Log P-103

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: July 19, 1978

Forwarded to:

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SAFETY RECOMMENDATION(S)
P-78-25 through -32

At 12:50 a.m., c.s.t., on December 15, 1977, a 2-inch plastic gas main under an alley in downtown Lawrence, Kansas, pulled out of a compression coupling which joined it to a steel gas main. Natural gas escaped from the main and migrated through the stone foundation walls of two nearby buildings. At 1:20 a.m., the accumulations of gas in the two buildings ignited. The resulting explosion and fire destroyed one building, severely damaged the other building, and broke nearby windows. Two persons were killed and three persons were injured. 1/

The Kansas Public Service Company, Inc., (gas company) has estimated that it completed about 24 similar plastic gas main insertion projects that were joined to the steel distribution system with "standard" compression couplings. The gas company initially indicated that it will excavate over these transition joints and replace the "standard" compression couplings with Dresser POSI-HOLD couplings. The Safety Board's tests have indicated that the "standard" compression coupling joint, when used with plastic pipe, loses its pullout resistance with time. Therefore, these change-outs should be completed as soon as possible and certainly before next winter when thermal contractions are again expected to occur.

The 2-inch polyethylene plastic pipeline that was 394 feet long could have contracted more than 1 foot in length because of thermal contraction, if not restrained. However, the standard compression coupling that was used was not designed for anchoring pipe, and the pipeline should have included anchoring provisions against pullout in its design.

1/ For more detailed information read "Pipeline Accident Report -- Kansas Public Service Company, Inc., Explosion and Fire, Lawrence, Kansas, December 15, 1977," (NTSB-PAR-78-4).

The gas company does not have an engineer on its staff to interpret manufacturer's technical data or do pipeline design work. Technical assistance is needed to evaluate which type of mechanical joint should be used for each size/length combination of plastic pipe, or to determine if a properly designed pipeline anchor would be more appropriate under certain applications.

Because of its small size, the gas company does not have its own testing laboratory and did not test the joint that was made with the compression coupling and smooth metal insert. However, the Federal code requires that destructive burst tests be conducted on plastic pipe joints to insure that the joints are as strong as the pipe being joined. Based on the test results, installation procedures should be written and its field personnel trained in the new procedures. Since the company does not have an engineer, a new job classification of part-time installation inspector possibly could be established for a knowledgeable member of the work crew and the person trained to recognize code compliances and the quality of workmanship.

The emergency response personnel from the gas company did not use CGI's to check out rumors of gas odors in nearby buildings. They used their own sense of smell to determine that the buildings were safe and that it was not necessary to evacuate bystanders or persons in buildings.

In this accident most of the gas was being consumed by the fire, and two sectionalizing valves were closed by an employee who remembered their location. Therefore, there was no extensive migration of the gas under frost-capped soil and pavement into other buildings with dangers of secondary explosions. However, Federal regulations require written emergency plans and designation of emergency high-pressure shutoff valves. Under different circumstances this information could have been vital to the safety of the remaining residents of the area and should be prepared before another emergency situation presents itself.

There was an 8-hour delay in the notification of the Safety Board of this accident because a notification procedure and a listing of telephone numbers to report accidents had not been formulated in a written emergency plan. The necessary telephone calls were not made until after the gas company office was opened for business in the morning.

Therefore, the National Transportation Safety Board recommends that the Kansas Public Service Company, Inc.:

> Complete the review of its plastic pipe systems before the 1978-79 winter season for other unanchored insertions more than 100 feet long, and rectify any potentially hazardous conditions found. (Class II, Priority Action) (P-78-25)

Require an engineer or engineering consultant firm to review the design of its plastic pipeline system, including the design of anchors, so there are safeguards to prevent pullout at the mechanical joint for each pipe size and insertion length. (Class II, Priority Action)(P-78-26)

Conduct destructive burst tests on each type of joint by which a plastic pipeline is connected to insure that the joint is as strong as the pipe being joined. (Class II, Priority Action)(P-78-27)

Write installation procedures on how to make up each type of plastic pipe joint based on tests that have proven that the joint is as strong as the pipe being joined, and test employees on compliance and proficiency. (Class II, Priority Action)(P-78-28)

Designate emergency shutoff valves on system maps and provide these maps to personnel on emergency call status. (Class II, Priority Action)(P-78-29)

Issue an emergency plan that conforms to 49 CFR 192.615 and train emergency response personnel to insure that they are knowledgeable of the emergency procedures, including the evacuation procedures and the emergency shutdown of the system. (Class II, Priority Action)(P-78-30)

Train an installation inspector on the various code provisions and have him inspect each joint for code compliance. The time required for temperature stabilization of inserted plastic pipe and the torque requirements of compression coupling should especially be inspected. (Class III, Longer Term Action)(P-78-31)

Include in its emergency plans the after-hours telephone numbers of the various agencies to which accidents must be reported, and instruct emergency response personnel to notify the appropriate officials at the earliest possible opportunity after hazards to life and property have been eliminated. (Class II, Priority Action)(P-78-32)

KING, Chairman, McADAMS, HOGUE, and DRIVER, Members, concurred in the above recommendations.

By: James B. King
Chairman