

# The SUPER RUBIN

## OVERVIEW

On June 30, 1999, at about 0110, the cargo ship SUPER RUBIN overflowed a diesel tank while receiving bunkers (fuel) from the barge MEGHAN 102 in the Upper Vancouver Anchorage on the Columbia River. The oil overflowed containment onto the deck of the ship, pooled at the front of the house, spilled over the side of the ship onto the deck of the barge, and into the Columbia River.

## PROBABLE CAUSE

The probable cause of the oil spill was the Second Engineer's failure to secure the starboard diesel oil (DO) tank valve before loading fuel oil (FO), resulting in the overflow of the starboard DO tank. Factors likely contributing to the spill included:

- fatigue resulting from an extended on-duty time for the ship's engineers who were responsible for the bunkering operation;
- the improper use of the ship's bunkering checklist by the ship's engineers; and
- the design of the ship's fuel piping system that located a diesel oil tank valve away from other valves, out of sight, and in a location more difficult to access.

## VESSEL INFORMATION

The SUPER RUBIN is a 15,932-gross ton bulk carrier built in 1996. It is 170 meters in length.



*Deck of barge MEGHAN 102. Note oil sheen and oiled absorbent pads*

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## PERSONNEL

The Person In Charge (PIC) of the bunkering operation was the Chief Engineer (C/E). Additional personnel involved with the bunkering operation, and their duties, included:

First Assistant Engineer (1/E), Point of Transfer  
Second Assistant Engineer (2/E), Valve alignment  
Third Assistant Engineer (3/E), Tank sounding  
3 Oilers (O), Tank soundings  
Second Officer (2/O), Deck Officer on Duty  
Able Bodied Seaman (AB), Deck Rover Watch

Philippine nationals crewed the vessel. Tagalog was the common working language used on board. All officers spoke and understood English. The entire crew was cooperative throughout the investigation.

In his interview, the C/E described the 2/E as a “very competent” engineer.

## ENVIRONMENT

### *Locale*

The location of the incident was near Columbia River mile 104, Upper Vancouver Anchorage. This anchorage area is south of the shipping channel in Oregon waters.

### *Weather and Tides*

Winds at the time of the spill were reported to be northeasterly at four to six knots. Visibility was greater than five miles with overcast skies and occasional light showers.

The Master reported about three to four knots of current in the river.

## CHRONOLOGY

*Note: The chronology of the spill was developed based on interviews with the crew of the SUPER RUBIN. The Tankerman on the barge MEGHAN 102 was also interviewed. Ecology and the U.S. Coast Guard jointly conducted the crew interviews. All times are approximate Pacific Daylight Time (PDT).*

On June 29, 1999, the SUPER RUBIN, sailing in ballast, approached the end of its sea voyage bound for the Columbia River. The 1/E reported to watch at 0345 and stayed on watch until 0800. At 0600 the C/E awoke to prepare for arrival. The 3/E reported to the engine room at 0745 and remained on watch until 1200. All three men would remain awake the remainder of the day.

The C/E conducted bunker training from 1000 to 1030. After lunch, the C/E, all the Assistant Engineers and two Oilers were in the engine room and remained there until the ship arrived at the Vancouver anchorage.

Arrival was made at the Columbia River at 1455. A Columbia River Bar Pilot and Columbia River Pilot were boarded in succession, and the ship continued its transit up the Columbia River where it dropped anchor at the Upper Vancouver anchorage at 2255 under the guidance of the

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River Pilot. At 2306, finished-with-engines was rung and the crew began preparations for bunkering.

At 2345 the tank barge MEGHAN 102 arrived alongside the SUPER RUBIN and made up to the ship's starboard quarter.

The C/E met with a Tankerman from the MEGHAN 102 at 0000 on June 30<sup>th</sup> for the required pre-transfer conference and completed the Declaration of Inspection. The C/E had prepared a pre-loading plan as follows:

<u>TANK</u>	<u>STARTING % FULL</u>	<u>PLANNED FINAL %</u>
Diesel Oil – Port	45%	75%
Diesel Oil – Starboard	47%	75%
Fuel Oil – #1 Port	8%	84%
Fuel Oil – #1 Starboard	8%	84%
Fuel Oil – #4 Center	66%	78%

By 0025 the barge was discharging DO to the SUPER RUBIN. The DO transfer was complete at 0050, with a total of 293 barrels having been transferred. The port and starboard DO tanks were sounded and found to be at 80% and 76% full, respectively.

The 2/E changed the valve alignment in the engine room in preparation to load FO into the No. 1 port and starboard FO tanks. The 2/E failed to close the starboard DO tank valve.

The barge began discharging FO to the SUPER RUBIN at 0055. The C/E monitored the transfer, taking sounding information from the 3/E via radio at 0105, and asked the barge to increase the transfer rate.

At 0110 the C/E went on deck and noted the starboard DO tank overflowing through its tank vent. The Tankerman was alerted by air horn to stop the transfer. He stopped the pumps and noted that oil spilled heavily off the deck of the ship and on to the deck of the barge for about five minutes. The C/E also estimated that the tank overflowed for about five minutes. The total amount of FO transferred at the time of the shutdown was 292 barrels.

The Tankerman notified his office of the spill. Tug and ship personnel began cleanup operations, including deployment of boom – from the barge – aft of both vessels. The river carried the oil over the boom. Notification of the spill was made to the U.S. Coast Guard and Washington State by the barge company.

The C/E took soundings at 0200 as follows:

<u>TANK</u>	<u>MEASURED FINAL %</u>
Diesel Oil – Port	80%
Diesel Oil – Starboard	100% (OVERFLOWED, sounding assumed by C/E)
Fuel Oil – #1 Port	16%
Fuel Oil – #1 Starboard	25%
Fuel Oil – #4 Center	78% (unchanged)

[Note: All other FO tanks were unchanged.]

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A spill response contractor arrived on scene at 0410 to continue cleanup efforts.

At 0730 a joint decision was made by the Captain, C/E, U.S. Coast Guard and Ecology to not resume bunkering operations until the crew was adequately rested.

## OIL QUANTITY SPILLED

The starboard DO tank overflowed when FO was inadvertently introduced into it. Overflow from the starboard DO tank exited via vents located on deck, ran aft, and overflowed the deck edge.

The quantity of oil spilled from the starboard DO tank aboard the SUPER RUBIN into waters of the Columbia River was estimated to have been 200 US gallons.

## EXTENT OF SPILL AND OIL SAMPLE TESTING RESULTS

Ecology's Natural Resource Damage Assessment (NRDA) Team and the Washington Department of Fish and Wildlife (WDFW) NRDA Team conducted an overflight of the lower Columbia River by helicopter on June 30, 1999. The purpose of the overflight was to determine the extent of the oil spill from the SUPER RUBIN, and to document the area of impact. The team arrived at the river at about 1730, and began observation from the Lewis and Clark Bridge at Longview, Washington, moving upstream. The flight continued upstream to Vancouver, Washington, concentrating on the Oregon side of the river, and then moved downstream on the Washington side to Fisher Island. Oil was observed from St. Helens, Oregon, to Barlow Point (river mile 75 downstream to river mile 63). From St. Helens to Prescott, the oil was concentrated on the Oregon side of the river, primarily near Sandy Island where skimmers were observed cleaning up the heaviest areas. Downstream from Prescott the oil fanned out across the river in long streamers, and impacted the Washington shoreline from the Lewis and Clark Bridge to Barlow Point.

The helicopter landed on the Washington shoreline about two miles downstream from the bridge to take a sample of the oil in the water along the shoreline. The sample was submitted to the Department of Ecology Manchester Environmental Laboratory for hydrocarbon matching analysis. Two source oil samples were collected from the SUPER RUBIN by the Oregon Department of Environmental Quality on July 1, 1999, and were also submitted to the Ecology Laboratory for hydrocarbon matching. The results of these analyses confirmed that the sample of oil collected from the river on the Washington shoreline matched the source oil samples collected from the SUPER RUBIN.

## DRUGS AND ALCOHOL

Some of the SUPER RUBIN's crew and the Tankerman of the BARGE MEGHAN 102 were tested for drugs and alcohol following the incident. The test results were negative.

## ANALYSIS

### *Work Hours*

The Seafarer's Training, Certification and Watchkeeping (STCW) Code of 1995, Section A-VIII/1 – Fitness for Duty – states that "all persons who are assigned duty as officer in charge of a watch or as a rating forming part of a watch shall be provided a minimum of 10 hours of rest in any 24-hour period. Similarly, Washington Administrative Code (WAC) 317-40-085 states "receiving and deliver-

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ing vessel personnel involved in bunkering may not work more than 15 hours in any 24-hour period...”

The SUPER RUBIN's C/E stated that he had been awake and working from 0600 the previous day until the time of the incident at 0110, a total of 19.2 hours. The C/E stated that the 1/E, 2/E and 3/E were also working for an extended period of time. In addition to maintaining standard watchkeeping times/duties, the C/E also required all Assistant Engineers and two Oilers to stand-by in the Engine Room while transiting the Columbia River. Bunkers were scheduled for delivery following the 8 ½ hour transit up-river. Fatigue was likely a factor in this incident.

## *Oil Transfer Procedures*

The Code of Federal Regulations (CFR) requires that “each part of the transfer system not necessary for the transfer operation is securely blanked or shut off.” The SUPER RUBIN's crew failed to fully isolate the DO transfer system from the FO transfer system. According to the C/E's statement, upon completing the transfer of DO, the 2/E failed to close the starboard DO tank valve before loading FO. As a result, the starboard DO tank overflowed.

The CFR also requires the PIC and personnel involved with the transfer operation “conduct the transfer operation in accordance with the...vessel transfer procedures.” The SUPER RUBIN's transfer procedures included a “Check List for Bunkering Operation”. The checklist asks, “Has a final check been made to determine all valves in the bunker system are set CLOSED or OPEN, according to the operational requirement?” The “Yes” box is checked on the form. As indicated earlier, the starboard DO tank valve was not closed before commencing the FO transfer. The 1/E signed the checklist on the line titled “Checked by.” The C/E signed below his name on the line marked “Approved by.” Despite the signatures on the checklist, the SUPER RUBIN's engineers failed to conduct the transfer operation in accordance with the vessel's transfer procedures.

## *Valve Location/Ergonomics*

Vessels of this type typically have FO and DO transfer tank valves clustered against the forward bulkhead of the Engine Room. These centralized manifolds allow for easier transfer alignments. The SUPER RUBIN's starboard DO tank valve was located remotely, out-of-sight of the FO manifold. In addition, the valve could only be accessed by crouching beneath overhead piping. These factors likely contributed to the spill.

## **LESSONS LEARNED**

- Bunkering operations require the utmost care, and should be accomplished by a rested and alert team, even if the bunkering operation must be postponed to provide rest for the team.
- Even a team that has been trained for a task may fail to work effectively when fatigue becomes a factor.
- Checklists, when used properly, are a good tool that provide an extra margin of safety, but the extra margin needs to be consciously maintained, not counted upon to make up for a lack of other precautions.
- Ship system design is critical to ensuring safe operations, and can influence whether a human factor incident becomes an accident.



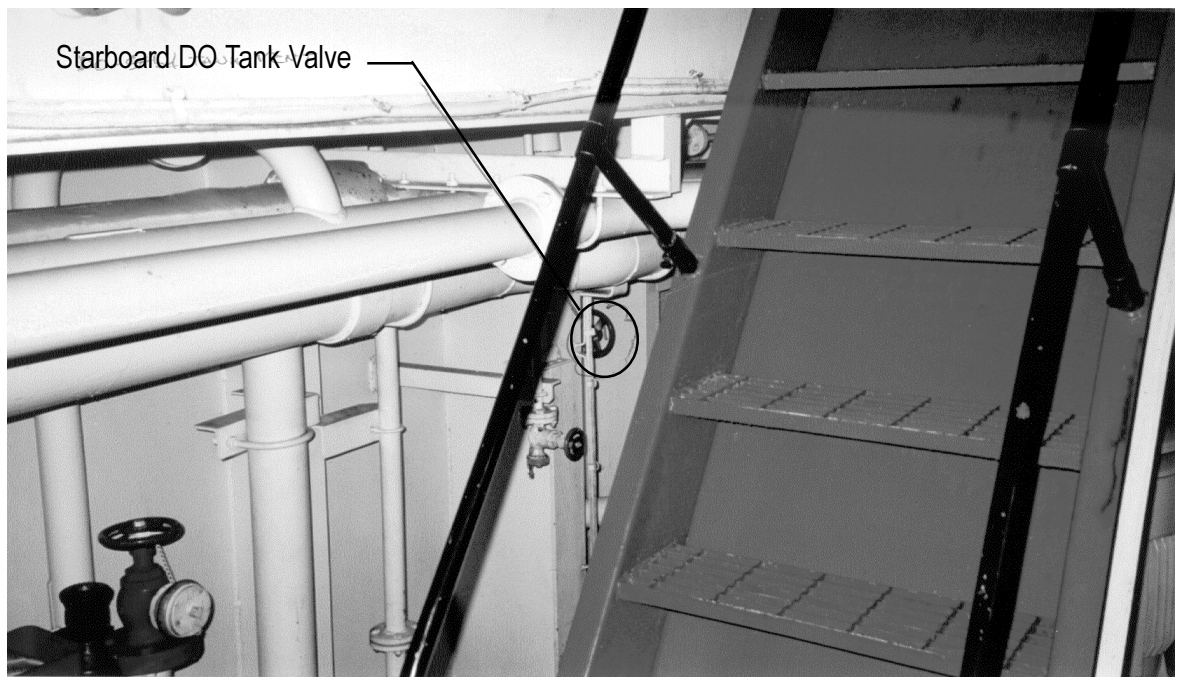
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## PREVENTION RECOMMENDATIONS

*To vessel Owners and Operators:*

- Ensure that work hour limitations are complied with, and that sufficient personnel are available to allow for compliance.
- Avoid scheduling bunkering operations immediately upon arrival in port, especially following difficult sea passages and prolonged passages in pilotage waters, in order to allow the crew sufficient rest to comply with work hour restrictions.
- Ensure that bunkering personnel understand the importance of following procedures, and do not become complacent about using standard checklists.
- When switching bunker tanks, ensure that tanks are sounded after being filled to confirm that oil is no longer flowing to them.
- Incorporate good ergonomic principles, to the maximum extent possible, in ship system design decisions, and carefully consider the influence of design decisions on operations safety.

*The operator of the SUPER RUBIN has indicated that a factor in the spill was the failure to check the valve position indicator for the starboard DO tank. They concluded that the valve was tight-open and not tight-closed. Following the spill, the operator of the ship sent a letter to their fleet describing the circumstances of the spill and prevention measures. The operator also revised their bunkering procedures and modified their bunker planning form to include the hours worked for those to be involved in the bunkering operation.*



*Location of the starboard DO tank valve handle.*

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*Starboard DO tank valve, located against forward bulkhead in engine room, behind stairwell and frame and away from fuel oil manifold. Note low overhang/ceiling of pipe rack. This valve was not secured prior to loading fuel oil.*

# More Prevention Bulletins

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- PB 99-02: The MONCHEGORSK (WDOE#99-261)
- PB 99-01: The ANADYR (WDOE#99-250)
- PB 98-01: The ARCADIA (WDOE#98-253)
- PB 96-02: BARGE 101
- PB 96-01: The KEYSTONE CANYON
- PB 95-02: The VERBIER
- PB 95-01: The DONA V

For copies of additional Prevention Bulletins, mail or fax a copy of this page to our Olympia office, call us at the number below, or visit our Web site. Please be sure to clearly show your address and phone number.

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See our Web site for more information and publications:  
<http://www.ecy.wa.gov/programs/spills/spills.html>

- Check here to automatically receive copies of future Prevention Bulletins.

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