

Log M-331A



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: October 13, 1987

In reply refer to: M-87-75 through -78

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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 (ITC) 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/}

^{1/} For more detailed information, read Marine Accident Report—"Fires On Board the Panamanian Tank Ship SHOUN VANGUARD and the U.S. Tank Barge HOLLYWOOD 3013, Deer Park, Texas, October 7, 1986," (NTSB/MAR-87/08).

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, concludes that the fire at the ITC terminal in Deer Park, Texas, was the result of the release and ignition of propylene.

The propylene transfer hose had not been hydrostatically pressure tested to 1 1/2 times the maximum allowable working pressure of the propylene system as required by U.S. Coast Guard regulations. Moreover, since the 200 psi working pressure of the hose was less than the maximum allowable working pressure of the propylene system, this hose should not have been used to transfer propylene. Title 33 Code of Federal Regulations 126.15(o) defines the maximum allowable working pressure of a system as the setting of the associated relief valves, and the only pressure relief valves in the propylene system operated at 300 psig. Therefore, a hose used to transfer propylene at the ITC facility should have been designed for a working pressure of 300 psig and should have been pressure tested to 450 psig. Instead, ITC's hose record showed that the maximum working pressure for the hose was 100 psig and that the hose was annually pressure tested to only 150 psig. The National Transportation Safety Board, therefore, concludes that the ITC hose testing procedures were inadequate to ensure the safe dockside transfer of propylene. The ITC procedures should be revised to test its hoses to the proper pressures.

The 7 1/2-year-old hose had incurred visible damage to the wire braid covering before the accident and should not have been used to transfer propylene. The damaged area had been observed by two dockmen just a few hours before the accident. One dockman considered decommissioning the hose after observing the damaged area; however, he never did. Although the other dockman who noticed the damage described it as moderate, he did not question the suitability of the hose. Neither dockman notified a supervisor of the damaged condition of the hose, although one of them admitted that perhaps he should have done so when he noticed the damage. The fact that two dockmen noticed the damage to the hose and came to opposing conclusions as to the suitability of the hose indicates a need to establish and make known written hose rejection criteria, so that a damaged hose may be removed from service at an appropriate time. Moreover, since the hose was in questionable condition before it was selected for use, the hose selection procedures at the ITC Deer Park terminal need to be improved.

A manufacturer who made hoses similar to the hose that failed in this accident said that a similar hose manufactured with a bursting pressure of 800 psig should not be pressure tested above 400 psig to avoid undesired stretching of the hose. Therefore, it is not clear that the hose that was ruptured in this accident should have been used to transfer propylene, since it may not have been safely pressure tested to levels required by Coast Guard regulations. The manufacturer of hoses similar to the hose that failed in this accident stated that, if the hose had been double-braided, its bursting pressure would have been increased to approximately 1,200 psig and it could have been tested to the required 450 psig without damage to the hose.

The ITC facility should amend its operations manual to address appropriate procedures and criteria for the selection, testing, inspection, and rejection of cargo transfer hoses. Consideration of the effects that the pipeline, storage, or other facility systems may have on a hose connected to such systems should be included in the development of such procedures and criteria.

The dockman who was on duty at the no. 2 dock when this accident happened was not involved in the decision to leave the cargo hose from the INGE MAERSK filled with propylene lying on the dock. During a routine inspection of the dock, which he was required to perform when he assumed his dockman duties, he may have noticed the hose, but he would have had to speculate on its contents and probably would not have been able to comprehend fully the danger that the hose presented in the event of a rupture.

A dockman is given very little opportunity to make unsupervised decisions. However, he is required to make independent evaluations of conditions that develop on the dock during cargo transfer operations, and he must know when a condition is serious enough to require the notification of a supervisor or the immediate shutdown of cargo transfer operations.

The relief procedure executed by the ITC dockmen at dock no. 2 just before the accident was for a meal break rather than for a shift change and only a cursory briefing took place. As a result, the relief dockman was not informed by the dockman whom he was relieving of the presence of a potential hazard on the dock, i.e. the presence of a pressurized propylene hose contrary to company procedures and Coast Guard regulations. In order for a dockman to be able to perform his duties properly, he must know exactly what activities are in progress and what conditions are present on the dock for which he is responsible. If the dockman is not the same dockman who is on duty when activities commence, he can only learn of ongoing activities by a comprehensive briefing from the dockman who is being relieved. For this reason, the Safety Board believes that whenever a dockman is relieved, for whatever reason and regardless of the length of time that the relief is expected to last, full and complete information concerning activities and conditions on the dock must be passed from the dockman being relieved to the relieving dockman. This accident demonstrates a need for ITC management to review its policy concerning dockman relief procedures and to revise them as necessary to ensure that complete information concerning activities and conditions on the dock is passed between dockmen during the relief procedure.

ITC personnel failed to follow both ITC's written procedures and Coast Guard requirements when propylene transfer operations to the INGE MAERSK were terminated on October 6, 1986. The terminal manager, contrary to ITC's written procedures, directed a foreman to leave the propylene hose attached to pipeline #89 after disconnecting it from the INGE MAERSK because he expected the vessel to return the next day to continue loading propylene. However, if the written procedures had been followed, the propylene hose would have been decommissioned and disconnected from the pipeline after the transfer operations were completed, the pipeline would have been secured with a blind flange, and the accident would not have occurred. The failure of company supervisory personnel to follow written company safety procedures suggests a serious lack of understanding of the potential for disaster that is always present when hazardous materials are handled and for the safety of personnel who work under their direction.

Additionally, a misunderstanding of instructions apparently occurred following the terminal manager's decision not to disconnect the propylene hose from the propylene pipeline. While the terminal manager testified that he had instructed the foreman to leave the propylene hose connected to the pipeline, he also said that he had instructed the foreman to close a valve at the end of the pipeline, to remove most of the propylene from the hose, and to lay the hose on the dock. The foreman, however, instructed a pumper and a dockman to leave the valve at the end of the pipeline open to relieve any propylene expansion pressure in the hose back through the pipeline to the storage tanks. Had the foreman correctly passed on the terminal manager's instructions to the pumper and

dockman and had "most" of the propylene been removed from the hose, the hose might not have ruptured, or if it did rupture there would have been a lesser amount of propylene released, and the consequences of the release may have been reduced. Nevertheless, the terminal manager's instructions were contrary to company written policy and Coast Guard regulations. Leaving a hazardous materials hose attached to a pipeline after cargo transfer operations have been completed presents a safety hazard that should not be permitted under any circumstances. If the valve at the end of the pipeline leaked or if the valve was not completely closed, hazardous materials could leak into the hose and refill it, resulting in a situation no different than if the product had never been removed from the hose in the first place.

ITC's operations manual contains safety checklists for cargo tank truck and rail tank car transfer operations, but it does not contain a similar checklist for marine transfer operations. A "safety critical" checklist identifying mandatory procedures to be followed for hazardous material cargo transfer operations for all modes should be developed for the use of terminal operating personnel. The use of such a safety critical checklist would remind terminal operating personnel of the safety requirements for the transfer of specific hazardous materials and reducing the likelihood that supervisors would issue improper orders to omit safety critical procedures.

Therefore, as a result of its investigation, the National Transportation Safety Board recommends that the Intercontinental Terminals Company:

Amend company operating procedures to provide a means of verifying that the pressure ratings of transfer hoses are compatible with the pressures required for their intended use. (Class II, Priority Action) (M-87-75)

Review company policy concerning dockman relief procedures, and revise them as needed, to require that whenever a dockman is relieved, complete information concerning activities and conditions on the dock is passed from the dockman being relieved to the relieving dockman. (Class II, Priority Action) (M-87-76)

Amend operations manuals to adequately address 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. (Class II, Priority Action) (M-87-77)

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. (Class II, Priority Action) (M-87-78)

Also as a result of its investigation, the Safety Board issued Safety Recommendations M-87-70 through -74 to the U.S. Coast Guard and M-87-79 through -83 to the Independent Liquid Terminals Association.

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 and would appreciate a response from you regarding action taken or contemplated with respect to the recommendations in this letter. Please refer to Safety Recommendations M-87-75 through -78 in your reply.

BURNETT, Chairman, GOLDMAN, Vice Chairman, and NALL and KOLSTAD, Members, concurred in these recommendations. LAUBER, Member, did not participate.

By: 
Jim Burnett
Chairman