

5. Although in the Conway accident the block valve at Conway was reported to have been initiated to the open position and it failed to open, no reason for the failure to open could be found, and no repairs to the system were made.

6. The visible vapor cloud in the Conway accident into which the trucks were driven was not pure ammonia, because concentrations of 0.5 percent would have been lethal to both truckdrivers. The vapor cloud probably consisted mostly of water vapor produced by condensation from the air, chilled by expansion and vaporization of the high-pressure NH₃.

7. MAPCO did not act in conformance with Federal regulation 49 CFR 195 in that it did not report this accident by telephone and it did not have a communications system that insures the transmission of information required for the safe operation of its pipeline system.

8. The Federal regulation, 49 CFR 195.260, Valves: Location (c), is vague and difficult to enforce, because it permits each pipeline operator to be the judge of the adequacy of valve spacing.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the pipeline rupture at Conway was the above-normal pressure on a section of pipe which had been weakened by previous damage by outside forces.

Contributing to the above-normal pressure was the failure of the dispatcher to insure that the line block valve at Conway was open after he started the pump at Borger.

Contributing to the amount of anhydrous ammonia spilled were the delay in shutting down the correct pipeline, the distance between line block valves, the time taken to manually close the existing block valve, and the highly volatile characteristics of the escaping product.

Contributing to the delay in shutting down the correct pipeline was the lack of any pressure-sensing devices on the upstream side of the line block valve at Conway.

RECOMMENDATIONS

The National Transportation Safety Board recommends that the Office of Pipeline Safety of the Department of Transportation:

1. In its upcoming rulemaking action for the transportation of highly volatile, toxic, or corrosive liquids, include anhydrous ammonia pipeline systems. Particular emphasis should be placed on a reduction of the maximum allowable pressures for NH₃

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systems, more closely spaced valves, and more remotely or automatically operated valves. (Recommendation No. P-74-50) 6/

2. In its consideration to take regulatory action concerning the methods of handling, containing, and disposing of liquefied petroleum gases, include NH₃. Necessary information should be obtained from the OPS study on highly volatile, toxic and/or corrosive liquids currently underway. Rulemaking should take into account such external factors as weather conditions, leak site topography, and population density. Attention should be given to the local temperature inversions caused by the rapid expansion of the escaping NH₃ and the possible use of externally supplied heat and air blowers to force the NH₃ vapors to rise and dissipate. (Recommendation No. P-74-51) 7/
3. Amend CFR 49 195.404(b), Maps and records, to provide for pressure recording instruments to be installed and properly maintained at each pump station and each pipeline terminal and that these recorded pressures be retained at a central location for at least 3 years. (Recommendation No. P-74-52)
4. Amend 49 CFR 195 to require liquid petroleum pipeline operators to establish liaison with appropriate public officials, including fire and police officials, to better inform them of the characteristics and hazards of liquid petroleum and related products. These regulations should include anhydrous ammonia and should be similar to those which appear in 49 CFR 192, "Transportation of Natural and Other Gas by Pipeline; Minimum Safety Standards." (Recommendation No. P-74-53)
5. Require the Mid America Pipe Line Company to:
 - (a) Improve its current written procedures under 49 CFR Section 195.402, General requirements, to require that dispatchers perform detailed monitoring of all points on a pipeline system during startup until conditions have stabilized. (P-74-54)
 - (b) Check the instrumentation at all stations, terminals and control points under 49 CFR Section 195.402 and make changes or additions as necessary to protect this pipeline system against overpressure. (P-74-55)
 - (c) Reevaluate their training program for inspectors and their inspection procedures under 49 CFR 195.204, Inspection-

6/ This recommendation is similar to recommendations 1(a) of NTSB-PAR-72-1 and 1(a) of NTSB-PAR-73-4.

7/ This recommendation is similar to recommendation 1(d) of NTSB-PAR-72-1 and 1(b) of NTSB-PAR-73-4.

general, to increase the probability that damage to their pipelines by outside parties is prevented or detected and reported. (P-74-56)

- (d) Initiate a program for a more specific inspection and repair program of the pipeline system pressure recording devices under 49 CFR 195.402 so that they will operate as designed and intended in a more reliable fashion. (P-74-57)
- (e) Review the operations of the pipeline system in the light of 49 CFR 195.402 to institute a more systematic and authoritative approach to understanding and controlling hazards. This review should cover the full life cycle of the pipeline system and be applicable to the design of new pipelines, as well as to the operation and maintenance of existing pipelines. (Recommendation No. P-74-58)

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

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