

Loop-310



National Transportation Safety Board
Washington, D.C. 20594

Safety Recommendation

Date: May 10, 1995

In Reply Refer To: P-95-24 and-25

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About 8:30 a.m. on July 22, 1993, a city of St. Paul Department of Public Works (DPW) backhoe hooked and pulled apart a Northern States Power Company (NSP) high-pressure gas service line.¹ The 1-inch plastic line pulled apart approximately 12 feet from where the backhoe hooked the line and just outside an elbow that was within 1 foot of the stone foundation wall of a building. A sidewalk extended from the street to the foundation wall and hindered the gas from rising. However, the foundation wall had many holes and loose, permeable mortar, enabling natural gas to flow quickly into the building, which contained three ground-floor businesses and eight upstairs residential apartments. An explosion and natural gas-fueled fire resulted about 20 minutes after the backhoe hooked the service line. The explosion force caused part of the building to land on and flatten an automobile traveling southwest on East Third Street, and the driver died instantly. The explosion and ensuing fire also killed an apartment occupant and a person outside the building and injured 12 people.

A St. Paul DPW crew, consisting of a crew leader, a backhoe operator, and two sewer services (SS) workers, had been repairing a sewer junction structure on the northeast corner of East Third Street and Maria Avenue before the accident. Their work included repairs to an adjoining sewer catch basin that ran along Maria Avenue, and the crew needed to excavate both the junction structure and the catch basin to complete the work.

On July 16, 1993, the St. Paul DPW contacted the one-call system, which notified all buried-facility operators, including the NSP, about the work planned for July 21 and 22. The NSP painted yellow markouts on the street surface on July 20 to indicate the gas main and

¹The accident is also discussed in Pipeline Accident Brief DCA-93-MP-011.

service line to 679 East Third Street.

The St. Paul DPW crew removed the old junction structure at the north corner of East Third Street and Maria Avenue and dug into a small concrete portion of Maria Avenue on July 21. That morning, when an NSP meter reader performed her monthly reading of the 679 East Third Street meter, she did not smell the odor of natural gas (mercaptan).

About 7 a.m. on July 22, the DPW crew used a pneumatic hammer on an older backhoe to fracture the concrete above the planned excavation area, which was directly above the gas service line to 679 East Third Street. A newer, conventionally equipped backhoe was moved into place after the concrete had been fractured. According to the DPW crewmember interviews, an SS worker then shoveled by hand to find the gas service pipeline. He had dug about 1 1/2 feet when the crew leader asked him whether he had found anything, and the SS worker replied, "No." (The gas service line should have been visible because its casing surface was 1 1/2 feet below the concrete, which was about 6 inches thick.) The crew leader then instructed the backhoe operator to "take back the concrete." About 8:30 a.m., the conventionally equipped DPW backhoe hooked the 3-inch (nominal diameter) steel casing with an inserted 1 1/4-inch plastic pipe. The SS worker told the crew leader that he smelled gas. The crew leader then told the backhoe operator to shut down the backhoe, and the operator did so.

Investigators found the damaged 3-inch steel casing after the accident about 1 foot north of a yellow markout on the concrete surface. Both the 3-inch steel casing and the inserted 1 1/4-inch plastic pipe were about 2 inches above the dirt surface. The soil-filled backhoe bucket was underneath the casing at a 90-degree angle to the backhoe arm.

The DPW crew leader used his truck radio to contact his office to inform the NSP about the backhoe striking the gas line. A sewer maintenance DPW dispatcher called the NSP gas service dispatch center between 8:30 and 8:35 a.m., and the NSP entered the gas service hit at 679 East Third Street into the crew dispatch computer system at 8:39 a.m. An NSP serviceman was dispatched to the site at 8:42 a.m., and others were dispatched less than 10 minutes later.

After the DPW crew leader made his radio call, a store owner came from the building and said that he could smell gas in his store. The four crewmembers went through the ground floor main entrance into the building. One SS worker and the store owner went upstairs to alert any apartment occupants; the two knocked on doors but received no response. After returning to the main entrance, they learned that all residents may not have exited. The same SS worker and the crew leader then went upstairs to alert any remaining residents. After these trips to the upstairs apartments, the SS worker, crew leader, and backhoe operator went in different directions outside the building to divert pedestrians from the intersection of East Third Street and Maria Avenue. The gas inside the building exploded about 8:50 a.m.

The St. Paul Fire Department received a 911 call at 8:52 a.m. from a local citizen, who reported an explosion and fire in the building at the northeast corner of East Third Street and Maria Avenue. Emergency response units were dispatched at 8:53 a.m. from the closest fire

station, about 1/2 mile from the accident site. (The St. Paul Fire Department had performed a disaster drill that simulated a building collapse involving 45 injuries about 2 months before this accident.)

If the St. Paul DPW dispatcher had called 911 after being notified that a gas pipeline had been struck and the odor of gas was present, the fire department would have had an opportunity to initiate an evacuation of the area and to close roads adjacent to the accident site before the explosion occurred. At the time of the accident, St. Paul DPW policy was to call the gas company. After the accident, the St. Paul DPW changed its policy and now requires that its dispatchers call both the fire department, using 911, and the gas company when a gas pipeline has been struck.

Excavation-caused pipeline damage is a serious problem in the city of St. Paul and is the primary cause of pipeline accidents in the State of Minnesota. The NSP had 243 and 976 pipeline strikes, respectively, in its St. Paul and Minnesota operations during 1993. Most of these pipeline strikes were not reported to the Minnesota Office of Pipeline Safety (MNOPS) or to the Occupational Safety and Health Division of the Minnesota Department of Labor and Industry (MNOSHA). The U.S. Department of Transportation (DOT) only requires natural gas pipeline operators to report an incident that involves a release of gas from a pipeline if it involves "(i) a death, or personal injury necessitating in-patient hospitalization; or (ii) estimated property damage, including cost of gas lost, of the operator or others, or both, of \$50,000 or more."

In this accident, the St. Paul DPW did not comply with the labor and transportation regulations in effect to prevent excavation-caused pipeline damage. The MNOSHA is responsible for enforcing the labor regulations. Title 29 Code of Federal Regulations 1926.651(b)(3) states:

When excavation operations approach estimated location of underground installations, the exact location of the installations shall be determined by safe and acceptable means.

The Minnesota one-call transportation regulations state:

The excavator or land surveyor shall determine the precise location of the underground facility, without damage, before excavating within 2 feet of a marked location of the underground facility.

St. Paul DPW officials stated that the DPW has no written procedures to prevent damage to underground facilities by excavation activities and that their excavators follow the Minnesota regulations. The one-call system has published guidelines that state:

If excavation is required within 2 feet horizontally of any marking, the excavation should be performed very carefully with hand tools and without damage.

These guidelines are similar to those developed at a recent workshop on excavation damage prevention sponsored by the Safety Board and the DOT. Workshop participants concluded that excavators should "use nonmechanized hand tools or tools specifically designed to safely expose an underground facility to determine its exact location." The DPW should develop procedures that incorporate these safe excavation guidelines and then train its excavators in these procedures.

The St. Paul DPW backhoe operator met all city employment requirements for a heavy equipment operator, which include holding a valid commercial drivers license (CDL) and having 40 hours of officially recognized training or 6 months of experience operating heavy equipment. He had experience but had not received formal training in operating heavy equipment. The crew leader also met all city employment requirements for his position, including holding a valid CDL and having a year of experience as an SS worker; he had not worked as a heavy equipment operator. Because heavy equipment operators are chosen from a pool and are not regular crewmembers, the crew leader does not work with the same heavy equipment operator on every job.

The MNOPS has sponsored and participated in Statewide excavation training and conferences. In addition, the Metropolitan Utility Coordinating Committee (MUCC), the NSP, and other utilities offer free training to all excavators in Minnesota, including St. Paul DPW excavation employees. The MUCC sponsors excavation damage prevention seminars by request, and the NSP (jointly with other companies) sponsors an annual excavation damage prevention course. Although the St. Paul DPW had registered its excavation employees for the 1992 NSP excavation damage prevention course, NSP records indicate that none of the DPW crewmembers involved in this accident had attended it. An SS worker involved in this accident was registered to take the course in February 1993; however, NSP attendance records do not indicate that he did so. The DPW contends that he was unable to attend because of a job-related injury. Of the four DPW crewmembers involved in this accident, the backhoe operator and an SS worker had registered for the 1994 course; NSP attendance records indicate that only the SS worker attended it. According to the DPW, the two unregistered crewmembers could not attend the course because of their accident-related injuries.

The DOT requires that pipeline operators have a written program to prevent excavation damage to pipelines; however, the DOT has no regulatory authority over the St. Paul DPW or other local government excavators. St. Paul DPW officials stated that they follow the Minnesota one-call laws, which do not include specific procedures regarding how employees are to comply with the laws, and that they do not have written procedures to prevent excavation-caused damage to underground facilities. The Safety Board believes that local government excavators should have a written program or written procedures and training to prevent excavation-caused damage to pipelines.

Therefore, the National Transportation Safety Board recommends that the American Public Works Association:


Advise its members of the circumstances of the July 22, 1993, explosion in St. Paul, Minnesota, and urge them to develop and implement written procedures and training to prevent excavation-caused pipeline damage. (Class II, Priority Action) (P-95-24)

Urge its members to call 911 immediately, in addition to calling the gas company, if a natural gas line has been severed. (Class II, Priority Action) (P-95-25)

Also, the Safety Board issued Safety Recommendations P-95-29 to the Minnesota Office of Pipeline Safety, P-95-28 to the Northern States Power Company, P-95-30 to the Minnesota Department of Labor and Industry, and P-95-26 and -27 to the St. Paul Department of Public Works.

The National Transportation Safety Board is an independent Federal agency with the statutory responsibility "to promote transportation safety by conducting independent accident investigations and by formulating safety improvement recommendations" (Public Law 93-633). The Safety Board is vitally interested in any action taken as a result of its safety recommendations. Therefore, it would appreciate a response from you regarding action taken or contemplated with respect to the recommendations in this letter. Please refer to Safety Recommendations P-95-24 and -25 in your reply. If you need additional information, you may call (202) 382-0670.

Chairman HALL, Vice Chairman FRANCIS, and Member HAMMERSCHMIDT concurred in these recommendations.

By: 
Chairman