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Lessons Learned 04 -10

ENSURING PROPER MAINTENANCE OF SYSTEMS, EQUIPMENT, AND COMPONENTS

A partial propulsion failure occurring on a commercial vessel can result in significant injury and damage when the movement of the vessel is unchecked and an allision or collision occurs. In some circumstances a significant amount of hull damage can occur at very slow speeds, while in others, multiple fatalities may occur. Owners and operators, and those responsible for vessel maintenance, specifically steering and propulsion systems may find the following information useful and recognize the need to examine their own vessel's equipment and maintenance systems. Although the following speaks to a specific propulsion system, the noted lessons are useful for any type.

The vessel was equipped with cycloidal drive units fore and aft. The propulsion units provide thrust forward, backwards, athwartship directions, or an infinite number of combinations. The control of the unit is achieved by two hydraulic rams actuated by control oil delivered from electro-hydraulic solenoid operated spool valves. Control oil for operation is piped from a branch of the main lube oil supply to the propulsion unit and flows through one of two canister type oil filters. From the filter, the oil proceeds to two, three position spool valves. An electrical signal positions the valves, thus controlling the flow to the respective hydraulic rams; therefore regulating the output of the propulsion unit. Two other electro-hydraulic valves are also in the circuitry complementing the operation.

Investigators discovered that several of the spool valves failed to operate as designed, were sluggish and stuck in various positions. Lube oil samples were taken from the filter housings and appeared highly contaminated. Investigators learned that no replacement filters or spare valves were available onboard or in stock at the nearby maintenance facility. The operator had previously purchased a complete control assembly consisting of new electro-hydraulic valves and filter housings which was on hand in storage. This system was installed post casualty and once replaced, the system worked as designed and required only minor adjustment.

The vessel was operated, maintained and managed by multiple levels of engineering personnel both onboard and ashore serving operational and support roles. Over the years, many of those engineers interacted with the system. However, despite their experience with the system they failed to recognize that the canister filters required routine replacement and that poor oil quality could contribute to improper operation of the solenoid valves. Further, no one identified that the Safety Management System and vessel Maintenance Management systems failed to provide a line item for the lube oil filters despite a requirement for routine changing in the associated equipment manual.

As a result of this casualty, the Coast Guard **strongly encourages** vessel owners and operators, engineers, and support staffs to perform a "preventative maintenance gap analysis" by:

- 1) closely inspecting their equipment, systems, and components, and reviewing associated technical manuals to ensure that all items requiring maintenance are captured in their respective maintenance management systems and;
- 2) ensuring that the maintenance is actually performed.

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