



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: OCT 1, 1999

In reply refer to: H-99-39

Mr. David B. Struhs
Secretary
Florida Department of Environmental Protection
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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.

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.

Although Florida's Department of Agriculture and Department of Environmental Protection regulate and require the registration of storage tanks used to store flammable liquids, only the Florida State Fire Marshal has the authority to regulate the fire safety of these tanks, including the grounding requirements. However, while the Florida State Fire Marshal has minimum requirements for inspecting storage tanks for fire safety and ensures the training and qualification of State and local fire safety inspectors, the storage tanks are inspected by Florida's 600 local jurisdictions. (Stock Island is in Monroe County.)

Dion was not aware that using a cargo tank as a storage tank required a county building permit and, consequently, had not applied for a permit. Also, the Stock Island volunteer fire chief (who knew about the vehicles on the site) did not know that the cargo tank was being used as a storage tank and did not tell the Monroe County fire marshal's office about the vehicles.

Therefore, the Monroe County fire marshal's office was not aware of this tank and had never inspected it for compliance with fire safety regulations.

Because highway cargo tanks are not readily identifiable as storage tanks the Safety Board concludes that local jurisdictions may not know that cargo tanks may be used to store flammable liquids and that such tanks need to be inspected to ensure that they are safe for the storage and transfer of these liquids. Although there is no list of the cargo tanks that are used as storage tanks, information could be gathered using the registration lists of the Florida Departments of Agriculture and of Environmental Protection, the list of motor carriers being developed by the Florida Department of Transportation, and information provided by inspectors for the various departments and the local fire departments.

The Safety Board believes that the Florida State Fire Marshal should ensure that each local jurisdiction has a program to identify and inspect cargo tanks used as storage tanks for flammable liquids to be sure the tanks meet all the fire safety standards applicable to storage tanks. The Safety Board believes that the Florida Department of Environmental Protection should assist the Florida State Fire Marshal in helping local jurisdictions identify cargo tanks being used as storage tanks so that the tanks can be inspected to ensure that they meet all fire safety standards applicable to storage tanks.

As a result of this accident, the National Transportation Safety Board makes the following safety recommendation to the Florida Department of Environmental Protection:

Assist the Florida State Fire Marshal in helping local jurisdictions identify cargo tanks being used as storage tanks so that the tanks can be inspected to ensure that they meet all fire safety standards applicable to storage tanks. (H-99-39)

Also, the Safety Board issued safety recommendations to the Federal Highway Administration, Dion Oil Company, the Florida State Fire Marshal, the Florida Department of Transportation, the Florida Department of Agriculture, 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 recommendation in this letter. Please refer to Safety Recommendation H-99-39 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 this recommendation.

By: Jim Hall
Chairman