Preventing Vessel Emergencies in Washington Waters

OVERVIEW

Washington Department of Ecology (Ecology) Spills Program research data shows that between 2011 and early 2014, **56 covered vessel incidents** occurred in Washington waters. Each posed a spill threat and is worth considering for prevention recommendations.

These included:

- 76% loss of propulsion.
- 9% groundings.
- 6% loss of electrical power or steering.
- 9% other types.

By area and rate:

- 52% occurred in the Columbia River. One per 98 vessel calls.
- 34% occurred in Puget Sound and One per 294 vessel calls. the Strait of Juan de Fuca.
- 2% occurred in Grays Harbor. One per 185 vessel calls.
- 12% occurred offshore.

The most frequent underlying causes were:

- Maintenance issues.
- Engineering watch standing issues.
- Navigation errors.

WHY THIS MATTERS

The Washington state Legislature directed Ecology to establish a "zero spills" goal. Ecology investigates vessel incidents to determine what went wrong, why, and what can be done to prevent incidents from reoccurring. Ecology is sharing these recommendations for prevention for vessel operators to incorporate into their day-to-day operations.

Special accommodations:

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LOSS OF PROPULSION accounted for 76% of the incidents.

In addition to an actual stoppage of the main engine, the following were also recorded as a loss of propulsion:

- An automatic engine slowdown or shutdown event.
- A failure to start or reverse.
- A loss of fuel supply caused by:
  - improper valve alignment,
  - low fuel temperature,
  - clogged strainers, or
  - low tank level.

- The inability to provide full rated power.
- The loss of bridge or engine control room remote control.
- High engine, thrust, or line shaft bearing temperatures requiring reduced speed operation.
- High or low engine pressure or temperature alarms.
- Loss of cylinder oil injection because the tank got too cold.
- Anchoring to quickly fix a leaking gasket.
- Other condition in which the main engine did not respond to maneuvering commands from the bridge.

LOSS OF ELECTRICAL POWER is not always a complete loss of power (blackout) scenario. It could be:

- Any interruption of electrical power, including operational mistakes.
- Not having two generators on line with an operational emergency generator standing by.
- The tripping or failure of circuit breakers or switchboard problems.

LOSS OF STEERING could be:

- Complete loss of both steering systems.
- Loss of control of the steering gear from the bridge helm.
- One steering unit is inoperable or out of service for any reason.
- A repetitive steering system alarm sounds.

GROUNDING INCIDENTS include:

- Going aground outside of the navigation channel while underway.
- Soft groundings or touching bottom on uncharted shoals or underwater obstructions.
- Swinging while anchored with the stern touching bottom in shallow water.
- Dragging anchor resulting in the hull touching the bottom.

How can maintenance-related casualties be prevented?

Since maintenance issues are an underlying cause in most of the incidents, ensure that:

- The planned maintenance system (PMS) is followed. The purpose of PMS is to ensure both the long-term reliability and the immediate readiness of machinery for the safe operation of the ship.
- Maintenance procedures are completed and followed per the manufacturer's instructions and best practices.
- Proper spare parts, seals, gaskets are used and installed correctly to specified torque.

Fatigue and rushing to complete the job before sailing time often lead to problems.

Avoid conducting maintenance tasks during maneuvering. There is potential to interrupt critical equipment or systems operations. The electrician on a car carrier was cleaning the emergency

switchboard during the Columbia River transit. A simple mishap led to a blackout. The loss of propulsion and steering resulted in the vessel grounding.

Bunkering, stores, USCG port state control exams, and shifting are routine in-port tasks. They rarely lead to an incident. A rushed, incomplete, or poorly done maintenance task can result in a stoppage during maneuvering. This may present a vessel emergency but at a minimum will probably lead to significant delays and costs to the company.

You rarely have the opportunity to test main engine repairs alongside the berth. A leaking gasket in the exhaust valve actuator piping noticed after you begin maneuvering can result in a vessel emergency.

During your port stay in Washington, determine if you have time to complete the PMS procedures. If unsure, consider delaying them for a less busy port call.

What about the second most frequent cause of these incidents?

Poor engineering watch practices,

When the engine room is put in a stand-by condition, the officer in charge of the engineering watch ensures all machinery and equipment, which may be used during maneuvering, is in a state of immediate readiness and that an adequate reserve of power is available for steering gear, bow thruster operation and other requirements. STCW A-VIII/2 Part 3.68

Ships transiting in Washington waters have run out of fuel because the service tank was not filled, the tank was not heated before departing or the valves were closed.

Extra engineers are assigned in the engine room during maneuvering. Whether in bridge control or engine room control,the engine room team must closely monitor machinery operations.

During an outbound transit a containership slowed to dead slow. The watch engineer failed to note the auxiliary blower did not auto start with the reduced RPMs. The engine did not respond to the next 'half ahead' bell and a loss of propulsion event resulted.

Implementation of **engine room resource management (ERM)** practices can reduce the number and seriousness of vessel casualties. ERM practices:

- Improve situational awareness and error trapping.
- Enable the team to tackle unexpected events and reduce potential confusion and hence minimize error.
- Develop optimum utilization of engine room machinery and human resources.

- Have all engine department crew contribute effectively as the engine room team during normal and emergency situation.
- Reduce the number of incidents and accidents plus the ship's downtime by addressing potential human errors as well as watch keeping arrangements and procedures.

Washington State **accepted industry standards** for engine room watch practices include having:

- Procedures for engineering responses to emergencies.
- Clear delegation of duties, responsibilities and authority between watch members.
- Inspection, maintenance and operation of the propulsion, steering, and power generating systems that meet international and federal requirements, and manufacturer's recommendations.

Navigation-related vessel emergencies during Ecology's review included allisions and groundings. Most allisions occured in tight maneuvering situations such as turning basins with limited clearances. Groundings happened due to unexpected shoaling near berths or when swinging at anchor. To reduce navigation errors ensure passage plans cover the complete transit in Washington waters. Include discussions of water depths near berths and anchorages in planning and with the pilot. Vessels anchored in the Columbia River routinely swing 360 degrees. Consider this before anchoring to ensure sufficient deep water around the vessel with enough chain out to hold the vessel during high wind and current situations. Navigation incidents that occurred in narrow navigational channels, in the close vicinity of other vessels, or during night, fog or other poor weather conditions heightened the threat of oil spills. Under these conditions, it is always prudent to implement the vessel oil spill plan, make notifications, and implement regional Harbor Safety Plans and applicable voluntary 'Standards of Care.' Work with the U.S. Coast Guard and Ecology for precautionary measures, i.e. moving response equipment or mobilizing a spill management team.

MORE SAFETY ADVISORY BULLETINS

- **SAB 09-01:** Vessel Fueling Spills (09-08-010)
- **SAB 06-02:** Oil Transfer Rates (06-08-019)
- **SAB 06-01:** Automatic Identification Systems (AIS) (06-08-010)
- **SAB 00-01:** The Importance of Identifying and Addressing Root Causes of Equipment Malfunctions (00-08-015)
- **SAB 97-01:** Deep Water Anchoring (00-08-004)
- **SAB 96-01:** Shifting a Ship by Warping (00- 08-003)

- **SAB 94-03:** Piston Crown Maintenance (00- 08-006)
- **SAB 94-02:** Importance of Preventative Maintenance (00-08-007)
- **SAB 94-01:** Potential Problems with Steam Turbine Throttle Controls (00-08-005)
- **SAB 99-02:** Passage Planning for the Oregon and Washington Coasts: Special Considerations (99-256)
- **SAB 99-01:** Traffic Separation Scheme and Puget Sound Vessel Traffic Service (99-253)
- **SAB 98-01:** Shipboard Systems Modifications (98-252)

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Phone: (360) 407-7455
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Program website:
www.ecy.wa.gov/programs/spills/spills.htm

Publication website:
www.ecy.wa.gov/biblio/spills.html

Puget Sound Harbor Safety Plan:

www.pshsc.org/about/harbor_safety_plan

Lower Columbia River Harbor Safety Plan

http://www.lcrhsc.org/documents/HSPlanJanuary2013edition.pdf

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