



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: June 29, 2000

In reply refer to: I-00-8

Mr. Jac Nasser
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The National Transportation Safety Board is an independent Federal agency charged by Congress with investigating transportation accidents, determining their probable cause, and making recommendations to prevent similar accidents from occurring. We are providing the following information to urge your organization to take action on the safety recommendation in this letter. The Safety Board is vitally interested in this recommendation because it is designed to prevent accidents and save lives.

This recommendation is derived from the Safety Board's investigation of a November 19, 1998, accident involving the unloading of hazardous materials from a cargo tank at the Ford Motor Company's Kentucky Truck Plant in Louisville, Kentucky.¹ The recommendation is consistent with the evidence we found and the analysis we performed. Information supporting the recommendation is discussed below. The Safety Board would appreciate a response from you within 90 days addressing the actions you have taken or intend to take to implement our recommendation.

On the morning of November 19, 1998, a truckdriver driving a Matlack, Inc., cargo tank truck arrived at the Kentucky Truck Plant to deliver a liquid mixture of nickel nitrate and phosphoric acid (designated CHEMFOS 700 by the shipper). At the plant's chemical transfer station, a plant pipefitter connected the truck's transfer hose to a transfer connection, then departed the area, leaving the truckdriver to complete the delivery alone. But the pipefitter had inadvertently connected the hose to the wrong connection. The pipe and coupler to which the transfer hose should have been connected was labeled "CHEMFOS 700"; however, the transfer hose was instead connected to an adjacent pipe and coupler labeled "CHEMFOS LIQ. ADD." The driver did not check whether the connection was correct and began unloading product, thus

¹ For more information, see Hazardous Materials Accident Brief HZB/00/02, *Chemical Reaction During Cargo Transfer, Louisville, Kentucky, November 19, 1998.*

introducing nickel nitrate and phosphoric acid solution into a storage tank containing sodium nitrite solution.

When the nickel nitrate and phosphoric acid solution mixed with the sodium nitrite solution, a chemical reaction occurred that produced toxic gases of nitric oxide² and nitrogen dioxide.³ About 10 minutes after the transfer operation started, an orange vapor cloud was observed coming from the bulk storage building. As a result, about 2,400 people were evacuated from the plant and surrounding businesses, and about 600 local residents were told by authorities to remain inside their homes. Three police officers, three Ford Motor Company employees, and the driver were treated for minor inhalation injuries. Damages exceeded \$192,000.

The National Transportation Safety Board determined that the probable cause of this accident was inadequate training of Ford Motor Company's employees on the company's procedures for unloading bulk hazardous materials. Contributing to the accident was the similar labeling of adjacent pipe connections, which made it possible for the pipefitter to confuse the two connections. Further contributing to the accident was the failure of the U.S. Department of Transportation to establish, and oversee compliance with, adequate safety requirements for unloading hazardous materials from highway cargo tanks.

From its investigation, the Safety Board identified deficiencies in hazardous materials training and a lack of general awareness and knowledge of the applicability of hazardous materials regulations to employees involved with unloading operations at Ford's Kentucky Truck Plant. The pipefitter in this accident who connected the transfer hose to the wrong coupling had not received training in the company's most recent written instructions and procedures for unloading bulk hazardous materials. On June 26, 1998, the pipefitter received training on *Local Work Instruction No. EI100-3*, dated May 26, 1998. However, 3 days before the pipefitter received his training, the company revised the local work instruction but did not provide a copy of it to the pipefitter or train him in its provisions. This newly revised *Local Work Instruction No. EI100-3*, dated June 23, 1998, added key tasks to be completed during the unloading process. These requirements included covering storm drains in the unloading area, verifying that sufficient capacity is available in the holding tank, and remaining with the truckdriver to observe the unloading process.

According to the company's manufacturing process engineer, another written company instruction included a step-by-step procedure for unloading bulk tankers. This procedure was developed to meet the company's ISO 9000 certification process in May 1997. This unloading procedure was not disseminated to Ford Motor Company pipefitters responsible for the unloading of cargo tanks; it was placed in the company's phosphate process manual, and the process engineer said he advised the pipefitters to review it. The procedure was also posted on a bulletin board inside the bulk storage building. According to interviews, the company did not train the pipefitters on the written unloading procedure, which included the requirement to double-check connections to verify the proper connection.

² Nitric oxide is toxic when inhaled and is a strong irritant to skin and mucous membranes.

³ Nitrogen dioxide may be fatal if inhaled.

The pipefitter stated that he was unaware of any written instructions or procedures covering the unloading of a cargo tank. Training records did indicate that the pipefitter was provided a copy of *Local Work Instruction No. E1100-3*, dated May 26, 1998. He further stated that if he had double-checked the connection before he left the transfer area, he probably would have noticed that the transfer hose was connected to the wrong coupling.

The Safety Board concludes that Ford Motor Company did not adequately train its employees at the Kentucky Truck Plant in the unloading of bulk hazardous materials.

The chemical transfer station for unloading cargo tanks at the Kentucky Truck Plant consisted of six 2-inch pipe connections enclosed in an access panel. The connections were identical stainless steel quick-connect couplers, and each had a shutoff valve. Each connection led to a different chemical storage tank. The couplings were not equipped with caps or locks, nor could the access panel be secured when the system was not in use.

The line that was intended for the transfer of the nickel nitrate and phosphoric acid solution was labeled "CHEMFOS 700" with black print on a yellow background. However, an identical adjacent pipe to the right had similar labeling, but the wording on the label was "CHEMFOS LIQ. ADD" and was partially obscured by tape. The similarity of the markings could easily lead to confusion since each label had the same yellow background and black lettering, and each pipe label started with "CHEMFOS."

The Safety Board concludes that Ford Motor Company's design, configuration, and labeling of its bulk hazardous materials unloading system contributed to the company employee's inadvertent connection of the cargo transfer hose to the wrong connection.

The Safety Board notes that the company now requires that before a cargo tank can be unloaded, the proper connection of the transfer hose must be verified by specially trained company personnel, the truckdriver, and an on-site chemical supplier employee (if available). Further, the company reports that it has upgraded the signs at transfer stations, installed color-coded key locks on pipe end caps, installed locks on the access panel, and posted unloading instructions at the transfer station.

While these measures address some of the issues identified in this investigation, they do not deal with the training issues. Ford Motor Company is a large organization with multiple facilities around the world. The Safety Board is concerned that the deficiencies in hazardous materials training that were found at the Kentucky Truck Plant may also exist at other company facilities.

The National Transportation Safety Board therefore recommends that Ford Motor Company:

Distribute written safety-critical procedures for unloading bulk shipments of hazardous materials to all Ford Motor Company employees who are engaged in cargo transfer operations, and conduct initial and recurrent training on the procedures. (I-00-8)

The Safety Board also issued safety recommendations to the Research and Special Programs Administration, the Occupational Safety and Health Administration, the American Chemistry Council, and National Tank Truck Carriers, Inc. In your response to the recommendation in this letter, please refer to Safety Recommendation I-00-8. If you need additional information, you may call (202) 314-6170.

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

By: Jim Hall
Chairman