Log P-191 AL-4

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

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SAFETY RECOMMENDATION(S)

P-82-16

At 2:45 p.m. on November 30, 1981, at Flatwoods, West Virginia, gas, leaking into a test section of a 26-inch-diameter gas transmission pipeline owned and operated by Columbia Gas Transmission Corporation (Columbia), ignited as a welder engaged in installing an end cap placed a tack weld 1/ on the east end of a 180-foot-long section of pipe. The resultant explosion blew off the east end cap, which struck and killed the welder's helper.

In order to ready the pipe for hydrostatic testing, welders employed by a contractor engaged by Columbia were simultaneously welding end caps on the exposed ends of the 180-foot section of 26-inch pipe; one on the west end and the other on the east end. The west end cap had been tacked in place and the "stringer bead" 2/ was being deposited by one of the welders. The east end cap which had been tacked in place with three tacks, each about 1 inch long, was blown out by an explosion within the pipe while welding was still in progress. The west end cap was not dislodged.

In order to uprate the pipeline from 700 to 800 psig to meet increased demand for natural gas through its system, Columbia had contracted for hydrostatic retesting of about 22 miles of the 26-inch pipeline originally constructed and tested in 1954. The section to be tested was composed of portions of API 5LX, grade X-52, 0.281-inch wall thickness pipe having a specified internal pressure of 1,130 psig at specified minimum yield strength and portions of API 5LX, grade X-52, 0.500-inch wall thickness pipe having specified internal pressure of 2,000 psig at specified minimum yield strength. The 180-foot section involved in the accident was to be hydrostatically tested separately because it contained a valve setting with a 26-inch venturi pattern plug valve. This type of valve will not permit passage of spheres or pigs which are run through the line while filling it with water and in conjunction with dewatering. Moreover, the valve setting was connected to an 800-foot-long, 10-inch-diameter, high-pressure (675 psig) crossover line. The 10-inch line connected the valve setting to a 36-inch-diameter transmission line.

1/ Tack welds are small points of weld metal deposited around the pipe circumference in order to hold and align the end cap on the pipe.
2/ A stringer bead is the first and most important weld made completely around the pipe. It is cleaned of impurities and followed in order by a hot pass, filler, stripper, and cover pass.

At approximately 400 feet from the valve setting, a residential customer service line was connected to the 10-inch line. The 10-inch line was kept active in order to serve the residential customer. Two 10-inch valves in the crossover line between the 36-inch operating line and the 26-inch line to be tested were closed against 675 psig pressure on the 36-inch line side and 0 psig pressure on the 26-inch line side.

On November 9 and 10, 1981, Columbia had isolated and blown down the entire 22 miles of 26-inch line, including the valve settings, and a few days later, about 2 weeks before the hydrostatic test, Columbia personnel had greased the two 10-inch crossover valves in a normal procedure intended to prevent them from leaking gas into the 26-inch line to be tested. On November 17, 1981, the contractor isolated the valve setting by cutting the 180-foot section in preparation for hydrostatic testing of that section. The contractor's superintendent stated that on the day of the accident he personally checked the area for the presence of natural gas; however, he did not use any gas detection equipment. He did say that there was a slight odor of gas ". . . like any other job. . . ." After the accident, the Safety Board and West Virginia State Public Service Commission personnel checked the two 10-inch crossover valves and found both valves to be leaking; the noise of gas leaking through the valves and the slight smell of gas were evident. There was no other connection or source of leaking gas into the 26-inch line section to be tested other than the two 10-inch crossover valves. The other end of the test section was open to the atmosphere for approximately 21 days prior to the beginning of the welding operations.

Columbia was responsible for operating the valves, moving and controlling gas, inspecting work on the facilities involved in the testing of the 26-inch line, and re-establishing normal operations when the test was completed. To carry out these responsibilities, one inspector under the immediate supervision of a chief inspector was assigned to the testing project.

The contractor was responsible for isolating specific sections of the 26-inch line to be tested, installing end caps at the isolation points, filling those sections with water, pumping to the required test pressures, transferring the water from section to section, dewatering the sections, removing the end caps, and permanently rejoining the previously isolated sections.

On the day of the accident, Columbia's inspector was monitoring coating and backfilling operations at another location. Upon completion of operations at that location, the inspector was to go to the valve setting to be hydrostatically tested and monitor the installations of the end caps; however, the contractor proceeded to install the end caps without waiting for the Columbia inspector. The superintendent did not specifically check whether the 10-inch crossover valves were leaking.

Columbia officials told the Safety Board that they did not know the time that the contractor planned to begin welding operations at the section containing the valve setting. The contractor's superintendent said that on the day of the accident, he did not see the inspector and he did not know that he was inspecting the contractor's work at another location. However, he did talk to Columbia's chief inspector that morning about the overall project, and therefore he believed that Columbia was aware of the planned welding activities at the site.

The Safety Board has concluded that Columbia's "WB-Loop Hydrostatic Testing" procedures do not provide adequate safeguards. The one-page procedure described the valve locations and the valves in the line to be closed, removed, or tested. It also

included a procedure to move water into and out of the hydrostatic test sections. A schematic diagram of the sections to be tested, the elevations, the test pressures, and the source of water accompanied the one-page document. There were no instructions or information for dealing with natural gas at the test site. In this connection the Safety Board notes that 49 CFR 192.751, Prevention of Accidental Ignition, states: "Each operator shall take steps to minimize the danger of accidental ignition of gas in any structure or area when the presence of gas constitutes a hazard of fire or explosion. . . ." Paragraph (b) of this Section states: "Gas or electric welding or cutting may not be performed on pipe or on pipe components that contain a combustible mixture of gas and air in the area of work."

Columbia's Manual of Approved Procedures For Operations, Guide No. 5, "Hydrostatic Testing of Pipelines" (manual) does not specify whether these procedures are applicable during retesting of existing pipelines nor does it include safety precautions to be taken when natural gas presents a hazard in a working area. Columbia's "WB-Loop Hydrostatic Testing" procedures for the retesting project in which the accident occurred do not cross-reference the manual for additional instructions. Even if they had, the manual does not indicate any safety procedures to be used when there is natural gas present at a test site. When the contractor's superintendent was asked if Columbia had furnished the contractor a copy of the manual, he stated: "Not for testing old lines that had gas present. . . . We were not given a manual for testing old pipelines."

The Safety Board is concerned that there is potential for similar accidents since gas transmission pipelines are often updated to accommodate increasing demands. Therefore, the National Transportation Safety Board recommends that the American Gas Association and the Interstate Natural Gas Association of America:

> Notify their member companies of the circumstances of this accident and urge them to develop detailed safety procedures for each hydrostatic test project. (Class II, Priority Action) (P-82-16)

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

By: Jim Burnett
Chairman