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NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: September 8, 1982

Forwarded to:

Honorable Howard J. Dugoff
Administrator
Research and Special Programs Administration
U.S. Department of Transportation
Washington, D.C. 20590

SAFETY RECOMMENDATION(S)

P-82-31

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 overpressure 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

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).

vent line before the test, but had been blown out after the test. It was also determined 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 been returned to operation.

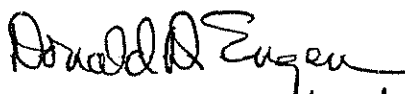
The Safety Board's review of the annual inspection reports for regulator Station No. 1 indicated that during the 5-year period before the accident the regulator station's relief valve had been variously turned off or not checked. The annual inspection reports for the regulator station had been filed 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.

The loading and sensing lines for the regulator were attached to the high and low pressure piping, respectively, outside of the metal building and were, therefore, vulnerable to damage from excavation operations. Although no Federal regulations for the design and installation of regulator stations were in effect when station No. 1 was built in 1957, industry standard ASA B31.8 was in existence. Data based on accidents reported under 49 CFR Part 191, "Transportation of Natural Gas by Pipeline; Report of Leaks," to the Materials Transportation Bureau of the U.S. Department of Transportation, indicate that outside force damage caused by excavation activities is the primary cause of pipeline failure.

Therefore, the National Transportation Safety Board recommends the Research and Special Programs Administration of the U.S. Department of Transportation:

Direct its regional field office personnel and State agents to include in their inspection of regulator stations a determination of whether the relief valves are properly set and are operational and whether the control lines are protected against excavation damage. (Class II, Priority Action) (P-82-31)

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


for By: Jim Burnett *Member*
Chairman