



COMMONWEALTH OF MASSACHUSETTS

OFFICE OF CONSUMER AFFAIRS AND BUSINESS REGULATION

**DEPARTMENT OF
TELECOMMUNICATIONS & ENERGY**

PIPELINE ENGINEERING AND SAFETY DIVISION

INCIDENT REPORT

9 Bonito Drive, Framingham, Massachusetts
May 24, 2002

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I. INTRODUCTION

A. Scope of this Investigation

The Pipeline Engineering and Safety Division of the Massachusetts Department of Telecommunications and Energy (“Department”), pursuant to G. L. c. 164, § 105A and G. L. c. 82, § 40 (“Dig Safe”) has investigated a natural gas (“gas”) explosion (“incident”) at 9 Bonito Drive, Framingham, that occurred on May 24, 2002. The incident resulted in an explosion and fire damaging the house at that address. NSTAR Gas Company (“NSTAR” or “Operator”), the operator of the pipeline, estimated the property damage to be \$150,000 (Exh. 1).

As for the Department’s investigation into compliance with the Dig Safe law, 220 C.M.R. §§ 99.00 et seq. establishes the procedures to determine the nature and extent of violations. In addition, these regulations set forth the standards used to determine the amount of civil penalties to be imposed. On August 22, 2002, the Department issued a Notice of Probable Violation (“NOPV”) to Pipeline Equipment & Supply, Inc. (“PE&S” or “Contractor”) (Exh. 2). A separate NOPV was issued to NSTAR on August 29, 2002 (Exh. 3). In both NOPVs, the Department alleged that a violation of the Dig Safe law occurred on May 24, 2002 on Bonito Drive, Framingham. NSTAR signed a Consent Order (Exh. 4) on September 23, 2002. PE&S did not respond to the NOPV. The Department issued a Remedial Order (Exh. 5) to PE&S on February 11, 2003.

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

“[e]ach accident or incident . . . involving a fatality, personal injury requiring hospitalization, of property damage of loss of more than an amount the Secretary establishes, any other accident the [Department] considers significant, and a summary of the investigation by the authority of the cause and

circumstances surrounding the accident or incident.”
See 49 U.S.C. § 60105(c)(1)(B).

The purpose of the report is to inform the DOT as to the circumstances surrounding and the cause of the incident.

The Department has established procedures for determining the nature and extent of the violations of codes and regulations pertaining to the safety of pipeline facilities and the transportation of gas, including, but not limited to, 220 C.M.R. §§ 101.00 through 113.00. See 220 C.M.R. §§ 69.00 et seq. The Department also enforces the DOT safety standards for gas pipeline systems and the drug and alcohol testing regulation as set forth in 49 C. F. R. §§192.00 et seq. and §§ 199.00 et seq. and 220 C.M.R. § 69.12.

B. Overview of the Incident

At approximately 8:50 a.m. on May 24, 2002, NSTAR telephoned the Department to report an explosion at 9 Bonito Drive, Framingham. NSTAR reported that its Contractor, PE&S, while working on a service line¹ to the house at that address, struck the service line with a backhoe.² The resulting failure, inside the foundation, caused an explosion in the house. The Department sent two investigators to the scene.

The backhoe struck and pulled a one-inch diameter, high pressure³ service line, owned and operated by NSTAR. The contact caused the line to break at the inlet of the service

1 A service line is a distribution line that transports gas from a common source of supply to (1) a customer meter . . . 49 C.F.R. §192.3: Definitions.

2 A backhoe is a wheel-mounted machine, usually diesel powered, with a hydraulic arm and bucket for excavating.

3 A high pressure system is a system in which the pressure in the main is higher than the pressure provided to the customer. 49 C.F.R. §192.3: Definitions.

regulator,⁴ located in the house basement. The line break allowed gas to enter the basement; an explosion and fire occurred shortly thereafter. The house was heavily damaged by the explosion and resulting fire. The ignition source is uncertain. However, a boiler and water heater were in the basement. Either one of these may have been the ignition source.

An NSTAR distribution technician (“technician”) evacuated three occupants from the house shortly before the explosion. As he was leaving the house, the explosion catapulted the technician through the front door. He landed, uninjured, on the front lawn.

The Department’s investigation finds that NSTAR and its contractor, PE&S, did not exercise caution while excavating in the vicinity of NSTAR’s underground facilities. The Dig Safe law requires that caution must be used when excavating around underground facilities.

II. THE DEPARTMENT’S INVESTIGATION

A. Description of the Site

Bonito Drive is a cul-de-sac located in a residential area of Framingham, running east from Concord Street. The houses are single family. The area is flat and spotted with mature trees.

The house at 9 Bonito Drive sat on a ¼-acre lot, located near the east end of the road. The lot borders the north side of Bonito Drive. The house was a one-story, raised contemporary, of wood-frame construction, with a half-basement.⁵

On the day of the incident, there were two live gas mains under Bonito Drive. One was

4 A service regulator is a valve which reduces the pressure in the service line from the pressure in the main to the pressure provided to the customer.

5 A half basement is a basement with a height of approximately 4 feet.

a two-inch diameter steel gas main, coated with X-Trucoat,⁶ installed in 1959. The newer main was a four-inch plastic gas main, installed in 2002. The newer main was installed to upgrade the gas distribution system with the intent of supplying gas to a nearby school. Both gas mains ran the length of Bonito Dr. (Exh. 6). The four-inch plastic main was 24 inches below grade. The two-inch steel main was 48 inches below grade. On the day of the incident, both mains were operating at approximately 56 pounds per square inch gauge (“psig”) (Exh. 7).

In 1959, Commonwealth Gas Company⁷ installed a one-inch diameter steel service line to 9 Bonito Drive (Exh. 8). The service line was connected to the two-inch diameter steel main on Bonito Drive (Exh. 9). Like the main, the service line was coated with X-Trucoat. The unsleeved service line entered the half-basement through the foundation’s south wall. Just inside the basement wall, upstream of the service regulator, was a service valve.⁸

B. Description of the Scene

On May 24, 2002 at about 10:20 a.m., two investigators from the Department’s Pipeline Engineering and Safety Division (“Division”) arrived at 9 Bonito Drive. They met with representatives from NSTAR, the Framingham Fire Department, and the Massachusetts Department of Public Safety.

The Division investigators observed that the house had suffered heavy fire damage to

6 X-Trucoat coating is a protective layer, applied at the factory, used to protect steel pipelines from external corrosion.

7 Commonwealth Gas Company is now known as NSTAR Gas Company.

8 A service valve is a manual valve used to shut off the flow of gas to the meter.

the half-basement level. The upper level of the house had smoke and soot damage. Windows and doors had been damaged and blown from the house (Exh. 10).

There was an open excavation in the street. Within the excavation, the investigators observed a bow in the pipe near the service connection to the two-inch diameter main (Exh. 25). The X-Trucoat coating on the service line was ripped, and there were scratch marks on the service line at the location of the bend (Exh. 25). The service line was 19 inches below the surface of the ground at this point (Exh. 11).

Inside the half-basement, the Department investigators observed that the gas meter had been separated from the service line. The meter appeared to have sustained damage from the explosion and fire. The Department investigators retrieved the gas meter (Exh. 12). The Department investigators observed that the service valve, service regulator, and fire valve⁹ were still attached to the service line in the basement (Exh. 13). They also observed a crack in the service line at the inlet connection to the service regulator (Exh. 13). The Department investigators impounded the service line segment inside the basement.

C. NSTAR Gas Company

The NSTAR technician arrived at the scene at about 8:00 a.m. on the day of the incident. He stated that, prior to his arrival, PE&S had already excavated and exposed the two mains, the service tee and a portion of the service line. The technician informed the contractor that an NSTAR crew was on its way to the site to shut off the service line attached to the older main (Exh. 14).

9 A fire valve is a valve that is designed to close and shut off the gas flow when exposed to the heat of a fire.

Minutes before the explosion, the technician asked the homeowner of #9 Bonito Drive if he could shut off the gas service. The homeowner accompanied the technician into the half-basement. While the technician was applying his wrench to the valve, the inside shutoff valve moved towards the basement wall, and gas began to flow into the half-basement. Recognizing the hazardous situation, the technician yelled for everyone to leave the house. As he followed the owner to the top of the cellar staircase, he saw two people exit the rear door. As the technician approached the front door, the explosion occurred, projecting him through the doorway onto the front lawn. He got up and called the NSTAR office for help (Exh. 14).

An NSTAR crew arrived a short while later, and NSTAR shut off the flow of gas by pinning off¹⁰ the service tee at 8:47 a.m., approximately 22 minutes after the explosion (Exh. 15). Normally, NSTAR would have stopped the gas flow by closing the curb valve.¹¹ However, when the backhoe pulled the service line, it displaced the curb valve horizontally, barring access to the curb valve through the curb box (Exh. 15). Later that day, NSTAR abandoned¹² the service line.

10 Pinning off a service tee is the process of inserting a steel pin into the tap hole on the main, removing the tee, and welding the steel pin to the main.

11 A curb valve is a manually operated valve on a service line located at or near the property line. Department regulations require that all high pressure service lines have a curb shutoff. 220 C.M.R. §101.06(14).

12 In 220 C.M.R. 107.03: Definitions, a service line is considered abandoned when:

- (a) The service line is disconnected or cutoff at or as close as practical to the main; and
- (b) Any opening in the main or the open end of the segment of the service line left thereto is sealed; and
- (c) The service line is purged of gas, except when the volume of gas is so small that there is no potential hazard; and

NSTAR personnel conducted a leak survey of the area around the house and adjacent houses on the day of the incident. They found no leaking gas in the ground or in any of the houses (Exh. 16). NSTAR also checked the odorant level in the gas after the incident and reviewed the most recent odorization test records. Samples were taken and tested at three different locations near #9 Bonito Drive. The detection levels for the odorant were well within the level allowed by state regulations (Exh. 17).

D. The Contractor

The Contractor's four-man crew arrived at the site at about 7:15 a.m. The crew consisted of a foreman, a backhoe operator, a truck driver and a laborer. The crew began to expose the two gas mains and the service line. The laborer removed the asphalt with a jackhammer. Then, the backhoe operator exposed the new gas main at a depth of 24 inches (Exh. 18). The foreman then used a shovel to expose the old main at a depth of 48 inches (Exh. 19).

Next, the PE&S foreman told the backhoe operator to expose the rest of the service line, indicating that it resided at a depth of 48 inches (Exh. 20). After excavating¹³ to a depth

(...continued)

(d) The open end of the disconnected service line near the main and traversing to the premises is sealed.

13 The Dig Safe Law, G. L. C. 82, § 40, requires an excavator to use care when excavating near underground utilities. G. L. c. 82, § 40C, states in the relevant part: When excavating in close proximity to the underground facilities of any company when such facilities are to be exposed, non-mechanical means shall be employed, as necessary to avoid damage in locating such facility and any further excavating shall be performed employing reasonable precaution to avoid damage to the underground facilities, including but not limited to, . . .penetrating or destruction of any pipe. . .protective

(continued...)

of about 24 inches, the backhoe operator felt something catch on the bucket's teeth.¹⁴ He immediately stopped digging. A few seconds later, the house exploded. The foreman told the backhoe operator to pull the pipe out of the house. The operator tried to do this with the backhoe, but the pipe wouldn't move. The NSTAR technician then told the four PE&S crew to leave the area.¹⁵ NSTAR admits that the backhoe operator could not be confirmed as licensed according to the Massachusetts Department of Public Safety (Exh. 15).

E. Examination of the Pipe

Two sections of pipe were recovered from #9 Bonito Drive by the D.T.E.'s investigators. The first section consisted of the manual shutoff valve, a tee, an elbow, and a broken length of pipe. This section extended from the foundation wall to the service regulator inlet. The break occurred where the pipe was connected to the inlet of the service regulator (Exh. 22). The manual shutoff valve was pulled up against the foundation wall when the backhoe pulled on the service line (Exh. 23).

The second section of pipe consisted of the service regulator itself. A piece of pipe remained threaded into the inlet side of the regulator (Exh 24a). The exposed end of this piece had been fractured. The fracture surface closely matches the fracture surface of the downstream end of the pipe that is part of the first section (Exh. 24b).

(...continued)

coating thereof, or damage to any pipe. . . .

14 It was determined that the service line was 32 inches deep at the point where the backhoe struck it. The service line went from 50 inches deep at the main to 32 inches deep where it crossed over a drain line (Exh. 21).

15 Report of Joseph Palermo, Backhoe Operator, Pipeline Equipment and Supply Co. Inc., May 31, 2002.

The D.T.E. investigators also examined the gas meter and the bowed area of the service line struck by the backhoe. The gas meter was badly damaged in the explosion and subsequent fire (Exh. 12). The investigators were unable to read the meter.

The section of service line that was struck by the backhoe showed damage to the coating and scrape marks on the steel (Exh. 25). The service line was also bent in two places. There were no punctures in the pipe (Exh. 25).

It appears that the pipe fractured at the inlet connection to the service regulator. As the pipe was being pulled by the backhoe, it moved horizontally underground. Then, something, possibly the service regulator or the meter, was pulled up against the inner foundation wall. The pipe began to bend until it fractured at a stress concentration point, in this case, the regulator inlet connection.

F. Drug and Alcohol Testing

On the day of the incident, the NSTAR technician and the four employees of PE&S were tested for drugs and alcohol. Federal regulations require post-accident drug testing of any employee whose actions may have contributed to the accident. See 49 C.F.R. § 199.105(b). Operators are also required to test any employee that they suspect for alcohol. See 49 C.F.R. § 199.225(a).

On the day of the incident, NSTAR's Distribution Manager instructed the PE&S crew members to proceed directly to the drug/alcohol collection facility for testing. The inspector went to the collection facility after he was examined for injuries at the hospital (Exh. 15).

The distribution technician tested negative for drugs and alcohol. One member of the PE&S crew tested positive for drugs (Exh. 26). The other PE&S employees, including the

foreman and the backhoe operator, tested negative for drugs.¹⁶ All PE&S employees tested negative for alcohol.

III. FINDINGS AND CONCLUSIONS

A. Findings

- (1) Commonwealth Gas Company installed a two-inch diameter steel main under Bonito Drive, Framingham in May 1959.
- (2) Commonwealth Gas Company installed the service line to #9 Bonito Drive, Framingham, in June 1959.
- (3) A one-inch diameter service line connected the house at #9 Bonito Drive to the two-inch diameter steel main on Bonito Drive.
- (4) NSTAR installed a four-inch plastic main under Bonito Drive, Framingham, in 2002.
- (5) The service line had 48 inches of cover at the service tee connection to the two-inch main.
- (6) The service line had 32 inches of cover at the point where the backhoe struck it.
- (7) The service line was at a lesser depth at that point because it crossed over a drain line.
- (8) NSTAR was connecting existing customers to the new four-inch plastic main.
- (9) NSTAR notified Dig Safe on May 2, 2002 of the excavation.
- (10) The contractor was working for NSTAR.
- (11) The contractor's foreman told the backhoe operator to excavate the remaining portion of the service line.
- (12) One of the PE&S crew tested positive for drugs. Neither the foreman nor the backhoe operator tested positive for drugs or alcohol.
- (13) The backhoe operator was not licensed to operate the backhoe.
- (14) The contractor's backhoe struck the service line approximately 35 feet from the house.
- (15) The force exerted by the backhoe pulled the underground and basement sections of the service line horizontally.
- (16) The service line broke at the inlet to the service regulator in the basement of #9 Bonito Drive.
- (17) An NSTAR employee and the homeowner were in the basement when the backhoe struck the service line.
- (18) There were two other people in the house at the time of the incident.
- (19) The three occupants of the house were able to make it outside before the explosion occurred.

16 Letter from Timothy N. Cronin, Assistant General Counsel, NSTAR, to Chris Bourne, Public Utilities Engineer, Pipeline Engineering and Safety Division, Massachusetts Department of Telecommunications and Energy, December 20, 2002, and Drug Test Results.

- (20) The NSTAR employee was still in the house when the explosion occurred.
- (21) The NSTAR employee was blown through the front doorway of the house by the force of the explosion.
- (22) The explosion heavily damaged the house.
- (23) The odorant level in the gas met regulatory requirements.

B. Conclusions

- (1) The Department found NSTAR and PE&S to be in violation of the requirements of G. L. c. 82, § 40.
- (2) The backhoe displaced the service line horizontally,
- (3) The horizontal movement of the line caused the service line to fracture and the gas to leak.
- (4) The explosion was attributable to hazardous gas concentrations in the house.