



# National Transportation Safety Board

Washington, D.C. 20594

## Safety Recommendation

Date: March 14, 1988

In reply refer to: I-88-1 and -2

Honorable James Burnley  
Secretary  
U.S. Department of Transportation  
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On the morning of October 7, 1986, the Panamanian tank ship SHOUN VANGUARD was discharging a cargo of acetone at the Intercontinental Terminals Company's (ITC) terminal facility in Deer Park, Texas. At the same time, the U.S. tank barges HOLLYWOOD 3013 and HOLLYWOOD 3003 were discharging a cargo of methyl tertiary butyl ether, a gasoline additive, on the other side of the same dock structure. About 0350, persons on the dock, some crewmembers on the main deck of the SHOUN VANGUARD, and the tankerman on the deck of the HOLLYWOOD 3003 noticed a white vapor cloud that enveloped the dock and then spread to the ship and to the HOLLYWOOD 3013. Moments later, the cloud ignited and the dock, the ship, and the HOLLYWOOD 3013 were engulfed in flames. Within minutes, terminal employees arrived on scene with firefighting gear and began fighting the fire on the dock. Meanwhile, the ship's crew had begun fighting the fire on the deck of the ship. Soon after, the fires on the dock and the ship were extinguished, but the fire on the HOLLYWOOD 3013 continued to burn. The HOLLYWOOD 3003 was removed from the scene of the fire and received only superficial damage in the accident. Efforts by shoreside firefighters to extinguish the fire on the HOLLYWOOD 3013 were not successful, and the fire continued to burn for 5 days until it burned itself out at 2343 on October 11, 1986.

As a result of the fire, the HOLLYWOOD 3013, valued at approximately \$1.3 million, sustained damages estimated to be in excess of \$920,000. In addition, about 10,000 barrels of the barge's cargo, valued at approximately \$500,000, were consumed by the fire. The ITC terminal was extensively damaged and total repair costs to the facility were estimated at \$960,000. In addition, firefighting expenses to ITC were about \$1.5 million, \$1.25 million of which was for firefighting foam. Damage to the

SHOUN VANGUARD was estimated at \$1.2 million. Two persons, the second officer aboard the SHOUN VANGUARD and the dock watchman, lost their lives in connection with this accident, and seven shoreside firefighters were injured during the firefighting operations. 1/

Three witnesses who were standing on the deck of the SHOUN VANGUARD testified that they saw a hose lying on the no. 2 dock rupture, and the only hose that was found to have ruptured on the dock was the hose that had been connected to the propylene pipeline. Liquid propylene released to the atmosphere forms a white cloud similar to that reported by witnesses. Furthermore, portions of the propylene pipeline were observed to be covered with frost when the fire broke out indicating that propylene was rapidly expanding within the pipeline, which would be expected if there was a breach in the system downstream from the frosted area, causing the pipeline to cool and the frost to form. The Safety Board, therefore, concluded that the fire at the ITC terminal in Deer Park, Texas, was the result of the release and ignition of propylene.

On the day before the accident, propylene was received by the ITC terminal facility from a Chevron Chemical Company pipeline, and the propylene was loaded directly on to a ship. While the accident did not occur until about 12 hours after the ship had temporarily discontinued its loading operations and after the ship had left the marine dock, the ship was scheduled to return the next day to continue loading propylene. While the ship was away from the dock, the ITC terminal continued to receive propylene from the Chevron pipeline, and it was directed to storage tanks. At the time the fire started on the ITC marine dock, propylene was continuing to be received from the Chevron pipeline.

Chevron delivers propylene to its meter station near the ITC property line by way of a 6-inch pipeline. At the meter station, propylene passes through a Chevron pneumatic remote-controlled positive shutdown gate valve, a turbine meter, and a delivery pressure and flow control valve. Propylene is then transported from the meter station to the ITC facility through a 4-inch ITC pipeline.

The 4-inch ITC pipeline transports propylene approximately 1/2 mile to ITC's storage tank area. At that location, the 4-inch line connects to a 6-inch line that provides service directly to a tank truck and tank car loading area, to the propylene storage tanks, and to an 8-inch pipeline that leads to the marine docks.

1/ For more detailed information, read Marine Accident Report-- "Fire on Board the Panamanian Tank Ship SHOUN VANGUARD and the U.S. Tank Barge HOLLYWOOD 3013, Deer Park, Texas, October 7, 1986" (NTSB/HAR-87/08).

ITC does not have a pressure control regulator valve on its propylene pipeline system. Instead, ITC relies on Chevron to control the delivery pressure of propylene at the meter station. Also, a pressure relief valve is not installed in the ITC pipeline system. Instead, pressure buildup in the ITC pipeline system is relieved to the storage tanks. This requires that all shutoff valves in the propylene pipeline system be left open from the ends of the pipelines back to the storage area. In this manner, pressure from the facility's propylene pipelines can be relieved into the storage tanks through either open valves at the storage area or through 1-inch pressure "runaround" safety pipelines at the storage area. However, if there were any pressure buildup at the storage tanks, the open valve configuration would also permit the pressure to be transmitted to the facility's propylene pipelines.

While some segments of the distribution operations in the ITC waterfront terminal facility involving the transportation of liquid propylene are currently subject to U.S. Department of Transportation (DOT) safety requirements, other segments of the distribution operations are not. The U.S. Coast Guard requires ITC to meet waterfront facility safety requirements from the connection of a cargo transfer hose at a marine vessel's manifold at a dock back to the last pipeline shutoff valve before the storage tanks. In addition, the DOT's Office of Pipeline Safety requires the Chevron Chemical Company to meet hazardous liquid pipeline safety requirements for transporting propylene to its ITC facility meter station.

However, neither the Coast Guard nor DOT has established minimum safety requirements for all portions of terminal transportation systems, such as the propylene system between the Chevron delivery meter station and the first shutoff valve at the beginning of the pipeline that leads to the marine dock area. Such nonregulated portions of these transportation systems are often used to continue the through movement of product directly from a pipeline to a vessel at a dock, a railcar at a siding, or a tank truck at a loading rack. Additionally, these unregulated portions of such systems, as was the case at the ITT terminal, may contain the only pressure relief safety devices for the entire system, thereby directly affecting the safe operation of regulated portions of the system. Also, other hazardous liquids may be transported by a terminal transportation pipeline system, as was the case at the ITT Deer Park facility, that connect different modes of transportation, and those systems also are not fully subject to DOT safety requirements.

ITC operates a multimodal bulk transportation facility for liquid chemicals, petroleum products, and fertilizers at its terminal in Deer Park, Texas. The Deer Park terminal provides public warehousing and transportation distribution services for tank ships, barges, railroad cars, trucks, and pipelines. The facility can store more than 193 million gallons of products in 131 storage tanks, including 24 bullet-shaped 30,000-gallon

propylene storage tanks. One of the primary functions of the ITC multimodal terminal is to facilitate the interchange of products between different modes of transportation through a facility pipeline transportation system. That facility system allows ITC to transport liquid chemicals and petroleum products between pipeline systems from outside the facility, marine vessels, tank trucks, and tank cars.

Multimodal distribution services, offering pipeline systems to facilitate the through movement of hazardous products between different modes of transportation, are not unique to the ITC terminal facility. During its investigation of a recent hazardous materials incident involving a tank car fire in New Orleans, Louisiana, on September 9, 1987, the Safety Board found that butadiene had been loaded into a tank car from a ship at a similar type storage and distribution terminal facility in Louisiana owned by a company other than ITC. The butadiene had been transferred from the ship to the tank car using a pipeline transfer system similar to those systems operated by the ITC terminal. That multimodal terminal facility in Louisiana is only 1 of 13 facilities operated by the other company. Many other companies operate similar public and/or private multimodal distribution systems.

The Safety Board believes that the Congress has mandated that the DOT oversee the safe operation of these types of facilities and has provided the necessary authority to promulgate appropriate regulations. The Hazardous Liquid Pipeline Safety Act of 1979 directs the Secretary of Transportation to establish minimum Federal safety standards for the transportation of hazardous liquids 2/ and pipeline facilities 3/ and to apply the standards to each person who engages in the transportation of hazardous liquids or who owns or operates pipeline facilities.

However, while the act broadly defines hazardous liquids and pipeline facilities, the definitions contained in the regulations promulgated by DOT under the act are more restrictive. Title 49 Code of Federal Regulations 195.2

2/ The Hazardous Liquid Pipeline Safety Act of 1979 defines a hazardous liquid as petroleum or any petroleum product and any substance or material which is in liquid state (excluding liquefied natural gas) when transported by pipeline facilities and which, as determined by the Secretary, may pose an unreasonable risk to life or property when transported by pipeline facilities.

3/ The Hazardous Liquid Pipeline Safety Act of 1979 defines a pipeline facility as including without limitation, new and existing pipe, rights-of-way, and any equipment, facility, or building used or intended for use in the transportation of hazardous liquids.

limits hazardous liquids to petroleum, petroleum products, or anhydrous ammonia, and 49 CFR 195.1(b)(7) states that safety regulations governing the transportation of hazardous liquids by pipeline do not apply to terminal facilities used exclusively to transfer hazardous liquids between modes of transportation.

However, Congress enacted the Transportation Safety Act of 1974 (Hazardous Materials Transportation Act) to protect against the risks to life and property that are inherent in the transportation of hazardous materials in commerce. In that legislation, Congress authorized the DOT Secretary to issue "regulations for the safe transportation in commerce of hazardous materials," and it requires such regulations to be applicable "to any person who transports, or causes to be transported or shipped, a hazardous material." The Congress defined transportation as "any movement of property by any mode, and any loading, unloading, or storage incidental thereto," and it defined hazardous material as "a substance or material in quantity and form which may pose an unreasonable risk to health and safety or property when transported in commerce."

Terminal facilities provide important and necessary operations in an intermodal hazardous materials transportation and distribution system, and such operations should be conducted under DOT safety regulations. The Safety Board believes that reasonable safety requirements should be established for the public and for the employees of all segments of a hazardous materials transportation system and that the DOT has been given the authority to do so by Congress. The lack of regulation in any portion of a hazardous materials transfer system may compromise the safety of the entire transportation system. Therefore, the DOT should amend its regulations to remove those sections that exclude safety requirements for hazardous materials transportation operations at intermodal facilities.

Also as a result of its investigation of the accident at the ITC facility, the Safety Board identified several inadequate safety procedures involving the transfer of hazardous cargo and, as a result, issued safety recommendations to the U.S. Coast Guard.

M-87-70

Establish a testing and certification program for persons in charge of oil or hazardous materials transfer operations at U.S. waterfront facilities.

M-87-74

Amend appropriate regulations to prohibit the transfer of any hazardous material cargo using a cargo transfer hose with visible hose or hose reinforcement defects.

Additionally, the Safety Board issued two safety recommendations to the ITC facility.

M-87-77

Amend operations manuals to address adequately procedures for inspecting, testing, selecting, and using cargo transfer hoses and include written procedures for discontinuing the use of transfer hoses that appear to be damaged.

M-87-78

Develop and require the use of a checklist identifying safety critical steps (procedures) that must be followed before, during, and upon completion of hazardous material cargo transfer operations for all modes.

The status of these recommendations to the U.S. Coast Guard and to the ITC facility are "Open--Awaiting Response."

In addition to its concerns about the transfer of hazardous materials between modes of transportation, the Safety Board has also been concerned about deficient conditions in rail and highway hazardous materials loading operations. On July 30, 1983, vinyl chloride monomer under pressure escaped from a railroad tank car at the loading facility within the Formosa Plastics Corporation chemical manufacturing plant in Baton Rouge, Louisiana. The released vinyl chloride monomer was ignited and a large billowing fire ensued. Two persons were injured seriously, two tank cars were destroyed, three tank cars were damaged moderately, and the loading facility was damaged extensively. The Safety Board determined that contributing to the probable cause of the accident was the failure of Formosa Plastics Corporation to maintain safe facilities for the loading of vinyl chloride monomer and to provide written procedures, adequate training, and supervision for its loading personnel. <sup>4/</sup> As a result of this investigation, the Safety Board issued a safety recommendation to the Research and Special Programs Administration (RSPA).

R-85-70

Establish safety standards and inspection procedures for loading facilities at petrochemical plants.

4/ Railroad Accident Report--"Vinyl Chloride Monomer Release from a Railroad Tank Car and Fire, Formosa Plastics Corporation Plant, Baton Rouge, Louisiana, July 30, 1983" (NTSB/RAR-85/08).

In response to this recommendation, RSPA advised the Safety Board that the Federal Railroad Administration (FRA) had an ongoing project to rewrite 49 CFR Part 174 and that standards for tank car loading and unloading will be integrated into one section. The Safety Board has classified this recommendation "Open--Acceptable Action" pending review of the completed project.

On March 6, 1984, in Orange County, Florida, orange vapors escaped from a cargo tank containing mixed waste acids that rapidly corroded the cargo tank's stainless steel shell. Eventually, the waste acids penetrated through the cargo tank shell and poured onto the ground. About 250 persons were evacuated from a 3-square mile area, and 12 persons who came in contact with the released vapors were injured, 4 seriously.<sup>5/</sup> The Safety Board determined that contributing to the cause of the accident was inadequate loading procedures, including the failure of the shipper and carrier to exchange critical information necessary to assure safe and proper loading of the cargo tank.

The Office of Technology Assessment (OTA) recently reviewed RSPA's written hazardous materials incident report database for all modes of transportation from 1976 to 1984. <sup>6/</sup> The data indicated that incidents frequently occurred during loading or unloading operations or when cargo shifted during transport. In its review, the OTA found 966 incidents involving hose bursts; 7,353 loading/unloading spills; 6,677 incidents involving cargo that shifted or fell; and, 2,492 incidents involving improper loading. The OTA concluded that a "thorough analysis of loading, unloading, blocking, and bracing operations and procedures is needed for all modes, but especially for truck, rail, and air. Standard procedures and industry training programs could be developed." The OTA also determined that more than 50 percent of the most serious hazardous materials transport incidents go unreported to RSPA.

Additionally, the DOT's own report assessing the need for additional regulatory requirements, "Cargo Tank Hose Failure Investigation," August 1985, also identified deficient loading and unloading conditions. However, the DOT has not taken any action or proposed any rulemaking to correct the deficiencies.

Many facilities have multimodal transportation loading and unloading operations, and DOT should develop uniform general requirements for these operations to provide adequate and equal levels of safety. Therefore, the Safety Board believes that DOT should review its present requirements for loading and unloading operations and the actions being taken by the U.S. Coast Guard

<sup>5/</sup> Hazardous Materials Investigation Report--"Release of Hazardous Waste Acid from Cargo Tank Truck, Orange County, Florida, March 6, 1984" (NTSB/HZM-85/01).

<sup>6/</sup> Congress of the United States, Office of Technology Assessment Report, "Transportation of Hazardous Materials," July 1986.

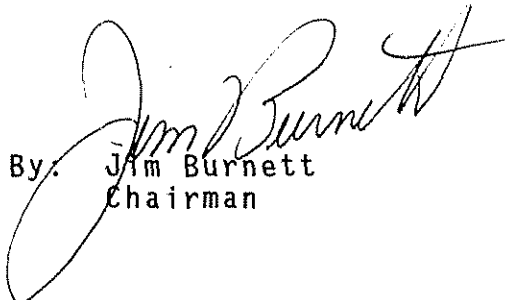
and the FRA in response to applicable previous safety recommendations. Based on this review, the DOT should establish adequate, uniform safety requirements for all hazardous materials loading and unloading operations.

Therefore, the National Transportation Safety Board recommends that the U. S. Department of Transportation:

Establish safety requirements for the movement and temporary storage of hazardous materials at intermodal transportation facilities. (Class II, Priority Action) (I-88-1)

Strengthen minimum safety requirements for loading and unloading of hazardous materials to provide adequate, uniform safety in all modes of transportation. (Class II, Priority Action) (I-88-2)

BURNETT, Chairman, and LAUBER, NALL, and KOLSTAD, Members, concurred in these recommendations.

  
By. Jim Burnett  
Chairman