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National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

DCA 89 MM036

Date: November 6, 1990

In reply refer to: M-90-81 through -84

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On the morning of March 7, 1989, a fire broke out in the engineroom of the U.S. tankship CHARLESTON while it was en route to Wilmington, North Carolina, with a partial load of No. 6 fuel oil. While trying to close a valve to a lube oil pressure gauge on the No. 1 turbogenerator, a crewmember fractured a pipe nipple, which allowed a stream of lube oil to spray onto the hot steam turbine casing and ignite. The fire quickly enveloped the turbogenerator and spread upward to the top of the engineroom. The crew started fighting the fire with CO₂ extinguishers, but the intensity of the fire increased. No attempt was made to stop the burning generator until a senior engineer arrived at the scene. When the first assistant engineer attempted to shift the electrical load to the other turbogenerator, that generator became disabled. The main engine and the boilers were secured, and the engineroom was evacuated.¹

After all 29 crewmembers were accounted for, the CO₂ fire extinguishing system was activated. However, the fire continued to burn for almost 2 hours. None of the crewmembers were injured. Because the fire had damaged some of the control and monitoring wiring, the emergency diesel generator could not be started until the engineers isolated the damaged circuits.

In an emergency of this kind, a licensed watch engineer, such as the third assistant engineer, or even a knowledgeable QMED should have been able to react quickly and correctly to the situation until a senior engineer arrived on scene and took charge. Emergency procedures should be set forth in such a manner that all watch engineers can act responsibly according to the policies of the company and the chief engineer. They should be instructed in procedures that have been tailored specifically for their particular vessel, if necessary, so that in an emergency they can immediately carry out the procedures established by the chief engineer. The Safety

¹For more detailed information, read Marine Accident Report--"Engineroom Fire Aboard the U.S. Tankship CHARLESTON in the Atlantic Ocean, About 35 Miles off the South Carolina Coast, March 7, 1989" (NTSB/MAR-90/06).

Board believes that the third assistant engineer should have had enough knowledge of the engineering plant to react to the emergency even before the first assistant engineer arrived in the engineroom and should not have abandoned the space after starting the fire pump. As soon as he became aware that lube oil was flowing out of the turbine, he could have activated the quick-release mechanism to stop the steam supply to the turbine or ordered the closest QMED to do so without waiting for a senior engineer to arrive on scene to take charge. The third assistant engineer, who said that smoke and fire drove him away, should have attempted to stop the burning turbogenerator before leaving the area.

Furthermore, by leaving the scene so quickly, the third assistant engineer, who was in charge of the watch, left the first assistant engineer without any help. Without the chief engineer or the watch engineer in the engineroom, the first assistant engineer had to carry out numerous tasks to shut down the engineering plant by himself. The company, through its chief engineer, should establish emergency procedures including a shutdown procedure that specifies the duties of each watch engineer and QMED during the process. The plan should address the following issues: the duties of the watch engineers in an emergency; the machinery that should be shut down in each type of emergency, such as mechanical failure, electrical failure, fire, flooding, or boiler casualties; and the responsibilities the watch engineers are to assume until a senior engineer arrives on scene to take charge.

The Safety Board questions the installation of an alarm relay circuit wiring from the emergency generator room to the engineroom. U.S. Coast Guard regulation 46 CFR Part 112.05-5(f) prohibits the installation of any wiring from the emergency switchboard to the engineering spaces, except to connect the equipment in the engineroom or boilerroom to the emergency switchboard, including the visible indicator required by 46 CFR Part 112.45-1(b), so that a casualty in these spaces will not render the emergency generator inoperative. The intent of the regulation is to ensure that the emergency generator is a self-contained unit capable of operating independently of the engineering spaces. The damaged alarm relay circuit, although not connected directly to the emergency switchboard, did introduce a fault in the circuit provided to protect the emergency diesel generator. However, the regulation concerning the monitoring of the diesel engine operation failed to address the probability that the monitoring circuit, if incorrectly connected to an alarm in the engineroom, could also introduce a fault in the system that would stop the diesel engine.

The Emergency Station Bill for the CHARLESTON was a printed form made for Apex Shipping Company for use on all company vessels. The emergency signals and alarms were included on the form, as is required by regulation; however, the selection of assignments to the various emergency stations for key crewmembers, as shown on the emergency station bill, was questionable. For example, the chief engineer's emergency station was the emergency generator room, presumably so that he could start the diesel generator if it failed to start automatically. The Safety Board questions the logic of assigning the chief engineer to such a lesser task instead of tasking him to

take charge of the engineroom in an emergency, particularly an engineering emergency.

The first assistant engineer was listed as a member of the emergency squad, which, according to the station bill, assembles in the void space between the upper and lower crew's quarters, leaving the engineroom without a senior engineer to take charge during an emergency. Although the location and types of emergencies are difficult to predict, had the CHARLESTON's station bill been strictly followed during the emergency after the general alarm was sounded, the engineroom might have been manned by the third assistant engineer who, in this instance, abandoned the engineroom. Unless the instructions and the assignments on a station bill are practical, it becomes a document to satisfy the regulations. The Safety Board believes that the chief engineer, who has responsibility for the entire engineering plant, or in his absence, the first assistant engineer should take charge in the engineroom during an emergency. The operation of the emergency diesel generator can be performed by an engineer of lesser rank, and Apex Shipping Company should revise its emergency station bills to better define the emergency stations and duties of the crewmembers who man them, commensurate with their regular duties aboard the vessel.

The marine safety consultants' periodic visits to the vessels in Apex's fleet to give instructions and safety training to crewmembers probably help highlight possible safety problems related to cargo handling, tank cleaning, and gas freeing procedures. Emergencies in the engineering spaces were apparently not fully addressed during these periodic visits, since the CO₂ fire-extinguishing system was misused during the fire. Instructions on the limitations and procedures of fixed CO₂ systems should be included in the safety training given by marine consultants during their visits. The Safety Board believes that Apex should ensure that such training be included during the marine safety consultants' periodic visits to Apex vessels and that procedures for responding to emergencies in the engineering spaces should be explained during the weekly drills.

The alarm relay circuit aboard the CHARLESTON and aboard any other company vessels that have similar circuits should be modified so that if the alarm relay circuit is grounded or damaged for any reason, it should not disable the emergency diesel generator. U.S. Coast Guard regulations 46 CFR Part 112.50-1(i) should be amended to state that if a fault or ground occurs in the diesel engine monitoring circuit, it will not render the emergency generator inoperative. In the interim, the Coast Guard should instruct its marine inspectors to check the installation of the monitoring circuits of emergency diesel generators so that damage to the wiring does not introduce a fault in the circuit that would render the diesel engine inoperative.

Therefore, the National Transportation Safety Board recommends that the Apex Marine Corporation:

Revise the Emergency Station Bill aboard the CHARLESTON and aboard other vessels of the company's fleet with similar station bills to state that the chief engineer's

emergency station is in the engine room. (Class II, Priority Action) (M-90-81)

Develop procedures for each vessel in the Apex fleet to address possible emergencies that may arise in the vessel's engineering spaces and include simulated emergencies during the required weekly drills. (Class II, Priority Action) (M-90-82)

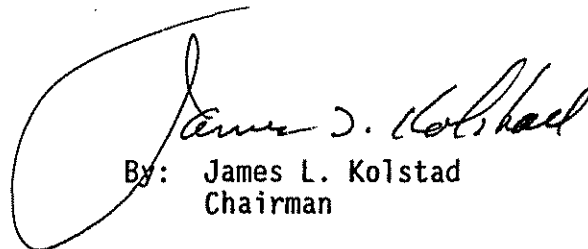
Include in the periodic instructions and training given by contracted marine consultants aboard Apex vessels an explanation of what the fixed CO₂ fire-extinguishing system was designed to do, its limitations, and the areas that are protected by the system. (Class II, Priority Action) (M-90-83)

Modify the alarm relay circuit for the emergency diesel generator aboard the CHARLESTON and other company vessels with similar installations so that a damage or ground in the circuit will not prevent the diesel generator from starting automatically. (Class II, Priority Action) (M-90-84)

Also, the Safety Board issued Safety Recommendations M-90-78 through -80 to the U.S. Coast Guard.

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 M-90-81 through -84 in your reply.

KOLSTAD, Chairman, COUGHLIN, Vice Chairman, and LAUBER, BURNETT, and HART, Members, concurred in these recommendations.


By: James L. Kolstad
Chairman