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NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C.

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Forwarded to:

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SAFETY RECOMMENDATION(S)  
M-85-7 through -11

About 0006 P.s.t. on March 19, 1984, the fully loaded 618-foot-long United States tankship SS MOBIL OIL experienced a steering gear malfunction and grounded in the Columbia River on the right ascending bank about 1 mile upstream from Saint Helens, Oregon. There were no injuries to the 36 persons aboard, but five cargo tanks and the forepeak tank were ruptured, and more than 170,000 gallons of oil polluted the river and its shores. The cleanup cost of the oil spill was estimated to be \$3 million, and the cost of the repair to the ship was estimated to be \$5 million. <sup>1/</sup>

At the time of the accident, the port and starboard main steering gear pumps were both operating in the followup control mode. The steering system failure probably was caused by the movement of the clevis pin out of the link which connects the crosshead of the starboard main steering pump to the differential control linkage. The pin movement probably resulted from the hunting and interrupted motion of the steering gear pumps in simultaneous operation and from heavy vibration in the ship's stern when the clearance between the keel and the river bottom averaged only about 10 feet.

The locations for the cotter pins in the four aft clevis pins of the crosshead linkage for the port and starboard pumps were not conducive to easy inspection. In order to see them it was necessary to stoop, but they could be felt if an inspector knew they were there and how they were oriented. The height of the grease fitting for the clevis pin that came out of position was 42 inches above the deck, and it was located just above the cotter pin that secured the clevis pin. Although grease was applied to the fitting weekly by the engineering day worker and the space was checked by many engineers in their routine duties after the vessel left the shipyard in July 1983, no one could say unequivocally that he had seen a cotter pin in the clevis pin which became disengaged. The crew had not been made aware of the existence of these small, hidden, but important parts of the steering gear control linkage, and had not been directed to check them.

<sup>1/</sup> For more detailed information read Marine Accident Report--"Grounding of the United States Tankship SS MOBIL OIL in the Columbia River near Saint Helens, Oregon, March 19, 1984" (NTSB/MAR-84/09).

The need for thorough inspection of these cotter pins was made apparent by this accident. When the MOBIL OIL was in the shipyard for overhaul in June 1983, the American Bureau of Shipping (ABS) surveyor noticed just before the shipyard's final post-repair test that the four aft clevis pins had no cotter pins to secure them. The test was run without the cotter pins installed, and no one caught the error. Even after cotter pins were installed, no one checked them for size, for how they were fitted, or to insure that all four had been installed. It was only after the failure on March 19, 1984, that the three remaining cotter pins were discovered to be undersized and with the split ends not completely bent to 180 degrees. No cotter pin or pieces of a cotter pin which may have come from the dislocated clevis pin were found, leaving doubt that the cotter pin was ever installed.

Operational tests conducted after the accident indicated that dual pump operation for this type of steering gear may be less reliable for navigation in restricted waters. Single pump and motor operation permitted smooth pump stroke excursions, while dual pump operation caused excessive hunting and interrupted motion of both strokes, which causes greater wear on the machinery parts as well as increasing the possibility of an unsecured clevis pin working free.

According to the International Maritime Organization (IMO) Protocol of 1978 Regulations on Steering, Regulation 19-1, simultaneous operation of steering gear power units is required where navigation demands special caution. This same concept underlay 33 CFR 164.39(p), which never was implemented; recently, however, the U.S. Coast Guard has incorporated the requirement into a final regulation, 33 CFR 164.11(t). The MOBIL OIL was operating both steering gear pumps simultaneously while it was in the maneuvering condition as it proceeded up the Columbia River. When the clevis pin became dislocated, the redundancy of the power units contributed nothing to save the ship from grounding. Had only one power unit been on and had the link connection failed even though no alarm had sounded, the bridge watch might have acted differently by first alerting the engineers who could have within 30 seconds started the deenergized power unit and regained steering.

Had a qualified engineer been in the steering gear space when the accident happened, the ship might have been saved from grounding. By pressing a pushbutton switch on a control cabinet on the forward bulkhead, the engineer could have stopped the starboard steering gear pump motor quickly and permitted the port pump to continue controlling the rudder. According to the manufacturer's manual, each steering gear and motor combination is of equal capacity and capable of supplying the required amount of power to operate the rudder under the specified extreme conditions. It was the practice on the MOBIL OIL when changing from two-pump to one-pump operation to close the two flow valves and open the crossover valve of the deenergized pump. The tests showed that it was unnecessary to make these valve changes in an emergency and that although the pump and motor might windmill opposite to normal rotation until the valves could be changed, control would not be affected and damage would not result. This information should be made available to all ship personnel who may have similar steering gear.

Although the engineering department on the MOBIL OIL tested and maintained the steering gear, no one aboard was aware of the effect if the control linkage separated on one of the steering gear pumps with the vessel underway and both pumps in operation.

When a postaccident test indicated that the starboard pump could be stopped without immediately realigning valves and the port pump continued operating the steering gear, senior engineers expressed surprise. Had the engineering personnel been trained in casualty control for the steering gear, they should have been made aware of this information.

According to Coast Guard steering casualty data, steering gear casualties are not uncommon. Over a period of 9 years, about 119 material failures of steering gears have been recorded on vessels of over 1,000 gross tons. The Coast Guard records contain a report of a similar steering gear failure which caused the 730-foot-long freighter MIDDLETOWN to ground. The Safety Board believes that neither the number of serious accidents which have occurred nor their consequences have been insignificant, and the Board continues to believe that steering compartments on oceangoing vessels should be manned by a trained person when the vessel's steering systems do not meet the IMO and Coast Guard steering gear standards for new vessels and the vessel is navigating in rivers, channels, and harbors of the United States in which there is limited maneuvering room. Had a qualified engineer on the MOBIL OIL been on watch in the steering gear room, his action to stop the faulty pump might have regained steering control in time to prevent the vessel from going hard aground. Manning the steering gear room during the passage of the MOBIL OIL up the Columbia River would have required only an additional 9 man-hours of watchstanding.

The anchors had previously been prepared for letting go. Only a pawl on each chain had to be lifted and the brakes on each anchor windlass released to drop the two anchors. Although there were men up and about on deck and a lookout on the bridge wing, no one was actually standing by on the foc'sle before the ship grounded to release the anchors. The lookout on the bridge wing only managed to reach the main deck before the ship grounded after he was ordered to drop the anchors. He still had to go forward about 200 feet and up a ladder to the foc'sle before reaching the anchor windlass. The men on deck were not called. Had there been an anchor detail set, the anchors could have been dropped quickly after the pilot gave the order, which may have reduced the vessel's speed in time to lessen the hull damage and oil pollution. However, dropping the anchors with the ship's engine full ahead and before substantial way was lost (even against the river current) would have been dangerous, had the anchors held and the anchor chains parted with the anchor detail on the foc'sle.

Therefore, as a result of this investigation, the National Transportation Safety Board recommends that the Mobil Oil Corporation:

Require more stringent supervision and inspection of maintenance and repair/renewal work that is conducted on ship's steering systems to insure that repairs are properly made, with particular attention to proper connections between moving parts in such systems. (Class II, Priority Action) (M-85-7)

Inform ship's personnel on vessels with a steering gear similar to that on the U.S. tankship SS MOBIL OIL of the circumstances of the accident involving the MOBIL OIL on March 19, 1984, and that based on postaccident test results, they can restore steering quickly in a similar emergency by energizing the alternate steering gear pump if it is not operating and stopping the faulty pump's motor before realigning valves for single-pump operation. (Class II, Priority Action) (M-85-8)

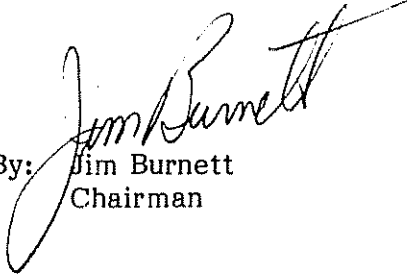
Provide comprehensive casualty control instructions for the steering gear to ship's personnel. (Class II, Priority Action) (M-85-9)

Direct that vessels in the fleet which do not meet the International Maritime Organization and Coast Guard steering gear standards for new vessels man the steering gear space with a qualified person in communication with the bridge while navigating in rivers, channels, and harbors in which there is limited maneuvering room. (Class II, Priority Action) (M-85-10)

Issue instructions to its fleet that require that personnel assigned to the anchor detail be stationed at the anchor windlass controls when navigating in rivers, channels, and harbors in which there is limited maneuvering room. (Class II, Priority Action) (M-85-11)

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 actions 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.

BURNETT, Chairman, GOLDMAN, Vice Chairman, and BURSLEY, Member, concurred in these recommendations.

By:   
Jim Burnett  
Chairman