



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Log P-304

Date: July 8, 1992

In reply refer to: P-92-21 and -22

Mr. Fredrick W. Buckman
President
Consumers Power Company
212 West Michigan Avenue
Jackson, Michigan 49201

About 12:00 noon eastern daylight savings time on July 17, 1991, workers were removing a corroded segment of the Consumers Power Company's (CP) 10-inch-diameter transmission line pipeline at Bailey Bridge Road in Mapleton, Michigan. As a segment of the pipeline was being removed, natural gas at 360-psig pressure exerted about 12 tons of force on an adjacent closed valve (H-143) causing it and a short segment of connected pipe to move and separate from an unanchored compression coupling. The force of the escaping gas killed one worker (a welder), injured five other workers, and collapsed a steel pit that housed valve H-143.¹

At 6:15 a.m. on July 17, 1991, the day of the accident, a CP gas operations crew closed and tagged valve H-143 located at Bailey Bridge Road. This valve, housed in a below-ground steel pit measuring 3 by 6 by 6 feet, was southeast of the pipe to be removed and replaced. Next, the crew shut off the gas at Salzburg Road northwest of the work area. Then, 2-inch blowdown valves were opened to vent to the atmosphere the gas within the then isolated segment of pipeline. The isolated segment of pipeline was purged of gas, and the atmosphere within the pipeline was monitored with a combustible gas detector to make sure that the pipeline was free of gas throughout the procedure.

Employees of the Beech Construction Company (BCC) performed the pipe replacement under CP's supervision. The work project was begun by excavating the pipeline northwest of valve H-143. After uncovering the pipe outside the steel pit housing valve H-143, the crew could see that the 1/4-inch steel pit wall was welded to the 10-inch pipeline. About 175 feet of pipeline northwest of the pit was excavated, and then a CP supervisor instructed the BCC crew to cold cut the 10-inch pipeline at a location about

¹See NTSB Pipeline Accident Brief No. DCA91FP010.

172 feet northwest of the steel pit. The BCC crew used a pipe wheel cutter but could not cut completely through the top portion of the pipe, leaving about 1/4 of the pipe's circumference intact at the top.

Next, a CP supervisor told the BCC welder to use a welding torch to cut through the pipeline about 2 feet northwest of the steel pit. First, the welder cut an arched window in the wall of the steel pit around the pipeline where it had been welded to the pit wall. Then, he made a circumferential cut through the pipeline. After making the cut, the portion of the pipeline between the cuts started to rise up toward an adjacent 6-inch casing pipe containing a 2-inch gas distribution main and an unidentified copper pipe, both of which crossed less than 2 feet above the 10-inch pipeline. To prevent damage to the smaller pipes, a CP supervisor told the BCC backhoe operator to use the bucket to hold the 10-inch pipeline down, which he did.

Then, a CP supervisor told the welder to make a second cut about 1 foot away from the first to release the 10-inch-diameter pipeline. After the welder cut through the pipeline, he hit the 1-foot-long pipe segment with a hammer to remove it, but it did not release. The welder then shut off his cutting torch and threw it and the hoses up on the bank of the ditch and started to come out of the ditch. Suddenly, there was a cracking noise, and a CP supervisor yelled that the pit was moving. Before anyone could react, the approximately 25,500 pounds of force exerted by the 360-psig pipeline pressure against the closed 10-inch valve (H-143) caused the valve and a short segment of connected pipe to move and separate from an unanchored compression coupling about 2 feet southeast of the pit. The force of the escaping gas pushed and collapsed the steel pit into the excavated area where the welder was later found dead, and it propelled dirt and other debris that injured five workers above the pipeline ditch. The escaping natural gas did not ignite.

After recovering from the shock of being blown down by the high-pressure gas, a CP supervisor drove his truck 5 miles southeast to a mainline valve, unlocked the steel cover on the pit that housed the valve, and closed the valve. This stopped the flow of gas to the separated segment of the pipeline.

The National Transportation Safety Board's investigation revealed the following:

- o CP was aware that the unanchored compression couplings installed in the pipeline (style 40 long sleeve compression couplings manufactured by the Dresser Manufacturing Company) were rated to withstand only 90-psig pressure without separation unless otherwise restrained or anchored.
- o CP engineers had determined that compression couplings should be anchored to the pipeline. To implement that decision, CP's procedures were revised to require welding straps or full-encirclement sleeves over the couplings when they were exposed during normal work activities.

- o CP was aware that its gas system maps fail to show or do not accurately show the locations of all compression couplings and do not accurately designate whether the couplings shown are anchored to the pipeline.
- o CP's replacement plan included provisions for maintaining gas service to customers both upstream and downstream of the pipeline segment to be replaced. Neither the plan nor CP's procedures required the lowering of the pressure in the adjacent pipeline segments to a safe level for exposed, unanchored compression couplings or for determining that any compression couplings in the adjacent pipeline segments had been anchored.
- o A CP superintendent discussed the replacement plan with the CP crew and briefed the owner of BCC about the work BCC employees were to perform. However, the BCC employees used to perform the work were not told about the hazards of the work or about the actions to take in an emergency.
- o CP's procedures do not require pre-work briefings of contractor employees to discuss the hazards of the work or to explain what actions to take in an emergency.

The CP supervisors who oversaw the pipeline replacement work knew of the possible presence of unanchored compression couplings in the area of the pipe replacement project. However, neither the supervisors who planned the work nor those who oversaw the work recognized the potential for the pipeline to separate at an unmapped, unanchored compression coupling in one of the adjacent pipeline segments. Thus, the CP supervisors did not require that precautions--such as eliminating or reducing the pipeline pressure to a safe level--be taken to minimize the potential for the pipeline to separate at an unanchored compression coupling.

CP's management should have required that the pressure be reduced to a safe level in the pipeline segments adjacent to the segment being replaced because CP did not require that compression couplings in the adjacent pipeline segments be located and the need for anchoring be evaluated. Had CP required that the pipeline pressure be eliminated or reduced to no more than 90-psig pressure in the pipeline segments at each end of the segment to be removed, this accident probably would not have occurred. This accident demonstrates that, until all compression couplings in CP's gas transmission pipelines have been located and anchored to the pipe, CP needs to implement procedures on the planning and performance of pipe excavation and replacement work to minimize the potential of future pipe separations from unanchored compression couplings.

This accident also indicates that CP needs to conduct pre-work planning sessions with contractor personnel to inform them about the hazards involved and the actions to take in an emergency. It was fortunate that the injuries

to the CP supervisor who knew how to stop the flow of gas did not prevent him from doing so. However, if one of the CP's employees had been unable to implement the necessary actions, the severity of this accident may have been greater because the BCC employees were untrained about the actions to take to stop the uncontrolled flow of gas and to keep other persons out of the area of danger. CP should correct this deficiency by requiring its supervisors to conduct pre-work briefings with contractor employees about the work hazards and the procedures to follow in an emergency.


Therefore, the National Transportation Safety Board recommends that the Consumers Power Company:

Implement procedures, such as the elimination or the reduction of the pipeline pressure to a safe level, to prevent the unintended separation of pipeline segments from known or unknown nearby unanchored compression couplings when pipe is excavated or removed. (Class II, Priority Action)(P-92-21)

Conduct pre-work meetings with contractor employees to instruct them on the potential hazards of the work and on the actions to take in an emergency. (Class II, Priority Action)(P-92-22)

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-92-21 and -22 in your reply.

Acting Chairman COUGHLIN and Members LAUBER, KOLSTAD, HART, and HAMMERSCHMIDT concurred in these recommendations.


By: Susan M. Coughlin
Acting Chairman