



National Transportation Safety Board
Washington, D.C. 20594
Pipeline Accident Brief

Accident No.: DCA-03-MP-004
Type of System: Natural gas distribution
Type of Accident: Rupture, explosion, and fire
Location: Wilmington, Delaware
Date and Time: July 2, 2003, at 1:44 p.m., eastern daylight time
Owner/Operator: Delmarva Power and Light Company doing business as Conectiv Power Delivery
Fatalities: None
Injuries: 14
Property Damage and Losses: \$300,000
Material Released: Natural gas
Pressure: 6 to 8 inches water column
Type of Failure: Excavation damage
Component Affected: 1-1/4 inch steel service line

The Accident

On July 2, 2003, a contractor hired by the city of Wilmington, Delaware, to replace sidewalk and curbing dug into an unmarked natural gas service line with a backhoe. (See figure 1.) Although the service line did not leak where it was struck, the contact resulted in a break in the line inside the basement of 1816 West 3rd Street, where gas began to accumulate. A manager for the contractor said that he did not smell gas and therefore did not believe there was imminent danger and that he called an employee of the gas company and left a voice mail message. At approximately 1:44 p.m., an explosion destroyed two residences and damaged two others to the extent that they had to be demolished. Other nearby residences sustained some damage, and the residents on the block were displaced from their homes for about a week. Three contractor employees sustained serious injuries. Eleven additional people sustained minor injuries.

Preaccident Events

Quickform Concrete Company was awarded a contract by the city of Wilmington to replace sidewalk and curbing at various locations specified in the contract. Tech Consultants was responsible for coordinating the sidewalk and curb improvements with

Quickform for the city. The contract noted that street addresses would be used to indicate general work locations but that the exact limits for the work would be marked out on site.



Figure 1. Pulled natural gas service line.

After the contract was issued, Tech Consultants received additional address locations for this work. One such location was 1820 West 3rd Street. A Tech Consultants project manager surveyed the work site and determined that sidewalk and curbing replacement was needed in front of the residences at 1816, 1818, and 1820 West 3rd Street. On April 10, 2003, a sketch was prepared by Tech Consultants showing the work to be done in front of the three addresses. On June 23, 2003, Tech Consultants issued a change order to Quickform, which included the 1820 West 3rd Street address location in a list of additional address locations. Tech Consultants did not provide the 1816 and 1818 addresses or sketch to Quickform. According to Tech Consultants, the city asked Tech Consultants not to provide these sketches to contractors because the scope of work could change and there was an expectation that the contractor would attend the work mark-out on site.

The contract also required Quickform to have the underground utilities marked out before beginning excavation. On June 23, a Quickform manager called Miss Utility to have underground utilities marked for 1820 West 3rd Street, but the manager inadvertently called in an incorrect address: 820 West 3rd Street.

Conectiv Power Delivery provided gas through its pipeline distribution network to the residences on this block. On June 24, a Conectiv employee placed yellow paint marks on the ground in front of 1818, 1820, and 1822 West 3rd Street to mark the location of its underground service lines to those addresses. The Conectiv employee said that although the Miss Utility information noted planned excavation at 820, he determined that the request for 820 was in error, and he proceeded to mark the correct 1820 address and the additional addresses of 1818 and 1822 to provide a further safety margin.

In response to a June 30, 2003, request from the Quickform manager to mark out the project scope, on July 1, a Tech Consultants inspector marked in white paint the sidewalk and curbing in front of 1816, 1818, and 1820 to indicate the scope of the work. The Tech Consultants inspector said that the project scope is normally marked out just days ahead of the work in order to (1) reduce the likelihood that those who live in the area will extend the marking in an attempt to get work done in front of their houses, and (2) limit the amount of open construction ongoing at any given time. Tech Consultants and Quickform said that about half the time, a Quickform representative would accompany the Tech Consultants inspector when locations were being marked; however, on July 1, a Quickform representative did not accompany him. The inspector said that he did not routinely look for signs that the locations of underground utilities had already been marked, and he could not recall noticing which addresses had been marked as he marked the job out in front of 1816, 1818, and 1820 West 3rd Street.

On July 2, a Quickform crew arrived at the accident site location. The Quickform foreman said that he understood that the white paint marks defined the scope of work and that as a result he understood that his crew was to replace sidewalk and curbing in front of 1816, 1818, and 1820. He also said that because he didn't see any yellow paint markings in front of 1816, he believed that there was no underground gas line there and that it was safe to excavate with a backhoe.

On July 2, a Quickform backhoe contacted and pulled up an unmarked 1-1/4 inch steel service line serving 1816 West 3rd Street. Contractor employees estimated that the damage to the service line occurred at about 1:30 p.m. The crew was not aware that the action of pulling the service line outside resulted in a break to the line inside the basement at 1816 West 3rd Street. Natural gas then began to accumulate in the residence. The Quickform crew said when they saw the damage, they stopped excavation activities and notified the Quickform manager when he arrived on site a few minutes after the service line was contacted.

The line was not leaking outside,¹ and the crewmembers and manager said that they did not smell a gas odor coming from the pulled line itself; however, four of the five crewmembers reported that they smelled a faint gas odor at other points along the block before the explosion. The Quickform manager called the Tech Consultants inspector to ask for the phone number of a Conectiv engineer to report the damage; cell phone records show that this call was placed at 1:31 p.m. And according to cell phone records, the

¹ Postaccident pressure tests established that the service line was not leaking outside.

manager placed a call at 1:34 p.m. to the Conectiv engineer's phone, and the manager left a voice mail message.

A resident of 1816 West 3rd Street said that she smelled a strong odor in her house at about 1:00 p.m. or shortly thereafter. She and her two children left the house, but she did not tell anyone about the odor. At 1:44 p.m., the explosion occurred. Eight other residents who lived on the block told investigators that they smelled a gas odor before the explosion. Except for Quickform's voice mail to Conectiv, no calls were placed to Conectiv or the fire department about the damaged line or a leak before the explosion.

Emergency Response

Beginning at 1:45 p.m., the Wilmington Police Department's dispatcher received numerous telephone calls reporting an explosion on West 3rd Street. The police department responded to the site to evacuate residents, conduct crowd and traffic control, and provide security.

At 1:45 p.m., the Wilmington Fire Department initially dispatched two engine companies, a ladder company, and a battalion chief. At 1:48 p.m., the first responding city ambulance arrived at the accident site. New Castle County Emergency Medical Services (EMS) received the initial dispatch and was en route to the scene at 1:49 p.m. At 1:50 p.m., the first fire department units arrived at the site. At 1:53 p.m., the first EMS responders arrived at the site. At 1:53 p.m., the deputy chief of operations for the fire department arrived at the site and assumed incident command.

Postaccident Excavation Procedures

In September 2003, Tech Consultants modified the contracts for sidewalk and curb improvements to require the contractor to be present for marking out the project scope, and then to call Miss Utility to have the underground utilities marked out for the project scope.

Since the accident, Quickform has developed written safety procedures that instruct employees to verify that underground utilities are marked before beginning excavation and to call emergency numbers if a natural gas line is hit. The Quickform manager advised that the company's interpretation of a hit line includes a line that is pulled.

Occupational Safety and Health Administration

The U.S. Department of Labor's Occupational Safety and Health Administration (OSHA) investigated this accident. Title 29 *Code of Federal Regulations* (CFR)

1926.651 establishes excavation requirements designed to prevent damage to underground utilities, including a requirement to establish the location of underground installations before opening an excavation. On December 3, 2003, OSHA issued a citation and notification of penalty to Quickform for not contacting Miss Utility before excavating in front of 1816 West 3rd Street.

As a result of its investigation of a natural gas pipeline accident in St. Cloud, Minnesota, on December 11, 1998,² the Safety Board made the following safety recommendation to OSHA:

P-00-2

Require excavators to notify the pipeline operator immediately if their work damages a pipeline and to call 911 or other local emergency response number immediately if the damage results in a release of natural gas or other hazardous substance or potentially endangers life, health, or property.

In response to this safety recommendation, on June 13, 2003, OSHA issued a Safety and Health Information Bulletin that advises contractors on the hazards of striking underground gas lines during excavation work. The bulletin recommended informing the pipeline operator immediately if the excavator causes damage to a pipeline and to immediately contact emergency authorities if the damage results in a release of natural gas or other hazardous substances.

Common Ground Alliance Best Practices

The Common Ground Alliance provides a guide to underground utility damage prevention best practices in use throughout the United States. These best practices speak to the value of effective communication among those involved in excavation activities. A best practice notes the value of premarking the excavation area before the one-call³ and before the locator arrives on site as a means of communicating where the excavation is to occur. A best practice advises that upon arrival at the excavation site, excavators should verify that the dig site matches the one-call request.

Another best practice, which came about in response to another safety recommendation issued as a result of the Safety Board's investigation of the St. Cloud, Minnesota, accident, states that excavators should notify the pipeline operator immediately if their work damages a pipeline and to call 911 or other local emergency

² National Transportation Safety Board, *Natural Gas Pipeline Rupture and Subsequent Explosion in St. Cloud, Minnesota, December 11, 1998*. Pipeline Accident Report NTSB/PAR-00/01 (Washington, D.C.: NTSB, 2000).

³ The *one-call* system, the name of which varies from State to State, allows excavators, with a single call, to notify all underground facility owners who are members of the one-call system of planned excavation so the locations of the various facilities can be marked.

response number immediately if the damage results in a release of natural gas or other hazardous substance or potentially endangers life, health, or property.⁴

Public Education

In September 2002, Conectiv included a natural gas informational insert in the utility bills of its natural gas customers. As part of its public education program, Conectiv mailed this type of insert to its natural gas customers approximately once per year. The insert included advice to customers that if the odor was extremely strong to evacuate the premises and call Conectiv.

Title 49 CFR 192.616 requires that pipeline operators establish a continuing education program to enable the public to recognize a gas pipeline emergency for the purpose of reporting it to the operator or appropriate public officials.

The Safety Board has long been concerned about the issue of pipeline public education programs, including the content, distribution, and effectiveness of pipeline operators' safety materials for both hazardous liquid and natural gas pipelines. As a result of its investigation of a liquid butane pipeline accident near Lively, Texas, on August 24, 1996,⁵ the Safety Board recommended that the Research and Special Programs Administration (RSPA):

P-98-38

Revise 49 *Code of Federal Regulations* Part 195 to require that pipeline operators periodically evaluate the effectiveness of their public education programs using scientific techniques.

In December 2003, the American Petroleum Institute published its Recommended Practice (RP) 1162 *Public Awareness Programs for Pipeline Operators*. This standard calls for pipeline operators to periodically evaluate the effectiveness of their public education programs. RSPA has advised the Safety Board that organizations representing essentially the entire gas and hazardous liquid pipeline industry have urged RSPA to incorporate RP 1162 into the pipeline safety regulations and that RSPA is committed to incorporating by reference RP 1162 into the pipeline safety regulation (49 CFR Parts 192 and 195). As a result, the Safety Board, on November 21, 2003, classified Safety Recommendation P-98-38 "Closed—Acceptable Action."

⁴ Safety Recommendation P-00-1.

⁵ National Transportation Safety Board, *Pipeline Rupture, Liquid Butane Release and Fire, Lively, Texas, August 24, 1996*. Pipeline Accident Report NTSB/PAR-98/02 (Washington, D.C.: NTSB, 1998).

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the July 2, 2003, natural gas explosion in Wilmington, Delaware, was the failure of Quickform to verify that all underground facilities were marked within the proposed dig site before beginning excavation. Contributing to the accident was the failure of Tech Consultants and Quickform to effectively communicate about the project scope. Contributing to the severity of the accident was the failure of Quickform employees to immediately notify the utility owner and emergency authorities when they realized they had struck and pulled up a gas service line.

Adopted: April 6, 2004