



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: June 29, 2000

In reply refer to: I-00-6

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

The National Transportation Safety Board has recently investigated two accidents involving the unloading of hazardous materials from cargo tanks. In one accident, the driver was killed. In the other accident, more than 3,000 people were either evacuated or ordered to stay inside and keep doors and windows closed.¹

On June 4, 1999, at approximately 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 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 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. Property damages 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

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.

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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. 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 pipefitter mistakenly connected the transfer hose 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 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 transfer 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.

In the Whitehall Leather Company accident, the 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 in assisting in the unloading of hazardous materials from bulk cargo tanks. He said he assumed the 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 stated that 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 had 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 established written instructions and procedures had been followed, the connecting of the transfer hose to the wrong coupler probably 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

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.

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, on a company-wide basis, the procedural and training issues identified during this investigation.

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 chemical different from the one the driver was carrying. Had he taken a moment to cross check 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 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.

In both the Whitehall and Louisville investigations, the Safety Board identified specific deficiencies in hazardous materials training and a general lack of awareness and knowledge of the applicability of the hazardous materials regulations (HMR) to employees involved with unloading operations. These deficiencies prompt Safety Board concern about the degree of oversight provided by the U.S. Department of Transportation (DOT) regarding the performance and training of personnel engaged in the unloading of hazardous materials from bulk containers at consignee facilities.

Title 49 *Code of Federal Regulations* (CFR) Section 172.702 requires hazmat employers to train and test their hazmat employees. Under Section 172.704, hazmat employers are required to provide general awareness, function-specific, and safety training to employees who perform functions related to the transportation of hazardous materials. Personnel at the Louisville truck plant and Whitehall Leather Company stated that DOT personnel had never conducted inspections or compliance audits at their facilities.

The Safety Board contacted the acting director of the DOT's Office of Motor Carrier Safety (OMC)⁵ to determine the scope of OMC enforcement of the HMR at facilities that receive hazardous materials shipments. The OMC official replied that the OMC has "no jurisdiction to perform investigations" of these facilities.

The OMC position that it has no jurisdiction over facilities that receive hazardous materials shipments contrasts with that of the DOT's Federal Railroad Administration (FRA). The FRA policy is to conduct inspections and enforce the HMR at all hazardous materials employer facilities. These facilities include shipping (loading), carrier (railroad operator), and unloading (consignee) facilities. The FRA has issued hazardous materials bulletins that specify FRA policy and guidance for industry in specific areas and has included the bulletins in the FRA inspectors' *Hazardous Materials Enforcement Manual*. Examples of some bulletin topics are tank car unloading, attendance requirements (during unloading), and hazardous materials training. Each of these bulletins suggests specific procedures applicable to the bulletin topic. Further, the FRA has published guidance documents for industry to follow in developing effective railroad tank car loading and unloading training programs. The FRA conducts "cursory reviews of the training received by hazmat employees...to ensure that each hazmat employee [has been] trained, tested, and certified on the employee's appropriate area of responsibility."

Under the FRA policy, then, had the hazardous materials deliveries to the Whitehall and Louisville facilities been routinely made by railroad tank car rather than cargo tank truck, the FRA would have provided oversight of the hazardous materials procedures and training programs of those facilities. But because the OMC does not interpret its role in hazardous materials transportation as broadly as does the FRA, the OMC does not exercise the same oversight of hazardous materials procedures and training.

⁵ Now designated the Federal Motor Carrier Safety Administration.

As a result of its investigation of a 1986 marine accident in Deer Park, Texas, which involved a transfer of hazardous materials between a marine vessel and a transfer terminal, the Safety Board pointed out the need for the DOT to establish uniform general requirements that would provide adequate and equal levels of safety for the public and for employees in all segments of a hazardous materials transportation system. As a result of the Deer Park accident investigation, the Safety Board issued intermodal Safety Recommendations I-88-1 and -2, asking the DOT to establish safety requirements for the movement and temporary storage of hazardous materials at intermodal transportation facilities and to strengthen the minimum safety requirements for loading and unloading of hazardous materials in all modes of transportation.

According to our records, the Safety Board has not received any correspondence from the DOT regarding Safety Recommendation I-88-1 since January 14, 1994, and regarding Safety Recommendation I-88-2 since September 30, 1988. In response to Safety Recommendation I-88-1, the DOT indicated that RSPA had initiated a review of jurisdictional authority that was to have been completed by December 31, 1988. In response to Safety Recommendation I-88-2, the DOT indicated that loading and unloading operations were being addressed in several regulatory projects by the different DOT modal administrations.

According to Safety Board records, no information has been received to indicate that the review of jurisdictional authority by RSPA or the other regulatory projects cited by the DOT were completed. The Safety Board is concerned that 12 years have elapsed without any substantive progress by the DOT on this issue. Safety Recommendations I-88-1 and -2 remain classified "Open—Unacceptable Response."

On July 29, 1996, RSPA published an advance notice of proposed rulemaking (ANPRM) titled "Applicability of Hazardous Materials Regulations (HMR) to Loading, Unloading, and Storage," Docket No. HM-223. The ANPRM announced that RSPA would "seek ideas, proposals and recommendations regarding the applicability of the HMR to particular hazardous materials transportation activities." RSPA indicated that this information would "help the agency to consolidate, clarify, revise and update existing agency interpretations, rulings and decisions regarding the applicability of the HMR and determine whether there is a need to amend the HMR." The ANPRM noted that RSPA had issued a number of interpretations and rulings in response to requests from the public for clarification regarding the meaning of "transportation in commerce" and whether particular activities are covered by that term and thus subject to regulation under the HMR. The ANPRM identified loading, unloading, storage, and handling of hazardous materials as areas of particular confusion and concern.

On April 27, 1999, RSPA published a supplemental ANPRM for Docket No. HM-223 to "highlight comments received" by the ANPRM and to invite additional comments on the applicability of the HMR to the loading, unloading, and storage of hazardous materials. RSPA has advised that it will issue a notice of proposed rulemaking later in 2000 that addresses the loading, unloading, and storage of hazardous materials.

The Safety Board is concerned that the lack of progress by RSPA in the HM-223 rulemaking indicates that the DOT is not providing sufficient direction to ensure that personnel involved in safety-critical unloading operations are properly trained and provided with clear written procedures.

Given the thousands of different hazardous materials that are loaded, transported, and unloaded on a daily basis and the potential risks associated with those materials, the training of personnel transferring these materials is extremely important. As shown by the Whitehall and Louisville investigations, accidents involving the reactions of two incompatible chemicals can be catastrophic and can be a serious threat to public health and safety. In the view of the Safety Board, continued confusion about the applicability of the HMR to certain activities related to unloading hazardous materials and uncertainties regarding Federal oversight responsibility threaten public safety.

The National Transportation Safety Board therefore makes the following safety recommendation to the Research and Special Programs Administration:

Within 1 year of the issuance of this safety recommendation, complete rulemaking on Docket HM-223 "Applicability of the Hazardous Materials Regulations to Loading, Unloading and Storage," to establish, for all modes of transportation, safety requirements for loading and unloading hazardous materials. (I-00-6)

Also, the Safety Board issued safety recommendations to the Occupational Safety and Health Administration, National Tank Truck Carriers, Inc., the American Chemistry Council, and Ford Motor Company. In your response to the recommendation in this letter, please refer to Safety Recommendation I-00-6. If you need additional information, you may call (202) 314-6170.

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

Original Signed

By: Jim Hall
Chairman