

NATIONAL TRANSPORTATION SAFETY BOARD
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Log P-236

SAFETY RECOMMENDATION(S)
P-83-26 and -27

At 12:15 p.m., c.d.t., on October 1, 1982, a 1/4-inch-thick steel plate, which had been welded by a work crew to cap temporarily the open end of a section of a 22-inch-diameter gas transmission pipeline which had been isolated by closing a gate valve and then gas freed, blew off under an initial pressure of possibly 260 psig. Rapidly escaping natural gas from the pipeline, which had accumulated due to a leak in the gate valve, ignited almost immediately and the entire work area and a portion of U.S. Route 65 were momentarily engulfed in flames. Seven persons who were working to replace a section of the pipeline under the road about 2 miles south of Pine Bluff, Arkansas, were burned and hospitalized. Resultant property damage was minimal. 1/

Work at the site had begun on September 13, 1982, when materials and equipment were moved to the job site and new 22-inch-diameter, heavy wall pipe lengths were welded together for installation under the crossing. The Mississippi River Transmission Corporation's (gas company) division superintendent, four other gas company personnel, and four persons from an independent pipeline contractor with whom the gas company had contracted were assigned to the project. During the next several days the original pipeline was excavated and totally exposed for a distance on each side of the road. One escape route, a sloping ramp out of the ditch, had been provided approximately halfway along the east side of the ditch; no ladders or other means of rapid escape were available. A similar excavation had been dug on the south side of the road. After the excavations were made, road boring equipment was set up, the passage under the road was "slick bored," and the new pipe was installed.

1/ For more detailed information read Pipeline Accident Report—"Mississippi River Transmission Corporation Natural Gas Flash Fire, Pine Bluff, Arkansas, October 1, 1982" (NTSB/PAR-83/03).

On September 28, 1982, a 10-mile section of the pipeline which included the section being replaced, was taken out of service by closing a 22-inch-diameter gate valve at milepost 94 (9.8 miles south of the road) and another 22-inch gate valve at milepost 104 (approximately 600 feet north of the road). Gas was transferred from the isolated section to adjacent looped lines using a portable compressor which reduced the pressure from 260 psig to 14 psig. The remaining 14 psig was vented to the atmosphere, leaving the isolated section of pipeline still full of gas at atmospheric pressure.

On September 30, 1982, the remaining gas in the isolated pipeline section was evacuated, and 20-foot-long sections of pipe were removed from the pipeline on each side of the roadway. The workers installed a temporary cap on the open end of the remaining pipeline using a round, 1/4-inch-thick steel plate welded with one pass because the cap was intended only to keep water and debris out of the pipeline; it was not intended to hold pressure. The blowdown valve at milepost 94 was left open to prevent pressure from building in the section of the pipeline that was then isolated between the gate valve and the end cap at the excavation site. All valves within the valve site were chained and locked. Nevertheless, pressure would build up in the isolated section if gas leaked through the closed gate valve.

By that afternoon, the new road crossing had been installed, the old road crossing had been abandoned, and a pipeline section composed of two 45-degree bends for connecting the new road crossing with the existing pipeline was being welded. At the end of the workday (approximately 5 p.m.), the gas company division superintendent sent a gas company maintenance man to the gate valve site at milepost 104. The superintendent said he told the maintenance man "to close his air mover down" and "to leave the gas venting out of the 6-inch blowdown." The maintenance man walked to the gate valve site, closed the air mover valve, and also closed the blowdown valve. The maintenance man said that he closed the blowdown valve, even though he was not so instructed, because he did not want rain to get into the pipeline.

On the morning of October 1, 1982, when the crew resumed work, the air mover valve and the blowdown valve at milepost 104 were still closed. The end plate valve was also closed, and no pressure gauge had been connected to it. This shut-in condition had been in effect since about 5 p.m. the evening before. The valves were not checked for their correct open or closed positions, nor was the capped, isolated section of pipeline between the gate valve at milepost 104 and the excavation site checked for pressure buildup. The crew was welding on the road crossing alignment section at the north side of the road when the accident occurred about 12:15 p.m.

Even though the gate valve at milepost 104 had been closed about 2 days before the accident and the isolated 500-foot section of pipe was made gas free at that time, gas must have been leaking through the valve continuously, but it would not have begun to accumulate in the isolated section until sometime after the pipe was capped. Even then, any gas leaking through the valve would have vented safely through the open blowdown valve until the blowdown valve was closed at 5 p.m. on September 30, 1982. Beginning at that time, the gas leaking through the valve and entering the isolated section of pipeline would have begun to build up pressure. The leakage of gas through the valve continued unnoticed because no means for monitoring the internal atmosphere of the isolated section had been provided and because no inspections or periodic checks were made to ensure that the isolated section remained gas free. As gas continued to leak through the valve, pressure within the 500-foot section increased for 19 hours until the single-weld bead on the end cap was abruptly ruptured, the end cap blew into the excavated work area, and the accumulated gas was rapidly released.

The superintendent recognized the potential for gas leakage through the closed valves, but he neither installed pressure gauges for monitoring the pressure within the isolated sections nor checked to ensure that any gas leaking through the gate valve was being vented safely. The 2-inch valves installed on each end cap had been closed to prevent any water that might accumulate in the excavation from entering the pipe. If a pressure gauge had been installed on the valves in the end caps, pressure buildup could have been detected visually by anyone in the work area. Even if pressure gauges had not been installed, the 2-inch valves could have been opened periodically throughout the day, and any gas under pressure would have been released making an audible sound; such a gas release would have initiated a search for the leak source, would have revealed the closed blowdown valve, and would have prompted its opening.

The superintendent with 28 years of pipeline experience apparently was aware of the possibility of gate valve leakage, since he said he told the maintenance man to leave the blowdown valve open. He also had the valves chained and locked so that the valve position could not be changed inadvertently or be operated by vandals. However, valve sites can be entered easily, chains can be cut, and the position (open or closed) of the valves can be changed readily; it is not enough to assume that valves that are in their proper position at the end of one workday will still be in the correct position at the start of another workday. The valves and the pressure in this isolated section should have been checked before work began on the day of the accident.

The gas company procedures were specific about what to do when cutting and welding on gas-filled pipelines. However, the work crew was not welding on a gas-filled or a gas-freed pipeline at the time of the accident; it was welding a new section of pipe that had never had gas in it. Therefore, the welders and the superintendent apparently assumed that there could not be an explosion or fire because no gas was involved in the pipe; it was a "cold work" situation. The gas company procedures do not specifically cover this situation nor do the procedures adequately discuss the importance of checking and monitoring the work area daily to detect hazardous conditions. In this case, when the "hot cut" work had been carried out several days before the accident, all of the company safety procedures had been complied with and the "hot cut" had been completed safely. It was after the "hot cut" work had been completed and welding was undertaken on the alignment pipe, which had never been in gas service, that the problem arose.

Not only did the superintendent fail to recognize an unsafe condition that is not covered by either gas company procedures or Federal regulations, but he also failed to follow specific company procedures and Federal regulations in that he did not make the work area safe. Company training in overall safety requirements and in recognizing potentially unsafe work conditions should have helped in this case. In addition, supplementary assistance could have been provided by the company to the superintendent in the form of a checklist of essential actions to be taken before work began. Such aids are helpful when performing nonroutine work such as this road relocation project. While checklists are not a foolproof means for eliminating unsafe conditions, they are in common use in many activities. A properly designed checklist for this project would have pointed out the need for adequate monitoring and other safety measures to ensure that gas did not reenter the isolated section of pipe undetected and the need for more and closer escape routes. Nevertheless, when a person has worked for 28 years around gas pipelines and has been promoted into a position of management, that person should be expected, based upon his background experience, to be able to conduct safely projects of this type even if they are not routine and are not performed on a daily basis.

Therefore, the National Transportation Safety Board recommends that the American Gas Association and the Interstate Natural Gas Association of America:

Notify its member companies of the circumstances of the accident in Pine Bluff, Arkansas, on October 1, 1982, and urge them to monitor continuously for the presence of gas when work is to be performed in the vicinity of pipeline sections that have been isolated from gas under high pressure solely by closed valves and by the installation of temporary end caps. (Class II, Priority Action) (P-83-26)

Urge its member companies to provide checklists to supervisory personnel for major work projects to identify the essential actions to be performed, before starting work and while work is in progress, to ensure employee and public safety. (Class II, Priority Action) (P-83-27)

BURNETT, Chairman, GOLDMAN, Vice Chairman, McADAMS, BURSLEY, and ENGEN, Members, concurred in these recommendations.

By: *Patrick A. Goldman*
Jim Burnett
Chairman