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NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: September 8, 1982

Forwarded to:

Mr. Burton G. Knowles
Mayor of the City of Centralia
Municipal Building
114 South Rollins Street
Centralia, Missouri 65240

SAFETY RECOMMENDATION(S)

P-82-38 and -39

About 10:30 a.m., e.s.t., on January 28, 1982, at Centralia, Missouri, natural gas at 47 psig entered a low pressure distribution system which normally operated at 11 inches water column (0.40 psig) after a backhoe bucket snagged, ruptured, and separated the 3/4-inch-diameter steel pressure regulator control line at the Missouri Power and Light Company's district regulator station No. 1. The backhoe, which was owned and operated by the city of Centralia, was being used to clean a ditch located adjacent to the pressure regulator station. The high pressure gas entering customer piping systems in some cases resulted in high pilot light flames which initiated fires in buildings; while in other cases, the pilot light flames were blown out, allowing gas to escape within the buildings. Of the 167 buildings affected by the overpressure, 12 were destroyed and 32 sustained moderate to heavy damages. Five persons received minor injuries. 1/

When the backhoe bucket snagged and broke the regulator control line, the regulator, in an attempt to hold the 11 inch W.C. (0.40 psig) and satisfy what the regulator sensed to be a demand for additional gas, opened wide. The wide open position of the regulator allowed gas at 47 psig to enter the low pressure system and overload all the appliances. When the overload occurred, some pilot lights were blown out, thus permitting raw gas at over 100 times its normal pressure to fill the building. In structures where the furnaces or stoves were in use, the gas flames intensified and burned flammable building materials within the structures.

The purpose of the relief valve in series with the district regulator is to avoid overpressuring the downstream, low pressure distribution system. When the relief valve senses an overpressure, it automatically opens and relieves the pressure on the downstream distribution system by venting the excess gas into the atmosphere. If the overpressure is small the relief valve opens just enough to relieve or vent the excess gas. If the over pressure is large, the relief valve opens wider to vent the excess gas through the vent line.

To operate properly, the relief valve must have the valves open on the inlet side (valve No. 3) and on the sensing line (valve No. 5). Tests after the accident showed that the relief valve opened properly at its low-pressure set point. Debris was found in the ventline before the test, but had been blown out after the test. It was also determined

1/ For more detailed information, read "Pipeline Accident Report -- Missouri Power and Light Company, Natural Gas Fires, Centralia, Missouri, January 28, 1982," (NTSB-PAR-82-3).

that on September 8, 1981, during an inspection, the relief valve had been turned off and entered as such on the inspection form; there was no entry stating that the valve had ever turned back on.

The in-place test results indicated that the relief valve was in good working order, but at the time of the accident either the gate valve (valve No. 3) under the relief valve was closed or the plug valve (valve No. 5) in the sensing line was closed. Therefore, the Safety Board must conclude that the relief valve was inoperative before the accident.

The Safety Board's review of the annual inspection reports for regulator Station No. 1 indicated that during the 5-year period before the accident the regulator station's relief valve had been variously turned off or not checked. The annual inspection reports for the regulator station had been filed and never reviewed or studied by gas company management and the fact that the relief valve was placed in an inoperative mode was not known to management, nor did it know why it was inoperative, why any deficiency was not immediately repaired, or make any analysis of what the consequences might be if the valve was left in the inoperative mode. Because such analysis of these inspection records was not routinely performed, gas company management was not alerted to the fact the overpressure protection for the low-pressure system in Centralia had been nullified. The serviceman who performed the last annual inspection for station No. 1 said that he reported the position of the relief valve to his supervisor; however, no records exist to indicate what action the supervisor took to rectify the situation. If, at the time of the control line rupture, the relief valve had been in the open or operational position, this accident would have been avoided because the high pressure gas would have been vented to the atmosphere through the relief valve's vent line and the low-pressure distribution system would have been protected from overpressure.

A number of factors tend to explain why the foreman was unaware of the presence of the control line in the vicinity of Station No. 1. He could not see the control line because it was located about 12 inches below the bottom of the ditch. He had cleaned the same ditch with the same type of equipment 2 years before the accident with no adverse effects. He had not received any briefings about the location of the underground gas lines. Finally, neither the gas company nor the city had provided the foreman with blueprints or diagrams for piping to or from the various regulator stations, or for any other gas lines throughout the city. The exact location of the underground control line and sensing line was not marked or staked because the city had not asked the gas company to do so. However, the lack of records or detailed blueprints, maps, or schematics of the regulator station No. 1, would have made it difficult for the gas company personnel to mark or stake the exact location of the control line.

The foreman and city officials stated that "the job was not excavation work" and added that "when excavation operations are involved," they "immediately contacted the gas company for location of underground facilities." However the Missouri Statute, Chapter 319, General Requirements, Section 319.015(1) states, in part:

"Excavation" means any operation in which earth, rock or other material in or on the ground is moved, removed or otherwise displaced by means of any tools, equipment or explosives and includes, without limitation, grading, trenching, digging, ditching, drilling, augering, tunnelling, scraping, cable or pipe plowing, driving, and demolition of structures."
(emphasis added)

Also, Section 319.025 of the same statute states:

Excavator must give notice and obtain information, when, from whom.-A person shall not make or begin any excavation in any public street, alley, right-of-way dedicated to the public use or easement without first giving notice to and obtaining information from each and every public utility, municipal corporation or other person having such underground facilities within the public street, alley, right-of-way or easement, concerning the possible location of any underground facility.

Since the installation of the company's natural gas distribution system in the 1930's, city and gas company officials have had sufficient time to meet and discuss the potential for damage by the city's heavy equipment to the system. A potential for damage existed in Centralia because almost all of the gas service lines cross under shallow ditches which are cleaned frequently, especially during the fall and winter seasons when the removal of mud, debris, and ice is necessary, oftentimes using a backhoe.

Meetings among the concerned parties would have provided the foreman with an awareness of the potential for an active natural gas line to exist in the digging area. During those meetings, the foreman could have been briefed about the location of all underground facilities and could have determined which of the gas utility lines would be in his cleaning path area. The gas company could have been provided with the dates and places of the intended diggings and, therefore, could have made arrangements to mark or stake the exact location of the control line.

The lack of meetings prevented all concerned parties from being made aware of the need to protect from digging operations the existing gas facilities in the area.


Therefore the National Transportation Safety Board recommends that the city of Centralia, Missouri:

Require city officials to give notice to all underground and above ground utilities of any planned excavation work to be performed for the city by a city employee or a private contractor. (Class II, Priority Action) (P-82-38)

Instruct the city's excavation equipment operators not to commence excavation activities until they have determined the specific location of underground utility line in the area. (Class II, Priority Action) (P-82-39)

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." (P.L. 93-633). The Safety Board is vitally interested in any actions taken as a result of its safety recommendations. Therefore, we would appreciate a response from you regarding action taken or contemplated with respect to the recommendations in this letter.

BURNETT, Chairman, and McADAMS, BURSLEY, and ENGEN, Members, concurred in these recommendations. GOLDMAN, Vice Chairman, did not participate.

for
By: 
Jim Burnett
Chairman 