

The SONGA HUA

Overview

In the early morning hours of Wednesday, February 28, 2007, the bulk cargo ship SONGA HUA was anchored in Elliot Bay, Seattle, Washington.

The tank barge SHAUNA KAY, accompanied by the tug ALYSSA ANN, was moored with its port side to the SONGA HUA's port side. The SHAUNA KAY was delivering intermediate fuel oil.

At about 0316 the transfer was stopped when the ship's Second Engineer sounded the emergency stop signal using an air horn. The ship's Chief Engineer called the tankerman aboard the SHAUNA KAY via radio and told him to stand by. After the tankerman's repeated attempts to contact the SONGA HUA's crew went unanswered, he climbed a portable ladder to reach the accommodation ladder of the ship and then climbed to the ship's deck. There he found the ship's crew cleaning oil from the SONGA HUA's starboard side deck and learned that oil spilled over the side to state waters. Approximately 93 gallons of intermediate fuel oil spilled to the water.

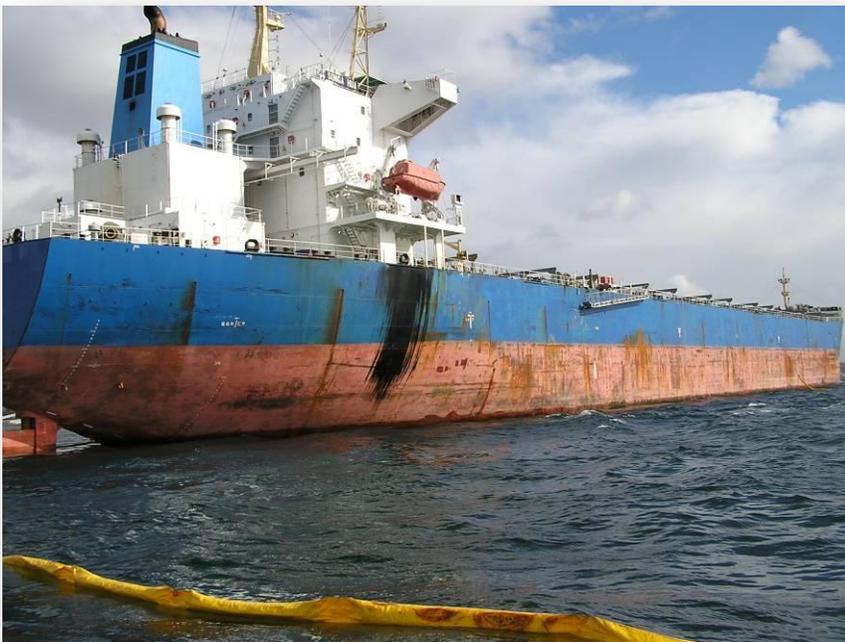


Figure 1 - The SONGA HUA at anchor in Elliot Bay, Seattle, Washington on February 28, 2007, showing an oil stain on its starboard side. [Photograph courtesy of Washington State Department of Fish and Wildlife.]

WHY THIS MATTERS

This bulletin was prepared to share lessons learned with industry and oil spill specialists. Prevention recommendations are also made to prevent similar occurrences. Sharing lessons learned is important if Washington State is to achieve its "zero spills" goal.

See pages 8 and 9 of this bulletin for the list of lessons learned and prevention recommendations.

The companies operating the ship and tank barge were offered the opportunity to provide additional information. The operators described changes they made on page 9 following the spill.

WEBSITE INFORMATION

<http://www.ecy.wa.gov/programs/spills/spills.html>

Special accommodations:

If you need this publication in an alternative format, call the Spills Program at 360-407-7455. Persons with hearing loss, call 711 for Washington Relay Service. Persons with a speech disability, call 877-833-6341.

The Facts

Ship Information

The SONGA HUA was a 738-foot (225-meter), 40,437-gross ton bulk carrier built in 2001 operating under the Marshall Islands flag. The ship had no previous history of spills in Washington waters.

Fuel oil headers were located on the port and starboard sides of the SONGA HUA just forward of the house. The six-inch (15 centimeter) fuel oil piping on deck fed the Nos. 1, 2 and 3 center fuel oil storage tanks via a pipeline dropping through the main deck to a manifold below deck. These center tanks were located forward of the house beneath the cargo holds.

The ship had two deep fuel oil tanks: No. 4 starboard and No. 4 port. Fuel oil delivered via the headers was directed to each of these tanks by opening a gate valve on the main deck immediately forward of the house that allowed oil to flow from the fuel oil piping serving the center tanks (see Figures 3 & 4). The gate valves were equipped with an indicator on the valve stem that rose and fell on the valve handle shaft to indicate whether the valve was opened or closed.

The No. 4 fuel oil tanks were connected to an overflow tank via an eight-inch (20 centimeter) pipe. The overflow tank was equipped with a high-level alarm that sounded in the engine control room. Vents for the No. 4 wing fuel oil tanks were located outboard of the SONGA HUA's house. These vents were equipped with fixed containment (see Figure 5).

The Third Engineer did the maintenance on the No. 4 starboard fuel oil tank deck valve. He provided Ecology investigators with a note he made regarding maintenance to the No. 4 starboard fuel oil tank valve. The note indicates that on February 19, 2007 the starboard side fuel oil deep tank valve was reconditioned.

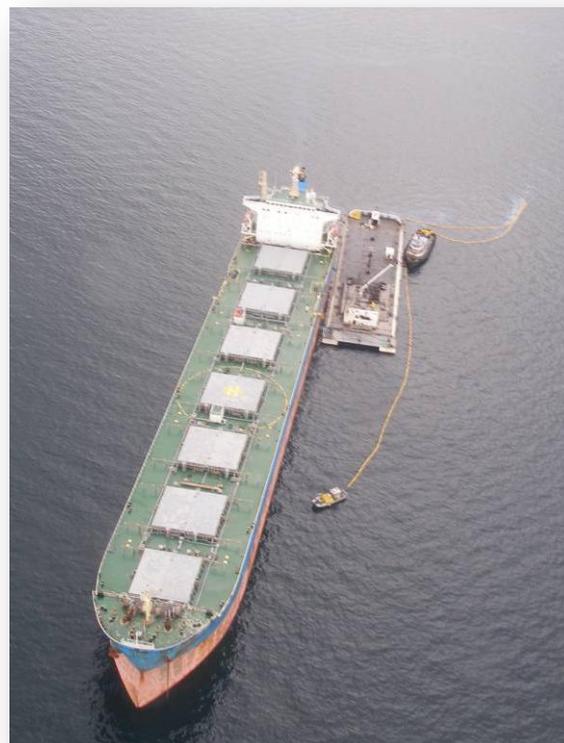


Figure 2 – SONGA HUA with SHAUNA KAY and ALYSSA ANN along side.



Figure 3 - The No. 4 starboard main deck fuel oil tank valve.

Following the spill and prior to the arrival of Ecology investigators, the ship's crew disassembled the valve under the supervision of the U.S. Coast Guard. They found that the Third Engineer improperly re-installed the indicator on the valve stem following the reconditioning in February 2007. Because the indicator bottomed-out on the stem threads prematurely, it prevented the valve handle from turning any farther. This caused the valve stem to stop turning before the valve could seat fully.

Tank Barge Information

The SHAUNA KAY was a 271-foot (83-meter), 3,263-gross ton double-hulled tank barge built in 2000 operating under a U.S. flag.

There was a single Tankerman-Person in Charge of the tank barge SHAUNA KAY. He was on the barge when he got the emergency stop signal via the SONGA HUA's whistle. He stopped the barge's pumps and the Chief Engineer told him to stand by. The Tankerman-Person in Charge (PIC) had six years experience as a tankerman, seven years experience working for the same company on tugboats and barges, and a total of thirteen years working in the tug and barge industry.

Environment where spill occurred

The SONGA HUA was anchored in the Smith Cove West anchorage which is commonly used by ships awaiting berth at the Pier 86 grain terminal. Just north of the anchorage is the Elliot Bay marina and breakwater. Northeast of the anchorage are Piers 90 and 91, common lay berths for fishing vessels.

The weather was cloudy with occasional showers. The wind was south-southwest at about 17 knots. The temperature was 38 Fahrenheit (3.5 Celsius) at 0300.



Figure 4. No. 4 starboard main deck fuel oil tank valve. Note the indicator (valve position indicator) mounted on the shaft of the valve stem.

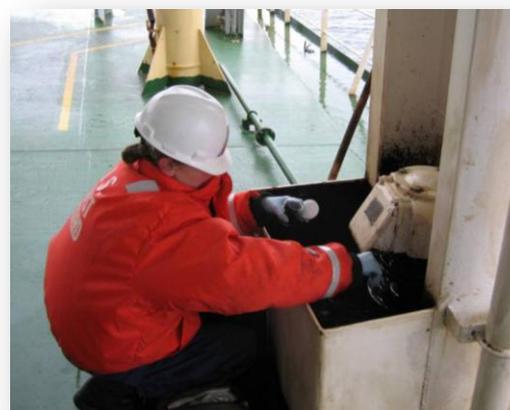


Figure 5 - A U.S. Coast Guard (USCG) officer takes a sample from the No. 4 starboard fuel oil vent containment box.



Figure 6 - SHAUNA KAY moored with its port side towards the port side of the SONGA HUA, and with tug ALYSSA ANN alongside on February 28, 2007.

Analysis

No. 4 Starboard Fuel Oil Tank Valve

Disassembly and reassembly of the No. 4 starboard fuel oil valve occurred on February 28, 2007 prior to arrival of Ecology investigators on scene. Documentation of maintenance on the No. 4 starboard fuel oil valve accomplished on February 19, 2007 was provided by the ship's Third Engineer. The Chief Engineer and USCG investigators discussed findings of the condition of the valve with Ecology investigators.

Examination of the valve showed that the stem-mounted valve position indicator on the valve was not positioned to correspond with the actual valve gate position. The valve position indicator could reach the end of the threads before the valve gate could close fully. This caused the valve stem to stop turning, giving the operator a false indication that the valve was fully closed. This likely explains why the Third Engineer did not note a problem when he checked the valve alignment prior to the transfer, and why the No. 4 starboard fuel oil tank was filling despite its being third in the planned filling sequence behind No. 2 and 3 center tanks.

Ecology examined gross volumes from the ship's sounding information. Based on that information, it appears that the No. 2 center fuel oil tank, which was the tank targeted for filling, took about 53 percent of the volume (354 cubic meters). The No. 4 starboard fuel oil tank, which was supposed to be static and nearly empty, and the overflow tank, which started out empty and received overflow from the No. 4 starboard tank, took about 47 percent of the volume (313 cubic meters).

Based on this split, it appears the No. 4 starboard fuel oil tank valve was open a substantial way and allowed the No. 4

CHRONOLOGY

February 19, 2007

The Third Engineer of the SONGA HUA reconditions the starboard deep tank fuel oil valve.

February 27, 2007

2300 The SONGA HUA arrived at Seattle, Washington from Pohang, South Korea.

2325 to 2335 The tank barge SHAUNA KAY was brought alongside the SONGA HUA by the tug ALYSSA ANN.

2350 The SHAUNA KAY was all fast alongside the SONGA HUA.

2350 to 0000 The Tankerman-PIC prepared the SHAUNA KAY, checked the alarms and emergency stops.

February 28, 2007

0000 to 0015 Cargo hose from the SHUANA KAY was connected to the SONGA HUA.

0015 to 0055 The Chief Engineer of the SONGA HUA and the Tankerman-PIC of the SHAUNA KAY (the PICs) held the pre-transfer conference and signed the Declaration of Inspection (DOI) at 0055.

0100 The Chief Engineer of the SONGA HUA signed the "Oil Transfer Check-list." The checklist indicated the maximum transfer rate was to be 250 metric tonnes per hour. However, the Tankerman-PIC and Chief Engineer agreed to a rate of 250 to 300 metric tonnes per hour during the pre-transfer conference. The pre-loading plan indicated a "Preferred" transfer rate of "250" and a "Maximum" rate of "300."

0105 The SHAUNA KAY began discharging 1,075 metric tonnes (tonnes) of intermediate fuel oil (IFO 380) to the SONGA HUA.

0120 The Tankerman-PIC observed that the transfer rate was 300 tonnes per hour and the ship was recording a pressure at the header of 2.5 bar.

0310 The duty Oiler of the SONGA HUA was in the Engine Control room and notified the Chief Engineer of an alarm on the ship's overflow tank. The Chief Engineer went below to verify the alarm was valid. The Chief Engineer told the Second Engineer to stop the transfer. The Second Engineer told the Chief Engineer that oil had been found on deck.

starboard fuel oil to accept 47 percent of the flow. Therefore, the reassembly of the No. 4 starboard fuel oil valve with regard to the positioning of the valve position indicator on the valve stem was significantly in error.

Given the importance of fuel oil valves to safety and the protection of the marine environment, the Chief Engineer should have carefully overseen the Third Engineer's work on the valve. In addition, the ship's bunkering team should have given special attention to the No. 4 starboard fuel oil tank levels during the first bunkering operation following the No. 4 starboard fuel oil tank valve's reassembly.

Transfer Rate

The transfer began at 0105 and was stopped on an emergency basis at 0316 (about 2.2 hours). According to the Tankerman-PIC, at 15 minutes into the transfer the transfer rate was about 300 metric tonnes per hour (about 311 cubic meters per hour).

Information provided by the Chief Engineer of the SONGA HUA indicated that 667 cubic meters (gross) were received. This results in a calculated average transfer rate of about 303 cubic meters per hour. The barge figures provided by the Tankerman-PIC indicated that about 673 cubic meters (gross) were delivered. This results in a calculated average transfer rate of about 306 cubic meters per hour.

The oil transfer check-list specified the maximum transfer rate was to be 250 metric tonnes per hour. The pre-loading plan prepared by the Chief Engineer and signed by the Master of the SONGA HUA indicated that the "Recommended" delivery rate was "250" and the "Maximum" delivery rate was "300" – no units were specified. The Tankerman-PIC understood the agreed delivery rate to be between 250 and 300

0316 The Second Engineer of the SONGA HUA called to the Tankerman-PIC of the SHAUNA KAY for an emergency shutdown via two blasts on the air horn. The Tankerman-PIC stopped the transfer by stopping the barge's pump within about five seconds. The Tankerman-PIC called the Chief Engineer to see what the problem was. The Chief Engineer told him to stand by and he would call back.

0331 The Tankerman-PIC tried to call the Chief Engineer on radio channel 71, but got no response. He tried seven more times and got no reply.

0335 to 0351 The Tankerman-PIC tried to contact the Chief Engineer using the air horn for 15 minutes but got no reply.

0351 The Tankerman-PIC put up a ladder to the SONGA HUA's gangway and climbed up to the ship's deck. He walked to the starboard side and saw oil all over the deck. He then went over and got the Captain on ALYSSA ANN.

0410 to 0415 The Songa Hua's Master phoned the company's Operations, Safety, and Health Manager in Seattle to notify him of the spill. The Operations/HSEQ Manager said he then phoned the ship's agent and told him to make further notifications of the spill. Further notifications were made to the SONGA HUA's oil spill response contractor and to the vessel operator's office in Singapore.

0415 The Tankerman-PIC notified the Captain of the ALYSSA ANN of the spill. The Captain and Tanker-PIC went back up to the ship and could see a little oil in the water. The Captain of the ALYSSA ANN went back to the tug to make notifications.

0430 The Tankerman-PIC and crew of the ALYSSA ANN deployed 1,500 feet of boom and threw a marker buoy.

March 1 to March 4, 2007

Cleanup contractors removed oil from the side of the SONGA HUA, the breakwater for the Elliot Bay Marina, and the pilings beneath Pier 91.

March 5, 2007

After a shoreline assessment the cleanup from the spill was signed-off as complete by the Incident Command.

metric tonnes per hour (about 259 to 311 cubic meters per hour). While there are differences in the ship's paperwork as to the transfer rate, the transfer rate appears to have been within the agreed upon range.

The oil transfer checklist signed by the Chief Engineer indicates "If any irregularities are observed, transfer must be stopped immediately?" The adjacent box is checked "Yes." Since about 47 percent of the flow was to the No. 4 starboard fuel oil tank during the transfer, it should have been apparent to the Chief Engineer that the transfer rate to the No. 2 center fuel oil tank was substantially below the agreed upon rate. This should have resulted in a stop of the transfer, but did not. Therefore, it appears that the Chief Engineer was not monitoring the transfer rate to the No. 2 center fuel oil tank or did not investigate the discrepancy.

In addition, the duties of personnel found in the SONGA HUA's bunkering procedures states that the "Responsible Engineer" (presumably the Chief Engineer as the PIC of the transfer), "Check constantly the state of the tanks and in replenishing and control the transfer rate." It does not appear that the Chief Engineer met this duty.

Conclusions

Based on the information gathered:

- Examination of the No. 4 starboard fuel oil tank valve showed that the stem-mounted valve position indicator on the valve was not positioned to correspond with the actual valve gate position. The valve position indicator could reach the end of the threads before the valve gate could close fully. This caused the valve stem to stop turning, giving the operator a false indication that the valve was fully closed.
- The reassembly of the No. 4 starboard fuel oil valve with regard to the positioning of the valve position indicator on the valve stem was significantly in error.
- Given the importance of fuel oil valves to safety and the protection of the marine environment, the Chief Engineer should have carefully overseen the Third Engineer's work on the valve.
- While there are differences in the ship's paperwork as to the planned transfer rate, the actual transfer rate appears to have been within the agreed upon range.
- Since about 47 percent of the flow was to the No. 4 starboard fuel oil tank during the transfer, it should have been apparent to the Chief Engineer that the transfer rate to the No. 2 center fuel oil tank was substantially below the agreed upon rate. This should have resulted in a stop of the transfer, but did not. Therefore, it appears that the Chief Engineer was not monitoring the transfer rate to the No. 2 center fuel oil tank or did not investigate the discrepancy.
- It does not appear that the Chief Engineer met his procedural duty to "Check constantly the state of the tanks and in replenishing and control the transfer rate."
- At least thirty-five minutes elapsed between the time the ship signaled for an emergency shut down, and the Tankerman-PIC learned of the spill by his own initiative. During that time the Chief Engineer did not communicate with the Tankerman-PIC despite the Tankerman-PIC's repeated attempts to make contact.
- About one hour and fifteen minutes elapsed before the SONGA HUA's Master activated the ship's contingency plan via the ship's agent.

- About one and one-half hours elapsed before required notifications were made on behalf of the SONGA HUA and only after the discovery of the spill by the Tankerman-PIC.
- Despite what the Chief Engineer certified on the Declaration of Inspection, the Second Engineer exceeded Washington's work hour requirements during the bunkering operation.
- Once they learned of the spill, the Tankerman-PIC and other tank barge company personnel quickly initiated notification and response actions.

Cause of Spill

Based on the information gathered, the immediate cause of the spill was the Chief Engineer's inadequate monitoring of the transfer rate via tank soundings. This compromised his situational awareness and allowed the No. 4 starboard fuel oil tank to overflow. Factors contributing to the spill included:

- The Third Engineer's improper reassembly of the No. 4 starboard fuel oil tank valve.
- The Chief Engineer's inadequate oversight of the Third Engineer's No. 4 starboard fuel oil tank valve reassembly.
- A lack of any special attention to the level of oil in the No. 4 starboard fuel oil tank during the first transfer following the valve's reassembly.
- The Chief Engineer's lack of adherence to a company procedure that required him to "Check constantly the state of the tanks and in replenishing and control the transfer rate."

Lessons Learned

- Maintaining situational awareness is critical during any maritime operation, whether underway or while conducting operations alongside. Situational awareness is particularly important for watchstanders and Persons-in-Charge.
- The oil transfer rate can be an important indicator of whether the fueling operation is proceeding as planned for Persons-in-Charge. An unanticipated high or low transfer rate may indicate to the Person-in-Charge that something is not right and requires investigation and correction.
- The ship's fuel transfer system is made up of equipment whose failure poses a substantial risk of an oil spill. Therefore, the ship's Chief Engineer should oversee maintenance and repairs of the fuel system. The first use of the fuel transfer system following maintenance or repairs should be carried out with a heightened level of caution.
- The fuel deliverer and receiver should maintain good communication throughout the bunkering process. They should work together following any spill to contain it and to notify appropriate authorities.

Prevention Recommendations

To ship owners and operators:

- Ensure bunkering procedures and all federal and state regulations regarding bunkering and oil transfers are understood and complied with by ships' crews.
- Review your maintenance program to ensure that it requires adequate oversight of repairs and testing of any equipment that may impact the safety of the ship and the marine environment.

- Ensure that the company's bunkering procedures emphasize quick communication with Persons-in-Charge of delivering vessels or facilities in the event of a discharge or other unexpected event during bunkering.
- Ensure crew members conduct soundings and record innages at regular intervals and that Persons-in-Charge use the information to calculate and record the rate of transfer. Ensure that the calculated rate is compared to the planned rate. If the rate of transfer is not what is expected, that Persons-in-Charge of a bunkering operation are instructed to investigate the discrepancy immediately.
- Ensure that crew members are given sufficient time off to get adequate rest prior to conducting bunkering procedures. Ensure that they understand the importance of adequate rest and the dangers of working while fatigued and that they comply with work hour limitations. Ensure that sufficient personnel are available to allow for compliance.
- Ensure that crews aboard company ships are aware of their obligations to quickly notify their contingency plan provider, the U.S. Coast Guard, and Washington State, when oil spills occur in Washington waters.

To tank barge operators:

- Ensure that company policies and procedures require tankermen to consider any unexpected shutdown during an oil transfer as a potential emergency. If unable to safely and quickly gather additional information from the receiving or delivering party as to the cause, request assistance from the tug's crew.

The tug and barge operator provided the following input regarding actions they have taken since the spill:

"As responsible environmental stewards of the waters of Washington State, we will continue to go above and beyond regulations with regards to transfer procedures during the course of bunker operations. In the case of the Songa Hua, we commended the tankerman for taking the initiative to investigate the status of the Songa Hua after the emergency shut down and repeated attempts to communicate via radio. As a result of this unfortunate release of oil into the waters of Smith Cove, we will continue to encourage our vessel crews to be proactive in doing our part to ensure that visiting vessels adhere to established transfer regulations. Below are operational best practices our company has established and distributed to our vessel crews and shore-based tankermen:

1. Tankermen to always investigate the cause for an emergency shut down during transfer procedures.
2. Ensure that clear communications are maintained throughout a transfer between vessels.
3. Remind Tankerman to notify tug crew in the event of the emergency shut down."

MORE PREVENTION BULLETINS

- PB 09-03 The COSMOS EXPRESS/ INVESTIGATOR (ECY 09-08-020)
- PB 09-02 The CICLOPE (ECY 09-08-014)
- PB 09-01 The DEFENDER (ECY 09-08-002)
- PB 08-02 The CATHERINE QUIGG (ECY 08-08-007)
- PB 08-01 The ALLEGIANCE (ECY 08-08-001)
- PB 07-01 The SEA SYNERGY (ECY 07-08-009)
- PB 06-01 The PACIFIC EXPLORER (ECY 06-08-018)
- PB 06-02 The NOHO HELE (ECY 06-08-037)
- PB 05-01 The TAI SHAN HAI (ECY 05-08-004)
- PB 03-01 The OVERSEAS WASHINGTON (ECY 03-08-001)
- PB 01-02 The ARCO TEXAS (ECY 01-08-006)
- PB 01-01 The SUPER RUBIN (ECY 01-08-002)
- PB 99-02 The MONCHEGORSK (ECY 99-261)
- PB 99-01 The ANADYR (ECY 99-250)
- PB 98-01 The ARCADIA (ECY 98-253)
- PB 96-21 BARGE 101
- PB 96-01 The KEYSTONE CANYON
- PB 95-02 The VERBIER
- PB 95-01 The DONA

For copies of additional Prevention Bulletins, call, mail or fax your request with your name and address to our Olympia office or check out "PUBLICATIONS" on our website.

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