



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: June 29, 2000

In reply refer to: I-00-11 and -12

Mr. Clifford J. Harvison
President
National Tank Truck Carriers, Inc.
2200 Mill Road
Alexandria, Virginia 22314

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 recommendations in this letter. The Safety Board is vitally interested in these recommendations because they are designed to prevent accidents and save lives.

These recommendations are derived from the Safety Board's recent investigation of two accidents involving the unloading of hazardous materials from cargo tanks. In one accident, the driver was killed; in the other, more than 3,000 people were evacuated or ordered to stay inside and keep doors and windows closed.¹ These recommendations are consistent with the evidence we found and the analysis we performed. As a result of these investigations, the Safety Board has issued seven safety recommendations, two of which are addressed to the American Chemistry Council. Information supporting the recommendations 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 recommendations.

On June 4, 1999, about 3:30 a.m., a Quality Carriers, Inc., truckdriver arrived at Whitehall Leather Company² in Whitehall, Michigan, and was directed by a Whitehall Leather Company shift supervisor to an area to unload his cargo tank, which was filled with sodium hydrosulfide solution. The driver connected the cargo delivery hose, at the direction of the supervisor, to the wrong storage tank, one that contained aqueous ferrous sulfate. Only one transfer connection was in place at that location, and it was clearly marked "FERROUS SULFATE." When sodium

¹ For more information, see Hazardous Materials Accident Briefs HZB/00/02, *Chemical Reaction During Cargo Transfer, Louisville, Kentucky, November 19, 1998*; and HZB/00/03, *Chemical Reaction During Cargo Transfer, Whitehall, Michigan, June 4, 1999*.

² A division of Volunteer Leather and a GENESCO Company.

hydrosulfide from the cargo tank mixed with ferrous sulfate solution in the storage tank, a reaction occurred that produced hydrogen sulfide, a poisonous gas.

About 10 minutes after the transfer operation started, an employee in the basement of the tannery building smelled a pungent odor and lost consciousness. The employee said that after regaining consciousness about 10 minutes later, he made his way out of the tannery and to an area adjacent to the south parking lot, where he found other employees on break. One of those employees called 911. The driver was found unconscious inside the tannery building, about 230 feet from the transfer area. He was pronounced dead at the scene and was later determined to have been overcome by hydrogen sulfide gas. Damages from the accident exceeded \$411,000.

About 7 months before the Whitehall Leather accident, the Safety Board investigated a similar accident at Ford Motor Company's Kentucky Truck Plant in Louisville, Kentucky. On the morning of November 19, 1998, a truckdriver driving a Matlack, Inc., cargo tank truck arrived at the 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 driver did not check whether the connection was correct and began unloading product, thus 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 oxide³ and nitrogen dioxide.⁴ 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.

Several of the pipes and couplers at the transfer station were marked with labels that were similar in color, size, and lettering. 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."

In both investigations, the Safety Board identified deficiencies in hazardous materials training and a lack of general awareness and applicability of Federal hazardous materials regulations to employees involved with unloading operations.

Whitehall Leather Company had no written procedures for unloading hazardous materials from bulk cargo tanks and no training program for those employees who could be involved with accepting and unloading shipments of hazardous materials. The supervisor who mistakenly directed the driver to the ferrous sulfate transfer area testified that he had not received training for assisting in the unloading of hazardous materials from bulk cargo tanks. He said he assumed the

³ Nitric oxide is toxic when inhaled and is a strong irritant to skin and mucous membranes.

⁴ Nitrogen dioxide may be fatal if inhaled.

chemical being delivered was ferrous sulfate because in his experience, ferrous sulfate was the only chemical that was commonly delivered on the third shift. He showed the driver where to unload his product without verifying the identity of the product, and he said he signed the delivery paperwork without reading it. He signed for the delivery before the driver began unloading the chemical and did not stay with the driver during the transfer—nor was he instructed to do so.

The Ford plant did have written instructions and procedures for unloading hazardous materials and a training program for employees involved in unloading bulk chemicals. While the pipefitter involved in this accident had received training, he had not been trained in the company's latest instructions for hazardous materials unloading, which included the requirement that he remain at the unloading site until the transfer was complete. The employee also had not received training in company procedures that required that all connections be double-checked before the transfer could begin. If these written instructions and procedures had been followed, the connecting of the transfer hose to the wrong coupler likely would not have occurred or would have been corrected before the unloading began.

The Safety Board concludes that Whitehall Leather Company and Ford Motor Company did not adequately train their employees involved in the unloading of hazardous materials and, as a result, those employees facilitated the introduction of hazardous materials into storage tanks containing different and dangerously reactive chemicals.

After the accident, Whitehall Leather Company developed written procedures to address the unloading of chemicals into storage tanks and provided training in the procedures to its employees. The Safety Board has issued safety recommendations to Ford Motor Company to address these procedural and training issues on a company-wide basis.

Quality Carriers, Inc., the carrier in the Whitehall accident, had written procedures for its drivers to follow. In the unloading procedures section of the driver's manual, drivers were instructed to defer to the receiving facility's personnel in determining which transfer coupler was the correct hook-up connection:

When you are in position to unload, make sure the receiving agent points out the actual container or pipe that the product should be loaded into or through. DO NOT ever take it upon yourself to unload a product into a container or storage facility without instructions from a receiving agent even if you have handled the same product to the same plant numerous times before. The consignee could have switched products in the storage facility, and if you were to unload into the tank without first checking, you could, at the least, contaminate two products or cause an explosion by mixing two incompatible chemicals. When the receiving agent points out the proper pipe or container, have him sign the release of responsibility block on the delivery receipt BEFORE you hook up hose or unload for the previous listed reasons. [Emphasis in the original.]

The significant differences in the unloading procedures and training of the consignees in these accidents suggest that drivers cannot always rely on facility personnel to verify that the transfer hose is connected to the proper coupler. Although employees of the company receiving hazardous materials should be in the best position to know where the product should be delivered and where the appropriate unloading lines are located, the driver can add an extra measure of

safety by comparing the labels and signs posted in the vicinity of the transfer area with the information on the shipping papers.

In the Louisville accident, the driver was aware that he was delivering a chemical designated "CHEMFOS 700." If he had checked the connection himself, he would likely have observed that the transfer hose was not connected to the coupling marked with that designation but was instead connected to the coupling adjacent to it, marked with another designation. At the very least, he could have questioned the pipefitter, who would likely have noticed the mistake and corrected it before the unloading began.

In the Whitehall accident, the shift supervisor made no attempt to determine what chemical was being delivered. But the driver likely did know, or should have known. Yet the driver made a connection to a coupling pointed out to him by the supervisor even though the coupling was clearly marked with the name of a chemical different from the one the driver was delivering. Had he taken a moment to compare the markings on the connection with the chemical named on his manifest, he may have avoided the accident.

The Safety Board therefore concludes that the procedures and practices followed by the drivers involved in the Whitehall and Louisville accidents were inadequate to prevent their transferring hazardous materials from their cargo tanks into storage tanks containing incompatible chemicals.

The Safety Board is aware that National Tank Truck Carriers, Inc., (NTTC) and the Chemical Manufacturers Association (CMA)⁵ formed the Interindustry Bulk Chemical Highway Safety Task Force to address the safe transportation of chemicals by truck. The joint CMA/NTTC *Manual of Operating Recommendations*, published with input from the task force, provides recommendations that can be implemented by both industries to enhance the safety of cargo tank unloading operations. While the Safety Board commends both NTTC and the CMA for this effort, the recommendations in the manual are general rather than specific. In the view of the Safety Board, if these recommendations provided more specific practices, both industries would have a baseline of procedures to follow that might help prevent accidents during unloading. For example, a recommended practice that drivers personally check or question all connections before beginning delivery of a hazardous material could help ensure that hoses are connected to the proper unloading lines and could help prevent such accidents as occurred at Whitehall and Louisville.

The National Transportation Safety Board therefore recommends that National Tank Truck Carriers, Inc.:

Revise, in cooperation with the American Chemistry Council, the *Manual of Operating Recommendations* to include specific recommended practices that can be implemented to prevent the unloading of hazardous materials into the wrong storage tank. For example, drivers should personally verify or question all transfer connections before beginning delivery of product. (I-00-11)

⁵ The Chemical Manufacturers Association was redesignated the American Chemistry Council on June 12, 2000.

Inform your members of the facts and circumstances of the June 4, 1999, accident in Whitehall, Michigan, and the November 19, 1998, accident in Louisville, Kentucky, and emphasize the importance of implementing specific safety critical hazardous materials cargo transfer procedures and training employees in those procedures. (I-00-12)

The Safety Board also issued safety recommendations to the Research and Special Programs Administration, the Occupational Safety and Health Administration, the Chemical Manufacturers Association, and Ford Motor Company. In your response to the recommendations in this letter, please refer to Safety Recommendations I-00-11 and -12. 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