206-I-49 AI-4

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: September 30, 1981

Forwarded to:

Honorable Howard Dugoff
Administrator
Research and Special Programs
Administration
400 Seventh Street, S. W.
Washington, D.C. 20590

SAFETY RECOMMENDATION(S)

I-81-4 through -6

About 12:45 a.m., eastern standard time, on July 27, 1981, two loaded, free rolling tank cars were humped in tandem in Conrail's Oak Island Yard in Newark, New Jersey, to be coupled with a standing empty tank car. As the empty tank car was driven forward, its coupler overrode the coupler and struck the head of a standing tank car loaded with 24,700 gallons of ethylene oxide. 1/ The impact resulted in a 1.25-inch by 0.125-inch breach near the bottom of the tank head of the loaded car. Ethylene oxide escaped through the breach and ignited. The resultant fire burned for 40 hours and was not extinguished until 5:30 p.m. July 28.

Because of the possibility that the burning tank could explode, local authorities ordered the evacuation of the area within a 1-mile radius of the tank car. Several hundred workers at companies near the Oak Island Yard were ordered to leave their jobs; some air traffic at Newark International Airport was delayed; and a hotel, part of the airport north terminal area, and the New Jersey marine terminal were evacuated. A 4-mile section of highway Routes 1 and 9 and the Pulaski Skyway leading to the Holland Tunnel were closed until the fire was out.

Although the Safety Board's investigation of the accident is continuing, it has disclosed that neither the empty tank car (DOT Specification 111A100W1) nor the ethylene oxide tank car (DOT Specification 111A100W4) had been equipped with top and bottom shelf couplers (coupler vertical restraint system). Had they been, the ethylene oxide tank car puncture and material release probably would have been prevented. The investigation has also disclosed that yard personnel handled the ethylene oxide tank cars as general freight cars; they neither took nor were they required to take special handling precautions in order to minimize the possibility of coupler override during the humping operations.

1/ Ethylene oxide is a material that can become violently unstable if heated or contaminated with alkalai metals, numerous other chemicals, and water. The National Fire Protection Association has assigned its highest flammability rating and its second highest reactivity rating to this product. Emergency information available at the scene recommended that in the event of a fire all persons within a radius of 5,000 feet should be evacuated.

Ethylene oxide has been involved in accidents in the past. On January 1, 1968, in Dunreith, Indiana, a derailed ethylene oxide tank car engulfed in fire started venting and exploded within 45 minutes, injuring five emergency response personnel. 2/ In 1973, contamination with water reportedly caused the contents of an ethylene oxide car to explode on an industry siding in Texas and caused an estimated $3 million in property damage. 3/ The Safety Board is aware of at least four other ethylene oxide tank cars which have exploded since 1964 as a result of accidents .

DOT regulations permit ethylene oxide to be transported in either DOT111A100W4 or DOT105A100W cars. The Safety Board's review of DOT's regulations indicates that there is a significant difference in the safety requirements for transporting ethylene oxide in these two types of tank cars. Since the DOT111A100W4 tank head is 1/8-inch thinner than the tank of a DOT105A100W car, the margin of safety when transporting ethylene oxide in the 111A100W4 car can be even less than that provided by the 105A100W car. On January 19, 1981, 49 CFR 173.31(a)(6) was amended to require 18,000 DOT105A tank cars, including about 1,000 cars in ethylene oxide service to be retrofitted with top and bottom shelf couplers by February 28, 1982. On the same date the Materials Transportation Bureau (MTB) also amended 49 CFR 173.31(a)(7) to require 73,000 other DOT specification tank cars, including over 300 DOT111 tank cars in ethylene oxide service, to be retrofitted with top and bottom shelf couplers by February 28, 1985. 4/

The Safety Board is concerned that current DOT regulations will allow over 300 DOT111's transporting ethylene oxide to go unretrofitted until March 1985. Without top and bottom shelf couplers, the DOT111 tank cars will have substantially less tank head protection than the DOT105's during the 3-year period between the retrofit deadline for the DOT105's and retrofit of the DOT111's. In order to provide a more uniform level of tank head protection for all cars carrying ethylene oxide, the Safety Board believes the DOT should require all cars in ethylene oxide service to be equipped with top and bottom shelf couplers by February 28, 1982--the deadline established for the DOT105 coupler retrofits.

Furthermore, other commodities which pose equal or greater dangers in accidents, based on evacuation distances recommended in the 1980 DOT Emergency Response Guidebook, may be transported in either DOT105 or 111 tank cars. For example, both types of tank cars are authorized for ethylene imine and sulfur trioxide, for which the DOT Guidebook recommends 2.2-mile downwind evacuations after large spills. Despite this potential danger, recently amended 49 CFR 173.31(a)(7) treats DOT111 tank cars transporting these commodities the same as DOT111 cars transporting less dangerous commodities such as caustic soda. The DOT Guidebook does not mention a need for evacuation after an accidental release of caustic soda.

The large losses and disruptions following the release of ethylene oxide at Newark indicate that the retrofitting of tank cars which transport commodities capable of causing large losses in accidents should be given priority over retrofitting of those which carry less dangerous commodities. If no other readily available basis for establishing these

2/ "Railroad Accident Report -- Pennsylvania Railroad Train PR-11A, Extra 2210 West and Train SW-6, Extra 2217 East, Derailment and Collision, Dunreith, Indiana, January 1, 1968."

3/ Fire Command "Tank Car Explosion," National Fire Protection Association, October 1974.

4/ Research and Special Programs Administration Final Rule, Docket No. HM-174, "Shippers: Specifications for Tank Cars," 46 FR 8005, January 26, 1981.

priorities presently exists, MTB could use the evacuation or isolation distances recommended in the 1980 DOT Emergency Response Guidebook or the Bureau of Explosives Hazardous Materials Emergency Guide in B.E. Pamphlet 2 to set these priorities.

RSPA and Federal Railroad Administration are assessing, under Docket HM-175, 5/ the levels of head-puncture and thermal protection appropriate for hazardous commodities other than those carried in DOT112 and 114 tank cars. Over 1 year has passed since DOT issued the ANPRM. The DOT's most recent regulations agenda, published April 2, 1981, indicated that the earliest expected decision date for a Notice of Proposed Rulemaking (NPRM) was April 1981; however, by mid-August 1981, no NPRM had been issued. The Safety Board is concerned that, because of differences in tank protection and insulation, DOT105 and DOT111 cars transporting numerous hazardous materials with a potential for large accident losses continue to move in transportation without adequate protection. The Safety Board urges that this important rulemaking be completed expeditiously.

Therefore, the National Transportation Safety Board recommends that the Research and Special Programs Administration:

> Amend 49 CFR 173.31(a)(7) to require that all tank cars authorized for ethylene oxide service be equipped with a coupler vertical restraint system in accordance with 49 CFR 179.105-6 by February 28, 1982. (Class I, Urgent Action) (I-81-4).
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> Amend 49 CFR 173.31(a)(6) to establish priorities for installation of coupler vertical restraint systems on DOT specification tank cars required to be retrofitted by February 28, 1985, based on the relative dangers posed in accidents by the commodity being transported. (Class II, Priority Action) (I-81-5)
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> Complete rulemaking on Docket HM-175 to require the extension of specified puncture and thermal protection levels to DOT specification tank cars and established priorities for installation based on the relative dangers posed in accidents by the commodity being transported. (Class II, Priority Action) (I-81-6)

KING, Chairman, DRIVER, Vice Chairman, GOLDMAN, and BURSLEY, Members, concurred in these recommendations. McADAMS, Member, did not participate.

By: James B. King
Chairman

5/ Research and Special Programs Administration, Advanced Notice of Proposed Rulemaking (ANPRM), Docket No. HM-175 "Shippers: Specifications for Tank Cars," 45 FR 48668, July 21, 1980.