



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: OCT 1, 1999

In reply refer to: H-99-33 and -34

Mr. George Ganem
Dion Oil Company
Post Office Box 1209
638 United Street
Key West, Florida 33041

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

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.

and diesel fuel from a plastic bucket into a cargo-tank compartment that contained a mixture of explosive vapors.

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.

Dion had no written procedures about loading and unloading cargo tanks. According to the driver, it was his normal practice to pour the contents of a bucket filled with a mixture of diesel fuel and gasoline into an open compartment on the top of his cargo tank, and that is what he was probably doing when the fire ignited. Because Dion did not have written procedures for safely handling the cargo, the driver's unsafe practice was not prohibited by the company and, probably, produced a static electric charge that ignited the cargo.

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. The Safety Board concludes that Dion did not have written procedures to ensure safe cargo handling, including procedures prohibiting the pouring of flammable liquids into its open cargo-tank compartments and procedures requiring the bonding of cargo tanks when flammable liquids are being switch loaded between them. Therefore, the Safety Board believes that Dion should establish written procedures for safely loading and unloading cargo tanks.

The “Hazardous Materials Regulations” (49 *Code of Federal Regulations* Subchapter C) require employers to train and test any of their employees who handle hazardous materials; the training must include function-specific training for cargo loading and unloading. Dion did not train its drivers adequately in this area. Other than on-the-job training, the only training Dion provided consisted of an American Trucking Association’s training video and test that gave only a general overview of hazardous-materials transportation. The video did not specifically address the procedures for loading or unloading hazardous materials into and from cargo tanks.

Each of Dion’s drivers had a Florida commercial driver’s license (CDL) with a “Tank” certification. According to Federal regulations, a CDL can be a substitute for general training; however, Florida’s *Commercial Driver License Manual for Truck and Bus Drivers* primarily focuses on driving a tractor and cargo tank rather than on procedures for loading or unloading hazardous materials into and from cargo tanks. Neither the Florida CDL nor the American Trucking Association’s video provided complete function-specific training on loading or unloading cargo tanks with hazardous materials. In summary, the Safety Board concludes that Dion did not adequately train its drivers to ensure safe cargo handling; in particular, the company did not teach its drivers about the danger of pouring flammable liquids into open compartments of a cargo tank or about the danger of switch loading flammable liquids between cargo tanks that are not bonded. Therefore, the Safety Board believes that Dion should give drivers function-specific training on the written procedures developed in conjunction with Safety Recommendation H-99-33. The training should explain the danger of discharging static electricity when flammable liquids are poured into open cargo-tank compartments that contain explosive vapors, the danger of transferring flammable liquids between cargo tanks that are not bonded, and the danger of explosive vapors produced by switch loading gasoline and diesel fuels.

As a result of this accident, the National Transportation Safety Board makes the following safety recommendations to Dion Oil Company:

Establish written procedures for safely loading and unloading cargo tanks.
(H-99-33)

Give drivers function-specific training on the written procedures developed in conjunction with Safety Recommendation H-99-33. The training should explain the danger of discharging static electricity when flammable liquids are poured into open cargo-tank compartments that contain explosive vapors, the danger of transferring flammable liquids between cargo tanks that are not bonded, and the danger of explosive vapors produced by switch loading gasoline and diesel fuels.
(H-99-34)

Also, the Safety Board issued safety recommendations to the Federal Highway Administration, 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.

The National Transportation Safety Board is an independent Federal agency with the statutory responsibility “to promote transportation safety by conducting independent accident

investigations and by formulating safety improvement recommendations” (Public Law 93-633). The Safety Board is vitally interested in any action taken as a result of its safety recommendations. Therefore, it would appreciate a response from you regarding action taken or contemplated with respect to the recommendations in this letter. Please refer to Safety Recommendations H-99-33 and -34 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