

## The CICLOPE

### Overview

On Sunday, March 12, 2006, the general cargo ship CICLOPE was moored with its starboard side towards Berth 1 at the Port of Vancouver, Washington (Figure 1). At about 0930 (local time), while the CICLOPE bunkered (loaded fuel) from the tank barge INVESTIGATOR, the No. 1 starboard tank was overfilled with intermediate fuel oil (IFO). The oil spilled into containment via the No. 1 starboard tank vent on the main deck. It overflowed the containment and spilled to the main deck and over the ship's side. About 90 gallons of IFO spilled to the deck and 10 gallons of IFO spilled to waters of Washington State.

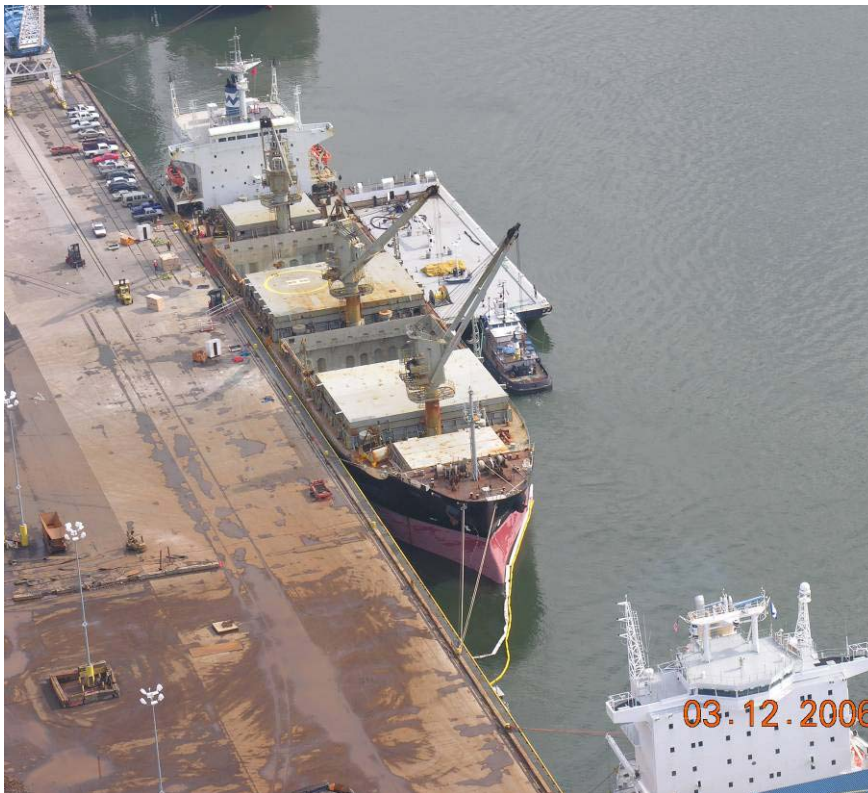


Figure 1 - CICLOPE at Vancouver, Berth 1 on March 12, 2006 with tank barge INVESTIGATOR alongside.

### 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 page 9 of this bulletin for the list of lessons learned and prevention recommendations.

The company operating the cargo ship CICLOPE 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 CICLOPE was built in 1985 and sailed under the flag of the Republic of Panama. It was approximately 170 meters (558 feet) in length. The vessel's gross tonnage was 18,977.

The CICLOPE was certified under the International Safety Management (ISM) Code.

The Washington State Department of Ecology (Ecology) previously issued a Letter of Concern (LOC) following a bunkering inspection of the CICLOPE on January 25, 2005 at Berth 1, Vancouver, Washington. The LOC was dated February 1, 2005, was not a formal enforcement action and was later closed.

#### Fuel System Arrangement

The CICLOPE had port and starboard fuel oil headers (oil transfer hose connection points) located just forward of the house on the main deck. The port fuel oil header was used for the transfer (Figure 2). The 150 mm (six-inch) fuel oil pipelines on deck led to pipelines down through the deck. These through-deck pipelines went to port and starboard pairs of fuel oil tanks located just forward of the house called No. 1 and No. 2. Each tank in the No. 1 pair of fuel oil tanks had a capacity of 263 cubic meters. Each tank in the No. 2 pair had a capacity of 326 cubic meters. The starboard side piping was equipped with a pressure gauge.



Figure 2 - Port side fueling station showing fuel oil header and tank drop line valves.

Each tank was equipped with a forward and an after vent leading to the outboard main deck edge. Vent pairs were equipped with fixed on-deck containment (Figure 3).





*Figure 3 - No. 1 starboard fuel oil tank vents from which oil spilled.  
Note: Oil splattering on pier.*

The tank sounding tubes for the four tanks were installed flush with the main deck just forward of the tank valves.



*Figure 4 - Location of recessed starboard sounding tube cap  
(view looking aft toward starboard fuel oil header).*

### Fuel Oil Transfer Planning & Preparation

The Chief Engineer (C/E) prepared a Pre-Bunkering Plan in advance of the transfer. The plan was to, "Start bunkering by receiving diesel oil in tanks...[port and starboard]...simultaneously, until product runs out. Maintain same levels." The plan then directed, "Continue bunkering by receiving IFO-380 in tanks...[No. 1 starboard fuel oil tank and No. 2 port fuel oil tank]...simultaneously up to 85%, then finish with remainder in [No. 2 starboard fuel oil tank]."

It was planned that approximately 140 metric tonnes (tonnes) of diesel and 580 tonnes of IFO would be received from the bunker barge. The planned starting and ending innages (volume in the tanks) and percents of capacity are summarized below.

Tank Name	Starting		Planned Ending	
	Innage (cubic meters)	Percent Capacity	Innage (cubic meters)	Percent Capacity
No. 1 starboard	5.1	2	221	85
No. 2 port	3.8	1	274	85
No. 2 starboard	0.6	< 1	124	39

The planned "recommended" loading rate for the transfer was 150 tonnes per hour, with a maximum of 180 tonnes per hour and a topping off rate of 50 tonnes per hour.

A training session for those crewmen with bunkering duties occurred at 1015 on March 9, 2006.

### Fuel Oil Transfer Execution - As found, post-spill

The Ecology vessel inspector asked the C/E to have the tanks resounded. The results, compared with planned final innages, are below.

Tank Name	Planned Ending		Actual Ending (time 1435)	
	Innage (cubic meters)	Percent Capacity	Innage (cubic meters)	Percent Capacity
No. 1 starboard	221	85	163	62
No. 2 port	274	85	298	91
No. 2 starboard	124	39	105	32

The barge documentation indicated that about 545 tonnes (567 cubic meters) of IFO were transferred to the CICLOPE prior to the spill.

## Recollections of the Transfer Participants

The C/E recalled:

- The marine diesel oil transfer was completed at the agreed upon transfer rate.
- The barge hoses were changed to load the IFO.
- At 0750, he signaled the tankerman to begin the transfer using hand signals.
- Approximately 10 minutes later, after confirming that oil was flowing into the No. 1 starboard and No. 2 port fuel oil tanks, he used hand signals to tell the tankerman to increase the rate.
- The Fitter was sounding No. 2 port fuel oil tank and the First Engineer was sounding No. 1 starboard fuel oil tank.
- While loading No. 1 starboard fuel oil tank and No. 2 port fuel oil tank, he was in the ship's office getting soundings every two minutes by radio and entering them into a computer program which showed volume but not the transfer rate.
- The soundings were radioed to him in the ship's office where he was entering them into the bunker report computer program.
- As he entered each new sounding, the program overwrote the previous entry and there was no record of soundings kept.
- He did not calculate the loading rate during the transfer, but believed that it was 150 tonnes per hour because that is what he told the barge to give him.
- He did not know what the pressure reading was on the gauge located in the starboard side fill pipe.
- Just before 0930, he believed that No. 1 starboard fuel oil tank was at 75 percent when No. 2 port fuel oil tank suddenly was at 83 percent.
- He radioed First Engineer to open No. 2 starboard fuel oil tank valve and close the No. 2 port fuel oil tank valve.
- The First Engineer opened No. 2 starboard fuel oil tank valve and was closing the No. 2 port fuel oil tank valve when the deck rover watch radioed that a spill had occurred.
- The First Engineer used the air horn to signal the tankerman for an emergency stop.
- The crew responded and began cleanup of oil flowing from both the forward and aft No. 1 starboard fuel oil tank vent pipes.
- Shortly after the spill and during the cleanup, the No. 1 starboard fuel oil tank sounding tube was checked and found to be full.
- The C/E did not signal for a slowdown prior to the spill.
- He did not know how No. 1 starboard fuel oil tank overflowed at only 75 percent full.

- Following the spill, he transferred fuel from the No. 1 starboard fuel oil tank to the No. 2 starboard fuel oil tank at 20 cubic meters per hour for several hours.
- The Fitter and First Engineer were on deck doing their assigned tasks during the bunkering and at the time of the spill.

The Tankerman-PIC (Person-in-Charge) of the tank barge INVESTIGATOR recalled:

- He completed the Declaration of Inspection (DOI) and pre-transfer conference with the C/E.
- They discussed flow rates and agreed on a rate of 150 tonnes per hour as stated on the C/E's pre-loading plan.
- After starting the transfer at a slow rate, the C/E signaled the barge to increase the rate.
- The Tankerman-PIC increased the rate.
- The barge was transferring with one pump only.
- Ten minutes later, the ship requested another transfer rate increase and he complied.
- The barge was pumping at 1,500 rotations per minute (80 percent of full speed) with a 50 pounds per square inch discharge pressure.
- He estimated the transfer rate to be 275 tonnes per hour based on pump speed, pressure, and his experience.
- Ten minutes later, the C/E requested he increase the transfer rate again. He felt the rate was sufficient and refused to increase it.
- Just before the spill, the CICLOPE crew was asking him how much longer the transfer was going to take.
- At 0930, the barge finished off-loading two tanks and had started off-loading the last tank when the emergency air horn on the CICLOPE sounded.
- He executed an emergency shutdown.
- He and tug crew then deployed an absorbent boom around the bow of the CICLOPE.

## Environment

The approximate position of the spill was on the north (Washington) side of the Columbia River (the right hand bank facing downstream), upstream of the confluence of the Columbia and Willamette Rivers near river mile 105. The terminal is in a largely industrial district, although downstream there is public access to the Columbia River.

The weather was partly cloudy with light southwest winds.



## Analysis

### Tank Overfill

The C/E initially told the Ecology investigator on scene that he could not understand how the No. 1 starboard tank could “burp” at only 75 percent of capacity. After fuel was moved from the No. 1 starboard tank to the No. 2 starboard tank, the Ecology investigator requested the crew take another set of fuel oil tank soundings to confirm the tank levels reported earlier.

Ecology analyzed the sounding information obtained and accounted for the post-spill transfer of oil from the No. 1 starboard tank to the No. 2 starboard tank. Based on analysis of the sounding information, the C/E’s belief that the No. 1 starboard tank burped (sprayed a small amount of oil from the tank vent due to air pressure being released) at 75 percent of capacity was incorrect, and the tank was instead overfilled.

### Transfer Rate

The planned “recommended” loading rate for the transfer was 150 tonnes per hour, with a maximum of 180 tonnes per hour and a topping off rate of 50 tonnes per hour.

The C/E stated that he did not monitor the transfer rate and assumed it would be transferred at the planned rate of 150 tonnes per hour.

The Tankerman-PIC stated that he estimated the transfer rate at 275 tonnes per hour after increasing the transfer rate at the ship’s request. He stated that he refused to further increase the transfer rate.

According to the barge’s records, the transfer of IFO began at 0735 and the emergency shutdown occurred at 0930. Barge records indicated that during that one hour 55 minutes, 545

## CHRONOLOGY

Thursday, March 9, 2006

**1015** The pre-bunker training session occurred.

Sunday, March 12, 2006

**0410** The CICLOPE’s crew began preparing for the bunkering operation.

**0415** The tank barge INVESTIGATOR was alongside the CICLOPE.

**0500** The CICLOPE’s bunkering team and the Tankerman-PIC connected the diesel oil hose between the INVESTIGATOR and the CICLOPE.

**0520** The pre-transfer conference between the PICs was held.

**0530** CICLOPE began receiving diesel from the INVESTIGATOR.

**0629** Sunrise

**0707** The transfer of 140 tonnes of diesel ended.

**0710** The diesel hose was disconnected.

**0730** The fuel oil hose was connected.

**0735** The INVESTIGATOR began transferring fuel oil to the CICLOPE.

**0930** Fuel oil began spilling from the No. 1 starboard fuel oil tank. The ship called for an emergency stop of the transfer. The initial estimate was that 48 gallons spilled on the main deck of the ship of which about 10 gallons spilled into the water.

**0945** The Master began reporting the spill, calling his agent and the ship’s designated person ashore. He then reported the spill to the USCG’s National Response Center (USCG/NRC).

**1005** Washington State Emergency Management Division was notified of the spill by the Master.

tonnes were transferred to the CICLOPE, indicating a transfer rate of about 284 tonnes per hour. This rate exceeded the maximum planned transfer rate by about 58 percent.

The DOI stated, in English, "100 P.S.I. MAX. TRANSFER RATE WILL BE ADJUSTED (INCREASED OR DECREASED) BY DIRECTION FROM THE RECEIVER." The DOI was signed by the C/E. This put the burden of monitoring the transfer rate on the C/E as the PIC.

The ship operator's bunkering checklist required that a transfer rate be agreed upon prior to bunkering, that the transfer begin at a reduced transfer rate, and that the transfer rate be reduced for topping-off. There was *no* checklist item requiring monitoring of the transfer rate during the transfer.

### Tank Soundings

The C/E indicated he was receiving soundings of the No. 1 starboard and No. 2 port fuel oil tanks every two minutes and that he was entering the soundings into a computer program that converted them to volume. According to the C/E, the last sounding he had for the No. 1 starboard tank that overflowed was 75 percent of capacity. The capacity of the No. 1 starboard tank was about 263 cubic meters, making the available space in the tank when the tank was 75 percent full about 66 cubic meters.

The transfer rate (284 tonnes per hour) in cubic meters was about 295 cubic meters per hour. The transfer rate into the No. 1 starboard tank was about 139 cubic meters per hour. At 139 cubic meters per hour it would have taken about 28 minutes to fill the last 25 percent (66 cubic meters) of space in the No. 1 starboard tank.

It appears that either the C/E was not getting regular soundings of the No. 1 starboard tank, or the soundings of the No. 1 starboard tank were incorrect, or the C/E's recollection of the last sounding indicating the No. 1 starboard tank was at 75 percent of capacity just prior to overflow was incorrect. No matter which situation actually occurred, the C/E's situational awareness of the actual status of the No. 1 starboard tank was compromised for a period of about one-half hour prior to the tank overflow.

### Causal Information

Based on the information gathered, the immediate cause of the spill was a loss of situational awareness on the part of the C/E with regard to the status of the No. 1 starboard fuel oil tank. This allowed the No. 1 starboard fuel oil tank to overflow. Factors contributing to the spill included:

- A high transfer rate that reduced the time available to detect and correct problems.
- A failure on the part of the C/E to ensure the transfer rate was within the bounds set in his bunkering plan.



## Lessons Learned

- Maintaining situational awareness is critical during any maritime operation, whether underway or while conducting operations at berth. Situational awareness is particularly important for watch standers and PICs.
- Bunker planning documents establish expectations for a transfer, including transfer rates. Departures from the plan during the bunkering process require a heightened standard of care by the Person-in-Charge authorizing the change to ensure that a spill does not occur as a result.
- Persons-in-Charge of bunkering should frequently check the transfer rate and compare it to the planned transfer rate.
- Regulations, company policy, plans, and checklists together set standards for safe bunkering. It is not enough to maintain copies of regulations, company policies, plans, and checklists; one must also comply with them to assure safe bunkering.

## Prevention Recommendations

### To ship owners and operators:

- Ensure the ship's Person-in-Charge compares the calculated bunkering rate to the planned rate and, if the rate is higher than planned, contacts the delivering vessel or facility immediately to reduce it.
- Ensure bunkering checklists include a requirement that the transfer rate be periodically calculated, recorded, and monitored by the Person-in-Charge of the transfer.
- Emphasize teamwork during bunkering training to help maintain situational awareness.
- Ensure your company policies and procedures place safety and environmental protection over commercial considerations in order of precedence.
- Emphasize the dangers of complacency during oil transfers to crews by publicizing lessons-learned from this spill throughout the company's fleet.

### To tank barge owners and operators:

- Have the tankerman aboard the bunkering barge calculate the transfer rate based on soundings of the barge and communicate that transfer rate to the ship's Person-in-Charge.

**MORE PREVENTION BULLETINS**

- 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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Spills Prevention Section  
PO Box 47600  
Olympia, WA 98504-7600  
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