



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: OCT 1, 1999

In reply refer to: H-99-30 through -32

Honorable Kenneth Wykle
Administrator
Federal Highway Administration
Washington, DC 20590

About 5:14 a.m., eastern daylight time, on June 29, 1998, at Stock Island, Key West, Florida, a Dion Oil Company (Dion) driver was on top of a straight-truck cargo tank checking the contents of its compartments and preparing to transfer cargo from a semitrailer cargo tank, which was being used as a temporary storage tank, when explosive vapors ignited within the straight-truck cargo tank. The ignition caused an explosion that threw the driver from the top of the truck. The fire and a series of at least three explosions injured the driver and destroyed the straight truck, a tractor, the front of the semitrailer, and a second nearby straight-truck cargo tank. Damage was estimated at more than \$185,000.¹

Right before the accident, according to the driver, he was carrying a plastic bucket of mixed fuels that he had retrieved from under the temporary storage tank. He believed the bucket contained a mixture of gasoline and diesel fuel that had spilled from hoses or fittings during previous cargo transfers.²

He climbed to the top of his vehicle, carrying the bucket, and opened the three compartment lids on his vehicle to determine the type of fuel each compartment held. He indicated that because the two back compartments opened without releasing pressure, he believed they held diesel fuel and that because the front compartment released pressure when it opened, he believed it held gasoline. He stated that he may have been pouring the contents of the bucket into the front compartment when he saw flames coming from the compartment and was thrown from the top of the truck.

The Safety Board determines that the probable cause of the accident was Dion's lack of adequate procedures and driver training, resulting in the driver's pouring a mixture of gasoline and diesel fuel from a plastic bucket into a cargo-tank compartment that contained a mixture of explosive vapors.

¹For more details, see Hazardous Materials Accident Report—*Fire and Explosion of Highway Cargo Tanks, Stock Island, Key West, Florida, June 29, 1998* (NTSB/HZM-99/01).

²The driver stated that he disposed of the spilled material in the buckets under the temporary storage tank as part of his daily routine.

Dion's drivers switch loaded materials in the compartments of their trucks as needed to make deliveries. According to the National Fire Protection Association (NFPA) and the American Petroleum Institute, the switch loading of gasoline and diesel fuel can create dangerous conditions within a compartment. When diesel fuel is loaded in a compartment that last contained gasoline or is contaminated with gasoline, according to the NFPA:

the atmosphere in contact with the rising oil surface is not enriched to bring it [gasoline vapors] out of the flammable range. If circumstances are such that a spark should occur either across the oil surface or from the oil surface to some other object, the spark occurs in a mixture that can be within the flammable range, and explosion can result.

Static electricity is a common ignition source. A static electrical charge can be generated when gasoline and diesel fuel are transferred from a container, such as a plastic bucket, that has insulating properties. Further, if the pouring causes the liquid to splash or become agitated, a static electrical charge is generated. In fact, the NFPA indicates that splash filling is a condition to be avoided when switch loading products. Therefore, the Safety Board concludes that the ignition and fire in the cargo tank were probably caused by a static discharge in a compartment on the straight-truck cargo tank that resulted from the driver's pouring a mixture of gasoline and diesel fuel from a plastic bucket into the compartment.

In addition, Dion had no procedures about or equipment for grounding and bonding its vehicles to prevent the accidental ignition of flammable liquids during cargo transfer. (Because the driver had not begun transferring cargo when the accident happened, the lack of grounding and bonding procedures is not directly related to the cause of this accident.) Florida's regulations and the NFPA's standards referenced therein require that storage tanks for flammable and combustible liquids be grounded and that a vehicle be bonded when NFPA Class I and Class II flammable liquids are being switch loaded. Dion's drivers frequently switch loaded gasoline (Class I liquid) and diesel fuel (Class II liquid) in various compartments of their cargo tanks.

Given the circumstances of this accident, the Safety Board believes that the FHWA should issue an "On Guard" bulletin to emphasize the danger of splash filling materials into cargo compartments and of switch loading materials having flash points at or above 100° F (NFPA Class II and III liquids) into compartments that last contained materials having flash points below 100° F (NFPA Class I liquid).

The "Hazardous Materials Regulations"³ (the HM regulations) require the function-specific training and testing of drivers on the loading and unloading of cargo tanks. An employer must train his employees in handling hazardous materials safely, particularly when cargo is being loaded or unloaded. The employer must ensure that the employee has recurrent training at least every 3 years. Florida had incorporated the HM regulations in its State regulations.

The records, however, indicate that Federal and State inspectors have never evaluated Dion's training programs and procedures for loading and unloading cargo tanks. Before the

³Title 49 *Code of Federal Regulations* Subchapter C.

accident, the FHWA had no authority to evaluate the training programs of intrastate motor carriers. Furthermore, while Florida had the authority to inspect Dion's facilities, the State focused on roadside inspections of vehicles and not on facility inspections.

Beginning in October 1998, all of the HM regulations became applicable to intrastate motor carriers, and the FHWA gained additional authority to inspect intrastate motor-carrier operations. The FHWA is working independently and in cooperation with the States to develop programs under which both the Federal and the State governments will inspect intrastate hazardous-materials motor carriers. Also, since the accident, Florida has expanded its compliance program to increase the number of intrastate hazardous-materials motor-carrier audits.

Thus far, however, the FHWA does not train Federal and State inspectors in evaluating function-specific training for employees who load and unload hazardous-materials cargo tanks. After reviewing the Research and Special Programs Administration's statistics, Safety Board investigators found that the number of unintentional releases of hazardous materials and the number of injuries that occur during the loading and unloading of cargo tanks are significant when compared to the numbers associated with cargo tanks that are en route. The Safety Board concludes that the Federal training programs for Federal and State motor-carrier inspectors do not adequately address the need for inspectors to evaluate the training that motor carriers give their drivers on loading and unloading cargo tanks. Therefore, the Safety Board believes that the FHWA should add elements to training programs for Federal and State inspectors that include instruction on determining whether motor carriers have adequate written procedures for and driver training in loading and unloading cargo tanks.

Also, given the circumstances of this accident--the fact that before October 1998 intrastate motor carriers were not subject to all of the HM regulations, the relative number of unintentional releases of hazardous materials from cargo tanks during loading and unloading, and the fact that the Federal training programs do not adequately address the need for inspectors to evaluate the training that motor carriers give their drivers about loading and unloading cargo tanks--the Safety Board concludes that there is a need to ensure that hazardous-materials motor carriers (both intrastate and interstate) have adequate procedures for and adequate driver training in loading and unloading cargo tanks. The Safety Board believes that the FHWA should evaluate the adequacy of cargo-tank loading and unloading procedures of and driver training for hazardous-materials motor carriers and require changes as appropriate.

As a result of this accident, the National Transportation Safety Board makes the following safety recommendations to the Federal Highway Administration:

Add elements to training programs for Federal and State inspectors that include instruction on determining whether motor carriers have adequate written procedures for and driver training in loading and unloading cargo tanks. (H-99-30)

Evaluate the adequacy of cargo-tank loading and unloading procedures of and driver training for hazardous-materials motor carriers and require changes as appropriate. (H-99-31)

Issue an "On Guard" bulletin to emphasize the danger of splash filling materials into cargo compartments and of switch loading materials having flash points at or above 100° F (National Fire Protection Association Class II and III liquids) into compartments that last contained materials having flash points below 100° F (National Fire Protection Association Class I liquid). (H-99-32)

Also, the Safety Board issued safety recommendations to Dion Oil Company, the Florida State Fire Marshal, the Florida Department of Transportation, the Florida Department of Agriculture, the Florida Department of Environmental Protection, the National Fire Prevention Association, the National Association of State Fire Marshals, and the International Association of Fire Chiefs.

Please refer to Safety Recommendations H-99-30 through -32 in your reply. If you need additional information, you may call (202) 314-6460.

Chairman HALL, Vice Chairman FRANCIS, and Members HAMMERSCHMIDT, GOGLIA, and BLACK concurred in these recommendations.

By: Jim Hall
Chairman