



National Transportation Safety Board

Washington, D.C. 20594

Pipeline Accident Brief

Accident No.:	DCA-99-MP-004
Type of System:	Natural gas service line
Type of Accident:	Rupture, explosion, and fire
Location:	Bridgeport, Alabama
Date and Time:	January 22, 1999, 10:02 a.m. CST
Owner/Operator:	Utilities Board of the City of Bridgeport
Property Damage and Losses:	\$1.4 million
Fatalities:	3
Injuries:	6
Material Released:	Natural gas
Pressure:	35 psig
Type of Failure:	Excavation damage
Component Affected:	¾-inch steel gas service line

The Accident

On January 22, 1999, while digging a trench behind a building at 406 Alabama Avenue, a backhoe operator damaged a ¾-inch steel natural gas service line and a 1-inch water service line. This resulted in two leaks in the natural gas service line, which was operated at 35 psig. One leak occurred where the backhoe bucket had contacted and pulled the natural gas service line. (See figure 1.) The other was a physical separation of the gas service line at an underground joint near the meter, which was close to the building. Gas migrated into the building at 406 Alabama Avenue, where it ignited about 10:02 a.m. An explosion followed, destroying three buildings: 404, 406, and 408 Alabama Avenue (see figure 2). Other buildings within a two-block area of the explosion sustained significant damage. Three fatalities, five serious injuries,¹ and one minor injury resulted from this accident.

¹ According to the Jackson County Coroner, on March 23, 2000, 14 months and 1 day after the accident, one of the seriously injured persons died as a result of injuries sustained in the explosion. In accordance with 49 *Code of Federal Regulations* (CFR) 830.2, his injuries continue to be classified as "serious" for reporting purposes. Title 49 CFR 830.2 defines fatal injury as "any injury which results in death *within 30 days* of the accident."



Figure 1. Damaged section of the gas service line to 406 Alabama Avenue. (Arrow shows leak location. Note how the bowed area corresponds with the width of a backhoe bucket.)



Figure 2. Damage to 404, 406, and 408 Alabama Avenue

Preaccident Events

The owner of R&B Construction (R&B) told investigators that the owner of 408 Alabama Avenue had hired R&B to dig a trench from an electric pole behind 404 Alabama Avenue to his building for an underground electric service cable. (See figure 3.) The owner of R&B told investigators that he had not planned beforehand to dig the trench to 408 Alabama Avenue on the morning of the accident and that he did not call the Alabama Line Location Center, Inc.² However, when a part-time employee, who had operated a backhoe for R&B in the past, arrived at the R&B office the morning of January 22 looking for work, the owner of R&B decided to have the employee dig the trench that day.

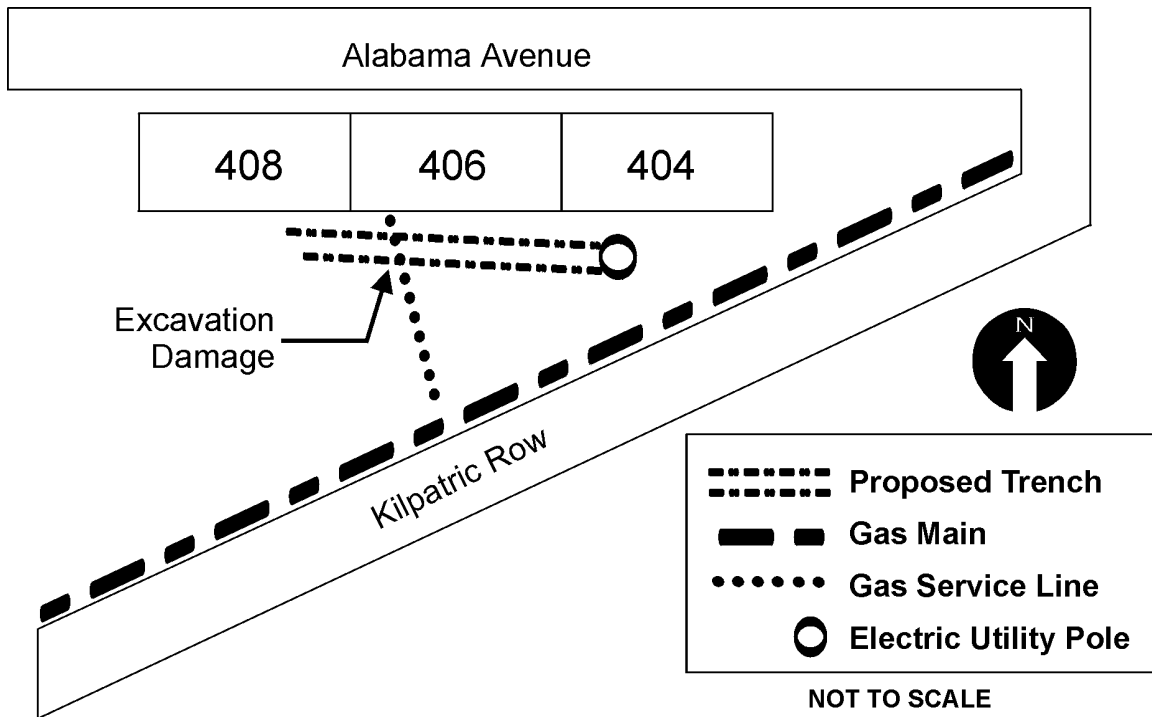


Figure 3. Schematic of accident area

The owner of R&B was a full-time employee of the Utilities Board of the City of Bridgeport (Utilities Board) at the time of the accident.³ He and a Utilities Board coworker, who was the acting supervisor of the Utilities Board field personnel on the morning of the accident, told Safety Board investigators that on the way to work that morning, they located and marked the gas and water service lines for the trenching

² Since the accident, the Alabama Line Location Center has been redesignated Alabama One Call.

³ The Utilities Board owns and operates Bridgeport's water and natural gas distribution systems.

activity. The owner of R&B told investigators that blue paint was used to mark both service lines because that was the only paint that they had.⁴ Upon their arrival the day after the explosion, Safety Board investigators could not find any blue or other line markings on the ground at the accident scene. Representatives from the Alabama Public Service Commission and the Alabama State Fire Marshals Office also did not observe any markings on the ground when they arrived at the accident scene within hours of the explosion.

The owner of R&B and the acting supervisor left the excavation site about 8:15 a.m. to go to the Utilities Board shop. They told investigators that, before they left, they had asked the owner of 408 Alabama Avenue to watch the backhoe operator. The R&B backhoe operator arrived at the excavation site some time after 8:15 a.m. While digging the trench, the backhoe operator damaged the underground gas and water service lines to 406 Alabama Avenue, resulting in leaks in the water and gas service lines. About 9:15 a.m., the owner of 408 Alabama Avenue went to the Utilities Board office at 513 Alabama Avenue and reported the excavation damage. He then returned to the excavation site. The General Manager of the Utilities Board said the owner of 408 Alabama Avenue reported that the water line and possibly the gas line were damaged.

The Utilities Board paged its field personnel between 9:18 and 9:22 a.m. Shortly afterward, five Utilities Board employees responded to the excavation site from three locations to locate and repair the leaks. One of the Utilities Board employees told Safety Board investigators that upon his arrival at the accident scene, the R&B backhoe operator showed him where he had wrapped black tape over the leak in the gas service line. In addition, he and other Utilities Board employees noticed that water was running on the ground. They could hear the hissing of leaking gas and smell a strong natural gas odor in the general area.

The Utilities Board employee who was the acting supervisor turned the water off so that field personnel could excavate and locate the leak. The acting supervisor could see a portion of the pulled gas service line above ground and said that he suspected that the gas service line was severed at some point. Though the acting supervisor could hear the gas blowing and see the gas bubbling from the water in the excavated ditch, he did not know the direction in which the gas was blowing. He told investigators that he “was hoping” that the line was pulled off at the main and that the gas was blowing up into the air. He added that he believed the leak was routine and the situation was safe. The Utilities Board employees did not check for gas migrating underground or accumulating in buildings and did not stop the flow of gas. After the acting supervisor turned off the water, a Utilities Board employee started digging to remove water and soil from the trench with a backhoe. By this time, the owner of R&B, because he was a Utilities Board employee and was paged, had arrived at the excavation site.

⁴ The Superintendent of the Utilities Board told Safety Board investigators that the Utilities Board uses yellow paint to mark gas lines and blue paint to mark water lines.

Shortly after the Utilities Board backhoe operator started digging, the building at 406 Alabama Avenue exploded. The owner of 408 Alabama Avenue, the R&B backhoe operator, and a Utilities Board employee received fatal injuries. Five other people, including a bystander, received serious injuries, and one person received a minor injury.

The Alabama State Fire Marshals Office determined that the likely source of ignition for the accumulated natural gas was a gas-fired heater at 406 Alabama Avenue, which had an active pilot light at the time of explosion.⁵ The Superintendent of the Utilities Board estimated that within 5 to 10 minutes after the explosion he had closed two valves on the 4-inch natural gas main feeding the natural gas to the broken service line.

R&B Construction

R&B is a small construction company that employs part-time employees. At the time of the accident, it did not have employee qualification and training records or written procedures for excavating near underground utility lines.

Recognizing that damages to underground facilities are usually preventable, and most frequently occur due to a breakdown in the damage prevention process, Government and industry have been working to identify and validate existing best practices for preventing damage to underground facilities. The resulting *Common Ground* study of one-call systems and damage prevention best practices⁶ discusses, among other best practices, the need to “call before you dig.” The study recommends, “Unless otherwise specified in state law, the excavator calls the one-call center at least two working days and no more than ten working days prior to beginning excavation.”⁷ It also recommends that an excavator observe a “tolerance zone” that includes the width of the facility plus 18 inches on either side and asks that excavators exercise reasonable care when excavating within the tolerance zone to protect the underground facilities.

⁵ Although the gas line had separated underground, the compacted earth surrounding the line would have provided a path that allowed continued gas flow sufficient to have fueled the pilot light.

⁶ *Common Ground: Study of One-Call Systems and Damage Prevention Best Practices*, U.S. Department of Transportation, Research and Special Programs Administration, Office of Pipeline Safety, Washington, D.C., August 1999. The *Common Ground* study, as authorized by the *Transportation Equity Act for the 21st Century* (TEA 21), was prepared by more than 160 individuals representing a wide range of interests, organizations, and viewpoints on preventing damage to underground utilities. A nonprofit organization, the Common Ground Alliance, has been formed to implement the best practices discussed in the *Common Ground* study.

⁷ Alabama State law is similar to this recommendation.

Bridgeport Utilities Board Procedures for Responding to Pipeline Emergencies

The Utilities Board's written emergency procedures in effect at the time of the January 22, 1999, accident instruct service personnel to "...evaluate the extent of the emergency, request assistance as needed, and inform the manager if necessary." The procedures further direct service personnel to:

Evacuate and secure the area if necessary. Actions should be directed towards protecting people *first* and then property.

...If, in the opinion of the person in charge, the emergency is so severe that immediate shutdown is imperative, he may do so without clearance from the Manager.

However, the procedures do not instruct employees responding to a reported leak to consider the possibility of multiple leaks, check for gas accumulation in nearby buildings, and, if necessary, to take steps to promptly stop the flow of gas.

During its annual inspections of the Utilities Board, the Alabama Public Service Commission did not identify any deficiencies in the Utility Board's emergency procedures. Since the accident, the emergency procedures have been changed only to update the names, addresses, and phone numbers of contact persons and employees.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the accident was the failure of R&B Construction to establish and follow safe procedures for excavation activities, resulting in damage to a 3/4-inch natural gas service line, and the failure of the Utilities Board of the City of Bridgeport to provide appropriate emergency response to the resulting natural gas leak.

Adopted: November 28, 2000