

## The CATHERINE QUIGG

### OVERVIEW

On Monday morning, September 4, 2006, the tug CATHERINE QUIGG was conducting an internal transfer. The Engineer transferred diesel fuel oil from the tug's storage tanks to a day tank. A day tank is typically a smaller fuel oil tank in or near the engine room. They store purified oil from which a vessel's engines draw their fuel 'for the day'. The tug was moored at the tug company facility in Seattle, Washington. The transfer began after 1045. At about 1110, the CATHERINE QUIGG was informed by another company tug that diesel was spilling off their deck into the water. The Engineer shut down the internal transfer. Approximately 43 gallons of diesel was spilled to waters of Washington State.



Figure 1 - CATHERINE QUIGG (tug on right) moored at Seattle on September 4, 2006.

### WHY THIS MATTERS

This bulletin was prepared to share lessons learned with industry and the interested public. 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 page 5 of this bulletin for the list of lessons learned and page 6 for prevention recommendations.

The company operating the tug CATHERINE QUIGG was offered the opportunity to provide comments.

### 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.

### FACTUAL INFORMATION

#### Vessel Description

##### General Characteristics

The CATHERINE QUIGG was a 61-foot, 95-gross ton tugboat built in 1977 operating under the U.S. flag.

##### Fuel System Arrangement

The CATHERINE QUIGG had six fuel tanks for storage and two day tanks. Storage tanks were arranged in port/starboard pairs: aft tanks (4,400 gallons each), double bottom tanks (2,200 gallons each), and forward tanks (1,200 gallons each). The day tanks had a capacity of 1,150 gallons each. The CATHERINE QUIGG used diesel as fuel.

The tug's fuel tanks were all fitted with visual sight gauges (see Figure 2). The fuel tanks were not fitted with high level alarms. Staining on the interior of the plastic tube used as the port day tank sight gauge indicated the typical level in the tank was 1,050 gallons or less. It was common for the day tanks to be filled to between 750 and 1,050 gallons during internal transfers (about 65 to 91 percent of capacity).

##### Internal Fuel Transfer Procedures

The company operations manual provided the following "mandatory" guidance regarding internal fuel transfers aboard tugs such as the CATHERINE QUIGG:

1. *On board fuel transfers are prohibited while at any fuel dock.*
2. *Before transferring any fuel, the person qualified to be making the transfer will notify the deck officer on watch that a fuel transfer will take place, the approximate time and amount of fuel to be transferred. The transfer will be logged in the deck log.*



Figure 2 – Port day tank sight glass.

3. *The Master shall assign the Person-in-Charge (PIC) of the fuel transfer operation. The PIC should be the person most knowledgeable of the fueling system. The Master shall also ensure assignment and monitoring of personnel at their stations, i.e. one person at the tank sight glasses (gauges) of sounding tubes (vertical pipes through which the level of oil in a tank can be measured with a tape), one at the manifold (a grouping of valves in the engine room that direct liquid, in this case fuel, from one tank to another within the vessel), and one tending to the security of the deck. At least one of these individuals must be a licensed deck officer.*

4. *Secure transfer if any outside distractions occur. The Engineer and crew must devote full attention to fueling, and should secure from [stop the] fuel transfer for the following reasons:*
  - A. *Visit by regulatory personnel.*
  - B. *The loading of stores (provisions), working of tow gear, etc., where distraction will interfere with transfer operations.*
  - C. *Meals, etc.*
5. *All vents will have vent bags or buckets under them. All scuppers (openings in a vessel's deck or sides that allow water to drain) will be plugged and have pillow boom cut to fit and absorbent pads readily available for an emergency. An exception to this procedure will be allowed by the Captain only when sea conditions are too severe to work safely on deck.*
6. *The Engineer will establish transfer rates. It is the Engineer's responsibility to know and control the transfer rate. The Engineer shall also establish maximum levels in each tank and ensure that those levels are not exceeded. Do not be pressured into transferring or topping-off too fast.*
7. *The loading of lube oil products shall not occur in conjunction with a fuel transfer.*
8. *As with all operations aboard the boat the Master is ultimately responsible for all operations aboard, and must be aware of transfer plans.*

## Environment

The spill occurred near Elliot Bay in Seattle, Washington.

Monday, September 4<sup>th</sup> was a sunny day with light north winds (less than five knots) and a temperature of 22 degree Celsius (72 degrees Fahrenheit). The tide was rising with an observed flood current setting to the south at about one to two knots.

### CHRONOLOGY

Monday, September 4, 2006

- 0001 The CATHERINE QUIGG moored at the operator's facility. The forward auxiliary generator was online. Fuel on board the CATHERINE QUIGG was 6,705 gallons.
- 0200, 0400, 0600, 0800 Security Rounds were completed aboard the CATHERINE QUIGG. All was "ok."
- 0900 The crew of the CATHERINE QUIGG started their day's work.
- 1045 The crew of the CATHERINE QUIGG completed conducting weekly drills.
- 1100 A Security Round was completed aboard the CATHERINE QUIGG. All was "ok."
- 1110 The daily tug log book recorded the following entry "Fuel spill out of vents on deck into water, while engineer was filling day tank."
- 1120 The tug operator's dispatcher was called by the Master of the CATHERINE QUIGG to inform him of the spill. The dispatcher notified the U.S. Coast Guard and Washington State.
- 1225 The tug's operator requested assistance from a local diving and salvage company in responding to the spill.

## ANALYSIS

### Tank Overfill

The Engineer indicated that he was transferring diesel from the starboard aft fuel storage tank to the port day tank. The typical fill level of the port day tank was between 750 and 1,050 gallons.

The Engineer believed that the “exaggerated trim” (trim describes the height of a vessel’s stern versus its bow as measured by relative depth of immersion at the waterline) of the tug put “the port tank vent at level with maximum fill mark.” He went on to say “During this transfer the vent being susceptible to air lock or overflow, evacuated fuel onto the aft deck of the tug before maximum operational fill mark of the port day tank was reached.”

The Engineer’s statement implies he actively monitored the tank level with a goal of reaching the maximum operational fill mark of the tank. His statement also indicates an awareness of a susceptibility of the tank to overflow through the vent – though this reported susceptibility was not documented for the CATHERINE QUIGG in the tug’s operations manual.

The reported trim of the tug was one foot by the stern. Given the forward fuel storage tanks were nearly empty and the aft tanks were about half-full, this may have been a larger than normal trim, but it is only one foot of trim over the 61 foot length of the tug. This can be stated as about 0.2 inches per foot (or less than two percent).

The likely mechanism for the spill was the Engineer, while attempting to fill the port day tank beyond its usual level to near its maximum level, overfilled the tank.



*Figure 3 - Day tank vents located on the port side main deck of the CATHERINE QUIGG.*

### Staffing

The tug’s operations manual required a PIC assigned by the Master, and a crew member at the tank sight glasses or sounding tubes, at the manifold, and on deck. Since the Engineer did not notify the Master that he was undertaking the transfer, the Master did not have the opportunity to officially designate the Engineer as PIC (though the Engineer would likely have been the PIC anyway), nor were there any of the other required personnel involved in the transfer.

The operations manual also stated that “The Engineer and crew must devote full attention to fueling...” and any transfer should be secured (stopped) if outside distractions occur. As the Engineer did not notify the Master of the transfer, deck maintenance operations were ongoing that occupied the attention of the crew – so much so that it was the crew of the tug moored alongside the CATHERINE QUIGG that discovered the spill.

## Communication

The Engineer was required by the tug's operations manual to notify the licensed deck officer that a fuel transfer would take place. No one but the Engineer was aware that the fuel transfer to the day tank was occurring.

## Containment

The company's operations manual required that all vents (Figure 3) have bags or buckets under them and that all scuppers (Figure 4) be plugged for the transfer. Neither action was accomplished prior to the start of the transfer.

## Maximum Allowable Fill Levels

Typically, the maximum planned fill level for fuel tanks ranges from 85 to 95 percent of capacity. The company's operations manual did not specify the maximum fill levels for the fuel tanks.

## Causal Information

Based on the information gathered, the immediate cause of the spill was the lack of containment due to the absence of vent bags, vent buckets and scupper plugs in violation of written company procedures. This allowed the tank overfill to become a spill of oil to water. Factors contributing to the spill included:

- The decision to fill the port day tank to its maximum level.
- Insufficient attention to the actual level of the diesel oil in the tank as the tank approached its maximum level.
- No communication between the Engineer and the Master regarding the internal transfer.
- A lack of involvement of other crew members.

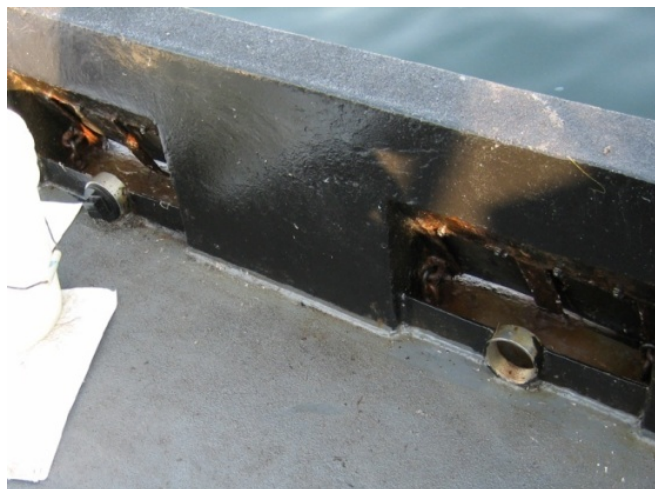


Figure 4 – Port side scuppers.

## Lessons Learned

- Maximum fill levels for oil tanks should be approached at a reduced transfer rate, and only with adequate planning, monitoring and personnel.
- Containment devices constitute an important safety net for oil transfers.
- Clear, consistent, communication between the deck and engine departments and between those involved in oil transfers is important to maintaining their safety.
- Oil transfers should be approached as a team effort to support the situational awareness of the PIC.
- Company procedures for oil transfers should be understood and consistently used.

## Prevention Recommendations

To tug and barge operators:

- Ensure that initial and refresher training to seagoing personnel adequately emphasizes the importance of reading, understanding, and following all federal, state, and company procedures for both internal and external oil transfers.
- Conduct internal audits of oil use, handling, transfer, and storage aboard your vessels to ensure that oil spill risks have been adequately addressed by company policies and procedures, and the employee training program.
- Ensure the fuel tank volume figures for your vessels are internally consistent and correspond with the actual tank volumes.
- Ensure maximum fill levels or maximum percentage of full for all fuel tanks are included in your tugs' operations manuals. Describe and document vessel list (the lean of the vessel to one side) or trim conditions that significantly impact these fill levels.

### MORE PREVENTION BULLETINS

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