



National Transportation Safety Board

Washington, D.C. 20594

Hazardous Materials Accident Brief

Accident No: DCA99MZ006
Location: Whitehall, Michigan
Date of Accident: June 4, 1999
Time: 3:50 a.m. eastern standard time
Carrier: Quality Carriers, Inc.
Vehicles: MC-307 Cargo Tank
Injured: 1 fatality and 1 injury
Evacuated: 11 people from the plant
Property Damage: In excess of \$411,000
Materials Involved: Sodium hydrosulfide solution reacting with ferrous sulfate solution
Type of Accident: Chemical reaction during cargo transfer

The Accident

About 3:30 a.m. on June 4, 1999, a Quality Carriers, Inc., truckdriver arrived at the Whitehall Leather Company¹ tannery in Whitehall, Michigan, to deliver a load of sodium hydrosulfide solution. The truckdriver had never been to the plant before. Upon arrival, he asked a tannery employee for assistance. The employee called the shift supervisor, who met the driver at the plant employee's work station.

The shift supervisor stated that the only chemical shipment he had previously received on the third shift was "pickle acid" (ferrous sulfate).² He said he had not been told to expect the delivery of another chemical on the shift,³ so he assumed this load was also pickle acid. The supervisor stated that because the driver did not know the plant's layout and was unfamiliar with where to unload his cargo, he walked the driver through the plant and out to the pickle acid transfer area. The supervisor did not verify what chemical was being delivered. The shipping documents identified the cargo as sodium hydrosulfide solution.

¹ A division of Volunteer Leather and a GENESCO Company.

² *Pickle acid* was the generic term used by tannery plant personnel for ferrous sulfate. When the shift supervisor was asked by Safety Board investigators what ferrous sulfate was, he said he did not know. He stated that *pickle acid* was the only term he had ever heard applied to the chemical used in that area of the tannery.

³ The delivery was not scheduled for the third shift; instead, it was to have been delivered after 7 a.m.

The shift supervisor showed the driver the ferrous sulfate connection (the only working transfer connection at that location) so he could deliver his product. (See figure 1.) The shift supervisor then unlocked a gate to allow the driver to bring his vehicle onto the plant property. The driver asked the supervisor to sign the shipping documents so he would not have to find the supervisor after the transfer was completed. According to the supervisor, he signed the paperwork without reading it and left the area. The signature block that the supervisor signed stated the following: “I have checked the documents for this shipment and verify that there is adequate storage room to receive this shipment and connection has been made to the proper storage facility.”



Figure 1. Postaccident view of the cargo tank (right) with transfer hose attached to the ferrous sulfate transfer coupler. The two pipes seen at the left of the ferrous sulfate coupling are no longer used and do not have couplers attached.

No plant employees were in the vicinity of the transfer area. When the driver arrived at the transfer area, a transfer hose was already connected to a pipe, marked “FERROUS SULFATE,” on the side of the transfer building. During the postaccident investigation, investigators found the other end of the transfer hose connected to the cargo tank and determined that sodium hydrosulfide solution had been transferred from the

cargo tank into the storage tank containing ferrous sulfate. (See figure 2.) (Sodium hydrosulfide solution reacts with ferrous sulfate solution to produce hydrogen sulfide, a poisonous gas.)



Figure 2. Close-up view of ferrous sulfate transfer coupler

About 4 a.m., 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 to an area adjacent to the south parking lot, where he found other employees on break. One of these employees called 911.

The driver was found unconscious inside the tannery building approximately 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. No telephone or other means of communication was located near the transfer area that the driver could have used to notify plant personnel of an emergency. Postaccident investigation revealed that both the emergency valve at the rear of the cargo tank and the compressed air valve, located inside the tannery building approximately 40 feet from the transfer area, were closed and secured.⁴

Chemical Transfer System

Whitehall Leather receives bulk shipments of ferrous sulfate, sulfuric acid, and sodium hydrosulfide. The products are kept in separate storage tanks on the property and used in the leather tanning process.

The ferrous sulfate transfer area was on the northeast side of the tannery facility. (See figure 3.) The connection was not equipped with a lock or any other safety or protective device.

The tannery received ferrous sulfate shipments during all shifts. According to company officials, when the chemical was delivered on the first shift, the environmental manager or the superintendent would usually assist the driver. The officials stated that when a shipment was delivered on the second or third shifts, shift supervisors were allowed to assist drivers. (The investigation determined that hourly employees also occasionally assisted with chemical deliveries arriving on the second or third shifts.) These employees would, according to the company, show the driver where to unload the product and point out the compressed air connection. After the cargo transfer was completed, the employees were to sign the invoice noting that the cargo had been delivered. These procedures were not in writing, and the investigation determined that they were not always followed. The company did not have a program to train its employees for unloading bulk cargo.

⁴ Investigators interviewed personnel from the tannery working at the time of the accident and emergency response personnel, all of whom stated that they did not close or secure either valve.

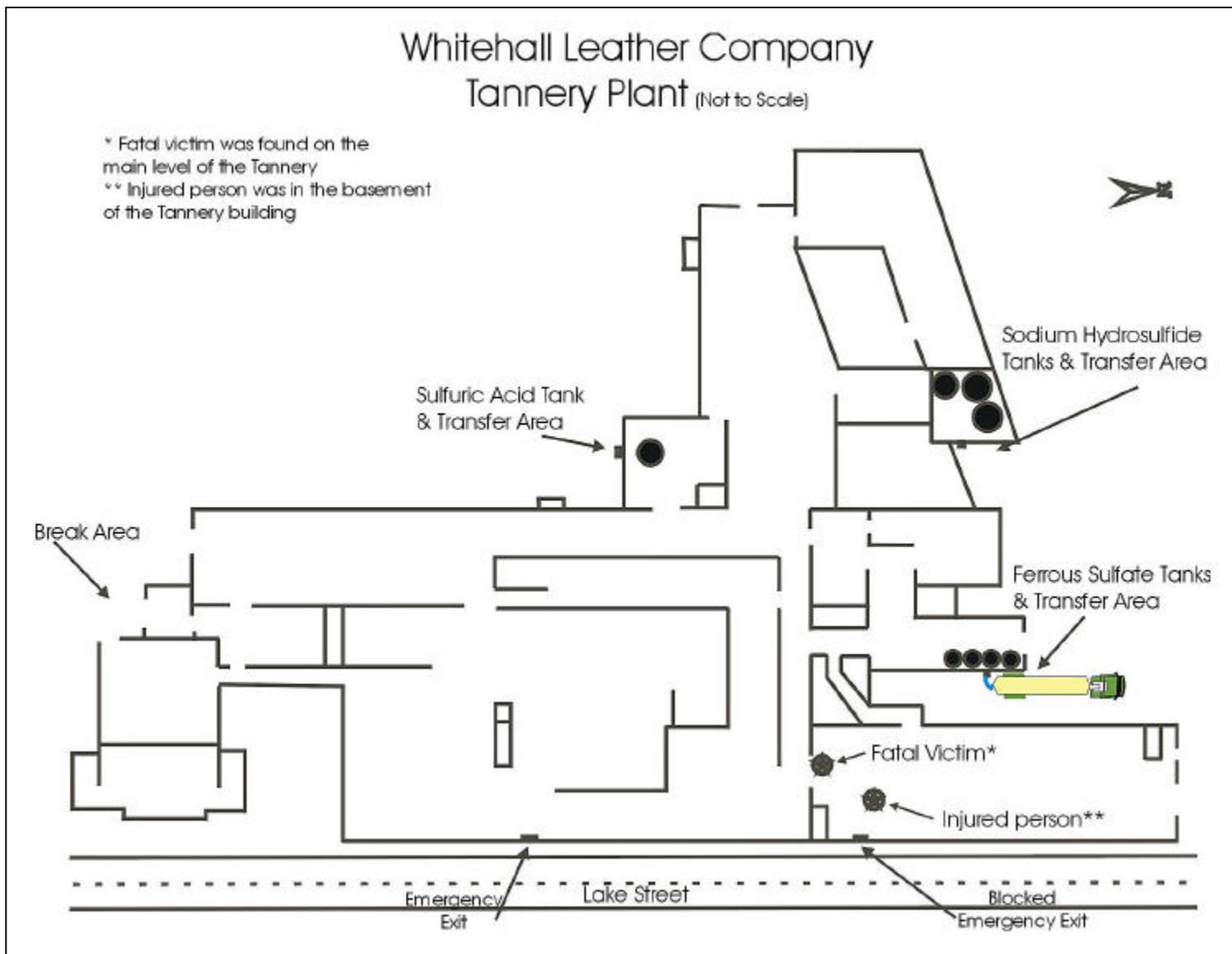


Figure 3. Whitehall tannery layout indicating the locations of the sodium hydrosulfide and ferrous sulfate transfer areas and the location of the cargo tank at the time of the accident

During postaccident interviews, the environmental manager stated that he was responsible for receiving bulk shipments of chemicals at the plant. Further, he stated that Whitehall Leather was not aware that ferrous sulfate was a regulated hazardous material. Shipping papers for ferrous sulfate on file at Whitehall Leather indicated the proper shipping name of the chemical was “Corrosive Liquids, Acidic, Inorganic, N.O.S., (Ferrous Sulfate), 8, UN 3264, II.” Material shipped with this shipping name is regulated by the U.S. Department of Transportation (DOT) as a hazardous material.

The company’s unloading areas for sulfuric acid and sodium hydrosulfide were both equipped with padlocks to help prevent the unauthorized unloading of a chemical into a storage tank. Postaccident investigation revealed that a padlock was attached to the sulfuric acid coupler to prevent a transfer hose from being attached. Though not directly related to the accident, the investigation revealed that the padlock that was supposed to secure the sodium hydrosulfide transfer coupler was not installed but was lying nearby. Rust outlined the padlock on the wood surface where it lay.

Carrier Unloading Procedures

Quality Carriers had provided the driver with a driver’s manual during his last refresher training, on August 16, 1998. The unloading procedures in the driver’s manual state:

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.]

Quality Carriers’ unloading procedures did not require drivers to compare the labeling on the facility’s transfer coupler that the receiving agent pointed out with the name of the chemical to be delivered.

Regulatory Requirements

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.

The term “hazmat employee,” as defined in 49 CFR §171.8, includes all persons who in the course of employment perform functions that directly affect hazardous materials transportation safety. According to the interpretation of the DOT’s Research and Special Programs Administration (RSPA), the employee’s functional relationship to hazardous materials transportation safety, rather than incidental contact with hazardous materials in the work place, is the primary factor in determining whether an individual is a “hazmat employee.”

The Safety Board contacted the acting director for the DOT’s Office of Motor Carrier Safety (OMC)⁵ to determine the scope of its enforcement of the hazardous materials regulations (HMR) by OMC’s investigators at facilities that receive hazardous materials shipments. The OMC official replied that “OMC has no jurisdiction to perform investigations of facilities that receive hazardous materials.” Neither the OMC nor RSPA had conducted compliance reviews at Whitehall Leather Company.

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 of 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 hazardous materials in all modes of transportation. In issuing these safety recommendations, the Safety Board noted that in the Transportation Act of 1974 (Hazardous Materials Transportation Act), Congress defined transportation as “any movement of property by any mode, and any loading, unloading, or storage incidental thereto.”

According to Safety Board records, the 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

⁵ On January 1, 2000, the Office of Motor Carrier Safety was redesignated the Federal Motor Carrier Safety Administration.

other regulatory projects cited by the DOT were completed. 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 three public meetings at which RSPA would “seek ideas, proposals and recommendations regarding the applicability of the HMR to particular hazardous materials transportation activities.” 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.” On April 27, 1999, RSPA published a supplemental ANPRM for Docket No. HM-223 to “highlight comments received” in response to the ANPRM and to invite additional comments on the applicability of the HMR to the loading, unloading, and storage of hazardous materials. RSPA has indicated that it will issue a notice of proposed rulemaking later in 2000 that addresses the loading, unloading, and storage of hazardous materials.

Although RSPA has not published a final rule for HM-223, the policy of the Federal Railroad Administration (FRA) is to inspect and enforce the HMR at all facilities that receive hazardous materials shipments by rail. These facilities include shipping (loading), carrier (railroad operator), and unloading (consignee) facilities. According to documentation provided to the Safety Board by the FRA, that agency has issued hazardous materials bulletins that specify FRA policy and guidance for industry in specific areas. These bulletins have been included in FRA inspectors’ *Hazardous Materials Enforcement Manual*. Examples of some bulletin topics are tank car unloading, attendance requirements, and hazardous materials training requirements. Each of these bulletins suggests specific procedures to be followed in the topical area. Further, the FRA has published guidance documents for industry’s use in developing effective railroad tank car loading and unloading training programs. The FRA conducts “cursory reviews of the training received by hazmat employees after completion of their training to ensure that each hazmat employee is trained, tested, and certified on the employee’s appropriate area of responsibility.”

Federal Occupational Safety and Health Administration (OSHA) regulations do not require facilities that receive bulk shipments of hazardous materials to have safety guards or equipment on transfer couplers to prevent incompatible chemicals from mixing. However, OSHA regulations do require that pipes or piping systems that contain hazardous chemicals be identified to an employee by a label or sign. OSHA allows States to develop and operate their own State implementation plans to enforce Federal occupational, safety, and health regulations in conjunction with the State’s own regulations. Michigan is one of 23 States that have approved State implementation plans. Because Michigan has an approved implementation plan, OSHA has not conducted safety or health inspections at Whitehall Leather Company.

The Michigan Occupational Safety and Health Act is administered by the Michigan Department of Consumer and Industry Services (MDCIS) and has promulgated standards

that are identical or similar to Federal OSHA regulations. The MDCIS has conducted inspections at Whitehall Leather Company; however, these inspections have not focussed on bulk unloading transfer areas.

Actions Taken Since The Accident

Whitehall Leather Company has designated two employees as “authorized personnel” to assist in the unloading of bulk shipments of hazardous materials and has advised management staff that no one else is authorized to assist with unloading bulk chemicals. These authorized personnel must remain at the chemical transfer area during the entire unloading operation. The company has developed written procedures and a check sheet for the authorized personnel to follow during the unloading. These procedures require verification that transfer hoses are connected to the proper storage tanks.

In addition to establishing the new procedures, the company has placed barrier gates at the entrances to all three bulk chemical unloading areas, placed locks on all access doors and transfer couplers, and installed an emergency remote alarm button at each transfer location.

Probable Cause

The National Transportation Safety Board determines that the probable cause of this accident was the failure of Whitehall Leather Company to have adequate unloading procedures, practices, and management controls in place to ensure the safe delivery of chemicals to storage tanks. 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.

Adopted: June 20, 2000

Recommendations

As a result of its investigation of the June 4, 1999, accident in Whitehall, Michigan, and the November 19, 1998, accident in Louisville, Kentucky,⁶ and the the Safety Board issues the following safety recommendations:

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)

To the Occupational Safety and Health Administration:

Require that facilities where bulk hazardous materials are transferred be equipped with a means of emergency communications. (I-00-7)

To 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)

To the American Chemistry Council:

Revise, in cooperation with National Tank Truck Carriers, Inc., 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-00-9)

⁶ National Transportation Safety Board. 2000. *Chemical Reaction During Cargo Transfer*. Hazardous Materials Accident Brief HZB/00/02. Washington, D.C.

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-00-10)

To 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)

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)