worker or public official ordered, precautionary
X Threat to the public
O Company policy

6. Elapsed time until area was made safe:
/ / 1 / hr. / 3 / 0 / min.

7. Telephone Report
8 / 9 / 5 / 8 / 1 / 6 (NRC Report Number) / 0 / 1 / (month) / 2 / 5 / (day) / 0 / 9 / (year)

8. a. Estimated pressure at point and time of incident:
0.33 *PSIG*

b. Max. allowable operating pressure *(MAOP): 0.5 PSIG*

c. MAOP established by:
O Test Pressure _____ psig
O 49 CFR § 192. 619 (a)(3)

PART B – PREPARER AND AUTHORIZED SIGNATURE

Christopher S. Aronson, Senior Counsel
(type or print) Preparer's Name and Title

781-907-1854
Area Code and Telephone Number

Christopher.aronson@us.ngrid.com
Preparer's E-mail Address

781-907-1659
Area Code and Facsimile Number

Authorized Signature

(type or print) Name and Title

2/25/09
Date

Area Code and Telephone Number

PART C - ORIGIN OF THE INCIDENT

1. Incident occurred on
   - OX Main
   - O Meter Set
   - Service Line
   - O Other: __
   - O Pressure Limiting and Regulating Facility
2. Failure occurred on
   - X Body of Pipe
   - O Pipe Seam
   - O Joint
   - O Component

   Other: re-check on Grade 3 leak inadvertently damaged gas service line.

3. Material involved *(pipe, fitting, or other component)*
   - O Steel
   - X Cast/Wrought Iron
   - Polyethelene Plastic (complete all items that apply in a-c)
   - O Other Plastic (complete all items that apply in a-c)
   - O Plastic failure was: ☐ a.ductile ☐ b.brittle ☐ c.joint failure
   - O Other material: _____
4. Year the pipe or component which failed was installed: 1911

PART D – MATERIAL SPECIFICATION (if applicable)

1. Nominal pipe size *(NPS)* / / / / 6 in.
2. Wall thickness / / / / / in.
3. Specification _____ SMYS / / / / / /
4. Seam type _____
5. Valve type _____
6. Pipe or valve manufactured by _____ in year / / / / /

PART E – ENVIRONMENT

1. Area of incident
   - O In open ditch
   - O Under pavement
   - O Above ground
   - X Under ground
   - O Under water
   - Inside/under building
   - O Other: _____
2. Depth of cover: 43 inches

PART F – APPARENT CAUSE

Important: There are 25 numbered causes in this section. Check the box to the left of the primary cause of the incident. Check one circle in each of the supplemental items to the right of or below the cause you indicate. See the instructions for this form for guidance.

F1 – CORROSION

If either F1 (1) External Corrosion, or F1 (2) Internal Corrosion is checked, complete all subparts a – e.

1. ☐ External Corrosion
2. ☐ Internal Corrosion

a. Pipe Coating
- O Bare
- O Coated
- O Unknown

b. Visual Examination
- O Localized Pitting
- O General Corrosion
- O Other: _____

c. Cause of Corrosion
- O Galvanic
- O Stray Current
- O Improper Cathodic Protection
- O Microbiological
- O Other: _____

d. Was corroded part of pipeline considered to be under cathodic protection prior to discovering incident?
O No O Yes O Unknown Year Protection Started: / / / / /

e. Was pipe previously damaged in the area of corrosion?
O No O Yes O Unknown How long prior to incident: / / / years / / months

F2 – NATURAL FORCES

3. ☐ Earth Movement ⇒ O Earthquake O Subsidence O Landslide O Other: _____
4. ☐ Lightning
5. ☐ Heavy Rains/Floods ⇒ O Washouts O Flotation O Mudslide O Scouring O Other: _____
6. ☐ Temperature ⇒ O Thermal stress O Frost heave O Frozen components O Other: _____
7. ☐ High Winds

F3 - EXCAVATION

8. Operator Excavation Damage *(including their contractors)* / Not Third Party
9. ☐ Third Party Excavation Damage *(complete a-d)*
   a. Excavator group
      O General Public O Government O Excavator other than Operator/subcontractor
   b. Type: O Road Work O Pipeline O Water O Electric O Sewer O Phone/Cable/Fiber O Landowner O Railroad
      O Building Construction O Other: _____
   c. Did operator get prior notification of excavation activity?
      O No O Yes: Date received: / / mo. / / day / / yr.
      Notification received from: O One Call System O Excavator O General Contractor O Landowner
   d. Was pipeline marked?
      O No O Yes *(If Yes, check applicable items i – iv)*
      i. Temporary markings: O Flags O Stakes O Paint
      ii. Permanent markings: O Yes O No
      iii. Marks were *(check one)* O Accurate O Not Accurate
      iv. Were marks made within required time? O Yes O No

F4 – OTHER OUTSIDE FORCE DAMAGE

10. ☐ Fire/Explosion as primary cause of failure ⇒ Fire/Explosion cause: O Man made O Natural *Describe in Part G*
11. ☐ Car, truck or other vehicle not relating to excavation activity damaging pipe
12. ☐ Rupture of Previously Damaged Pipe
13. ☐ Vandalism

F5 – MATERIAL OR WELDS

Material

14. ☐ Body of Pipe ⇒ O Dent O Gouge O Wrinkle Bend O Arc Burn O Other: _____
15. ☐ Component ⇒ O Valve O Fitting O Vessel O Extruded Outlet O Other: _____
16. ☐ Joint ⇒ O Gasket O O-Ring O Threads O Fusion O Other: _____

Weld

17. ☐ Butt ⇒ O Pipe O Fabrication O Other: _____
18. ☐ Fillet ⇒ O Branch O Hot Tap O Fitting O Repair Sleeve O Other: _____
19. ☐ Pipe Seam ⇒ O LF ERW O DSAW O [illegible]less O Flash Weld
O HF ERW O SAW O Spiral O Other: _____

*Complete a-f if you indicate **any** cause in part F5.*

a. Type of failure:

☐ Construction Defect ⇒ O Poor Workmanship O Procedure not followed O Poor Construction Procedures

☐ Material Defect

b. Was failure due to pipe damage sustained in transportation to the construction or fabrication site? O Yes O No

c. Was part which leaked pressure tested before incident occurred? O Yes, *complete d-f, **if known*** O No

d. Date of test: /__/__/ mo. /__/__/ day /__/__/ yr.

e. Time held at test pressure: /__/__/ hr.

f. Estimated test pressure at point of incident: _____ *PSIG*

F6 – EQUIPMENT OR OPERATIONS

20. ☐ Malfunction of Control/Relief Equipment ⇒ O Valve O Instrumentation O Pressure Regulator O Other: _____
21. ☐ Threads Stripped, Broken Pipe Coupling ⇒ O Nipples O Valve Threads O Mechanical Couplings O Other: _____
22. ☐ Leaking Seals

23. ☐ Incorrect Operation

a. Type: O Inadequate Procedures O Inadequate Safety Practices O Failure to Follow Procedures O Other: _____

b. Number of employees involved in incident who failed post-incident drug test: /__/__/__/ Alcohol test: /__/__/__/

c. Was person involved in incident qualified per OQ rule? O Yes O No d. Hours on duty for person involved: /__/__/

F7 – OTHER

24. Miscellaneous, *describe:* .
25. Unknown

O Investigation Complete X Still Under Investigation *(submit a supplemental report when investigation is complete)*

PART G – NARRATIVE DESCRIPTION OF FACTORS CONTRIBUTING TO THE EVENT *(Attach additional sheets as necessary)*

Six inch broken cast iron main was found in front of 76 Eastern Avenue, Gloucester, Massachuetts. Cause is under investigation.

EXHIBIT 2

National Grid – DPU Incident Report

nationalgrid

D.P.U. INCIDENT REPORT

TODAY'S DATE: February 2, 2009
DATE/TIME OF INCIDENT: 01/25/09 @ 8:30

Mr. Christopher Bourne
Department of Public Utilities
Pipeline Safety and Engineering Division
One South Station
Boston, MA 02110

INCIDENT LOCATION	TYPE OF INCIDENT	# PEOPLE AFFECTED	DATE/TIME CALLED	DOT NOTIFIED
76 Eastern Ave. Gloucester, MA Dispatched @ 08:30 On Site @ 08:47	Leak: X Outage: X Evacuation: X Time Out: Time In:	5	To Dispatch: 0 8:30 To D.P.U.: 09:15 a.m. (Chris Bourne)	Yes __X___ Time 11:45 a.m. ___ No.: 895816

PROBABLE CAUSE: Six inch broken main found in front of 76 Eastern Avenue, Gloucester. Cause is under investigation.

PERSON(S) INJURED	TYPE OF EMERGENCY CARE
Mr. Wayne Sargeant	Taken to hospital.

PROPERTY DAMAGES:

LOCATION OF DAMAGE	TYPE OF DAMAGE
76 Eastern Avenue	House and contents.
74 Eastern Avenue	House-Structural Damage and contents
78 Eastern Avenue	House and contents
77 Eastern Avenue	House
72 Eastern Avenue	Minor damage to house

TOTAL DURATION EVACUATION: The City's of Gloucester engineer determined that 74 Eastern Avenue was not structurally sound and therefore the two adults and two children were not allowed back in the house.
TOTAL DURATION OUTAGE:

EVACUATED BY:
FIRE DEPT. ___X___
POLICE _____
SELF _____
NATIONAL GRID_____

NATIONAL GRID
LEGAL SERVICES
(781) 907-1854

EXHIBIT 3

Gloucester Fire Department Report

A

FDID *	State *	Incident Date (MM DD YYYY) *	Station	Incident Number *	Exposure *
09107	MA	01 25 2009	1	09-0000301	000

☐ Delete ☐ Change ☐ No Activity

NFIRS -1 Basic

B Location*

☐ Check this box to indicate that the address for this incident is provided on the Wildland Fire Module in Section B "Alternative Location Specification". Use only for wildland fires.

Census Tract 2212 - 02

[X] Street address
☐ Intersection
☐ In front of
☐ Rear of
☐ Adjacent to
☐ Directions

Number/Milepost: 76 | Prefix: | Street or highway: Eastern | Street Type: AVE | Suffix:

Apt./Suite/Room: | City: Gloucester | State: MA | Zip Code: 01930 -

Cross street or directions, as applicable

C Incident Type *

111 Building fire

Incident Type

D Aid Given or Received*

1 [X] Mutual aid received
2 ☐ Automatic aid recv.
3 ☐ Mutual aid given
4 ☐ Automatic aid given
5 ☐ Other aid given
N ☐ None

Their FDID: 09092 | Their State:

Their Incident Number:

E1 Date & Times

Midnight is 0000

Check boxes if dates are the same as Alarm Date.

	Month	Day	Year	Hr Min Sec
Alarm * (ALARM always required)	01	25	2009	07:59:12
[X] Arrival * (ARRIVAL required, unless canceled or did not arrive)	01	25	2009	08:03:00
☐ Controlled (CONTROLLED Optional, Except for wildland fires)				
[X] Last Unit Cleared (LAST UNIT CLEARED, required except for wildland fires)	01	26	2009	16:02:00

E2 Shift & Alarms

Local Option

Shift or Platoon: 2 | Alarms: 03 | District: HQ

E3 Special Studies

Local Option

Special Study IDs: | Special Study Value:

F Actions Taken *

11 Extinguishment by fire
Primary Action Taken (1)

Additional Action Taken (2)

Additional Action Taken (3)

G1 Resources *

[X] Check this box and skip this section if an Apparatus or Personnel form is used.

	Apparatus	Personnel
Suppression	0011	0044
EMS		
Other		

☐ Check box if resource counts include aid received resources.

G2 Estimated Dollar Losses & Values

LOSSES: Required for all fires if known. Optional for non fires.

	$			None
Property $		800,	000	☐
Contents $		050,	000	☐

PRE-INCIDENT VALUE: Optional

	$			
Property $	001,	000,	000	☐
Contents $		150,	000	☐

Completed Modules

[X] Fire-2
[X] Structure-3
[X] Civil Fire Cas.-4
☐ Fire Serv. Cas.-5
☐ EMS-6
☐ HazMat-7
☐ Wildland Fire-8
[X] Apparatus-9
[X] Personnel-10
☐ Arson-11

H1 * Casualties ☐ None

	Deaths	Injuries
Fire Service		
Civilian		001

H2 Detector

Required for Confined Fires.

1 ☐ Detector alerted occupants
2 ☐ Detector did not alert them
U [X] Unknown

H3 Hazardous Materials Release

N [X] None
1 ☐ Natural Gas: slow leak, no evacuation or HazMat actions
2 ☐ Propane gas: <21 lb. tank (as in home BBQ grill)
3 ☐ Gasoline: vehicle fuel tank or portable container
4 ☐ Kerosene: fuel burning equipment or portable storage
5 ☐ Diesel fuel/fuel oil: vehicle fuel tank or portable
6 ☐ Household solvents: home/office spill, cleanup only
7 ☐ Motor oil: from engine or portable container
8 ☐ Paint: from paint cans totaling < 55 gallons
0 ☐ Other: Special HazMat actions required or spill > 55gal., Please complete the HazMat form

I Mixed Use Property

NN [X] Not Mixed
10 ☐ Assembly use
20 ☐ Education use
33 ☐ Medical use
40 ☐ Residential use
51 ☐ Row of stores
53 ☐ Enclosed mall
58 ☐ Bus. & Residential
59 ☐ Office use
60 ☐ Industrial use
63 ☐ Military use
65 ☐ Farm use
00 ☐ Other mixed use

J Property Use* Structures

131 ☐ Church, place of worship
161 ☐ Restaurant or cafeteria
162 ☐ Bar/Tavern or nightclub
213 ☐ Elementary school or kindergarten
215 ☐ High school or junior high
241 ☐ College, adult education
311 ☐ Care facility for the aged
331 ☐ Hospital
341 ☐ Clinic, clinic type infirmary
342 ☐ Doctor/dentist office
361 ☐ Prison or jail, not juvenile
419 [X] 1-or 2-family dwelling
429 ☐ Multi-family dwelling
439 ☐ Rooming/boarding house
449 ☐ Commercial hotel or motel
459 ☐ Residential, board and care
464 ☐ Dormitory/barracks
519 ☐ Food and beverage sales
539 ☐ Household goods, sales, repairs
579 ☐ Motor vehicle/boat sales/repair
571 ☐ Gas or service station
599 ☐ Business office
615 ☐ Electric generating plant
629 ☐ Laboratory/science lab
700 ☐ Manufacturing plant
819 ☐ Livestock/poultry storage (barn)
882 ☐ Non-residential parking garage
891 ☐ Warehouse

Outside

124 ☐ Playground or park
655 ☐ Crops or orchard
669 ☐ Forest (timberland)
807 ☐ Outdoor storage area
919 ☐ Dump or sanitary landfill
931 ☐ Open land or field
936 ☐ Vacant lot
938 ☐ Graded/care for plot of land
946 ☐ Lake, river, stream
951 ☐ Railroad right of way
960 ☐ Other street
961 ☐ Highway/divided highway
962 ☐ Residential street/driveway
981 ☐ Construction site
984 ☐ Industrial plant yard

Lookup and enter a Property Use code only if you have NOT checked a Property Use box:

Property Use 419

1 or 2 family dwelling

NFIRS-1 Revision 03/11/99

K1 Person/Entity Involved

Local Option

Business name (if applicable) | Area Code | Phone Number

☐ Check This Box if same address as incident location. Then skip the three duplicate address lines. -

Mr.,Ms., Mrs. | First Name: Wayne | MI | Last Name: Sargent | Suffix

Number | Prefix | Street or Highway | Street Type | Suffix

Post Office Box | Apt./Suite/Room | City

State | Zip Code

☐ More people involved? Check this box and attach Supplemental Forms (NFIRS-1S) as necessary

K2 Owner

Local Option

☐ Same as person involved? Then check this box and skip The rest of this section.

Business name (if Applicable) | Area Code | Phone Number

☐ Check this box if same address as incident location. Then skip the three duplicate address lines.

Mr.,Ms., Mrs. | First Name | MI | Last Name | Suffix

Number | Prefix | Street or Highway | Street Type | Suffix

Post Office Box | Apt./Suite/Room | City

State | Zip Code

L Remarks

Local Option

Several calls were received reporting a house explosion at 76 Eastern Ave. Upon arrival the 2 story single family residence was found to be almost leveled with heavy fire showing from the rubble and fire extending to the houses on either side at 74 and 78 Eastern Ave. The resident of 76 Eastern Ave., Wayne Sargent, was found in the street in front of his house being assisted by police officers Joseph Aiello and Steven Mizzoni. Rescue 1 was assigned to treat the victim and Med flight was requested. Upon initial size up of the incident a 2nd alarm was requested and Engine 4 was ordered to lay a 4" hydrant supply line from the corner of Williams Ct. to the front of the building. Ladder 2 was assigned to the front of the building and numerous hose lines were stretched to 74 and 78 Eastern Ave. to knock down the exterior fires impinging on these buildings and to evacuate any remaining residents. Engine 6 from West Gloucester assisted in establishing a water supply and Engine 3 from Bay View arrived and was assigned to establish a water supply in front of 78 Eastern Ave. Master streams were established onto the building of origin at 76 Eastern Ave. and a 3rd alarm was requested for more manpower, apparatus and equipment due to the threat of extension, frigid weather conditions, and numerous reports of odors of natural gas from residents in the neighborhood. National Grid was requested to the scene to secure gas and electricity in the area. Rockport Engine 1 was assigned to the Medflight landing zone at O'Maley School and Essex Ladder 1 was positioned between 78 and 80 Eastern Ave. to prevent further fire extension if needed. Once the exterior fire impinging on the exposure buildings were knocked down crews entered those buildings to check for extension. Residents were evacuated from the houses west of 74 Eastern Ave, and east of 78 Eastern Ave. A command post was established in the front of 74 Eastern Ave. utilizing Car 2 with Capt. Fuller assigned Operations/Logistics, Capt. Aptt assigned Accountability, Chief McKay assigned Public Informations Officer/Liaison, Firefighter MacArthur assigned Safety and myself as Incident

L Authorization

Officer in charge ID	Signature	Position or rank	Assignment	Month	Day	Year
02543	Aiello, Stephen M	DC		01	25	2009

Check Box if same as Officer in charge.	Member making report ID	Signature	Position or rank	Assignment	Month	Day	Year
[X]	02543	Aiello, Stephen M	DC		01	25	2009

FDID *	State *	MM	DD	YYYY	Incident Date *	Station	Incident Number *	Exposure *	
09107	MA	1	25	2009		1	09-0000301	000	Complete Narrative

Narrative:

Several calls were received reporting a house explosion at 76 Eastern Ave. Upon arrival the 2 story single family residence was found to be almost leveled with heavy fire showing from the rubble and fire extending to the houses on either side at 74 and 78 Eastern Ave. The resident of 76 Eastern Ave., Wayne Sargent, was found in the street in front of his house being assisted by police officers Joseph Aiello and Steven Mizzoni. Rescue 1 was assigned to treat the victim and Med flight was requested. Upon initial size up of the incident a 2nd alarm was requested and Engine 4 was ordered to lay a 4" hydrant supply line from the corner of Williams Ct. to the front of the building. Ladder 2 was assigned to the front of the building and numerous hose lines were stretched to 74 and 78 Eastern Ave. to knock down the exterior fires impinging on these buildings and to evacuate any remaining residents. Engine 6 from West Gloucester assisted in establishing a water supply and Engine 3 from Bay View arrived and was assigned to establish a water supply in front of 78 Eastern Ave. Master streams were established onto the building of origin at 76 Eastern Ave. and a 3rd alarm was requested for more manpower, apparatus and equipment due to the threat of extension, frigid weather conditions, and numerous reports of odors of natural gas from residents in the neighborhood. National Grid was requested to the scene to secure gas and electricity in the area. Rockport Engine 1 was assigned to the Medflight landing zone at O'Maley School and Essex Ladder 1 was positioned between 78 and 80 Eastern Ave. to prevent further fire extension if needed. Once the exterior fire impinging on the exposure buildings were knocked down crews entered those buildings to check for extension. Residents were evacuated from the houses west of 74 Eastern Ave, and east of 78 Eastern Ave. A command post was established in the front of 74 Eastern Ave. utilizing Car 2 with Capt. Fuller assigned Operations/Logistics, Capt. Aptt assigned Accountability, Chief McKay assigned Public Informations Officer/Liaison, Firefighter MacArthur assigned Safety and myself as Incident Commander. An Incident Action Plan was created and the goals and objectives were incident mitigation including prevention of any further explosions/injuries, extinguishment of the fire, securing the scene for investigators, securing the surrounding damaged homes to limit property damage/loss, and salvage. Rehab 5 arrived on scene and established Rehab on the corner of Hartz St. and Eastern Ave. Firefighting crews continued to pour water onto the fire while other crews investigated reports of natural gas from the areas of 114 Eastern Ave., Dove Lane, Adams Place and Harrison Ave. Rockport Engine 1 was dispatched to the Harrison Ave. area to investigate several reports of natural gas odors and they reported a strong odor of natural gas coming from a catch basin. As National Grid personnel arrived on scene they were assigned to work with firefighters to secure gas and electric service in the area and on a search of the neighborhood for other possible gas leaks. Several houses in the immediate area were ventilated after readings of natural gas were detected in or near them. Personnel from the Water and Sewer Departments of the Gloucester Department of Public Works were requested and they arrived on scene to assist National Grid in securing water service to the houses with no electricity and in locating the water and sewer mains on Eastern Ave. and Harrison Ave. As off duty firefighting personnel arrived on scene on duty personnel were released. Deputy Chief Dench was assigned Operations, Capt. Tom LoGrande was assigned Safety, and Capt. Parsons was assigned Safety. Representatives of the State Fire Marshall's Office arrived on scene and Capt. Parsons was assigned to work as a liaison between the Fire Department, Fire Marshall's Office, and National Grid. Utilizing their leak detection equipment National Grid unearthed a break in the 6" gas main in front of 76 Eastern Ave. Firefighters were standing by with charged hose lines while National Grid searched for the leak and made repairs to the gas main. National Grid crews and firefighters continued to monitor the exposures for any signs of natural gas in the atmosphere while firefighters continued to pour water onto the remnants of the structure at 76 Eastern Ave. The explosion leveled the building of origin at 76 Eastern Ave, and seriously damaged the immediate exposure buildings at 74 and 78 Eastern

FDID *	State *	MM	DD	YYYY	Station	Incident Number *	Exposure *	Complete Narrative
09107	MA	1	25	2009	1	09-0000301	000	

Incident Date *

Narrative:

Ave. There was also minor damage to several other building in the neighborhood. It was now approximately 15:30 and I transferred command to Deputy Chief Dench so I could attend a briefing in the Mayor's office.

1/26/09 Deputy Chief Stephen Aiello

As of 1/29/09 investigators from the State Fire Marshall's Office and the Gloucester Police and Fire Departments have determined that the explosion was caused by gas from the leak in the 6" gas main entering the structure at 76 Eastern Ave. and being ignited by an unknown ignition source.

1/29/09 Deputy Chief Stephen Aiello

A

FDID *	State *	Incident Date * (MM DD YYYY)	Station	Incident Number *	Exposure *
09107	MA	01 25 2009	1	09-0000301	000

☐ Delete ☐ Change ☐ No Activity

NFIRS -2 Fire

B Property Details

B1 0001 ☐ Not Residential
Estimated Number of residential living units in building of origin whether or not all units became involved

B2 002 ☐ Buildings not involved
Number of buildings involved

B3 Acres burned (outside fires) [X] None ☐ Less than one acre

C On-Site Materials or Products [X] None

Complete if there were any significant amounts of commercial, industrial, energy or agricultural products or materials on the Property, whether or not they became involved

Enter up to three codes. Check one or more boxes for each code entered.

On-site material (1): NNN None
1 ☐ Bulk storage or warehousing
2 ☐ Processing or manufacturing
3 ☐ Packaged goods for sale
4 ☐ Repair or service

On-site material (2):
1 ☐ Bulk storage or warehousing
2 ☐ Processing or manufacturing
3 ☐ Packaged goods for sale
4 ☐ Repair or service

On-site material (3):
1 ☐ Bulk storage or warehousing
2 ☐ Processing or manufacturing
3 ☐ Packaged goods for sale
4 ☐ Repair or service

D Ignition

D1 UU Undetermined — Area of fire origin *

D2 UU Undetermined — Heat source *

D3 65 Flammable liquid/gas - — Item first ignited *
1 ☐ Check box if fire spread was confined to object of origin

D4 11 Natural gas — Type of material first ignited
Required only if item first ignited code is 00 or <70

E1 Cause of Ignition

☐ Check box if this is an exposure report. Skip to section G

1 ☐ Intentional
2 [X] Unintentional
3 ☐ Failure of equipment or heat source
4 ☐ Act of nature
5 ☐ Cause under investigation
U ☐ Cause undetermined after investigation

E2 Factors Contributing To Ignition

[X] None

Factor Contributing To Ignition (1): NN None

Factor Contributing To Ignition (2):

E3 Human Factors Contributing To Ignition

Check all applicable boxes [X] None

1 ☐ Asleep
2 ☐ Possibly impaired by alcohol or drugs
3 ☐ Unattended person
4 ☐ Possibly mental disabled
5 ☐ Physically Disabled
6 ☐ Multiple persons involved
7 ☐ Age was a factor

Estimated age of person envolved

1 ☐ Male 2 ☐ Female

F1 Equipment Involved In Ignition

[X] None If Equipment was not involved, Skip to Section G

Equipment Involved: NNN None

Brand

Model

Serial #

Year

F2 Equipment Power

Equipment Power Source

F3 Equipment Portability

1 ☐ Portable
2 ☐ Stationary

Portable equipment normally can be moved by one person, is designed to be use in multiple locations, and requires no tools to install.

G Fire Suppression Factors

Enter up to three codes. [X] None

Fire suppression factor (1): NNN None

Fire suppression factor (2)

Fire suppression factor (3)

H1 Mobile Property Involved

[X] None

1 ☐ Not involved in ignition, but burned
2 ☐ Involved in ignition, but did not burn
3 ☐ Involved in ignition and burned

H2 Mobile Property Type & Make

Mobile property type: NN None

Mobile property make

Moblie property model

Year

License Plate Number

State

VIN Number

Local Use

☐ Pre-Fire Plan Available

Some of the information presented in this report may be based upon reports from other Agencies

☐ Arson report attached
☐ Police report attached
☐ Coroner report attached
☐ Other reports attached

I1 Structure Type *
If Fire was In enclosed building or a portable/mobile structure complete the rest of this form

1 [X] Enclosed Building
2 [ ] Portable/mobile structure
3 [ ] Open structure
4 [ ] Air supported structure
5 [ ] Tent
6 [ ] Open platform (e.g. piers)
7 [ ] Underground structure (work areas)
8 [ ] Connective structure (e.g. fences)
0 [ ] Other type of structure

I2 Building Status *

1 [ ] Under construction
2 [X] Occupied & operating
3 [ ] Idle, not routinely used
4 [ ] Under major renovation
5 [ ] Vacant and secured
6 [ ] Vacant and unsecured
7 [ ] Being demolished
0 [ ] Other
U [ ] Undetermined

I3 Building * Height
Count the ROOF as part of the highest story

002 Total number of stories at or above grade

[ ] Total number of stories below grade

I4 Main Floor Size*

NFIRS-3 Structure Fire

[ ] , [ ] [960] Total square feet

OR

[ ] , [040] BY [ ] , [024]
Lenght in feet — Width in feet

J1 Fire Origin *

[001] Story of fire origin

[ ] Below Grade

J2 Fire Spread *

1 [ ] Confined to object of origin
2 [ ] Confined to room of origin
3 [ ] Confined to floor of origin
4 [ ] Confined to building of origin
5 [X] Beyond building of origin

J3 Number of Stories Damaged By Flame
Count the ROOF as part of the highest story

[ ] Number of stories w/ minor damage (1 to 24% flame damage)

[ ] Number of stories w/ significant damage (25 to 49% flame damage)

[ ] Number of stories w/ heavy damage (50 to 74% flame damage)

[002] Number of stories w/ extreme damage (75 to 100% flame damage)

K Material Contributing Most To Flame Spread

[ ] Check if no flame spread OR same as material first ignited OR unable to determine — Skip To Section L

K1 [UU] Undetermined
Item contributing most to flame spread

K2 [UU] Undetermined
Type of material contributing most of flame spread — Required only if item contributing code is 00 or<70

L1 Presence of Detectors *
(In area of the fire)

N [ ] None Present — Skip to section M
1 [ ] Present
U [X] Undetermined

L2 Detector Type

1 [ ] Smoke
2 [ ] Heat
3 [ ] Combination smoke - heat
4 [ ] Sprinkler, water flow detection
5 [ ] More than 1 type present
0 [ ] Other _____
U [ ] Undetermined

L3 Detector Power Supply

1 [ ] Battery only
2 [ ] Hardwire only
3 [ ] Plug in
4 [ ] Hardwire with battery
5 [ ] Plug in with battery
6 [ ] Mechanical
7 [ ] Multple detectors & power supplies
0 [ ] Other _____
U [X] Undetermined

L4 Detector Operation

1 [ ] Fire too small to activate
2 [ ] Operated (Complete Section L5)
3 [ ] Failed to Operate (Complete Section L6)
U [X] Undetermined

L5 Detector Effectiveness
Required if detector operated

1 [ ] Alerted Occupants, occupants responded
2 [ ] Occupants failed to respond
3 [ ] There were no occupants
4 [ ] Failed to alert occupants
U [ ] Undetermined

L6 Detector Failure Reason
Required if detector failed to operate

1 [ ] Power failure, shutoff or disconnect
2 [ ] Improper installation or placement
3 [ ] Defective
4 [ ] Lack of maintenance, includes cleaning
5 [ ] Battery missing or disconnected
6 [ ] Battery discharged or dead
0 [ ] Other _____
U [ ] Undetermined

M1 Presence of Automatic Extinguishment System *

N [X] None Present
1 [ ] Present — Complete rest of Section M

M2 Type of Automatic Extinguishment System *
Required if fire was within designed range of AES

1 [ ] Wet pipe sprinkler
2 [ ] Dry pipe sprinkler
3 [ ] Other sprinkler system
4 [ ] Dry chemical system
5 [ ] Foam system
6 [ ] Halogen type system
7 [ ] Carbon dioxide (CO_2) system
0 [ ] Other special hazard system
U [ ] Undetermined

M3 Automatic Extinguishment System Operation
Required if fire was within designed range

1 [ ] Operated & effective (Go to M4)
2 [ ] Operated & not effective (M4)
3 [ ] Fire too small to activate
4 [ ] Failed to operate (Go to M5)
0 [ ] Other
U [ ] Undetermined

M4 Number of Sprinkler Heads Operating
Required if system operated

[ ] Number of sprinkler heads operating

M5 Automatic Extinguishment System Failure Reason
Required if system failed

1 [ ] System shut off
2 [ ] Not enough agent discharged
3 [ ] Agent discharged but did not reach fire
4 [ ] Wrong type of system
5 [ ] Fire not in area protected
6 [ ] System components damaged
7 [ ] Lack of maintenance
8 [ ] Manual Intervention
0 [ ] Other _____
U [ ] Undetermined

EXHIBIT 4

DPU Investigator Notes

To: Chris Bourne, William Stevens

From: Jorge Santi

Date: January 27, 2009

Re: 76 Eastern Ave. Gloucester

Chris Bourne requested that I report to 76 Eastern Ave. Gloucester and assist Rob McCabe to investigate a potential incident involving natural gas.

Sunday January 25, 2009

Upon arrival we met with National Grid personnel; John Higgins, Moe Sarno and Gary Bennet who provided us a status update regarding the incident. We found that the house had been demolished and was smoldering as the Gloucester Fire Department had extinguished the fire. National Grid personnel explained that they had been notified of the incident at approximately 0945 hrs. via their Emergency Notification procedure.

Moe Sarno explained that as he was receiving the notification he was also being updated by supervisor Wayne Duecker who was onsite and was told that the home had been demolished and was on fire. Upon our arrival National Grid personnel were in the process of pinpointing the gas leak and were barring over the main to locate the source of the leak. The bar holes were producing high gas readings and to better pinpoint the leak source they were aerated.

We were informed that service technicians had been dispatched across the neighborhood to perform an area check and inspect buildings to check for potential gas accumulation. At the time of arrival we were informed that readings had been attained at 74, 72 and 77 Eastern Ave. and were being vented and monitored by National Grid personnel also 74 and 78 Eastern Ave. had been evacuated due to the damage sustained by the explosion.

Gas readings had also been attained at a manhole on Adams Pl. this street ran parallel to Eastern Ave. and was located at higher altitude and as such gas had migrated to this street via sewer lines that ran from Eastern Ave. to Adams Pl. The gas readings attained at the manhole was 6% gas. Several manhole covers on Eastern Ave. had been pried open to allow gas to vent to the atmosphere.

We asked for a review of the areas that had been leak surveyed and were informed that on Eastern Ave. the survey area was from approximately Hartz St. to a short distance beyond Elizabeth Rd. We requested that they expand the survey area on Eastern Ave. as the area that had been surveyed was not sufficient, in particular because this location was the high point of several streets.

National Grid personnel explained that the survey process and area check of buildings within the neighborhood was still ongoing but they initiated our request to further expand the survey area on Eastern Ave. We asked if any other leaks had been found during the survey and were told that a leak at 3 Elizabeth Rd. had been found and it was thought to be a leak on the gas service. Another leak was found at the intersection of Eastern Ave and Elizabeth Rd. which was a grade 2 leak.

Moe Sarno was asked to acquire odorant levels at the time of the incident and he informed us that the testing had been performed and the odorant levels were found to be within tolerance.

We introduced ourselves to the Gloucester Fire Chief, Police Lieutenant and Massachusetts State Police Fire and Explosion Investigation Section Troopers Stephen J. Cunningham and Peter Cummings to provide our assistance in the investigation process. The troopers spoke to us and asked us to work with National Grid to secure the leak and to provide them information as gathered. We reviewed the findings to date and explained what measures would be taken to secure the leak as well as additional investigatory actions.

Also onsite was the Mayor of Gloucester Carolyn Kirk and Bruce Tarr Sate Senator and Representative (name) they explained that neighbors had concerns about the condition of the gas main as gas leaks had been reported in the area and the residents felt that National Grid had not addressed them appropriately. They informed us that a meeting would be conducted at City Hall later in the afternoon to provide a status update and maintain the residents informed. We were asked if we could participate in the meeting and we explained that we would speak with our Director to get direction.

The Mayor also wanted to acquire information regarding gas mains and repair activities under taken by National Grid and I explained that due to the ongoing investigation that information requests would be addressed by our counsel and explained that Bill Stevens would be the person responsible for addressing those concerns. We explained that gas companies have Federal and State codes that they must adhere to and that as inspectors we oversee operator's daily activities and would be doing so here to ensure that repairs and investigations were completed appropriately.

After speaking with Chris Bourne and acquiring approval to attend the meeting Rob McCabe departed the site and I stayed to observe the repair activities and provide a presence to the State Troopers and Fire Department.

National Grid pinpointed the leak and began to excavate, when the gas main was exposed a circumferential crack was found on the 6" CI low pressure main that also involved the 1¼" BS service and tee supplying gas to 77 Eastern Ave. To secure the leak the service tee had to be removed from the main to allow for the installation of a clamp, we asked National Grid to cut the service line approximately one foot away from the tee and then to unthread the tee off the main with the small section of the service attached. The tee and section of service pipe was held to for evidentiary purposes by the State police Troopers.

At 1615 hrs National Grid personnel installed a clamp over the main break to secure the leak. They wanted to tap the main for a new tee location for the gas service to 77 Eastern Ave. in an area adjacent to the main break. We instructed them not to, as the cracked section of main, was going to be removed for analysis and we did not want it to be compromised. Since tapping the main was not an option, a Servi-Seal clamp would be required to both secure the leak and provide a tap for the service to 77 Eastern Ave. To allow for the installation of this clamp the crew had to clear away a large piece of ledge that was residing directly below the section of main that cracked.

During the course of the incident the gas service to 76 Eastern Ave. had not been shut off as there was no service valve installed. The focus of National Grid personnel was to secure the leak and to allow the gas service to vent. An additional crew was called in to begin the process of digging out the street to expose the main and service to allow for the service to be cut-off at the main. The crew exposed a 1½" coated steel service, it was cut, the tee removed and the main and service were plugged. The State police Troopers also took these materials and will hold them as evidence.

The gas service to 74 Eastern Ave. was also cut off at the main as the building had been deemed uninhabitable by the State Troopers. National Grid exposed the gas main and service and cut and capped both. The trench was backfilled with gravel and left at street grade.

The trenches over the main break and the service location for 76 Eastern Ave. were both steel plated overnight. We spoke with State Troopers Cummings and Cunningham to review the actions taken and our findings to date, they told us that on Monday they would begin the process of removing debris to continue their investigation and requested our presence.

Monday, January 26, 2009

When we arrived onsite we met with State Troopers Cummings and Cunningham and discussed the activities that would take place. We explained that we wanted to pressure test the gas service to 76 Eastern Ave. and would need to expose the gas service inside the foundation wall to shut the service cock off and plug or cap the service as required to perform the pressure test.

A machine arrived onsite that had been facilitated by the Town of Gloucester and debris from the right front corner of the building was removed as the Troopers worked inside the foundation to expose the gas service. The gas service, meter and inside piping was found intact to the outlet of the meter. It appeared that as the building collapsed the inside piping broke off at an elbow above the meter outlet. The meter assembly and piping were bent over at a 90◦ angle as it turned the tee on the service.

National Grid personnel prepared a pressure test assembly that was placed on the service in the trench. State Trooper Cummings shut the service cock off inside the basement and 10 lbs. of air pressure was introduced into the service to determine if the piping was tight. The test did not hold and the fittings in the basement were soaped that showed a leak on the nipple attached to the tee and service cock.

State Trooper Cummings was asked to cut the gas pipe above the service cock with a cutter. He cut the pipe and then removed the service cock from the tee that had the leaking nipple and small section of pipe below the cut still attached. The service tee was plugged with a steel plug and again 10 lbs. air pressure was introduced all the fittings and gas service piping in the foundation wall were soaped and no leaks were present. The pressure test assembly was also soap tested and the pressure test at 10 lbs. held for 17 minutes. Upon completion of this test the pressure was increased to 90 lbs. and again all fittings were soap tested, this test also held for 18 minutes and we determined that the gas service to 76 Eastern Ave. was not leaking.

We conveyed our findings to the State Troopers and noted that we wanted to allow National Grid to backfill the service trench if the Troopers did not have any other requests regarding the service. They did not have any concerns regarding the service and the trench was backfilled and compacted with gravel.

The trench involving the cracked section of main was also backfilled. The gas main was padded by hand with gravel to a level of one foot above the main and then two plates were placed over the main, one plate ran above the main and the other was perpendicular to the main to allow for protection of the main during the backfilling and compacting process.

The Troopers continued their investigation and were attempting to identify the source of ignition. They removed debris and exposed the water heater, house heater, gas range and customer piping that utilized sections of CSST (corrugate stainless steel tubing) pipe that supplied gas to the range and another gas appliance that was not identified.

In the afternoon the Troopers stopped their investigation and explained that they would continue with an interview of the home owner as soon as the person was available to speak with them. The gas piping removed from the incident scene was held onto by the Troopers and would be released after they concluded their investigation.

Bill Stevens arrived in the morning and we reviewed our findings with him. He assisted by acquiring maps of the neighborhood that showed the sewer laterals. We introduced him to the Mayor and she explained that another meeting would be held in the afternoon to provide updates to the Town managers and abutters. Rob McCabe and Bill Stevens attended the meeting and I stayed at the incident site.

EXHIBIT 5

National Grid Leak Repair List

GLOUCESTER LEAK REPAIRS

DATE REC	work order	GRADE	SOURCE	ADDRESS	Target repair week	Repair date	REPAIR MADE
01/25/09	643667	2	Survey Special	237 E Main St		31-Jan	6'' joint repair 2psig
01/25/09	643681	2	Survey Special	131 Western Ave		01/29/2009	12'' joint repair LP
01/25/09	643683	2	Survey Special	131 Western Ave		01/26/2009	leak repaired under wo#643681
01/25/09	643686	2	Survey Special	32 Webster St		01/26/2009	6'' joint repair LP
01/25/09	643774	2	Survey Special	79 Eastern Ave		01/26/2009	3'' joint repair LP
01/25/09	643881	2	Survey Special	14 Elizabeth Rd		01/28/2009	service inserted
01/25/09	643675	2	Survey Special	128 Western Ave		01/30/2009	joint repair 12'' LP
01/25/09	643881	2	employee	11 Addison St		01/28/2009	CALLED OFF
01/25/09	643582	1	public	77 Eastern Ave		01/27/2009	CALLED OFF
01/25/09	643586	1	public	4 Lantern Ln		01/25/2009	installed 3 full clamps 2'' 2PSIG
01/25/09	643588	1	public	3 Elizabeth Rd		01/25/2009	joint repair 3'' LP
01/25/09	643593	1	public	77 Eastern Ave		01/27/2009	reconnected service
01/25/09	643594	1	public	74 Eastern Ave		01/26/2009	cut-off service
01/25/09	643595	1	WINTER SURVEY	Poplar St		01/26/2009	full clamp 4'' HP
01/25/09	643596	1	public	76 Eastern Ave		01/26/2009	broken main 6'' LP
01/25/09	643597	1	WINTER SURVEY	3 Highland Ct		01/26/2009	service inserted
01/25/09	643598	1	WINTER SURVEY	12 Addison St		01/27/2009	service clamped
01/26/09	643961	3	WINTER SURVEY	3 Ferry St	07-Mar		
01/26/09	643568	3	WINTER SURVEY	32 School St		02/09/2009	repaired with grade 1 645887 3'' LP
01/26/09	643892	2	employee	1 Beach Rd		01/31/2009	joint repair 6'' IP
01/26/09	643864	1	public	4 Lantern Ln		01/27/2009	installed 6 full clamps 2'' 2 PSIG
01/27/09	644085	2	employee	32 Patriots Cir	24-Feb		
01/27/09	644241	2	WINTER SURVEY	171 Atlantic Rd		02/09/2009	full seal clamp leaking 2'' IP
01/27/09	644245	3	WINTER SURVEY	114 Prospect St	24-Feb		
01/27/09	644269	3	WINTER SURVEY	19 Ferry St	24-Feb		
01/27/09	644271	3	WINTER SURVEY	29 Centennial Ave	24-Feb		
01/27/09	644273	3	WINTER SURVEY	2 Hodgkins St	07-Mar		
01/27/09	643991	1	public	4 Lantern Ln		01/28/2009	full clamp 2'' 2 PSIG
01/27/09	644031	1	public	88 Pleasant St		01/27/2009	joint 8'' IP
01/27/09	644151	3	employee	111 Gloucester Ave		02/01/2009	tightened dresser couplings 2'' BS HP
01/28/09	644298	3	WINTER SURVEY	376 Washington St	24-Feb		
01/29/09	644660	3	WINTER SURVEY	105 Washington St	24-Feb		
01/29/09	234312	2	WINTER SURVEY	13 Atlantic Rd		02/07/2009	3 way tee, repaired 3 joints at tee 6'' IP

GLOUCESTER LEAK REPAIRS

DATE REC	work order	GRADE	SOURCE	ADDRESS	Target repair week	Repair date	REPAIR MADE
01/29/09	644484	2	WINTER SURVEY	227 E Main St		02/07/2009	leak called off, residual gas from 237 E Main St, Glo
01/29/09	644367	1	public	10 Starknaught Hts		01/30/2009	partial service insert
01/30/09	644526	1	employee	10 Starknaught Hts		01/31/2009	partial service insert
01/30/09	644657	2	WINTER SURVEY	18 Acacia St		02/08/2009	inserted service & Joint 4'' LP
01/30/09	644659	3	WINTER SURVEY	109 Western Ave	07-Mar		
01/30/09	644813	3	employee	61 High Popples Rd	07-Mar		
01/31/09	644721	2	WINTER SURVEY	27 Webster St		02/14/2009	6" joint repair LP
01/31/09	644704	1	employee	8 Lantern Ln		02/14/2009	relay service
01/31/09	644702	1	WINTER SURVEY	207 Main st. (rogers)		02/01/2009	2" HP service (dresser) & a buried service valve leaking
01/31/09	644720	2	WINTER SURVEY	69 Atlantic Rd		02/08/2009	repaired with grade 1 #645881 4'' CLAMP BS IP
02/01/09	644799	3	employee	13 Starknaught Hts	07-Mar		
02/01/09	644805	3	employee	61 Witham St	07-Mar		
02/01/09	644809	3	WINTER SURVEY	19 Commonwealth Ave		02/17/2009	inserted service
02/01/09	644806	2	WINTER SURVEY	25 Commonwealth Ave		02/15/2009	repaired 3- 3" joints LP
02/01/09	644906	3	employee	8 Beach Rd	07-Mar		
02/01/09	644802	3	public	14 Starknaught Hts		02/04/2009	turtled leaking coupling 2'' BS IP
02/02/09	644929	1	WINTER SURVEY	9 Winchester Ct		02/02/2009	joint repair 3'' LP
02/02/09	644880	1	WINTER SURVEY	36 Derby St		02/02/2009	joint repair 8'' LP
02/02/09	644727	1	employee	10 Starknaught Hts		02/03/2009	coupling leaking 2'' BS 2 PSIG
02/02/09	646036	3	WINTER SURVEY	840 Washington St	07-Mar		
02/02/09	645137	3	employee	12 Abbott St	07-Mar		
02/02/09	645330	2	employee	17 St Louis Ave		02/10/2009	6" joint repair LP

EXHIBIT 6

Photographs
76 Eastern Avenue; Broken Main;
House Heater and Water Heater


4-16-2009


JAN 25 2009

EXHIBIT 7

Gas Main Information

Information Request PL 1-4

Respondent: Fred Amaral/Eileen Ormond

Request: Provide records for the main on Eastern Avenue, including but not limited to, installation date, MAOP, leak history from January 1, 2006 to January 24, 2009 and operating pressure at the time of the Incident

Response: The 6 inch cast iron main in Eastern Avenue in Gloucester was installed in 1911. The MAOP is 14 inches water column, also known as low pressure. The operating pressure at the time of the Incident on January 25, 2009 was between 9 and 9.5 inches water column. The leak history from January 1, 2006 to January 24, 2009 is attached as Exhibit PL 1-4

EXHIBIT 8

Gas Service Information

GAS SERVICE RECORD

FG-10836.NG Rev. 1/2008

SERVICE ADDRESS	NO: 76	STREET: Eastern Av	TOWN: Gloucester	STATE: MA
SERVICE TAP STREET	STREET:		DATE: 1/25/09	SERVICE ID #: 248613
CREW LEADER: M. Foley	WORK ORDER #: 643596	TASK #: 8101	GRID # OR REG. #: MAR 12 2009	

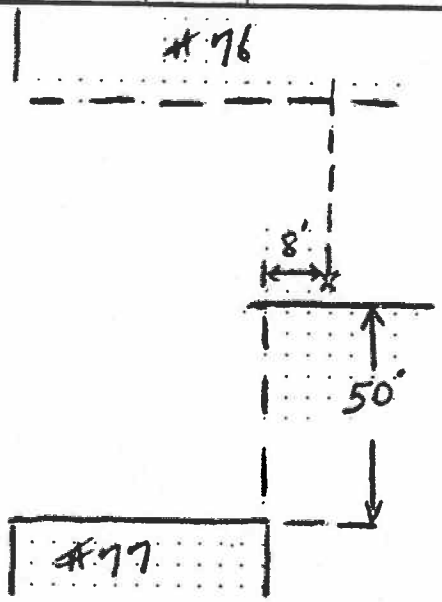
WORK PERFORMED: NEW ☐ STUB ☐ STUB EXT ☐ INSERT ☐ RELAY ☐ RELOCATE ☐ TRANSFER ☐

SERVICE DATA	SIZE	MATERIAL	FOOTAGE	TAP SIZE	MAIN DATA	SIZE	MATERIAL	PRESSURE	COVER
MAIN TO: ☐ PROP LINE ☐ CURB LINE ☐ VALVE									
☐ PROP LINE ☐ CURB LINE ☐ VALVE TO RISER				COVER	PRESSURE TEST	HRS	MIN	PRESSURE	

METER LOCATION	SERVICE VALVE INSTALLED	EXCESS FLOW VALVE INSTALLED	CATHODIC PROTECTION: TEST STA. INSTALLED	ANODES	ANODE LOCATION	INSULATED
IN ☐ OUT ☐	YES ☐ NO ☐	YES ☐ ____ CFH NO ☐	YES ☐ NO ☐	QUANTITY ____ SIZE ____	RISER ☐ MAIN ☐	MAIN ☐ RISER ☐ METER ☐ ANODELESS RISER ☐

PIPE LOT #: | SDR #: | COMMENTS:

ABANDONED	SIZE	MATERIAL	FOOTAGE	ABANDONED	SIZE	MATERIAL	FOOTAGE
MAIN TO: ☐ PROP LINE ☐ CURB LINE ☐ VALVE	1½	CS	15	☐ PROP LINE ☐ CURB LINE ☐ VALVE TO RISER			
☒ AT MAIN. ☐ OTHER	ORIG. INSTALL YEAR		1960		ORIG. INSTALL YEAR		



MEASUREMENTS: P.O.E. LOC.: ☐ MAIN TO BLDG: ☐ TAP LOCATION: ☐ MAIN LOCATION: ☐ VALVE LOCATION: ☐ OFFSET MEASUREMENT: ☐

EXHIBIT 9

Photographs
76 Eastern Avenue (Post Incident);
Excavation for Broken Main;
Gas Service to 76 Eastern Avenue

EXHIBIT 10

Leak Survey Schedule

Information Request PL 1-5

Respondent: Lisa Gentile/Ernie Grasso

Request: Please provide the Division with all documentation memorializing the leakage surveys conducted on Eastern Avenue from December 1, 2005 to January 24, 2009, pursuant to National Grid's Winter Patrol Procedures. Include in your response a copy of the Operator's Winter Patrol Procedures.

Response: Below please find a summary of National Grid's leak surveys conducted on Eastern Avenue from December 1, 2005 to January 24, 2009. In addition see attached as Exhibit PL 1-5, a copy of National Grid's Mobile Survey Procedure.

Leakage Surveys on Eastern Av., Gloucester from 12/1/05 to 1/24/09

2005-2006 Winter Patrol Survey (1/5/06 – 3/9/06)

1st pass	1/5/06
2nd pass	1/12/06
3rd pass	1/20/06
4th pass	1/27/06
5th pass	2/3/06
6th pass	3/2/09
7th final pass	3/9/06

2006 Mobile Survey (Eastern Av.) 3/13/06 & 3/14/06

2006 Spring Monitoring Grade 3 at 32 Eastern Av. 4/7/06 (remained grade 3)

2006 Fall Monitoring - no leaks (2 or 2A) monitored on Eastern Av.

2006 Business District Survey – (GLOB_23 Eastern Av. @ Webster St.) 10/27/06

2007 Mobile Survey (Eastern Av.) 1/17/07

2006-2007 Winter Patrol Survey from 2/1/07 to 3/13/07

1st pass	2/2/07
2nd final pass	3/7/07

2007 Spring Monitoring - no leaks (2 or 2A) monitored on Eastern Av.

2007 Fall Monitoring Grade 3 at 32 Eastern Av. 10/9/07 (remained grade 3)

2007 Business District Survey – (GLOB_23 Eastern Av. @ Webster St.) 10/31/07

2007-2008 Winter Patrol Survey - Due to the lack of sustained frost no winter patrol conducted.

2008 Spring Monitoring - no leaks (2 or 2A) monitored on Eastern Av.

2008 Walking Survey (Eastern Av.) 6/5/08

2008 Fall Monitoring Grade 3 at 32 Eastern Av. 9/22/08 (remained grade 3)

2008-2009 Winter Patrol Survey from 1/15/09 to 1/25/09
1st only pass 1/15/07

LSUR-5010: Mobile Surveys

Date:	4/13/2006	Filed:	Yes	Application:	MA
		Review:	Annual	Lead Org:	Mand. Prog.
Revisions: Updated and clarified C.4 for leak reporting.					

DESCRIPTION

This procedure describes the requirements to perform a Mobile leakage survey of gas mains. The surveys will be performed by qualified personnel.

PROCEDURE

A. Specific Survey Requirements

1. The Mobile leak survey must be performed annually on all distribution system transmission lines, mains, and service lines within roadways.

2. Winter Patrol Survey shall be conducted during winter months, principally over the cast-iron, with a frequency determined by degree-day data, current leak incidents, and the value code.

B. Primary Equipment

1. A mobile or portable Hydrogen Flame Ionization Unit, or equivalent industry accepted testing equipment, set at a sensitivity of 10 PPM for full scale deflection is used to collect and analyze samples of atmosphere through a probe or equivalent system. The distance from the probe to the ground must not exceed 3 inches.

2. Percent gas-in-air readings are obtained using a Combustible Gas Indicator or equivalent.

3. The Hydrogen Flame Ionization Unit and Combustible Gas Indicator shall be at least tested in a manner consistent with the manufacturer specification.

C. General Procedure

1. Mobile leak detection surveys are performed utilizing a map of the survey area. The surveyor shall color code the map by day surveyed.

2. The survey is conducted at 5-10 mph over the survey area.

3. The leak detection vehicle shall make a reasonable effort to pass over or near manholes, cracks in pavement or any other street opening from which leaking

gas could vent. When manholes in the street area are not accessible because of parked cars, etc. a portable unit shall be used.

4. If any indication of a leak is detected, a test hole shall be made to obtain a reading utilizing a combustible gas indicator. If a positive reading is detected the leak shall be classified. **Grade 1 leaks shall be reported immediately to the Customer Call Center. Grade 2A, 2, and 3 leaks shall be submitted to the appropriate division field coordinator.**

5. The mobile leak detection survey shall not be performed, when in the judgement of the Supervisor conducting the survey, conditions are otherwise unsuitable.

D. Reports

The leak surveyor prepares daily and weekly reports containing leak statistics, miles surveyed, and hours worked. The reports are sent to Leak Survey. A copy of the leak investigation report is given to the division and a copy to Leak Survey. The surveyor also retains a copy.

E. Records

Records which may include survey data, consultants reports, maps and required survey reporting forms of Mobile FI surveys shall be retained for a period of time not less than the interim between surveys.

(End LSUR-5010)

EXHIBIT 11

Leak Survey Summary

Information Request PL 1-7

Respondent: Fred Amaral

Request: The response for IR PL "Provide a list of leaks in Gloucester (Grades 2 and 3) as of January 24, 2009." National Grid did not yet include Grade 2 leaks in response. Please provide the Grade 2 information requested.

Response: National Grid provided the Department a complete list of outstanding leaks in Gloucester as of January 24, 2009 in its initial response to IR PL 1-7. There were no outstanding Grade 2 leaks as of January 24, 2009.

Leak No	FWMS #	Address	Intersecting Address	Class Date	Source	Location Comments
235729	276988	ATLANTIC RD	HIGH POPPLES RD	09/11/2002	Walking Survey	
266239	390311	ATLANTIC RD	MORELAND RD	09/01/2004	Public	GLOUCESTER INN
234910	273177	107 ATLANTIC RD		09/05/2002	Public	BASS ROCKS INN
213872	178946	129 ATLANTIC RD		02/21/2001	Winter patrol	
226347	234312	13 ATLANTIC RD	BEACH RD	01/18/2002	Winter patrol	
212647	173814	39 ATLANTIC RD		01/23/2001	Winter patrol	
226578	237955	75 ATLANTIC RD		02/05/2002	Winter patrol	
100136	16439	1 BARBERRY LN	GERRING RD	05/31/1996	Summer FI	
309674	597002	4 BARBERRY LN	GERRING RD	04/11/2008	Walking Survey	
243007	304470	29 CENTENNIAL AV		03/10/2003	Winter patrol	
193521	132414	32 EASTERN AV		06/22/2000	Walking Survey	
235754	277138	EASTERN POINT RD	HAWTHORNE LN	09/09/2002	Walking Survey	
41847	13724	14 EASTERN POINT RD		09/28/1993	Walking Survey	
309562	592442	28 EASTERN POINT RD	GRAPEVINE RD	04/09/2008	Walking Survey	
309677	597011	40 EASTERN POINT BLVD	BEMO AVE	04/10/2008	Walking Survey	
309676	597010	42 EASTERN POINT BLVD	BEMO AVE	04/10/2008	Walking Survey	
309679	597015	51 EASTERN POINT BLVD	LAKE AVE	04/10/2008	Walking Survey	
226585	237962	19 FERRY ST		02/06/2002	Winter patrol	
311130	612271	3 FERRY ST	WASHINGTON ST	05/29/2008	Walking Survey	
194754	137255	44 FORT HILL AV		07/14/2000	Walking Survey	
243943	307372	4 GERRING RD	BARBERRY LN	03/20/2003	Winter patrol	
212650	173821	18 GLENMERE AV		01/24/2001	Winter patrol	
161096	110156	101 GLOUCESTER AV		02/24/2000	Winter patrol	
310870	610445	HARBOR RD	ATLANTIC RD	05/28/2008	Walking Survey	
305810	573923	17 HARBOR LOOP	ROGERS ST	11/01/2007	Special	MEASUREMENTS FROM LIGHT POLE #
243023	304554	7 HARBOR RD		03/11/2003	Winter patrol	
287709	489115	HOMESTEAD DR	AMES DR	11/14/2006	Public	
245553	313614	15 MADISON CT		04/08/2003	Summer FI	
294528	519531	12 E MAIN ST	PARKER ST	10/30/2006	Summer FI	
231344	258997	199 MAIN ST		04/21/2003	Public	
212652	173825	259 E MAIN ST		01/23/2001	Winter patrol	
309485	592061	285 MAIN ST	VINCENT ST	04/07/2008	Walking Survey	
294939	521670	330 MAIN ST		11/09/2006	Winter patrol	
311129	612270	9 MARSH ST	WASHINGTON ST	05/29/2008	Special	
267243	394694	61 MT VERNON ST		10/20/2004	Summer FI	
278198	444974	11 NALLY AV	HODGKINS ST	08/11/2005	Walking Survey	
161402	112233	21 NAUTILUS RD		02/24/2000	Winter patrol	
243946	307377	3 NAUTILUS RD		03/20/2003	Winter patrol	
291867	507113	21 PATRIOTS CIR		09/20/2006	Public	
309673	596997	28 PATRIOTS CIR	VETERANS WAY	09/19/2008	Building Survey	IT SEEMS TO BE RESIDUAL FROM S
294770	520954	65 PLEASANT ST	LIBERTY ST	11/06/2006	Winter patrol	
294769	520952	71 PLEASANT ST	SMITH ST	11/06/2006	Winter patrol	
213888	178970	POPLAR ST	CHERRY ST	02/23/2001	Winter patrol	
149733	75911	46 POPLAR ST		05/10/1999	Summer FI	
108797	18079	14 PROCTOR ST		01/09/1997	Winter patrol	
296098	5 6	13 ROCKPORT RD		12/18/2006	Public	

311321	613343	20 ROCKPORT RD	LONG BEACH RD	08/06/2008	Walking Survey	
296099	525588	24 ROCKPORT RD	LONG BEACH RD	12/18/2006	Public	
294666	520573	13 SHEPHERD ST		11/01/2006	Summer FI	
295960	525225	STARKNAUGHT RD	JOSEPHS WY	12/13/2006	Public	
296068	525520	10 STARKNAUGHT RD	JOSEPHS WY	12/14/2006	Public	
317490	642982	50 SUMMER ST	HOVEY ST	01/16/2009	Winter patrol	26 % @ DRILL HOLE AT HOUSE,)
311132	612273	19 VETERANS WAY	WASHINGTON ST	05/29/2008	Walking Survey	
291315	504471	31 VETERANS WY		08/08/2006	Company Personnel	METER #OX755751
291314	504470	75 VETERANS WY		08/08/2006	Company Personnel	
278203	444980	93 VETERANS WY		08/09/2005	Walking Survey	
161105	110165	WASHINGTON ST	WHEELER ST	02/24/2000	Winter patrol	
226358	234326	122 WASHINGTON ST		01/15/2002	Winter patrol	
234795	272751	201 WASHINGTON ST		08/19/2002	Walking Survey	
294663	520548	302 WASHINGTON ST		11/14/2006	Public	
245560	313626	426 WASHINGTON ST		04/11/2003	Summer FI	
114938	25093	728 WASHINGTON ST	BUTTERNUT LN	07/24/1997	Walking Survey	
296599	528706	827 WASHINGTON ST		01/03/2007	Public	
278427	445834	853 WASHINGTON ST	REVERE ST	08/18/2005	Walking Survey	
299969	544533	892 WASHINGTON ST	S KILBY ST	05/14/2007	Public	
294453	519268	32 WEBSTER ST		10/27/2006	Public	
109110	19035	WESTERN AV	ESSEX AV	01/24/1997	Winter patrol	
197352	147914	WHEELER ST	CORLISS AV	08/23/2000	Walking Survey	
245564	313632	79 WHEELER ST	GRANDVIEW AV	04/10/2003	Summer FI	
TOTAL GRADE 3 LEAKS OUTSTANDING FOR GLO: 69						

EXHIBIT 12

Photographs
State Fire Marshal Scene Investigation
Inside Service Piping
Service Shut-off
Gas Service Pressure

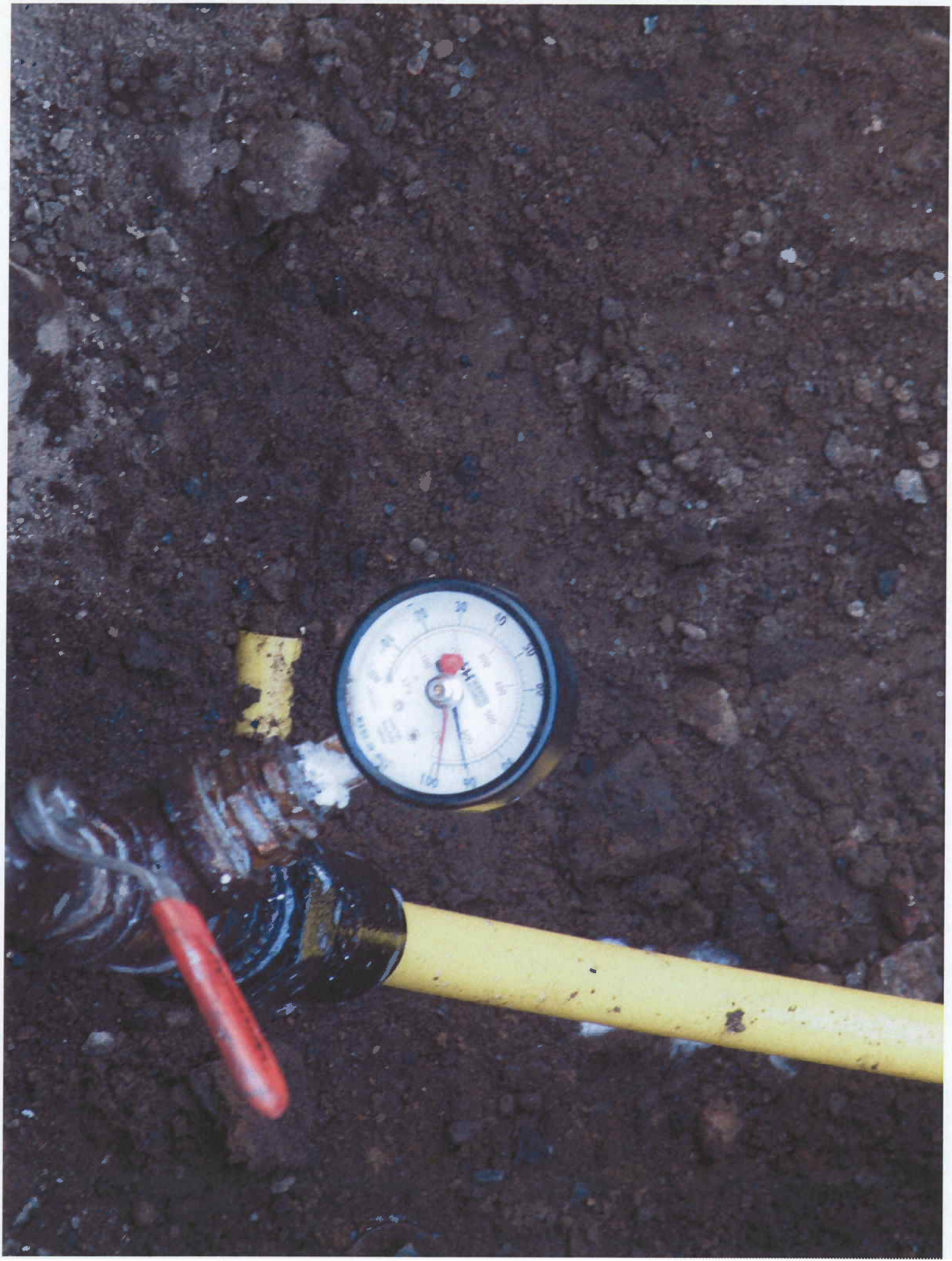


EXHIBIT 13

Homeowner Interview Memorandum

Memorandum

To: File

From: Jorge Santi

RE: [redacted] – 76 Eastern Avenue, Gloucester

Date: March 10, 2009

Cc: Robert McCabe, William Stevens

On March 10, 2009, at 10:00 a.m. William Stevens and I interviewed [redacted] at the Law Offices of Goddard, Scuteri & Delaney, 27 Congress Street, Salem MA 01970.

Present at the meeting were [redacted], his friend [redacted], Stephen H. Lash, Esq., Jeffrey Scuteri, Esquire, Lester MacLaughlin (engineer); Randy C. Smith for One Beacon Insurance adjustor.

Mr. [redacted] was asked to describe what had occurred on Sunday January 25, 2009 the date of the incident. He stated that he arrived home from work at approximately 0800 hrs. and, as he was driving home he could see black smoke emanating from the house chimney which was spreading out across the neighborhood and thought that he might have problems with the chimney. He entered his home through the rear door, and noticed a haze in the kitchen and an odor resembling soot.

He could also see small particles floating in the air, and was not familiar with the odor that was present that had a garlicky smell to it. He also heard a humming noise coming from the house heater and opened the cellar door. He recalls turning on a light switch at the top of the stairs, walking down the stairs and then turning on another light switch for additional lighting.

He checked the house heater and he knew that it was running but not producing much heat as the pipes were not hot, just warm and the heater was making noise that he described as sounding like "jake braking". He recalled walking around the cellar and he did not notice a gas odor. He remembered that the cellar was also filled with a heavier haze then had been present in the kitchen.

He then walked up the stairs and into the kitchen, where he called the oil company to report the problem with his oil burner. He spoke with an oil company person and requested service for the burner.

He hung up the phone and walked to the cellar door and had intended to shut off the lights and close the door, but as he stood at the doorway he saw a white flash at the bottom of the stairs and

heard a loud noise. He stated that he fell into the cellar along with the debris from the home and when he was able to stand he could see daylight where the house walls were once present.

He then saw three balls of flames coming towards him and he covered his face and thought that he had deflected the flames but he had become engulfed, then the flames dissipated. At this time he could hear his neighbors calling for him, and they were able to pull him from the debris.

He recalls calling for his dog, but he was lead down the driveway and into an ambulance that took him to the hospital for treatment.

We asked Mr. [redacted] some additional questions regarding the sketches that had been provided detailing the floor layout of his home. He explained that the home had been built by his grandfather and that an addition had been built in 2001 at the rear of the house.

The addition at the rear of the house had a poured concrete foundation and floor, the remainder of the house foundation was constructed of stone and mortar with a cement floor. A crawl space was located at the left front corner of the house that was constructed with concrete blocks it had a dirt floor and approximately 3-4 feet of headroom. No insulation or vapor barrier had been installed on the first floor joists inside the crawlspace. A window opening that led into the remainder of the cellar from the crawlspace had been framed but no window had been installed.

Mr. [redacted] was asked if he could recall any construction activity having taken place in the area around his home and he recalled that approximately 10 years ago a catch basin had been installed in front of his home due to puddle problems in the street. He believed that a new gas service was installed to 74 Eastern Ave. approximately 3 years ago and that the water and sewer mains were located on the opposite side of the street.

He had his water heater replaced one year ago but had no service calls for other appliances. He believes that Nationalgrid replaced his gas meter 1-2 years ago. The house had CO and Smoke detectors that were electrically operated with battery backup that had not sounded.

He was asked if he recalled noticing anything different when he departed for work the previous night and he stated that nothing unusual was present.

When asked if he had smelled gas outdoors at any time he stated that he reported a gas leak last summer as he could smell gas emanating from the catch basin at the front of the house. He said that after Nationalgrid had investigated the leak he was told that no leak was present.

More recently Mr. [redacted] said that a gas odor had been present but he thought that it was related to the work that was being done at 70 Eastern Ave. by Nationalgrid.

The meeting adjourned and we thanked Mr. [redacted] for his assistance.

EXHIBIT 14

National Grid Work Orders

Work Order	642398	WorkType	LR	Status	CASBUILT
Location	749480	36 EASTERN AVE,GLO		Town	GLO

Operation	20	Standard Unit		Count	3
Loc	749480	36 EASTERN AVE,GLO		Completion Date	2009-01-13-0.0

Repairs

Work Action	LEAK	Paving Code	1	# Main FT Inspected	
Repair sent to LMS?	Y	Joint Seal Replaced?		Type of Joint Replaced	
Reason for Failure		Facility Type	MAIN	Size	04
Material	CI	Pressure	L	Where Leak	JOINT
Leak Cause	MATLWELD	Contributing Factor		Depth	3FT 2IN
Comments	FULL SEAL MUFFS ON ALL 3 BELL JOINTS	Construction Type	MF		

Relights

RGO Performed?		House Heaters		Water Heaters	
Standby?		Ranges		Other	
Reconnect?		Comments			

Pressure Test

Pressure		Medium	
Duration		Chart?	

Valve Inspections

Primary Valve?		Location Verified ?		Valve Greased	
Valve Box Cleaned		Valve Operability?		CGI Reading (% Gas)	
Comments					

Work Order	641375	WorkType	LR	Status	CASBUILT
Location	748376	72 EASTERN AVE,GLO		Town	GLO

Operation	40	Standard Unit		Count	1
Loc	748376	72 EASTERN AVE,GLO		Completion Date	2009-01-05-0.0(

Repairs

Work Action	LEAK	Paving Code	1	# Main FT Inspected		Repair sent to LMS?	Y
		Joint Seal Replaced?	Y	Type of Joint Replaced	N	Reason for Failure	
Facility Type	MAIN	Size	06	Material	CI	Pressure	L
Where Leak	JOINT	Leak Cause	MATLWELD	Contributing Factor		Depth	3FT 6IN
Comments	FULL SEAL MUFF ON BELL JOINT.					Construction Type	MF

Relights

RGO Performed?		House Heaters		Water Heaters	
Standby?		Ranges		Other	
Reconnect?		Comments			

Pressure Test

Pressure		Medium	
Duration		Chart?	

Valve Inspections

Primary Valve?		Location Verified ?		Valve Greased	
Valve Box Cleaned		Valve Operability?		CGI Reading (% Gas)	
Comments					

Work Order 641051 WorkType ER Status CASBUILT

Location 748019 70 EASTERN AVE,GLO Town GLO

Operation 20 Standard Unit Count 1

Loc 748019 70 EASTERN AVE,GLO Completion Date 2008-12-28-0.0

Repairs

Work Action LEAK Paving Code 1 # Main FT Inspected Repair sent to LMS? Y

Joint Seal Replaced? Y Type of Joint Replaced N Reason for Failure

Facility Type MAIN Size 06 Material CI Pressure T

Where Leak BRMAIN Leak Cause CORR Contributing Factor Depth 4FT

Comments CLAMPED 6" BROKEN MAIN Construction Type CL

Relights

RGO Performed? House Heaters Water Heaters

Standby? Ranges Other

Reconnect? Comments

Pressure Test

Pressure Medium

Duration Chart?

Valve Inspections

Primary Valve? Location Verified ? Valve Greased

Valve Box Cleaned Valve Operability? CGI Reading (% Gas)

Comments

EXHIBIT 15

Odorant Inspection Report

nationalgrid

Inter-office Memo
Instrumentation & Regulation NE

To: File

From Gary Munroe

Date: January 26, 2009

Subject: **Eastern Avenue, Gloucester**

On Sunday, January 25, 2009 at approximately 9:00 a.m., Jack Ebert placed a phone call into Gas Control regarding an incident that occurred at Eastern Avenue, Gloucester. Gas Control then dispatched Don Hutchinson, Instrumentation and Regulation Technician, Jack Ebert and Matt Breslin, Senior Supervisors Gas, Instrumentation and Regulation to the Gloucester area to perform Distinct Odor Level testing. Distinct Odor Level tests were conducted at 77 Eastern Avenue, Gloucester, 82 Eastern Avenue, Gloucester and 8 School Street, Gloucester. These buildings are located in close proximity to the incident.

The results of these tests are listed below:

Date	Location	Threshold Odor Level (% Gas in Air)	Distinct Odor Level (% Gas in Air)	Test Equip. ID	Test Equip. Calibration Date	Test By
1/25/2009	77 Eastern Avenue Gloucester	0.015 0.055 0.04	0.035 0.10 0.09	2931-5 2931-5 2931-5	4/2008 4/2008 4/2008	D.H. M.B J.E.
1/25/2009	82 Eastern Avenue Gloucester	0.025 0.04 0.035	0.04 0.075 0.075	2931-5 2931-5 2931-5	4/2008 4/2008 4/2008	D.H. M.B J.E.
1/25/2009	Central Station Fire Hse. 8 School Street Gloucester	0.015 0.04 0.055	0.035 0.09 0.10	2931-5 2931-5 2931-5	4/2008 4/2008 4/2008	D.H. M.B J.E.

An additional reading was taken on Monday, January 26, 2009 at approximately 10:00 a.m. by Don Hutchinson, Instrumentation and Regulation Technician at the Central Station Fire House, 8 School Street, Gloucester.

Date	Location	Threshold Odor Level (% Gas in Air)	Distinct Odor Level (% Gas in Air)	Test Equip. ID	Test Equip. Calibration Date	Test By
1/25/2009	Central Station Fire Hse. 8 School Street Gloucester	0.025	0.040	2931-5	4/2008	D.H.

cc: J. Higgins
G. Munroe
J. Gatherum
P. Vigeant
C. Aronoson
J. Barrett
M. Eagan

EXHIBIT 16

Cast-Iron Main Replacement Program

Information Request PL 1-12

Respondent: James Hughes

Request: Provide all records documenting the Operator's analysis and performance evaluation of the Cast iron main located on Eastern Avenue, as required by Section GENG-2040: Gas Engineering - System Integrity in the National Grid Operations Manual.

Response: The 6 inch, low pressure cast iron main segment installed in 1911 near #76 Eastern Avenue in Gloucester did not qualify as a condition based replacement under the guidelines of the company's prioritization algorithm, GENG-2050 (not 2040), during the evaluation analysis that took place in an effort to select candidates for the 2008 construction season. Based on the broken cast iron main at #70 Eastern Av on 12/28/2008 and the broken cast iron main at #76 Eastern Av on 01/26/2009, this segment would qualify for replacement under GENG-2050 and would have been identified for inclusion in the 2009 replacement program.

The annual cast iron main analysis for the condition replacement program begins with a report generated out of the company's ArcGIS mapping system. Each broken main repair is recorded in the company Leak Management System (LMS). The data within the LMS system is linked to the gas main data within the company's ArcGIS mapping system. For all cast iron gas mains that have experienced a main break, a 200 foot arc is created around the location of the break. Each instance where two or more arcs combine to indicate that two or more broken mains have been repaired within 400 feet of each other creates as a base line candidate. As a result of this coordinated data, the system generates a report listing each cast iron main replacement candidate produced by the mapping and LMS systems. Each candidate that appears on this list is individually analyzed, with a system map, main attribute information, and the applicable leak data gathered. The leak data is manually plotted on the base map to create a preliminary design for the cast iron main candidate. The data is then entered into the company's prioritization algorithm to create a risk ranking for all of the candidates and establish a replacement priority. Work orders are generated for replacement based on this priority. This algorithm is described in depth in procedure GENG-2050.

A work order has been generated and approved for the replacement of the main segment near #76 Eastern Avenue. The leak analysis and prioritization calculation for this segment of main is available within a separate MS excel file.

EXHIBIT 17

National Grid Incident Investigation Report

nationalgrid

Operations Performance-QA/QC Gas Distribution

Investigation Summary Report on Procedures related to the Gloucester Incident

National Grid Quality Report No. QANE011

Distribution
Draft Report

Mallikarjun Angalakudati
Daniel Saad

Date of issue

Final Report	2/21/09
Draft Report	2/20/09

Investigation Team:

Mark Correia	Quality Assurance Specialist (NE)
Jim McNeill	Quality Assurance Specialist (NE)
Kevin Mahoney	Quality Assurance Manager (NE)

Contents

1 Introduction

On Sunday, January 25, 2009 National Grid was contacted by the Gloucester Fire Department that an explosion had occurred at 76 Eastern Avenue, Gloucester. Upon arrival National Grid, personnel located a broken gas main in the roadway at this address. The main was made of 6" diameter cast iron, and was installed in 1911. The main cracked at the service tap location for an adjacent home.

Field Operations has requested that Operations Performance, Quality Assurance Team, conduct an independent review. This review focused on the time period of December 26, 2008 through January 24, 2009 and the series of responses by National Grid leading up to the incident. All documents, policies, and procedures have been reviewed by the Investigation Team to determine if any deficiencies or gaps in procedures or protocol contributed to the incident. The New England Vice-President of Field Operations will receive a final report subsequent to completing this review.

2 Scope and Approach

The scope of this review encompasses the validation of Operator Qualifications, procedural compliance to first response, leak investigation and subsequent repairs made by National Grid crews. Additionally, the review includes the effectiveness of National Grids Main Replacement Program, Winter Survey Patrol, measurement of the Gloucester system odorant levels, and third party activities. Specifically this includes the following:

Review of Operator Qualifications

- 010100-PL: Operator Qualification Plan

Compliance to applicable National Grid procedures

- LEAK-5010: First Responder and Leak Investigation
- LEAK -5030: Leak Receipt and Classification
- LEAK-5040: Leak Response and Repair
- LEAK-5075: Sealing of Cast Iron Joints

Program Effectiveness

- GENG-2050: Identification, Evaluation and Prioritization of Distribution Main Segments for Replacement
- LSUR-5010: Mobile Surveys

System Odorant Levels

- ODOR-5010: Procedure for Monitoring Gas System Odorant Concentrations

Third Party Activities

- PBWK-5010: Maintenance Procedure Related to Foreign Construction

The investigation team examined the following items:

Reference Number 1: Were National Grid personnel who responded during the time period under review Operator Qualified for assigned tasks?

Reference Number 2: Did National Grid's Customer Metering Services personnel comply with company procedures?

Reference Number 3: Did National Grid's Field Operations personnel comply with company procedures?

Reference Number 4: Did the relevant programs associated with this incident provide satisfactory levels of assurance to protect system integrity and public safety?

Reference Number 5: Do proper controls exist regarding odorant level measurement ?

Reference Number 6: Did third party activities influence the incident?

3 Findings / Recommendations / Action Plan

Reference 1: Were National Grid personnel who responded during the time period under review Operator Qualified for assigned tasks?

Summary	
The Investigation Team obtained all respondents information and validated that their Operator Qualifications were in compliant with National Grid's Operator Qualification Plan.	
Recommendation	Agreed Management Action
None	None
Person Responsible	Due Date
None	None

Reference 2: Did National Grid's Customer Metering Services personnel comply with company procedures?

Summary	
Response to successive odor complaints in the Eastern Avenue area were responded to in a timely and appropriate manner by ERU personnel from Customer Meter Services. Initial odor complaints from dates December 28, 2008 and January 11, 2009 were documented both electronically on the Field Data Capture (FDC) device, and with hard copy Premise Condition Reports, as specified in Procedure MA LEAK-5010. However, Monitor Checks for gas readings requested for subsequent days (follow up work orders) only captured the gas reading results electronically without completion of a hard copy Premise Condition Report. These omissions indicate non-compliance of Procedure MA LEAK 5010, Section I.3 Monitor Check, on the dates 12/29, 12/30, 12/31, 1/01, and 1/02. Additional ERU responses to odor complaints, originating on dates 1/15 and 1/20, by CMS personnel found no gas readings and were correctly documented electronically in the FDC device. There is no further requirement for a written Premise Condition Report for these instances because no gas readings were found at the locations.	
Recommendation	Agreed Management Action
A review of LEAK-5010: First Responder and Leak Investigation, Section I.3 Monitor Check should be reviewed with all CMS service technicians.	
Person Responsible	Due Date

Reference 3: Did National Grid's Field Operations personnel comply with company procedures?

Summary	
Maintenance personnel repaired a broken main and five cast iron joints on Eastern Ave during the time period under review, as specified in LEAK-5040: Leak Response and Repair & LEAK-5075:Sealing of Cast Iron Joints. Evidence suggest that on at least three different dates Maintenance crew(s) were onsite and possibly purging residual gas on Eastern Ave. However there are no associated work orders for this specific task(s), nor did the crew(s) account for their time appropriately if this occurred, based on a review of Smart Time records, Maximo work orders, and interviews with personnel.	
Recommendation	Agreed Management Action
Field Operations should evaluate existing control mechanisms in place related to time entry and Maximo / Field Data Capture work order assignment.	
Person Responsible	Due Date

Reference 4: Did the relevant programs associated with this incident provide satisfactory levels of assurance to protect system integrity and public safety?

Summary	
The investigation encompassed two specific programs, New England's Main Replacement Program and Winter Survey Patrol. Based on interviews with Asset Management and the Program Manager responsible for Main Replacements, it was determined that the program utilizes a sophisticated algorithm including age, pipe size, and leak history to determine eligibility for replacement. It was determined that the main on Eastern Avenue Gloucester, would not be considered a replacement candidate due to the criteria specified in procedure GENG-2050: Identification, Evaluation and Prioritization of Distribution Main Segments for Replacement. A two day Winter Patrol was conducted throughout the City of Gloucester beginning January 15 and was completed January 16, 2009. The patrol surveyed Eastern Ave on the 15th and reported no leak activity. The survey was executed in a manner which was compliant with the established procedure LSUR-5010: Mobile Surveys	
Recommendation	Agreed Management Action
None	None
Person Responsible	Due Date
None	None

Reference 5: Do proper controls exist regarding odorant level measurement?

Summary
Interviews with the Manager of Instrumentation and Regulation revealed that when an incident of this type occurs distinct odorant level reads (DOL) are taken as close and as soon to the incident as possible. Odorant measurements obtained at three locations adjacent to the incident site had both Threshold and Distinct Odor Levels that met requirements. The investigation identified that the actions taken and results obtained are in compliance with National Grid Procedure ODOR-5010: Procedure for Monitoring Gas System Odorant Concentrations. Typically following an incident of this kind, a DOL bag sample is taken and forwarded to the Downstate Lab. Because of the lapse in time, bag sample readings tend to indicate low levels of mercaptan. This sampling method is not a regulatory requirement and exists as a work practice only.

Recommendation	Agreed Management Action
A more reliable process of bag sample collection and analysis should be considered, or discontinuation of the practice if a more reliable method cannot be determined.	
Person Responsible	Due Date

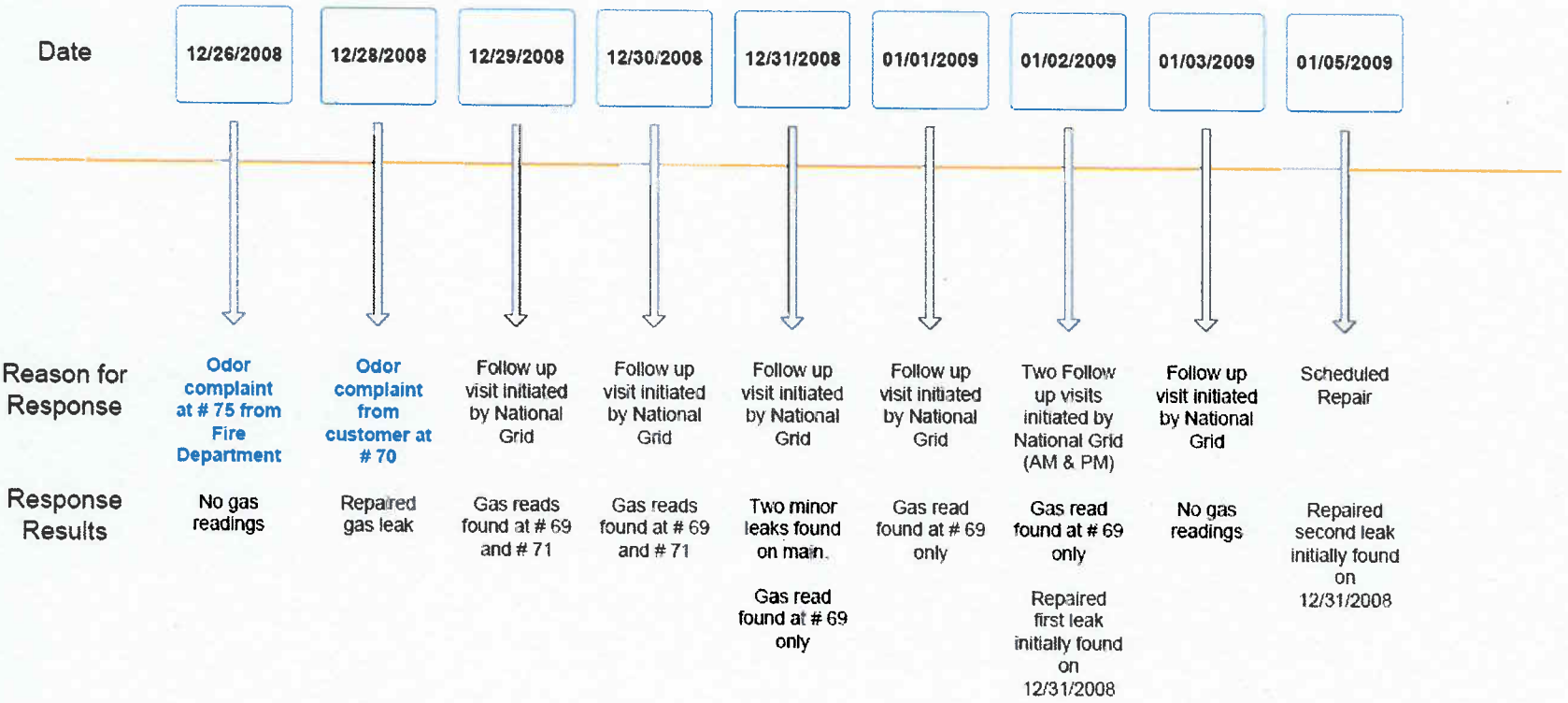
Reference 6: Did third party activities influence the incident?

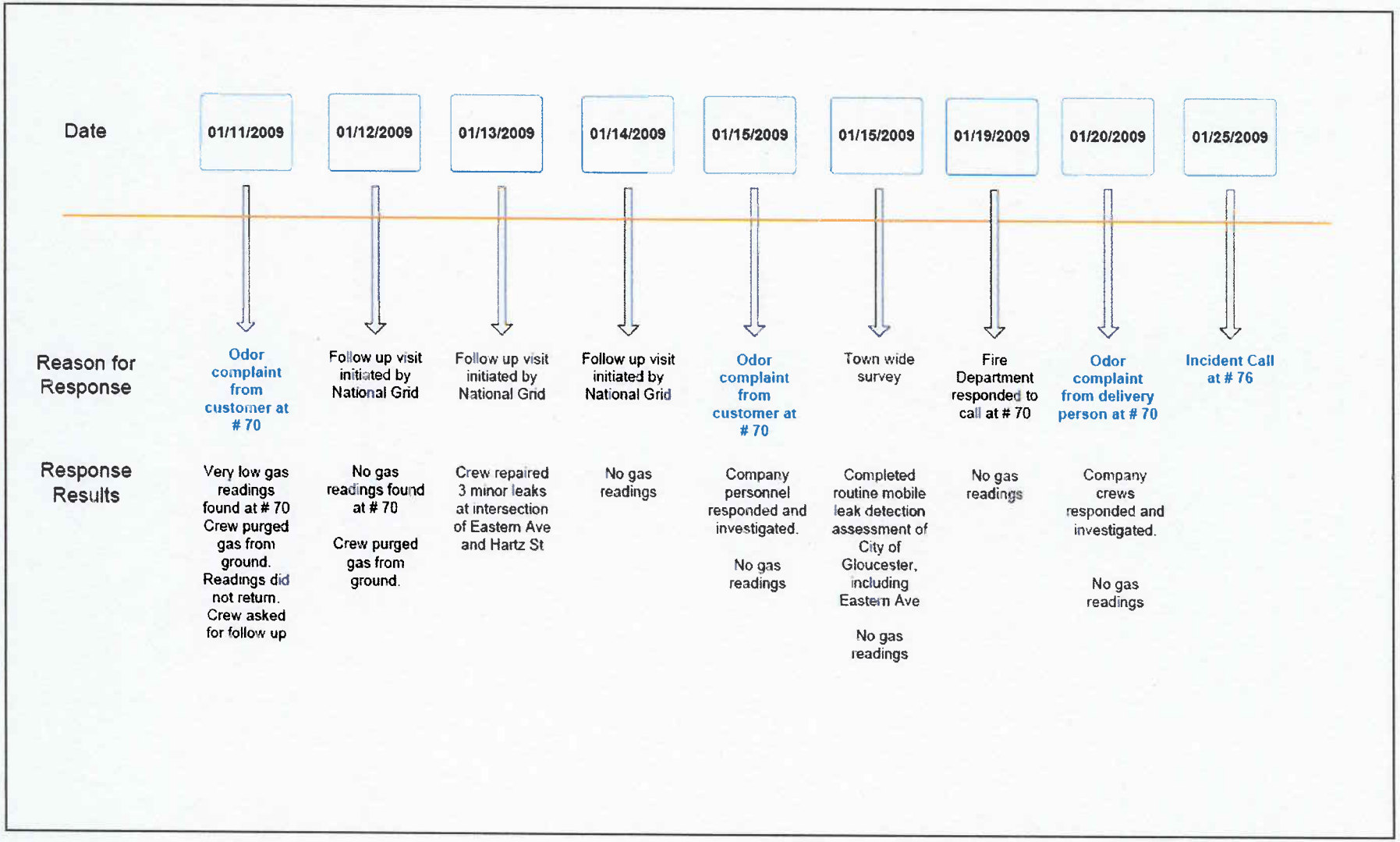
Summary	
During the time period specified National Grid's Damage Prevention Department accepted 75 damage prevention tickets. Three of those tickets were identified as work being performed by a third party contractor. The scope of work included blasting for a proposed drainage ditch, a sewer connection, and an emergency utility pole replacement. The blasting was proposed to take place in front 126 Eastern Ave. which is approximately 1800' away from the incident at 76 Eastern Ave. The investigation was unable determine if any of these events occurred or had an impact at the incident site. Further investigation revealed that there were no encroachments performed by a third party contractor during the last two years on Eastern Ave.	
Recommendation	Agreed Management Action
None	None
Person Responsible	Due Date
None	None

4 Conclusion

The review findings indicate that National Grid's core responsibilities related to emergency response and safe operation of its gas network have been met. Structured programs are in place and provide a satisfactory level of assurance regarding replacement of mains, leak survey patrols, and system odorant levels. The investigation team recommends specific action items to ensure full procedural compliance to established Company procedures, enhance labor accountability, and emergency testing of gas odorant levels.

5 Timeline


Date
12/26/2008
12/28/2008
12/29/2008
12/30/2008
12/31/2008
01/01/2009
01/02/2009
01/03/2009
01/05/2009
Reason for Response
Odor complaint at # 75 from Fire Department
Odor complaint from customer at # 70
Follow up visit initiated by National Grid
Follow up visit initiated by National Grid
Follow up visit initiated by National Grid
Follow up visit initiated by National Grid
Two Follow up visits initiated by National Grid (AM & PM)
Follow up visit initiated by National Grid
Scheduled Repair
Response Results
No gas readings
Repaired gas leak
Gas reads found at # 69 and # 71
Gas reads found at # 69 and # 71
Two minor leaks found on main.
Gas read found at # 69 only
Gas read found at # 69 only
Gas read found at # 69 only
Repaired first leak initially found on 12/31/2008
No gas readings
Repaired second leak initially found on 12/31/2008


Date
01/11/2009
01/12/2009
01/13/2009
01/14/2009
01/15/2009
01/15/2009
01/19/2009
01/20/2009
01/25/2009
Reason for Response
Odor complaint from customer at # 70
Follow up visit initiated by National Grid
Follow up visit initiated by National Grid
Follow up visit initiated by National Grid
Odor complaint from customer at # 70
Town wide survey
Fire Department responded to call at # 70
Odor complaint from delivery person at # 70
Incident Call at # 76
Response Results
Very low gas readings found at # 70 Crew purged gas from ground. Readings did not return. Crew asked for follow up
No gas readings found at # 70
Crew purged gas from ground.
Crew repaired 3 minor leaks at intersection of Eastern Ave and Hartz St
No gas readings
Company personnel responded and investigated.
No gas readings
Completed routine mobile leak detection assessment of City of Gloucester, including Eastern Ave
No gas readings
No gas readings
Company crews responded and investigated.
No gas readings

7 APPENDIX A

National Grid received an odor complaint from Gloucester Fire Department on December 26, 2008. Unfortunately, the report provided the National Grid dispatcher with incorrect address information. A Leak Investigation order was created and dispatched for 275 Eastern Avenue, instead of 75 Eastern Avenue. This has been confirmed by tape recordings of the phone call. A qualified ERU attempted to locate the address, which apparently is beyond the town line of Gloucester. The dispatcher called the Fire Department to clarify the address and it was determined that the correct location in question was 75 Eastern Ave, where a fire truck responded. The dispatcher sent an electronic update to the Field Data Capture device with the address update. Further investigation continues regarding exactly where the ERU went to investigate, whether or not the ERU noticed the electronic update on the FDC device, and whether or not the responding ERU passed by the fire truck enroute to the incorrect address.

8 APPENDIX B

System odorant levels were obtained from adjacent properties on Eastern Ave on the day of the incident as follows:

Date	Location	Threshold Odor Level (% Gas in Air)	Distinct Odor Level (% Gas in Air)	Test Equip. ID	Test Equip. Calibration Date	Test By
1/25/2009	77 Eastern Avenue Gloucester	0.015 0.055 0.04	0.035 0.10 0.09	2931-5 2931-5 2931-5	4/2008 4/2008 4/2008	D.H. M.B J.E.
1/25/2009	82 Eastern Avenue Gloucester	0.025 0.04 0.035	0.04 0.075 0.075	2931-5 2931-5 2931-5	4/2008 4/2008 4/2008	D.H. M.B J.E.
1/25/2009	Central Station Fire Hse. 8 School Street Gloucester	0.015 0.04 0.055	0.035 0.09 0.10	2931-5 2931-5 2931-5	4/2008 4/2008 4/2008	D.H. M.B J.E.

An additional reading was taken on Monday, January 26, 2009 at approximately 10:00 a.m. by Don Hutchinson, Instrumentation and Regulation Technician at the Central Station Fire House, 8 School Street, Gloucester.

Date	Location	Threshold Odor Level (% Gas in Air)	Distinct Odor Level (% Gas in Air)	Test Equip. ID	Test Equip. Calibration Date	Test By
1/25/2009	Central Station Fire Hse. 8 School Street Gloucester	0.025	0.040	2931-5	4/2008	D.H.