



National Transportation Safety Board

Washington, D.C. 20594
Safety Recommendation

Date: September 12, 1990

In reply refer to: H-90-91

Mr. Travis P. Dungan
Administrator
Research and Special Programs Administration
400 Seventh Street, S.W.
Washington, D.C. 20590

About 5:15 a.m. local time on December 28, 1988, the driver of a tractor-semitrailer operated by Virginia Chemical Company, Inc. (Virginia Chemical) of Portsmouth, Virginia, was off-loading sulfur dioxide into a storage tank at Bear Island Paper Company (Bear Island) in Ashland, Virginia, when a nipple in the MC-331 cargo tank's discharge system cracked and failed. The failure resulted in the unintentional release of 40,900 pounds of sulfur dioxide, a nonflammable gas.¹ The driver attempted to escape the vapor cloud but was overcome by the highly toxic gas and suffered fatal injuries; 14 other individuals were taken to the hospital for treatment and were released.

The driver was alone when he began off-loading the sulfur dioxide. He had not removed the emergency breathing apparatus from the vehicle and placed it upwind before he began off-loading, as required by Virginia Chemical. The apparatus was found later, with the face mask missing, in a storage compartment of the vehicle. Within an hour after the off-loading began, the stainless steel nipple on the output port of the cargo tank's liquid discharge pump cracked and began to release liquid sulfur dioxide, which immediately turned to vapor. At this point, the only method of stopping the flow of sulfur dioxide was to close the internal shut-off valve. The control for this valve was located in the same compartment as the failed pump nipple, and that compartment was filled with toxic gas. There were no remote shut-off devices for the internal valve on the cargo tank. The driver ran away from the vehicle, but he had no emergency breathing apparatus available and was overcome by the escaping sulfur dioxide.

A Bear Island employee saw the driver stumbling toward him, calling, gesturing for help, and eventually falling. The employee also saw a white cloud of vapor coming from the bottom of the cargo tank. He and another employee donned air packs, pulled the driver out of the contaminated area, and performed CPR until fire and rescue personnel arrived.

¹ RSPA Docket HM-181 has proposed reclassifying sulfur dioxide as a poisonous gas.



The postaccident investigation revealed that the cargo tank's discharge system had been modified from the manufacturer's design, which resulted in an increase in the length and weight of unsupported piping. The vibration of this piping during transportation and off-loading established cyclic loading on the nipple. Failure analysis by Safety Board laboratory personnel revealed that the nipple failed because of bilateral cyclic fatigue. Shortly after the accident, Virginia Chemical was taken over by Hoechst Celanese Corporation (Hoechst), and the use of this type of discharge system was discontinued. Currently, each of Hoechst's MC-331 cargo tanks has a remote shut-off device at the front and back of the vehicle. Hoechst has also established detailed training programs for handling emergencies involving hazardous materials.

Federal regulations require all piping on MC-331 cargo tanks to be protected from damage resulting from vibration, when manufactured. Federal regulations also require remotely controlled internal shut-off valves for MC-331 cargo tanks, but only for those tanks transporting a flammable liquid, flammable compressed gas, hydrogen chloride (refrigerated liquid), or anhydrous ammonia.² MC-331 cargo tanks are not required to have remote shut-off devices when they are transporting sulfur dioxide and other commonly transported hazardous materials. In this accident, the toxic vapor from sulfur dioxide and the lack of accessible and adequate safety equipment limited the driver from reaching the shut-off control for the internal valve. Had he been able to stop the discharge of the product at a location away from the leak, he may have escaped fatal injury.

Remote shut-off devices are required on all MC-306, MC-307, and MC-312 cargo tanks (and previously authorized models of the same type of cargo tanks) when used to transport any hazardous materials. The MC-338 cargo tanks (used to transport cryogenic materials) must have remotely controlled internal shut-off valves only when used to transport flammable lading. (According to major transporters and shippers, most, if not all, MC-338 cargo tanks are already equipped with remotely controlled internal shut-off valves.) The Safety Board believes that whenever there is an emergency involving the transfer of a hazardous material from a cargo tank, an operator must have the ability to stop the flow of product from the cargo tank through the discharge system to minimize threats to public safety. However, when a failure occurs in the vicinity of the cargo tank's operating controls, the operator may be prevented from stopping the discharge of the hazardous material from the cargo tank.

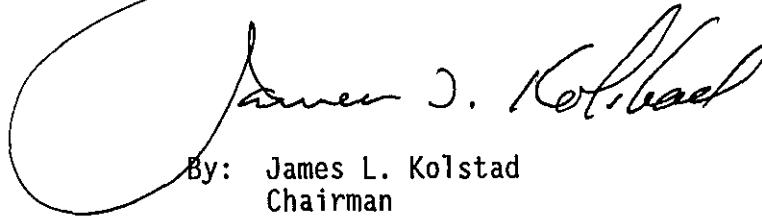
Currently, only MC-331 cargo tanks (and its predecessors) and possibly some MC-338 cargo tanks are not equipped with remote shut-off valves. The Safety Board is concerned that these cargo tanks, which are used to transport hazardous materials, are not equipped with remote shut-off devices and believes that the regulations should be amended to require the installation of remote shut-off valves on all cargo tanks used to transport hazardous materials.

² Title 49 CFR 178.337.

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

Require controls for internal shut-off valves for the discharge system to be installed at remote locations on all newly constructed and currently authorized Department of Transportation specification cargo tanks that are used for the transportation of any hazardous materials. (Class II, Priority Action) (H-90-91)

KOLSTAD, Chairman, COUGHLIN, Vice Chairman, and LAUBER, BURNETT, and HART, Members, concurred in this recommendation.

A large, stylized handwritten signature in black ink, which appears to read "James L. Kolstad". The signature is written in a cursive style with a large initial "J".

By: James L. Kolstad
Chairman