National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: July 18, 2000

In reply refer to: P-00-13

Mr. Garry Briese
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The National Transportation Safety Board is an independent Federal agency charged by Congress with investigating transportation accidents, determining their probable cause, and making recommendations to prevent similar accidents from occurring. We are providing the following information to urge your organization to take action on the safety recommendation in this letter. The Safety Board is vitally interested in this recommendation because it is designed to prevent accidents and save lives.

This recommendation addresses the adequacy of St. Cloud, Minnesota, Fire Department procedures and training for responding to natural gas leaks. The recommendation is derived from the Safety Board's investigation of the December 11, 1998, accident in St. Cloud, Minnesota,[1] and is consistent with the evidence we found and the analysis we performed. As a result of this investigation, the Safety Board has issued 13 safety recommendations, 1 of which is addressed to the International Association of Fire Chiefs. Information supporting this recommendation is discussed below. The Safety Board would appreciate a response from you within 90 days addressing the actions you have taken or intend to take to implement our recommendation.

About 10:50 a.m. on December 11, 1998, while attempting to install a utility pole support anchor in a city sidewalk in St. Cloud, Minnesota, a communications network installation crew from Cable Constructors, Inc., (CCI) struck and ruptured an underground, 1-inch-diameter, high-pressure plastic gas service pipeline, thereby precipitating a natural gas leak. About 40 minutes later, while utility workers and emergency response personnel were taking preliminary precautions and assessing the situation, an explosion occurred. As a result of the explosion, 4 persons were fatally injured; 1 person was seriously injured; and 10 persons, including 2 firefighters and 1 police officer, received minor injuries. Six buildings were destroyed. Damage assessments estimated property losses at $399,000.

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

The firefighters arrived on the scene about 11:08 a.m. The first responders in the engine company included a lieutenant and three firefighters. The lieutenant said he immediately took notice of the wind direction when arriving at the site. He later said that he planned to use the information to decide which buildings needed to be evacuated first if evacuation became necessary.

One of the firefighters, accompanied by another firefighter, began testing the area using a hazardous and combustible gas monitor. After radio approval from his lieutenant, and within a minute of arrival, the other firefighter moved the fire truck to the east end of First Street North to eliminate a possible ignition source.

Four vehicles were parked near the leak site. The St. Cloud Fire Department lieutenant told the firefighters that the owner of the pipeline, Northern States Power (NSP), would need to bring heavy equipment into the area to repair the leak and that the vehicles would have to be moved. The lieutenant then walked to the police department building and asked that the license numbers for the parked vehicles be researched and their owners contacted. None of the owners were contacted, but they all eventually came out of nearby buildings and moved their vehicles.

With another firefighter at his side, the firefighter with the gas monitor first tested the concentration of natural gas above the leak site. He then performed the same test alongside the buildings adjacent to the leak. The firefighter who carried the gas monitor said the area "smelled really bad." He said he essentially got no reading when he placed the monitor directly adjacent to the hole in the ground made by the anchor. He said that the monitor's lower explosive limit (LEL) reading went from -2 to 0.[2] A firefighter stated that they had not had time to do a fresh-air calibration[3] of the monitor because of the short distance between Fire Station 1 and the accident site.

About 11:16 a.m., about 26 minutes after the pipeline was ruptured, two NSP trucks arrived. An NSP gas technician specialist arrived in one truck, which he parked on the street alongside the damage area. He then went to the location of the damage to assess its extent and to talk to the CCI foreman. An NSP locator technician (the individual who finds and marks the locations of buried utilities) was in the other truck, which was parked behind the gas technician specialist's truck. With NSP personnel on scene, two of the fire department responders joined the third already at the fire truck, while the lieutenant remained in the vicinity of the leak.

Witnesses stated that the NSP gas technician specialist entered Book-Em's Bar, the building nearest the leak, at street level (the building did not have a basement). Inside the bar, he took readings on a combustible gas indicator and was overheard stating he obtained a reading of

[2] *Lower explosive limit* refers to the lowest concentration of a flammable gas that can be ignited. NSP standards state that the LEL of its natural gas is about 4.8 percent. Gas monitors typically indicate the percentage of LEL, meaning that an NSP gas monitor reading of 100 percent would indicate a natural gas concentration of about 4.8 percent.

[3] To ensure accurate readings, the monitor is to be turned on in fresh air, after which it automatically completes a 20-second self-test and start-up sequence.

7 percent.[4] Bar patrons said the gas technician specialist then left the building to look for an entrance to the basement of the adjacent building, which housed Bellanti's Pizza and Deli.

While the gas technician specialist was taking his readings, according to witness statements, the NSP locator technician was determining if the service line had been properly marked. He was also seen assisting with the movement of a vehicle from the secured area. According to radio and cell phone records, about 11:29 a.m., an explosion occurred that killed both the gas technician specialist and the locator technician, as well as one person in the Bellanti's building and a nearby pedestrian.

According to the report of the Minnesota State fire marshal, the explosion occurred in the basement of the building where Bellanti's Pizza was located. The basement walls were made of stacked stones and crumbling mortar. According to the fire marshal's report, gas collected in the basement of the building and was ignited by an unknown source. In the basement of the building were several potential sources of ignition, including gas water heaters.

In its analysis of this accident, the Safety Board addressed the actions of the firefighters who were the first responders to the site of the pipe rupture. The firefighters arrived within minutes of fire department notification, and two of them attempted to take gas concentration readings with a gas monitor. But the monitor had not been calibrated in fresh air and gave invalid or unreliable readings. Firefighters continued to attempt readings with the improperly calibrated instrument, all the while working in an environment in which they described the gas smell as "pretty bad." At no point did firefighters check buildings near the leak site to determine if natural gas was accumulating or to help assess the need for a possible evacuation, even though the gas line was continuing to release gas that could migrate through the ground and into nearby buildings, where it could present a danger of explosion. Two of the firefighters near the leak site returned to their truck as soon as two gas company employees arrived. It should have been obvious to the firefighters that a threat continued to exist and that the situation could worsen.

The Safety Board therefore concluded that firefighters of the St. Cloud Fire Department responded quickly to the scene of the leak; however, once on the scene, the firefighters' actions did not fully address the risk to people and property posed by the leak or reduce the consequences of a possible fire or explosion.

As part of its postaccident activities, the St. Cloud Fire Department developed guidelines for natural gas emergency response that address the issues identified in this accident. According to fire department officials, revisions to procedures have been developed that should help prevent a similar accident in the future in the St. Cloud Fire Department's response area. In the view of the Safety Board, all first responders should be prepared to respond effectively to a gas leak hazard.

Timely, effective response to a natural gas emergency can save lives. In an October 30, 1998, accident in Chicago, Illinois, excavation work damaged a 24-inch-diameter natural gas

[4] Although the gas technician specialist was killed in the explosion and the gas monitor was not recovered, because NSP employees were trained to use their monitors to measure gas concentration as a percentage of the LEL, the 7 percent probably referred to 7 percent of the LEL rather than to a 7 percent concentration of gas in the air.

main.[5] The natural gas ignited about 40 minutes later, causing major fire and heat damage to a nearby 15-story high-rise apartment building. Responding fire and police personnel completely evacuated the high-rise building before the gas ignited, with the result that no one was injured in the accident.

Therefore, the National Transportation Safety Board issues the following safety recommendation to the International Association of Fire Chiefs:

> Inform your membership of the circumstances surrounding the December 11, 1998, accident in St. Cloud, Minnesota, to make them aware of the potential dangers of gas migrating into buildings from damaged underground gas lines. Advise your membership of the need to determine the hazards posed by natural gas leaks and the value of having an evacuation plan in place to be used when the situation warrants. (P-00-13)

The Safety Board also issued safety recommendations to the Research and Special Programs Administration, the Occupational Safety and Health Administration, the Associated General Contractors of America, the National Utility Contractors Association, the Power and Communications Contractors Association, the American Public Works Association, and the National Cable Television Association.

In your response to the recommendation in this letter, please refer to P-00-13. If you need additional information, you may call (202) 314-6170.

Chairman HALL and Members HAMMERSCHMIDT, GOGLIA, BLACK, and CARMODY concurred in this recommendation.

Original Signed

By: Jim Hall
Chairman

[5] Illinois Commerce Commission, September 1999, *Report of the ICC Staff: Incident at 1507 North Claybourn Avenue, Chicago, Illinois, October 30, 1998*.