DEPARTMENT OF TRANSPORTATION
HAZARDOUS MATERIALS REGULATIONS BOARD
WASHINGTON, D.C. 20590

[49 CFR Part 180]

[Docket No. HM–6A]

TRANSPORTATION OF HIGHLY VOLATILE LIQUIDS BY PIPELINE

Request for Public Advice; Advance Notice of Proposed Rule Making

Highly volatile liquids, such as liquefied petroleum gas and anhydrous ammonia, are transported by pipeline in ever-increasing quantities. From a review of the accident reports for 1968, we believe that we may need higher safety standards for the transportation of highly volatile liquids than for other liquid products.

This advance notice of proposed rule making invites the public to help us define the safety problems and devise solutions to those problems. We are now working on regulations to cover general pipeline operations, without special provisions for highly volatile liquids. We invite advice on (i) the extra hazards resulting from the high volatility of these liquids, as distinguished from less volatile liquids such as jet fuel and gasoli[illegible] and (ii) the safety standards re[illegible] to cope with the extra hazards.

[illegible]s. Our information is far from complete, since we have accident reports only from January 1, 1968. But the information we have is quite enough to cause this inquiry, as these examples show.

Liquefied petroleum gas (LPG) is the principal highly volatile liquid transported by pipeline. Although involved in only 9 percent of the accidents reported in 1968, LPG caused 82 percent of the deaths, 37 percent of the personal injuries, and 26 percent of the property damage.

Ruptures of LPG lines frequently release thousands of barrels of product. The largest LPG spill reported in 1968 was 6,126 barrels (257,292 gallons) from an 8-inch line. Had the pipe been larger, the amount of LPG released would have been larger. Under the same circumstances, a 10-inch line would have spilled 9,572 barrels (402,024 gallons) and a 12-inch line would have spilled 13,783 barrels (578,886 gallons).

On June 1, 1968, an 8-inch pipeline reputured in Coshocton County, Ohio, spilling 4,100 barrels (172,200 gallons) of LPG. Vapor from the spill flowed down a small valley, covering an area about 200 yards wide and more than a mile long. There were no residences in the area covered by the vapor, but there were five people. When the vapor was ignited [illegible]ably by an automobile, the flash [illegible]lled three of them and critically [illegible]d the other two.

Anhydrous ammonia has only recently entered into pipeline transportation, so we have limited experience with it. However, much of our experience with LPG is pertinent to anhydrous ammonia. The amount of anhydrous ammonia which would be spilled after a rupture should be substantially the same as LPG. Both vaporize when spilled. Although the flow characteristics of the vapors differ, the vapors of both may be hazardous quite a distance from the spill.

A recent railroad accident illustrates the harm which can result from the spill of anhydrous ammonia. On February 18, 1969, a railroad train accident in Crete, Nebr., ruptured a tank car and released 30,703 gallons of liquefied anhydrous ammonia, which vaporized upon release from pressure. The asphyxiating vapors killed six people, hospitalized 14, and injured 23 others. Although the weather was calm, the vapors spread over a large area. The persons killed were 250 to 400 feet from the ruptured tank car. The civil authorities evacuated 300 residents from an area about 1 mile square.

Pipelines cross rivers which supply municipal water systems. Anhydrous ammonia dissolves readily in water. One-half part per million is the highest concentration of ammonia which is acceptable for public water supplies, using common treatment processes. (Report of the Committee on Water Quality Criteria, Federal Water Pollution Control Administration, U.S. Department of the Interior (1968).) Allowing for the difference in weight, this is comparable to 1 gallon of anhydrous ammonia in 1,366,800 gallons of water; a spill of 257,292 gallons into a municipal water source would contaminate over 350 billion gallons of water.

Discussion. These highly volatile liquids are essential to the national economy. Our objective is to set safety standards which will minimize the hazard to the public, within the limits of technical feasibility and economic practicability.

Our safety standards should be designed to prevent failures, since a failure almost anywhere could result in loss of life. The danger is greater where the population density is higher, but the mobility of these vapors makes them a threat even in sparsely settled areas. These are some of the regulatory actions which might be appropriate to the prevention of pipe failures:

1. Prohibit the use of high yield strength pipe, because it is more susceptible to stress corrosion cracking. Further, pipe manufacture and pipeline construction tolerances are more critical with high yield strength pipe.

2. Require 100 percent nondestructive testing of all welds, including longitudinal welds. We have reports of longitudinal and girth weld failures which should be prevented by these tests.

3. Require independent inspection of the manufacture of the pipe and construction of the pipeline. We have reports of failure of pipelines which should not have occurred, if the pipe manufacturer and the pipeline builder had done their work properly. An independent inspector should improve quality control.

4. Require a lower operating pressure, in relation to test pressure, for highly volatile liquids than for other liquids. We should require a higher safety factor when the pipeline is carrying a product which is inherently more dangerous in the event of rupture.

5. Improve the means of marking or protecting the pipeline. About 20 percent of reported pipeline ruptures are caused by external force. All of these ruptures occurred with one person or more in the near vicinity.

6. Require periodic determination of the integrity of the pipeline and repair of deficient pipe. The determination could be by electronic, sonic, or other means of monitoring corrosion and changes in the metallurgy of the pipe.

7. Require early protection against corrosion and frequent testing of the efficacy of the protective system. Corrosion is the largest single cause of reported liquid pipeline failures.

Our safety standards should be designed to minimize loss of product, in event of rupture. These are some of the regulatory actions which might be appropriate to minimize loss of product.

1. Require that all main line valves be either automatic or remotely controlled from manned locations. The loss of 6,126 barrels (257,292 gallons) of highly volatile liquid in a single spill is not tolerable. The distance between valves is also a factor in limiting the spill.

2. Limit the size of pipe. As noted in the third paragraph of "Facts", the spill from a 10-inch line would be more than 50 percent greater than from an 8-inch line and the spill from a 12-inch line would be more than twice as much. Of course, the amount of spill could be controlled by having valves closer together on larger pipe.

3. Require frequent patrol inspection to find small leaks.

Our safety standards should be designed to provide a higher level of safety for critical areas than for open country. When an area builds up so that it is no longer open country, the pipeline operator should meet the higher standards. Critical areas include residential areas, places where people gather, river crossings, and municipal water sources. How should we define these areas? Should we require that pipelines be routed around critical areas, where practicable?

Scope of notice. This is not a proposal to change the regulations. It is an effort to get public participation early in the rule making process. It is an effort to develop facts upon which to base rational rule making. We invite the general public to advise us on all aspects of this subject.

We invite interested persons to give us their views by June 23, 1969. Advice (identifying the docket number) should be submitted in duplicate to the Secretary, Hazardous Materials Regulations Board, Department of Transportation, 400 Sixth Street SW., Washington, D.C. 20590.

Issued in Washington, D.C., on April 18, 1969.

WILLIAM C. JENNINGS,
Director,
Office of Hazardous Materials.

[F.R. Doc. 69-4860; Filed, Apr. 22, 1969; 8:52 a.m.]

DEPARTMENT OF TRANSPORTATION
OFFICE OF THE SECRETARY
Washington, D.C. 20590

Official Business

POSTAGE AND FEES PAID
DEPARTMENT OF TRANSPORTATION