



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: July 16, 2002

In reply refer to: R-02-16

Honorable Allan Rutter
Administrator
Federal Railroad Administration
1120 Vermont Avenue, N.W.
Washington, D.C. 20590

About 3:45 a.m., eastern daylight time, on July 14, 2001, at the ATOFINA Chemicals, Inc., (ATOFINA) plant in Riverview, Michigan, a pipe attached to a fitting on the unloading line of a railroad tank car fractured and separated, causing the release of methyl mercaptan, a poisonous and flammable gas. About 4:09 a.m., shortly after the Riverview Fire Department chief arrived on scene, the methyl mercaptan ignited, engulfing the tank car in flames and sending a fireball about 200 feet into the air. Fire damage to cargo transfer hoses on an adjacent tank car resulted in the release of chlorine, a poisonous gas that is also an oxidizer. The fire was extinguished about 9:30 a.m. Three plant employees were killed in the accident. There were several other injuries; most of the injured were treated for respiratory symptoms and released. About 2,000 residents were evacuated from their homes for about 10 hours. Two tank cars, railroad track, and plant equipment (including hoses and fittings) were damaged in the fire.¹

The Safety Board determined that the probable cause of the accident was a fractured cargo transfer pipe that resulted from (1) the failure of ATOFINA to adequately inspect and maintain its cargo transfer equipment, and (2) inadequate Federal oversight of unloading operations involving hazardous materials. Contributing to the accident was ATOFINA's reliance on a tank car excess flow valve to close in the event of a leak from cargo transfer equipment and the company's failure to require appropriate safety equipment for employees involved in tank car loading and unloading operations.

Both the Environmental Protection Agency (EPA) and the Occupational Safety and Health Administration (OSHA) required ATOFINA to develop and document safety plans for the Riverview facility that included safeguards intended to reduce the risk and consequences of catastrophic releases of hazardous materials. ATOFINA's risk management plan (mandated by the EPA) and process hazard analysis (mandated by OSHA) included an accident scenario that involved the failure of a flexible hose on the unloading apparatus for a methyl mercaptan tank car—a scenario similar to this accident. Under both plans, ATOFINA indicated that the release of methyl mercaptan would be stopped by the automatic closure of the tank car's excess flow valve. Further, ATOFINA's risk management plans explicitly noted that excess flow valves on the tank car would activate in the event of a pipeline or unloading hose rupture. However, when the transfer pipe failed on July 14, 2001, the excess flow valve on the tank car did not close and stop the release of the methyl mercaptan.

¹ For more information, see National Transportation Safety Board, *Hazardous Materials Release From Railroad Tank Car With Subsequent Fire at Riverside, Michigan, July 14, 2001*. Hazardous Materials Accident Report NTSB/HZM-02/01 (Washington, D.C.: NTSB, 2002).

Calculations made by Safety Board engineers and parties to the investigation indicated that the flow rate of methyl mercaptan through the broken transfer piping was insufficient to cause the excess flow valve to close. Excess flow valves are designed to close and stop the release of product from the tank car in the event a tank car valve or fitting is broken or sheared off during transit. Attaching cargo transfer apparatus to a tank car can change product release rates and flow rate characteristics and can prevent the excess flow valve from closing in the event of an emergency. As noted by the Chlorine Institute in its *Chlorine Manual* and by the Safety Board in its investigation of a July 30, 1983, accident at the Formosa Plastics plant in Baton Rouge, Louisiana,² tank car excess flow valves are not designed to act as an emergency shutoff device during cargo transfer.³ Therefore, the Safety Board concluded that reliance on tank car excess flow valves to stop leaks during tank car cargo transfer operations is inappropriate.

To determine whether reliance upon tank car excess flow valves as safety mechanisms during transfer operations is restricted to ATOFINA or is a broader problem, Safety Board investigators interviewed a sampling of domestic chemical companies. Interviews with personnel responsible for company safety plans revealed that six of nine companies surveyed rely on tank car excess flow valves as a method of stopping or limiting a leak in the transfer equipment. Only one company reported having remotely operated shutoff valves on the unloading piping just outside the tank car dome. (The other two companies did not respond to the Safety Board's inquiry.) Although the Safety Board's sampling was limited, the results suggest that the inappropriate use of tank car excess flow valves may be a widespread practice in the chemical industry.

Therefore, the National Transportation Safety Board makes the following safety recommendation to the Federal Railroad Administration:

Issue a hazardous materials bulletin to warn companies involved in tank car loading and unloading operations that tank car excess flow valves cannot be relied upon to stop leaks that occur during those operations. (R-02-16)

The Safety Board also issued safety recommendations to the U.S. Department of Transportation, the Environmental Protection Agency, and the Occupational Safety and Health Administration.

Please refer to Safety Recommendation R-02-16 in your reply. If you need additional information, you may call (202) 314-6177.

Chairman BLAKEY, Vice Chairman CARMODY, and Members HAMMERSCHMIDT, GOGLIA, and BLACK concurred in this recommendation.

Original Signed

By: Marion C. Blakey
Chairman

² National Transportation Safety Board, *Vinyl Chloride Monomer Release From a Railroad Tank Car and Fire, Formosa Plastics Corporation Plant, Baton Rouge, Louisiana, July 30, 1983*, Hazardous Material Accident Report NTSB/HZM-85/08 (Washington, D.C.: NTSB, 1985).

³ Although excess flow valves are routinely used as safety mechanisms in the piping systems of fixed facilities, those excess flow valves are designed and constructed for specific piping systems and the properties of the material flowing through the pipe.