2008 Assessment of Cruise Ship Environmental Effects in Washington

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2008 Assessment of Cruise Ship Environmental Effects in Washington

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Executive Summary

A Memorandum of Understanding (MOU) between Department of Ecology (Ecology), the NorthWest CruiseShip Association (NWCA) and the Port of Seattle was signed on April 20, 2004. This MOU covers large passenger ships that are members of the NWCA. It does not cover ships such as Alaska Marine Highway ferries, shipping vessels, small passenger ships or boats.

The MOU prohibits discharges of both black and gray water to Washington state waters from all cruise ships except discharges treated with advanced wastewater treatment systems (AWTS) and when stringent requirements are met. Such systems are being installed in cruise ships serving the Alaska market as required by the state of Alaska. AWTS provide treatment that meets or exceeds Alaska's requirements under federal law.

The MOU defines the subject waters as being consistent with Washington marine waters. It requires sampling and monitoring of wastewater discharges and allows for vessel inspections by Ecology. The MOU includes additional elements, such as:

- Sewage sludge (biomass) discharges are prohibited within 12 nautical miles from shore and within the Olympic Coast National Marine Sanctuary.
- Specific sampling regimen, testing, and reporting are required.
- Continuous monitoring for turbidity and disinfection with capability to shutdown immediately.
- Advanced notification and documentation are required from ships planning to discharge via an AWTS.
- Cruise ships must comply with Washington's more restrictive hazardous-waste laws, are prohibited from dumping garbage into state waters and may only discharge oily bilge water per regulation.

The MOU has been amended each season to incorporate needed clarifications. MOU amendments finalized on May 19, 2008:

1. Incorporating recommendations from the Washington State Department of Health virus report:
   a. Not allow discharges within a half a mile of shellfish beds.
   b. Define a "disinfection system upset" condition as a disinfection below levels of four log (99.99%) inactivation of norovirus and require immediate shutdown capability from an upset condition of disinfection .
   c. Require immediate notification to the Department of Health for an upset condition.
2. Require whole effluent toxicity testing for only those vessels that have submitted documentation for continuous discharge.
3. Other minor changes for organization of the document.

The MOU continues to be a valuable tool in meeting the goal of protecting Washington's marine waters from cruise-ship waste water. The requirement for discharges to be treated with AWTS

ensures only high quality effluent is discharged. The requirement to allow vessels to be inspected leads to increased compliance. The need to understand the requirements of the MOU has called for increased communication between Ecology, and the cruise lines and vessel staff.

Most cruise lines and vessels operating under the MOU were in compliance throughout the 2008 season. Some notable successes include, sampling results for conventional pollutants continue to show excellent effluent quality, and increased waste minimization efforts.

The cruise-ship MOU has resulted in several benefits to Washington's environment:

- It ensures that we have a water-quality strategy in place for large passenger vessels.
- It increases Ecology's understanding of the operational practices of the cruise industry, and increases the cruise industry's understanding of the environmental concerns in Washington.
- It forges a new and valuable partnership between state regulators, the cruise industry and other interested parties.
- It doesn't lessen the state's authority to enforce Washington's water quality laws.

Admittedly, the MOU also has its limitations:

- Compliance is voluntary.
- Enforceability is limited to those federal and state water quality laws that continue to apply to cruise ships.
- Applicability is limited. Cruise ships that do not make a port call while in Washington waters or are not a member of the NorthWest CruiseShip Association are not covered by the MOU.
- Concerns regarding air quality are not addressed.

The Department of Ecology recommends that:

1. The MOU continue to be used as a complement to environmental regulations until state specific regulations for cruise ship waste management in Washington State are put in place.
2. Ecology continues to inspect ships that discharge in waters subject to the MOU, including closely looking at wastewater management and the management of other waste streams.
3. The parties of the MOU continue to work together on evaluating the testing protocols, results, and testing guidelines for whole effluent toxicity and make recommendation on how to proceed.
4. The cruise lines conduct a thorough review of records on an on-going basis throughout the season as well as at the end of the system to evaluate compliance, and that all recommendations made in inspection reports be implemented.

1. Introduction

1.1 Assessment report

The purpose of this report is to assess the performance of the cruise industry for environmental impacts to state waters for the 2008 cruise season. The goals of this report are to:

1. Analyze the overall compliance with the Memorandum of Understanding.
2. Evaluate the performance of the advanced wastewater treatment systems.
3. Make recommendations in relation to the matters discussed in the report.

This report also presents general background information and detailed appendices of wastewater sampling data. Issues and concerns related to the discharge of bilge and ballast water are beyond the scope of this report.

1.2 Cruise industry operations in Washington State

Celebrity Cruises, Holland America Line, Norwegian Cruise Line, Princess Cruises, and Royal Caribbean Cruises Ltd. operated regularly scheduled cruises of large ships between Seattle and Alaska. Most of these large ships have a capacity of about 2,000 to 4,200 persons on board. Regent Cruises' SEVEN SEAS MARINER made one call to Seattle in 2008. Alaska's Marine Highway runs regular cruises out of Bellingham to Alaska. The ships have a passenger/crew capacity of about 175 to 225.

This report centers on the operations of the large cruise ships that are covered under a Memorandum of Understanding (MOU); however, more is being learned about the operations of the smaller passenger vessels. Some smaller cruise lines, such as CruiseWest and Linblad Expeditions, run cruises on the Columbia and Snake Rivers, Puget Sound, and in British Columbia and Alaska. Linblad Expeditions also runs cruises through the San Juan Islands.

Large cruise ships have operated out of Seattle since 1999. The cruise business is one of the fastest growing business segments at the Port of Seattle. The Port has had two berths suitable for large vessels at Terminal 30 that will be operated from the new Terminal 91 beginning in 2009. There is one berth at Pier 66. Sailings departed Seattle on Fridays, Saturdays, Sundays, and occasionally on other weekdays between the end of April 2008 and the end of October 2008. The figure below shows the rising number of passengers enjoying Alaska-bound cruises since 1999.

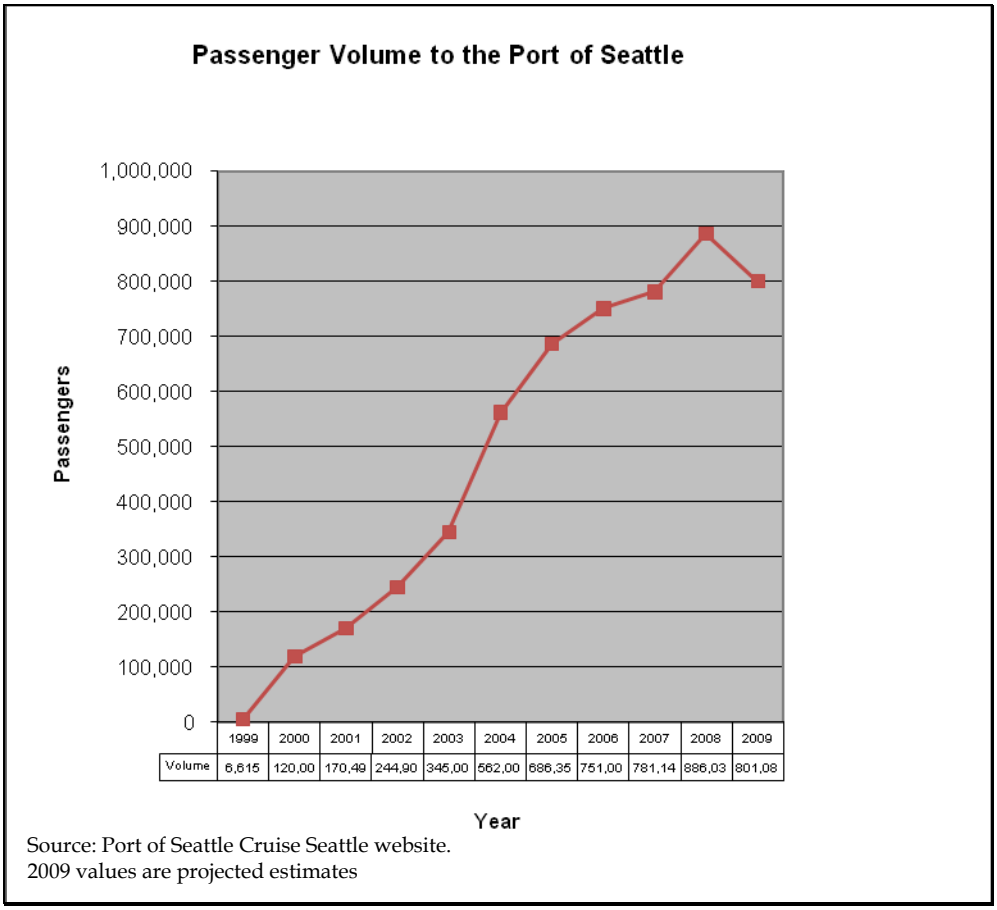


Figure 1. Passenger Volume

Cruise ships have been operating under a rather ambiguous set of environmental standards. Cruise ships and their wastewater treatment systems have been excluded from many of the U.S. environmental laws and regulations that land-based industries must meet. Recently, the Environmental Protection Agency has issued a vessel general permit for commercial vessels greater than 79 feet. The permit covers various discharge types including, but no limited to, graywater, oily bilge, pool/spa water, and ballast water. The permit does not cover blackwater unless it is combined with graywater.

Several other environmental standards may apply to certain vessels. The United States Coast Guard (USCG) certifies marine sanitation devices to meet certain operational standards for performance but does not monitor wastewater effluent quality. Large ships operate under International Convention for the Prevention of Pollution from Ships (MARPOL), an environmental treaty drafted by the International Maritime Organization (IMO). Annex IV of MARPOL addresses the disposal of sewage. The U.S. did not sign Annex IV; therefore, it is not mandatory that ships follow Annex IV in the United States. Most large ships have adopted the "Cruise Industry Waste Management Practices and Procedures" put forth by the Cruise Lines International Association (CLIA).

The NorthWest CruiseShip Association (NWCA) consisted of the following member lines during the 2008 season:

1. Carnival Cruise Lines
2. Celebrity Cruises
3. Crystal Cruises
4. Disney Cruise Line
5. Holland America Line
6. Norwegian Cruise Line
7. Princess Cruises
8. Regent Seven Seas Cruises
9. Royal Caribbean International
10. Silversea Cruises

In 2008, 100% of port calls by large vessels to Seattle were made by NWCA member ships. Table 1 below depicts the member lines, the ships visiting Seattle, the number of port calls and the persons on board.

Table 1. 2008 Cruise Ships Calling to Ports in Washington

Vessel Operator	Vessel Name	2008 Number of Port Calls[1]	Total Persons on Board[2]
NWCA MEMBERS			
Celebrity Cruises	INFINITY	21	2880
Celebrity Cruises	MERCURY	11	2779
Celebrity Cruises	MILLENIUM	4	3455
Holland America Line	AMSTERDAM	19	2027
Holland America Line	OOSTERDAM	23	2648
Holland America Line	VOLENDAM	2	2079
Holland America Line	WESTERDAM	21	2648
Holland America Line	ZAANDAM	1	2107
Norwegian Cruise Line	NORWEGIAN PEARL	22	4230
Norwegian Cruise Line	NORWEGIAN STAR	21	4000
Princess Cruise Line	GOLDEN PRINCESS	21	3660
Princess Cruise Line	STAR PRINCESS	21	3800
Regent Seven Seas	SEVEN SEAS MARINER	1	1200
Royal Caribbean	RHAPSODY OF THE SEAS	17	3381
Royal Caribbean	SERENADE OF THE SEAS	2	2950
Total		207	
NON NWCA MEMBERS			
NONE			

[1] Numbers come from Port of Seattle 2008 Cruise Ship Sailing Schedule and the Port of Seattle staff.
[2] Numbers come from Alaska DEC 2008 Large Commercial Vessel Discharge Status. Actual # of passengers/crew may vary.

The Port of Seattle's schedule for 2009 includes a total of 207 port calls from the following vessels: Celebrity Cruises INFINITY, and Celebrity Cruises MERCURY, Holland America Line AMSTERDAM, STATENDAM, VOLENDAM, WESTERDAM AND ZAANDAM, Norwegian Cruise Line PEARL and STAR, Princess Cruises GOLDEN PRINCESS, PACIFIC PRINCESS, SAPPHIRE PRINCESS and STAR PRINCESS, Royal Caribbean RHAPSODY OF THE SEAS, and SERENADE OF THE SEAS, Residensea's THE WORLD, and Fred Olsen's BLACKWATCH. All of the vessels with the exception of Residensea's THE WORLD and Fred Olsen's BLACKWATCH which are scheduled for one port call each are part of the NorthWest CruiseShip Association.

1.3 Memorandum of Understanding summary

On April 20, 2004, a Memorandum of Understanding (MOU) between Ecology, the NorthWest CruiseShip Association (NWCA) and the Port of Seattle was signed. The MOU covers ships that are members of the NWCA, and therefore does not cover ships such as the Alaska Marine Highway ferries, or any of the small ships. The MOU bans cruise-ship wastewater discharges (black and gray water), except from vessels with advanced treatment systems (AWTS). AWTS provides treatment that meets or exceeds Alaska's requirements under federal law. The MOU allows continuous discharge in Washington waters from these AWTS with stringent provisions. Sewage sludge (biomass) may only be discharged more than 12 miles from shore and not within the Olympic Coast National Marine Sanctuary. The MOU specifies a sampling regime, testing, reporting and limit requirements, and requires advanced notification and documentation from ships planning to discharge. The MOU also specifies that the ships comply with Washington's more restrictive hazardous waste laws and stipulates that garbage may not be discharged in state waters.

May 19, 2008 MOU amendments included:

1. Incorporating recommendations from the Washington State Department of Health virus report:
   a. Not allow discharges within a half a mile of shellfish beds. Include an appendix identifying the areas where bivalve shellfish beds that are recreationally harvested or commercially approved within half a mile of the shipping lanes and update annually. And include an appendix with background information on the virus related elements.
   b. Define a "disinfection system upset" condition as a disinfection below levels of four log (99.99%) inactivation of norovirus.
   c. Beginning in 2009, require immediate shutdown capability from an upset condition of disinfection below levels of four log (99.99%) inactivation of norovirus for all vessels that have submitted documentation to discharge.
   d. Require immediate notification to the Department of Health for an upset condition.
2. Require whole effluent toxicity testing for only those vessels that have submitted documentation for continuous discharge.
3. Other minor changes for organization of the document.

The MOU and related documents are available on Ecology's website at:
http://www.ecy.wa.gov/programs/wq/wastewater/cruise_mou/index.html

A copy of the current MOU (Amendment No.4) is included in Appendix A.

1.4 MOU funding

Ecology, the Port of Seattle, the NWCA and its member lines finalized a process via an agreement to recover costs incurred by Ecology associated with implementing the MOU. A funding agreement for the 2006, 2007, and 2008 seasons were signed and employed. A similar

agreement for the 2009 season is being finalized and should be in place prior to the start of the 2009 sailings.

2. MOU Requirements

2.1 Description of requirements

Applicability of MOU:

The MOU applies to cruise ships that are part of the NorthWest CruiseShip Association (NWCA) and only to those member ships making a call at a port in Washington. NWCA member ships that do not make a port call in Washington are not subject to the provisions of the MOU while transiting off the Washington coast. All the ships subject to the MOU are engaged in cruise itineraries greater than one-day duration.

Great care was taken in developing the geographic area in which the terms of the MOU apply. Washington's definition of "waters of the state" reaches to the international border with Canada. The cruise industry agreed to recognize Washington's definition of state waters for the purposes of the MOU. The "Waters subject to this MOU" are defined as including the Puget Sound and the Strait of Juan de Fuca south of the international boundary with Canada. Off the west coast of Washington, "Waters subject to this MOU" include the belt of seas measured from the line of ordinary low water along that portion of the coast which is in direct contact with the open sea and the line marking the seaward limit of inland waters, and extending seaward a distance of three miles, as illustrated in Appendix iii of the MOU. The definition of the "waters subject to this MOU" is inclusive of the marine waters of the state as defined in Washington law. See figure 2 below.

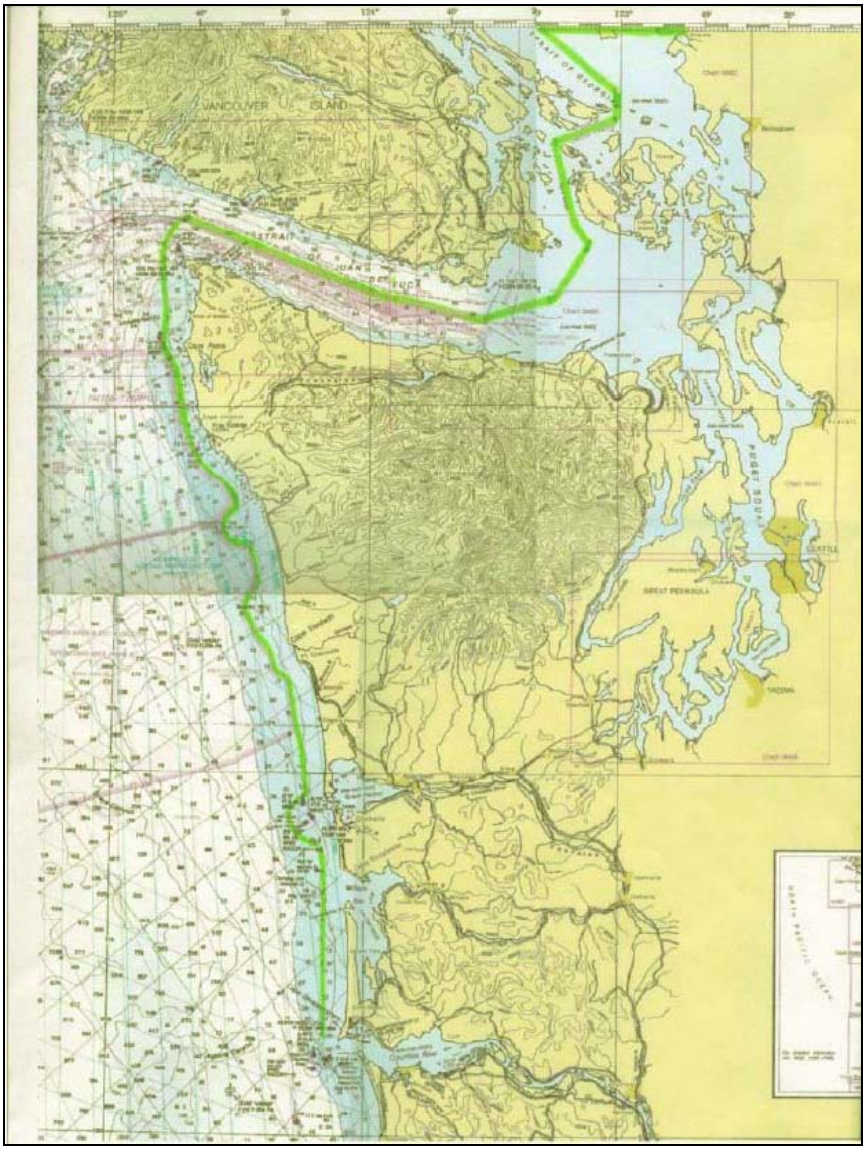


Figure 2. Map of "Waters subject to this MOU:

Wastewater discharges

The MOU defines "blackwater" as wastes from toilets, urinals, medical sinks and other similar facilities, and "graywater" as including drainage from dishwasher, shower, laundry, bath, galley drains and washbasin drains.

Advanced wastewater treatment systems (AWTS) are systems that meet the higher standards and testing regime as set out in federal law, Title XIV, Certain Alaska Cruise Ship Operations, Section 1404(c). The AWTS are systems such as the Zenon and Hamworthy membrane biological reactor ultrafiltration system, the Scanship biological reactor and ultrafiltration system, and the Rochem reverse osmosis ultrafiltration system. Table 2 identifies the type of treatment in use during the 2008 season by NWCA member ships.

Table 2. 2008 Vessels and Wastewater Treatment

Vessel Operator	Vessel Name	Blackwater (BW) Treatment System Manufacturer	Graywater (GW) Treatment System Manufacturer	Type of Treatment System
NWCA MEMBERS				
Celebrity Cruises	INFINITY	Zenon	Mixed with BW	AWTS: Zenon is a bioreactor and membrane ultrafiltration system.
Celebrity Cruises	MERCURY	Traditional MSD - Biopure	None	Non AWTS: Biopure is a marine sanitation device.
Celebrity Cruises	MILLENIUM	Hydroxyl	Hydroxyl	AWTS: Hydroxyl is a biological reactor and ultrafiltration system.
Holland America Line	AMSTERDAM	Traditional MSD - Hamworthy	None	Non AWTS: Traditional Marine Sanitation Device
Holland America Line	OOSTERDAM	Rochem	Rochem	AWTS: Rochem BW is a bioreactor and ultrafiltration; AWTS: Rochem GW is reverse osmosis ultrafiltration system.
Holland America Line	VOLENDAM	Zenon	Mixed with BW	AWTS: Zenon is a bioreactor and membrane ultrafiltration system.
Holland America Line	WESTERDAM	Rochem	Rochem	AWTS: Rochem BW is a bioreactor and ultrafiltration; AWTS: Rochem GW is reverse osmosis ultrafiltration system.
Holland America Line	ZAANDAM	Zenon	Mixed with BW	AWTS: Zenon is a bioreactor and membrane ultrafiltration system.
Norwegian Cruise Line	NORWEGIAN PEARL	Scanship	Mixed with BW	AWTS: Scanship is a biological reactor and ultrafiltration system.
Norwegian Cruise Line	NORWEGIAN STAR	Scanship	Mixed with BW	AWTS: Scanship is a biological reactor and ultrafiltration system.
Princess Cruise Line	GOLDEN PRINCESS	Hamworthy Bioreactor	Mixed with BW or held	AWTS: Hamworthy is a biological reactor and ultrafiltration system.
Princess Cruise Line	STAR PRINCESS	Hamworthy Bioreactor	Mixed with BW	AWTS: Hamworthy is a biological reactor and ultrafiltration system.
Regent Cruises	SEVEN SEAS MARINER	Hamworthy Reactor	Mixed with BW	AWTS: Hamworthy is a biological reactor and ultrafiltration system.
Royal Caribbean	RHAPSODY OF THE SEAS	Traditional MSD	None	Non AWTS: Traditional Marine Sanitation Device
Royal Caribbean	SERENADE OF THE SEAS	Scanship	Mixed with BW	AWTS: Scanship is a biological reactor and ultrafiltration system.
NON NWCA MEMBERS				
None				

The MOU prohibits discharges of untreated blackwater and untreated graywater within waters subject to the MOU from any type of treatment system. The MOU also bans discharges of treated blackwater and treated graywater unless treated with an AWTS which meets the Alaska requirements and under these terms:

- The ships are allowed to discharge ≥ one nautical mile away from its berth and ≥ 6 knots with the submittal of documentation and provisions including 24-hour continuous monitoring for turbidity and in 2009, UV disinfection, and emergency shutdown for treatment upsets.
- The ships are allowed to discharge within one nautical mile of berth with further documentation and provisions including 24-hour continuous turbidity or equivalent monitoring, and in 2009, UV disinfection, emergency shutdown for treatment upsets, and ultraviolet light disinfection immediately prior to discharge.

All ships discharging within waters subject to the MOU must:

- Not discharge within 0.5 miles of bivalve shellfish beds that are recreationally harvested or commercially approved to harvest. For the 2008 season, this includes three areas (President's Point, Apple Tree Cove, and Tyee Shoal).
- Immediately stop all discharges when high turbidity occurs and, beginning in 2009, when a disinfection system upset occurs (and make appropriate notifications).
- Sample the effluent once per month while in Washington using a Washington state-certified laboratory.
- Meet the limitations on discharge as set in Alaska regulation.
- Split samples with Ecology upon request.
- Conduct Whole Effluent Toxicity (WET) testing once every two years for homeported vessels and once every 40 calls for other vessels (applies to continuous discharge approved vessels only).
- Provide test results provided to Alaska.
- Notify Ecology prior to sampling and allow Ecology to conduct inspections to verify compliance with the MOU (all vessels).
- Notify Ecology of any material changes made to the system.

The MOU prohibits the discharge of residual solids from the treatment system (sludge or biomass) in waters subject to the MOU, within 12 nautical miles from shore, and within the Olympic Coast National Marine Sanctuary. Residual solids are defined as including grit or screenings, ash generated during the incineration of sewage sludge and sewage sludge, which is solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works and includes scum or solids removed in advanced wastewater treatment processes. The Port of Seattle has been leading a study to evaluate the feasibility of alternative options to discharging biomass at sea.

The discharge of oily bilge water is prohibited if not in compliance with applicable federal and state laws. Vessels typically discharge at less than 15 parts per million, and some are more stringent at 10 or five parts per million.

Hazardous waste:

Per the MOU, Washington and the NWCA agreed to a uniform application procedure for the EPA national identification number under the Resource Conservation and Recovery Act (RCRA). The MOU details that Washington has the right to inspect all records upon request for hazardous waste management. NWCA member lines shall provide an annual report regarding the total hazardous waste offloaded in Washington. NWCA agrees to comply with the guidelines for certain waste streams per Washington regulations. Only Celebrity Cruises, Princess Cruises, and Royal Caribbean offloaded hazardous waste in Seattle in 2007 and did so per WAC 173-303-240.

Solid waste:

The discharge of solid waste (garbage) is prohibited in waters subject to the MOU.

2.2 Alaska requirements and certification

The U.S. Congress enacted Title XIV – Certain Alaskan Cruise Ship Operations in December 2000. The law creates wastewater standards for vessels. The regulations to implement the law (AS 46.03.460 – AS 46.03.490 and 18 AAC 69) became effective in July 2001 and November, 2002, and are enforced by the United States Coast Guard. Under the legislation, large cruise ships may discharge blackwater and graywater in Alaska while underway and law allows continuous discharge of blackwater and graywater that meet more stringent standards through a certification process. A ship approved by the U.S. Coast Guard to discharge continuously must sample their wastewater twice per month.

In August 2006, a ballot measure added new requirements to the Alaska Commercial Passenger Vessel Environmental Compliance Program. The new statute requires vessels to obtain a wastewater discharge permit for the discharge of any treated sewage, graywater, or other wastewater into marine waters of the state. The General Permit has stringent monitoring and reporting requirements as well as interim and final effluents limits.

All of the cruise ships subject to the Washington Cruise MOU are also subject to the Alaska requirements.

3. Documentation of Discharges from Advanced Wastewater Treatment Systems per the Mou

3.1 Documentation required

Discharges ≥ one nautical mile and six knots:

Documentation is required for discharges from an AWTS occurring one nautical mile or more away from a ship's berth. The ship must be moving at a speed at or greater than 6 knots. The documentation must identity the type of treatment system in use on the ship, include schematic diagrams of the system and show that the system is certified by the United States Coast Guard. In addition, vessel specific information on how the ship's system meet 24-hour continuous turbidity or equivalent monitoring, documentation of system design that demonstrates emergency shut-down capacity.

Discharges within one nautical mile (continuously):

When the discharge occurs within one nautical mile of berth, the cruise ship operator is required to submit the above documentation. In addition, vessel specific information that all treated effluent will receive final polishing with ultraviolet light immediately prior to discharge, copies

of water quality test results for the past six months and a vessel specific plan that identifies storage capacities and notification procedures.

3.2 2008 approvals

Ship(s) receiving approval to discharge one mile or more from berth while traveling at a speed of 6 or more knots:

There were no requests or approvals for discharge at greater than one mile from berth and 6 knots.

Ships receiving approval to discharge while at berth or at a distance less than one nautical mile from berth (continuously):

The Norwegian Cruise Line NORWEGIAN PEARL and NORWEGIAN STAR submitted documentation that the systems were certified by the USCG for continuous discharge in Alaska for the 2008 season. Schematics and other documentation were also provided. Ecology staff reviewed the documentation and on May 12, 2008 sent a letter detailing approval for continuous discharge.

The Princess Cruise Line GOLDEN PRINCESS and STAR PRINCESS submitted documentation that the systems were certified by the USCG for continuous discharge in Alaska for the 2008 season. Schematics and other documentation were also provided. Ecology staff reviewed the documentation and on May 12, 2008 sent a letter detailing approval for continuous discharge.

Table 3. 2008 Approval to Discharge

Vessel Operator	Vessel Name	Discharging in Washington[1] ≥ 1nm from berth and ≥ 6 knots		Discharging in Washington[1] continuously (at berth or within 1 nm of berth)		Date Approved
		BW	GW	BW	GW	
Celebrity Cruises	INFINITY					
Celebrity Cruises	MERCURY	NO	NO	NO	NO	NA
Celebrity Cruises	MILLENIUM	NO	NO	NO	NO	NA
Holland America Line	AMSTERDAM	NO	NO	NO	NO	NA
Holland America Line	OOSTERDAM	NO	NO	NO	NO	NA
Holland America Line	VOLENDAM	NO	NO	NO	NO	NA
Holland America Line	WESTERDAM	NO	NO	NO	NO	NA
Holland America Line	ZAANDAM	NO	NO	NO	NO	NA
Norwegian Cruise Line	NORWEGIAN PEARL	YES	YES	YES	YES	May 12, 2008
Norwegian Cruise Line	NORWEGIAN STAR	YES	YES	YES	YES	May 12, 2008
Princess Cruise Line	GOLDEN PRINCESS	YES	YES	YES	YES	May 12, 2008
Princess Cruise Line	STAR PRINCESS	YES	YES	YES	YES	May 12, 2008
Regent Seven Seas	SEVEN SEAS MARINER	NO	NO	NO	NO	NA
Royal Caribbean	RHAPSODY OF THE SEAS	NO	NO	NO	NO	NA
Royal Caribbean	SERENADE OF THE SEAS	NO	NO	NO	NO	NA

BW = Black Water; GW = Gray Water; NA = not applicable

[1] Washington waters refers to the "waters subject to this Memorandum of Understanding (MOU)" as defined in the MOU signed April 20, 2004 and as amended.

4. Sampling per the MOU

4.1 Sampling required

Alaska requires twice-monthly sampling of conventional pollutants, as well as sampling of additional pollutants as part of the Alaska general permit. Per the MOU, the vessels that are approved for discharge are required to sample the quality of the treated effluent using a Washington state-certified laboratory at least one time per month while at port in Seattle during each cruise season. The cruise lines must use the sampling requirements set up by the USCG, Captain of the Port, Southeast Alaska Policy for conventional pollutants continued compliance monitoring regime. The MOU requires that the following parameters be sampled: pH, Biochemical Oxygen Demand (BOD), Fecal Coliform, Total Suspended Solids (TSS), and Residual Chlorine (RC).

Whole effluent toxicity testing

Whole effluent toxicity (WET) testing is required for vessels that are approved to discharge continuously, once every 2 years for homeported vessels (20 or more calls/turnarounds per season) and once per 40 port calls or turnarounds for all other vessels. WET testing guidelines were developed specifically for cruise ships by Ecology and are available on Ecology's website on cruise ships.
http://www.ecy.wa.gov/programs/wq/wastewater/cruise_mou/WETtestguideMOU2008.pdf

Ecology received WET test reports from two vessels taken in the 2008 season. Results were submitted for the NORWEGIAN STAR and the NORWEGIAN PEARL. WET testing was also required for the GOLDEN PRINCESS. Results were not submitted for that vessel.

Ecology's WET expert provided a synopsis of the results from the NORWEGIAN STAR AND NORWEGIAN PEARL. Ammonia levels were slightly higher for the PEARL, though the STAR had marginally more toxic results. Due to other indicators such as conductivity and the relative sensitivity of fish and mysids to the samples, another toxicant besides ammonia may be present. Surfactants from detergents or metals may be possible toxicants. Appendix B includes the synopsis provided and related material.

Appendix B includes a comparison table of cruise ship WET testing results since 2005 to on-land treatment plant WET test results. On-land treatment plant results with samples with total ammonia less than 11 milligrams per liter tended to be consistently nontoxic in acute results. 47% of the on-land treatment plants samples in the 11-30 mg/l total ammonia range had some level of acute toxicity to fish. 20% of the on-land treatment plant samples in the 11-37 mg/l total ammonia range had some level of acute toxicity to daphnids. On-land treatment plant samples with total ammonia >37 mg/l tended to always be acutely toxic to daphnids. For on-land treatment plants, ammonia toxicity is readily eliminated by dilution in all of these cases.

For all of the cruise ship WET tests on file, the cruise ship WET test samples have had total ammonia levels in the range of 15.4- 52.9. All but two results had total ammonia levels above

30 mg/l. Ammonia levels can be higher than in municipal effluents because cruise ships practice water conservation measures and therefore are treating a much more concentrated, and smaller volume of wastewater than a comparable sized municipality. As with the on-land treatment plants, ammonia toxicity in cruise ship discharges may be readily eliminated by dilution.

It is the unionized ammonia in the sample which is toxic. Unionized ammonia increases with pH and temperature. Therefore, total ammonia numbers will only be loose predictors of toxicity and lab test results will be difficult to relate to environmental effects.

A study is being finalized (preliminary results out now) from Alaska Department of Environmental Conservation/EPA on dilution from cruise ships while stationary. Preliminary analysis indicates that the average dilution factor at a distance between 5 to 15 meters away from the cruise ships ranged from a factor of 22 to 50.

Copies of the cruise ship WET test reports can be provided upon request.

4.2 Sampling Data

Sampling results were received for the cruise ships that were approved for discharge in waters subject to the MOU:

- Norwegian Cruise Line's PEARL and STAR
- Princess Cruises GOLDEN PRINCESS and STAR PRINCESS

Sampling results were compared to the limits established by Alaska/the Washington Cruise MOU and are also compared to Washington's water quality standards. Sampling results are summarized for all data received in Appendix C.

Table 4 below shows the results for the cruise ships during the approval period and within Washington/Alaska voyages.

Table 4. Sample Results - Cruise Ships Approved for Discharge into Washington Waters

SHIP: NORWEGIAN PEARL							
		pH	BOD	TSS	Chlorine Residual	Fecal Coliform	Comments
		St. Units	mg/l	mg/l	mg/l	#/100 ml	
MOU/Alaska Limits[1]		6-9	30/45	30/45	10 ug/l	20 / 40	
WA State Water Quality Standards[2]		7.0-8.5	NA	NA	13 / 7.5 ug/l	14 / 43	
Sample Date	Location/ Lab						
5/13/08	Juneau/Admiralty	6.18	3.9	5	ND< 0.10	ND< 1	MIXED BLACK AND GRAY OVERBOARD
5/18/08	Seattle/Pace Analytical	6.1	14.0	ND< 2	ND< 0.10	< 2	MIXED BLACK AND GRAY OVERBOARD
6/3/08	Juneau/Admiralty	6.74	2.1	2.4	ND< 0.10	ND< 1	MIXED BLACK AND GRAY unannounced sampling (+ priority pollutants)
6/8/08	Seattle/Pace Analytical	6.2	11	8	ND< 0.10	< 2	MIXED BLACK AND GRAY OVERBOARD
6/17/08	Juneau/Admiralty	6.75	3.46	7	ND< 0.10	8	MIXED BLACK AND GRAY OVERBOARD
6/24/08	Juneau/Admiralty	6.8	13	6	ND< 0.10	ND< 1	MIXED BLACK AND GRAY OVERBOARD
7/13/08	Seattle/Pace Analytical	6.3	19	2	ND< 0.10	< 2	MIXED BLACK AND GRAY OVERBOARD
7/15/08	Juneau/Admiralty	6.76	3.2	ND< 1.0	ND< 0.10	ND< 1	MIXED BLACK AND GRAY OVERBOARD
7/22/08	Juneau/Admiralty	6.75	3.2	6	ND< 0.10	ND< 1	MIXED BLACK AND GRAY OVERBOARD

8/12/08	Juneau/Admiralty	6.67		2.9	ND<	1.0	ND<	0.10	ND<	1	MIXED BLACK AND GRAY OVERBOARD
8/17/08	Seattle/Pace Analytical	6.6		22		2	ND<	0.10	<	2	MIXED BLACK AND GRAY OVERBOARD
8/19/08	Juneau/Admiralty	6.53		3.0	ND<	1.0	ND<	0.10	ND<	1	MIXED BLACK AND GRAY OVERBOARD
9/2/08	Juneau/Admiralty	6.75	<	2.0		7	<	0.10	<	2	MIXED BLACK AND GRAY unannounced sampling (+ priority pollutants)
9/9/08	Juneau/Admiralty	6.77	ND<	0.5		6	ND<	0.10	ND<	1	MIXED BLACK AND GRAY OVERBOARD
9/14/08	Seattle/Pace Analytical	6.4		27	ND<	2	ND<	0.10	<	2	MIXED BLACK AND GRAY OVERBOARD
	MINIMUM	**6.1**		**ND**		**ND**		**ND**		**ND**	met Seattle sampling requirement
	AVERAGE			**8.7**		**3.9**		**0.10**			
	MAXIMUM	**6.8**		**27**		**8**		**0.10**		**8**	
	GEOMETRIC MEAN									**1.5**	

SHIP: NORWEGIAN STAR

		pH	BOD	TSS	Chlorine Residual	Fecal Coliform	Comments
		St. Units	mg/l	mg/l	mg/l	#/100 ml	
MOU/Alaska Limits[1]		6-9	30/45	30/45	10 ug/l	20 / 40	
WA State Water Quality Standards[2]		7.0-8.5	NA	NA	13 / 7.5 ug/l	14 / 43	
Sample Date	**Location/ Lab**						
5/13/08	Juneau/Admiralty	7.01	5.5	ND< 1.0	ND< 0.10	ND< 1	MIXED BLACK AND GRAY OVERBOARD
5/17/08	Seattle/Pace Analytical	6.8	38.0	2	ND< 0.10	< 2	MIXED BLACK AND GRAY OVERBOARD
6/3/08	Juneau/Admiralty	6.69	5.6	4	ND< 0.10	ND< 1	MIXED BLACK AND GRAY unannounced sampling (+ priority pollutants)
6/3/08	Juneau/Admiralty	6.69	5.4	3.2	ND< 0.10	ND< 1	MIXED BLACK AND GRAY unannounced sampling (BLIND DUPLICATE)
6/7/08	Seattle/Pace Analytical	6.9	13	4	ND< 0.10	8	MIXED BLACK AND GRAY OVERBOARD
6/17/08	Juneau/Admiralty	6.71	ND< 0.5	ND< 1.0	ND< 0.10	ND< 1	MIXED BLACK AND GRAY OVERBOARD
6/24/08	Juneau/Admiralty	6.63	8	8	ND< 0.10	ND< 1	MIXED BLACK AND GRAY OVERBOARD
7/12/08	Seattle/Pace Analytical	6.8	30	4	ND< 0.10	< 2	MIXED BLACK AND GRAY OVERBOARD
7/15/08	Juneau/Admiralty	6.79	7	ND< 1.0	ND< 0.10	ND< 1	MIXED BLACK AND GRAY OVERBOARD
7/29/08	Juneau/Admiralty	6.84	4.7	7	ND< 0.10	12	MIXED BLACK AND GRAY OVERBOARD
8/12/08	Juneau/Admiralty	6.66	8.5	ND< 1.0	ND< 0.10	ND< 1	MIXED BLACK AND GRAY OVERBOARD
8/16/08	Seattle/Pace Analytical	6.6	65	4	ND< 0.10	< 2	MIXED BLACK AND GRAY OVERBOARD
8/19/08	Juneau/Admiralty	6.71	9.1	ND< 1.0	ND< 0.10	2	MIXED BLACK AND GRAY OVERBOARD
8/26/08	Juneau/Admiralty	6.76	12.9	11	ND< 0.10	4	MIXED BLACK AND GRAY unannounced sampling (+ priority pollutants)
9/2/08	Juneau/Admiralty	6.60	8.1	4	ND< 0.10	*	MIXED BLACK AND GRAY OVERBOARD
9/6/08	Seattle/Pace Analytical	6.60	7	ND< 1.0	ND< 0.10	8	MIXED BLACK AND GRAY OVERBOARD
9/9/08	Juneau/Admiralty	6.5	8.3	ND< 1.0	ND< 0.10	ND< 1	MIXED BLACK AND GRAY OVERBOARD
9/16/08	Juneau/Admiralty	6.73	18.4	ND< 1.0	ND< 0.10	ND< 1	MIXED BLACK AND GRAY OVERBOARD
*fecal coliform analysis demonstrated confluent growth, so results not quantifiable. Re-sample ordered.							
	MINIMUM	**6.5**	**ND**	**ND**	**ND**	**ND**	met Seattle sampling requirement
	AVERAGE		**14.2**	**3.3**	**0.10**		
	MAXIMUM	**7.01**	**65**	**11**	**0.10**	**12**	
	GEOMETRIC MEAN					**1.8**	

SHIP: GOLDEN PRINCESS

		pH	BOD	TSS	Chlorine Residual	Fecal Coliform	Comments
		St. Units	mg/l	mg/l	mg/l	#/100 ml	
MOU/Alaska Limits[1]		6-9	30/45	30/45	10 ug/l	20 / 40	
WA State Water Quality Standards[2]		7.0-8.5	NA	NA	13 / 7.5 ug/l	14 / 43	
Sample Date	**Location/ Lab**						
5/12/08	Juneau/Admiralty	8.16	ND< 0.5	ND< 1.0	ND< 0.10	12	MIXED BLACK AND GRAY OVERBOARD
5/15/08	Juneau/Admiralty	6.98	2.7	ND< 1.0	ND< 0.10	ND< 1	MIXED BLACK AND GRAY unannounced sampling (+ priority pollutants)
5/19/08	Juneau/Admiralty	6.96	ND< 0.5	ND< 1.0	ND< 0.10	ND< 1	MIXED BLACK AND GRAY OVERBOARD
6/7/08	Seattle/Pace Analytical	7.3	12	2	ND< 0.10	2	MIXED BLACK AND GRAY OVERBOARD
6/9/08	Juneau/Admiralty	7.12	3.9	ND< 1.0	ND< 0.10	ND< 1	MIXED BLACK AND GRAY OVERBOARD
6/16/08	Juneau/Admiralty	7.44	ND< 0.5	ND< 1.0	ND< 0.10	ND< 1	MIXED BLACK AND GRAY OVERBOARD
6/30/08	Juneau/Admiralty	7.47	3.2	ND< 1.0	ND< 0.10	2	MIXED BLACK AND GRAY OVERBOARD
7/7/08	Juneau/Admiralty	7.34	2.3	ND< 1.0	ND< 0.10	ND< 1	MIXED BLACK AND GRAY OVERBOARD

7/12/08	Seattle/Pace Analytical	7.0	13	2	ND< 0.10	4	MIXED BLACK AND GRAY OVERBOARD
7/21/08	Juneau/Admiralty	7.34	2.8	ND< 1.0	ND< 0.10	4	MIXED BLACK AND GRAY OVERBOARD
8/11/08	Juneau/Admiralty	7.15	3.5	ND< 1.0	ND< 0.10	ND< 1	MIXED BLACK AND GRAY OVERBOARD
8/16/08	Seattle/Pace Analytical	7.3	14	2	ND< 0.10	< 2	MIXED BLACK AND GRAY OVERBOARD
8/18/08	Juneau/Admiralty	7.38	ND< 0.5	ND< 1.0	ND< 0.10	ND< 1	MIXED BLACK AND GRAY OVERBOARD
9/1/08	Juneau/Admiralty	7.62	20.2	ND< 1.0	ND< 0.10	ND< 1	MIXED BLACK AND GRAY OVERBOARD
9/8/08	Juneau/Admiralty	7.32	3.3	ND< 1.0	ND< 0.10	ND< 1	MIXED BLACK AND GRAY OVERBOARD
9/13/08	Seattle/Pace Analytical	7.2	24	ND< 2	ND< 0.10	4	MIXED BLACK AND GRAY OVERBOARD
	MINIMUM	**6.96**	**ND**	**ND**	**ND**	**ND**	met Seattle sampling requirement
	AVERAGE		**6.7**	**1.1**	**0.10**		
	MAXIMUM	**8.16**	**24**	**2**	**0.10**	**12**	
	GEOMETRIC MEAN					**1.7**	

SHIP:	**STAR PRINCESS**						
		pH	**BOD**	**TSS**	**Chlorine Residual**	**Fecal Coliform**	**Comments**
		St. Units	**mg/l**	**mg/l**	**mg/l**	**#/100 ml**	
MOU/Alaska Limits[1]		6-9	30/45	30/45	10 ug/l	20 / 40	
WA State Water Quality Standards[2]		7.0-8.5	NA	NA	13 / 7.5 ug/l	14 / 43	
Sample Date	**Location/ Lab**						
5/14/08	Juneau/Admiralty	6.98	6.4	ND< 1.0	ND< 0.10	ND< 1	MIXED BLACK AND GRAY OVERBOARD
5/28/08	Juneau/Admiralty	7.11	4	ND< 1.0	ND< 0.10	ND< 1	MIXED BLACK AND GRAY unannounced sampling (+ priority pollutants)
6/8/08	Seattle/Pace Analytical	6.9	15	6	ND< 0.10	< 2	MIXED BLACK AND GRAY OVERBOARD
6/18/08	Juneau/Admiralty	6.88	ND< 0.5	ND< 1.0	ND< 0.10	ND< 1	MIXED BLACK AND GRAY OVERBOARD
6/25/08	Juneau/Admiralty	6.67	6.8	ND< 1.0	ND< 0.10	ND< 1	MIXED BLACK AND GRAY OVERBOARD
7/13/08	Seattle/Pace Analytical	6.7	15	2	ND< 0.10	< 2	MIXED BLACK AND GRAY OVERBOARD
7/16/08	Juneau/Admiralty	6.61	ND< 0.5	ND< 1.0	ND< 0.10	ND< 1	MIXED BLACK AND GRAY OVERBOARD
7/17/08	Juneau/Admiralty	6.76	3.4	ND< 1	ND< 0.10	< 2	MIXED BLACK AND GRAY unannounced sampling (+ priority pollutants)
8/13/08	Juneau/Admiralty	7.25	4	ND< 1.0	ND< 0.10	ND< 1	MIXED BLACK AND GRAY OVERBOARD
8/17/08	Seattle/Pace Analytical	7.1	29	ND< 2	ND< 0.10	2	MIXED BLACK AND GRAY OVERBOARD
8/20/08	Juneau/Admiralty	7.15	3.7	ND< 1.0	ND< 0.10	ND< 1	MIXED BLACK AND GRAY OVERBOARD
9/3/08	Juneau/Admiralty	7.35	ND< 0.5	ND< 1.0	ND< 0.10	ND< 1	MIXED BLACK AND GRAY OVERBOARD
9/10/08	Juneau/Admiralty	7.43	ND< 0.5	ND< 1.0	ND< 0.10	ND< 1	MIXED BLACK AND GRAY OVERBOARD
9/14/08	Seattle/Pace Analytical	7.4	29	ND< 2	ND< 0.10	< 2	MIXED BLACK AND GRAY OVERBOARD
	MINIMUM	**6.61**	**ND**	**ND**	**ND**	**ND**	met Seattle sampling requirement
	AVERAGE		**8.5**	**1.6**	**0.10**		
	MAXIMUM	**7.4**	**29**	**6**	**0.10**	**2**	
	GEOMETRIC MEAN					**1.2**	

ND = Non Detect, value in box is the detection level. Unnanounced sampling includes other parameters not listed above.

BOD = Biochemical Oxygen Demand - or organics; TSS = Total Suspended Solids

mg/l = milligrams per liter; ug/l = micrograms per liter; #/100 ml = coliforms per 100 millileters

[1]MOU/Alaska limits from Title XIV, Certain Alaska Cruise Ship Operations, Section 1404(c) /40CFR 133.102

BOD and TSS: 30-day average shall not exceed 30 mg/l, 7-day average shall not exceed 45 mg/l

Fecal Coliform: geometric mean of any 30-day period shall not exceed 20 fecal colifrom/100 ml and not more than 10% of the samples exceed 40 fecal coliform/100 ml

[2]Washington State Water Quality Standards for Surface Waters of the State of Washington Chapter 173-201A WAC

Fecal Coliform: shall not exceed a geometric mean of 14 colonies/100 ml and not more than 10% of a samples shall exceed a geometric mean of 43 colonies/100 ml

pH: 7-8.5 with a human-caused variation within less than 0.2

chlorine: 13 ug/l is the acute limit (1-hour average); 7.5 ug/l is the chronic limit (4-day average)

For the ships that discharged from the AWTS's, the results were in compliance with the Washington MOU and Alaska limits. However, when the samples were compared to Washington's water quality standards, pH would have violated the standards at the point of discharge. The discharges from the cruise ships does not account for a mixing zone. On-land

sewage treatment plants do have mixing zones. The results from the cruise ships for the parameters listed as above are generally as good as or better than most of the on-land plants. Random unannounced samples were taken by the Alaska Department of Environmental Conservation in Alaska throughout the season. The samples taken included other parameters than the conventional pollutants detailed in Table 4. Copies of laboratory results received by Ecology can be obtained through Ecology's public disclosure office.

The sample results submitted by the lines included some results for other parameters required as part of the Alaska General Permit including copper, zinc, nickel, and ammonia. These results are included in Appendix C.

Table 5 below compares the various advanced wastewater treatment systems results as averaged. All result received are included in the averages.

Table 5. Comparison of Advanced Wastewater Treatment Systems and Result Averages

Total Number of Sample Dates = 68	**pH**	**BOD**	**TSS**	**Chlorine Residual**	**Fecal Coliform**	**Ammonia**	**Copper (dissolved)**	**Nickel (dissolved)**	**Zinc (dissolved)**
	Standard Units	**mg/l**	**mg/l**	**mg/l**	**#/100 ml**	**mg/l**	**µg/l**	**µg/l**	**µg/l**
	AVG	AVG	AVG	AVG	Geometric Mean	AVG	AVG	AVG	AVG
Scanship	6.65	11.6	3.6	<0.10	1.6	26.5	6.25	8.10	83.4
Hamworth y	7.16	8.6	1.5	<0.10	1.6	39	43.17	10.59	161

5. Inspections

5.1 Inspections per the MOU

Eleven different vessels were inspected by Ecology staff throughout the 2008 season. A list of vessels inspected is included in Table 6. The inspections were per the MOU and included a walkthrough of the wastewater systems, a review of discharge records, a review of notification and discharge procedures, and a review of other wastestreams. The inspections typically also included sampling for vessels approved to discharge. Results are included in the inspection reports.

In general, the ship's wastewater systems were operating well and produced high quality effluent. There is more process control sampling being done on board the vessels. Discharge protocols are thorough and include verifications.

Recommendations were made for some of the vessels. One vessel was reminded that it was due for WET testing which had not yet been done yet or scheduled. It was pointed out that one vessel must not discharge, even though approved to do so until the disinfection system is

operational (current protocol on the vessel). A copy of the MOU was not available on one vessel and should be available. Two vessels had operational problems with their advanced wastewater discharge systems and held all discharges.

It was noted that during the inspections, many of the vessels have greatly increased their waste minimization efforts. Increased recycling rates, minimization of materials used, decreased water usage, and reusing more items has all contributed to the overall minimization of wastes being burned or sent to a landfill.

As not all vessels could be inspected, copies of discharge documents were requested and received for all vessels from the date of inspection till the end of the season for those inspected and for the entire season for those not inspected. Upon review, no violations of the MOU were discovered.

Copies of the inspection reports are included in Appendix D.

Table 6. 2008 Vessel Inspections

Vessels Inspected	Date Inspected
OOSTERDAM (Holland America Line)	June 7, 2008
WESTERDAM (Holland America Line)	June 22, 2008
STAR PRINCESS (Princess Cruises)	June 22, 2008
INFINITY (Celebrity Cruises)	July 18, 2008
NORWEGIAN STAR (Norwegian Cruise Line)	July 26, 2008
GOLDEN PRINCESS (Princess Cruises)	July 26, 2008
AMSTERDAM (Holland America Line)	August 22, 2008
RHAPSODY OF THE SEAS (Royal Caribbean)	August 29, 2008
NORWEIAN PEARL (Norwegian Cruise Line)	September 14, 2008
MERCURY (Celebrity Cruises)	September 22, 2008
MILLENNIUM (Celebrity Cruises)	October 1, 2008

6. Compliance

6.1 Compliance with MOU requirements

There were no reported incidents of non-compliance with any provision of the MOU.

Letters detailing compliance with the MOU from member lines are included in Appendix E.

One vessel did not conduct sampling for WET testing as is required by the MOU. The GOLDEN PRINCESS has been a homeported vessel approved for continuous discharge for both the 2007 and 2008 season. The sampling was not conducted.

7. Shellfish and Viruses

In 2007, The Washington State Department of Health issued a report from a study to examine the potential human health impacts from virus discharges from large passenger vessels. Their results indicate that, when AWTS are fully functional, viral discharges from large cruise ships should not cause illness through shellfish. However, if the treatment systems malfunction, virus discharges from cruise ships may reach some shellfish beds at levels that may lead to illness. The Department of Health report identifies recommendations to limit the risk of an unacceptable discharge. Recommendations include:

- No discharge should occur within 0.5 nautical miles of bivalve shellfish beds that are recreationally harvested or commercially approved to harvest.
- Cruise ships should withhold discharge when a system upset occurs.
- DOH should be notified immediately in the event of an AWTS upset.
- A small passenger ship study should be done to assess potential impacts of these vessels.
- The Department of Ecology should revise their 'Criteria for Sewage Works Design' to address minimum UV dosage for virus inactivation.

The full report can be found at: www.doh.wa.gov/ehp/sf/Pubs/cruise-ship-report.pdf

The recommendations were incorporated into the MOU via the 2008 amendments.

8. Conclusions

8.1 Overall

The Memorandum of Understanding continues to be a key tool in protecting water quality by having requirements in place to only allow discharges from advanced wastewater treatment systems, allowing for inspections to verify compliance, and building communication with the cruise lines and vessel staff on requirements of the MOU.

While we continue to learn more about the large passenger vessels, more information is needed in regards to the small ships including which ships are operating in Washington waters, what type of treatment systems are on board, which ships are discharging and where, and the quality of the effluent being discharged.

The majority of the lines and vessels operating with the MOU had a successful season and were in compliance throughout. The sampling results for conventional pollutants continue to show

excellent effluent quality. One cruise line did not conduct the required whole effluent toxicity testing as required.

The MOU specifies that all of the parties agree to at least one annual meeting to review the effectiveness of the MOU. The annual meeting was held on January 22, 2009. The Port of Seattle, the Department of Ecology, representatives from the NorthWest CruiseShip Association and some of its member lines (Princess Cruises, Holland America Line, and Royal Caribbean/Celebrity Cruises), the Department of Health, as well as other interested parties convened for the meeting. Agenda items included:

- Welcome and Introductions.
- Compliance with the 2008 season.
- Department of Health Report – viruses.
- Updates on Biomass, EPA Vessel Discharge Permit, MOU Amendments and MOU Funding.
- Comments/Discussion from cruise lines and interested parties.
- Looking Ahead.

The meeting notes are included in Appendix F.

Advantages to the MOU include having something in place to protect water quality, building a partnership with the cruise industry and other key stakeholders, and being able to inspect and evaluate the quality of treatment from the ships that discharge. Limitations of the MOU include the inability to effectively enforce on what is essentially a voluntary agreement, the lack of coverage under the MOU for large passenger ships that are not members of the NorthWest CruiseShip Association, and air quality issues are not currently covered in the MOU.

8.2 Recommendations

1. The Department of Ecology recommends that the MOU continue to be used as a complement to environmental regulations until state specific regulations for cruise ship waste management in Washington State are put in place.
2. Ecology recommends that Ecology continue to inspect ships that discharge in waters subject to the MOU, including closely looking at wastewater management and the management of other waste streams.
3. It is recommended that the parties of the MOU continue to work together on evaluating the testing protocols, results, and testing guidelines for whole effluent toxicity and make recommendation on how to proceed.
4. It is recommended that the cruise lines conduct a thorough review of records on an on-going basis throughout the season as well as at the end of the system to evaluate compliance, and that all recommendations made in inspection reports be implemented.

Appendix A. Amendment No. 4 of the Memorandum of Understanding, Cruise Operations in Washington State

Memorandum of Understanding Cruise Operations in Washington State

Originally signed April 20, 2004
Amendment No. 4 dated May 19, 2008

Washington State Department of Ecology
Northwest Cruise Ship Association
Port of Seattle

MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding, originally signed on April 20, 2004 is amended by and between the State of Washington, the Port of Seattle, and the Northwest Cruise Ship Association, hereinafter referred to as NWCA, representing the international cruise lines identified in *Appendix i*.

Whereas the State of Washington is charged with the responsibility of protecting and conserving Washington's environmental resources in relation to the Cruise Industry's environmental practices in Washington; and

Whereas the United States Coast Guard, herein referred to as USCG, has Federal jurisdiction over environmental matters in navigable waters in the United States; and

Whereas the Port of Seattle is charged with providing the services and facilities to accommodate the transportation of passengers, including cruise ship passengers, while protecting and enhancing the environment of the Port of Seattle; and

Whereas, the NWCA is a non-profit entity organized for the purpose of representing member cruise lines which operate in and about waters subject to this Memorandum of Understanding (MOU), whose current membership is identified in *Appendix i*; and

Whereas, the NWCA has adopted the "**Cruise Industry Waste Management Practices and Procedures"** as promulgated by the Cruise Industry's trade association, the Cruise Lines International Association, herein referred to as CLIA, which practices and procedures are attached hereto as *Appendix ii*; and

Whereas, NWCA cruise vessels operate in international waters and move passengers to destinations worldwide and, consequently, those cruise vessel waste management practices must take into account environmental laws and regulations in many jurisdictions and international treaties and conventions; and

Whereas, the NWCA, the State of Washington as represented by the Washington Department of Ecology (Ecology), the USCG and the Port of Seattle have met to develop waste management practices that preserve a clean and healthy environment and demonstrate the Cruise Industry's commitment to be a steward of the environment; and

Whereas, research is ongoing to establish the impact of ships' wastewater discharges on the ocean environment, and the results of this research will be taken into account in periodic review of the wastewater discharge practices described in this Agreement; and

Whereas, the cruise industry recognizes Washington's fragile marine environment and is committed to help protect this environment;

Now therefore, based upon mutual understanding, the parties enter into this Memorandum of Understanding to implement the following environmental goals, policies and practices:

Definition of terms for the purpose of this agreement:

“blackwater” means waste from toilets, urinals, medical sinks and other similar facilities;

"cruise ship" means any vessel that is owned or operated by a member of the NWCA;

“disinfection system upset” means disinfection below levels of four log (99.99%) inactivation of norovirus based on expected results assuming a minimum intensity of ultraviolet (UV) lights used for disinfecting effluent or other shipboard administrative controls as may be accepted by the Washington Department of Health..

“graywater” includes drainage from dishwasher, shower, laundry, bath, galley drains and washbasin drains;

“monitoring for disinfection effectiveness” means using measuring equipment to determine the intensity of ultraviolet (UV) lights used for disinfecting effluent, or other shipboard administrative controls as may be accepted by the Washington Department of Health.

“oily bilge water” includes bilge water that contains used lubrication oils, oil sludge and slops, fuel and oil sludge, used oil, used fuel and fuel filters, and oily waste.

“residual solids” includes grit or screenings, ash generated during the incineration of sewage sludge and sewage sludge, which is solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works. Sewage sludge includes, but is not limited to, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment processes; and a material derived from sewage sludge.

“solid waste” means all putrescible and nonputrescible solid and semisolid wastes including, but not limited to, garbage, rubbish, ashes, industrial wastes, swill, sewage sludge, demolition and construction wastes and recyclable materials [RCW 70.95.030 (22), Solid Waste Management: Reduction and Recycling].

“waters subject to this Memorandum of Understanding (MOU)” include the Puget Sound and the Strait of Juan de Fuca south of the international boundary with Canada; and for off the west coast, the belt of the seas measured from the line of ordinary low water along that portion of the coast which is in direct contact with the open sea and the line marking the seaward limit of inland waters, and extending seaward a distance of three miles as illustrated in *Appendix iii*.

1. Applicability

1.1 The State of Washington agrees that the performance required by the NWCA under the terms of this Memorandum of Understanding shall be directed only to its member cruise lines. The NWCA acknowledges that its members operate cruise vessels engaged in

cruise itineraries greater than one day duration; and further that its members do not operate one-day attraction ships or casino gambling ships. This agreement only applies to voyages during which the commercial passenger vessel actually calls at a port in the State of Washington.

1.2 The State of Washington and Port of Seattle accepts the CLIA Industry Standard E-0l – 01, titled ***Cruise Industry Waste Management Practices and Procedures*** (*Appendix ii*) as CLIA member policy in the management of solid waste, hazardous wastes and wastewaters in waters subject to this MOU. In addition to the CLIA Practices, the member vessels of NWCA operating in Washington agree to allow Ecology to conduct a minimum of one vessel inspection per season to verify compliance with the MOU and agree to comply with the following unique practices while operating in waters subject to this MOU:

2.1 Wastewater Management

In recognition of the sensitive nature of Washington's marine environment, the NWCA agrees to the following:

2.1.1 to prohibit the discharge of untreated blackwater, untreated graywater, and solid waste within waters subject to this MOU (*Appendix iii*); and to prohibit the discharge of oily bilge water if not in compliance with applicable federal and state laws within waters subject to this MOU.

2.1.2 other than as set forth in section 2.1.3 below, to prohibit the discharge of treated blackwater and treated graywater in waters subject to this MOU.

2.1.3 the discharge of treated blackwater and treated graywater from ships equipped with advanced wastewater treatment systems (AWTS) which meet the higher standards and the testing regime set out in federal law, Title XIV, Certain Alaska Cruise Ship Operations, Section 1404 (c) (*Appendix vi*) is allowed under the following conditions:

A. For discharges if the ship is at least one nautical mile away from its berth at a port in Washington and is traveling at a speed of at least 6 knots:

1) No later than 60 days prior to the date the cruise ship wishes to commence discharge of AWTS-treated effluent, the cruise line shall submit the following vessel specific information to Ecology

a. Documentation on the type of treatment system in use on the ship including schematic diagrams of the system.
b. Documentation that the system is certified by the United States Coast Guard for continuous discharge in Alaska. If the certification has not yet been provided by the Coast Guard at the time the other documentation is submitted to Ecology, it may be submitted less than 60 days prior to commencement of discharge but in no event less than 30 days prior to the commencement of discharge.

c. Provision for daily twenty-four hour continuous turbidity or equivalent monitoring of the quality of the effluent generated by the AWTS and, beginning in 2009, daily twenty-four hour continuous monitoring for disinfection effectiveness.
d. Documentation of system design that demonstrates the AWTS can be automatically shut down if monitoring of treated effluent indicates high turbidity or, beginning in 2009, a disinfection system upset; or documentation that demonstrates that operational controls exist to insure system shut down if monitoring of treated effluent indicates high turbidity or, beginning in 2009, a disinfection system upset. An example of an acceptable operational control is a system that has the continuous monitoring device alarmed as to immediately alert engineering staff on watch to shut down overboard discharges from the system in the event of high turbidity levels or disinfection ineffectiveness in the treated effluent.

B. For continuous discharge:

1) No later than 60 days prior to the date a cruise ship wishes to commence discharge of AWTS effluent, the cruise line shall submit the following vessel specific information to Ecology:

a. Documentation on the type of treatment system in use on the ship including schematic diagrams of the system.
b. Documentation that the system is certified by the United States Coast Guard for continuous discharge in Alaska. If the certification has not yet been provided by the Coast Guard at the time the other documentation is submitted to Ecology, it may be submitted less than 60 days prior to commencement of discharge but in no event less than 30 days prior to commencement of discharge.
c. Provision for daily twenty-four hour continuous turbidity or equivalent monitoring of the quality of the effluent generated by the AWTS and, beginning in 2009, daily twenty-four hour continuous monitoring for disinfection effectiveness.
d. Documentation of system design that demonstrates the AWTS can be automatically shut down if monitoring of treated effluent indicates high turbidity or, beginning in 2009, a disinfection system upset; or documentation that demonstrates that operational controls exist to insure system shut down if monitoring of treated effluent indicates high turbidity or, beginning in 2009, a disinfection system upset. An example of an acceptable operational control is a system that has the continuous monitoring device alarmed as to immediately alert engineering staff on watch to shut down overboard discharges from the system in the event of high turbidity levels or disinfection ineffectiveness in the treated effluent.
e. Documentation that all treated effluent will receive final polishing for disinfection immediately prior to discharge.
f. Copies of water quality tests results taken from the AWTS effluent during the preceding six months.

g. A vessel specific plan that: identifies how effluent will be stored until the AWTS is repaired and which indicates the storage capacity of holding tanks; and includes a notification protocol for notifying Ecology of system shut down which occurs while within waters subject to this MOU.

If Ecology determines that the documentation provided is insufficient, it shall so notify the cruise line. The cruise line shall provide supplemental documentation as requested by Ecology. If Ecology and the cruise line are unable to agree on the supplemental documentation and cruise line elects to discharge from the AWTS, cruise line understands that any such discharge will not have been approved by Ecology and further that Ecology may take appropriate action, including, but not limited to, publicizing, such fact.

Any cruise ship discharging from an AWTS in waters subject to this MOU operates within the shipping lanes and this effectively means that vessels are more than a half a mile from shellfish beds with the possible exception of President's Point, Apple Tree Cove and Tyee Shoal for the 2008 cruise season. For specific information relative to shellfish protection measures, see *appendix x*.

C. The vessels that have submitted documentation under A or B above agree to:

1) Not discharge within 0.5 nautical miles of bivalve shellfish beds that are recreationally harvested or commercially approved to harvest as identified annually by the Department of Ecology. This season's locations include President's Point, Apple Tree Cove and Tyee Shoal as referenced in *Appendix x*.
2) Immediately stop all discharges when high turbidity occurs and, beginning in 2009, when a disinfection system upset condition occurs.
3) Immediately notify the Washington State Department of Health in the event of a disinfection system upset at (360) 236-3330 during office hours or (360) 786-4183 after hours (24 hour pager). The agreement to provide this notice is based on the understanding by NWCA that the Department of Health will not publicize the information provided unless it reasonably determines that a discharge presents a material public health risk.
4) Sample the quality of the treated effluent using a Washington state-certified laboratory at least one time per month while at port in Washington during each cruise season using the sampling requirements established per the United States Coast Guard, Captain of the Port, Southeast Alaska Policy for conventional pollutants continued compliance monitoring regime and as referenced in *Appendix vi*. Parameters sampled include pH, Biochemical Oxygen Demand (BOD), Fecal Coliform, Total Suspended Solids (TSS), and Residual Chlorine (RC).
5) Meet the limitations on discharge as set in Alaska regulations (*Appendix vi*) for BOD, TSS, pH, Fecal Coliform and Residual Chlorine.[1]
6) Split samples with Ecology upon Ecology's request when sampling is conducted in Washington waters.

7) For vessels that have submitted documentation under B above (continuous discharge), conduct Whole Effluent Toxicity (WET) Testing once every two years for vessels homeported[2] in Washington and once every 40 port calls or turnarounds to a port in Washington for all other vessels.
8) Provide Ecology with duplicates of test results obtained for and provided to the State of Alaska to enable Ecology to monitor the quality of the effluent from such systems.
9) Notify Ecology at least a week in advance of sampling and to allow Ecology staff access to the ship in order to observe sampling events.
10) Notify Ecology if any material changes are made to the system.

Note 1: There is a presumption that meeting Alaska's standards means that Washington's Water Quality Standards are likely being met and that if Alaska's standards are not being met, Washington's Water Quality Standards are not being met.
Note 2: A "homeported" vessel is a vessel that makes a call or does a turnaround at a port in Washington at least 20 times per year.

2.1.4 The discharge of residual solids from either a type 2 marine sanitation device or an advanced waste water treatment system is prohibited in waters subject to this MOU, within 12 nautical miles from shore, and within the entire boundaries of the Olympic Coast Marine Sanctuary. All parties acknowledge that most of the Olympic Coast National Marine Sanctuary lies beyond 3 miles of shore and therefore is outside the jurisdiction of the State of Washington.

2.2 Hazardous Waste Management

2.2.1 The CLIA in consultation with NWCA has developed, in conjunction with the Environmental Protection Agency (EPA), a national practice for the assigning of an EPA Identification Number to each cruise ship as the "generator" of hazardous wastes, which recognizes the multi-jurisdictional itineraries of a cruise vessel. EPA also proposes that the state where company offices are located may issue the national identification numbers provided the criteria and information submitted required for obtaining the number is standard for the United States. The State of Washington and NWCA agree to a uniform application procedure for the EPA national identification number in accordance with the Resource Conservation Recovery Act (RCRA) (*Appendix v*). The State of Washington shall have the right to inspect all such records upon written request to the cruise vessel operator. The State of Washington recognizes that in some cases EPA Identification Numbers may not be required under federal law for conditionally exempt small quantity generators.

2.2.2 *Appendix ii* includes the uniform procedure adopted by the NWCA for the application of RCRA to cruise vessels disposing of hazardous wastes in the State of Washington. The State of Washington accepts this procedure as the appropriate process for vendor selection and management of hazardous wastes in Washington. NWCA member lines agree to provide an annual report regarding the total hazardous waste offloaded in Washington by each cruise vessel.

2.2.3 The NWCA acknowledges that the state of Washington regulates some hazardous wastes differently than EPA and agrees, within the waters subject to this MOU, to comply with the guidelines for specific waste streams found in *Appendix vii*.

2.2.4 The State of Washington and NWCA agree that all hazardous waste disposal records required by RCRA for cruise vessels entering a Washington port shall be available to the State of Washington upon written request to the cruise vessel operator.

3. The State of Washington and the NWCA understand that the U.S. Coast Guard (USCG) has Federal jurisdiction over environmental matters in navigable waterways in the United States and conducts passenger ship examinations that include review of environmental systems, Safety Management System (SMS) documentation and such MARPOL-mandated documents as the Oil Record Book and the Garbage Record Book. Additionally, NWCA member cruise vessels will integrate such industry standards into SMS documentation that ensure compliance through statutorily required internal and third party audits.

4. The USCG has developed guidelines relating to the inspection of waste management practices and procedures, which have been adopted by the cruise industry. The State of Washington accepts the USCG Navigation and Vessel Inspection Circular and Environmental Systems Checklist (*Appendix iv*), which will be incorporated into USCG 840 Guidebook as the procedure to conduct waste management inspections on board cruise vessels. To reduce administrative burden on the cruise ship industry, the State of Washington agrees to first request from the USCG any records for cruise vessels entering waters subject to this MOU to the extent that those records are covered by the Memorandum of Agreement, dated May 25th, 2001, between the State of Washington Department of Ecology and the USCG. Other USCG records will be provided to the State directly by the NWCA member lines upon request.

5. The State of Washington recognizes that waste management practices are undergoing constant assessment and evaluation by cruise industry members. It is understood by the State of Washington and the NWCA that the management of waste streams will be an on-going process, which has as its stated objectives both waste minimization and pollution prevention. Consequently, all parties agree to continue to work with each other in good faith to achieve the stated objectives. This may require additional meetings with the parties to this Agreement to discuss specific issues applicable to the cruise industry in the U.S.

6. The NWCA acknowledges that its operating practices are required to comply with the applicable provisions of the Marine Mammal Protection Act, the Invasive Species Act and the State of Washington Ballast Water Management law, RCW Ch. 77.120. The NWCA agrees to acknowledge and comply with appropriate rules and regulations related to the Olympic Coast National Marine Sanctuary, including but not limited to the regulations for implementing the National Marine Sanctuary Program (subparts A through E and subpart O of Title 15, Chapter IX, Part 922 of the Code of Federal Regulations) and the International Maritime Organization (IMO) “Area To Be Avoided” off the Washington Coast.

7. This agreement does not prohibit discharges made for the purpose of securing the vessel or saving life at sea, provided that all reasonable precautions have been taken for the purpose of preventing or minimizing the discharge.

8. All parties acknowledge that ongoing discussions of environmental goals are recognized as a necessary component to the successful implementation of management practices for waste minimization and reduction.

9. Compliance, Modification and Review of MOU: NWCA members agree to immediately self-report non-compliance with any provision of this MOU to the Department of Ecology at the following 24-hour number: 425-649-7000. By December 1st of each year, a report shall be submitted to the Department of Ecology detailing the compliance with this MOU for each vessel within the NWCA that calls to a port in Washington for the previous cruise season. The reports should follow the format included in *Appendix viii*. All parties acknowledge that this MOU is not inclusive of all issues, rules or programs that may arise in the future. The State of Washington reserves the right to enter into additional MOUs to address or refine such issues, to take enforcement action in response to violations of state law, or to pursue appropriate legislation. All parties agree to at least one annual meeting to review the effectiveness of the MOU, such meeting to be scheduled, if feasible, during October of each year. The State of Washington and NWCA reserve the right to cancel this MOU upon 90 days written notice.

10. The Port of Seattle and Ecology entered into an interagency agreement for the purpose of providing funding for Ecology personnel to further the intent of the MOU. The Port of Seattle is acting solely as a pass-through contracting entity to facilitate the collection of funds from the individual NWCA members to provide payment to Ecology on behalf of the NWCA members. The interagency agreement as included in *Appendix ix* may be amended or renewed separately from this MOU at any time by the parties of the agreement without amending the MOU.

Appendix xi includes a summary of amendments.

IN RECOGNITION OF THE MUTUAL UNDERSTANDINGS DISCUSSED HEREIN THE PARTIES HERETO AFFIX THEIR SIGNATURES. THIS AMENDMENT SHALL BE EFFECTIVE UPON THE DATE AND SIGNATURE OF THE FINAL SIGNING PARTY, THE DEPARTMENT OF ECOLOGY.

Washington Department of Ecology

5/19/08
Date

Port of Seattle

Northwest Cruise Ship Association

APPENDICES
MEMORANDUM OF UNDERSTANDING

Appendix i	List of NWCA Member Lines
Appendix ii	CLIA Standards
Appendix iii	Navigational Chart of the waters subject to this MOU
Appendix iv	USCG Navigation & Vessel Inspection Circular and Environmental Systems Checklist
Appendix v	Uniform application procedure for EPA National ID Number as per Resource Conservation Recovery Act.
Appendix vi	Alaska Regulations
Appendix vii	Washington Hazardous Waste Management Best Management Practices
Appendix viii	Boilerplate Compliance Letter
Appendix ix	Interagency Agreement (cost-recovery)
Appendix x	Bivalve Shellfish Beds
Appendix xi	Summary of Amendments

Appendix i

List of NWCA Member Lines

Carnival Cruise Lines
Celebrity Cruises
Crystal Cruises
Holland America Line
Norwegian Cruise Lines
Princess Cruises
Regent Seven Seas
Royal Caribbean Cruises
Silversea Cruises

Appendix ii

CLIA INDUSTRY STANDARD

CRUISE INDUSTRY
WASTE MANAGEMENT
PRACTICES AND PROCEDURES

The members of the Cruise Lines International Association (CLIA) are dedicated to preserving the marine environment and in particular the pristine condition of the oceans and other waters upon which our vessels sail. The environmental standards that apply to our industry are stringent and comprehensive. Through the International Maritime Organization, the United States and flag and port states, CLIA has developed consistent and uniform international standards that apply to all vessels engaged in international commerce. These standards are set forth in the International Convention for the Prevention of Pollution from Ships (MARPOL). The international standards of MARPOL have in turn been adopted by the United States and augmented by additional national legislation and regulation. The U.S. has jurisdiction over both foreign and domestic vessels that operate in U.S. waters where U.S. laws, such as the Federal Water Pollution Control Act, the Act to Prevent Pollution from Ships, the Ports and Waterways Safety Act, and the Resource Conservation and Recovery Act - which applies to hazardous waste as it is landed ashore for disposal, apply. The U.S. Coast Guard enforces both international conventions and domestic laws.

The cruise industry commitment to protecting the environment is demonstrated by the comprehensive spectrum of waste management technologies and procedures employed on its vessels.

CLIA members are committed to:

a. **Designing, constructing and operating vessels, so as to minimize their impact on the environment;**

b. **Developing improved technologies to exceed current requirements for protection of the environment;**

c. **Implementing a policy goal of zero discharge of MARPOL, Annex V solid waste products (garbage) and equivalent US laws and regulations by use of more comprehensive waste minimization procedures to significantly reduce shipboard generated waste;**

d. **Expanding waste reduction strategies to include reuse and recycling to the maximum extent possible so as to land ashore even smaller quantities of waste products;**

e. **Improving processes and procedures for collection and transfer of hazardous waste; and**

f. **Strengthening comprehensive programs for monitoring and auditing of onboard environmental practices and procedures in accordance with the International Safety Management Code for the Safe Operation of Ships and for Pollution Prevention (ISM Code).**

INDUSTRY WASTE MANAGEMENT STANDARDS: **CLIA member cruise vessel operators have agreed to incorporate the following standards for waste stream management into their respective Safety Management Systems.**

1. **Photo Processing, Including X-Ray Development Fluid Waste:** ***Member lines have agreed to minimize the discharge of silver into the marine environment through the use of best available technology that will reduce the silver content of the waste stream below levels specified by prevailing regulations.***

2. **Dry-cleaning waste fluids and contaminated materials:** ***Member lines have agreed to*** **prevent** ***the discharge of chlorinated dry-cleaning fluids, sludge, contaminated filter materials and other dry-cleaning waste byproducts into the environment***

3. **Print Shop Waste Fluids:** ***Member lines have agreed to prevent the discharge of hazardous wastes from printing materials (inks) and cleaning chemicals into the environment.***

4. **Photo Copying and Laser Printer Cartridges:** ***Member lines have agreed to initiate procedures so as to maximize the return of photo copying and laser printer cartridges for recycling. In any event, these cartridges will be landed ashore.***

5. **Unused And Outdated Pharmaceuticals:** ***Member lines have agreed to ensure that unused and/or outdated pharmaceuticals are effectively and safely disposed of in accordance with legal and environmental requirements.***

6. **Fluorescent And Mercury Vapor Lamp Bulbs:** ***Member lines have agreed to prevent the release of mercury into the environment from spent fluorescent and mercury vapor lamps by assuring proper recycling or by using other acceptable means of disposal.***

7. **Batteries:** ***Member lines have agreed to prevent the discharge of spent batteries into the marine environment.***

8. **Bilge and Oily Water Residues:** ***Member lines have agreed to meet or exceed the international requirements for removing oil from bilge and wastewater prior to discharge.***

9. **Glass, Cardboard, Aluminum and Steel Cans:** ***Member lines have agreed to eliminate, to the maximum extent possible, the disposal of MARPOL Annex V wastes into the marine environment. This will be achieved through improved reuse and recycling opportunities. They have further agreed that no waste will be discharged into the marine environment unless it has been properly processed and can be discharged in accordance with MARPOL and other prevailing requirements.***

10. **Incinerator Ash:** ***Member lines have agreed to reduce the production of incinerator ash by minimizing the generation of waste and maximizing recycling opportunities.***

11. **<u>Graywater</u>: [*For ships traveling regularly on itineraries beyond the territorial waters of coastal states], member lines have agreed that graywater will be discharged only while the ship is underway and proceeding at a speed of not less than 6 knots[1]; that graywater will not be discharged in port and will not be discharged within 4 nautical miles from shore or such other distance as agreed to with authorities having jurisdiction or provided for by local law except in an emergency, or where geographically limited. Member lines have further agreed that the discharge of graywater will comply with all applicable laws and regulations. For vessels whose itineraries are fully within US territorial waters, discharge shall comply fully with U.S. and individual state legislation and regulations.***

12. **<u>Blackwater</u>:** ***CLIA members have agreed that all blackwater will be processed through a Marine Sanitation Device (MSD), certified in accordance with U.S. or international regulations, prior to discharge. For ships traveling regularly on itineraries beyond territorial coastal waters, discharge will take place only when the ship is more than 4 miles from shore and when the ship is traveling at a speed of not less than 6 knots.[1] For vessels whose itineraries are fully within US territorial waters, discharge shall comply fully with U.S. and individual state legislation and regulations.***

Some member cruise lines are field-testing wastewater treatment systems that utilize advanced technologies. These onboard wastewater treatment systems, which are currently being referred to as advanced wastewater purification (AWP) systems, are designed to result in effluent discharges that are of a high quality and purity; for example, meeting or surpassing secondary and tertiary effluents and reclaimed water. Effluents meeting these high standards would not be subjected to the strict discharge limitations previously discussed.

Each CLIA cruise vessel operator has agreed to utilize one or more of the practices and procedures contained in the attached *"Cruise Industry Waste Management Practices and Procedures"* in the management of their shipboard waste streams. Recognizing that technology is progressing at a rapid rate, any new equipment or management practices that are equivalent to or better than those described, and which are shown to meet or exceed international and federal environmental standards, will also be acceptable. Member lines have agreed to communicate to CLIA the use of equivalent or other acceptable practices and procedures. As appropriate, such practices and procedures shall be included as a revision to the attached document. As an example, when improved systems for treating blackwater and graywater are perfected and shown to meet the requirements for MSDs and accepted by appropriate authorities, the new systems and associated technology will be included in the attachment as a revision.

<u>CLIA and its Environmental Committee will continue to work with the U.S. Coast Guard, the U.S. Environmental Protection Agency and other appropriate agencies to further implement the above commitments.</u>

[1] <u>For vessels operating under sail, or a combination of sail and motor propulsion, the speed shall not be less than 4 knots.</u>

ATTACHMENT: *CRUISE INDUSTRY WASTE MANAGEMENT PRACTICES AND PROCEDURES*

Revised: November 12, 2006
Effective for non-prior ICCL members:July 1, 2007

Appendix ii (cont.)

Attachment to CLIA Standard

CRUISE INDUSTRY WASTE MANAGEMENT PRACTICES AND PROCEDURES

REVISED: (November 27, 2006)

The cruise industry is dedicated to preserving the marine environment and oceans upon which our ships sail. As a stated industry standard, CLIA members have adopted aggressive programs of waste minimization, waste reuse and recycling, and waste stream management set forth in the following. In addition, CLIA members are working in a number of areas to identify and implement new technologies in order to improve the environmental performance of their ships. CLIA member lines currently have agreed to utilize waste management practices and procedures, which meet or exceed the stringent standards as set forth in international treaties and applicable U.S. laws.

Introduction

The cruise industry is inextricably linked to the environment. Our business is to bring people to interesting places in the world, over the water. Recognizing the future of the industry depends on a clean and healthy environment; cruise industry senior management is committed to stewardship of the environment and establishing industry practices that will make CLIA member cruise ship operators leaders in environmental performance.

This document outlining member line practices has been developed under the auspice of the industry's professional organizations, the Cruise Lines International Association (CLIA), the Florida Caribbean Cruise Association (FCCA), and the Northwest Cruise Ship Association (NWCA). The purpose of this document is to set forth cruise industry waste management practices and procedures that CLIA member cruise vessel operators have agreed to incorporate into their respective Safety Management Systems.

In the development of industry practices and procedures for waste management, the members of the Cruise Lines International Association have endorsed policies and practices based upon the following fundamental principles:

- Full compliance with applicable laws and regulations;
- Maintaining cooperative relationships with the regulatory community;
- Designing, constructing and operating vessels, so as to minimize their impact on the environment;
- Embracing new technology;
- Conserving resources through purchasing strategies and product management;
- Minimizing waste generated and maximize reuse and recycling;
- Optimizing energy efficiency through conservation and management;
- Managing water discharges; and
- Educating staff, guests and the community.

Discussion

Just as on shore, ship operations and passengers generate waste as part of many daily activities. On ships, waste is generated while underway and in port. Because ships move, the management of these wastes becomes more complicated than for land-based activities, as the facilities and laws change with the location of the ship. Facilities on the ships as well as management practices must be designed to take into account environmental laws and regulations around the world and the various local and state laws and regulations. Moreover, because waste management ultimately becomes a local activity, the local port infrastructure, service providers, and local waste disposal vendors are factors in the decision-making processes.

On an international level, environmental processes are an important part of the International Maritime Organization's (IMO's) policies and procedures for the maritime industry. CLIA member lines have agreed to incorporate environmental performance into Safety Management Systems (SMS) and MARPOL mandated Waste Management Manuals. Under agreements and laws specific to many nations, these programs are routinely reviewed by Port States to ensure compliance. For example, in the United States, the US Coast Guard has jurisdiction over environmental matters in ports and waterways and conducts passenger ship examinations that include review of environmental systems, SMS documentation and such MARPOL-mandated documents as the Oil Record Book and the Garbage Record Book. Within the United States, environmental laws and regulations apply include the Clean Water Act, the Refuse Disposal Act, the Resource Conservation and Recovery Act, The Clean Air Act, the Oil Pollution Act of 1990, and the Pollution Prevention Act, to name a few, which apply to all ships within U.S. waters.

The industry effort to develop waste management practices and procedures has focused on the traditional high volume wastes (garbage, graywater, blackwater, oily residues (sludge oil) and bilge water), pollution prevention, and the small quantities of hazardous waste produced onboard. In the process, CLIA members have shared waste management strategies and technologies, while focusing on a common goal of waste reduction.

The process of waste reduction includes waste prevention, the purchasing of products that have recycled content or produce less waste (e.g. source reduction), incineration, and recycling or reuse of wastes that are generated. The ultimate goal is to have the waste management culture absorbed into every facet of cruise vessel operation. A fully integrated system beginning with the design of the vessel should address environmental issues at every step.

Management practices for waste reduction should start before a product is selected. Eco-purchasing and packaging are vital to the success of any environmental program, as are strategies to change packaging, processes and management to optimize the resources used.

The commitment of the industry to this cooperative effort has been quite successful, as companies have shared information and strategies.

Industry Standard Waste Handling Procedures

CLIA member lines have agreed that hazardous wastes and waste streams onboard cruise vessels will be identified and segregated for individual handling and management in accordance with appropriate laws and regulations. They have further agreed, hazardous wastes will not be discharged overboard, nor be commingled or mixed with other waste streams.

A. **Hazardous Waste Collection and Storage onboard Ship:** *CLIA member lines have agreed that specific procedures for hazardous waste collection, storage and crew training will be addressed in each ship's SMS or equivalent onboard instruction in the Case of US registry vessels.*

B. **Photo Processing, Including X-Ray Development Fluid Waste:** *CLIA member lines have agreed to eliminate the discharge of silver from these sources into the marine environment through the use of best available technology that will reduce the silver content of the waste stream below levels specified by prevailing regulations or by treating all photo processing and x-ray development fluid waste (treated or untreated) as a hazardous waste and landing ashore in accordance with RCRA requirements.*

There are several waste streams associated with photo processing operations that have the potential to be regulated under the Resource Conservation and Recovery Act (RCRA). These waste streams include spent fixer, spent cartridges, expired film and silver flake.

Photographic fixer removes the unexposed silver compounds from the film during the developing process. The spent fixer can have as much as 2000-3000 parts per million (ppm) of silver. Silver bearing waste is regulated by RCRA as a hazardous waste if the level of silver exceeds 5 ppm as determined by the Toxicity Characteristic Leaching Procedure (TCLP) test.

Silver recovery units may be used to reclaim the silver from the used fixer waste stream. There are two types of recovery units. These are active (with electricity) and passive (without electricity) units. The active unit uses electricity to plate silver onto an electrode. The passive unit uses a chemical reaction between steel wool and silver to remove most of the silver from solution. Utilizing the best available technology, the equipment currently onboard CLIA member cruise ships is conservatively estimated to reduce the silver content of this effluent below 4 mg/l (milligrams/l or ppm)

Handling Method 1 Employed by Member Lines:

Treat used photographic and x-ray development fluids to remove silver for recycling.

Verify that the effluent from the recovery unit is less than 5 parts per million (ppm) silver, as measured by EPA-approved methodology.

After treatment, the residual waste stream fluid is non-hazardous and landed ashore as industrial waste.

Handling Method 2 Employed by Member Lines:

Used photographic and x-ray development fluids, either treated or untreated, may be assumed to be a hazardous waste. In this event, they are landed ashore in accordance with the requirements of the Resource Conservation and Recovery Act (RCRA).

C. **Dry-cleaning waste fluids and contaminated materials**: *CLIA member lines have agreed to prevent the discharge of chlorinated dry-cleaning fluids, sludge, contaminated filter materials and other dry-cleaning waste byproducts into the environment.*

Shipboard dry cleaning facilities use a chlorinated solvent called perchlorethylene (also known as PERC or tetrachloroethylene) as a dry cleaning fluid. This is the approved dry cleaning solvent for these units. Operators must receive specific required training for the correct use of this chemical and its associated precautions. This solvent should be used in accordance with all safety procedures including appropriate personal protective equipment (PPE).

The dry cleaning units produce a small volume waste from condensate, the bottoms of the internal recovery stills, waste products from button and lint traps, spent perchloroethylene and filter media. This waste is comprised of dirt, oils, filters material, and spent solvent. Each ship utilizing these dry-cleaning units produces approximately two pounds of waste material weekly. However, the amounts may vary greatly by season and passenger load. This material is classified as hazardous waste under RCRA and must be disposed of accordingly.

Handling Method 1 Employed by Member Lines:

Perchloroethylene (PERC) and other chlorinated dry-cleaning fluids, contaminated sludge and filter materials are hazardous waste and landed ashore in accordance with the requirements of RCRA.

C. **Print Shop Waste Fluids**: *CLIA member lines have agreed to prevent the discharge of hazardous wastes from printing materials (inks) and cleaning chemicals into the environment.*

Print shop waste may contain hazardous waste. Printing solvents, inks and cleaners all may contain hydrocarbons, chlorinated hydrocarbons, and heavy metals that can be harmful to human and aquatic species. Recent advances in printing technology and substitution of chemicals that are less hazardous reduces the volume of print shop waste generated and reduces the impact of these waste products.

CLIA member lines have agreed to utilize, whenever possible, printing methods and printing process chemicals that produce both less volume of waste and less hazardous waste products, that shipboard printers will be trained in ways to minimize printing waste generated, and that alternative printing inks such as soy based, non-chlorinated hydrocarbon based ink products will be used whenever possible. The member lines have further agreed that all print shop waste including waste solvents, cleaners, and cleaning cloths will be treated as hazardous waste, if such waste contains chemical components that may be considered as hazardous by regulatory definitions, and that all other waste may be treated as non-hazardous.

Handling Method 1 Employed by Member Lines:

When using traditional or non-soy based inks and chlorinated solvents, all print shop waste is treated as hazardous, and discharged ashore in accordance with RCRA.

Handling Method 2 Employed by Member Lines:

Shipboard printing processes use non-toxic based printing ink such as soy based, non-chlorinated solvents, and other non-hazardous products to eliminate hazardous waste products.

D. **Photo Copying and Laser Printer Cartridges**: *CLIA member lines have agreed to initiate procedures so as to maximize the return of photocopying and laser printer cartridges for recycling, and in any event, have agreed that these cartridges will be landed ashore.*

Increased use of laser and photo copying equipment on shore as well as onboard ship results in the generation of increased volumes of waste cartridges, inks, and toner materials. CLIA member lines have agreed to use only such inks, toners and printing/copying cartridges that contain non-hazardous chemical components, and that none of these cartridges or their components should be disposed of by discharge into the marine environment. In recognition of the member lines' goal of waste minimization, they have further agreed these cartridges should, whenever possible, be returned to the manufacturer for credit, recycling, or for refilling.

Handling Method Employed by Member Lines:

CLIA member lines have agreed that wherever possible, photo copying and laser printer cartridges will be collected, packaged and returned for recycling and when this is not possible, that these materials will not be discharged into the sea or other bodies of water but will be handled as other shipboard waste that is landed ashore for further disposal.

F. **Unused And Outdated Pharmaceuticals**: *CLIA member lines have agreed to ensure that unused and/or outdated pharmaceuticals are effectively and safely disposed in accordance with legal and environmental requirements.*

In general ships carry varying amounts of pharmaceuticals. The pharmaceuticals carried range from over-the-counter products such as anti-fungal creams to prescription drugs such as epinephrine. Each ship stocks an inventory based on its itinerary and the demographics of its passenger base. CLIA member lines have agreed that all pharmaceuticals will be managed to ensure that their efficacy is optimized and that disposal is done in an environmentally responsible manner.

CLIA member lines have further agreed that when disposing of pharmaceuticals, the method used will be consistent with established procedures, and that pharmaceuticals and medications which are off specification or which have exceeded their shelf-life, and stocks that are unused and out of date, cannot be used for patients and therefore will be removed from the ship. Further, each regulatory jurisdiction has a posting of listed pharmaceuticals that must be considered hazardous waste once the date has expired or the item is no longer considered good for patient use.

Through onboard management of the medical facility, CLIA member lines have agreed that stocks of such listed pharmaceuticals are returned to the vendor prior to date of expiration. Pharmaceuticals that are being returned and which have not reached their expiration date are shipped using ordinary practices for new products.

Safety and Health

CLIA member lines have agreed that all expired listed pharmaceuticals will be handled in accordance with established procedures and all personnel handling this waste will receive

appropriate training in the handling of hazardous materials. As guidance, the US Environmental Protection Agency (EPA) has issued a report that clarifies the fact that residuals, such as epinephrine, found in syringes after injections are not considered an acutely hazardous waste by definition and may be disposed of appropriately in sharps containers. Member lines have agreed that all Universal Precautions will be adhered to when handling sharps.

Handling Method 1 Employed by Member Lines:

Establish a reverse distribution system for returning unexpired, unopened non-narcotic pharmaceuticals to the original vendor.

Handling Method 2 Employed by Member Lines:

Appropriately destroy narcotic pharmaceuticals onboard ship in a manner that is witnessed and recorded.

Handling Method 3 Employed by Member Lines:

Land listed pharmaceuticals in accordance with local regulations. Listed pharmaceuticals are a hazardous waste having chemical compositions which prevent them from being incinerated or disposed of through the ship's sewer system. Listing of such pharmaceuticals may vary from state to state.

Handing Method 4 Employed by Member Lines:

Dispose of other non-narcotic and non-listed pharmaceuticals through onboard incineration or landing ashore.

G. **Fluorescent and Mercury Vapor Lamp Bulbs**: *CLIA member lines have agreed to prevent the release of mercury into the environment from spent fluorescent and mercury vapor lamps by assuring proper recycling or by using other acceptable disposal methods.*

Fluorescent and Mercury Vapor lamps contain small amounts of mercury that could potentially be harmful to human health and the environment. To prevent human exposure and contamination of the environment, CLIA member lines have agreed that these lamps will be handled in an environmentally safe manner. Recycling of mercury from lamps and other mercury containing devices is the preferred handling method and is encouraged by various states. The recycling of fluorescent lamps and high intensity discharge (HID) lamps keeps potentially hazardous materials out of landfills, saves landfill space and reduces raw materials production needs.

The recycling of fluorescent and HID lamps is a proven technology capable of reliably recovering greater than 99 percent of the mercury in the spent lights. At the recycling facility, this is done by using a crush-and-sieve method. In this process, the spent tubes are first crushed and then sieved to separate the large particles from the mercury containing phosphor powder. The phosphor powder is collected and processed under intense heat and negative pressure, a process called retorting. The mercury is volatized and then recovered by condensation. The glass particles are segregated and recycled into other products such as fiberglass. Aluminum components are also recycled separately.

Storage and handling of used lamp bulbs pose no compatibility problems. Disposal of the glass tubes can be accomplished by (1) processing with shipboard lamp crusher units that filter and adsorb the mercury vapor through H.E.P.A. and activated carbon or (2) by keeping the glass tubes intact for recycling ashore. The intact lamps or crushed bulbs are classified as "Universal Waste" when they are shipped to a properly permitted recycling facility; as such, testing is not required. The filters are disposed of as a hazardous waste in accordance with applicable US EPA or other prevailing laws and regulations.

Handling Method Employed by Member Lines:

(1) Fluorescent and mercury vapor lamps are collected and processed aboard by lamp crusher units and disposed of as stated above; or

(2) Fluorescent and mercury vapor lamps are collected intact and landed for recycling or disposal in accordance with prevailing laws and regulations.

H. Other Mercury Containing Products: *CLIA Member lines have agreed to prevent the discharge of mercury containing products into the sea.*

Reduction in use: Where feasible, CLIA members will reduce the use of mercury containing products.

Disposal: Once mercury-containing products are no longer able to be used, or require disposal, these products shall be landed ashore as universal or hazardous waste as appropriate.

I. Batteries: *CLIA member lines have agreed to prevent the discharge of spent batteries into the marine environment.*

If not properly disposed of, spent batteries may constitute a hazardous waste stream. Most of the large batteries are on tenders and standby generators. Small batteries used in flashlights and other equipment and by passengers, account for the rest. There are four basic types of batteries used.

Lead-acid batteries – These are used in tenders and standby generators. They are wet, rechargeable, and usually six-celled. They contain a sponge lead anode, lead dioxide cathode, and sulfuric acid electrolyte. The electrolyte is corrosive. These batteries require disposal as a hazardous waste, unless recycled or reclaimed.

Lead-acid batteries use sulfuric acid as an electrolyte. Battery acid is extremely corrosive, reactive and dangerous. Damaged batteries will be drained into an acid-proof container. A damaged and leaking battery is then placed in another acid-proof container, and both the electrolyte and the damaged battery placed in secure storage for proper disposal as a hazardous waste.

Nickel-cadmium (NiCad) batteries – These are usually rechargeable, and contain wet or dry potassium hydroxide as electrolyte. The potassium hydroxide is corrosive and the cadmium is a characteristic hazardous waste. Therefore, NiCad batteries will be disposed of as hazardous waste, unless recycled or reclaimed.

Lithium batteries – These are used as a power source for flashlights and portable electronic equipment. All lithium batteries will be disposed of as hazardous waste, or sent out for reclamation.

Alkaline batteries – These are common flashlight batteries and are also used in many camera flash attachments, cassette recorders, etc. They should be recycled, properly disposed or reclaimed.

Handling Method Employed by Member Lines:

Spent batteries are collected and returned for recycling and/or disposal in accordance with prevailing regulations. Discarded batteries are isolated from the refuse waste stream to prevent potentially toxic materials from inappropriate disposal. The wet-cell battery-recycling program is kept separate from the dry battery collection process. Intact wet-cell batteries are sent back to the supplier. Dry-cell batteries are manifested to a licensed firm for recycling.

J. Bilge and Oily Water Residues: *CLIA member lines have agreed to meet or exceed the international requirements for removing oil from bilge and wastewater prior to discharge.*

The area of the ship at the very bottom of the hull is known as the bilge. The bilge is the area where water collects from various operational sources such as water lubricated shaft seals, propulsion system cooling, evaporators, and other machinery. All engine and machinery spaces also collect oil that leaks from machinery fittings and engine maintenance activities. In order to maintain ship stability and eliminate potential hazardous conditions from oil vapors in engine and machinery spaces, the bilge spaces should be periodically pumped dry. In discharging bilge and oily water residues, both international regulations (MARPOL) and United States regulations require that the oil content of the discharged effluent be less than 15 parts per million and that it not leave a visible sheen on the surface of the water.

All ships are required to have equipment installed onboard that limits the discharge of oil into the oceans to 15 parts per million when a ship is en route and provided the ship is not in a special area where all discharge of oil is prohibited. Regulations also require that all oil or oil residues, which cannot be discharged in compliance with these regulations, be retained onboard or discharged to a reception facility. The equipment and processes implemented onboard cruise ships to comply with these requirements are complex and sophisticated.

The term "*en route*" as utilized in MARPOL (73/78) Regulation 9(b) is taken to mean while the vessel is underway. The U.S. Coast Guard has informed CLIA that it agrees with this meaning of "*en route.*"

In accordance with MARPOL (73/78) Regulation 20 and as appropriate, US regulations (33CFR151.25), CLIA member lines have agreed that every cruise ship of 400 gross tons and above shall be provided with an oil record book which shall be completed on each occasion whenever any of numerous specified operations take place in the ship and that operations include:

a. Ballasting or cleaning of fuel oil tanks,
b. Discharge of dirty ballast or cleaning water from the fuel oil tanks above,
c. Disposal of oily residues,
d. And discharge of bilge water that accumulated in machinery spaces.

Requirements regarding the keeping of an Oil Record Book as well as the form of the Oil Record Book are also found in MARPOL and in U.S. Coast Guard regulations (33CFR151).

Handling Method Employed by Member Lines:

Bilge and oily water residue are processed prior to discharge to remove oil residues, such that oil content of the effluent is less than 15 ppm as specified by MARPOL Annex 1.

K. Glass, Cardboard, Aluminum and Steel Cans: *CLIA member lines have agreed to eliminate, to the maximum extent possible, the disposal of MARPOL Annex V wastes into the marine environment. This will be accomplished through improved reuse and recycling opportunities. They have further agreed that no waste will be discharged into the marine environment unless it has been properly processed and can be discharged in accordance with MARPOL and other prevailing requirements.*

Management of shipboard generated waste is a challenging issue for all ships at sea. This is true for cruise vessels, other commercial vessels, military ships, fishing vessels and recreational boats. Waste products in the past were made from natural materials and were mostly biodegradable. Today's packaging of food and other products present new challenges for waste management. A large cruise ship today can carry over three thousand passengers and crew. Each day, an average cruise passenger will generate two pounds of dry trash and dispose of two bottles and two cans.

A strategy of source reduction, waste minimization and recycling has allowed the cruise industry to significantly reduce shipboard generated waste. To attain this, CLIA member lines have agreed to adopt a multifaceted strategy that begins with waste minimization to decrease waste from provisions brought onboard. This means purchasing in bulk, encouraging suppliers to utilize more efficient packaging, reusable packaging, and packaging materials that are more environmentally friendly—those that can be more easily disposed of or recycled. In fact, through this comprehensive strategy of source reduction, total waste on passenger vessels has been reduced by nearly half over the past ten years.

Another important component of the industry's waste reduction strategy is product or packaging recycling. Glass, aluminum, other metals, paper, wood and cardboard are, in most cases, recycled. Wood and cardboard may be incinerated when appropriate.

Handling Method Employed by Member Lines:

MARPOL Annex V ship waste is minimized through purchasing practices, reuse and recycling programs, landing ashore and onboard incineration in approved shipboard incinerators. Any Annex V waste that is discharged at sea will be done in strict accordance with MARPOL and any other prevailing requirements.

L. Incinerator Ash: *CLIA member lines have agreed to reduce the production of incinerator ash by minimizing the generation of waste and maximizing recycling opportunities, and that the discharge of incinerator ash containing hazardous components will be prevented through a program of waste segregation and periodic ash testing.*

Incinerator ash is not normally a hazardous waste. Through relatively straightforward waste management strategies, items that would cause the ash to be hazardous are separated from the waste stream and handled according to accepted hazardous waste protocols. In general, source segregation for waste streams is foundational for onboard waste management and is incorporated into the waste management manual required by MARPOL. Waste management for onboard waste streams include the following: source reduction, minimization, recycling, collection, processing and discharge ashore. This allows the incinerator to be used primarily for food waste, contaminated cardboard, some plastics, trash and wood.

Member lines have agreed that incinerator ash will be tested at least once quarterly for the first year of operation to establish a baseline and that testing may then be conducted once a year. The member lines have further agreed that a recognized test procedure will be used to demonstrate that ash is not a hazardous waste. A recognized test procedure includes the following metals as indicators for toxicity - arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. Special attention is placed on the removal of batteries from the incinerator waste stream. The use of incinerators saves landfill space and prevents the build up of material onboard that could become the breeding ground for insects, rodents and other vermin.

Handling Method Employed by Member Lines:

Proper hazardous waste management procedures are to be instituted onboard each ship to assure that waste products, which will result in a hazardous ash, are not introduced into the incinerator. Non-hazardous incinerator ash may be disposed of at sea in accordance with MARPOL Annex V. Ash identified as being hazardous is disposed of ashore in accordance with RCRA.

M. Wastewater reclamation

Because of the amounts of fresh water involved, and its restricted availability onboard ship (all fresh water must be either purchased or generated onboard), fresh water is a valuable commodity. Therefore, water management is extremely important and takes the form of both minimizing water usage and the potential reclamation and reuse of water for non-potable purposes. Many CLIA companies are researching new technology and piloting graywater treatment systems onboard their vessels. CLIA member operators also take numerous steps in onboard water management. Water management techniques include:

a. Use of technical water (for example: air conditioning condensate) where possible.
b. Use of water recovery systems (for example: filtering and reuse of laundry water – last rinse use for first wash).
c. Reclamation and reuse as technical water (flushing toilets, laundry, open deck washing) of properly treated and filtered wastewaters.
d. Active water conservation (for example: use of reduced flow showerheads, vacuum systems for toilets, vacuum food waste transportation and laundry equipment that utilizes less water).

N. Graywater: *For ships traveling regularly on itineraries beyond the territorial waters of coastal states, CLIA member lines have agreed to discharge graywater only while the ship is underway and proceeding at a speed of not less than 6 knots[1]; that graywater will not be discharged in port and will not be discharged within 4 nautical miles from shore or such other distance as agreed to with authorities having jurisdiction or provided for by local law except in an emergency, or where geographically limited. The member lines*

have further agreed that the discharge of graywater will comply with all applicable laws and regulations. For vessels whose itineraries are fully within US territorial waters, discharge shall comply fully with U.S. and individual state legislation and regulations.

The term graywater is used on ships to refer to wastewater that is generally incidental to the operation of the ship. The International Maritime Organization (IMO) defines graywater as including drainage from dishwasher, shower, laundry, bath and washbasin drains. The US Clean Water Act (formally know as the Federal Water Pollution Control Act) includes galley, bath and shower water in its definition of graywater. The US regulations implementing this act do not include a further definition of gray water. However, the regulations do include a provision that exempts all of the wastewater included in the IMO definition and other discharges incidental to the operation of a ship from the Clean Water Act's permitting program (formally known as the National Pollution Discharge Elimination System (NPDES) program). Finally, the US Coast Guard regulations include provisions that essentially combine the two definitions from the IMO and the Clean Water Act. None of the definitions of graywater include blackwater (discussed below) or bilgewater from the machinery spaces. Recent U.S. Legislation places limits on the discharge of graywater in the Alaska Alexander Archipelago.

Handling Method Employed by Member Lines:

Graywater is discharged only while ships are underway and proceeding at a speed of not less than 6 knots, in recognition that dispersal of these discharges is desirable and that mixing of these waters, which are discharged approximately 10-14 feet below the surface, by the action of the propellers and the movement of the ship, provides the best dispersal available.

O. Blackwater: *Waste from toilets, urinals, medical sinks and other similar facilities is called "blackwater." CLIA members have agreed that all blackwater will be processed through a Marine Sanitation Device (MSD), certified in accordance with U.S. or international regulations, prior to discharge. For ships traveling regularly on itineraries beyond the territorial water of coastal states, discharge will take place only when the ship is more than 4 miles from shore and when the ship is traveling at a speed of not less than 6 knots.* [1]
For vessels whose itineraries are fully within US territorial waters, discharge shall comply fully with U.S. and individual state legislation and regulations.

P. Advanced Wastewater Purification Systems:

To improve environmental performance, cruise lines are testing and installing wastewater purification systems that utilize advanced technologies. These onboard wastewater treatment systems are designed to result in effluent discharges that are of a high quality and purity; for example, meeting or surpassing standards for secondary and tertiary effluents and reclaimed water. Effluents meeting these high standards would not be subjected to the strict discharge limitations previously discussed.

[1] For vessels operating under sail, or a combination of sail and motor propulsion, the speed shall not be less than 4 knots.

Q. Training and Educational Materials

Training is an important and ongoing part of every position and tasking onboard cruise ships. Not only is training necessary for the safe and economical operation of a ship, it is required by numerous international conventions and flag state regulations. The International Convention on Standards of Training Certification and Watchkeeping (STCW) for example, sets forth requirements for knowledge, experience and demonstrated competency for licensed officers of the deck and engineering departments and for ratings forming part of the navigation or engineering watch. Equivalent national standards apply to ships in United States registry. These detailed requirements address not only the navigation of the ship but also the proper operation of the shipboard machinery and knowledge of and ability to assure compliance with the environmental protection requirements of MARPOL and the safety regulations of The International Convention on Safety of Life at Sea (SOLAS). SOLAS also requires that the ship's training manual (which contents are prescribed by regulation) be placed in the crew messes and recreation rooms or in individual crew cabins.

CLIA member lines have developed programs that raise the level of environmental awareness on the part of both the passengers and the crew. Each ship's crew receives training regarding shipboard safety and environmental procedures. Advanced training in shipboard safety and environmental management procedures is provided for those directly involved in these areas. Those directly responsible for processing wastes are given specific instruction in their duties and responsibilities and in the operation of the various equipment and waste management systems. Specific actions that our member lines have taken to train employees and increase passenger awareness include:

a. Announcements over the public address system and notices in ship newsletters that caution against throwing any trash overboard,
b. Signage and colorful posters placed in crew and passenger areas encouraging environmental awareness and protection,
c. Safety and environmental information booklets in crew cabins and crew lounges,
d. Regular meetings of ship safety and environmental committees consisting of officers and crew from all departments to review methods of improving performance, including better and more effective environmental practices.

For ships on an international voyage, STCW, SOLAS, the International Management Code for the Safe Operation of Ships and for Pollution Prevention (ISM Code), require that training be fully documented. Individual training is documented in each crewmember's file. Ship training exercises, such as fire drills and emergency response exercises, are documented in the appropriate ship's logs. All of these training documents are required to be available for oversight examination by both the ship's flag state inspectors and by port state authorities such as the United States Coast Guard.

Placards warning of the prohibition of the discharge of oil are posted on all ships operating in the navigable waters of the United States as required by U.S. Coast Guard regulations (33CFR155.450). Additionally, as part of required shipboard waste management plans, both Coast Guard regulations (33CFR151.59) and MARPOL (Annex V Regulation 9) require the posting of placards that notify the passengers and the crew of the disposal requirements for garbage. These placards are to be written in the official language of the State whose flag the ship is entitled to fly and also in English or French if neither of these is the official

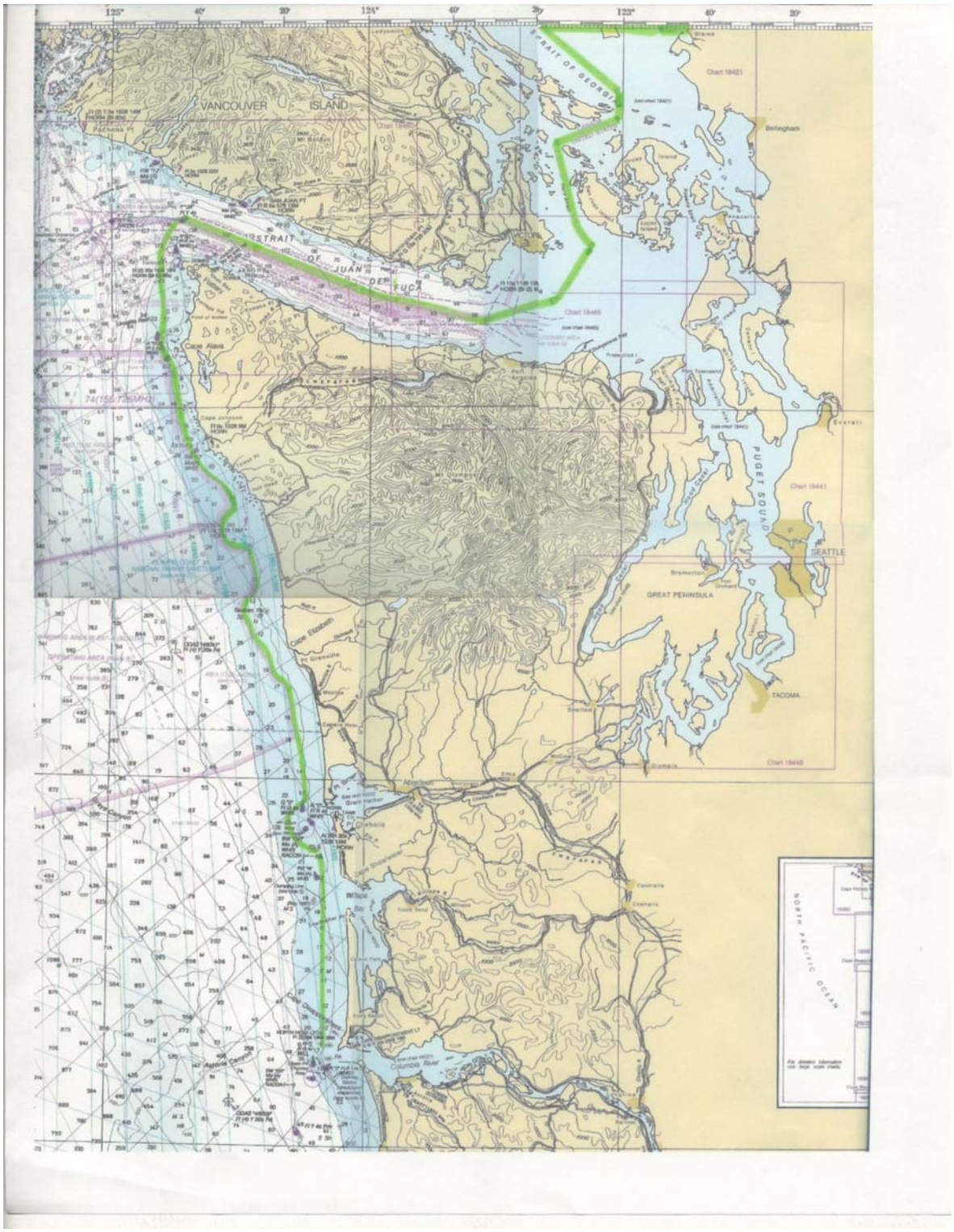
language. Once again, oversight of compliance with these requirements is conducted by ISM audits and frequent inspections by flag states and the United States Coast Guard.

For those ships on an international voyage, the Safety of Life at Sea Convention mandates compliance with the ISM Code. This comprehensive Code requires that each vessel operating company and each vessel participate in a_very strictly defined management program, under both internal and external audit and regulatory oversight that sets forth detailed procedures for assuring compliance with safety, environmental protection, emergency response and training mandates.

Equivalent equipment, practices and procedures

CLIA member lines have agreed that the use of equivalent or other acceptable practices and procedures shall be communicated to CLIA. As appropriate, such practices and procedures shall be included as a revision to this document. As an example, when improved systems for treating blackwater and graywater are perfected, shown to meet the requirements for MSDs and accepted by appropriate authorities for the treatment of graywater, the new systems and associated technology will be included together with their impact on the current standard of discharging graywater only while underway.

Appendix iii:
Navigational Chart of Waters Subject to this MOU



Appendix iv

U.S. Department of Homeland Security

United States Coast Guard

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COMDTPUB P16700.4
NVIC 04-04

13 FEBRUARY 2004

NAVIGATION AND VESSEL INSPECTION CIRCULAR NO. 04-04

Subj: ENVIRONMENTAL INSPECTION CHECKLIST; ADDENDUM TO FOREIGN PASSENGER VESSEL EXAMINATION BOOK, CG-840

Ref:
(a) General Accounting Office (GAO) Report of February 2000 on "MARINE POLLUTION - Progress Made to Reduce Marine Pollution by Cruise Ships, but Important Issues Remain."
(b) Title XIV "Certain Alaskan Cruise Ship Operations" contained in Section 1(a)(4) of Public Law 106-554 enacted on December 21, 2000
(c) 33 CFR 159, Subpart E – Discharge of Effluents in certain Alaskan Waters by Cruise Vessel Operations
(d) Memorandum of Understanding (MOU) dated March 14, 2000 entered between Florida Department of Environmental Protection (FDEP) and the Florida-Caribbean Cruise Association (FCCA), a representative of the cruise industry in Florida
(e) International Council of Cruise Lines (ICCL) Industry Standard E-01-01, "Waste Management Practices and Procedures"

1. PURPOSE. As the result of a GAO report and Bluewater Network petition, the FCCA, FDEP, and the Coast Guard began discussing the means to improve and ensure the compliance of large passenger vessels with existing Federal and state environmental standards. These discussions have resulted in the checklist contained in Enclosure 1. This checklist is an extensive list of possible inspection items related to pollution prevention equipment, operation, plans and records. It is intended as a job aid to be used by Coast Guard personnel during certificate of compliance examinations onboard foreign-flagged passenger vessels. Additionally, this document does not change or establish new Coast Guard authorities, but is intended to provide

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	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
A																										
B	*	1	1											1				1								1
C					1							1	1	1												
D	1										1															
E														1	1											
F																										
G																										
H																										

NON-STANDARD DISTRIBUTION: B:a G-MOC, G-MO-1, G-MSE (1)

a framework and focus on responsibilities currently possessed. This checklist will be incorporated into a future revision of the existing Foreign Passenger Vessel Examination Book, CG-840.

2. ACTION. Officers in Charge Marine Inspections (OCMIs) and their designated marine inspectors should:

   a. Bring this circular to the attention of appropriate individuals in the marine industry within their zones, especially those in the industry who are not members of ICCL. This circular is available on the world-wide web at: http://www.uscg.mil/hq/g-m/nvic/index.htm. Internet release authorized.

   b. Follow the guidance in this circular while conducting Certificate of Compliance examinations on foreign-flag passenger vessels, choosing one of the five waste streams to inspect.

   c. If any non-conformities are noted between the procedures listed in the vessel's Safety Management System (SMS) documentation and the actual procedures being followed on the ship, notify the Company immediately and follow the guidance contained in NVIC 4-98. If major non-conformities are identified, an OCMI should use risk-based decision-making and exercise discretion with regard to the level of control action utilized on the vessel.

   d. If deficiencies or discrepancies are noted in the execution of the hazardous waste management program, notify the applicable Environmental Protection Agency (EPA) office or the State Resource Conservation and Recovery Act (RCRA) program office immediately.

3. DIRECTIVES AFFECTED. The existing Foreign Passenger Vessel Examination Books CG-840, CV1, CV2 and CV3 will be revised to include the checklist contained in Enclosure (1), as soon as practicable.

4. BACKGROUND.

   a. From 1993 to 1998, nearly 2400 documented cases of pollution by foreign-flagged vessels were investigated, of which nearly four percent involved passenger vessels. As a result, Congress requested the GAO to examine the nature and extent of cruise ship involvement in these incidents; current and planned federal agency enforcement efforts; and cruise company actions to prevent future recurrences of pollution incidents. On February 1, 2000, the GAO completed a report to Congress, reference (a), recommending that the Coast Guard initiate discussions with the cruise ship industry, other federal and state agencies, and environmental groups as appropriate, on the need for improved water quality standards for gray water and black water discharged from cruise ships and other vessels. In addition, the report recommended an assessment of the need to periodically monitor the water quality of these discharges. This GAO report is available on the world-wide web for review at http://frwebgate. access.gpo.gov/cgi-bin/useftp.cgi?IPaddress=162.140.64.21 &filename=rc00048.pdf&directory=/diskb/wais/data/gao.

b. At the time reference (a) became public, federal responsibilities were in place for various vessel waste stream control systems including effluent from the oily water separators, effluent from the sewage treatment plants, hazardous waste, and garbage. Subsequently, legislation was passed and regulations were promulgated (see references (b) and (c)) that expanded federal responsibilities to include requirements for gray water discharge and for monitoring and sampling of black water and gray water waste streams on cruise ships in Alaska[1].

c. On March 14, 2000, the Florida Caribbean Cruise Association (FCCA) signed a MOU with the Florida Department of Environmental Protection (FDEP), reference (d), that is available for review on the world-wide web at **http://www.iccl.org/resources/fdep_mou.htm.** Under this MOU, the FDEP recognized ICCL's Industry Standard E-01-01, "Waste Management Practices and Procedures," reference (e), as meeting or exceeding the standards set forth in Florida laws and applicable regulations. Though not a party to the MOU, the Coast Guard participated in discussions that resulted in the MOU. In the MOU, the FDEP recognized the Coast Guard as the primary federal agency with responsibility for examining passenger vessel waste streams. As a result, the Coast Guard worked in conjunction with FDEP and ICCL to develop a checklist related to monitoring of hazardous waste and disposal.

5. DISCUSSION. The enclosed checklist reflects the collective work of the USCG, FCCA and FDEP and has been tested for use by several Coast Guard Marine Safety Offices. The checklist is not a listing of all items to be inspected; rather the marine inspector should use it as a reminder of the various items that may be examined during a certificate of compliance examination of a foreign passenger vessel. As always, the marine inspector's experience, knowledge, and judgment will determine the depth and scope of each examination. However, each marine inspector should select at least one waste stream for a thorough and detailed inspection during every annual or periodic foreign passenger vessel examination. The stream selection will be based on the marine inspector's discretion, taking into account the inspector's impression about the condition of the various waste stream systems on board the vessel. The selection will also be based on the need to inspect all systems over a reasonable period of time, whether a particular waste stream is applicable for examination (e.g. there may be no requirement applicable to gray water at the port of examination or the vessel does not discharge/offload hazardous waste), and maintaining randomness so that the operator has no advance knowledge of the waste stream that may be selected. During the examination, the operator should be able to present to the marine inspector a clear description of the practices and procedures for handling each waste stream and also to produce such records, as the inspector might need to verify compliance with these guidelines. In performing pollution prevention examinations, inspectors should be especially familiar with the contents of the Marine Safety Manual (MSM), Volume II, Material Inspection, Section B, Chapter 6, "Pollution Prevention," and Section C, Chapter 2, Paragraph K, "Marine Sanitation Devices" and this NVIC. Marine inspectors should also be familiar with ICCL's Industry Standard E-01-01 "Waste Management Practices and Procedures", reference (e), and the vessel's Safety Management System (SMS) documentation, which should address all the elements discussed in

1 Presently, there are no other federal requirements **applicable to the control or filtering of gray water discharge from foreign-flagged passenger ships.**

this standard. Note reference (e) is available at the ICCL website at http://www.iccl.org/resources/exhibit a.pdf. If any elements are not addressed there should be a rationale for its omission. The different waste streams may be categorized as follows:

a. Oil pollution prevention systems: include the oily water separator, the fuel/lubricating oil transfer, and sludge containment system. The marine inspector should verify that the oily water separator is operating within the desired range; that the alarms are working; that crew is knowledgeable and operating instructions are posted; and that maintenance is carried out at regular intervals. Actual piping may be verified against the approved piping diagram if the marine inspector notices modifications made to the system.

b. Black water system: includes marine sanitation devices (MSDs) and other systems to treat, store, and discharge sewage. The checklist is designed to guide the marine inspector through some basic questions to ascertain whether the system is working as designed and that the crew is properly trained in its operation. For example, does the MSD appear to be properly installed? Is the MSD approved for use on this particular vessel (USCG Approved, IMO or Administration Approved to MARPOL Annex IV)? Is there adequate capacity or throughput for the number of persons on board? Are maintenance procedures being followed, including procedures outlined in the vessel's SMS? Are there records of expendables being ordered: filters, chemicals, et cetera? Are the units operating within the manufacturer's design specifications? Are there clear and simple operating instructions? Is the crew knowledgeable in the use of the equipment/system?

c. Hazardous waste: includes dry cleaning (containing Perchloroethylene, or commonly-called "PERC") waste, used paints and thinners that contain hazardous substances, silver-bearing photo-processing waste, cleaning solutions and other items that contain hazardous substances. Each vessel may vary in both the type and volumes of hazardous waste generated depending on the technology and processes used aboard. This checklist is designed to evaluate onboard management of hazardous waste streams, to ensure that hazardous constituents are not released into the environment, and that accountability is demonstrated via adequate waste disposal records.

d. Non-hazardous waste: includes shipboard garbage including plastics and synthetic material, medical waste, food wastes and recyclables such as glass, cardboard, aluminum and metal cans. Items to be checked should include: disposal and incineration records; waste sorted to prevent hazardous waste from entering the non-hazardous waste stream; no plastics or synthetics discharge overboard; separate and proper disposal of hazardous and non-hazardous incinerator ash; and proper disposal of cooking grease from grease traps.

e. Gray water system: includes discharges from galley, sinks, washbasin drains, showers, and baths, excluding drains and sinks from medical spaces. These may be held in large tanks before being pumped overboard. The handling and discharge of gray water will *vary* from ship to ship and the inspector should ensure the procedures followed by the ship correspond to those described in its SMS documentation. If gray water is directed to MSD systems, the marine inspector shall ensure that combined gray water/black water throughput does not exceed the throughput of the MSD systems. Other waste streams such as hazardous waste

or medical waste must also not be mixed with gray water. Drains from hospitals, photo labs (if hazardous substances are used and stored therein), and slops, must be separate from the gray water system.

T. H. GILMOUR
Rear Admiral, U. S. Coast Guard
Assistant Commandant for Marine Safety,
Security, and Environmental Protection

Encl: (1) Foreign Passenger Vessel Pollution Survey Exam Book (CG-840 PSEB)

United States Coast Guard

FOREIGN PASSENGER VESSEL POLLUTION SURVEY EXAM BOOK

(FOR ALL PASSENGER VESSELS)

Name of Vessel	**Flag** ☐ No Change
IMO Number	**Case Number**
Date Completed	
Location	
Senior Marine Inspectors / Port State Control Officers	
1.	5.
2.	6.
3.	7.
4.	8.

Use of Foreign Passenger Vessel Pollution Survey Exam Book

This Checklist is an extensive list of possible examination items related to pollution prevention equipment, operation, plans and records. It is intended as a job aid to be used by Coast Guard senior marine inspectors during boardings of foreign-flagged passenger vessels. It is not the Coast Guard's intention to inspect all the items listed in the checklist at every exam; rather the inspector should use it as a reminder of the various items that may be examined during a foreign passenger vessel certificate of compliance examination. As always, the inspector's experience, knowledge, and judgment will determine the depth and scope of each examination; however, the inspector should select at least one waste stream for a thorough and detailed inspection. The stream selection will be based on the marine inspector's discretion, taking into account the inspectors impression about the condition of the various waste stream systems on board the vessel, weighing the need to inspect all systems over a reasonable period of time, and maintaining randomness so that the operator has no advance knowledge of the waste stream that may be selected.

It is incumbent on the vessel operator to be familiar with this checklist. The individuals responsible for different segments of the various waste streams should be able to present to the inspector a clear description of the practices and procedures for handling each waste stream and also to produce such records, as the marine inspector might need, to verify compliance with these guidelines. Inspectors should obtain a clear picture about the selected waste stream(s) and associated environmental processes by observing onboard practices and through questioning of the individuals that perform these practices. Inspectors should avoid circumstances in which a shore-side representative is the sole company liaison during the environmental inspection.

As a port state responsibility, marine inspectors and port state control officers must verify that the vessels and their crews are in substantial compliance with international conventions and applicable U.S. laws. The marine inspectors and port state control officers, based on their observations, must determine the depth and scope of the examination.
This document does not establish or change Federal laws or regulations. References given are only general guides. Refer to IMO publications, United States Code, Code of Federal Regulations, the Port State Control Job Aid, NVIC's, and any locally produced guidance for specific regulatory references. Marine inspectors should be especially familiar with all equipment standards and the contents of the Marine Safety Manual (MSM), Volume II, Material Inspection, Section B, Chapter 6, "Pollution Prevention," Section C, Chapter 2, Paragraph K, "Marine Sanitation Devices," and Volume IV, Technical, Chapter 3, Section K, "Special Engineering Applications for Pollution Prevention".

NOTE: *Guidance on how to examine foreign passenger vessels for compliance with pollution prevention equipment standards, can be found in NVIC _-04.*

Conducting the exam

- ❑ Complete Certificates/Equipment Data/Records information (Section A).
- ❑ Review SMS Environmental Procedures (Section B).
- ❑ Examine MSD, OWS, Garbage logs, Oil Record Book as per CG-840 Exam books.
- ❑ Determine if gray water requirements apply in the vessel's AOR and in inspection zone (If not, do not select C2)
- ❑ Make waste stream selection for a detailed exam (Section C)
  Section
  - CI Oil Pollution Handling Waste Stream (Bilge, Sludge, Fuel, Lube Oil etc)
  - C2 Gray Water Waste Stream
  - C3 Black Water/Sewage Waste Stream
  - C4 Hazardous Waste Stream
  - C5 Non-hazardous Waste Stream

NOTE: Many items listed are not mandatory requirements, but fall under the umbrella of "Management Policy". Marine inspectors should be familiar with ICCL's Industry Standard E-01-01 "Waste Management Practices and Procedures," and SMS documentation on all cruise ships should address all the elements discussed in this standard. If any elements are not addressed there should be a rationale for its omission. If the areas listed are corporate policy as set out in the company's SMS documentation, then the vessel should be held accountable for the actions as required in 33 CFR 96 and SOLAS Chapter IX. If state or local laws exist that are more stringent than U.S. or international law, then the local or state laws must be followed. These vessels are not exempt simply because they are a foreign-flagged vessel.

Pre-inspection Items

- Review MISLE records
- Deficiency History
  - Critical Profile
- Review Court-ordered requirements and environmental audit reports, if applicable
  CG Activity History
  Print Center for Disease Control Green Sheet
  http://www2. cdc.gov/nceh/vsp/vspmain. asp

Post-inspection Items

- Issue letters/certificates to vessel
- Issue Port State Control Report of Inspection-Form A
- Issue Port State Control Report of Inspection-Form B (if needed)
- Complete COC endorsement (include "Waste Stream" area inspected)
- MISLE activity case

Certificates / Reports (complete at annual exam or to update MISLE Certificate data)

Name of Certificate	Issuing Agency	ID #	Port Issued	Issued Date	Expiration Date	No Change	Endorsement Date
International Oil Pollution Prevention (leave blank if completed in the CVE 840 book							
International Sewage Pollution Prevention Certificate (if issued)							
International Anti-Fouling System Certificate (if issued)							
State Certificates of Emission (only if applicable)							
State Certificates of Ballast Water (only if applicable)							

Equipment Data

Equipment Name	Capacity		US or MEPC Approval Nr	Authority/Agency	No Change	Date of approval/acceptance
Oily Water Separator	Throughput					
Oily Water Separator	Throughput					
Oily Water Separator	Throughput					
Waste Oil Holding Tank(s) Capacity(ies)						
Marine Sanitation Device Certificate of Type Test	Volume/day					
Marine Sanitation Device Certificate of Type Test	Volume/day					
Marine Sanitation Device Certificate of Type Test	Volume/day					
Black Water Tank Capacity						
Gray Water Tank Capacity						

Pollution Records

	Date	Location	Amount
Last time bunkers were taken on			
Next time bunkers will be taken on			
Last time sludge/oily bilge water pumped ashore			
Last operation of OWS or overboard discharge			
Garbage incinerated			
Garbage discharged overboard at sea			
Garbage discharged ashore			
Required U.S. Ballast Water Report			

SECTION A
Certificates/Equipment Data/Records
Information

Section B
Environmental Procedures

Environmental Procedures can be found in the ship's Safety Management System (SMS) documentation or in company polices and maintenance manuals, inspection logs, oil record books, etc. Marine inspectors should question the ship staff on procedures and normal operations, and compare the answer to what is written in procedures and manuals. For each waste stream, persons with specific responsibilities should be questioned at each step in the waste handling process. Inspectors should require being shown specific process step by the person responsible for that step. Inspectors should ask extensive questions regarding availability of documents and supporting material relevant to the individual performing the specific activity in the waste handling process. Other questions should focus upon training provided and reporting procedures when problems with waste management processes are identified. 33 CFR 155.700

- ❑ Current pollution prevention records — 33 CFR 156.150
  - Person-in-charge designated and qua lified(certificated/licensed) — 33 CFR 156.170
  - Transfer equipment tests and inspections — ISM Code/SMS
  - Declaration of Inspection (available and retained for at least one month) — 33 CFR 96
  - Ship to provide PMS logs and required PMS activities for the selected waste stream for verification.
  - Verify SMS incorporates PMS activities and logs for all Waste Streams.
  - Court required logs to track oil usage in systems having oil to sea interfaces (if applicable)
  - Recent environmental audit reports when available
- ❑ Oil Record book (Part 1) (spot-check)
  - Each operation signed by person-in-charge
  - Each complete page signed by master
  - Book maintained for 3 years — MARPOL Annex. 1/20
  - Use of proper codes and version for vessel — 33 CFR 151.25
  - Transfer receipts/manifest match oil record book entries
  - OWS rates not exceeding design criteria
  - Incinerator rates not exceeding design criteria
  - Consistent bilge water management patterns
  - Comparison of oil record book entries to vessel's daily tank sounding book
- ❑ Shipboard Oil Pollution Emergency Plan — MARPOL Annex. 1/26.1
  - Approved by Administration (class society) — 33 CFR 151.26
  - Updated and current
  - In English and working language of crew
  - Correct contact numbers for National and Local Authorities (Port Authorities for ports visited not every COTP)
  - Immediate Actions List
  - Non Mandatory Provisions (if listed in SOPEP). Spill kits located and inspected
- ❑ MARPOL Annex V
  - Placard posted
  - Record book
  - Garbage management plan — MARPOL Annex V/9
- ❑ Non-Hazardous Waste Disposal Documentation (if applicable)
  - EPA Generator ID#_____ (if applicable)
  - Records
  - Non-Hazardous Waste Manifests — U.S. Local Regulations as applicable
- ❑ Recycling policy being followed (requires a detailed assessment)
- ❑ Hazardous Waste Disposal Documentation (if applicable)
  - EPA Generator ID#_____ (if applicable) — Shipboard policy
  - Records — SMS
  - Uniform Hazardous Waste Manifests — 40 CFR 262
  - Land Disposal Restriction Notification Certification Forms (LDR) — Shipboard policy
  - Shipping Document for Regulated Medical Waste — SMS
  - Interview Person(s) responsible for landing of wastes
  - Specialized training for Responsible person(s) and related documentation
  - Evidence of disposal in other countries to bona fide receivers documented

Oil pollution prevention systems include, but are not limited to, the oily water separator, other filtering or flocculation devices, bilge water management, fuel/lubricating/waste oil transfer, purifier and lantern space sludge collection, transfer and containment systems. Marine inspectors should verify that the oily water separator is operating within the required range; that the alarms are working and sound at appropriate levels; that crew is knowledgeable and operating instructions are posted; that maintenance is carried out at regular intervals and repairs are documented; and that system operation and maintenance are in accordance with the vessel's SMS. Marine inspectors should verify the actual pollution prevention system piping against vessel's approved piping diagrams, if modifications such as blanked off tees, connections points, hoses, or temporary piping segments associated with these systems are observed.

- ❑ Oily Water Separator (OWS)
  - Verify bilge piping, no modifications & matches approved diagram (direct to OWS, to holding tank, etc.) — MARPOL Annex 1/16
  - No blanked flanges, pipe caps, or dead-ended valves, or tees on inlet or outlet piping — 33 CFR 155.360/370
  - Evidence of bolting/unbolting of associated piping segments
  - Recent paint on pipe segments
  - Observe general housekeeping and cleanliness
  - Witness operational test of OWS, evaluate operator competency. System operating in published ranges
  - Verify unit is processing contaminated source. Operate system for sufficient time (15 minute minimum) to identify reduction in contaminated source
  - Test 15 ppm Oil Content Meter and alarm
  - On units with multiple Oil Content Meters, compare readings
  - Ensure sample analyzed by Meter is OWS output (Trace sample line for presence of unacceptable clean water connection)
  - Verify no electrical bypasses, jumpers, extra switches on or within unit or Meter control panel
  - Verify system automatically re-circulates (3-way valve) or shuts down when >15ppm. Verify proper operation of valve
  - Verify proper operation of system backflush or oil purge cycle
  - Visually sample processed water for gross contamination (sheen or visible oil)
  - Compare ship's operational maintenance routine with actual Preventative Maintenance conducted. Request proof/documentation of maintenance completed (used consumables from OWS, receipts of service, technician reports, contractor disposal records)
  - Review meter calibration records
  - Review strip charts if fitted
  - Examine other machinery space overboard piping for unusual connections
  - Review records pertaining to system repairs
- ❑ Oil Pollution placard posted — 33 CFR 155.450
- ❑ Oil Transfer Procedures — 33 CFR 154.340
  - Posted / available in crew's language — 33 CFR 155.720
  - Person in Charge (PIC) fluent in English or language mutually agreed upon w/ shoreside PIC — 33 CFR 155.750
  - Format in CFR order or cross reference index page — 33 CFR 154.310
  - List/description of products carried by vessel
  - Description of transfer system including a line diagram of piping system (pumps, vents, valves, alarms,
  - shutoffs, etc.)
  - Number of persons required on duty
  - Duties by title of each person
  - Means of communication (two-way voice)
  - Procedures to top off tanks and disconnect
  - Procedures to report oil discharges
  - Emergency response procedures (fire, spill, human exposure)
- ❑ Standard discharge connection — MARPOL Annex 1/19
- ❑ Fuel/lube/sludge oil fill, vent & overflow discharge containment — 33 CFR 155.430, 33 CFR 155.320
  - Size (<1600GT'/2 bbl, >1600GT 1 bbl)
  - Fixed (Built after 30Jun74) or Portable (before 30Jun74)
  - Drains
  - Scupper closures
- ❑ Prohibited oil spaces (no oil/hazardous substances carried fwd of collision bulkhead) — 33 CFR 155.470

- ❑ Lighting at each Transfer Operations Work Area — 33 CFR 155.790
  - Adequate
  - Located/Shielded to not interfere with navigation
- ❑ Oil transfer hose (if vessel uses to transfer in U.S. waters) including LifeboatlTender Hoses — 33 CFR 155.800/805
  - Condition — 33 CFR 154.500
  - Markings (MAWP, Mfg. Date, Test date) - — 33 CFR 156.170
  - Hose assembly requirements (blanked off if not new, gas free or in use)
  - Tests and inspections
- ❑ Bilge Water Management — MARPOL Annex I
  - Examine machinery space bilges (stem to stem)
  - Contamination / oily residues in bilges on bulkheads, piping, structures, within roseboxes
  - Leakage from systems and engines into machinery spaces (may not be seen during port ops)
  - Engine oil usage, quantities, where lost, consumed or in bilges
  - Evidence of recent cleaning of systems, equipment and components
  - Status of oily bilge water tanks, last cleaned, at capacity
  - Adequate capacity all tanks
  - Levels of tanks during inspection — high or low?
  - If tanks near full — what are the vessel's processing plans?
  - Evidence of detergent usage (Note- emulsions cannot separate in gravity separator and are likely to result in discharges over 15 PPM)
  - Other methods to discharge bilge water
  - Evidence of excess water ingress, pump glands, seals, valve glands
  - Portable (diaphragm /other) pumps present
  - Hoses, fittings, and connections in areas — usage unknown
  - Unlocked overboard valves on bilge, bilge & ballast, salt water service
  - Seal management program-used
  - Designated clean or exempted areas — oil free status
  - Lifeboat / Security / Tender vessel engineering systems leak free
  - Lifeboat / Security / Tender vessel bilges clean
  - Lifeboat / Security / Tender vessel- oily bilge handling when leakages present (when in use off vessel or once reloaded)
- ❑ Waste/Sludge oil incineration
  - Tests and inspections
  - Record keeping
  - Incinerator operates with sludge / waste oils
  - Clean / dirty furnace, evidence of use
  - Operators capable & prove operation
  - Purifier sludge tanks full / empty
  - Connections to bilge main or other areas
  - Transfer pump operable
  - Transfer pump to sludge system, ashore, incinerator settler only
  - Estimated quantities of sludge produced — normal or excessive (fuel sludge production can exceed 2% of total fuel used)
- ❑ Systems with Oil to Sea Interfaces
  - Oil lubricated stern tubes, bow and stern thruster seals, fin stabilizer seals, etc.
  - Exterior examination in way of systems for evidence of leaking seals
  - Presence of barrels, drums, hoses, pumps, and other equipment/supplies/arrangements necessary to refill systems at equipment.
  - Check consumption records if SMS or environmental compliance programs require such records.

Section C2
Gray Water Waste Stream

Gray water system includes discharges from galley, sinks, washbasin drains, showers, and baths. These may be held in large tanks before being pumped overboard. The handling and discharge of gray water will vary from ship to ship and the marine inspector should ensure the procedures followed by the ship correspond to those described in its SMS documentation. If gray water is pumped through a/the Marine Sanitation Device(s) (MSD), ensure that the total volume does not exceed the MSD's capacity. Other waste streams such as hazardous waste or medical waste (RCRA biomedical wastes) must not be mixed with gray water. Drains from hospitals (U.S. restriction), photo labs (if commingled with hazardous wastes), slops, must be separate from the gray water system.

- ❑ Sources
  - Galley (ex. Dishwashers, floor drains, sinks)
  - Showers/Baths & washbasin drains
  - Laundry
  - Deck drains throughout vessel
- ❑ Prohibited Sources (hazardous materials, bilges, photo shop & print shop if hazardous wastes are commingled, hospital spaces (U.S. only), etc.)
- ❑ Evidence of other drained fluids into scuppers or other entry points (photo lab, hospital, specialty spaces)
- ❑ Drains from spaces containing machinery (fan rooms, hotel equipment, etc.) oil free or segregated
- ❑ Connections to the Black Water System (if permitted in MSD Operation Manual, if so, is MSD capacity sufficient?)
- ❑ Connections to Ballast Water System
- ❑ Number of tanks
- ❑ Total tank capacity _____m3
- ❑ Volume Produced_____ (m3 per day)
- ❑ Maximum number of days in port without discharging.
- ❑ Current capacity sufficient for persons on board and time in port?
- ❑ Review vessel's gray water handling procedures (SMS).
- ❑ Ensure that Quality Assurance / Quality Control Plan is vessel specific.
- ❑ Is Gray water processed and discharged?
- ❑ What are Gray water disposal procedures: Shore and at Sea. (company policy)
- ❑ Does vessel have sampling procedures? (if so, review)
- ❑ Types of tests performed, equipment and useable testing supplies readily available?
- ❑ Sampling equipment/supplies useable and available?
- ❑ How often do they take samples? Review samples record book.
- ❑ What are the state, federal and local regulations for gray water discharge?
- ❑ Responsible crew interviewed
- ❑ Disposal and Records
  - Shore (receipts available)
  - At sea (logs maintained)
  - Sampling/Testing (logs maintained)
  - Note some gray water treatment employs advanced ultra-filtration systems, these systems claim to reduce gray water waste by 85% - 90%, or more.
  - Alaska - Effective July 2001, Operators of cruise vessels carrying 500 or more passengers & transiting applicable waters of Alaska are restricted in where they may discharge effluents & will be required to perform testing of sewage & gray water discharges. The Coast Guard will inspect, monitor, & oversee this process to ensure compliance with applicable water quality laws & regulations. (33 CFR 159)

(Clean Water Act)
33 USC 1251 et seq.
33 CFR 159.300
Subpart E for (D17)
Local Regulations
ISM Code
33 CFR 96

Black water system includes MSDs and other systems to collect, treat, store, and discharge sewage. This checklist is designed to guide the marine inspector through some basic questions to ascertain whether the system is working as designed and that the crew is properly trained in its operation. For example, does the MSD appear to be properly installed? Is there adequate capacity for the number of persons on board? Are maintenance procedures, including SMS procedures, being followed? Are there records of expendables being ordered: filters, chemicals, et cetera? Are the units operating within the manufacturer's design specifications? Are there clear and simple operating instructions? Is the crew knowledgeable in the use of the equipment/system?

	MARPOL Annex IV*
❑ Sources	40 CFR 140.3 & .4
• Toilets, Urinals, scuppers	33 CFR 159.57
• All Drainage from Medical Premises (U.S. restriction)	33 CFR 159.7
• System installed, maintained and operated in accordance with approved plans and manufacturers specifications.	33 CFR 159.55 33 CFR 159.59
• Tank Capacity and Volume Produced	MARPOL Annex IV/9*
• Current volume in tanks	40 CFR 140.3
• Modifications documented	MARPOL Annex IV/11 * Resolution MEPC.2(VI) 33 CFR 159.65
❑ Operations and Treatment (new section)	NVIC 9-82
• Chemical/Biological treatment & protective equipment	ISM Code
• Chemical Treatment Level	33 CFR 96
• Sufficient chemicals, additives, approved cleaning materials onboard. (enzymes, "Gamazyme", chlorine)	
• Compressors operating, inlet filters maintained	33 CFR 159
• Vacuum system operable, if applicable	
• Flow indicators clear — indicating flow	
• Last system cleaning	
• Macerator operating maintenance	
• Methods to dilute discharge?	
• Operating instructions/SMS procedures	
❑ U.S. Marine Sanitation Device Requirements	
• Type (II, III)	
• Nameplate (Should be designed to resist efforts of removal or efforts to alter the information)	
• Placard	MARPOL Annex IV/2*
• Proper operation (macerators, treatment chemicals) and structural integrity, no leaks	MARPOL Annex IV/10*
• Certificate of Type Test. <u>For Foreign Flag Vessels in U. S. Waters</u> A foreign flag vessel that has a "Certificate of Type Test" under MARPOL Annex IV indicating that its sewage treatment plant meets the test requirements of Resolution MEPC.2 (VI) of the International Maritime Organization (IMO) will be accepted by the Coast Guard as being in compliance with 33 CFR 159.7(b) or (c). The Certificate of Type Test must be issued by or on behalf of a government that is a party to the MARPOL convention. Such a plant will be considered as fully equivalent to a Coast Guard certified Type II MSD as long as the unit is in operable condition. However, the unit may not be labeled as USCG certified. U.S. registered vessels will continue to be required to have Coast Guard certified MSDs per 33 CFR 159.	MARPOL Annex IV* 33 CFR 159.7 40 CFR 140.4 40 CFR 136
❑ Standard Discharge Connection (NLT 27 Sep 03)	
• New ships 200 gross tons and above	
• New ships less than 200 gross tons and carry more than 10 persons.	
• Existing ships 200 gross tons and above and exiting ship less than 200 gross tons and carry more than 10 persons after 27 Sep 13 (10 years after the date entry into force of Annex IV)	
❑ Disposal	
• Shore (last done, reasons?)	
• Overboard valves secured	
• MSD bypass piping noted? (Condition of valves, pipe tees and caps, evidence of frequent usage)	
• At sea (provide proof of discharge location)	
• Logged position, speed (if required by management) MARPOL Annex IV*	
• When comminuted and disinfected greater than 3 miles. 33 CFR 159	
• Company policy followed?	
• When not comminuted or disinfected greater than 12 miles.	
• Both to be discharged while ship is underway at greater than 4 knots. Locations of discharges compared to deck logs.	
• Not in EPA "No Discharge Zones"	
• Connections to the gray water system (effluent routed to gray water system to dilute effluent?)	

- Alaskan Waters:
  Effective July 2001, Operators of cruise vessels carrying 500 or more passengers and transiting applicable waters of Alaska are restricted in where they may discharge effluents and will be required to perform testing of sewage and gray water discharges. The Coast Guard will inspect, monitor, and oversee this process to ensure compliance with applicable water quality laws and regulations. (33 CFR 159).

❑ Sampling/Testing

- Lab analysis of fecal coliform/total suspended solids in effluent (recorded on ISPP if issued)
  - Results of residual chlorine content in effluent testing
  - Calibration records for dosing pump/proportioner

* Although the United States is not signatory to MARPOL Annex IV, the requirements of Annex IV may be enforced for those vessels that have committed to comply with Annex IV requirements in addition to 33 CFR Part 159 requirements as part of the vessels' SMS. This commitment is typical for ICCL Member vessels and many other cruise ships.

Hazardous waste must be handled in accordance with the ship's SMS. If such waste is disposed of in U. S. waters, the SMS hazardous waste handling procedures must meet or exceed 40 CFR Part 262 requirements. Hazardous waste includes dry cleaning (PERC) waste, used paints and thinners that contain hazardous substances, silver-bearing photo-processing waste, cleaning solutions and other similar items. Each vessel may vary in both the type and volumes of hazardous waste generated depending on the technology and processes aboard ship. This checklist is designed to evaluate on-board management of hazardous waste streams and to ensure that hazardous constituents are not released into the environment, disposed of properly and that accountability is demonstrated via adequate waste disposal records.

❑ Hazardous Waste

40 CFR 262
49 CFR 173
RCRA
SARA Title III
42 USC 11002(a)(3) 40 CFR 355 App A / B ISM Code
33 CFR 96

- Has the company conducted a waste determination? Through Process Knowledge or Waste Analysis (circle one)? If not, hazardous waste may not be landed.
- Have responsible personnel received initial and refresher training? Has the training been documented?
- Is there any evidence that hazardous wastes are being incinerated, diluted, neutralized, or evaporated as a means of disposal.
- Is there any evidence (e.g. lack of disposal records) of hazardous material being discharged overboard?
- Are hazardous wastes being properly stored, maintained, labeled, and placarded? Note any observations made of deficiencies, dates and nature of repairs.
- Are proper storage devices available?
- Waste not commingled
- Quantities on board consistent with receipt/disposal documentation?
- Does the crew have ready access to spill control and decontamination equipment?
- Are records maintained and manifests completed for potential hazardous waste streams, for example:
  - Silver Bearing Photo Processing Waste (developers, wash water, Silver Recovery Units)
  - X-Ray equipment
  - Print Shop Waste (inks, dyes, cleaning solvents)
  - Used Solvents, Paints & Thinners
  - Fluorescent/Mercury Vapor Bulbs
  - Batteries (universal wastes): Nickel Cadmium (Nicad); Lead Acid; Lithium; Alkaline
  - Certain Pharmaceuticals/Narcotics
  - Dry Cleaning Waste (PERC, lint, sludge, filters, condensate water)
  - Aerosol Cans
  - Cleaning Solutions (de-scalers, acids, bases, other corrosives)
  - Expired pyrotechnics (from safety equipment and entertainment use)
  - Rags contaminated with hazardous wastes (also - in approved storage containers?)
  - Incinerator ash if contaminated with toxic/hazardous substances (plastics containing heavy metals)
- Do records reflect reasonable accumulations of waste with respect to the capacity of the vessel, its age, technologies onboard, and amounts of repair/maintenance?
- Used lead acid batteries not mixed and kept dry?

❑ Records of hazardous consumables kept updated
Used and unused

Shipboard Records
ISM Code
33 CFR 96

The following excerpt from 40 CFR 262 regarding Resource Conservation and Recovery Act (RCRA) requirements is provided for background information only. The Federal or State RCRA program office must be consulted if any clarifications are needed for a particular situation.

HAZARDOUS WASTE HANDLING REQUIREMENTS

§ 262.11 Hazardous waste determination.
A person who generates a solid waste, as defined in 40 CFR 261.2, must determine if that waste is a hazardous waste using the following method: (a) Determine if the waste is listed as a hazardous waste in subpart D of 40 CFR part 261.
(c) Or if not listed in subpart D of 40 CFR part 261, generator must determine if the waste is identified in subpart C of 40 CFR part 261 by either:
(1) Testing the waste according to the methods set forth in subpart C of 40 CFR part 261
(2) Applying knowledge of the hazard characteristic of the waste in light of the materials or the processes used.

262.12 EPA identification numbers.
(a) A generator must not treat, store, dispose of, transport, or offer for **transportation,** hazardous waste without having received an EPA identification number from the Administrator.

262.20 General requirements.

(a) A generator who transports, or offers for transportation, hazardous waste for offsite treatment, storage, or disposal must prepare a Manifest OMB control number 2050-0039 on EPA form 8700-22, and, if necessary, EPA form 8700-22A, according to the appendix to part 262.

(b) Generator must designate on manifest one facility that is permitted to handle the waste described on the manifest.

262.23 Use of the manifest.
(a) The generator must:
(1) Sign the manifest certification by hand; and
(2) Obtain the handwritten signature of the initial transporter and date of acceptance on the manifest; and
(3) Retain one copy, in accordance with § 262.40(a) and give the transporter the remaining copies of the manifest.

262.30, .31, .32 & .33 Packaging, Labeling, Marking and Placarding.
Before transporting hazardous waste or offering hazardous waste for transportation off-site, a generator must package, label, mark and placard the waste in accordance with the applicable Department of Transportation regulations on packaging under 49 CFR parts 172, 173, 178, and 179. Before transporting hazardous waste or offering hazardous waste for transportation off-site, a generator must mark each container of 110 gallons or less used in such transportation with the following words and information displayed in accordance with the requirements of 49 CFR 172.304: **HAZARDOUS WASTE Federal Law Prohibits Improper Disposal. If found, contact the nearest police or public safety authority or the U.S. Environmental Protection Agency. Generator's Name and Address ---------- . Manifest Document Number ----------.**

262.34 Accumulation time.
A generator may accumulate hazardous waste on-site for 90 days or less for large quantity generator and 180 days or less for small quantity generator, without a permit or without having interim status.
The date upon which each period of accumulation begins must be clearly marked and visible for inspection on each container and while being accumulated on-site, each container and tank is labeled or marked clearly with the words, "Hazardous Waste."

§ **262.40 Recordkeeping.**
(a) A generator must keep a copy of each manifest signed in accordance with § 262.23(a) for three years or until he receives a signed copy from the designated facility which received the waste. This signed copy must be retained as a record for at least three years from the date the waste was accepted by the initial transporter.
(b) A generator must keep a copy of each Biennial Report and Exception Report for a period of at least three years from the date of the report.
(c) A generator must keep records of any test results, waste analyses, or other determinations made in accordance with § 262.11 for at least three years from the date that the waste was last sent to on-site or off-site treatment, storage, or disposal.

Non-hazardous wastes include shipboard garbage containing plastics and synthetic material, certain medical wastes, food wastes and recyclables such as glass, cardboard, aluminum and metal cans. Items to be checked should include waste sorted to prevent hazardous waste from entering the non-hazardous waste stream; no plastics or synthetics are to be discharged overboard, separate; proper disposal of hazardous (i.e. containing residual plastics or un-burnt food waste) and non-hazardous incinerator ash; and proper disposal of cooking grease from grease traps.

- ❑ Shipboard Garbage Management Plan — 33 CFR 151.63, MARPOL Annex V, MARPOL Annex V/9, MARPOL Annex V/3, 7 CFR 330.400
  - Shipboard garbage properly handled in accordance with Garbage Management Plan
  - Garbage Record Book entries
    - Type, amount, location, date/time
    - Receipts
    - Each entry signed by Officer-in-Charge and each page by Master
    - Any reports of alleged inadequacy of port reception facilities for garbage on file
  - Person-in-Charge Designated
  - No plastics or synthetics discharged overboard
  - Waste sorted to prevent hazardous waste entering non-hazardous waste stream or incinerated. Separate defined storage areas for hazardous/non-hazardous — no commingled waste.
  - Signage in working language of crew and in English, French or Spanish
  - Incinerator ash if discharged overboard free of plastic residue (clinkers) or free of unburned food wastes if landed ashore.
  - Trash chutes clean, free from oil residue (No oil stains on decks, side of hull adjacent to trash chutes)
  - Foreign Food Wastes handled per APHIS regulations
  - Medical Wastes-incinerated or manifested as Bio-Hazardous Waste.
  - Discharged outside of special areas only (when special area restrictions are in effect)
  - Incinerator operation observed (if in operation)
- ❑ Garbage Pollution Placards posted — MARPOL Annex V/ 33 CFR 151
- ❑ Procedures to minimize amount of potential garbage
  - Is vessel encouraging ship suppliers to consider alternate means of packing, use of other than plastics? Examine stores being loaded.
  - Is vessel using reusable packing? Examine stockpiles for use
  - Is waste generated while in port disposed to shore reception facility prior to sailing? Examine waste being offloaded.
- ❑ Recycling
  - Is ships crew following policy for recycling. Interview crewpersons in varied work areas, casino, galley, housekeeping, etc. with recycling responsibilities for procedures used.
- ❑ Maintenance and repair conducted on equipment
  - Incinerator
  - Grinders
  - Valves and flappers on chutes
- ❑ Human factors
  - Warning signs posted around equipment.
  - Master and crew familiar with essential shipboard garbage handling procedures.
  - Personal protective equipment available, functioning and in place (ILO 134).
  - Sanitation, from a health standpoint, being maintained (ILO 147).

AGENT
Vessel representative hired by the ship's owners. Ship's agent may be tasked with various jobs such as: ensuring proper vessel documentation and compliance.

AUTOMATIC STOPPING DEVICE
Is a control mechanism that ensures discharge of an oily water separator is stopped when the oil content of the effluent exceeds 15 parts per million (PPM). The automatic stopping device may be initiated by the operation of the oil content meter.

BALLAST
Used to improve the stability and control the draft of a ship. (In Ballast - having only ballast for a load)

BLACK OIL
A viscous and black or very dark brown colored oil. Depending on the quantity spilled, oil tends to quickly spread out over the water surface to a thickness of about one-millimeter.

BLACK WATER (sewage)
Examples - possible sources toilets, urinals and drainage from medical facilities (U.S. restriction).

COC

Certificate of Compliance, CG Form 3585.

COTP
Captain of the Port.

CWA
Clean Water Act.

CVE
Control Verification Examination is the examination of vessel for compliance with SOLAS requirements and applicable U. S. regulations. More properly referred to as the Passenger Vessel Certificate of Compliance Examination.

DISPERSION
The breaking up of an oil slick into small droplets which are mixed into the water column as a result of breaking waves and other sea surface turbulence.

EFFLUENT
To flow out. (Waste material, refuse, and sewage)

EMULSIFICATION
The formation of a water - in - oil mixture. In the environment, the tendency for emulsification to occur varies with different oils and is much more likely to occur under high-energy conditions (wind and waves). Emulsions may also be formed by surfactants, including detergents, which cause the oil and water to mix, or by mechanical means such as pressure washing or pump action.

EPA
Environmental Protection Agency

EQUIPMENT HAVING AN OIL TO SEA INTERFACE
Equipment that uses a seal to prevent leakage of oil into the sea. Examples, oil-lubricated stern tube seals, hydraulically-driven stabilizer fin seals, bow and stern thruster seals. An indicator that system seals are leaking to the sea may be evidence of frequent filling of system reservoirs, presence of barrels, drums, hoses, pumps, and other equipment/supplies/arrangements necessary to refill systems. Some ships' SMS or environmental compliance programs may require that records of refilling such systems are kept. If so, these records should be checked.

15 PPM ALARM

An alarm that activates when the effluent passing though oil-filtering equipment exceeds 15 parts per million (ppm) of oil.

GRAY WATER

Includes discharges from galley, sinks, washbasins, drains, showers and baths. These may be held in large tanks prior to being discharged overboard (State, Fed, regulation permitting).

HSSC

International Convention to Harmonized System of Survey and Certification.

ICCL

International Council of Cruise Lines, a cruise ship industry association which participates in industry standards and policy development process to promote all measures that foster a safe, secure, healthy cruise ship environment.

ICLL

International Convention for Load Lines.

IMO

International Maritime Organization; a specialized agency of the United Nations concerned solely with maritime affairs. IMO is responsible for international treaties, conventions, resolutions and codes to improve maritime safety.

ISM Code

International Safety Management Code. (Chapter IX of SOLAS)

MARPOL

The International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978.

MSC

Maritime Safety Committee. One of five technical committees of the IMO which deals with issues such as aids to navigation, vessel equipment and construction, manning requirements, handling dangerous cargoes, hydrostatic and marine casualty information.

MSD

Marine Sanitation Device.

OIL CONTENT METER

An instrument used to measure continuously the oil content of the effluent in the OWS output line, in parts per million, to ensure that the operation does not contravene the convention.

OIL FILTERING EQUIPMENT

Equipment that uses any combination of a separator, filter or coalescer, and also a single unit designed to produce an effluent with oil content less than 15 parts per million (ppm). (MARPOL Annex I, Reg 16)

OILY WATER SEPARATOR (OWS)

The basic principle of oil / water separation is their difference in specific gravity. The specific gravity of most oils is less than water; therefore, it will naturally float to the top of an oil and water solution. Small droplets of oil float to the top much slower than large droplets. This is due to the large surface area to mass ratio. To speed up the process of separation, OWS units form larger oil droplets out of smaller ones, thus decreasing the surface area to mass ratio. The increased mass of the oil droplet increases its buoyancy, thus causing it to rise more quickly. Gravitational-based systems are not effective processors of oil-water emulsions formed by detergents or mixtures containing high specific gravity oils.

PASSENGER SHIP

A ship which carries more than 12 passengers.

PMS

Preventative Maintenance System

QUALIFIED INDIVIDUAL (QI)

The person authorized by the responsible party to act on their behalf, authorize expenditures and obligate organization's resources.

RCRA

Resource Conservation and Recovery Act (RCRA), was enacted by the U.S. in 1976 to address the issue of how to safely manage and dispose of the huge volumes of municipal and industrial hazardous waste generated nationwide.

RECOVERABLE OIL

Oil that is in a thick enough layer on the water to be recovered by conventional techniques and equipment. Only black or dark brown oil, mousse, and heavy sheens (dull brown) are generally considered thick enough to be effectively recovered by skimmers.

SEPARATION EQUIPMENT

A device designed to remove enough oil from an oil-water mixture to provide a resulting mixture with an oil content of less than 100ppm, or 15ppm, such as an Oily Water Separator (OWS).

SLICK

Oil spilled on the water, which absorbs energy and dampens out the surface waves making the oil appear smoother or slicker than the surrounding water.

SHEEN

A sheen is a very thin layer of oil (less than 0.0001 inches or 0.003mm) floating on the water surface and is the most common form of oil seen in the later stages of a spill. According to their thickness, sheens vary in color ranging from dull brown for the thicker layers to rainbows, grays silvers and almost transparent for the thinnest layers.

SLUDGE TANKS

Tanks used to contain sludge formed by fuel and lube oil purifiers and from other sources or cleaning activities. Sludge is not readily processed by many oily water separators and frequently requires treatment ashore or incineration. Every ship of 400 GT or more must be provided with a tank or tanks of adequate capacity, in regard to type of machinery and length of voyage, to receive the oil residues (sludge) that cannot be dealt with otherwise in accordance with MARPOL Annex I.

SMS

Safety Management System (sometimes referred to as an SQM). Required by the ISM Code and Chapter IX of SOLAS.

SOLAS

Safety of Life at Sea. The International Convention for the Safety of Life at Sea.

SOPEP

Shipboard Oil Pollution Emergency Plan. (MARPOL Annex I, Reg. 26)

STCW

The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers.

TANKER

Is a self-propelled vessel constructed or adapted for the carriage of bulk liquid cargoes of oil or hazardous materials.

TRANSFER

Any movement of oil or hazardous material to, from or within a vessel by means of pumping, gravitation, or displacement.

Appendix v

MEMORANDUM SUBJECT: Cruise Ship Identification Numbers and State Required Annual Reporting Components

FROM: Elizabeth Cotsworth, Director Office of Solid Waste
TO: RCRA Senior Policy Managers

Regions 1-10

Over the last several months, the Environmental Protection Agency (EPA), Office of Solid Waste has been working with Region 4, Region 9, Region 10, and ten states having cruise ship traffic to facilitate national acceptance of one EPA hazardous waste identification (ID) number per individual cruise ship. This came about because the ships were receiving different numbers from each state in which hazardous waste was off-loaded. Having multiple identification numbers causes the ships to create and maintain duplicate copies of hazardous waste management records, leading to an increased paperwork burden.

Through meetings and conference calls, the participants on this project reached an agreement on the issue. Today, we are asking that individual cruise ships be assigned only one EPA hazardous waste identification number as a generator of hazardous waste for purposes of the Resource Conservation and Recovery Act. The following procedures would apply:
a) A cruise ship would determine its American-based home port state (the state in which it has corporate offices or its main port of call).
b) After determining the home port state, the cruise line will notify the selected state or corresponding EPA regional office of its hazardous waste activities. c) The cruise ship will identify its hazardous waste generator size in accordance with 40 CFR 261.5(c).
d) The home port state or EPA regional office will issue an EPA hazardous waste identification number for each individual cruise ship using the current established procedure. The number will reflect the home port state initials and ten alphanumeric characters.

We are recommending that the state or region consider using a ship = s registry number, which is known as the International Maritime Organization (IMO) number, as part of the EPA hazardous waste identification number. The IMO number is generally a five to seven digit number; zeros can be added before or after the number to reach the ten characters required for the EPA hazardous waste identification number. Using the IMO number will allow for coordination with the Coast Guard, as this is the number they use most often.

After the identification number is assigned, it will remain with that ship and be used on all hazardous waste manifests regardless of where the waste is off-loaded in the U.S. The assignment of the EPA ID number will not impact the applicability of state-specific RCRA requirements. For example, when waste is off-loaded in a state, the cruise ship will comply with that particular state = s RCRA requirements whether or not that state assigned the ID number. The ship will be required to provide records to the individual state as required by state law.

Many of the states who will not be issuing the ID number expressed an interest in obtaining

information provided by the cruise ship in either an annual or biennial report to its home port state. This request for annual report information can be addressed through the existing Biennial Reporting System (BRS). The attachment to this memo provides more specific information on how the ID numbers and annual reports will be incorporated into the EPA = s BRS databases.

If you have any questions, please contact Teena Wooten at (703) 308-8751.

Attachment (1)

cc: Key RCRA Contacts, Regions 1 - 10
RCRA Enforcement Contacts, Regions 1 - 10
RCRA Data Management Contacts, Regions 1-10
Tom Kennedy, Association of State and Territorial Solid Waste
Management Officials (ASTSWMO)
Anne Dobbs, Texas Natural Resource Conservation Commission (TNRCC)

Dangerous Waste Site Identification Form

Site ID

Washington State Department of Ecology
Hazardous Waste Information
P.O. Box 47658
Olympia, WA 98504-7658
(800) 874-2022 (within state)
(360) 407-6170

Web site: www.ecy.wa.gov/programs/hwtr

For Ecology Use Only		Date Received:	
Form	Reviewed	Entered	Verified
Site ID			
GM			
WR			
OI			

1. Reason for Submittal

- ☐ To provide **New** Notification of Regulated Waste Activity (complete entire form)
- ☐ To provide **Revised** Site Identification information (complete entire form)
- ☐ To **Withdraw** Site Identification Number (skip sections 10 and 11)
- ☐ To **Reactivate** Site Identification Number (complete entire form) Effective Date: _____ (mm/dd/yyyy)
- ☐ A component of the **Dangerous Waste Annual Report** (skip section 11) Reporting Year: _____ (yyyy)

2. RCRA Site ID Number:

3. Site Location Information

Company Name: _____
Site Address: _____
City/State/Zip: _____
County: _____
Tax Registration Number: _____
NAICS Code: _____
Type of Business: _____

4. Company Mailing Address

Name: _____
Mail Address: _____
City/State/Zip: _____
Country: _____

5. Legal Owner

Name: _____
Mail Address: _____
City/State/Zip: _____
Phone Number (Ext): (_____) _____
Owner Since: _____ (mm/dd/yyyy)
Owner Type: ☐ Federal ☐ State ☐ County ☐ Municipal
☐ District ☐ Private ☐ Tribal ☐ Other

6. Land Owner

Name: _____
Mail Address: _____
City/State/Zip: _____
Phone Number (Ext): (_____) _____
Owner Type: ☐ Federal ☐ State ☐ County ☐ Municipal
☐ District ☐ Private ☐ Tribal Land
☐ Puyallup Trust ☐ Other

Dangerous Waste Site Identification Form (continued)

Site ID

RCRA Site ID Number:

7. Site Operator

Name: _____

Mail Address: _____

City/State/Zip: _____

Phone Number (Ext): (_____) _____

Operator Since: _____ (mm/dd/yyyy)

Operator Type: ☐ Federal ☐ State ☐ County ☐ Municipal

☐ District ☐ Private ☐ Tribal ☐ Other

8. Site Contact

Name: _____

Mail Address: _____

City/State/Zip: _____

Phone Number (Ext): (_____) _____

Email Address: _____

9. Form Contact

Name: _____

Mail Address: _____

City/State/Zip: _____

Phone Number (Ext): (_____) _____

Email Address: _____

10. Type of Regulated Waste Activity (Mark the appropriate boxes for activities that apply to your site)

***A.* Hazardous Waste Activities**

1. Generator of Hazardous Waste
(Choose only one of the following four categories)

☐ *a. LQG: Large Quantity Generator (Greater than 2,200 lbs/mo)*

☐ *b. MQG: Medium Quantity Generator (Between 220 – 2,200 lbs/mo)*

☐ *c. SQG: Small Quantity Generator (Less than 220 lbs/mo)*

☐ *d. XQG: No Regulated Waste Generated*

2. Frequency of Generation
(Choose only one of the following three types)

☐ *a. Monthly*

☐ *b. Batch*

☐ *c. One-time only*

3. Transporter of Hazardous Waste

☐ *a. Transport own waste*

☐ *b. Transport for commercial purposes*

☐ *4.* **Recycler of On-Site Waste**
(i.e., on-site use, reuse or reclamation of a waste after it has been generated)

☐ ***5.* Transfer Facility of Hazardous Waste**

☐ **6. Permit-by-Rule (PBR)**

☐ **7. Treatment-by-Generator (TBG)**

☐ **8. Generator of Mixed Radioactive Waste**

☐ **9. Importer of Hazardous Waste**

☐ 10. **Treatment, Storage, Disposal or Recycling (TSDR) Facility**
(Note: A RCRA Permit is required for this activity)

☐ **11. 24-Hour Recycler of Off-Site Waste**
(i.e., Immediate Recycler)

12. Dangerous Waste Fuel Activity

☐ a. Generator of dangerous waste fuel

☐ b. Generator marketing to burner

☐ c. Other marketers (i.e., blender, distributor, etc.)

d. Burner (indicate type of combustion unit)

☐ 1. Utility boiler

☐ 2. Industrial boiler

☐ 3. Industrial furnace

e. Deferrals/Exemptions (in federal registry only)

☐ 1. Smelter deferral

☐ 2. Small quantity exemption

☐ 3. Other (specify):

Dangerous Waste Site Identification Form (continued)

Site ID

RCRA Site ID Number:

B. Universal Waste Activities

1. Large Quantity Handler of Universal Waste
(Mark all boxes that apply)

	Generate	Accumulate
a. Batteries	☐	☐
b. Mercury containing thermostats	☐	☐
c. Lamps	☐	☐

☐ **2. Destination Facility for Universal Waste**
(Note: A RCRA Permit is required for this activity)

C. Used Oil Activities

1. **Off-specification used oil burner** Indicate type(s) of combustion devices
   - ☐ 1. Utility boiler
   - ☐ 2. Industrial boiler
   - ☐ 3. Industrial furnace
2. **Used oil transporter** Indicate type(s) of activity(s)
   - ☐ a. Transporter
   - ☐ b. Transfer facility
3. **Used oil processor/re-refiner** Indicate type(s) of activity(s)
   - ☐ a. Process
   - ☐ b. Re-refine
4. **Used Oil Fuel Marketer**
   - ☐ a. Directs shipment of used oil to used oil burner
   - ☐ b. First claims the used oil meets the specifications

11. Description of Hazardous Wastes

A. Waste Codes for Federally Regulated Hazardous Wastes: Identify those codes that best describe your waste. (e.g., D001 – Ignitable, D002 – Corrosive, D003 – Reactive, etc.)

B. Waste Codes for State Regulated (i.e., non-Federal) Hazardous Wastes: Identify those codes that best describe your waste. (e.g., WT02 – Toxic, WP02 – Persistent, WL02 – Labpack, WSC2 – Solid Corrosive, etc.)

12. Comments

Additional sheets may be attached for comments if needed.

13. Certification

This form cannot be processed without a signature

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature _____ **Date** _____

Name (print or type) _____ **Title** _____

If you have special accommodation needs or require this document in an alternative format, please contact the Hazardous Waste and Toxics Reduction Program at 1-800-833-6388 (TTY) or quick dial 711-833-6388 (TTY).

14. Electronic Submittals

☐ I am interested in the electronic filing of my Dangerous Waste Annual Reporting and Site Identification information to Ecology over the Internet. Ecology will issue a PIN number, along with electronic filing instructions, in a letter addressed to the Form Contact in Section 9 on this form.

Appendix vi

Alaska Regulations

Title XIV – Certain Alaskan Cruise Ship Operations

SEC. 1404. LIMITATIONS ON DISCHARGE OF TREATED SEWAGE OR GRAYWATER.

……

(c) Until such time as the Administrator promulgates regulations under paragraph (b) of this section, treated sewage and graywater may be discharged from vessels subject to this Title in circumstances otherwise prohibited under paragraphs (a)(1) and (a)(2) of this section, provided that—

(1) the discharge satisfies the minimum level of effluent quality specified in 40 CFR 133.102, as in effect on the date of enactment of this Section;

(2) the geometric mean of the samples from the discharge during any 30-day period does not exceed 20 fecal coliform/100 ml and not more than 10% of the samples exceed 40 fecal coliform/100 ml;

(3) concentrations of total residual chlorine may not exceed 10.0 µg/l; and,

(4) prior to any such discharge occurring, the owner, operator or master, or other person in charge of a cruise vessel, can demonstrate test results from at least five samples representative of the effluent to be discharged, taken from the vessel on different days over a 30-day period, conducted in accordance with the guidelines promulgated by the Administrator in 40 CFR Part 136, which confirm that the water quality of the effluents proposed for discharge is in compliance with paragraphs (1), (2) and (3) of this subsection. To the extent not otherwise being done by the owner, operator, master or other person in charge of a cruise vessel pursuant to section 1406, the owner, operator, master or other person in charge of a cruise vessel shall demonstrate continued compliance through periodic sampling. Such sampling and test results shall be considered environmental compliance records that must be made available for inspection pursuant to section 1406 (d) of this Title.

Title 40 CFR 133.102 Secondary treatment.

The following paragraphs describe the minimum level of effluent quality attainable by secondary treatment in terms of the parameters—BOD5, SS and pH. All requirements for each parameter shall be achieved except as provided for in §§ 133.103 and 133.105.

(a) *BOD*5.

(1) The 30-day average shall not exceed 30 mg/l.

(2) The 7-day average shall not exceed 45 mg/l.

(3) The 30-day average percent removal shall not be less than 85 percent.

(4) At the option of the NPDES permitting authority, in lieu of the parameter BOD5 and the levels of the effluent quality specified in paragraphs (a)(1), (a)(2) and (a)(3), the parameter CBOD5 may be substituted with the following levels of the CBOD5 effluent quality provided:

(i) The 30-day average shall not exceed 25 mg/l.

(ii) The 7-day average shall not exceed 40 mg/l.

(iii) The 30-day average percent removal shall not be less than 85 percent.

(b) *SS.*

(1) The 30-day average shall not exceed 30 mg/l.

(2) The 7-day average shall not exceed 45 mg/l.

(3) The 30-day average percent removal shall not be less than 85 percent.

(c) *pH.* The effluent values for pH shall be maintained within the limits of 6.0 to 9.0 unless the publicly owned treatment works demonstrates that: (1) Inorganic chemicals are not added to the waste stream as part of the treatment process; and (2) contributions from industrial sources do not cause the pH of the effluent to be less than 6.0 or greater than 9.0.

Appendix vii

Hazardous Waste Management

This Appendix is to be used as guidance for hazardous waste discharged in Washington State waters or landed ashore in Washington. The following is a list of Resource Conservation Recovery Act (RCRA) and Washington State Criteria hazardous waste that may be found on cruise ships, and appropriate guidance for its discharge or offloading from the ship.

Terms

Hazardous Waste – Includes all hazardous waste as defined by RCRA and Chapter 173-303 of the Washington Administrative Code (WAC), where Washington State Criteria hazardous waste is defined.

Publicly Owned Treatment Works (POTW) - Ecology's Hazardous Waste Toxics Reduction (HWTR) Program will acknowledge Advanced Wastewater Treatment Systems (AWTS) as a substitute for a POTW. Type 2 Marine Sanitation Devices (MSDs) are not considered a POTW for purposes of this MOU.

WASTE STREAMS

Antifreeze- Excluded as a hazardous waste if recycled. (WAC 173-303-522)

Aqueous Degreasing - If the resulting waste is hazardous it can be treated to remove the hazard and the resulting effluent can be sent to the AWTS or Oily Water Separator. If no treatment is performed it can be landed ashore for proper disposal.

Batteries & Mercury Containing Thermostats - These are universal waste if sent for recycling. (Ecology Publication Number 98-407, Universal Waste Rule for Batteries and Mercury Containing Thermostats)

Spent Lead Acid Batteries - Spent lead-acid batteries are conditionally excluded if recycled. (WAC 173-303-520)

Cathode Ray Tubes (CRTs) - Excluded if recycled, otherwise are to be managed as a hazardous waste. (Ecology Publication Number 02-04-017, Interim Enforcement Policy Conditional Exclusion for Cathode Ray Tubes* and Related Electronic Wastes)

Dry Cleaner – Perchloroethylene (PERC) and other chlorinated dry cleaning fluids, contaminated sludge and filter materials are hazardous waste and must be landed ashore in accordance with RCRA requirements.

Florescent Tubes - Handling procedures for fluorescent tubes do not allow for crushing of the bulbs. (WAC 173-303-573 and Ecology Focus Sheet, Publication # 00-04-020, Universal Waste Rule for Dangerous Waste Lamps)

HVAC - CFC's or HCFC's are excluded as a hazardous waste if recycled. (WAC 173-303-506)

Filters from HVAC units that use Halogenated Organic Compounds (HOC's) as fire retardants would be a State Criteria hazardous waste and must be managed as such.

Mercury Switches - Are a hazardous waste and must be managed as such.

Painting - Discarded Paints & Cleanup Solvents. All spent paints and solvents must be properly designated and if hazardous waste, managed as such.

PCB's - Regulated as a state hazardous waste if they come from transformers, capacitors and bushings if PCB's are from 2ppm to 50ppm. If PCB's are above 50 ppm they must be managed as a TSCA waste. (WAC 173-303-9940)

Pharmaceuticals - Drugs that designate as RCRA waste, but that are not controlled substances must be sent ashore as hazardous waste. If the drug is a RCRA waste <u>and</u> a controlled substance, contact the US Drug Enforcement Agency (DEA) about suitable destruction methods and then manage the residue from destruction as a hazardous waste (disposal to water, regular garbage or incineration would be illegal). If the drug is <u>not</u> a RCRA waste, regardless whether it is a controlled substance or not, it can be incinerated on board or sent ashore for incineration at a facility permitted to incinerate municipal solid waste. (WAC 173-303-071(nn))

Photo Waste - Silver can be removed from fixer and the resulting effluent would be allowed to go to an advanced wastewater treatment system (AWTS), but not to graywater or to a Type 2 MSD. If the fluids can not go to the AWTS, they must be landed ashore in accordance with RCRA requirements. (Ecology Publication 94-138R, <u>A Guide For Photo Processors)</u>

Printer Wastes - Inks, solvents and rags, used for cleaning, will need to be properly designated, and if hazardous waste, managed as such.

Spray Cans – Cans that are not empty must be properly designated, and if hazardous waste, managed as such.

Solvent Degreasing - Solvents, when used, must be properly designated, and if hazardous waste, managed as such.

Appendix viii

Regional Director
Washington State Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

Dear Director:

Re: Washington Cruise MOU Compliance Report: XXXX (enter year) Cruise Season

Section 9 of the Memorandum of Understanding for Cruise Operations in Washington State (signed XXX (enter signature date)), requires an annual submittal detailing the compliance with the MOU for the each vessel within the NWCA that calls to a port in Washington for the previous cruise season. Please accept this letter on behalf of XXX (name your cruise line) for the XXXX (enter year) cruise season.

The following ships operated Washington waters during XXXX (enter year):

- Name the ship or ships; list the port of call and the dates.

XXX's operations in Washington State addressed the following key provisions of the MOU as follows:

<u>Section 2.1 Wastewater Management.</u> XXX managed its wastewater in compliance with this section as follows:

[Choose one or more options as appropriate]

- In compliance with Section 2.1.1 and 2.1.2, XXX held all treated and untreated gray and black water while in Washington waters and did not discharge solid waste or oily bilge water if not in compliance with applicable federal and state laws while in Washington waters. List the ships that held their effluent and describe the type of treatment system each ship in this category has. Based on a thorough review of ships' logs and records we certify that our ship(s) complied with these provisions of the MOU. XXX will make these records available to Ecology upon request.

- In compliance with Section 2.1.3 (A), XXX submitted the information required to allow discharge of treated wastewater one mile from berth to Ecology on XX date for the following ship(s): -------. Describe the type of treatment system each ship in this category has. Approval of the information was received from Ecology on XX date.

- In compliance with Section 2.1.3 (B), XXX submitted information supporting its request to discharge treated wastewater continuously to Ecology on XX date for the following ship(s) --

---. Describe the type of treatment system each ship in this category has. Approval to discharge while at berth was received from Ecology on XX date.

Section 2.1.3 (C)(1-3) Shellfish and "upset" conditions. Based on a review of XXX ship's logs and records, XXX certifies that we complied with the prohibition on discharging within 0.5 nautical miles of bivalve shellfish beds that are recreationally harvested or commercially approved to harvest as identified annually by the Department of Ecology and that any "upset" conditions were stopped and immediately reported to the Washington State Department of Health.

Section 2.1.3 (C)(4-10) Other discharge approval requirements. Based on a review of XXX ship's logs and records and other knowledge, XXX certifies that the requirements in this section were met.

Section 2.1.4 Discharge of Residual Solids. Based on a review of XXX ships' logs and records, XXX certifies that we complied with the prohibition on discharging residual solids coming from any type of treatment system within 12 nautical miles from shore and within the Olympic Coast National Marine Sanctuary. XXX will make these records available to Ecology upon request.

Section 2.2.1 through 2.2.4 Hazardous Waste Management. Based on a review of XXX ship's logs and records, XXX certifies that Hazardous Wastes were managed in accordance with these sections of the MOU. XXX will make these records available to Ecology upon request. Add a description of how hazardous waste is managed while in Washington.

Section 6. Marine Mammal Protection Act, Invasive Species Act, and the Washington Ballast Water Management Act. Based on a review of XXX ship's logs and records, XXX certifies that the provisions of the above laws were implemented as required by these laws. XXX will make these records available to Ecology upon request. Add a description of how compliance with these laws was achieved.

Section 9. Immediate self-reporting to Ecology of any incidences of non-compliance with any provisions of the MOU. Describe any incidences of non-compliance and when they were reported to Ecology and any corrective actions taken.

I hereby certify that the above information is true and can be verified through documentation. If you have any questions or concerns, please call me at XXX-XXX-XXXX.

Sincerely,

Name
Position/Title
Company

Appendix ix

2007 Agreement

INTERAGENCY AGREEMENT NO. C007032

BETWEEN

THE STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

AND

PORT OF SEATTLE

THIS AGREEMENT is made and entered into by and between the DEPARTMENT OF ECOLOGY, hereinafter referred to as "Ecology", and the Port of Seattle, hereinafter referred to as the PORT.

IT IS THE PURPOSE OF THIS AGREEMENT to provide the funding for Ecology personnel to further the intent of the *Memorandum of Understanding, Cruise Operations in Washington State* (the "Cruise MOU") which was entered into between the Department of Ecology, the Port of Seattle, and the Northwest Cruiseship Association ("NWCA"). The Port and Ecology acknowledge their intent to amend the Cruise MOU in the near future to specifically authorize these activities. The parties further acknowledge that the Port is acting solely as a pass-through contracting entity to facilitate the collection of funds from the individual NWCA members and to provide payment to Ecology on behalf of the NWCA members.

THEREFORE, IT IS MUTUALLY AGREED THAT:

STATEMENT OF WORK

Ecology shall furnish the necessary personnel, equipment, material and/or service(s) and otherwise do all things necessary for or incidental to the performance of the work set forth in Attachment "A" attached hereto and incorporated herein.

PERIOD OF PERFORMANCE

Subject to its other provisions, the period of performance of this Agreement shall commence on January 1, 2007, and be completed on December 31, 2007, unless terminated sooner as provided herein.

PAYMENT

The parties have determined that the cost of accomplishing the work herein will not exceed $75,000.00. Payment for satisfactory performance of the work shall not exceed this amount unless the parties mutually agree to a higher amount. Compensation for service(s) shall be based on the following rates or in accordance with the following terms, or as set forth in accordance with the budget in Attachment "B" which is attached hereto and incorporated herein.

Notwithstanding anything to the contrary in this Agreement, the Port's obligation to pay for the work set forth on Attachments A and B is expressly contingent on payment to the Port by NWCA and/or its members for such work.

BILLING PROCEDURE

Ecology shall submit an invoice to the Port for work accomplished during the year by March 1, 2008. Payment to Ecology for approved and completed work will be made by warrant or account transfer by the

Port within 60 days of receipt of the invoice. Upon expiration of the Agreement, any claim for payment not already made shall be submitted within 60 days after the expiration date or the end of the fiscal year, whichever is earlier.

Payment will be mailed to Ecology at the following address:

Dept. of Ecology
Cashiering Section
PO Box 5128
Lacey, WA 98509-5128

360-407-7096 Telephone
360-649-7193
dine461@ecy.wa.gov

RECORDS MAINTENANCE

The parties to this Agreement shall each maintain books, records, documents and other evidence which sufficiently and properly reflect all direct and indirect costs expended by either party in the performance of the service(s) described herein. These records shall be subject to inspection, review or audit by personnel of both parties, other personnel duly authorized by either party, the Office of the State Auditor, and federal officials so authorized by law. All books, records, documents, and other material relevant to this Agreement will be retained for six years after expiration and the Office of the State Auditor, federal auditors, and any persons duly authorized by the parties shall have full access and the right to examine any of these materials during this period.

Records and other documents, in any medium, furnished by one party to this agreement to the other party, will remain the property of the furnishing party, unless otherwise agreed. The receiving party may be required to disclose records and documents, but will not disclose or make available this material to any third parties without first giving notice to the furnishing party and giving it a reasonable opportunity to respond. Each party will utilize reasonable security procedures and protections to assure that records and documents provided by the other party are not erroneously disclosed to third parties.

RIGHTS IN DATA

Unless otherwise provided, data which originates from this Agreement shall be "works for hire" as defined by the U.S. Copyright Act of 1976 and shall be owned by Ecology. Data shall include, but not be limited to, reports, documents, pamphlets, advertisements, books, magazines, surveys, studies, computer programs, films, tapes, and/or sound reproductions. Ownership includes the right to copyright, patent, register, and the ability to transfer these rights.

INDEPENDENT CAPACITY

The employees or agents of each party who are engaged in the performance of this Agreement shall continue to be employees or agents of that party and shall not be considered for any purpose to be employees or agents of the other party.

AGREEMENT ALTERATIONS AND AMENDMENTS

This Agreement may be amended by mutual agreement of the parties. Such amendments shall not be binding unless they are in writing and signed by personnel authorized to bind each of the parties.

TERMINATION

Either party may terminate this Agreement upon 30 days' prior written notification to the other party. If this Agreement is so terminated, the parties shall be liable only for performance rendered or costs incurred in accordance with the terms of this Agreement prior to the effective date of termination.

TERMINATION FOR CAUSE

If for any cause, either party does not fulfill in a timely and proper manner its obligations under this Agreement, or if either party violates any of these terms and conditions, the aggrieved party will give the other party written notice of such failure or violation. The responsible party will be given the opportunity to correct the violation or failure within 15 working days. If failure or violation is not corrected, this Agreement may be terminated immediately by written notice of the aggrieved party to the other.

DISPUTES

In the event that a dispute arises under this Agreement, it shall be determined by a Dispute Board in the following manner: Each party to this Agreement shall appoint one member to the Dispute Board. The members so appointed shall jointly appoint an additional member to the Dispute Board. The Dispute Board shall review the facts, agreement terms and applicable statutes and rules and make a determination of the dispute. The determination of the Dispute Board shall be final and binding on the parties hereto. As an alternative to this process, either of the parties may request intervention by the Governor, as provided by RCW 43.17.330, in which event the Governor's process will control.

GOVERNANCE

This Agreement is entered into pursuant to and under the authority granted by the laws of the state of Washington and any applicable federal laws. The provisions of this Agreement shall be construed to conform to those laws.

In the event of an inconsistency in the terms of this Agreement, or between its terms and any applicable statute or rule, the inconsistency shall be resolved by giving precedence in the following order:

a. Applicable state and federal statutes and rules;
b. Statement of work; and
c. Any other provisions of the agreement, including materials incorporated by reference.

ASSIGNMENT

The work to be provided under this Agreement, and any claim arising thereunder, is not assignable or delegable by either party in whole or in part, without the express prior written consent of the other party, which consent shall not be unreasonably withheld.

WAIVER

A failure by either party to exercise its rights under this Agreement shall not preclude that party from subsequent exercise of such rights and shall not constitute a waiver of any other rights under this Agreement unless stated to be such in a writing signed by an authorized representative of the party and attached to the original Agreement.

SEVERABILITY

If any provision of this Agreement or any provision of any document incorporated by reference shall be held invalid, such invalidity shall not affect the other provisions of this Agreement which can be given effect without the invalid provision, if such remainder conforms to the requirements of applicable law and the fundamental purpose of this agreement, and to this end the provisions of this Agreement are declared to be severable.

ALL WRITINGS CONTAINED HEREIN

This Agreement contains all the terms and conditions agreed upon by the parties. No other understandings, oral or otherwise, regarding the subject matter of this Agreement shall be deemed to exist or to bind any of the parties hereto.

COUNTERPARTS

This Agreement may be executed in counterparts, each of which may have the signature of only one Party, but each of which shall be deemed to be an original, and all of which, when taken together, shall be deemed to be a single Agreement.

CONTRACT MANAGEMENT

The program manager for each of the parties shall be responsible for and shall be the contact person for all communications and billings regarding the performance of this Agreement.

The Contract/Program Manager for Ecology is:

Kevin Fitzpatrick
Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452
(425) 649-7033
E-mail: kfit461@ecy.wa.gov

The Contract/Program Manager for Port of Seattle is:

Michael McLaughlin
General Manager, Cruise and Dock Services
Port of Seattle
P.O. Box 1209
Seattle, WA U.S.A. 98111
Phone:(206)728-3453
E-mail: mclaughlin.m@portseattle.org

IN WITNESS WHEREOF, the parties have executed this Agreement.

State of Washington
Department of Ecology

10/5/09

David C. Peeler, Manager — Date
Water Quality Program

Port of Seattle

Linda Strout 9/24/07

for Tay Yoshitani, Date
Chief Executive Officer

APPROVED AS TO FORM:

ATTORNEY GENERAL'S OFFICE

Susan Ridgley, Senior Port Counsel

Susan Ridgley

2007 Agreement

ATTACHMENT A

Department of Ecology/Port of Seattle

Cruise Ship Memorandum of Understanding Scope of Work

The Department of Ecology (Ecology), the Port of Seattle, and the NorthWest CruiseShip Association (NWCA) are signatory to the *Memorandum of Understanding, Cruise Operations in Washington State* (MOU). Originally the MOU was signed April 20, 2004 and thereafter annually amended. The member cruise lines of the NWCA agree to comply with practices, while operating in waters subject to the MOU, pertaining to the management of solid and hazardous wastes and wastewaters. Ecology is charged with protecting and conserving Washington's environmental resources in relation to the cruise industry's environmental practices in Washington. The NWCA has agreed to fund Ecology's costs to implement the MOU and to accomplish the tasks listed herein.

Task 01

Compliance Work:

Work with stakeholders on drafting necessary amendments to cruise MOU. Provide technical assistance for cruise lines and vessel staff. Field questions from the public, press, environmental groups, and cruise lines. Monitor compliance with the MOU. Work with other programs within Ecology on hazardous waste, biosolids, solid waste, spill prevention, and other MOU elements. Work with Ecology policy and fiscal staff on cruise related issues. Research issues related to vessel discharges. Evaluate, draft and update guidance on Whole Effluent Toxicity (WET) testing for cruise ships and evaluate WET testing results. Work with Department of Health Shellfish program on shellfish and virus related studies and issues. Manage and update Ecology's cruise ship website.

Task 02

Inspections:

Conduct annual inspections of cruise vessels to verify the operation of the treatment systems and to evaluate compliance with the MOU. Write up inspection reports and provide recommendations for improvement. Take samples from vessels and evaluate results.

Task 03

Wastewater Discharge Approvals:

Verify documentation submitted for approval of discharges. Evaluate documentation and treatment systems for requirements of MOU to discharge and based on the information submitted and an engineering review, provide approval for discharges as appropriate.

Task 04

Annual Reports:

Draft annual assessment of cruise ship environmental effects report. Evaluate monthly sampling data results and summarize annually.

Task 05

Project Management:

Oversee the cruise ship MOU program and assist as needed. Provides Administrative oversight for compliance with the MOU, represents senior program management in duties related to protection of water quality from cruise ship discharges including negotiations.

Task 06

Additional tasks may become part of this agreement by mutual concurrence of Ecology and the Port of Seattle, or upon extension of the agreement.

Attachment B

Department of Ecology / Port of Seattle

Cruise Vessel Wastewater Treatment Inspections
Budget, by Object

The following is a detail breakdown of the salary, benefits and other costs of the Department of Ecology staff who will be funded under this agreement.

OBJECT	COST
1. Salary:	
Environmental Specialist 5 (ES5) $54,840 x .36 FTE =	$ 19,743
Environmental Engineer 4 (EE4) $77,520 x .10 FTE =	$ 7,752
WMS Band 2 (WMS2) $75,924 x .05 FTE =	$ 3,796
Total Salary:	$ 31,291
2. Benefits @ 28.2% of Salary:	$ 8,824
3. Indirect Costs @ 38.95% of Salary & Benefits (1): (from 1/1/07 through 6/30/07)	$ 7,812
Indirect Costs @ 35.78% of Salary & Benefits (1): (from 7/1/07 through 12/31/07)	$ 7,177
4. Goods & Services @ $4,388 per budgeted FTE:	
ES5 $4,388 x .36 FTE =	$ 1, 580
EE4 $4,388 x .10 FTE =	$ 439
WMS2 $4,388 x .05 FTE =	$ 219
Annual data summary =	$ 2,500
Annual report =	$ 10,000
Lab costs =	$ 5,158
Total Goods & Services:	$ 19,896
TOTAL	$ 75,000

(1) Ecology's indirect rate, as approved by the federal cognizant agency (United States Department of Interior) will apply. The approved FY07 rate for 7/1/06 through 6/30/07 was 38.95%. The current rate for 7/1/07 through 6/30/2008 is 35.78% of salaries and benefits.

Appendix x
Bivalve Shellfish Beds

Cruise ships that discharge treated sewage into Puget Sound under this MOU employ advanced systems that treat sewage to a very high degree using a combination of filtration, biological treatment, ultra-filtration, and disinfection. These systems are called Advanced Wastewater Treatment Systems (AWTS). The ultra-filtration process effectively removes nearly all bacteria from the treated sewage. However, viruses which tend to be smaller organisms may pass through the ultra-filtration membranes but are typically destroyed by the disinfection unit.

The Centers for Disease Control & Prevention reported 18 norovirus outbreaks on cruise ships in the Pacific Northwest since 2000. Cruise ships discharge into shallow waters along the shipping lanes, near some commercial shellfish beds. Today, national standards provide little guidance on setting shellfish closure zones based on viral risk and there is no reliable viral indicator standard in part due to difficulties in sampling and testing for norovirus.

Because shellfish in Puget Sound and Admiralty Inlet are valuable resources for Washington State, the Washington State Legislature commissioned the Washington State Department of Health (DOH) Office of Shellfish and Water Protection (OSWP) to study the potential risk to shellfish beds from virus contamination associated with cruise ship waste water discharges. DOH contracted with the University of Washington School of Public Health and Community Medicine to perform a risk assessment, which was completed in November 2007. The study used a quantitative microbial risk assessment method coupled with water quality modeling in Puget Sound. Some key findings of the study include:

- *When advanced wastewater treatment systems (AWTS) are functioning well, there is low concern for viral illness. Adequate disinfection is the key to effective norovirus inactivation.*
- *Loss of disinfection could lead to potentially unacceptable virus levels in water over shellfish beds, even with the large dilution provided by ships under sail. However, using minimum dilution factors for when ships are moving at least 6 knots along the current route, dilution is estimated at 1,500,000:1 between the ship and the shore.*
- *The UW study did not gather samples of norovirus concentrations in treated sewage from cruise ships or in the salt water over shellfish beds. Norovirus remains non-culturable, so there is very limited environmental data that is "norovirus specific." In response, UW researchers used data for norovirus "surrogates" from other studies in their analysis.*
- *Consumption data from Tribes that use shellfish beds closest to the path of cruise ships was used in the risk analysis. These rates are higher than for the general population. Raw oyster consumption rates were used as a conservative assumption for these areas.*

The study included many conservative assumptions, but nonetheless concluded that well functioning AWTSs would not lead to norovirus accumulation in shellfish beds such that the median annual risk of potential illness to shellfish consumers from cruise ship discharges in Puget Sound is less than 10,000,000:1. This compares quite favorably with the calculated annual risk of norovirus illness from consumption of raw oysters in the general population, which the UW researchers calculated as about 1,000:1.

As described above, the potential risk of viral contamination of shellfish beds from cruise ship is extremely low when AWTS systems are functioning well. Additionally the geography of Puget Sound and the configuration of shipping lanes provide most shellfish beds some protection from potential contamination from passing ships. However, the signatories to the MOU understand the importance of shellfish resources to Washington State and have agreed to take the actions outlined on page ___ of the MOU to protect shellfish beds and human health while operating in Washington MOU waters.

Appendix x
continued
Bivalve Shellfish Beds
2008 Season

2008 Cruise Season Boundary Points

Id	Tract Name	LATITUDE	LONGITUDE
1	Apple Tree Cove	47.81274089040	-122.48047265700
2	Apple Tree Cove	47.81255672180	-122.47941651600
3	Apple Tree Cove	47.81197112760	-122.47872458000
4	Apple Tree Cove	47.81129443870	-122.47812835500
5	Apple Tree Cove	47.81056937740	-122.47758747000
6	Apple Tree Cove	47.80992145700	-122.47684781100
7	Apple Tree Cove	47.80931916930	-122.47604614700
8	Apple Tree Cove	47.80895286530	-122.47498673900
9	Apple Tree Cove	47.80852971000	-122.47419683400
10	Apple Tree Cove	47.80812779070	-122.47315426700
11	Apple Tree Cove	47.80748647770	-122.47257436300
12	Apple Tree Cove	47.80668065230	-122.47239303200
13	Apple Tree Cove	47.80586169470	-122.47237830900
14	Apple Tree Cove	47.80507505630	-122.47246917900
15	Apple Tree Cove	47.80443177020	-122.47321819700
16	Apple Tree Cove	47.80389497510	-122.47389983000
17	Apple Tree Cove	47.80348525790	-122.47492954200
18	Apple Tree Cove	47.80310261180	-122.47598949400
19	Apple Tree Cove	47.80237402570	-122.47638256900
20	Apple Tree Cove	47.80219450150	-122.47688158400

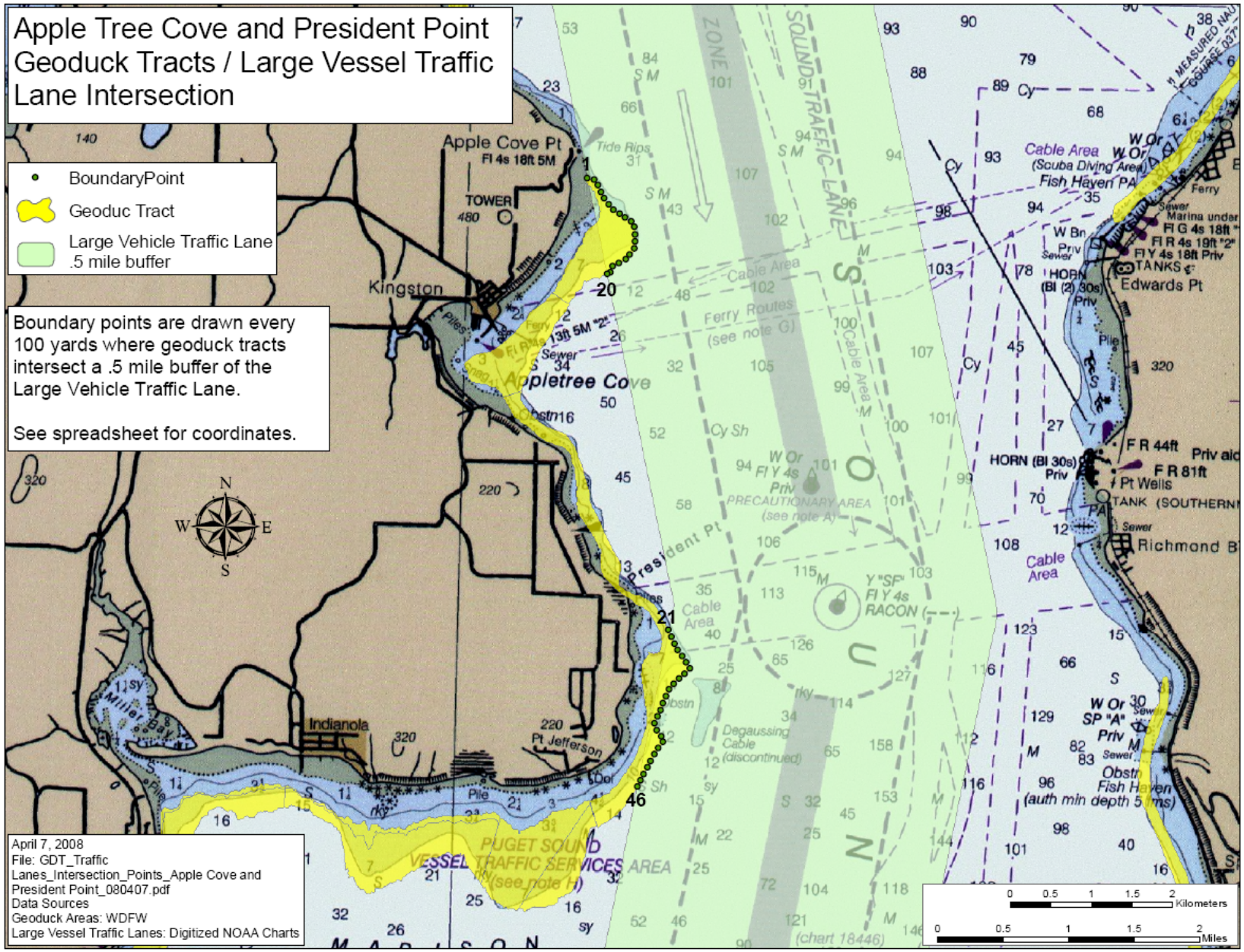
Id	Tract Name	LATITUDE	LONGITUDE
47	Tyee Shoal	47.61916098460	-122.48420272400
48	Tyee Shoal	47.61865190330	-122.48324910700
49	Tyee Shoal	47.61814655430	-122.48229042500
50	Tyee Shoal	47.61761807860	-122.48135871800
51	Tyee Shoal	47.61718007830	-122.48033341700
52	Tyee Shoal	47.61670845870	-122.47935532600
53	Tyee Shoal	47.61609072620	-122.47855854300
54	Tyee Shoal	47.61543441750	-122.47782569300
55	Tyee Shoal	47.61469777070	-122.47729421200
56	Tyee Shoal	47.61394668260	-122.47679893700
57	Tyee Shoal	47.61317098590	-122.47657100600
58	Tyee Shoal	47.61237442300	-122.47686659800
59	Tyee Shoal	47.61162109430	-122.47735159900
60	Tyee Shoal	47.61083929010	-122.47772883400
61	Tyee Shoal	47.61005751060	-122.47810617700
62	Tyee Shoal	47.60927581650	-122.47848390200
63	Tyee Shoal	47.60847990770	-122.47877353100
64	Tyee Shoal	47.60766507680	-122.47893589300
65	Tyee Shoal	47.60687831460	-122.47927979300
66	Tyee Shoal	47.60609769090	-122.47964967100
67	Tyee Shoal	47.60531536900	-122.48000498600
68	Tyee Shoal	47.60457213290	-122.48052049900
69	Tyee Shoal	47.60398226870	-122.48118881300
70	Tyee Shoal	47.60407102430	-122.48180079600

2008 Cruise Season Boundary Points

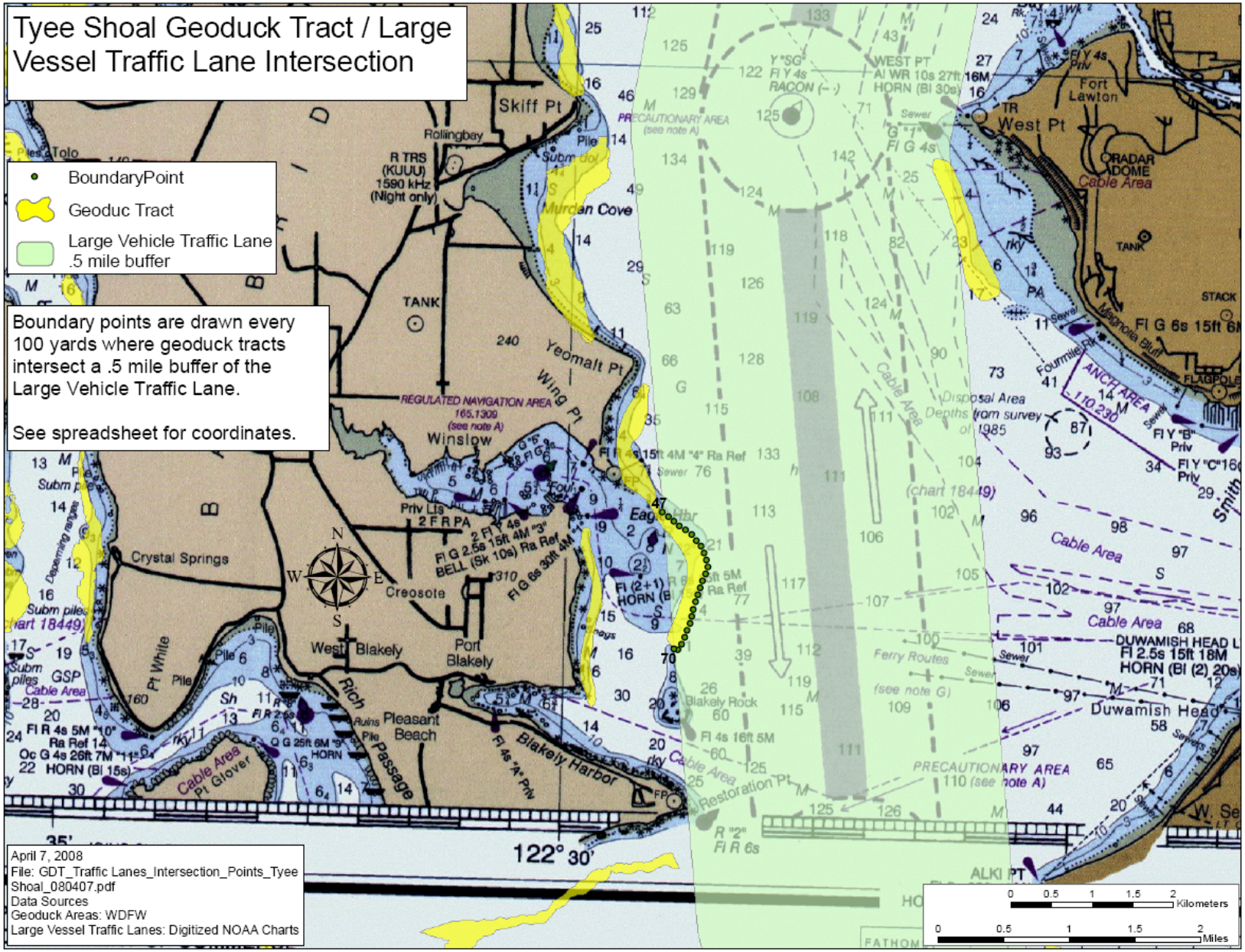
Id	Tract Name	LATITUDE	LONGITUDE
21	President Point	47.76301811440	-122.46531995900
22	President Point	47.76227795780	-122.46478860500
23	President Point	47.76153965240	-122.46425163200
24	President Point	47.76079984240	-122.46372318400
25	President Point	47.76012732540	-122.46302154800
26	President Point	47.75945808780	-122.46231363200
27	President Point	47.75877611500	-122.46163224400
28	President Point	47.75821701680	-122.46249970800
29	President Point	47.75769964180	-122.46344179800
30	President Point	47.75709757920	-122.46424411400
31	President Point	47.75642784290	-122.46495166300
32	President Point	47.75568013190	-122.46545052600
33	President Point	47.75491428200	-122.46589325600
34	President Point	47.75413762450	-122.46629389900
35	President Point	47.75340374390	-122.46683607100
36	President Point	47.75266140050	-122.46720422800
37	President Point	47.75189295980	-122.46684018600
38	President Point	47.75123556490	-122.46610769300
39	President Point	47.75058390610	-122.46579489800
40	President Point	47.74994707310	-122.46656628000
41	President Point	47.74921684450	-122.46711888700
42	President Point	47.74848682750	-122.46768011900
43	President Point	47.74775279740	-122.46822961800
44	President Point	47.74701858040	-122.46877863300
45	President Point	47.74627675290	-122.46930377000
46	President Point	47.74561278720	-122.46984543000

DATUM = HARN
83

Apple Tree Cove and President Point Geoduck Tracts / Large Vessel Traffic Lane Intersection



Tyee Shoal Geoduck Tract / Large Vessel Traffic Lane Intersection



Appendix xi

MEMORANDUM OF UNDERSTANDING
CRUISE OPERATIONS IN
WASHINGTON STATE
SUMMARY OF AMENDMENTS

AMENDMENT NO. 1

Signed July 8, 2005

1. Changing references to the Seattle being the only port berthed to all ports in Washington.
    - While the ships typically call only to Seattle, there is potential for port calls to other ports.
2. Adding a requirement for all vessels within the NWCA to submit an annual report of compliance with MOU.
    - This requirement is being added due to the need to know if ships complied with the MOU whether or not they go through the process of authorization to discharge. For ships that choose to hold their discharge while in Washington waters, it is important to know if they complied.
3. Adding regulation language referenced in Appendix vi to show all effluent limits required for discharge.
    - Ships that discharge must meet the higher standards as set in Alaska which is referenced in the MOU and in appendix vi.

AMENDMENT NO. 2

Signed April 28, 2006

1. Adding a requirement to prohibit the discharge of oily bilge water and a definition was also added. The purpose of this addition is to include specific prohibition language on all major sources of potential pollutants from the vessels.

2. Adding a definition for residual solids. Residual Solids has gone undefined although we have had the requirement to prohibit the discharges. This has been added to clarify exactly what types of residual solids are being managed per this MOU.

3. Adding specific language about what limits must be met for monitoring results. The purpose of this addition is to make it clear to the cruise lines and to the public what limits need to be met.

4. Changing the requirement on WET testing from once per 2 years to once per 40 port calls or turnarounds for vessels that are not homeported due to the fact that vessels come and go from this route from year to year.

5. Other minor changes for organization of the document.

Appendix xi
continued

AMENDMENT NO. 3
Signed May 25, 2007

1. Changing all references and the appendix from the International Council of Cruise Lines (ICCL) to the Cruise Line International Association (CLIA) as the association changed.

2. Adding language about the interagency agreement for cost recovery and referencing the appendix.

3. Changing where residual solids (sludge) can be discharged to disallow any residual solids discharges in the entire Olympic Coast National Marine Sanctuary.

4. Clarifying the language to allow for inspections of all vessels, whether approved for discharge or not for compliance with the MOU. The language currently only allows for inspections of vessels discharging.

5. Clarifying the language to say that all vessels approved for discharge, not just those actually discharging agree to the sampling requirements set out in the MOU. The current language has been confusing for some vessels approved for discharge, but mostly holding discharges anyways.

AMENDMENT NO. 4

1. Incorporating recommendations from the Washington State Department of Health virus report:
    a) Not allow discharges within a half mile of shellfish beds. Include an appendix identifying the areas where bivalve shellfish beds that are recreationally harvested or commercially approved within half a mile of the shipping lanes and update annually. And include an appendix with background information on the virus related elements.
    b) Define a “disinfection system upset” condition as a disinfection below levels of four log (99.99%) inactivation of norovirus.
    c) Require immediate shutdown capability from an upset condition of disinfection below levels of four log (99.99%) inactivation of norovirus for all vessels that have submitted documentation to discharge.
    d) Require immediate notification to the Department of Health for an upset condition.

2. Require whole effluent toxicity testing for only those vessels that are have submitted documentation for continuous discharge.

3. Other minor changes for organization of the document.

Appendix B. Whole Effluent Toxicity Information

Jankowiak, Amy (ECY)

From: Marshall, Randall (ECY)
Sent: Wednesday, January 21, 2009 3:10 PM
To: Jankowiak, Amy (ECY)
Subject: Norwegian Cruise Line samples

Amy,

The Norwegian Star was sampled on 8/16/08. Total ammonia in the sample was 24.3 mg/L and conductivity was 789. Both the 96-hour topsmelt and 48-hour mysid acute tests had NOECs of 25% effluent meaning that 4:1 dilution removed the toxicity. The topsmelt LC50 was 39% effluent and the percent survival in 100% effluent was 10%. The mysid LC50 was 89.4% effluent and the percent survival in 100% effluent was 42.5%.

The Norwegian Pearl was sampled on 9/7/08. Total ammonia in the sample was 32 mg/L and conductivity was 589. The 96-hour topsmelt acute test had an NOEC of 25% effluent meaning that 4:1 dilution removed the toxicity. The topsmelt LC50 was 72.8% effluent and the percent survival in 100% effluent was 35%. The 48-hour mysid acute test an NOEC of 50% effluent meaning that 2:1 dilution removed the toxicity. The mysid percent survival in 100% effluent was 90% indicating that the LOEC of 100% effluent may have been a statistical artifact. There was no mysid LC50 because no more than 10% died.

I believe that the Norwegian Star sample had another toxicant besides ammonia. Samples from both ships had ammonia concentrations in the range causing acute toxicity to fish. Mysids are less sensitive to ammonia. The Norwegian Pearl sample was only toxic to fish and ammonia seems to be the cause. The Norwegian Star sample was toxic to both fish and mysids. The Norwegian Star sample was also more toxic than the Norwegian Pearl sample even though the ammonia concentration was lower. Conductivity was much higher in the Norwegian Star sample indicating that the toxicant may have been ionic. Surfactants from detergents in the Norwegian Star sample may be too blame. Metals are also a possibility but mysids tend to be more sensitive to metals than fish but were a little less sensitive to the Norwegian Star sample.

Randall Marshall
WET Coordinator
WA State Dept. of Ecology
P.O. Box 47600
Olympia, Washington 98504-7600
360-407-6445
rmar461@ecy.wa.gov
WA WET webpage:
http://www.ecy.wa.gov/programs/wq/wet

Link Code	Sample Date	Start Date	Lab	Title	Organism	Material	Source	Endpoint	NOEC	LOEC	PMSD
RMAR301	09/17/05	09/18/05	Nautilus Environmental	Acute Fish Survival Test	Atherinops affinis (Topsmelt)	Ship Black Water (or combined)	Holland America Cruise Ship	96h Survival Rate	12.5	25	28.91%
RMAR302	09/17/05	09/18/05	Nautilus Environmental	Acute Mysid Survival Test	Americamysis bahia (Atlantic Mysid)	Ship Black Water (or combined)	Holland America Cruise Ship	48h Survival Rate	25	50	6.54%
RMAR576	09/27/05	09/28/05	Nautilus Environmental	Acute Fish Survival Test	Atherinops affinis (Topsmelt)	Ship Black Water (or combined)	Norwegian Star	96h Survival Rate	25	50	24.28%
RMAR575	09/27/05	09/28/05	Nautilus Environmental	Acute Mysid Survival Test	Americamysis bahia (Atlantic Mysid)	Ship Black Water (or combined)	Norwegian Star	48h Survival Rate	50	100	8.11%
RMAR670	06/04/06	06/06/06	Nautilus Environmental	Echinoid Fertilization Test	Strongylocentrotus purpuratus (Purple Sea Urchin)	Ship Black Water (or combined)	Norwegian Star	Fertilization Rate	<6.25	6.25	5.84%
RMAR746	09/08/06	09/09/06	Nautilus Environmental	Acute Fish Survival Test	Atherinops affinis (Topsmelt)	Ship Black Water (or combined)	Zaandam	96h Survival Rate	25	50	21.02%
RMAR745	09/08/06	09/09/06	Nautilus Environmental	Acute Mysid Survival Test	Americamysis bahia (Atlantic Mysid)	Ship Black Water (or combined)	Zaandam	48h Survival Rate	<6.25	6.25	18.93%
RMAR750	09/09/06	09/10/06	Nautilus Environmental	Acute Fish Survival Test	Atherinops affinis (Topsmelt)	Ship Black Water (or combined)	Oosterdam	96h Survival Rate	25	50	20.62%
RMAR749	09/09/06	09/10/06	Nautilus Environmental	Acute Mysid Survival Test	Americamysis bahia (Atlantic Mysid)	Ship Black Water (or combined)	Oosterdam	48h Survival Rate	50	100	18.79%
RMAR748	09/10/06	09/11/06	Nautilus Environmental	Acute Fish Survival Test	Atherinops affinis (Topsmelt)	Ship Black Water (or combined)	Westerdam	96h Survival Rate	25	50	14.84%
RMAR747	09/10/06	09/11/06	Nautilus Environmental	Acute Mysid Survival Test	Americamysis bahia (Atlantic Mysid)	Ship Black Water (or combined)	Westerdam	48h Survival Rate	25	50	12.20%
RMAR1305	08/16/08	08/16/08	Nautilus Environmental	Acute Mysid Survival Test	Americamysis bahia (Atlantic Mysid)	Ship Black Water (or combined)	Norwegian Star	48h Survival Rate	25	50	9.61%
RMAR1306	08/16/08	08/16/08	Nautilus Environmental	Acute Fish Survival Test	Atherinops affinis (Topsmelt)	Ship Black Water (or combined)	Norwegian Star	96h Survival Rate	25	50	30.50%
RMAR1307	09/07/08	09/08/08	Nautilus Environmental	Acute Mysid Survival Test	Americamysis bahia (Atlantic Mysid)	Ship Black Water (or combined)	Norwegian Pearl	48h Survival Rate	50	100	5.66%
RMAR1308	09/07/08	09/08/08	Nautilus Environmental	Acute Fish Survival Test	Atherinops affinis (Topsmelt)	Ship Black Water (or combined)	Norwegian Pearl	96h Survival Rate	25	50	24.10%

NOEC = no observed effects concentration

LOEC = lowest observed effects concentration

PMSD = percent minimum significant difference

Sample Code	Sample Date	Start Date	Lab	Material	Source	Parameter	Measurement	Units
RMAR301-302	09/17/05	09/18/05	Nautilus Environmental	Ship Black Water (or combined)	Holland America Cruise Ship	Alkalinity (CaCO3)	360	mg/L
						Conductivity	911	µmhos
						Dissolved Oxygen	4.6	mg/L
						pH	7.51	
						Total Ammonia (N)	39.6	mg/L
RMAR575-576	09/27/05	09/28/05	Nautilus Environmental	Ship Black Water (or combined)	Norwegian Star	Conductivity	857	µmhos
						Total Ammonia (N)	35.9	mg/L
RMAR670	06/04/06	06/06/06	Nautilus Environmental	Ship Black Water (or combined)	Norwegian Star	Alkalinity (CaCO3)	76	mg/L
						Conductivity	732	µmhos
						Hardness (CaCO3)	52	mg/L
						pH	6.68	
						Total Ammonia (N)	15.4	mg/L
						Total Residual Chlorine	0.03	mg/L
RMAR745-746	09/08/06	09/09/06	Nautilus Environmental	Ship Black Water (or combined)	Zaandam	Alkalinity (CaCO3)	508	mg/L
						Conductivity	971	µmhos
						Hardness (CaCO3)	64	mg/L
						pH	7.77	
						Total Ammonia (N)	52.9	mg/L
RMAR749-750	09/09/06	09/10/06	Nautilus Environmental	Ship Black Water (or combined)	Oosterdam	Alkalinity (CaCO3)	236	mg/L
						Conductivity	600	µmhos
						Hardness (CaCO3)	72	mg/L
						pH	7.59	
						Total Ammonia (N)	50.4	mg/L
RMAR747-748	09/10/06	09/11/06	Nautilus Environmental	Ship Black Water (or combined)	Westerdam	Alkalinity (CaCO3)	184	mg/L
						Conductivity	499	µmhos
						Hardness (CaCO3)	56	mg/L
						pH	7.3	
						Total Ammonia (N)	36	mg/L

POTW	Total Ammonia (mg/L)			Fish % Survival in 100% Sample			Daphnid % Survival in 100% Sample		
	mean	max	min	mean	max	min	mean	max	min
All Tests	16.54	54.80	0.03	75.5%			86.4%		
Aberdeen WWTP	20.83	29.00	7.30	57.9%	92.5%	25.0%	98.8%	100.0%	95.0%
Alderwood WWTP	10.55	11.50	8.70						
Arlington WWTP	0.67	1.00	0.50	98.5%	100.0%	96.7%	97.5%	100.0%	90.0%
Bremerton WWTP	23.10	25.80	21.30	70.6%	100.0%	15.0%	95.0%	100.0%	85.0%
Central Kitsap Plant	32.70	39.90	22.60	0.0%	0.0%	0.0%	43.7%	100.0%	0.0%
Chambers Creek WWTP	41.29	48.80	30.80				35.2%	100.0%	0.0%
Chehalis WWTP	0.77	1.30	0.50						
Edmonds WWTP	23.90	29.40	19.00	75.0%	100.0%	0.0%	98.1%	100.0%	90.0%
Ellensburg WWTP	0.93	2.00	0.50	97.5%	100.0%	92.5%	100.0%	100.0%	100.0%
Enumclaw WWTP	5.30	6.30	4.30						
Gig Harbor WWTP	14.33	24.20	0.50	69.4%	100.0%	15.0%	100.0%	100.0%	100.0%
King County West Point WWTP	22.21	29.10	17.80	86.9%	100.0%	55.0%	100.0%	100.0%	100.0%
Lakota WWTP	29.89	53.70	13.60	34.2%	100.0%	0.0%	69.8%	100.0%	0.0%
Lynden WWTP	0.50	0.50	0.50	88.9%	100.0%	0.0%	98.8%	100.0%	95.0%
Lynnwood WWTP	22.69	30.10	19.20	62.9%	86.7%	15.0%	100.0%	100.0%	100.0%
Marysville WWTP	25.03	35.10	0.50	18.5%	97.5%	0.0%	86.5%	100.0%	0.0%
Miller Creek, SW Suburban Sewer D.	20.10	33.80	13.00						
Oak Harbor STP	35.20	46.90	22.40	61.3%	100.0%	0.0%	61.2%	100.0%	0.0%
Pasco WWTP	15.90	19.70	13.40						
Port Angeles WWTP	21.85	25.00	17.10	56.3%	100.0%	7.5%			
Port Townsend WWTP	0.87	1.70	0.50	98.8%	100.0%	97.5%	96.3%	100.0%	85.0%
Prosser WWTP	1.38	3.30	0.50						
Puyallup WWTP	1.61	6.02	0.03	98.1%	100.0%	92.5%	99.7%	100.0%	95.0%
Quincy Industrial	7.85	14.90	0.50	66.3%	100.0%	0.0%	72.1%	100.0%	0.0%
Tacoma #1	37.34	54.80	11.50	57.7%	97.5%	0.0%	57.8%	100.0%	0.0%
Tacoma #3	28.77	35.80	19.80	76.0%	100.0%	0.0%	98.3%	100.0%	80.0%
Vancouver West STP	13.45	21.40	2.80	79.5%	100.0%	12.5%	98.2%	100.0%	85.0%
Wenatchee WWTP	6.52	17.30	0.50				90.8%	100.0%	45.0%
Yakima WWTP	1.11	4.50	0.50				99.8%	100.0%	95.0%

PRINCESS CRUISES

March 18, 2009

RECEIVED
MAR 20 2009
DEPT OF ECOLOGY

Amy Jankowiak
Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, Washington 98008-5452

Dear Mrs. Jankowiak:

Princess Cruises certifies that Star Princess and Golden Princess did not discharge in Washington State while at berth during the 2008 season. Wet testing was not scheduled for these two ships as it was our understanding that this was not required if the ship did not discharge at berth as per the Memorandum of Understanding Cruise Operations in Washington State. We appreciate your recent clarification.

Princess Cruises will instruct its vessels not to discharge while at berth during the 2009 season. This year Princess Cruises would like to requests discharge approval for Star Princess, Golden Princess and Pacific Princess for one nautical mile from berth at a port in Washington and traveling at a speed of at least 6 knots.

Please find attached the Vessel Specific Sampling Plans for the above three ships. Once we receive the United States Coast Guard letters of continuous discharge approval from Sector Juneau, Alaska, we will forward these to you.

Sincerely,

Andrew Lorenzana
Environmental Operations Manager
PRINCESS CRUISES
24305 Town Center Drive
Santa Clarita, CA 91355-4999
Office: 661-753-2755

Appendix C. Sampling Data for Compliance

Appendix C: Sample Results - Cruise Ships Approved for Discharge into Washington Waters

SHIP: NORWEGIAN PEARL

		pH	BOD	TSS	Chlorine Residual	Fecal Coliform	Ammonia	Copper (dissolved)	Nickel (dissolved)	Zinc (dissolved)	Comments
		St. Units	mg/l	mg/l	mg/l	#/100 ml	mg/l	ug/l	ug/l	ug/l	
MOU/Alaska Limits[1]		6-9	30/45	30/45	10 ug/l	20 / 40					
WA State Water Quality Stan		7.0-8.5	NA	NA	13 / 7.5 ug/l	14 / 43					
Sample Date	Location/ Lab										
5/13/08	Juneau/Admiralty	6.18	3.9	5	ND< 0.10	ND< 1	18	9.2	6.91	94.4	MIXED BLACK AND GRAY OVERBOARD
5/18/08	Seattle/Pace Analyt	6.1	14.0	ND< 2	ND< 0.10	< 2					MIXED BLACK AND GRAY OVERBOARD
6/3/08	Juneau/Admiralty	6.74	2.1	2.4	ND< 0.10	ND< 1	27	5.7	4	67	MIXED BLACK AND GRAY unannounced sampling (+ priority pollutants)
6/8/08	Seattle/Pace Analyt	6.2	11	8	ND< 0.10	< 2					MIXED BLACK AND GRAY OVERBOARD
6/17/08	Juneau/Admiralty	6.75	3.46	7	ND< 0.10	8	38	19.3	9.43	50.3	MIXED BLACK AND GRAY OVERBOARD
6/24/08	Juneau/Admiralty	6.8	13	6	ND< 0.10	ND< 1	23	4.84	5.74	105	MIXED BLACK AND GRAY OVERBOARD
7/13/08	Seattle/Pace Analyt	6.3	19	2	ND< 0.10	< 2					MIXED BLACK AND GRAY OVERBOARD
7/15/08	Juneau/Admiralty	6.76	3.2	ND< 1.0	ND< 0.10	ND< 1	26	9.43	6.06	54.7	MIXED BLACK AND GRAY OVERBOARD
7/22/08	Juneau/Admiralty	6.75	3.2	6	ND< 0.10	ND< 1	25	3.53	3.47	67.1	MIXED BLACK AND GRAY OVERBOARD
8/12/08	Juneau/Admiralty	6.67	2.9	ND< 1.0	ND< 0.10	ND< 1	34	6.9	5.1	110	MIXED BLACK AND GRAY OVERBOARD
8/17/08	Seattle/Pace Analyt	6.6	22	2	ND< 0.10	< 2					MIXED BLACK AND GRAY OVERBOARD
8/19/08	Juneau/Admiralty	6.53	3.0	ND< 1.0	ND< 0.10	ND< 1	41	12	4.9	110	MIXED BLACK AND GRAY OVERBOARD
9/2/08	Juneau/Admiralty	6.75	< 2.0	7	< 0.10	< 2	27	8.5	3.8	73	MIXED BLACK AND GRAY unannounced sampling (+ priority pollutants)
9/9/08	Juneau/Admiralty	6.77	ND< 0.5	6	ND< 0.10	ND< 1	36	8.8	5	62	MIXED BLACK AND GRAY OVERBOARD
9/14/08	Seattle/Pace Analyt	6.4	27	ND< 2	ND< 0.10	< 2					MIXED BLACK AND GRAY OVERBOARD
	MINIMUM	**6.1**	**ND**	**ND**	**ND**	**ND**	**18**	**3.53**	**3.47**	**50.3**	met Seattle sampling requirement
	AVERAGE		**8.7**	**3.9**	**0.10**		**30**	**8.82**	**5.44**	**79.4**	
	MAXIMUM	**6.8**	**27**	**8**	**0.10**	**8**	**41**	**19.3**	**9.43**	**110**	
	GEOMETRIC MEAN					**1.5**					

SHIP: NORWEGIAN STAR

		pH	BOD	TSS	Chlorine Residual	Fecal Coliform	Ammonia	Copper (dissolved)	Nickel (dissolved)	Zinc (dissolved)	Comments
		St. Units	mg/l	mg/l	mg/l	#/100 ml	mg/l	ug/l	ug/l	ug/l	
MOU/Alaska Limits[1]		6-9	30/45	30/45	10 ug/l	20 / 40					
WA State Water Quality Stan		7.0-8.5	NA	NA	13 / 7.5 ug/l	14 / 43					
Sample Date	Location/ Lab										
5/13/08	Juneau/Admiralty	7.01	5.5	ND< 1.0	ND< 0.10	ND< 1	32	2.27	8.09	79.4	MIXED BLACK AND GRAY OVERBOARD
5/17/08	Seattle/Pace Analyt	6.8	38.0	2	ND< 0.10	< 2					MIXED BLACK AND GRAY OVERBOARD
6/3/08	Juneau/Admiralty	6.69	5.6	4	ND< 0.10	ND< 1	6.6	1.5	8.9	26	MIXED BLACK AND GRAY unannounced sampling (+ priority pollutants)
6/3/08	Juneau/Admiralty	6.69	5.4	3.2	ND< 0.10	ND< 1	6.6	1.3	8.2	23	MIXED BLACK AND GRAY unannounced sampling (BLIND DUPLICATE)
6/7/08	Seattle/Pace Analyt	6.9	13	4	ND< 0.10	8					MIXED BLACK AND GRAY OVERBOARD
6/17/08	Juneau/Admiralty	6.71	ND< 0.5	ND< 1.0	ND< 0.10	ND< 1	19	2.52	6.89	58.4	MIXED BLACK AND GRAY OVERBOARD
6/24/08	Juneau/Admiralty	6.63	8	8	ND< 0.10	ND< 1	22	1.99	8.73	111	MIXED BLACK AND GRAY OVERBOARD
7/12/08	Seattle/Pace Analyt	6.8	30	4	ND< 0.10	< 2					MIXED BLACK AND GRAY OVERBOARD
7/15/08	Juneau/Admiralty	6.79	7	ND< 1.0	ND< 0.10	ND< 1	29	1.38	9.6	63.6	MIXED BLACK AND GRAY OVERBOARD
7/29/08	Juneau/Admiralty	6.84	4.7	7	ND< 0.10	12	43	2.15	8.38	69.9	MIXED BLACK AND GRAY OVERBOARD
8/12/08	Juneau/Admiralty	6.66	8.5	ND< 1.0	ND< 0.10	ND< 1	20	3.7	13	100	MIXED BLACK AND GRAY OVERBOARD
8/16/08	Seattle/Pace Analyt	6.6	65	4	ND< 0.10	< 2					MIXED BLACK AND GRAY OVERBOARD
8/19/08	Juneau/Admiralty	6.71	9.1	ND< 1.0	ND< 0.10	2	26	2.3	13	110	MIXED BLACK AND GRAY OVERBOARD
8/26/08	Juneau/Admiralty	6.76	12.9	11	ND< 0.10	4	20	4.6	11	94	MIXED BLACK AND GRAY unannounced sampling (+ priority pollutants)
9/2/08	Juneau/Admiralty	6.60	8.1	4	ND< 0.10	*	11	2.2	11	160	MIXED BLACK AND GRAY OVERBOARD
9/6/08	Seattle/Pace Analyt	6.60	7	ND< 1.0	ND< 0.10	8					MIXED BLACK AND GRAY OVERBOARD
9/9/08	Juneau/Admiralty	6.5	8.3	ND< 1.0	ND< 0.10	ND< 1	17	12	14	140	MIXED BLACK AND GRAY OVERBOARD
9/16/08	Juneau/Admiralty	6.73	18.4	ND< 1.0	ND< 0.10	ND< 1					MIXED BLACK AND GRAY OVERBOARD
*fecal coliform analysis demonstrated confluent growth, so results not quantifiable. Re-sample ordered.											
	MINIMUM	**6.5**	**ND**	**ND**	**ND**	**ND**	**6.6**	**1.3**	**6.89**	**23**	met Seattle sampling requirement
	AVERAGE		**14.2**	**3.3**	**0.10**		**21.0**	**3.16**	**10.07**	**86.3**	
	MAXIMUM	**7.01**	**65**	**11**	**0.10**	**12**	**43**	**12**	**14**	**160**	
	GEOMETRIC MEAN					**1.8**					

SHIP: GOLDEN PRINCESS

		pH	BOD	TSS	Chlorine Residual	Fecal Coliform	Ammonia	Copper (dissolved)	Nickel (dissolved)	Zinc (dissolved)	Comments
		St. Units	mg/l	mg/l	mg/l	#/100 ml	mg/l	ug/l	ug/l	ug/l	
MOU/Alaska Limits[1]		6-9	30/45	30/45	10 ug/l	20 / 40					
WA State Water Quality Stan		7.0-8.5	NA	NA	13 / 7.5 ug/l	14 / 43					
Sample Date	Location/ Lab										
5/12/08	Juneau/Admiralty	8.16	ND< 0.5	ND< 1.0	ND< 0.10	12	21	9.26	6.92	179	MIXED BLACK AND GRAY OVERBOARD
5/15/08	Juneau/Admiralty	6.98	2.7	ND< 1.0	ND< 0.10	ND< 1	29	8.3	6	180	MIXED BLACK AND GRAY unannounced sampling (+ priority pollutants)
5/19/08	Juneau/Admiralty	6.96	ND< 0.5	ND< 1.0	ND< 0.10	ND< 1	27	11.3	7.30	225	MIXED BLACK AND GRAY OVERBOARD
6/7/08	Seattle/Pace Analyt	7.3	12	2	ND< 0.10	2					MIXED BLACK AND GRAY OVERBOARD
6/9/08	Juneau/Admiralty	7.12	3.9	ND< 1.0	ND< 0.10	ND< 1	36	10.2	6.33	203	MIXED BLACK AND GRAY OVERBOARD
6/16/08	Juneau/Admiralty	7.44	ND< 0.5	ND< 1.0	ND< 0.10	ND< 1	51	10.7	4.89	106	MIXED BLACK AND GRAY OVERBOARD
6/30/08	Juneau/Admiralty	7.47	3.2	ND< 1.0	ND< 0.10	2	42	5.1	5.3	93	MIXED BLACK AND GRAY OVERBOARD
7/7/08	Juneau/Admiralty	7.34	2.3	ND< 1.0	ND< 0.10	ND< 1	22	14.5	7.36	156	MIXED BLACK AND GRAY OVERBOARD
7/12/08	Seattle/Pace Analyt	7.0	13	2	ND< 0.10	4					MIXED BLACK AND GRAY OVERBOARD
7/21/08	Juneau/Admiralty	7.34	2.8	ND< 1.0	ND< 0.10	4	21	6.72	6.47	269	MIXED BLACK AND GRAY OVERBOARD
8/11/08	Juneau/Admiralty	7.15	3.5	ND< 1.0	ND< 0.10	ND< 1	33	17	6.8	150	MIXED BLACK AND GRAY OVERBOARD
8/16/08	Seattle/Pace Analyt	7.3	14	2	ND< 0.10	< 2					MIXED BLACK AND GRAY OVERBOARD
8/18/08	Juneau/Admiralty	7.38	ND< 0.5	ND< 1.0	ND< 0.10	ND< 1	38	41	9.4	350	MIXED BLACK AND GRAY OVERBOARD
9/1/08	Juneau/Admiralty	7.62	20.2	ND< 1.0	ND< 0.10	ND< 1	63	11	5.7	130	MIXED BLACK AND GRAY OVERBOARD
9/8/08	Juneau/Admiralty	7.32	3.3	ND< 1.0	ND< 0.10	ND< 1	46	35	6.9	210	MIXED BLACK AND GRAY OVERBOARD
9/13/08	Seattle/Pace Analyt	7.2	24	ND< 2	ND< 0.10	4					MIXED BLACK AND GRAY OVERBOARD
	MINIMUM	**6.96**	**ND**	**ND**	**ND**	**ND**	**21**	**5.10**	**4.89**	**93**	met Seattle sampling requirement
	AVERAGE		**6.7**	**1.1**	**0.10**		**36**	**15.01**	**6.61**	**188**	
	MAXIMUM	**8.16**	**24**	**2**	**0.10**	**12**	**63**	**41**	**9.4**	**350**	
	GEOMETRIC MEAN					**1.7**					

SHIP: STAR PRINCESS

		pH	BOD	TSS	Chlorine Residual	Fecal Coliform	Ammonia	Copper (dissolved)	Nickel (dissolved)	Zinc (dissolved)	Comments
		St. Units	mg/l	mg/l	mg/l	#/100 ml	mg/l	ug/l	ug/l	ug/l	
MOU/Alaska Limits[1]		6-9	30/45	30/45	10 ug/l	20 / 40					
WA State Water Quality Stan		7.0-8.5	NA	NA	13 / 7.5 ug/l	14 / 43					
Sample Date	Location/ Lab										
5/14/08	Juneau/Admiralty	6.98	6.4	ND< 1.0	ND< 0.10	ND< 1	21	135	15.7	110	MIXED BLACK AND GRAY OVERBOARD
5/28/08	Juneau/Admiralty	7.11	4	ND< 1.0	ND< 0.10	ND< 1	34	100	12	130	MIXED BLACK AND GRAY unannounced sampling (+ priority pollutants)
6/8/08	Seattle/Pace Analyt	6.9	15	6	ND< 0.10	< 2					MIXED BLACK AND GRAY OVERBOARD
6/18/08	Juneau/Admiralty	6.88	ND< 0.5	ND< 1.0	ND< 0.10	ND< 1	27	59.2	13.6	123	MIXED BLACK AND GRAY OVERBOARD
6/25/08	Juneau/Admiralty	6.67	6.8	ND< 1.0	ND< 0.10	ND< 1	32	55.5	15.7	119	MIXED BLACK AND GRAY OVERBOARD
7/13/08	Seattle/Pace Analytical	6.7	15	2	ND< 0.10	< 2					MIXED BLACK AND GRAY OVERBOARD
7/16/08	Juneau/Admiralty	6.61	ND< 0.5	ND< 1.0	ND< 0.10	ND< 1	42	30.1	18.4	113	MIXED BLACK AND GRAY OVERBOARD
7/17/08	Juneau/Admiralty	6.76	3.4	ND< 1	ND< 0.10	< 2	30	19	8.5	87	MIXED BLACK AND GRAY unannounced sampling (+ priority pollutants)
8/13/08	Juneau/Admiralty	7.25	4	ND< 1.0	ND< 0.10	ND< 1	64	100	19	81	MIXED BLACK AND GRAY OVERBOARD
8/17/08	Seattle/Pace Analyt	7.1	29	ND< 2	ND< 0.10	2					MIXED BLACK AND GRAY OVERBOARD
8/20/08	Juneau/Admiralty	7.15	3.7	ND< 1.0	ND< 0.10	ND< 1	65	79	20	100	MIXED BLACK AND GRAY OVERBOARD
9/3/08	Juneau/Admiralty	7.35	ND< 0.5	ND< 1.0	ND< 0.10	ND< 1	56	35	9.3	120	MIXED BLACK AND GRAY OVERBOARD
9/10/08	Juneau/Admiralty	7.43	ND< 0.5	ND< 1.0	ND< 0.10	ND< 1	71	60	11	49	MIXED BLACK AND GRAY OVERBOARD
9/14/08	Seattle/Pace Analyt	7.4	29	ND< 2	ND< 0.10	< 2					MIXED BLACK AND GRAY OVERBOARD
	MINIMUM	**6.61**	**ND**	**ND**	**ND**	**ND**	**21**	**19**	**8.5**	**49**	met Seattle sampling requirement
	AVERAGE		**8.5**	**1.6**	**0.10**		**44**	**67.3**	**14.3**	**103**	
	MAXIMUM	**7.4**	**29**	**6**	**0.10**	**2**	**71**	**135**	**20**	**130**	
	GEOMETRIC MEAN					**1.2**					

ND = Non Detect, value in box is the detection level. Unnanounced sampling includes other parameters not listed above.

BOD = Biochemical Oxygen Demand - or organics; TSS = Total Suspended Solids

mg/l = milligrams per liter; ug/l = micrograms per liter; #/100 ml = coliforms per 100 millileters

[1]MOU/Alaska limits from Title XIV, Certain Alaska Cruise Ship Operations, Section 1404(c) /40CFR 133.102

BOD and TSS: 30-day average shall not exceed 30 mg/l, 7-day average shall not exceed 45 mg/l

Fecal Coliform: geometric mean of any 30-day period shall not exceed 20 fecal colifrom/100 ml and not more than 10% of the samples exceed 40 fecal coliform/100 ml

[2]Washington State Water Quality Standards for Surface Waters of the State of Washington Chapter 173-201A WAC

Fecal Coliform: shall not exceed a geometric mean of 14 colonies/100 ml and not more than 10% of a samples shall exceed a geometric mean of 43 colonies/100 ml

pH: 7-8.5 with a human-caused variation within less than 0.2

chlorine: 13 ug/l is the acute limit (1-hour average); 7.5 ug/l is the chronic limit (4-day average)

Appendix D. Inspection Reports

State of Washington Department of Ecology

Cruise Ship Memorandum of Understanding, Cruise Operations in Washington State Inspection Report

Northwest Regional Office
3190 160th Ave SE
Bellevue, WA 98008
Phone: (425) 649-7000 Fax: (425) 649-7098

Section A: General Information

Vessel Name:	OOSTERDAM	Date:	June 7, 2008
Vessel Operator:	Holland America Line	Entry Time:	9:30 AM
Vessel Type	Passenger Ship	Exit Time:	12:10 PM
Location:	Pier 30, Seattle	Notification (name & date):	Jon Turvey, Bill Morani; June 2, 2008
On-board contact(s):	Ted Arnold, Environmental Officer, Bob Diaz, HAL Office – Deputy Director, Environmental Compliance, Sergij Wladimirov, 3rd Enginner/AWWPS Operator		
Inspector(s):	Amy Jankowiak, Department of Ecology, Water Quality Program		
# passengers/crew:	1848/800		

The OOSTERDAM arrived on April 29th, 2008 at the Port of Seattle to begin the 2008 cruise season. The Rochem graywater system was not functioning at the time of the inspection. The majority of the graywater is held and then discharged outside of MOU waters. The rest of the graywater is sent to the blackwater system to dilute the concentrated blackwater influent. The blackwater system is functioning, but all discharges are being held and then discharged outside of MOU waters.

Section B: Areas Evaluated

☒	Black/Gray wastewater system	☒	Residual solids	☒	Records/Reports	☒	Hazardous Waste/Solid Waste	☐	Sampling/ Monitoring
☒	Discharge locations	☒	Operations & Maintenance	☒	Sludge Handling/ Disposal	☒	Oily bilge water	☒	Other

Section C: For vessels discharging ≥ 1nm from berth and ≥ 6 knots only [2.1.3(A)]

☐	Schematics match black/gray wastewater system	Not Applicable
☐	Operations as described in submitted documentation	Not Applicable
☒	Daily 24-hour continuous monitoring for turbidity or equivalent monitoring	Not yet required, but they do have continuous monitoring for turbidity.
☒	Turbidimeter or equivalent monitoring equipment functioning properly	Not required, but their continuous turbidity monitoring equipment appears to be functioning properly.
	Turbidity or equivalent : Not yet required, but they do have continuous turbidity monitoring. Last calibration – as needed. Trigger level for early alarm: 10 fun Trigger level for shutdown: 20 fnu Recorded turbidity/equivalent levels above triggers:	
☒	Auto shut down or operational controls to insure system shut down if high turbidity occurs	Not required, but they do have continuous monitoring for turbidity which automatically shuts down the discharge at 20 fnu.
☒	Disinfection system operated and maintained properly	The disinfection system appears to be maintained and operating properly.
	Disinfection System: There is one ultraviolet (UV) disinfection system for the blackwater system, and one UV system for the graywater system. Each UV unit has eight light bulbs with a lighted alarm at the unit if a bulb is out.	

Section D: For vessels discharging continuously [2.1.3(B)]

☐	Schematics match black/gray wastewater system	Not Applicable
☐	Operations as described in submitted documentation	Not Applicable
☐	Daily 24-hour continuous turbidity or equivalent monitoring	Not Applicable

☐	Turbidimeter or equivalent monitoring equipment functioning properly	Not Applicable
	Turbidity or equivalent : Last calibration Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:	
☐	Auto shut down or operational controls to insure system shut down if a high turbidity occurs	Not Applicable
☐	Disinfection immediately prior to discharge	Not Applicable
☐	Disinfection system operated and maintained properly	Not Applicable
	Disinfection System:	

Section E: General (Approved to Discharge)		
☒	No discharges within ½ mile from shellfish beds/protocol (President's Point, Apple Tree Cove, Tyee Shoal)	No discharges are currently occurring within Waters subject to the MOU. They do have protocols in place and maps depicting the shellfish areas within ½ mile of the shipping lanes.
☒	Discharges immediately stopped when high turbidity occurs	No discharges are currently occurring within Waters subject to the MOU. They do have their systems set up to automatically shut down the discharge if high turbidity occurs.
☒	Immediate notifications made to Health for disinfection system upset	No discharges are currently occurring within Waters subject to the MOU. They do have the appropriate notifications numbers posted and available.
☒	Sampling conducted 2/month, 1/month in Seattle (BOD, TSS, fecal coliform, pH, chlorine residual)	Sampling is being conducted, although not necessary as not approved to or discharging in Waters subject to the MOU.
☒	Whole Effluent Toxicity Testing 1 per 2 years (homeported) or once/40 calls for continuous	Not required at this time.
☒	Discharges immediately stopped when GI >2% passengers or crew	No discharges are currently occurring within Waters subject to the MOU. Protocols are being put in place.
☒	Immediate notifications to Health for GI>2% passengers or crew	No discharges are currently occurring within Waters subject to the MOU. They do have protocols in place for notifications.

Section F: General		
☒	Discharge records review	Discharge records were reviewed (blackwater/graywater/residual solids) and are maintained properly. No discharges in MOU waters were present from the time of the last inspection (August 25, 2007) to present.
☒	Residual solids managed properly/ disposal protocol per MOU	Residual solids are either incinerated or held to be discharged at greater than 12 nautical miles and outside of MOU waters and the Olympic Coast National Marine Sanctuary.
☒	Hazardous Waste managed properly	All hazardous waste that is collected is being sent off-shore in Victoria, Canada. Records were reviewed for hazardous waste discharges.
☒	WA Haz Waste guidelines followed (appendix vii)	All hazardous waste that is collected is being sent off-shore in Victoria, Canada. Records were reviewed for hazardous waste discharges.
☒	Solid Waste managed properly	Solid waste is being managed properly. The various solid waste streams are collected, sorted, stored, and sent ashore or incinerated as appropriate.
☒	Oily bilge water managed properly	Oily bilge water is treated and discharged at less than 15 ppm and outside of MOU waters.
Other:		

Health = Washington State Department of Health

Section G: Sample Results

Parameter	Results
Biochemical Oxygen Demand 5-Day (BOD)	Not Applicable
Total Suspended Solids (TSS)	Not Applicable
Fecal Coliform	Not Applicable
Residual Chlorine	Not Applicable
pH	Not Applicable
Ammonia, Nitrogen	Not Applicable

Section H: Summary of Findings/Comments

Introduction

Amy Jankowiak, Washington State Department of Ecology (Ecology) Northwest Regional Office, Water Quality Program conducted the inspection of the Holland America Line OOSTERDAM on June 7, 2008. The main contacts on board the OOSTERDAM included Ted Arnold, Environmental Officer, Sergij Wladimirov, 3rd Engineer and AWWPS Operator, and Robert Diaz, Deputy Director, Environmental Compliance HAL. Prior notification of the visit was given on June 2, 2008 for security protocol. The purpose of the inspection was to evaluate compliance with the *Memorandum of Understanding Cruise Operations in Washington State* (MOU), as amended. The OOSTERDAM is currently not approved for and is not discharging black or graywater into MOU waters. The vessel has requested and received approval for discharge at greater than one nautical mile from shore and at greater than six knots in 2004, 2005, and 2006. Discharge approval has not been requested as of yet for the 2008 season. Discharges are being held until outside MOU waters.

The HOLLAND OOSTERDAM was built in 2002, and is 936 feet long with a width of 106 feet and a maximum draft of 26 feet. There passenger capacity is 1848 and the crew capacity is 800. The ship's wastewater systems', Rochem, were installed in 2002. The vessel is powered with on-shore power during port calls in Seattle.

Inspection

I arrived and boarded the ship (photo #01) at about 9:30 am and began with introductions and a plan for the day with the Ted Arnold, the Environmental Officer and Bob Diaz with Holland America Line. We then discussed various waste streams, and the discharge protocols. Discharge records were reviewed for blackwater and graywater discharges; and later for hazardous waste off-loads. We then viewed and discussed the black water treatment system. Next, we toured the garbage sorting area and hazardous waste storage. We then headed to the bridge to review discharge procedures and to verify locations of certain discharges. The inspection was then finalized and I disembarked the vessel at about 12:10 pm.

Discharge Types and Protocols:

All discharges to water occur at greater than 12 nautical miles and outside of MOU waters. No discharges occur in the Olympic Coast National Marine Sanctuary. Only upon verification of location between the Bridge and the Engine Control Room (ECR), will a discharge occur at greater than 12 nautical miles and outside of MOU waters. The maps on the bridge clearly showed that no discharges are to occur in the Olympic Coast National Marine Sanctuary and included a map of "Waters Subject to this MOU". A list of notification numbers in the event of a spill or release in Washington waters includes all required phone numbers per the MOU (Ecology's regional office and Department of Health), as well as other contacts (photo #22). Notifications numbers for oil releases were also posted. If a discharge is allowed, the Bridge authorizes any discharge. The latitude and longitude coordinates are recorded in the *Sewage and Graywater Discharge Record Book* and in the deck log. There is an overboard valve monitoring system on the bridge. The system has four lights:

- >12 nm
- > 4, <12 nm
- <4 nm
- Special Areas

The "special areas light" means no discharges (lit during inspection). The computer system "Overboard Valve Monitoring" system details where certain discharges can and cannot take place and includes alarms. When any overboard valve is open, the location (lat and long) is automatically recorded (open and close). The date, time and location of both the start and the stop of the discharges are recorded, along with port location, effluent type, volumes, and speed. Discharges are tentatively scheduled ahead of time by matrix, but locations are always verified prior to discharges. Alls discharge records that were reviewed appeared to be in compliance with the MOU. A few locations were plotted at the Bridge for verification of location (outside of MOU waters). Some copies were requested and provided for later verification of location. All locations were outside of the MOU waters.

Blackwater, which includes toilet waste, Galley waste, infirmary drains and crew waste, and some graywater for dilution, is treated with a Rochem membrane bioreactor and ultrafiltration system and is then discharged outside of MOU waters. The graywater system, Rochem low pressure reverse osmosis system, is currently not operational and therefore graywater is collected, held and discharged outside of MOU waters.

Screenings and grit from the blackwater system are collected and incinerated. The solids separated out from the blackwater system at the SWECO filter and from the bioreactors, known by the cruise lines as "biomass", is collected into a tank and discharged outside of MOU waters, >12 nautical miles from shore, and outside of the Olympic Coast National Marine Sanctuary.

Pool and spa water is discharged outside of MOU waters.

Food waste is collected in various locations including the galley and the garbage sorting area (photo #21), and is sent to the press. The solid food waste is heated (by steam engine), dried and incinerated. The liquid food waste is sent to the graywater system. Grease is collected separately and off-loaded to shore, often in Seattle for biodiesel use.

Oily bilge water is sent to the 50 ppm oily water separator, then to the intermediate tank and then to the 15 ppm oily water separator. If the effluent does not meet 15ppm, it is automatically sent back for further treatment. The effluent that meets 15 ppm is either discharged at greater than 12 nautical miles and outside of MOU waters or is sent to a clean tank and later discharged. All effluent first goes through the white box for monitoring prior to discharge.

Potable water is bunkered now and then, while the rest is produced by desalination. Steam from the boilers heat up the sea water with low pressure evaporation. The condensate is then chlorinated and adjusted for pH prior to distribution. Salt collected from the evaporators is sent back to the sea. Scaling is treated with acid and is then neutralized prior to discharge at sea. Residual chlorine is monitored at the furthest point for a minimum of 0.2 ppm.

Air conditioning condensate is collected and re-used for wash-down.

Laundry water is sent to the graywater system. Eco-Lab products are used for the laundry and cleaning. Dry cleaning currently uses Perchloroethylene (PERC) which is collected and off-loaded as hazardous waste in Victoria. The dry cleaning system will soon be replaced with a banana oil-based product replacing the PERC.

Silver is captured from the photo waste, collected and off-loaded as hazardous waste in Victoria. All hazardous wastes to shore are off-loaded in Victoria.

Medical waste that is not hazardous is collected in white bags and incinerated. Red bags are used for material containing bodily fluids, and along with sharps are collected and sent to shore with hazardous waste.

Plastics, garbage, and other materials are collected and sorted into various color-coded cans (photo #19) and sorted on a sorting table (photo #20). The materials are then condensed and recycled on-shore. The garbage and food-contaminated cardboard is incinerated. Cardboard is collected and off-loaded for recycling (14 pallets had recently been off-loaded). Glass, aluminum, tin, paper, and plastics are all recycled along with other materials. The amount of materials collected and recycled is maximized in order to minimize the amount of materials incinerated or land filled.

Holland America Line is ISO 14001 Certified. Documents posted on the vessel graph the progress made towards waste minimization and energy conservation. The OOSTERDAM is equipped for shore power in Seattle and was connected during the inspection.

There are weekly passenger presentations from the Environmental Officer that details their environmental programs. Welcome packets and materials in the passenger's cabins encourage energy minimization and proper handling of waste materials.

Graywater System:
The graywater system, Rochem low pressure reverse osmosis (LP-RO), was not operational during the inspection. Graywater is being collected held and discharged outside of MOU waters. Holland America Line continues to work with Rochem on trouble-shooting the system.

Blackwater System:
Sergij Wladimirov, 3rd Engineer and AWWPS operator, joined us to describe the blackwater system, Rochem UF; ultrafiltration, and tour the system. Toilet waste, Galley waste, infirmary drains, crew waste and some graywater (a total of about 20 cubic meters per day) goes to a collection tank (photo #09) and then to a buffer tank (photo #02 and photo #03). Fine bubble diffusion adds air into the buffer tank.

From the buffer tank, flow is sent to prefiltration through the SWECO system (photo #11). Screenings are filtered out and sent to incineration. The SWECO system vibrates out the solids to the solids tank (photo #16) where it combines with solids from the bioreactors and is sent to another tank (5S) for holding and discharge outside of MOU waters. The filters are cleaned about once a month by placing them in a cleaning tank. A temporary pump (photo #11) was being used while one of the regular pumps (photo #12) waits for repair. Filtrate from the SWECO (photo #14 and photo #15) is collected to a tank and then sent to the bioreactors.

There are three bioreactor lines. Lines 1 and 2 have four MBR units, and Line 3 has two MBR units (photo #04) for a total of ten. PH is adjusted after prefiltration before Lines 1 and 2. Conductivity is also monitored at this point. The biological activity takes place in the bioreactors. Solids in the bioreactors are returned back to the beginning of the bioreactors to enhance activity. A minimal amount of solids are periodically wasted to the solids tanks. Total Suspended Solids (TSS) are

monitored continuously at the bioreactors. Oxygen levels are also monitored.

From the bioreactors, flow goes through the membranes for ultrafiltration (UF) (photo #05 and photo #17). Turbidity is also monitored continuously after the permeate for line 3 (photo #06) and in the permeate for lines 1 (photo #10) and 2. Effluent or permeate from the UF's are sent to the permeate tanks. All three lines then combine at one ultraviolet light disinfection system (photo #07). The UV system consists of 8 lights and a control board (photo #08) has a lighted alarm if any of the bulbs are out. Intensity or wattage is not monitored with this system. The glass sleeves on the bulbs are wiped with a rag periodically and inspected weekly. Once a year, the full set of bulbs is replaced. Spares are available on board. From the UV, the flow can either go straight overboard, it can be combined with the graywater system effluent, or can go to storage tanks. The blackwater system is currently not discharging in MOU waters.

The membranes are cleaned by forward movement for 45 minutes, back-flushing for 45 minutes and then an air flush which happens automatically. If the flow drops from about 1.6 cubic meters per day, the membranes may be clogging up and a chemical cleaning is done. The chemical cleaning is done about once a month.

A high alarm is set for turbidity reaching 10 FNU (formazin nephelometric unit), and a high high alarm is set at 20 FNU which automatically shuts down any discharge. Occasionally, alarms have been triggered when there are air bubbles in the sensors. Calibration of the turbidity meters is not required per the manufacturer.

A maintenance program, AMOS, triggers maintenance required such as oiling and greasing motors. Spare blowers, motors, membranes, screens, and UV bulbs are kept on board the vessel. The system is inspected daily for clogs, level switches and other items. Sampling is done on board for COD (permeate of each line separately, and after UV) and for pH and chlorine after UV. A small laboratory area (photo #18) is used for the testing. All other sampling is done by an on-shore laboratory.

Sampling is not required per the MOU when not approved and not discharging. No samples were taken by Ecology.

The blackwater system has had some recent higher results for Biochemical Oxygen Demand (BOD). One of the blowers for the buffer tank had failed and was fixed. The lack of air to the buffer tank could have been the cause of the elevated BOD results. Also, the sampling line may not have been flushed out properly for the latest sample.

Conclusions and Recommendations

Staff seemed very knowledgeable of the protocols and systems. The discharge protocols and notification procedures were very clear.

The efforts made towards waste minimization and energy conservation are impressive.

It is recommended that staff continue to work towards high functioning wastewater treatment systems.

Attachments:
Photographs
Discharge records (copies requested during inspection)

Copies to:
William Morani, Jr., HAL
Bob Diaz, HAL
John Turvey, HAL
Tina Stoltz, HAL
Ted Arnold, Environmental Officer
Amy Jankowiak, Ecology
Mark Toy, Health
Kevin Fitzpatrick, Ecology
Central Files: Holland America Line – HOLLAND OOSTERDAM; WQ 6.1

Section I: Signatures

Name and Signature of Inspector	Agency/Office/Telephone	Date
Amy Jankowiak Amy Jankowiak	Department of Ecology/Northwest Regional Office/Water Quality Program/Municipal Compliance Specialist/(425) 649-7195	7/15/08
Name and Signature of Reviewer	**Agency/Office/Telephone**	**Date**
Kevin C. Fitzpatrick Kevin C. Fitzpatrick	Department of Ecology/Northwest Regional Office/Water Quality Section Manager/(425) 649-7033	7/15/08

PHOTO #:01 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P6070067
DESCRIPTION: OOSTERDAM VESSEL AT PIER 30, SEATTLE

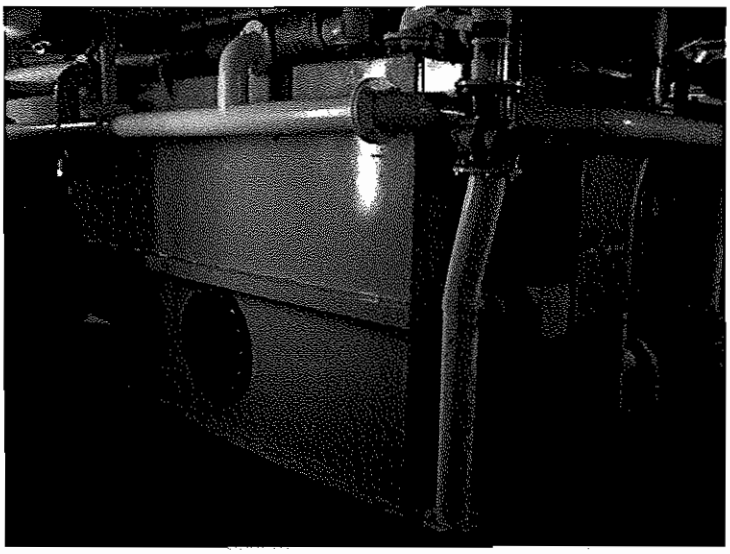


PHOTO #:02 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6070068
DESCRIPTION: BLACKWATER SYSTEM BUFFER TANK

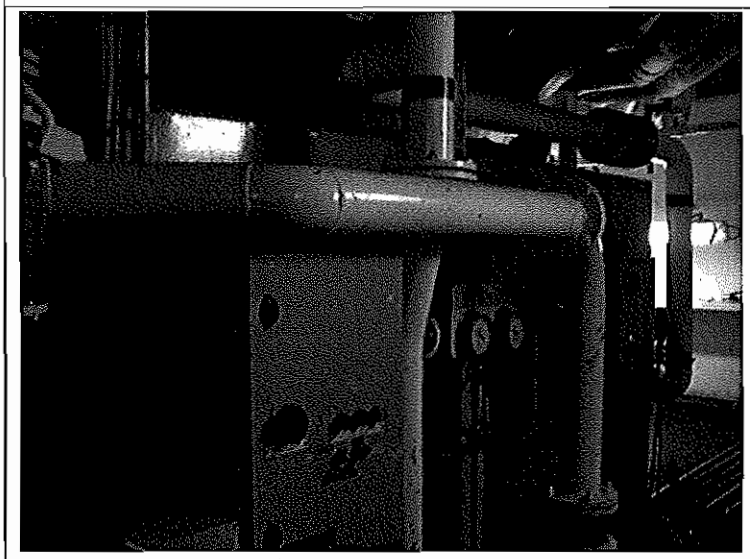


PHOTO #:03 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6070069
DESCRIPTION: BLACKWATER SYSTEM BUFFER TANK

PHOTO #:04 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6070070
DESCRIPTION: BLACKWATER SYSTEM MBR'S LINE 3 (2 UNITS)

PHOTO #:05 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P6070071
DESCRIPTION: BLACKWATER SYSTEM MBR'S ULTRA FILTERS (LINE 3)

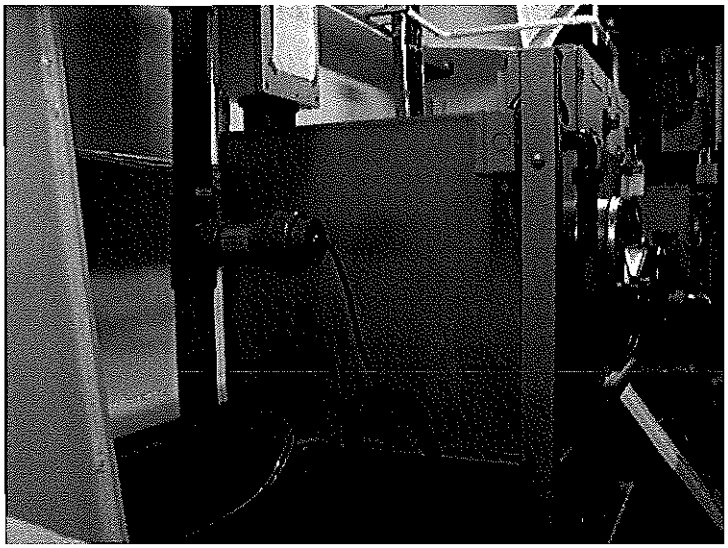


PHOTO #:06 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6070072
DESCRIPTION: BLACKWATER SYSTEM PERMEATE TANK AND TURBIDIMETER (LINE 3)

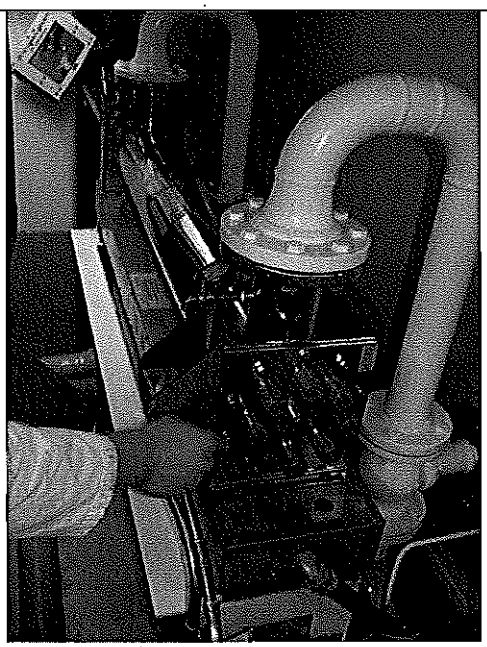


PHOTO #:07 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6070073
DESCRIPTION: BLACKWATER SYSEM ULTRAVIOLET DISINFECTION UNIT

PHOTO #:08 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6070075
DESCRIPTION: BLACKWATER SYSEM ULTRAVIOLET DISINFECTION UNIT PANEL (8 LIGHTS)

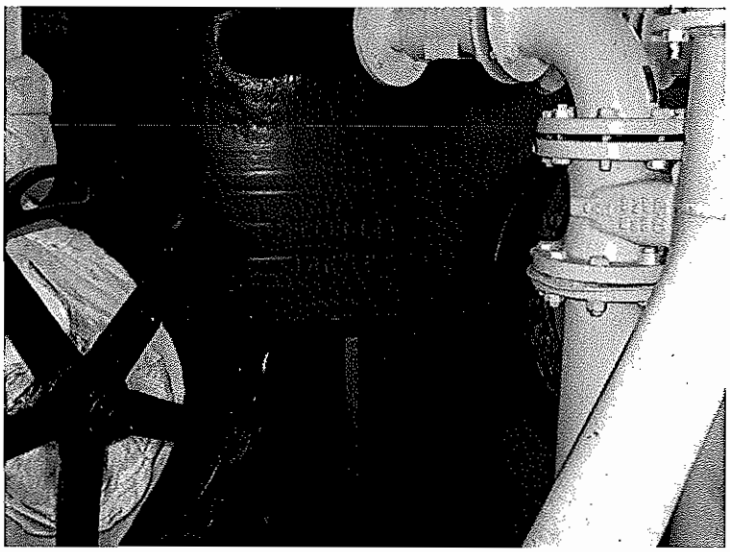


PHOTO #:09 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P6070076
DESCRIPTION: BLACKWATER COLLECTION TANK

PHOTO #:10 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6070077
DESCRIPTION: BLACKWATER SYSTEM CLEANING TANK (FRONT), PERMEATE TANK FOR LINE 1 (BACK)

PHOTO #:11 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6070078
DESCRIPTION: BLACKWATER SYSTEM SWECO FILTER SYSTEM (SOLIDS TANK ON RIGHT, VIBRATING FILTER ON LEFT, TEMP PUMP FRONT)

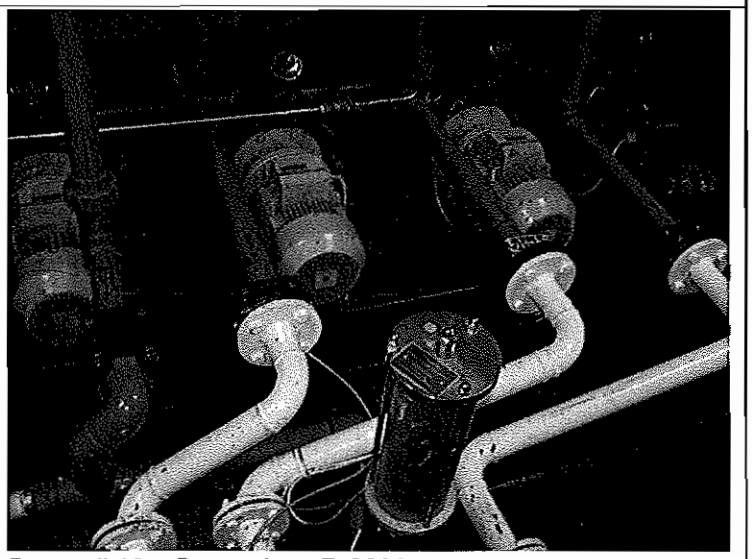


PHOTO #:12 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6070079
DESCRIPTION: BLACKWATER SYSTEM SWECO FILTER PUMPS

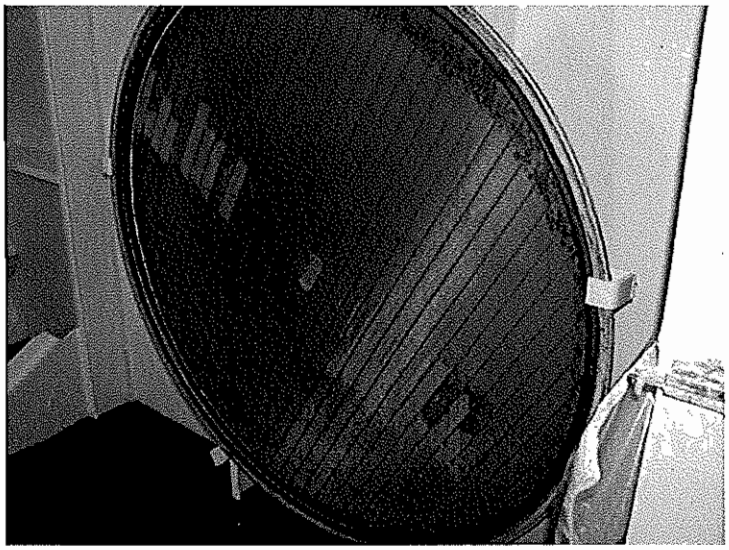


PHOTO #:13 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P6070080
DESCRIPTION: BLACKWATER SYSTEM SWECO FILTER – OLD FILTER

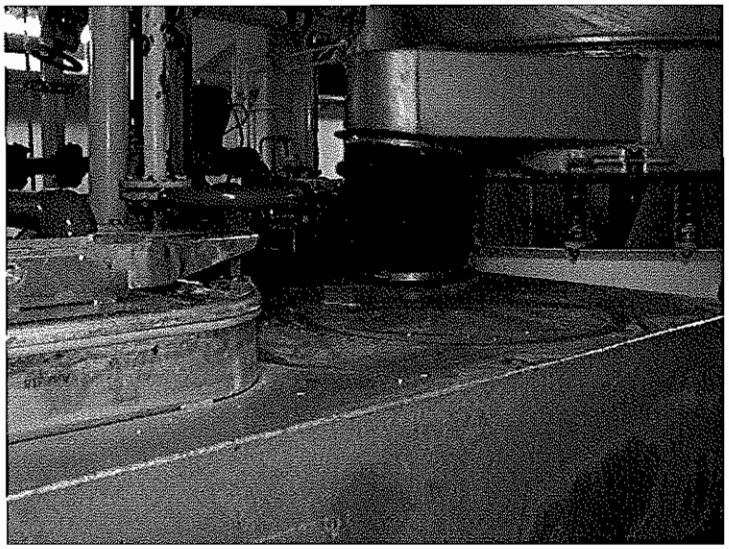


PHOTO #:14 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6070081
DESCRIPTION: BLACKWATER SYSTEM SWECO FILTER, VIBRATOR TO FILTRATE TANK

PHOTO #:15 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6070082
DESCRIPTION: BLACKWATER SYSTEM SWECO FILTER, INSIDE OF FILTRATE TANK

PHOTO #:16 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6070083
DESCRIPTION: BLACKWATER SYSTEM SWECO FILTER, INSIDE OF SOLIDS TANK

PHOTO #:17 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P6070084
DESCRIPTION: BLACKWATER SYSTEM SPARE MEMBRANES

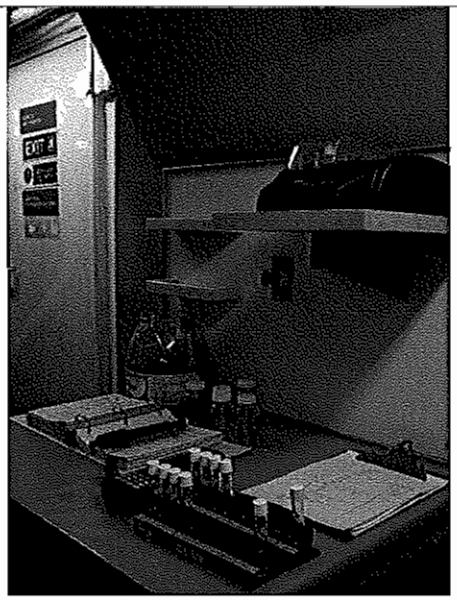


PHOTO #:18 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6070086
DESCRIPTION: ON-BOARD SAMPLING LABORATORY AREA

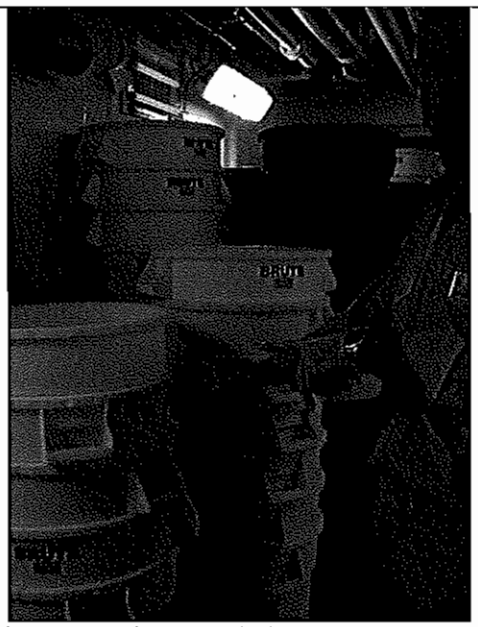


PHOTO #:19 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6070087
DESCRIPTION: GARBAGE AREA SORTING CANS

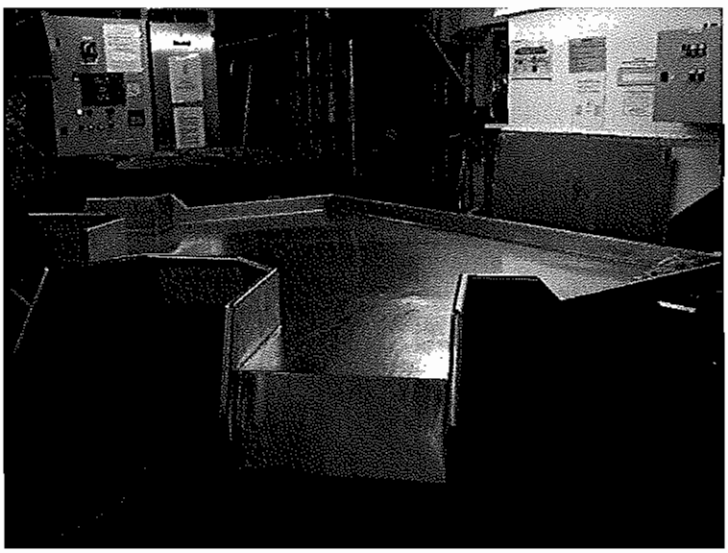


PHOTO #:20 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6070088
DESCRIPTION: GARBAGE AREA SORTING TABLE

PHOTO #:21 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P6070089
DESCRIPTION: GARBAGE AREA FOOD WASTE COLLECTION

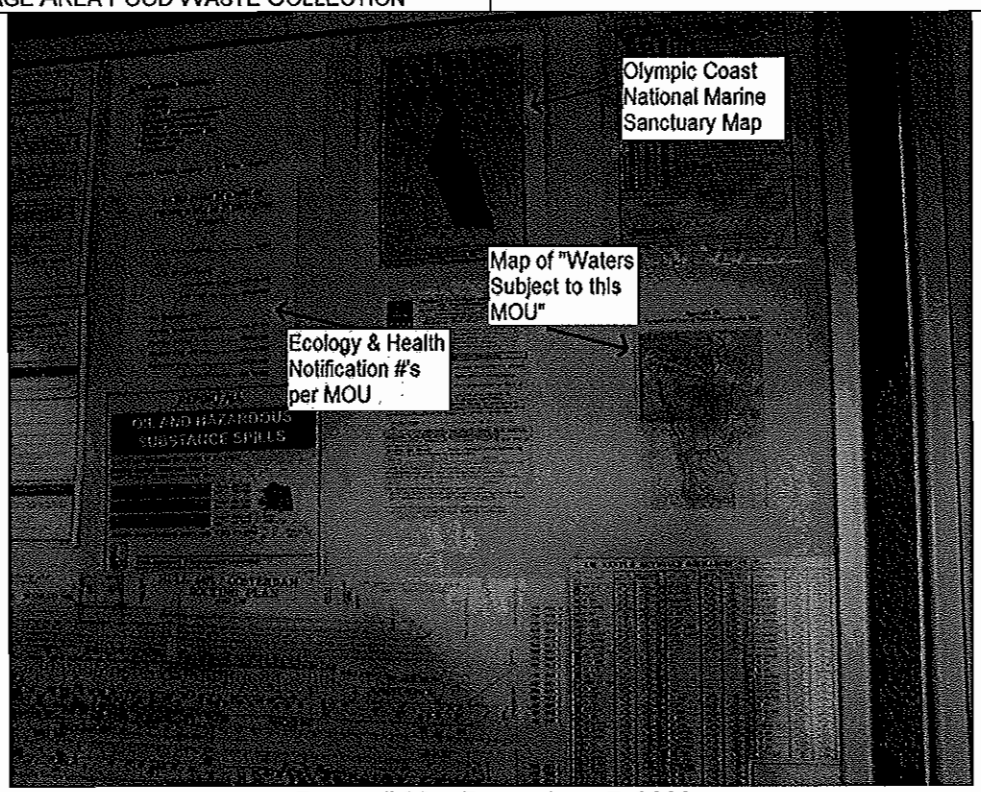


PHOTO #:22 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6070090
DESCRIPTION: BRIDGE NOTIFICATIONS AND MAPS ON BOARD

State of Washington Department of Ecology

Cruise Ship Memorandum of Understanding, Cruise Operations in Washington State Inspection Report

Northwest Regional Office
3190 160th Ave SE
Bellevue, WA 98008
Phone: (425) 649-7000 Fax: (425) 649-7098

Section A: General Information

Vessel Name:	WESTERDAM	Date:	June 22, 2008
Vessel Operator:	Holland America Line	Entry Time:	9:02 AM
Vessel Type	Passenger Ship	Exit Time:	10:58 AM
Location:	Pier 30, Seattle	Notification (name & date):	Jon Turvey, Bill Morani; June 19, 2008
On-board contact(s):	Kees Kant, Environmental Officer, Bob Diaz, HAL Office – Deputy Director, Environmental Compliance, Jan Velthuis, Chief Engineer, Daniel Dan, AWWPS Operator		
Inspector(s):	Amy Jankowiak, Department of Ecology, Water Quality Program		
# passengers/crew:	1848/800		

The WESTERDAM arrived on May 11th, 2008 at the Port of Seattle to begin the 2008 cruise season. The Rochem graywater system was not functioning at the time of the inspection. The graywater is held and then discharged outside of MOU waters. The blackwater system is functioning, but all discharges are being held and then discharged outside of MOU waters.

Section B: Areas Evaluated

☒	Black/Gray wastewater system	☒	Residual solids	☒	Records/Reports	☒	Hazardous Waste/Solid Waste	☐	Sampling/ Monitoring
☒	Discharge locations	☒	Operations & Maintenance	☒	Sludge Handling/ Disposal	☒	Oily bilge water	☒	Other

Section C: For vessels discharging ≥ 1nm from berth and ≥ 6 knots only [2.1.3(A)]

☐	Schematics match black/gray wastewater system	Not Applicable
☐	Operations as described in submitted documentation	Not Applicable
☒	Daily 24-hour continuous monitoring for turbidity or equivalent monitoring	Not yet required, but they do have continuous monitoring for turbidity.
☒	Turbidimeter or equivalent monitoring equipment functioning properly	Not required, but their continuous turbidity monitoring equipment appears to be functioning properly.
	Turbidity or equivalent : Not yet required, but they do have continuous turbidity monitoring. Last calibration – as needed. Trigger level for early alarm: 15.5 fnu Trigger level for shutdown: 25 fnu Recorded turbidity/equivalent levels above triggers:	
☒	Auto shut down or operational controls to insure system shut down if high turbidity occurs	Not required, but they do have continuous monitoring for turbidity which automatically shuts down the discharge at 25 fnu.
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	Disinfection System: There is one ultraviolet (UV) disinfection system for the blackwater system, and one UV system for the graywater system. Each UV unit has eight light bulbs with a lighted alarm at the unit if a bulb is out.	

Section D: For vessels discharging continuously [2.1.3(B)]

☐	Schematics match black/gray wastewater system	Not Applicable
☐	Operations as described in submitted documentation	Not Applicable
☐	Daily 24-hour continuous turbidity or equivalent monitoring	Not Applicable
☐	Turbidimeter or equivalent monitoring equipment functioning properly	Not Applicable

	Turbidity or equivalent : Last calibration Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:	
☐	Auto shut down or operational controls to insure system shut down if a high turbidity occurs	Not Applicable
☐	Disinfection immediately prior to discharge	Not Applicable
☐	Disinfection system operated and maintained properly	Not Applicable
	Disinfection System:	

Section E: General (Approved to Discharge)		
☒	No discharges within ½ mile from shellfish beds/protocol (President's Point, Apple Tree Cove, Tyee Shoal)	No discharges are currently occurring within Waters subject to the MOU.
☒	Discharges immediately stopped when high turbidity occurs	No discharges are currently occurring within Waters subject to the MOU. They do have their systems set up to automatically shut down the discharge if high turbidity occurs.
☒	Immediate notifications made to Health for disinfection system upset	No discharges are currently occurring within Waters subject to the MOU.
☒	Sampling conducted 2/month, 1/month in Seattle (BOD, TSS, fecal coliform, pH, chlorine residual)	Sampling is being conducted, although not necessary as not approved to or discharging in Waters subject to the MOU.
☒	Whole Effluent Toxicity Testing 1 per 2 years (homeported) or once/40 calls for continuous	Not required at this time.
☒	Discharges immediately stopped when GI >2% passengers or crew	No discharges are currently occurring within Waters subject to the MOU. Protocols are being put in place.
☒	Immediate notifications to Health for GI>2% passengers or crew	No discharges are currently occurring within Waters subject to the MOU. They do have protocols in place for notifications.

Section F: General		
☒	Discharge records review	Discharge records were reviewed (blackwater/graywater/residual solids) and are maintained properly. No discharges in MOU waters were present from the beginning of the 2008 cruise season to present (vessel last here in 2006 and last inspected August 27, 2006.
☒	Residual solids managed properly/ disposal protocol per MOU	Residual solids are either incinerated or held to be discharged at greater than 12 nautical miles and outside of MOU waters and the Olympic Coast National Marine Sanctuary.
☒	Hazardous Waste managed properly	All hazardous waste that is collected is being sent off-shore in Victoria, Canada. Records were reviewed for hazardous waste off-loads.
☒	WA Haz Waste guidelines followed (appendix vii)	All hazardous waste that is collected is being sent off-shore in Victoria, Canada. Records were reviewed for hazardous waste off-loads.
☒	Solid Waste managed properly	Solid waste is being managed properly. The various solid waste streams are collected, sorted, stored, and sent ashore or incinerated as appropriate.
☒	Oily bilge water managed properly	Oily bilge water is treated and discharged at less than 15 ppm and outside of MOU waters.
Other:		

Health = Washington State Department of Health

Section G: Sample Results

Parameter	Results
Biochemical Oxygen Demand 5-Day (BOD)	Not Applicable
Total Suspended Solids (TSS)	Not Applicable
Fecal Coliform	Not Applicable
Residual Chlorine	Not Applicable
pH	Not Applicable
Ammonia, Nitrogen	Not Applicable

Section H: Summary of Findings/Comments

Introduction

Amy Jankowiak, Washington State Department of Ecology (Ecology) Northwest Regional Office, Water Quality Program conducted the inspection of the Holland America Line WESTERDAM on June 22, 2008. The main contacts on board the WESTERDAM included Kees Kant, Environmental Officer, Daniel Dan, 3rd Engineer and AWWPS Operator, and Robert Diaz, Deputy Director, Environmental Compliance HAL. Prior notification of the visit was given on June 19, 2008 for security protocol. The purpose of the inspection was to evaluate compliance with the *Memorandum of Understanding Cruise Operations in Washington State* (MOU), as amended. The WESTERDAM is currently not approved for and is not discharging black or graywater into MOU waters. The vessel has requested and received approval for discharge at greater than one nautical mile from shore and at greater than six knots in 2006. Discharge approval has not been granted for the 2008 season. Discharges are being held until outside MOU waters.

The HOLLAND WESTERDAM was dedicated in 2004, and is 936 feet long with a width of 105.8 feet. There passenger capacity is 1848 and the crew capacity is 800. The vessel is powered with on-shore power during port calls in Seattle.

Inspection

I arrived and boarded the ship (photo #01) at about 9:02 am and began with introductions and a plan for the day with the Kees Kant, the Environmental Officer and Bob Diaz with Holland America Line. We then discussed various waste streams, and the discharge protocols. Discharge records were reviewed for blackwater and graywater discharges, hazardous waste off-loads, oil and garbage. We then viewed and discussed the black water treatment system. Next, we toured the Hazardous waste storage, and the garbage sorting area. The inspection was then finalized and I disembarked the vessel at about 10:58 am.

Discharge Types and Protocols:

All discharges to water occur at greater than 12 nautical miles and outside of MOU waters. No discharges occur in the Olympic Coast National Marine Sanctuary. Only upon verification of location between the Bridge and the Engine Control Room (ECR), will a discharge occur at greater than 12 nautical miles and outside of MOU waters. If a discharge is allowed, the Bridge authorizes any discharge. The latitude and longitude coordinates are recorded in the *Sewage and Graywater Discharge Record Book* and in the deck log. There is an overboard valve monitoring system on the bridge. The system has four lights:

- >12 nm
- > 4, <12 nm
- <4 nm
- Special Areas

The "special areas light" means no discharges. The computer system "Overboard Valve Monitoring" system details where certain discharges can and cannot take place and includes alarms. When any overboard valve is open, the location (lat and long) is automatically recorded (open and close). The date, time and location of both the start and the stop of the discharges are recorded, along with port location, effluent type, volumes, and speed. Discharges are tentatively scheduled ahead of time by matrix, but locations are always verified prior to discharges. Alls discharge records that were reviewed appeared to be in compliance with the MOU.

Blackwater, which includes toilet waste, Galley waste, infirmary drains and crew waste, is treated with a Rochem membrane bioreactor and ultrafiltration system and is then discharged outside of MOU waters. The graywater system, Rochem low pressure reverse osmosis system, is currently not operational and therefore graywater is collected, held and discharged outside of MOU waters.

Screenings and grit from the blackwater system are collected and incinerated. The solids separated out from the blackwater system at the SWECO filter and from the bioreactors, known by the cruise lines as "biomass", is collected into a tank and discharged outside of MOU waters, >12 nautical miles from shore, and outside of the Olympic Coast National Marine Sanctuary.

Pool and spa water is discharged outside of MOU waters.

Food waste is collected in various locations including the galley and the garbage sorting area (photo #12). The food is shredded to one inch and incinerated. The liquid food waste is sent to the graywater system. Food waste is hand checked for plastics and other materials and is sorted prior to shredding. Grease is collected separately and off-loaded to shore, often for biodiesel use.

Oily bilge water is sent to the 50 ppm oily water separator, then to the intermediate tank and then to the 15 ppm oily water

separator. If the effluent does not meet 15ppm, it is automatically sent back for further treatment. The effluent that meets 15 ppm is either discharged at greater than 12 nautical miles and outside of MOU waters or is sent to a clean tank and later discharged. All effluent first goes through the "white box" for monitoring prior to discharge.

Potable water is bunkered now and then, while the rest is produced by desalination. Steam from the boilers heat up the sea water with low pressure evaporation. The condensate is then chlorinated and adjusted for pH prior to distribution. Salt collected from the evaporators is sent back to the sea. Scaling is treated with acid and is then neutralized prior to discharge at sea.

Air conditioning condensate is collected and re-used as technical water.

Laundry water is sent to the graywater system. Eco-Lab products are used for the laundry and cleaning. Dry cleaning currently uses Perchloroethylene (PERC) which is collected and off-loaded as hazardous waste in Victoria (approximately 25 liters/month). The dry cleaning system will soon be replaced with a banana oil-based product replacing the PERC.

Silver is captured from the photo waste, collected and off-loaded as non-hazardous waste in Victoria. Digital photos are used primarily. All hazardous wastes to shore are off-loaded in Victoria.

Medical waste that is not hazardous is collected in white bags and incinerated. Red bags are used for material containing bodily fluids, and along with sharps are collected and sent to shore with hazardous waste. X-ray's are done digitally, and therefore there is no x-ray waste. Medications that are expired or not used are sent back to the manufacturer.

Paint waste, batteries and oil sludge are also off-loaded with hazardous waste (photos #10 & #11) in Victoria.

Plastics, garbage, and other materials are collected and sorted into various color-coded cans and sorted on a sorting table (photo #13). The materials are then condensed and recycled on-shore. The garbage, oily rags and food-contaminated cardboard is incinerated. Cardboard is collected and off-loaded for recycling (approximately 4-5 pallets per week). Glass, aluminum, tin, paper, and plastics are all recycled along with other materials. The amount of materials collected and recycled is maximized in order to minimize the amount of materials incinerated or land filled. Fluorescent light bulbs are collected, crushed in a system that collects the mercury vapors. The material is then off-loaded with hazardous waste.

Holland America Line is ISO 14001 Certified. The WESTERDAM is equipped for shore power in Seattle and was connected during the inspection.

Graywater System:
The graywater system, Rochem low pressure reverse osmosis (LP-RO), was not operational during the inspection. Graywater is being collected held and discharged outside of MOU waters. Holland America Line continues to work with Rochem on trouble-shooting the system. The graywater system, when operational, collects graywater to collection tanks. The graywater is then sent to a buffer tank and then to the SWECO prefiltration system. Graywater then moves to the LP-RO for treatment. Approximately 15% of the graywater reject is sent to the blackwater system. Effluent from the LP-RO moves to permeate tanks prior to disinfection treatment via ultraviolet disinfection. Effluent is then held or discharged outside of MOU waters.

Blackwater System:
Daniel Dan, 3rd Engineer and AWWPS operator, joined us to describe the blackwater system, Rochem UF; ultrafiltration, and tour the system. Toilet waste, Galley waste, infirmary drains, and crew waste goes by vacuum to one of five collection tanks and then to a buffer tank (photo #02). Fine bubble diffusion adds air into the buffer tank. Screenings collected by a filter are sent to incineration.

From the buffer tank, flow is sent to prefiltration through the SWECO system (photo #03). Screenings are filtered out and sent to incineration. The SWECO system vibrates out the solids to the solids tank (photo #04) where it combines with solids from the bioreactors and is sent to another tank (5S) for holding and discharge outside of MOU waters. The filters are cleaned about once a month by cleaning the grease off and flushing with fresh water. Filtrate from the SWECO is collected to a tank and then sent to the bioreactors. PH is adjusted and conductivity monitored prior to going to the bioreactors (photo #05).

There are three bioreactor lines. Lines 1 and 2 have four MBR units, and Line 3 has two MBR units for a total of ten. The biological activity takes place in the bioreactors. Solids in the bioreactors are returned back to the beginning of the bioreactors to enhance activity. A minimal amount of solids are periodically wasted to the solids tanks. Total Suspended Solids (TSS) are monitored continuously at the bioreactors. Oxygen levels are also monitored.

From the bioreactors, flow goes through the membranes for ultrafiltration (UF) (photo #06). The membranes are cleaned by

flushing with air and reverse direction flow. Turbidity is also monitored continuously after the permeate (photo #07). Effluent or permeate from the UF's are sent to the permeate tanks. All three lines then combine at one ultraviolet light disinfection system (photo #08). The UV system consists of 8 lights and a control board (photo #09) has a lighted alarm if any of the bulbs are out. Intensity or wattage is not monitored with this system. The glass sleeves on the bulbs are wiped with a rag about once a month. Once a year, the full set of bulbs is replaced. Spares are available on board. From the UV, the flow can either go straight overboard, it can be combined with the graywater system effluent, or can go to storage tanks. The blackwater system is currently not discharging in MOU waters.

The blackwater system had been experiencing some elevated ammonia levels. A blocked air line was causing the problem. The manufacturer was contacted and the line was fixed. A regular schedule to check the air lines has been put in place.

A high alarm is set for turbidity reaching 15.5 FNU (formazin nephelometric unit), and a high high alarm is set at 25 FNU which automatically shuts down any discharge.

A maintenance program, AMOS, triggers maintenance required such as oiling and greasing motors. Spare blowers, motors, membranes, screens, and UV bulbs are kept on board the vessel. Sampling is done on board for COD (permeate of each line separately, and after UV) and for pH and chlorine after UV. A small laboratory area is used for the testing. All other sampling is done by an on-shore laboratory.

Sampling is not required per the MOU when not approved and not discharging. No samples were taken by Ecology.

Conclusions and Recommendations

Staff seemed very knowledgeable of the protocols and systems. The discharge protocols and notification procedures were very clear.

The efforts made towards waste minimization and energy conservation are impressive.

It is recommended that staff continue to work towards high functioning wastewater treatment systems.

Attachments:
Photographs

Copies to:
William Morani, Jr., HAL
Bob Diaz, HAL
John Turvey, HAL
Tina Stoltz, HAL
Kees Kant, Environmental Officer
Amy Jankowiak, Ecology
Mark Toy, Health
Kevin Fitzpatrick, Ecology
Central Files: Holland America Line – HOLLAND WESTERDAM; WQ 6.1

Section I: Signatures		
Name and Signature of Inspector Amy Jankowiak Amy Jankowiak	Agency/Office/Telephone Department of Ecology/Northwest Regional Office/Water Quality Program/Municipal Compliance Specialist/(425) 649-7195	Date 8/14/08
Name and Signature of Reviewer Kevin C. Fitzpatrick Karen Bryson for	Agency/Office/Telephone Department of Ecology/Northwest Regional Office/Water Quality Section Manager/(425) 649-7033	Date 8/15/08

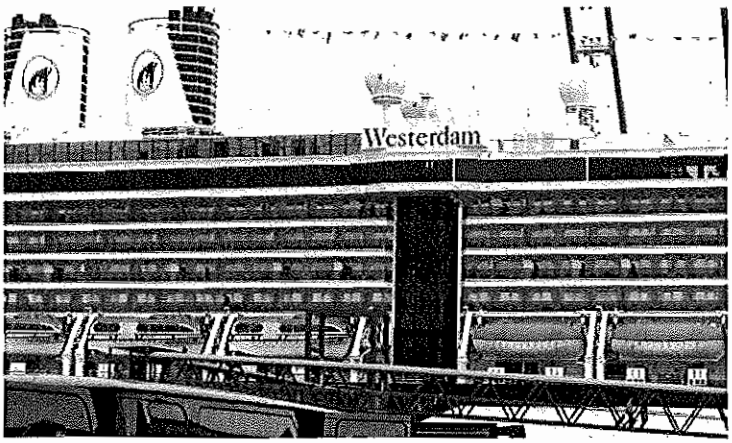

PHOTO #:01 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P6220067
DESCRIPTION: WESTERDAM VESSEL AT PIER 30, SEATTLE

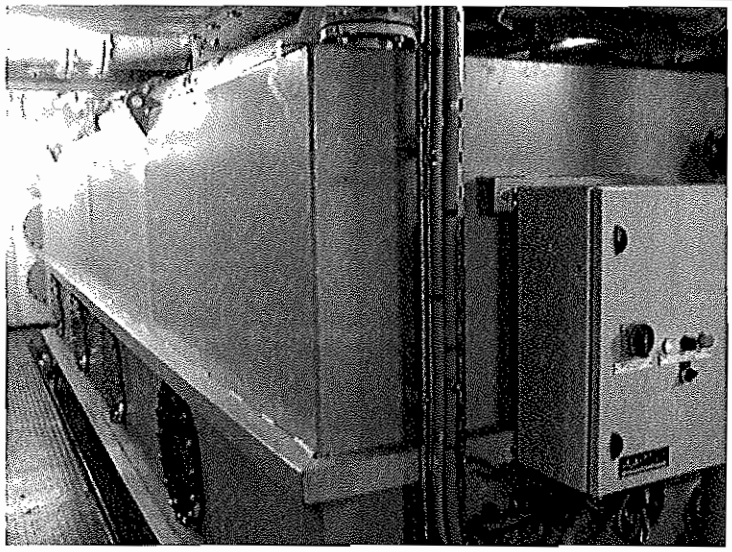

PHOTO #:02 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6220068
DESCRIPTION: BLACKWATER BUFFER TANK

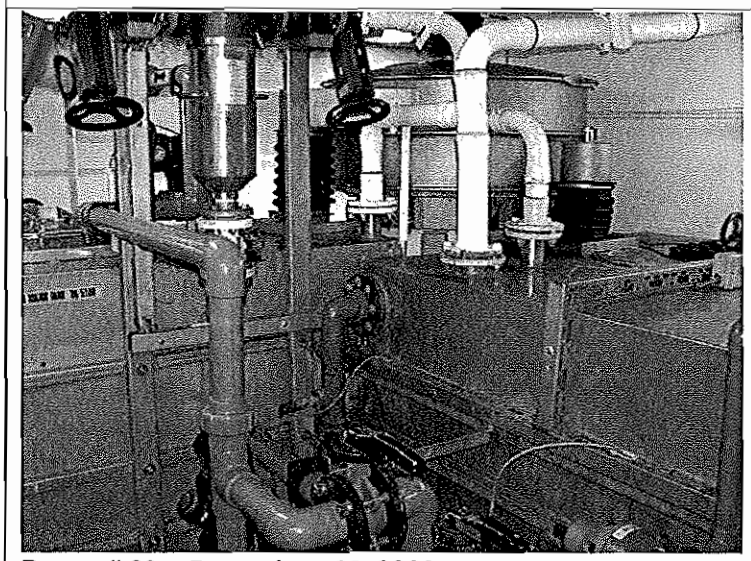

PHOTO #:03 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6220070
DESCRIPTION: BLACKWATER SWECO FILTER SYSTEM

PHOTO #:04 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6220071
DESCRIPTION: INSIDE OF BLACKWATER SWECO SOLIDS TANK

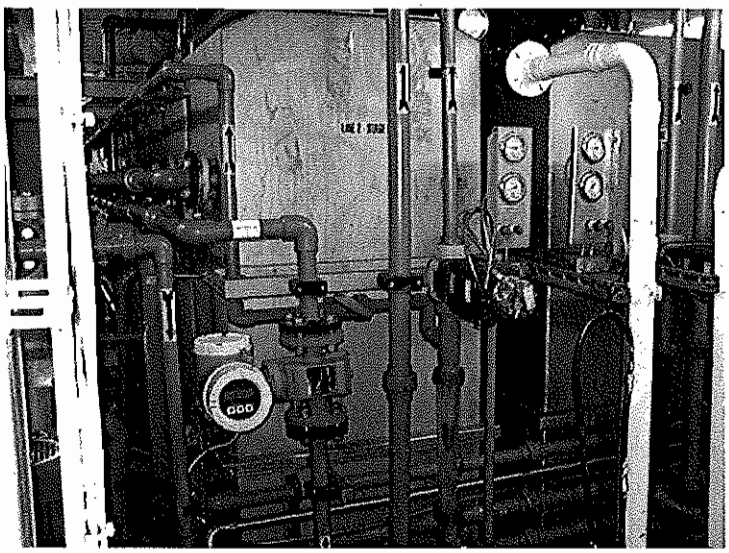

PHOTO #:05 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P6220072
DESCRIPTION: BLACKWATER SYSTEM BIOREACTORS

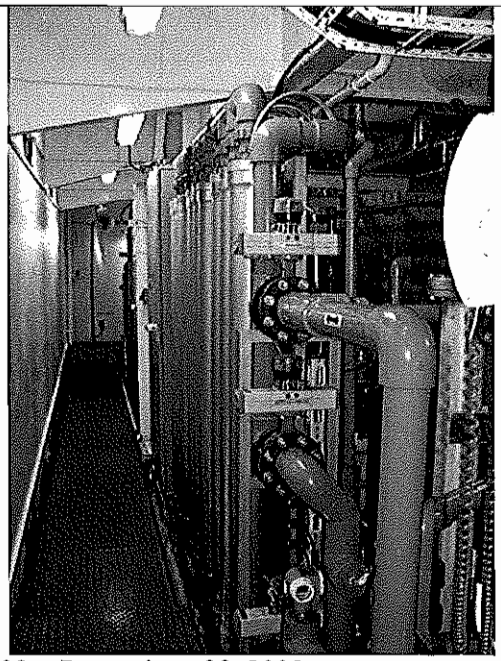

PHOTO #:06 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6220073
DESCRIPTION: BLACKWATER SYSTEM MEMBRANES

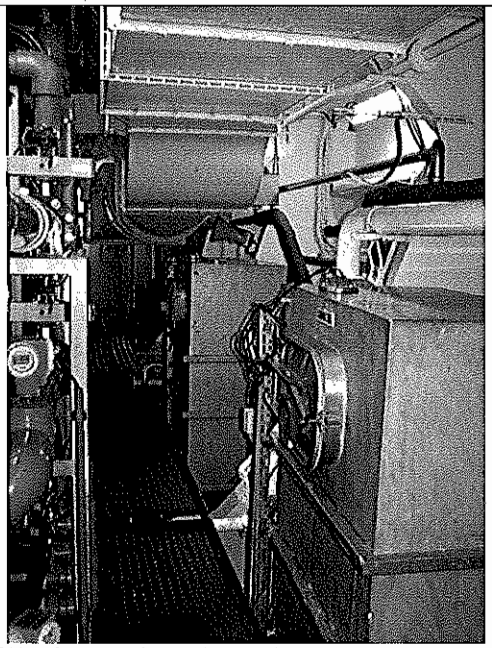

PHOTO #:07 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6220074
DESCRIPTION: BLACKWATER SYSTEM CLEANING TANK (FRONT) AND PERMEATE TANK (BACK)

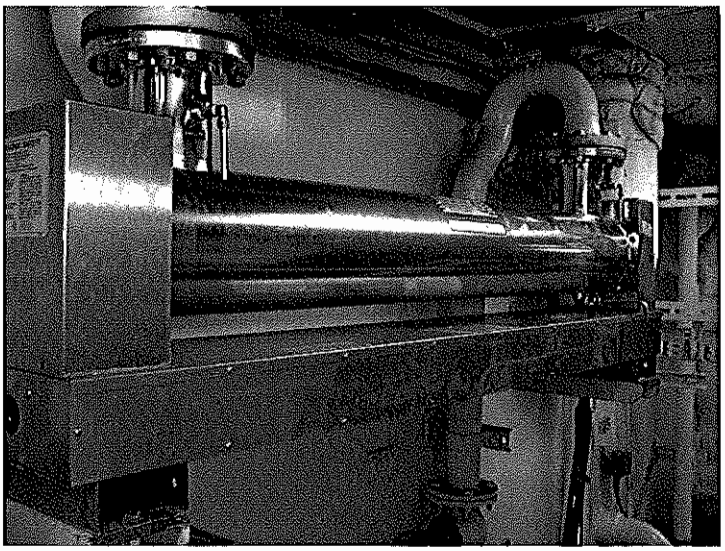

PHOTO #:08 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6220075
DESCRIPTION: BLACKWATER SYSTEM ULTRAVIOLET LIGHT DISINFECTION SYSTEM

PHOTO #:09 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P6220076
DESCRIPTION: BLACKWATER SYSTEM ULTRAVIOLET LIGHT DISINFECTION SYSTEM CONTROL PANEL

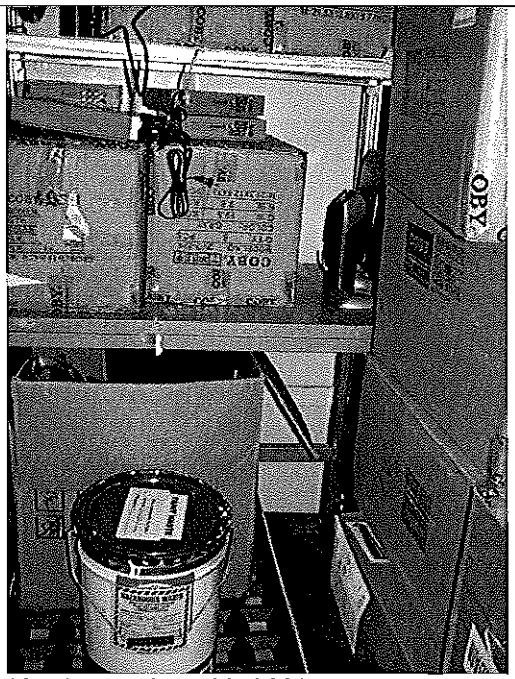

PHOTO #:10 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6220077
DESCRIPTION: HAZARDOUS WASTE STORAGE

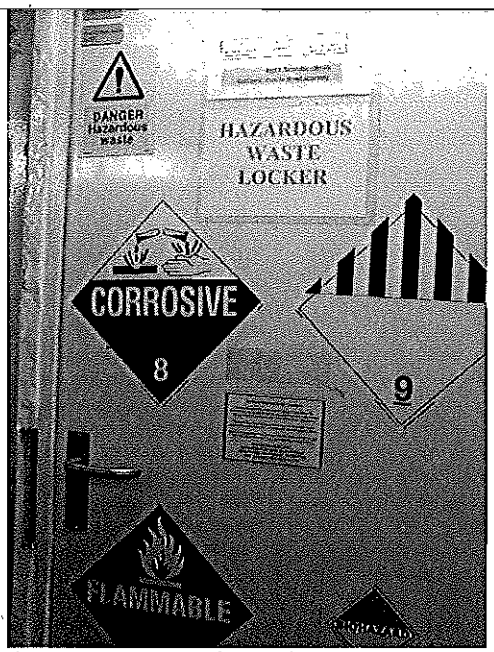

PHOTO #:11 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6220078
DESCRIPTION: HAZARDOUS WASTE STORAGE DOOR WITH LABELS

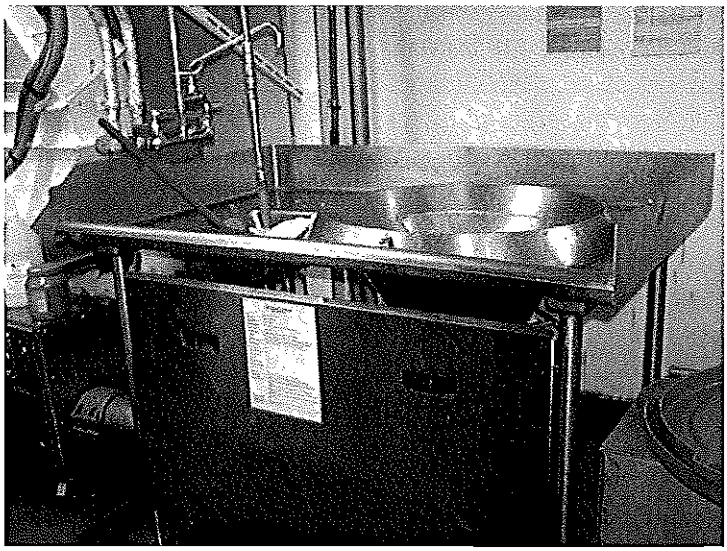

PHOTO #:12 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6220079
DESCRIPTION: FOOD WASTE COLLECTION SYSTEM IN GARBAGE SORTING ROOM

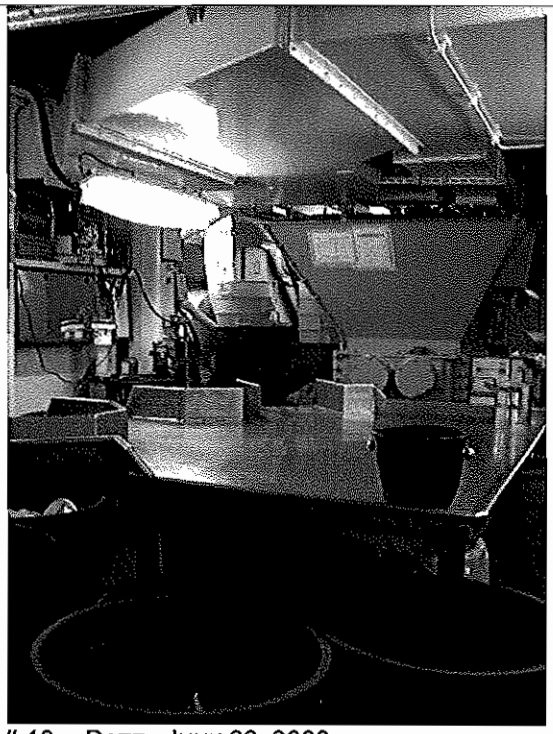

PHOTO #:13 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P6220080
DESCRIPTION: WASTE SORTING AREA

State of Washington Department of Ecology

Cruise Ship Memorandum of Understanding, Cruise Operations in Washington State Inspection Report

Northwest Regional Office
3190 160th Ave SE
Bellevue, WA 98008
Phone: (425) 649-7000 Fax: (425) 649-7098

Section A: General Information

Vessel Name:	STAR PRINCESS	Date:	June 22, 2008
Vessel Operator:	Princess Cruises	Entry Time:	12:31 PM
Vessel Type	Passenger Ship	Exit Time:	2:50 PM
Location:	Pier 30, Seattle	Notification (name & date):	A. Lorenzano and D. Hutchinson on June 19, 2008
On-board contact(s):	Virginie Stirbois, Environmental Officer and Agostino Salza, Staff Engineer		
Inspector(s):	Amy Jankowiak, Department of Ecology, Water Quality Program		
# passengers/crew:			

The STAR PRINCESS arrived on May 4th, 2008 at the Port of Seattle to begin the 2008 cruise season. Hamworthy is a biological reactor and ultrafiltration system. The system includes screening via a screen press, biological treatment via bio-reactors with inter-stage filters and a membrane system, and ultraviolet light disinfection (although not yet completely installed or operational). Approval for continuous discharge from Ecology was granted on May 12, 2008, however, the vessel has been holding effluent and not discharging in MOU waters since the beginning of the season.

Section B: Areas Evaluated

☒	Black/Gray wastewater system	☒	Residual solids	☒	Records/Reports	☒	Hazardous Waste/Solid Waste	☒	Sampling/ Monitoring
☒	Discharge locations	☒	Operations & Maintenance	☒	Sludge Handling/ Disposal	☒	Oily bilge water	☒	Other

Section C: For vessels discharging ≥ 1nm from berth and ≥ 6 knots only [2.1.3(A)]

☐	Schematics match black/gray wastewater system	
☐	Operations as described in submitted documentation	
☐	Daily 24-hour continuous monitoring for turbidity or equivalent monitoring	
☐	Turbidimeter or equivalent monitoring equipment functioning properly	
	Turbidity or equivalent : Last calibration – Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:	
☐	Auto shut down or operational controls to insure system shut down if high turbidity occurs	
☐	Disinfection system operated and maintained properly	
	Disinfection System:	

Section D: For vessels discharging continuously [2.1.3(B)]

☐	Schematics match black/gray wastewater system	Schematics matched with the exception of the UV disinfection system which was only partially installed and was not operational.
☐	Operations as described in submitted documentation	Operations were as described with the exception of the UV disinfection system which was only partially installed and not operational.
☒	Daily 24-hour continuous turbidity or equivalent monitoring	Continuous turbidity for monitoring. There are turbidity meters on each of the three MBR permeate tanks.
☒	Turbidimeter or equivalent monitoring equipment functioning properly	Appears to be functioning properly.

	Turbidity or equivalent : Last calibration – Maintenance program triggers need for calibration Trigger level for early alarm: 6 NTU Trigger level for shutdown: 30 NTU Recorded turbidity/equivalent levels above triggers: Not this season	
☒	Auto shut down or operational controls to insure system shut down if a high turbidity occurs	A value of 30 NTU or greater triggers shut down (also alarmed at 6 NTU).
☒	Disinfection immediately prior to discharge	Protocol: When discharging, UV occurs immediately prior to discharge.
☐	Disinfection system operated and maintained properly	The disinfection system is not completely installed or operational.
	Disinfection System:	

Section E: General (Approved to Discharge)		
☒	No discharges within ½ mile from shellfish beds/protocol (President's Point, Apple Tree Cove, Tyee Shoal)	No discharges are currently occurring within Waters subject to the MOU.
☒	Discharges immediately stopped when high turbidity occurs	No discharges are currently occurring within Waters subject to the MOU. They do have their systems set up to automatically shut down the discharge if high turbidity occurs.
☒	Immediate notifications made to Health for disinfection system upset	No discharges are currently occurring within Waters subject to the MOU.
☒	Sampling conducted 2/month, 1/month in Seattle (BOD, TSS, fecal coliform, pH, chlorine residual)	Sampling is being conducted as required, as of the date of the inspection.
☒	Whole Effluent Toxicity Testing 1 per 2 years (homeported) or once/40 calls for continuous	Not required at this time.
☒	Discharges immediately stopped when GI >2% passengers or crew	No discharges are currently occurring within Waters subject to the MOU. Protocols should be in place.
☒	Immediate notifications to Health for GI>2% passengers or crew	No discharges are currently occurring within Waters subject to the MOU. Protocols should be in place.

Section F: General		
☒	Discharge records review	Discharge records were reviewed (blackwater/graywater/residual solids) and are maintained properly. No discharges in MOU waters were present from the beginning of the 2008 cruise season to present.
☒	Residual solids managed properly/ disposal protocol per MOU	Residual solids are either incinerated or held to be discharged at greater than 12 nautical miles and outside of MOU waters and the Olympic Coast National Marine Sanctuary.
☒	Hazardous Waste managed properly	All hazardous waste that is collected is being sent off-shore in Victoria, Canada. Records were reviewed for hazardous waste discharges.
☒	WA Haz Waste guidelines followed (appendix vii)	All hazardous waste that is collected is being sent off-shore in Victoria, Canada. Records were reviewed for hazardous waste discharges.
☒	Solid Waste managed properly	Solid waste is being managed properly. The various solid waste streams are collected, sorted, stored, and sent ashore or incinerated as appropriate.
☒	Oily bilge water managed properly	Oily bilge water is treated and discharged at less than 15 ppm and outside of MOU waters.
Other:		

Health = Washington State Department of Health

Section G: Sample Results

Parameter	Results
Biochemical Oxygen Demand 5-Day (BOD)	<10 mg/l
Total Suspended Solids (TSS)	<1 mg/l
Fecal Coliform	<1 CFU/100 ml
Residual Chlorine	<0.1 mg/l
pH	6.70 unit
Ammonia, Nitrogen	3.5 mg/l

Section H: Summary of Findings/Comments

Introduction

Amy Jankowiak, Washington State Department of Ecology (Ecology) Northwest Regional Office, Water Quality Program conducted the inspection of the Princess Cruises STAR PRINCESS June 22, 2008. The main contacts on board the STAR PRINCESS included Virginie Stirbois, Environmental Officer and Agostino Salza, Staff Engineer. Prior notification of the visit was given on June 19, 2008 for security protocol. The purpose of the inspection was to evaluate compliance with the *Memorandum of Understanding Cruise Operations in Washington State* (MOU), as amended. A copy of the current MOU was not available on-board. A paper copy was left with the Environmental Officer for her use. The STAR PRINCESS received approval to discharge continuously on May 12, 2008. The vessel has not been discharging and is holding effluent until outside MOU waters.

The STAR PRINCESS was placed into service in 2002, and is 951 feet long with a width of 118 feet.

Inspection

I arrived and boarded the ship (photo #01) at about 12:31 pm and began with introductions and a plan for the day with Virginie Stirbois, the Environmental Officer. We then discussed various waste streams, and the discharge protocols. Discharge records were reviewed for blackwater and graywater discharges and hazardous waste off-loads. We then took samples of the Hamworthy effluent and viewed and discussed the black water and gray water treatment system. Next, we toured the garbage sorting area and hazardous waste storage area. The inspection was then finalized and I disembarked the vessel at about 2:50 pm.

Discharge Types and Protocols:

If a discharge is allowed, the Bridge authorizes any discharge. The latitude and longitude coordinates are recorded in the *Sewage and Graywater Discharge Record Book* and in the deck log. The date, time and location of both the start and the stop of the discharges are recorded, along with port location, effluent type, volumes, and speed. All discharge records that were reviewed appeared to be in compliance with the MOU and did not occur in MOU waters.

Blackwater, which includes toilet waste and infirmary drains and graywater which includes sink and shower water is treated with a Hamworthy advanced wastewater treatment system and is currently discharged outside of MOU waters. Laundry water and galley water is collected separately, not treated, and held for discharge at greater than 4 nautical miles from land, at greater than 6 knots and outside of the Olympic Coast National Marine Sanctuary.

Screenings and grit from the Hamworthy system are collected and incinerated. The solids separated out by the bioreactors is discharged outside of MOU waters, >12 nautical miles from shore, and outside of the Olympic Coast National Marine Sanctuary.

Pool and spa water is discharged outside of 12 nautical miles.

Food waste is collected in various locations, is sent through a pulper and then goes to the gray water tanks. Grease is collected (photo #18) and recycled in Seattle.

Oily bilge water is treated with an oily water separator and discharged at less than 15 ppm after first going through a "white box" for monitoring (photo #17) and is discharged at greater than 12 nautical miles from land and at speed of greater than 6 knots and outside of the Olympic Coast National Marine Sanctuary.

Potable water is bunkered now and then, while the rest is produced by desalination. Steam from the boilers heat up the sea water with low pressure evaporation. The condensate is then chlorinated and adjusted for pH prior to distribution. Salt collected from the evaporators is sent back to the sea. Scaling is treated with acid and is then neutralized (between 6.5 and 7.2) prior to discharge at sea.

Air conditioning condensate is held and discharged as with graywater.

Dry cleaning currently uses Perchloroethylene (PERC) which is collected and off-loaded as hazardous waste in Victoria. Other hazardous wastes include batteries, bulbs (no crusher on board), paints, oily rags, sludge oil, aerosols (punctured), and sharps. All hazardous wastes (photo #22) to shore are off-loaded in Victoria.

Silver is captured from the photo waste (photo #21), treated to less than 2 ppm and is incinerated. Medical waste that is not hazardous is collected in white bags and incinerated. X-ray's are done digitally, and therefore there is no x-ray waste. Other materials incinerated include garbage, some plastics, food-contaminated cardboard and food-contaminated tin.

Plastics, garbage, and other materials are collected and sorted into various color-coded cans and sorted on a sorting table. Most materials are then condensed and recycled on-shore. Cardboard is collected and off-loaded for recycling (photo #19). Glass (photo #20), aluminum, tin, paper, and plastics are all recycled along with other materials.

Black water and Gray water System:
The Hamworthy system (photo #02) consists of three separate membrane bioreactors (MBRs). Black water, which includes toilet waste and infirmary drains is collected by vacuum to one of five collection tanks (photo #12) and then combines with gray water which includes sink and shower water and is piped to a buffer tank (photo #13). From the buffer tank, flow moves to the screen press (photo #03). The solids are screened into bags (photo #04) and are then sent to the incinerator. The liquid moves to the 1st stage of the membrane bioreactor (photo #05) where aeration occurs (photo #11). From the 1st stage, flow moves to the Russell Filters (inter-stage filters – photo #06). The inter-stage filtered solids are returned back to the 1st stage. The liquid moves onto the 2nd stage of the MBR for further aeration. From the 2nd stage MBR, flow is sent to the membrane modules (photos #07 & #08) for ultrafiltration. Solids from the filters are sent back to the 2nd stage MBR. Effluent from the membrane modules are sent to a permeate tank (photo #09) where turbidity is monitored (photo #10). Flow then combines with the other two MBR's at the UV Permeate tank. From the UV Permeate tank, effluent moves through the ultraviolet (UV) disinfection system (once it is fully installed and operational – photos #14 and #15). Disinfected effluent either goes directly overboard or to a holding tank if not in an approved area for discharge. Currently, effluent from the permeate tanks is held and discharged outside of MOU waters.

Turbidity is measured continuously on each of the MBR permeate tanks. At the time of the inspection, MBR #1 was 0.7 and MBR #3 was 0.8. The meters are alarmed at 6 NTU with shut down at a 30 NTU maximum. Every 2-3 days, the membranes are switched out. Backwashing is done manually on the membranes and chemical cleaning occurs every few days. The Russell Filters are cleaned regularly. The membranes are cleaned by backwashing about once a week and is triggered by the pressure values.

The staff have a small laboratory on board where they sample for such parameters as total coliform, total suspended solids (TSS), chemical oxygen demand (COD), free and total chlorine, and pH, which are monitored on board about once a week. The on-board sampling allows for immediate results and a chance for immediate corrections to the system.

The UV disinfection system was supposed to be installed and operational by May 12th when the approval to discharge was granted. Ecology was not notified that the UV system had not yet been installed until the inspection. The vessel has not been discharging. At the time of the inspection, they were waiting for some cables and would need to have the contractor to come on board to finalize installation (maybe by Mid August).

Samples were taken for Biochemical Oxygen Demand (BOD 5-Day), Total Suspended Solids (TSS), pH, chlorine residual, fecal coliform and ammonia from the combined effluent of the MBR's prior to going to the holding tank. The sample port (photo #16) was cleaned prior to pulling samples. The samples were put on ice immediately and were transported to AmTest laboratory in Redmond, Washington that afternoon. Chain of Custody and sampling procedures were followed. All results are in Section F. The results are typical of the results submitted to Ecology thus far for 2008.

Conclusions and Recommendations
Until the ultraviolet disinfection is completely installed and operational, no discharges of Hamworthy effluent from the vessel are allowed.

It should be clear that a vessel can be more than 12 nautical miles from shore in some areas and still be in "Waters Subject to this MOU". All protocols for discharge outside of MOU waters should be clearly stated.

The laboratory testing on-board is an excellent way to monitor and make needed adjustments to the system. Having a laboratory on-board for the testing is ideal.

It is recommended that staff continue to work towards a high functioning wastewater treatment system.

Attachments:
Photographs
Laboratory Report

Copies to:
William Morani, Jr., HAL
Bob Diaz, HAL
John Turvey, HAL
Tina Stoltz, HAL
Virginie Stirbois, Environmental Officer

Amy Jankowiak, Ecology
Mark Toy, Health
Kevin Fitzpatrick, Ecology
Central Files: Princess Cruises – STAR PRINCESS; WQ 6.1

Section I: Signatures		
Name and Signature of Inspector Amy Jankowiak Amy Jankowiak	Agency/Office/Telephone Department of Ecology/Northwest Regional Office/Water Quality Program/Municipal Compliance Specialist/(425) 649-7195	Date 8/14/08
Name and Signature of Reviewer Kevin C. Fitzpatrick Karen Bangs for	Agency/Office/Telephone Department of Ecology/Northwest Regional Office/Water Quality Section Manager/(425) 649-7033	Date 8/15/08

PHOTO #:01 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P6220105
DESCRIPTION: STAR PRINCESS VESSEL, PIER 30, SEATTLE

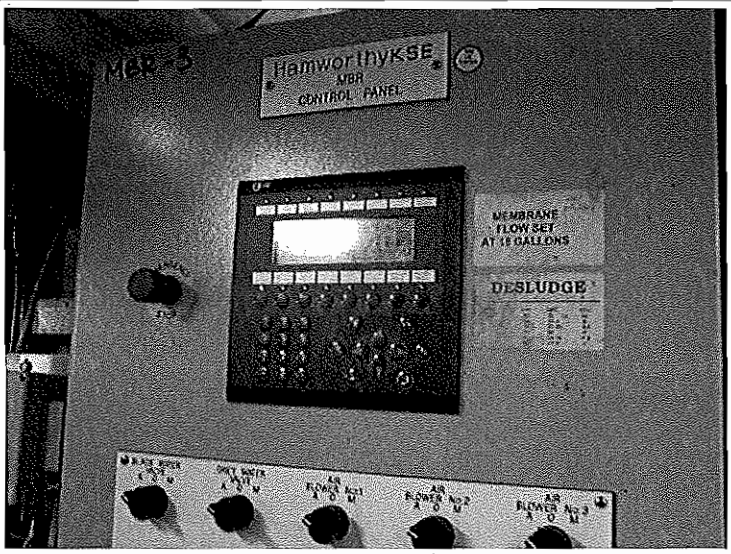

PHOTO #:02 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6220081
DESCRIPTION: HAMWORTHY TREATMENT SYSTEM CONTROL PANEL

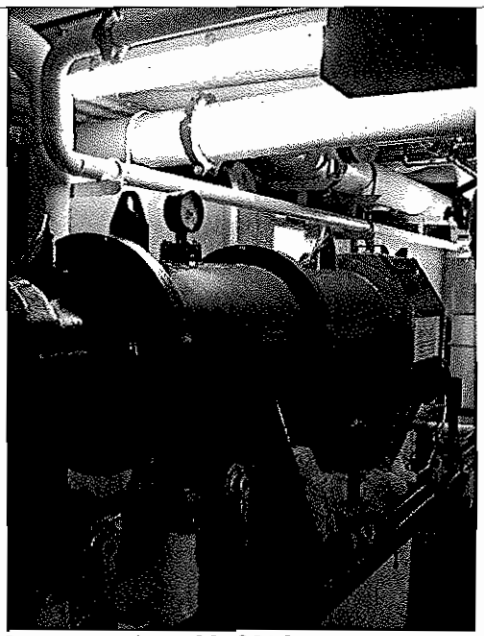

PHOTO #:03 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6220082
DESCRIPTION: SCREEN PRESS

PHOTO #:04 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6220083
DESCRIPTION: SCREEN PRESS SCREENINGS BAG

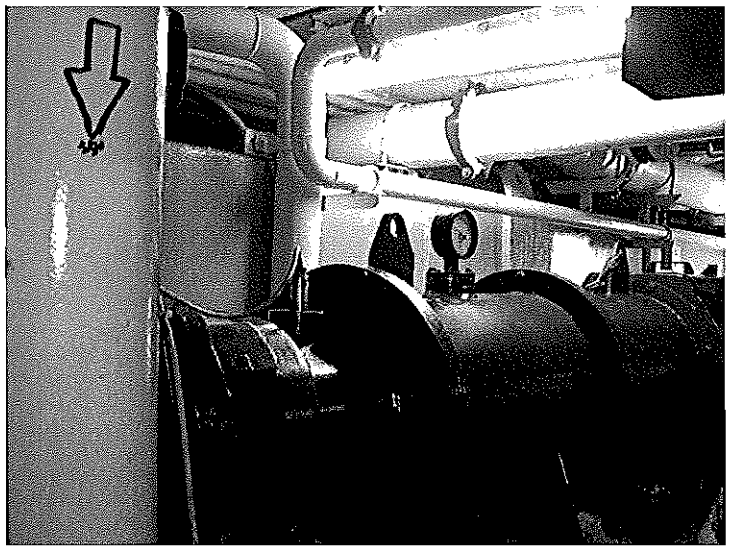

PHOTO #:05 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P6220084
DESCRIPTION: SCREEN PRESS WITH MBR BEHIND IT

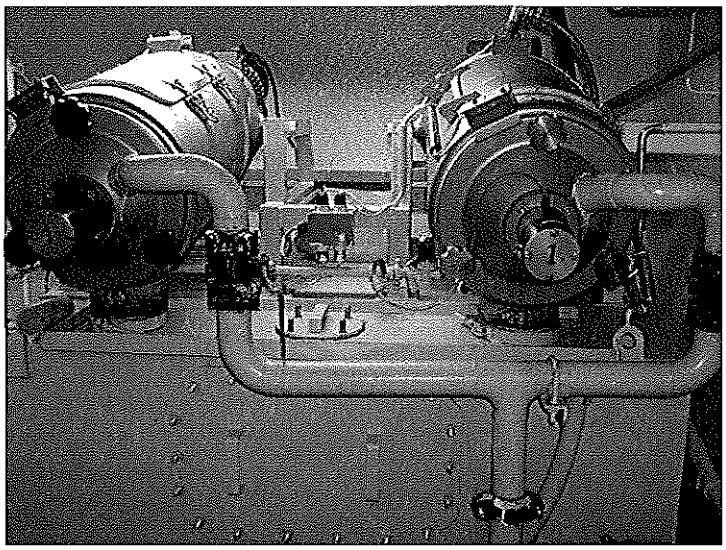

PHOTO #:06 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6220085
DESCRIPTION: MBR RUSSEL FILTERS

PHOTO #:07 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6220086
DESCRIPTION: MEMBRANES WITH PUMPS BEHIND

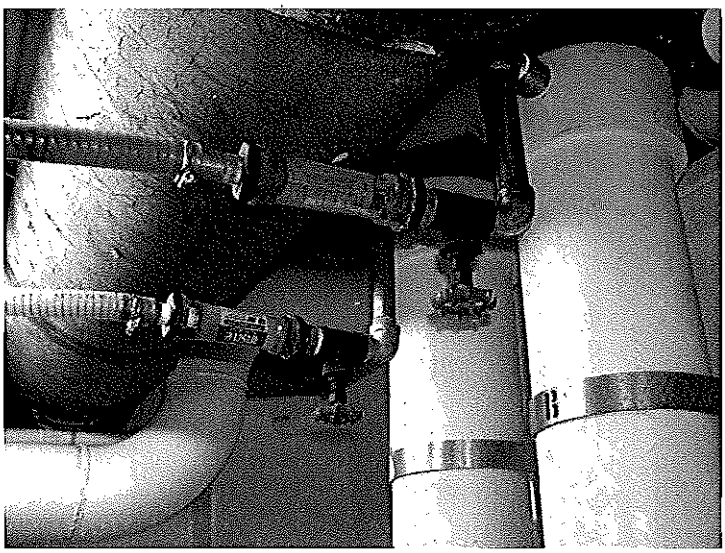

PHOTO #:08 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6220087
DESCRIPTION: MEMBRANES WITH CLEAR TUBES SHOWING MEMBRANE EFFLUENT

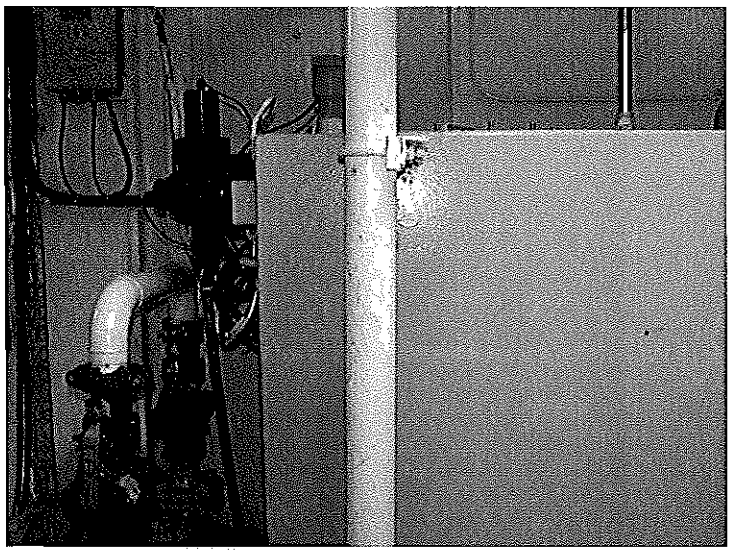

PHOTO #:09 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P6220088
DESCRIPTION: PERMEATE TANK

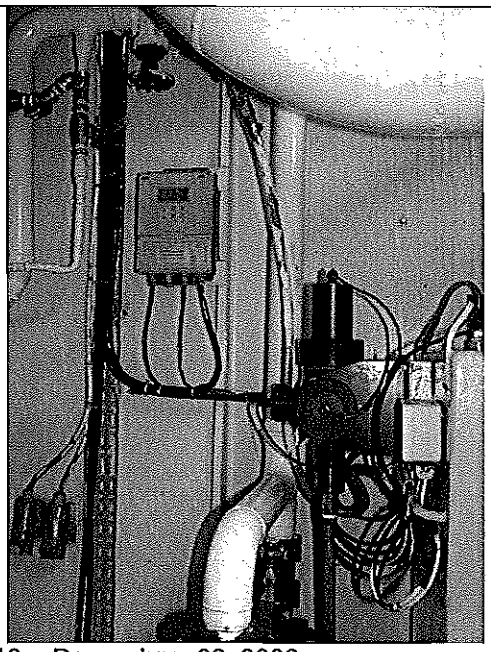

PHOTO #:10 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6220089
DESCRIPTION: PERMEATE TANK TURBIDITY (0.06)

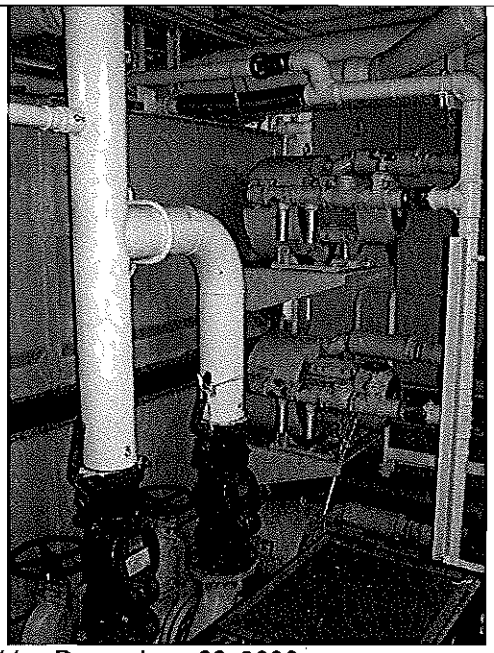

PHOTO #:11 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6220090
DESCRIPTION: MBR PUMPS IN FRONT, BLOWERS (GREEN) IN BACK

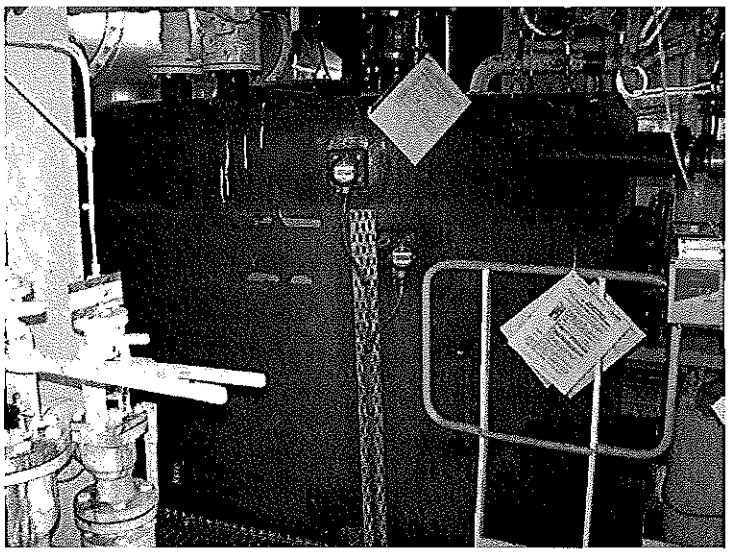

PHOTO #:12 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6220091
DESCRIPTION: BLACKWATER COLLECTION TANK

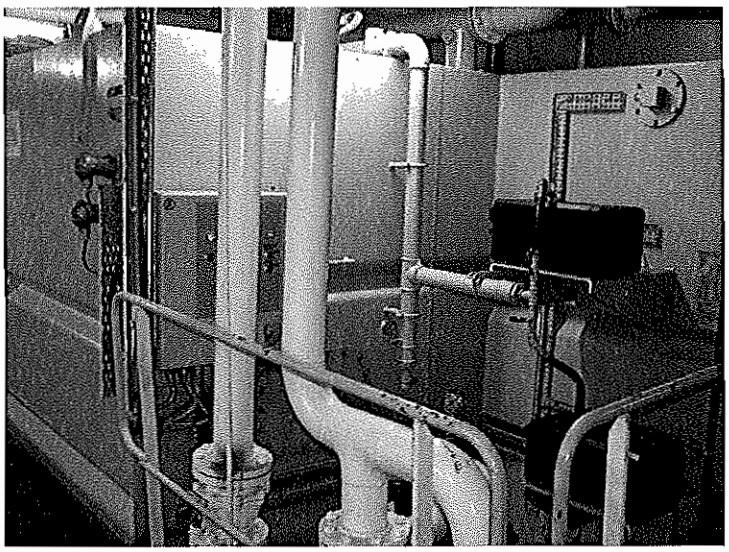

PHOTO #:13 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P6220092
DESCRIPTION: BUFFER TANK (BLOWERS IN FRONT)

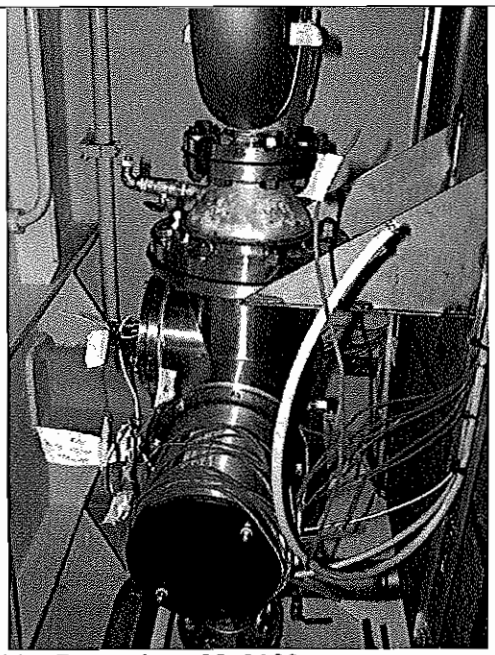

PHOTO #:14 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6220094
DESCRIPTION: ULTRAVIOLET DISINFECTION (UV) SYSTEM

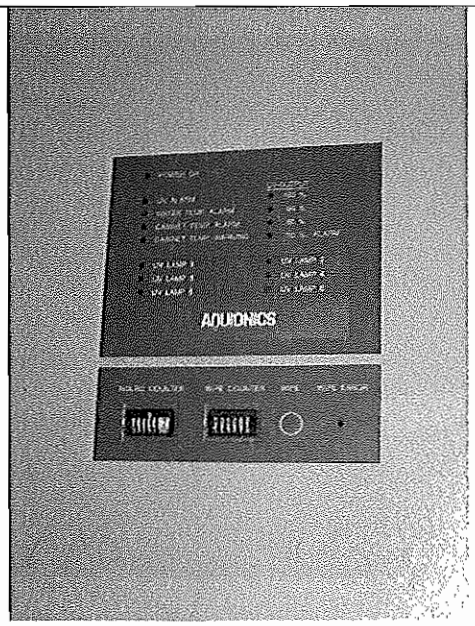

PHOTO #:15 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6220095
DESCRIPTION: UV SYSTEM CONTROL PANEL

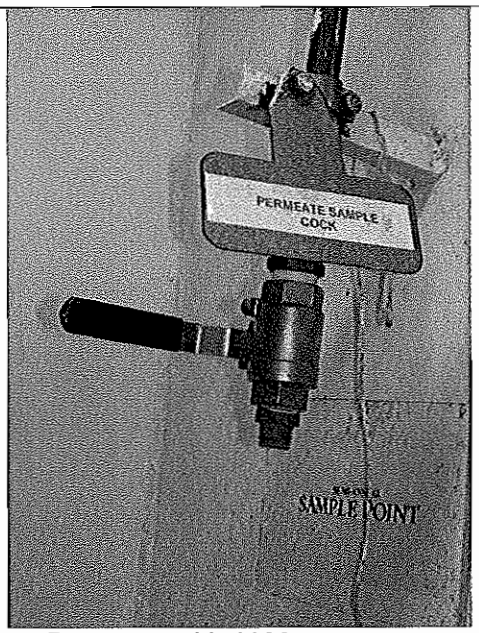

PHOTO #:16 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6220096
DESCRIPTION: SAMPLE POINT

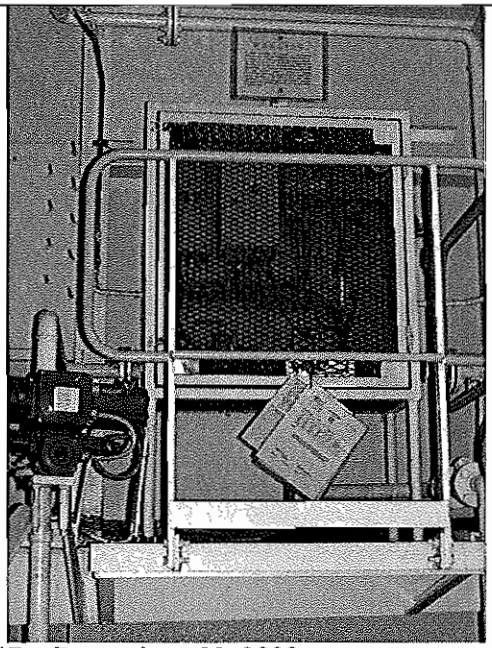

PHOTO #:17 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P6220097
DESCRIPTION: OILY BILGE WATER WHITE BOX

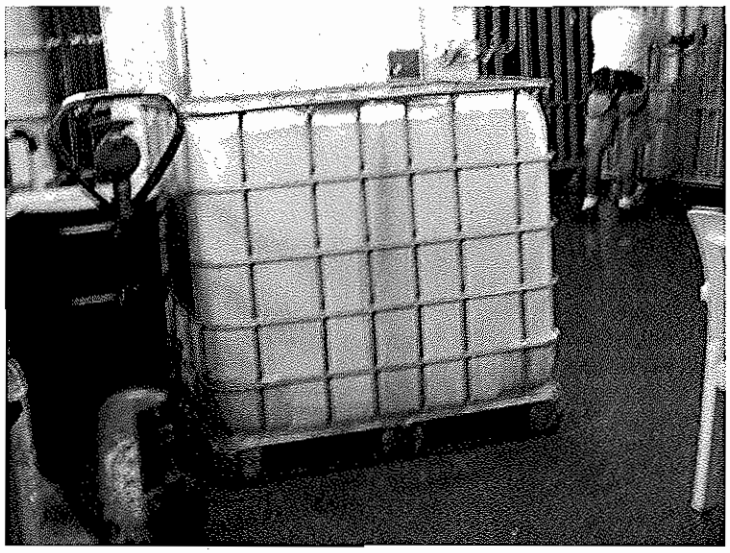

PHOTO #:18 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6220098
DESCRIPTION: GREASE COOLING OIL CONTAINER (NEW EMPTY ONE)

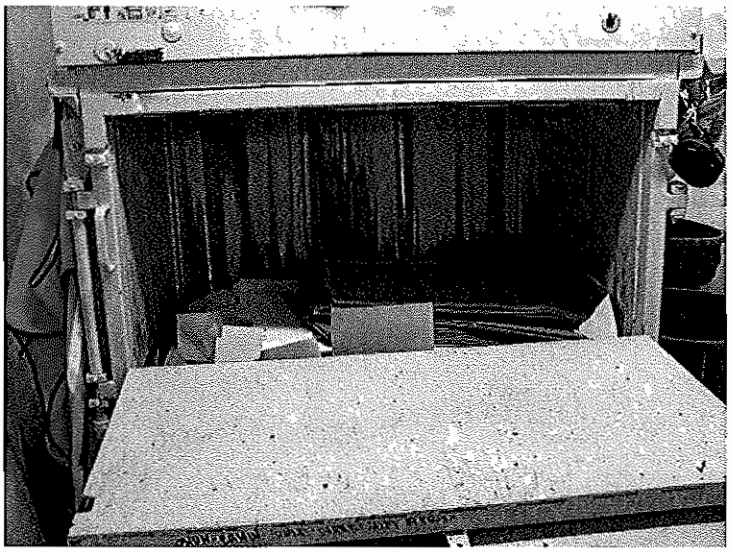

PHOTO #:19 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6220099
DESCRIPTION: CARDBOARD COMPACTOR

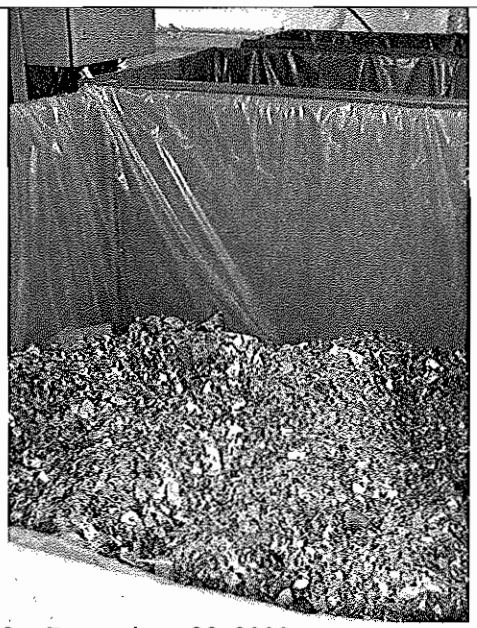

PHOTO #:20 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6220101
DESCRIPTION: CRUSHED GLASS

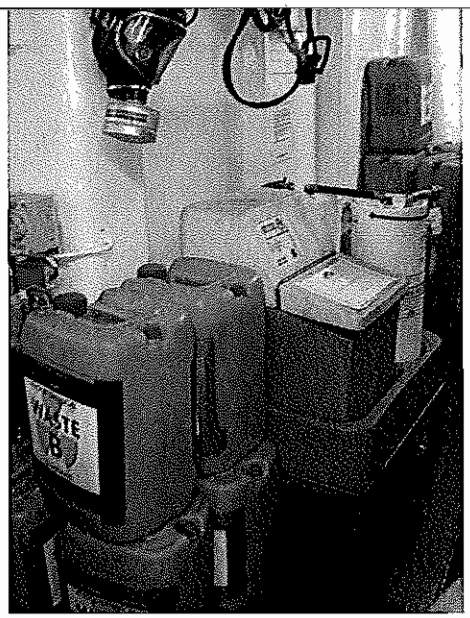

PHOTO #:21 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P6220102
DESCRIPTION: PHOTO WASTE

PHOTO #:22 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P6220103
DESCRIPTION: HAZARDOUS WASTE STORAGE AREA

Am Test Inc.
14603 N.E. 87th St.
Redmond, WA 98052
(425) 885-1664

AMTEST
LABORATORIES

Professional Analytical Services

Jul 11 2008
Department of Ecology
3190 160th Ave SE
Bellevue, WA 98008
Attention: Amy Jankowiak

RECEIVED
JUL 16 2008
DEPT OF

Dear Amy Jankowiak:

Enclosed please find the analytical data for your StarPrincess project.

The following is a cross correlation of client and laboratory identifications for your convenience.

CLIENT ID	MATRIX	AMTEST ID	TEST
Starprin-Eff	Water	08-A007512	Micro, CONV, DEM, NUT

Your sample was received on Monday, June 23, 2008. At the time of receipt, the sample was logged in and properly maintained prior to the subsequent analysis.

The analytical procedures used at AmTest are well documented and are typically derived from the protocols of the EPA, USDA, FDA or the Army Corps of Engineers.

Following the analytical data you will find the Quality Control (QC) results.

Please note that the detection limits that are listed in the body of the report refer to the Method Detection Limits (MDL's), as opposed to Practical Quantitation Limits (PQL's).

If you should have any questions pertaining to the data package, please feel free to contact me.

Sincerely,

Kathy Fugiel
President

BACT = Bacteriological
CONV = Conventionals
TC=Total Coliforms
MET = Metals
ORG = Organics
NUT=Nutrients
DEM=Demand
MIN=Minerals
APC=Aerobic Plate Count

Am Test Inc.
14603 N.E. 87th St.
Redmond, WA 98052
(425) 885-1664
www.amtestlab.com

AMTEST LABORATORIES

Professional Analytical Services

ANALYSIS REPORT

Department of Ecology
3190 160th Ave SE
Bellevue, WA 98008
Attention: Amy Jankowiak
Project Name: StarPrincess

Date Received: 06/23/08
Date Reported: 7/11/08

RECEIVED
JUL 16 2008

AMTEST Identification Number 08-A007512
Client Identification Starprin-Eff
Sampling Date 06/22/08, 13:23
All results reported on an as received basis.

Microbiological

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Fecal Coliforms	< 1	CFU/100 ml		1.	SM 9222D	KF	06/22/08 18:00

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
pH	6.70	unit			EPA 150.1	KF	06/22/08
Chlorine Residual	< 0.1	mg/l		0.10	EPA 330.5	KF	06/22/08
Total Suspended Solids	< 1	mg/l		1.0	EPA 160.2	SL	07/01/08

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
BOD	< 10	mg/l		10.	SM 5210B	MRW	06/26/08

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	3.5	mg/l		0.005	EPA 350.1	TS	07/09/08

Kathy Fugiel
President

AMTEST LABORATORIES

QC Summary for sample number: 08-A007512

DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	DUPLICATE VALUE	RPD
08-A007274	Ammonia Nitrogen	mg/l	0.25	0.27	7.7
08-A007628	Total Suspended Solids	mg/l	3.0	< 1	
08-A007637	Total Suspended Solids	mg/l	4.0	6.0	40.
08-A007771	Total Suspended Solids	mg/l	6.0	4.0	40.
08-A007781	Total Suspended Solids	mg/l	< 1	1.0	
08-A007930	Total Suspended Solids	mg/l	14.	16.	13.

MATRIX SPIKES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
08-A007608	Ammonia Nitrogen	mg/l	< 0.005	0.22	0.25	88.00 %

STANDARD REFERENCE MATERIALS

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
BOD	mg/l	200	150	75.0 %
Chlorine Residual	mg/l	0.50	0.44	88.0 %
Ammonia Nitrogen	mg/l	8.9	10.	112. %
Total Suspended Solids	mg/l	100	100	100. %
Total Suspended Solids	mg/l	100	100	100. %
Total Suspended Solids	mg/l	100	110	110. %
Total Suspended Solids	mg/l	100	90.	90.0 %

BLANKS

ANALYTE	UNITS	RESULT
BOD	mg/l	< 10
Chlorine Residual	mg/l	< 0.1
Ammonia Nitrogen	mg/l	< 0.005
Total Suspended Solids	mg/l	< 1
Total Suspended Solids	mg/l	< 1
Total Suspended Solids	mg/l	< 1
Total Suspended Solids	mg/l	< 1

AMTEST LABORATORIES
Professional Analytical Services

AmTest Chain of Custody Record

14603 NE 87th St. Redmond, WA 98052
Ph (425) 885-1664 Fx (425) 883-3495
www.amtestlab.com

Page 1 of 1

Chain of Custody No. 3679

Client Name & Address: Department of Ecology 3190 160th Ave SE. Bellevue WA 98008	Invoice To: Department of Ecology Fiscal Office, Accounts Payable PO Box 47612 Olympia WA 98504-7612
Contact Person: Amy Jankowiak	Invoice Contact:
Phone No: 425-649-7195	PO Number:
Fax No: 425-649-7098	Invoice Ph/Fax:
E-mail: ajan461@ecy.wa.gov	Invoice E-mail:
Report Delivery: (Choose all that apply) (Mail) / Fax / (Email) / Posted Online	Data posted to online account: YES / NO Web Login ID:
Special Instructions:	
Requested TAT: (Rush must be pre-approved by lab) Standard RUSH (5 Day / 3 Day / 48 HR / 24 HR)	RUSH Request Approved By:

Project Name: STAR PRINCESS

Project Number:

AmTest ID	Client ID (35 characters max)	Date Sampled	Time Sampled	Matrix	No. of containers	BOD (5-Day)	TSS	Fecal Coliform (MF)	Chlorine Residual	pH	Temperature				
7312	STARPRIN-EFF	6-22-08	13:23	W	3	1	1	1	1	1	1				

Collected/Relinquished By:	Date	Time	Received By:	Date	Time
Amy Jankowiak	6-22-08	15:22	cooler AmTest	6-22-08	15:22
Relinquished By:	Date	Time	Received By:	Date	Time
Relinquished By:	Date	Time	Received By:	Date	Time
				6/22/08	16:30

COMMENTS:

State of Washington Department of Ecology

Cruise Ship Memorandum of Understanding, Cruise Operations in Washington State Inspection Report

Northwest Regional Office
3190 160th Ave SE
Bellevue, WA 98008
Phone: (425) 649-7000 Fax: (425) 649-7098

Section A: General Information

Vessel Name:	INFINITY	Date:	July 18, 2008
Vessel Operator:	Celebrity Cruises	Entry Time:	8:58 AM
Vessel Type	Passenger Ship	Exit Time:	11:20 AM
Location:	Terminal 66, Seattle	Notification (name & date):	Rich Pruitt; July 15, 2008
On-board contact(s):	Ronald Raasch, Environmental Officer; Pantelis Glykas, 2nd Engineer		
Inspector(s):	Amy Jankowiak, Department of Ecology, Water Quality Program		
# passengers/crew:	~2270/~950		

The INFINITY arrived on May 9th, 2008 at the Port of Seattle to begin the 2008 cruise season. Zenon (Zeeweed) is a biological reactor and ultrafiltration system. The system includes screening, biological treatment and ultrafiltration via membrane bio-reactors, and ultraviolet light disinfection. Approval for continuous discharge from Ecology has not been requested nor issued. The vessel has been holding effluent and not discharging in MOU waters since the beginning of the season.

Section B: Areas Evaluated

☒	Black/Gray wastewater system	☒	Residual solids	☒	Records/Reports	☒	Hazardous Waste/Solid Waste	☐	Sampling/ Monitoring
☒	Discharge locations	☒	Operations & Maintenance	☒	Sludge Handling/ Disposal	☒	Oily bilge water	☒	Other

Section C: For vessels discharging ≥ 1nm from berth and ≥ 6 knots only [2.1.3(A)]

☐	Schematics match black/gray wastewater system	
☐	Operations as described in submitted documentation	
☐	Daily 24-hour continuous monitoring for turbidity or equivalent monitoring	
☐	Turbidimeter or equivalent monitoring equipment functioning properly	
	Turbidity or equivalent : Last calibration – Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:	
☐	Auto shut down or operational controls to insure system shut down if high turbidity occurs	
☐	Disinfection system operated and maintained properly	
	Disinfection System:	

Section D: For vessels discharging continuously [2.1.3(B)]

☐	Schematics match black/gray wastewater system	
☐	Operations as described in submitted documentation	
☐	Daily 24-hour continuous turbidity or equivalent monitoring	
☐	Turbidimeter or equivalent monitoring equipment functioning properly	
	Turbidity or equivalent : Last calibration –	

	Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:	
☐	Auto shut down or operational controls to insure system shut down if a high turbidity occurs	
☐	Disinfection immediately prior to discharge	
☐	Disinfection system operated and maintained properly	
	Disinfection System:	

Section E: General (Approved to Discharge)		
☐	No discharges within ½ mile from shellfish beds/protocol (President's Point, Apple Tree Cove, Tyee Shoal)	
☐	Discharges immediately stopped when high turbidity occurs	
☐	Immediate notifications made to Health for disinfection system upset	
☐	Sampling conducted 2/month, 1/month in Seattle (BOD, TSS, fecal coliform, pH, chlorine residual)	
☐	Whole Effluent Toxicity Testing 1 per 2 years (homeported) or once/40 calls for continuous	
☐	Discharges immediately stopped when GI >2% passengers or crew	
☐	Immediate notifications to Health for GI>2% passengers or crew	

Section F: General		
☒	Discharge records review	Discharge records were reviewed (blackwater/graywater/residual solids) and are maintained properly. No discharges in MOU waters were present from the beginning of the 2008 cruise season to present.
☒	Residual solids managed properly/ disposal protocol per MOU	Residual solids are typically dewatered, dried and incinerated. If the equipment is not functioning properly, residual solids are held for discharge at greater than 12 nautical miles and outside of MOU waters and the Olympic Coast National Marine Sanctuary.
☒	Hazardous Waste managed properly	Hazardous waste is collected is being sent off-shore where appropriate after accumulating for as long as possible. It was reported that no off-loads have occurred since April of 2008. Discharge records were not found readily for review.
☒	WA Haz Waste guidelines followed (appendix vii)	Hazardous waste is collected is being sent off-shore where appropriate after accumulating for as long as possible. It was reported that no off-loads have occurred since April of 2008. Discharge records were not found readily for review.
☒	Solid Waste managed properly	Solid waste appeared to be managed properly. The various solid waste streams are collected, sorted, stored, and sent ashore or incinerated as appropriate.
☒	Oily bilge water managed properly	Oily bilge water is treated and discharged at less than 5 ppm (above and beyond the requirement of 15 ppm) and at greater than 12 nautical miles while traveling at least 6 knots.
Other:		

Health = Washington State Department of Health

Section G: Sample Results

Parameter	Results
Biochemical Oxygen Demand 5-Day (BOD)	Not Applicable
Total Suspended Solids (TSS)	Not Applicable
Fecal Coliform	Not Applicable
Residual Chlorine	Not Applicable
pH	Not Applicable
Ammonia, Nitrogen	Not Applicable

Section H: Summary of Findings/Comments

Introduction

Amy Jankowiak, Washington State Department of Ecology (Ecology) Northwest Regional Office, Water Quality Program conducted the inspection of the Celebrity Cruises INFINITY on July 18, 2008. The main contacts on board the INFINITY included Ronald Raasch, Environmental Officer; and Pantelis Glykas, 2nd Engineer. Prior notification of the visit was given on July 15, 2008 for security protocol. The purpose of the inspection was to evaluate compliance with the *Memorandum of Understanding Cruise Operations in Washington State* (MOU), as amended. A copy of the current MOU was not available on-board (they had only the original 2004 version). An electronic copy has been sent to the Environmental Officer. The INFINITY has not requested nor has received approval to discharge in MOU waters. The vessel has not been discharging and is holding effluent until outside MOU waters.

The INFINITY was placed into service in 2001, and is 965 feet long with a width of 105 feet.

Inspection

I arrived and boarded the ship (photo #01) at about 8:58 am and began with introductions and a plan for the day with Ronald Raasch, the Environmental Officer. Mr. Raasch is a new Environmental Officer and has been on board for about one month. We then met with Pantelis Glykas, 2nd Engineer and discussed the Zenon advanced wastewater treatment system for black water and gray water. We then discussed food waste and discharge protocols for other waste streams. Discharge records were reviewed for blackwater and graywater discharges. We then viewed the desalinization system, the Zenon system, the Oily Water Separators, the sewage sludge (biomass) dewatering and drying system and the sampling laboratory. Next, we toured the part of the garbage sorting area/food waste extractor and some of the hazardous waste storage. The inspection was then finalized and I disembarked the vessel at about 11:20 am.

Discharge Types and Protocols:

If a discharge is to occur (although not occurring in MOU waters), the Bridge contacts the control room and confirms sea conditions as well as location and also send the information by e-mail. The control room also logs the information. Discharge ports have to manually unlocked for any discharge for double safety. The latitude and longitude coordinates are recorded in the *Sewage and Graywater Discharge Record Book* and in the deck log. The date, time and location of both the start and the stop of the discharges are recorded, along with port location, effluent type, and volumes. All discharge records that were reviewed appeared to be in compliance with the MOU and did not occur in MOU waters.

Blackwater, which includes toilet waste and infirmary drains and graywater which includes sink and shower water, and laundry water is treated with a Zenon advanced wastewater treatment system and is currently discharged outside of MOU waters. Galley water is collected separately and held for discharge at greater than 12 nautical miles and outside of MOU waters.

Screenings and sewage sludge (biomass) from the Zenon system are dewatered, dried and incinerated. If for some reason, the dewatering and drying process is not functioning, the residual solids are held in a tank for discharge outside of MOU waters., >12 nautical miles from shore, and outside of the Olympic Coast National Marine Sanctuary.

Pool water is discharged overboard almost everyday outside of 12 nautical miles. Spa water is sent to the graywater tank everyday, held and discharged outside of 12 nautical miles.

Food waste is collected in various locations, is sent to the economizing tank, then extracted (photo #28) where the solids are sent to the silo tanks for incineration and the liquid is recycled. Periodically the liquid is wasted, the economizer and the line is drained, the liquid is sent to the grease traps, to the raising unit (photos #03 & #04) and to the galley water holding tanks for discharge outside of 12 nautical miles. A new mixing tank is in place and will be operational soon. With the new mixing tank (photo #18), the Zenon system should be able to handle the galley waste. The collection of the galley waste and separation is overseen by the Environmental Officer and other staff. Grease (cooking oil) is collected and recycled often as biodiesel.

Oily bilge water is treated with an oily water separator and discharged at less than 5 ppm at greater than 12 nautical miles and going 6 knots. There are two Marin Floc Systems with analyzers. Once per year the analyzers are inspected and certified. A white box is in the process of installation for additional monitoring assurance.

Potable water is bunkered very infrequently, while the majority is produced by desalination. There are two evaporators (photo #02) at approximately 57cubic meters per hour total. The water is then softened and chlorinated (photos #06 & #07). Reverse Osmosis is on board as a back-up system. A chemical descaler, Ameroyal is used. PH is adjusted before discharging.

Air conditioning condensate is held and used as technical water.

Dry cleaning currently uses Perchloroethylene (PERC) which is collected and off-loaded as hazardous waste (photo #29). Medical waste and expired medications are incinerated at Sea (with witnesses). Medical sharps are collected and off-loaded on shore with hazardous waste.

Other hazardous wastes include batteries, fluorescent bulb waste (after going through a mercury recovery system, thinners and paint waste. The hazardous wastes are stored for as long as possible to minimize the number of off-loads. The Environmental Officer reported that the last hazardous off-load was in April 2008. The records were not readily available.

Silver is captured from the photo waste treated through a silver recovery system and held until off-loaded in a location that accepts it as non-hazardous waste. X-ray waste is collected and combined with photo waste. Materials recycled include cardboard, paper, plastics, aluminum, tin, scrap metal, batteries, electronics, cooling oil and crushed glass.

Black water and Gray water System:
The advanced wastewater treatment system, Zenon, consists of two separate membrane bioreactors. Black water, which includes toilet waste and infirmary drains is collected by vacuum to black water collection tanks (photo #17). Gray water, which includes sink and shower water, and laundry water is collected to gray water collection tanks. The gray water (photo #05) and black water (photo #14) then combine just as they enter the screening units (2 units) (photo #15). The screening units are flushed with hot water about every two hours. Solids from the screening unit first go to the wasting transfer tank (photo #16) and then onto the sludge tank where they eventually go through a dewatering unit (polymers added) and driers prior to incineration (photos #23, #24 & #25). Return from the dewatering unit goes back to the black water tank for treatment again.

The liquid from the screening units moves to the bioreactors (photo #08). The bioreactors have a capacity of about 1,000 cubic meters per day. The MBRs use air by both oxygen generators (photo #11) and blowers. The membrane bioreactors are cleaned automatically about once a day and chlorine or an acid are sometimes used for a more thorough cleaning (photo #13). The cleaning can be done manually as well. About once a year, a complete empty and clean is called for. Solids that are wasted from the MBRs periodically are sent to the wasting transfer tank. Effluent from the MBRs is combined and sent to the ultraviolet disinfection unit (UV 18) (photos #20 & #22). After UV, the effluent is sent to (photo #12) permeate holding tanks (6) if not in an area for discharge. When discharging, effluent from the holding tanks goes through another UV system (UV20) (photos #19 & #21) prior to discharge. The UV systems have lighted alarms when bulbs go out and alarms for intensity and overheating. The sleeves are cleaned with a chemical by hand wipe at least twice per year. There are both spare bulbs and sleeves on board.

Sampling is done on board (photos #26 & #27) the vessel twice weekly. Parameters include total suspended solids, chemical oxygen demand, ammonia, chlorine and total coliform. There are plans to also test biochemical oxygen demand on board as well. Total suspended solids are tested daily in order to decide how much to waste. There are turbidity meters on each bioreactor, after the back pulse before UV, and after UV20. The highest turbidity seen has been about 1.0 NTU.

Zenon representatives will be on board the vessel soon to help with brining on line a new mixing tank. The new mixing tank is already in place (modified an old tank). The new mixing tank should help provide more consistency in waste once the black water and gray water are combined. The tank should also allow galley water to go through the Zenon system.

The INFINITY has been able to keep their old treatment system (Hamann) onboard, which could be used if there was a problem with the Zenon system and then discharged outside of MOU waters.

Conclusions and Recommendations
The laboratory testing on-board is an excellent way to monitor and make needed adjustments to the system. Having a laboratory on-board for the testing is ideal.

It is recommended that staff continue to work towards a high functioning wastewater treatment system.

Attachments:
Photographs

Copies to:
Rich Pruitt, RCCL
Ronald Raasch, Environmental Officer
Amy Jankowiak, Ecology
Mark Toy, Health
Kevin Fitzpatrick, Ecology

Central Files: Celebrity Cruises – INFINITY; WQ 6.1

Section I: Signatures		
Name and Signature of Inspector Amy Jankowiak Amy Jankowiak	Agency/Office/Telephone Department of Ecology/Northwest Regional Office/Water Quality Program/Municipal Compliance Specialist/(425) 649-7195	Date 8/14/08
Name and Signature of Reviewer Kevin C. Fitzpatrick Karen Bryson for	Agency/Office/Telephone Department of Ecology/Northwest Regional Office/Water Quality Section Manager/(425) 649-7033	Date 8/15/08

PHOTO #:01 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P7180030
DESCRIPTION: INFINITY VESSEL, SEATTLE

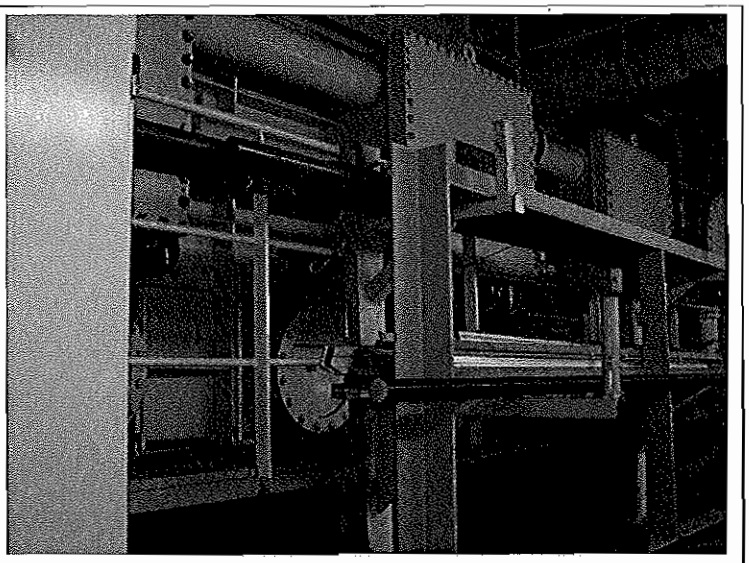

PHOTO #:02 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P7180001
DESCRIPTION: DESALINIZATION EVAPORATOR

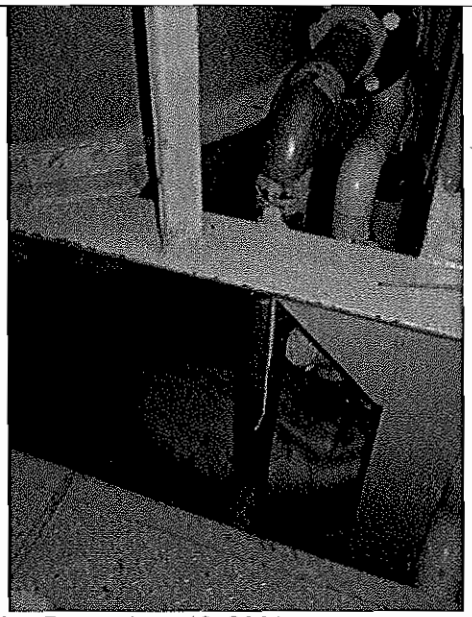

PHOTO #:03 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P7180002
DESCRIPTION: RAISING/GREASE TRAP

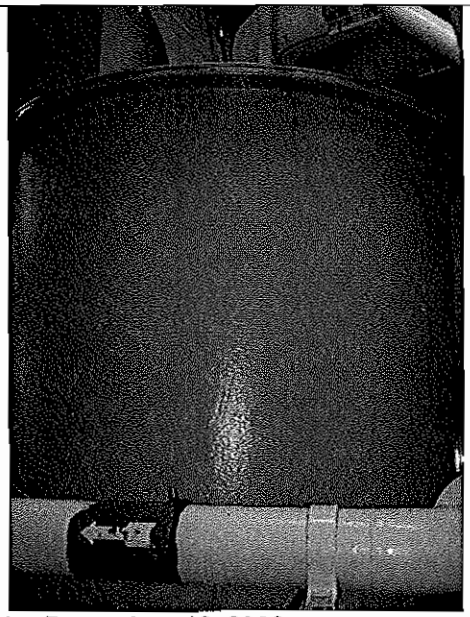

PHOTO #:04 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P7180003
DESCRIPTION: GREASE TRAP

PHOTO #:05 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P7180005
DESCRIPTION: GRAY WATER TO SCREENS

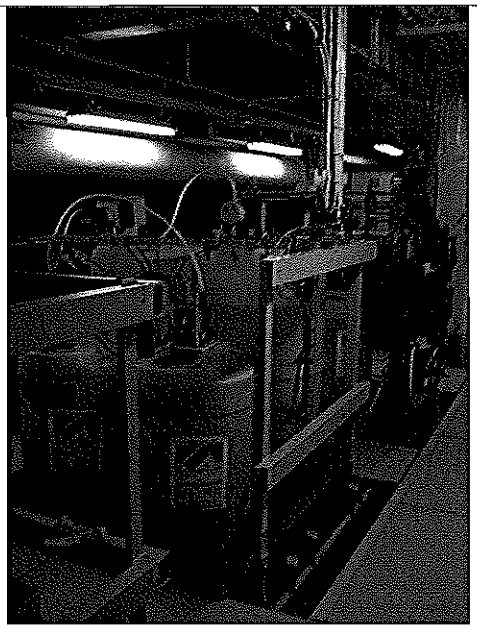

PHOTO #:06 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P7180006
DESCRIPTION: POTABLE WATER CHEMICALS

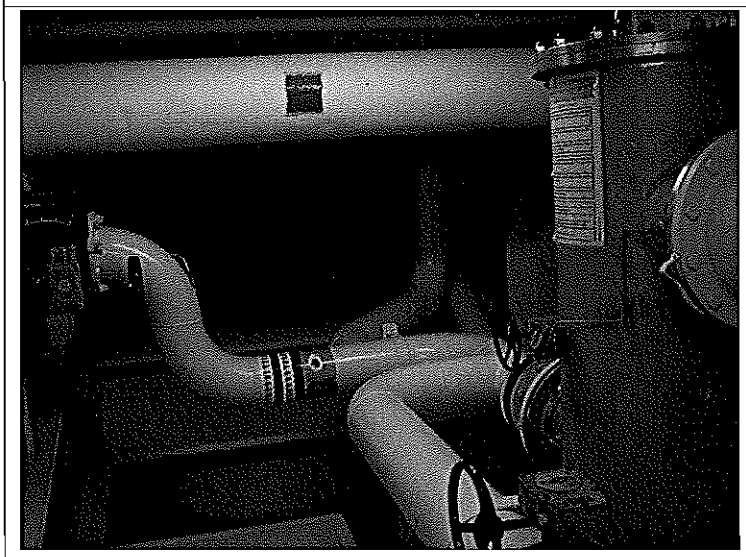

PHOTO #:07 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P7180007
DESCRIPTION: POTABLE WATER FILTER AND CHLORINE FEED

PHOTO #:08 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P7180008
DESCRIPTION: MEMBRANE TANK (1 OF 2 MBRS)

PHOTO #:09 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P7180009
DESCRIPTION: AIR HOLD TANKS FOR OXYGEN UNIT

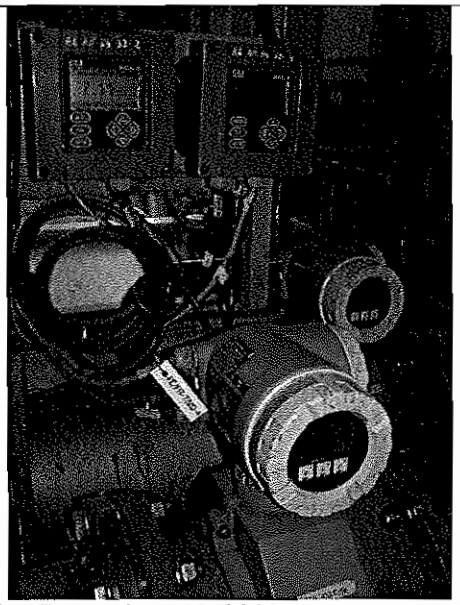

PHOTO #:10 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P7180010
DESCRIPTION: ZENON pH AND FLOW SENSORS

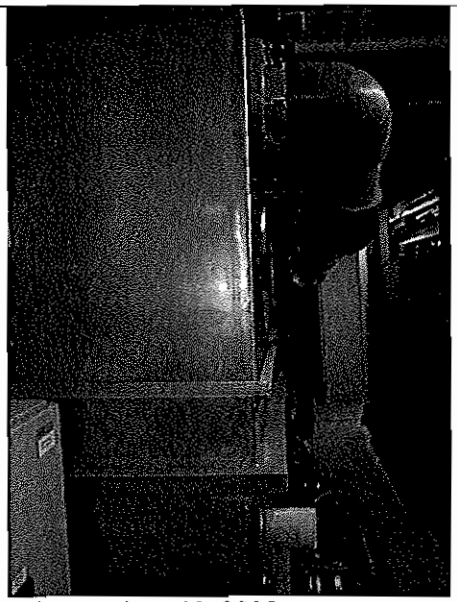

PHOTO #:11 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P7180011
DESCRIPTION: ZENON BACKPULSE TANKS (LEFT)

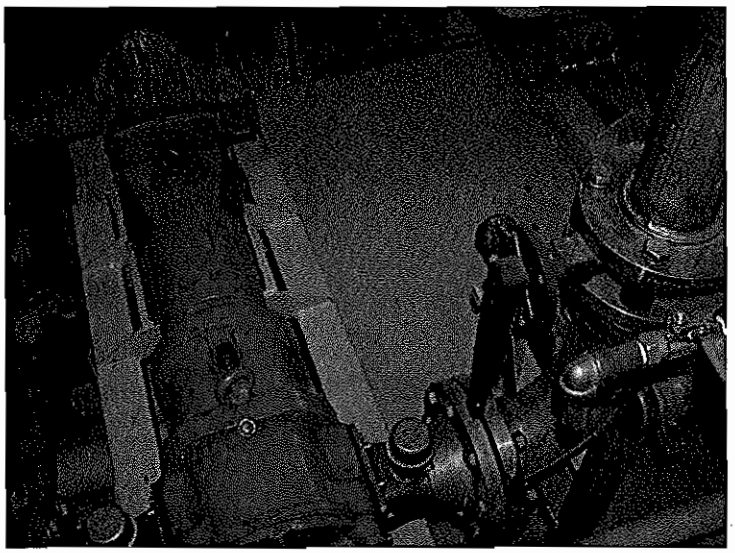

PHOTO #:12 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P7180012
DESCRIPTION: PERMEATE PUMPS

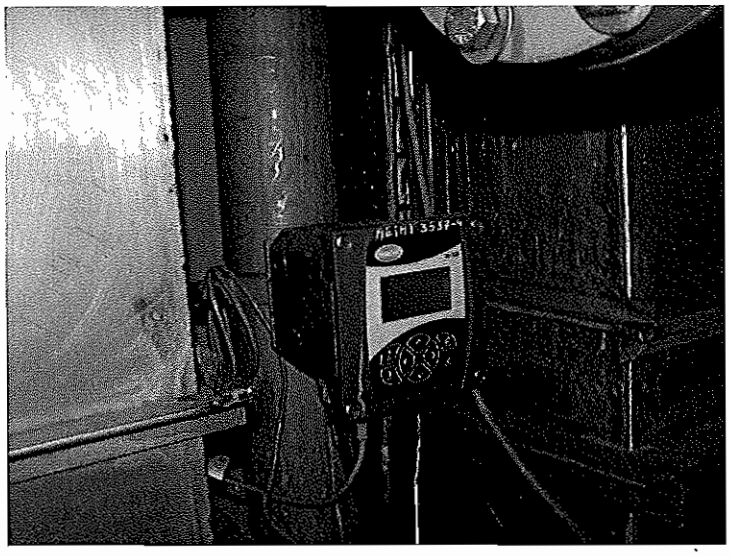

PHOTO #:13 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P7180013
DESCRIPTION: TURBIDITY METER (1 OF 2) ON BACKPULSE TANKS

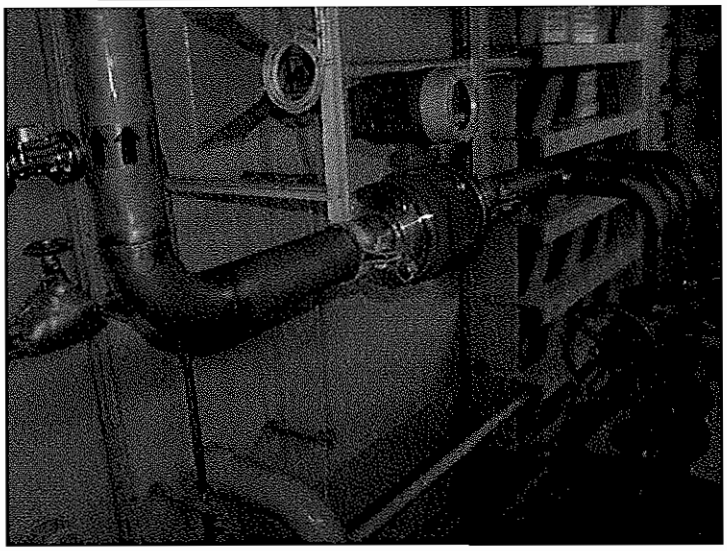

PHOTO #:14 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P7180014
DESCRIPTION: BLACK WATER TO SCREENS

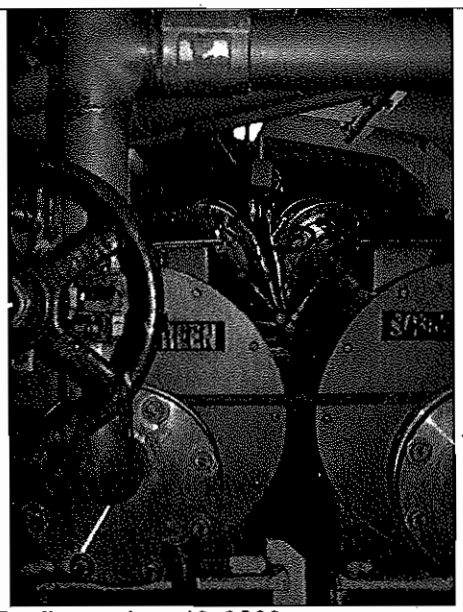

PHOTO #:15 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P7180015
DESCRIPTION: SCREENS

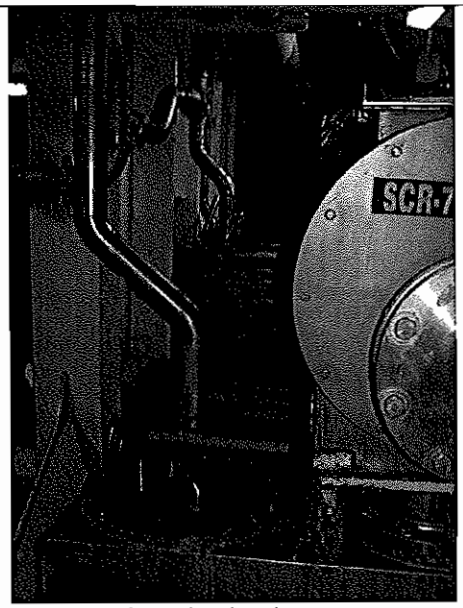

PHOTO #:16 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P7180016
DESCRIPTION: WASTING TRANSFER TANK (LEFT OF SCREEN)

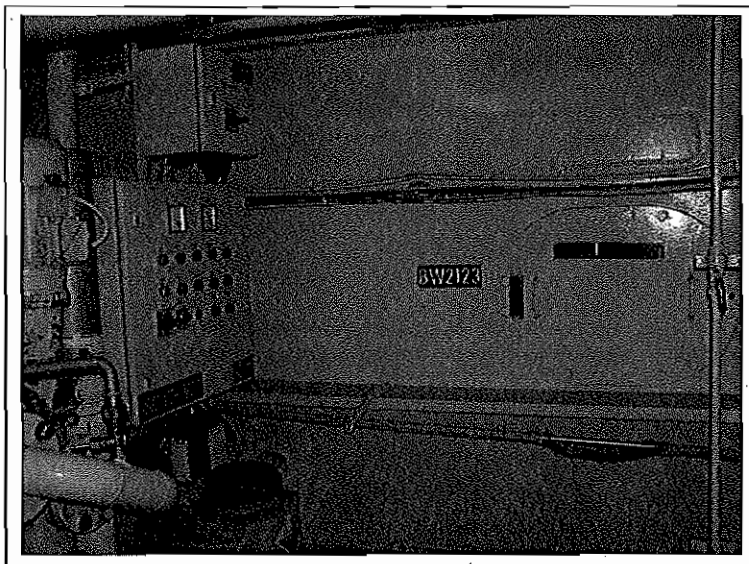

PHOTO #:17 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P7180017
DESCRIPTION: BLACKWATER HOLDING TANK

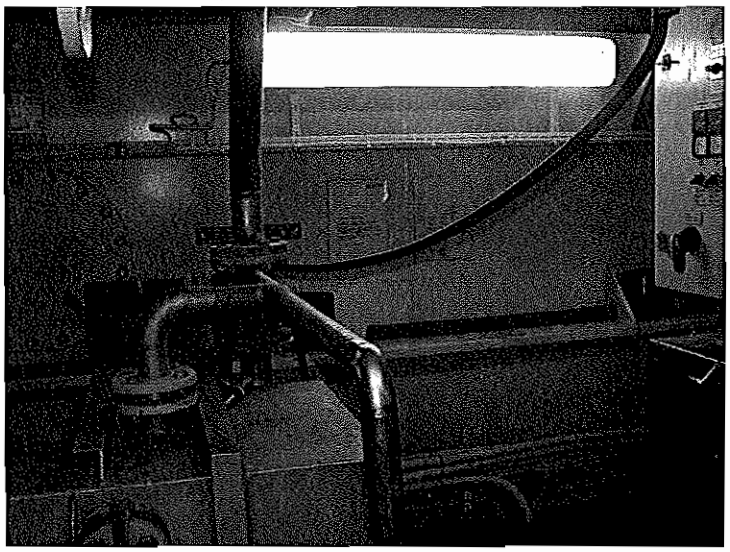

PHOTO #:18 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P7180018
DESCRIPTION: NEW MIXING TANK

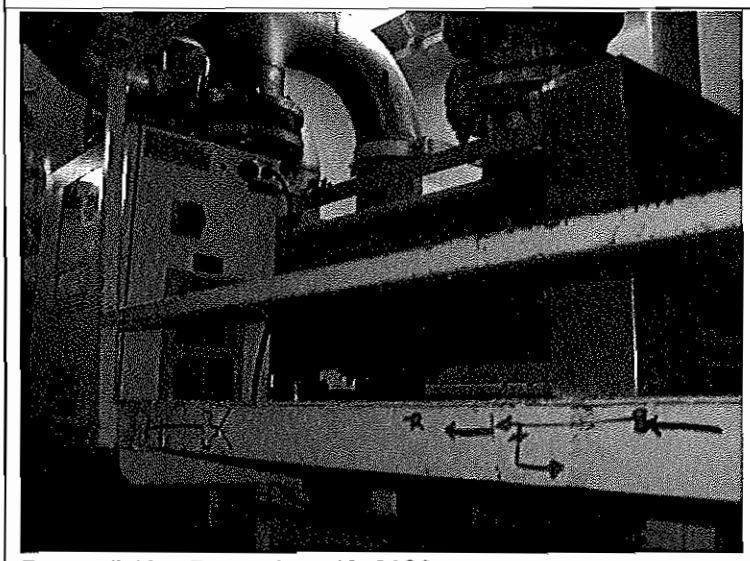

PHOTO #:19 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P7180019
DESCRIPTION: ULTRAVIOLET (UV) DISINFECTION SYSTEM UV20 FOR DISCHARGE AFTER EFFLUENT IN HOLDING TANK

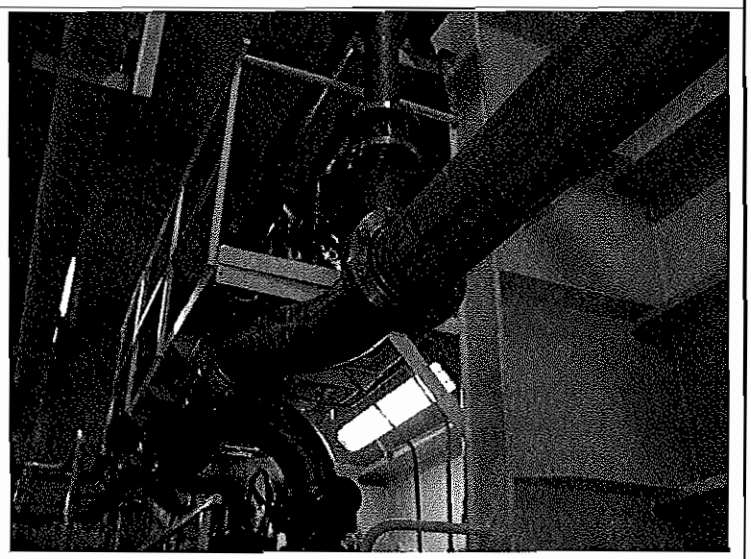

PHOTO #:20 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P7180020
DESCRIPTION: UV18 FOR DISCHARGE IMMEDIATELY AFTER TREATMENT

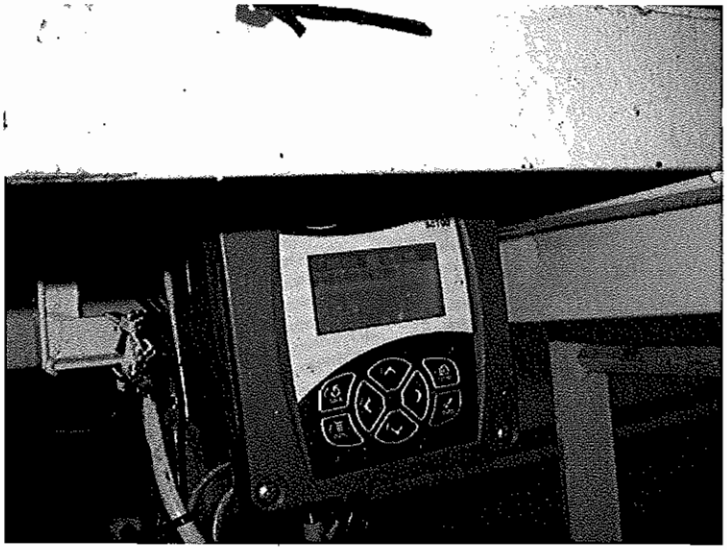

PHOTO #:21 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P7180021
DESCRIPTION: TURBIDITY METER FOR UV20

PHOTO #:22 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P7180022
DESCRIPTION: CONTROL PANEL FOR UV18

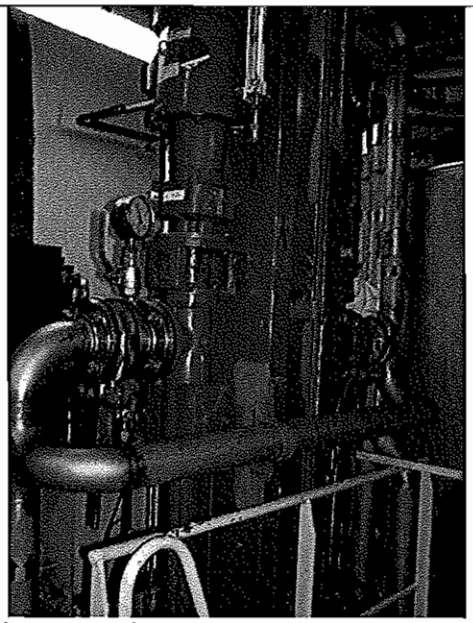

PHOTO #:23 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P7180023
DESCRIPTION: SLUDGE TANK TO DEWATER UNITS (A&B)

PHOTO #:24 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P7180024
DESCRIPTION: MJORUD SLUDGE COLLECTION TANK

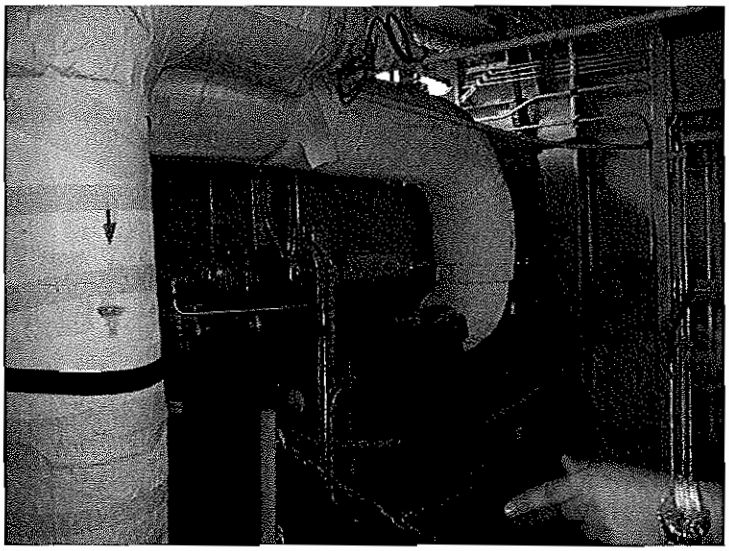

PHOTO #:25 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P7180025
DESCRIPTION: MJORUD DRYER

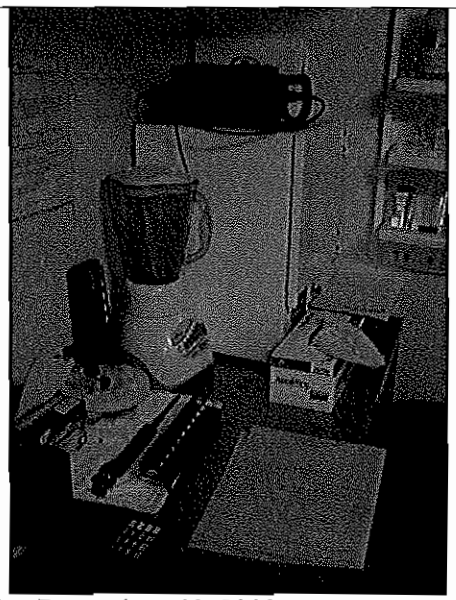

PHOTO #:26 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P7180026
DESCRIPTION: SAMPLING LABORATORY

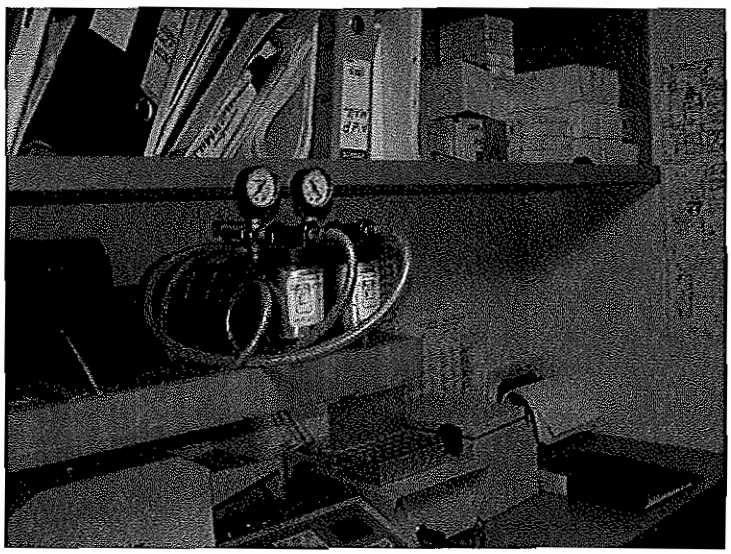

PHOTO #:27 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P7180027
DESCRIPTION: SAMPLING LABORATORY

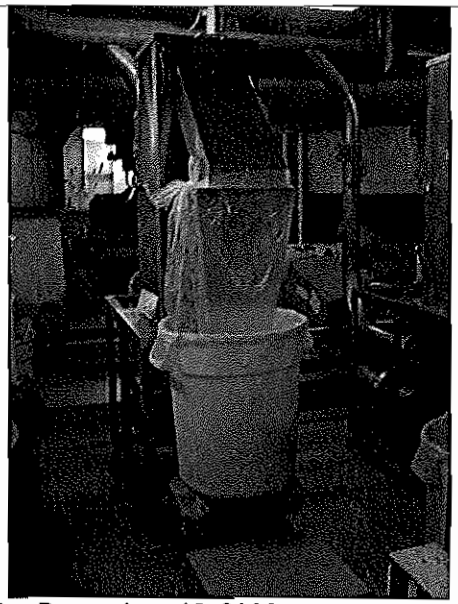

PHOTO #:28 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P7180029
DESCRIPTION: FOOD WASTE EXTRACTOR

PHOTO #:29 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK . FILE NO.:P7180029
DESCRIPTION: PERC STORAGE

State of Washington Department of Ecology

Cruise Ship Memorandum of Understanding, Cruise Operations in Washington State Inspection Report

Northwest Regional Office
3190 160th Ave SE
Bellevue, WA 98008
Phone: (425) 649-7000 Fax: (425) 649-7098

Section A: General Information

Vessel Name:	GOLDEN PRINCESS	Date:	July 26, 2008
Vessel Operator:	Princess Cruises	Entry Time:	9:02 AM
Vessel Type	Passenger Ship	Exit Time:	11:25 AM
Location:	Pier 30, Seattle	Notification (name & date):	A. Lorenzano and D. Hutchinson on July 22, 2008
On-board contact(s):	Markus Valerio, Environmental Officer; Pietro Donato, Staff Engineer, Nick Nash, Captain		
Inspector(s):	Amy Jankowiak, Department of Ecology, Water Quality Program; Karen Burgess, Department of Ecology, Water Quality Program; and Mark Toy, Department of Health		
# passengers/crew:	~2800/~1100		

The GOLDEN PRINCESS arrived on May 10th, 2008 at the Port of Seattle to begin the 2008 cruise season. Hamworthy is a biological reactor and ultrafiltration system. The system includes screening via a screen press, biological treatment via bio-reactors with inter-stage filters and a membrane system, and ultraviolet light disinfection. Approval for continuous discharge from Ecology was granted on May 12, 2008, however, the vessel has been holding effluent and not discharging in MOU waters since the beginning of the season.

Section B: Areas Evaluated

☒	Black/Gray wastewater system	☒	Residual solids	☒	Records/Reports	☒	Hazardous Waste/Solid Waste	☒	Sampling/ Monitoring
☒	Discharge locations	☒	Operations & Maintenance	☒	Sludge Handling/ Disposal	☒	Oily bilge water	☒	Other

Section C: For vessels discharging ≥ 1nm from berth and ≥ 6 knots only [2.1.3(A)]

☐	Schematics match black/gray wastewater system	
☐	Operations as described in submitted documentation	
☐	Daily 24-hour continuous monitoring for turbidity or equivalent monitoring	
☐	Turbidimeter or equivalent monitoring equipment functioning properly	
	Turbidity or equivalent : Last calibration – Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:	
☐	Auto shut down or operational controls to insure system shut down if high turbidity occurs	
☐	Disinfection system operated and maintained properly	
	Disinfection System:	

Section D: For vessels discharging continuously [2.1.3(B)]

☒	Schematics match black/gray wastewater system	Schematics appeared to be consistent with they system on board.
☒	Operations as described in submitted documentation	Operations were as described.
☒	Daily 24-hour continuous turbidity or equivalent monitoring	Continuous turbidity for monitoring. There are turbidity meters on each of the three MBR permeate tanks.
☒	Turbidimeter or equivalent monitoring equipment functioning properly	Appears to be functioning properly.
	Turbidity or equivalent :	

	Last calibration – Maintenance program triggers need for calibration Not recommended by manufacturer's instruction book Trigger level for early alarm: none Trigger level for shutdown: 25 NTU Recorded turbidity/equivalent levels above triggers:	
☒	Auto shut down or operational controls to insure system shut down if a high turbidity occurs	A value of 25 NTU or greater triggers automatic shut down of that MBR.
☒	Disinfection immediately prior to discharge	Protocol: When discharging, UV occurs immediately prior to discharge.
☒	Disinfection system operated and maintained properly	The UV system appeared to be operational and maintained well.
	Disinfection System: The disinfection system is with an ultraviolet light system with 6 bulbs that are alarmed for bulb failure and high temperature. Intensity is also monitored. The bulbs are cleaned automatically with wipers more than once a day. There is one spare bulb on board, with more ordered (just replaced some).	

Section E: General (Approved to Discharge)		
☒	No discharges within ½ mile from shellfish beds/protocol (President's Point, Apple Tree Cove, Tyee Shoal)	No discharges are currently occurring within Waters subject to the MOU per company protocol.
☒	Discharges immediately stopped when high turbidity occurs	No discharges are currently occurring within Waters subject to the MOU. They do have their systems set up to automatically shut down the discharge if high turbidity occurs.
☒	Immediate notifications made to Health for disinfection system upset	No discharges are currently occurring within Waters subject to the MOU.
☒	Sampling conducted 2/month, 1/month in Seattle (BOD, TSS, fecal coliform, pH, chlorine residual)	Sampling is being conducted as required, as of the date of the inspection.
☒	Whole Effluent Toxicity Testing 1 per 2 years (homeported) or once/40 calls for continuous	WET testing is required this season for the GOLDEN PRINCESS
☒	Discharges immediately stopped when GI >2% passengers or crew	No discharges are currently occurring within Waters subject to the MOU. Protocols should be in place.
☒	Immediate notifications to Health for GI>2% passengers or crew	No discharges are currently occurring within Waters subject to the MOU. Protocols should be in place.

Section F: General		
☒	Discharge records review	Discharge records were reviewed (blackwater/graywater/residual solids) and are maintained properly. No discharges in MOU waters were present from the beginning of the 2008 cruise season to present.
☒	Residual solids managed properly/ disposal protocol per MOU	Residual solids are either incinerated or held to be discharged at greater than 12 nautical miles and outside of MOU waters and the Olympic Coast National Marine Sanctuary.
☒	Hazardous Waste managed properly	All hazardous waste that is collected is being sent off-shore in Victoria, Canada. Records were reviewed for hazardous waste discharges.
☒	WA Haz Waste guidelines followed (appendix vii)	All hazardous waste that is collected is being sent off-shore in Victoria, Canada. Records were reviewed for hazardous waste discharges.
☒	Solid Waste managed properly	Solid waste is being managed properly. The various solid waste streams are collected, sorted, stored, and sent ashore or incinerated as appropriate.
☒	Oily bilge water managed properly	Oily bilge water is treated and discharged at less than 15 ppm and outside of MOU waters.
Other:		

Health = Washington State Department of Health

Section G: Sample Results

Parameter	Results
Biochemical Oxygen Demand 5-Day (BOD)	<10 mg/l
Total Suspended Solids (TSS)	3 mg/l
Fecal Coliform	1 CFU/100 ml
Residual Chlorine	4.61 mg/l
pH	6.95 unit
Ammonia, Nitrogen	38 mg/l

Section H: Summary of Findings/Comments

Introduction

Amy Jankowiak, Washington State Department of Ecology (Ecology) Northwest Regional Office, Water Quality Program (NWRO-WQ) along with Karen Burgess, Ecology, NWRO-WQ, and Mark Toy, Washington State Department of Health, Office of Shellfish and Water Protection conducted the inspection of the Princess Cruises GOLDEN PRINCESS on July 26, 2008. The main contacts on board the GOLDEN PRINCESS included Markus Valerio, Environmental Officer; Pietro Donato, Staff Engineer, Nick Nash, Captain. Prior notification of the visit was given on July 22, 2008 for security protocol. The purpose of the inspection was to evaluate compliance with the *Memorandum of Understanding Cruise Operations in Washington State* (MOU), as amended. A copy of the current MOU was on-board. The GOLDEN PRINCESS received approval to discharge continuously on May 12, 2008. The vessel has not been discharging and is holding effluent until outside MOU waters.

The GOLDEN PRINCESS was placed into service in 2001, and is 951 feet long with a width of 118 feet.

Inspection

We arrived and boarded the ship at about 9:02 am and began with introductions and a plan for the day with Markus Valerio, the Environmental Officer and with Nick Nash, Captain. We then headed to the Engine Control Room (ECR) and discussed various waste streams, and the discharge protocols. Discharge records were reviewed for blackwater and graywater discharges and hazardous waste off-loads. We then discussed the blackwater and graywater system in detail. Next, we viewed the garbage sorting area and hazardous waste storage. We then took samples of the Hamworthy effluent and toured the Hamworthy system and oily water separator. The inspection was then finalized with a debriefing and we disembarked the vessel at about 11:25 am.

Discharge Types and Protocols:

If a discharge is allowed, the Bridge authorizes any discharge. The latitude and longitude coordinates are recorded in the *Sewage and Graywater Discharge Record Book* and in the deck log. The date, time and location of both the start and the stop of the discharges are recorded, along with port location, effluent type, and volumes. All discharge records that were reviewed appeared to be in compliance with the MOU and also did not occur in MOU waters.

Blackwater, which includes toilet waste and graywater which includes sink and shower water is treated with a Hamworthy advanced wastewater treatment system and is currently discharged outside of MOU waters. Laundry water and galley water is collected separately and held for discharge outside of MOU waters.

Medical blackwater is sent to evac #4, and in case of emergency, will be isolated by valve.

Screenings and grit from the Hamworthy system are collected and incinerated. The solids separated out by the bioreactors is discharged outside of MOU waters, >12 nautical miles from shore, and outside of the Olympic Coast National Marine Sanctuary.

Pool and spa water is discharged outside of 12 nautical miles.

Food waste is collected in various locations, is sent through a pulper. The water is recirculated and eventually held and discharged outside of MOU waters. The solid food material from the pulpers is incinerated. Grease, or cooking oil (photo #03) is collected and recycled for biodiesel in Seattle.

Oily bilge water is treated with an oily water separator (photo #16) and discharged at less than 15 ppm after first going through a white box for monitoring.

Potable water is bunkered now and then, while the rest is produced by desalination. Evaporators are used to generate water with a VAPTREATMENT system. The water then goes to the UV lama and true mineralizaer and is chlorinated before going to a storage tank. Salt collected from the evaporators is sent back to the sea.

Dry cleaning uses a solvent called Soft' N Brite, a delicate wetcleaning detergent. Other hazardous wastes include batteries, bulbs (no crusher on board), paints, oily rags, sludge oil, aerosols (punctured), and sharps. Silver is captured from the photo waste (photo #04), treated to less than 5 ppm and is incinerated. Medical waste that is not hazardous is collected and incinerated. Hazardous medical waste, including sharps is off-loaded with hazardous waste in Victoria. All hazardous waste (photo #02) is off-loaded in Victoria. Expired medications are logged and sent ashore to be sent back to England. X-ray's are done digitally, and therefore there is no x-ray waste. Other materials incinerated (photo #06) include paper, cartons, some plastics, and sludge.

Plastics, garbage (photo #01), and other materials are collected and sorted on a sorting table (photo #05). Most materials

are then condensed and recycled on-shore. Some cardboard is collected and off-loaded for recycling. Glass, aluminum, tin, and plastics are all recycled along with other materials.

Black water and Gray water System:
The Hamworthy system consists of three separate membrane bioreactors (MBRs). Black water, which includes toilet waste is collected by vacuum to one of five collection tanks and then combines with gray water which includes sink and shower water and has been piped to a buffer tank. Combined gray and black water flow moves to the screen press (photo #09). The solids are screened into bags (photos #10 and #11) and are then sent to the incinerator. The liquid moves to the 1st stage of the membrane bioreactor where aeration occurs. From the 1st stage, flow moves to the Russell Filters (inter-stage filters – photo #14). The inter-stage filtered solids are returned back to the screen press. The liquid moves onto the 2nd stage of the MBR for further aeration. From the 2nd stage MBR, flow is sent to the membrane modules for ultrafiltration (photo #15). There are 16 membranes with each MBR system which are cleaned in a washing tank with chemicals. Solids from the filters are collected and incinerated. Effluent from the membrane modules are sent to a permeate tank (photo #12) where turbidity is monitored. Flow then combines with the other two MBR's at the Ultraviolet (UV) Light Permeate tank. From the UV Permeate tank, effluent moves through the ultraviolet (UV) disinfection system (photo #08). Disinfected effluent either goes directly overboard or to a holding tank if not in an approved area for discharge. Currently, effluent is held and discharged outside of MOU waters.

Turbidity is measured continuously on each of the MBR permeate tanks (photo #13). At the time of the inspection, the MR's were at 3.9, 1.5 and 2.8. The meters are alarmed and shutdown at 25 NTU maximum. The UV system consists of 6 bulbs which are alarmed for bulb failure and high temperature. Intensity is also monitored (photo #07). The UV sleeves are automatically cleaned by wiper more than once a day. There is one spare on board with more on order as they just replaced some of the bulbs.

Staff regularly communicate with Hamworthy representatives. The staff have a small laboratory on board where they sample for such parameters as coliform, total suspended solids (TSS), chemical oxygen demand (COD), free and total chlorine, and pH, which are monitored on board about twice a week. The on-board sampling allows for immediate results and a chance for immediate corrections to the system.

Samples were taken for Biochemical Oxygen Demand (BOD 5-Day), Total Suspended Solids (TSS), pH, chlorine residual, fecal coliform and ammonia from the combined effluent of the MBR's after UV disinfection. The sample port was cleaned prior to pulling samples. The samples were put on ice immediately and were transported to AmTest laboratory in Redmond, Washington that afternoon. Chain of Custody and sampling procedures were followed. All results are in Section F. The results are typical of the results submitted to Ecology thus far for 2008.

Conclusions and Recommendations

It is recommended that staff continue to work towards high functioning wastewater treatment systems.

The laboratory testing on-board is an excellent way to monitor and make needed adjustments to the system. Having a laboratory on-board for the testing is ideal.

Whole Effluent Toxicity (WET) testing is required this season for the GOLDEN PRINCESS. Please follow the requirements of the MOU for WET testing as well as the Guidelines included on our website under the "Sampling" header. http://www.ecy.wa.gov/programs/wq/wastewater/cruise_mou/index.html.

Attachments:
Photographs
Laboratory Report

Copies to:
Andrew Lorenzana, Princess Cruises
Markus Valerio, Environmental Officer
Amy Jankowiak, Ecology
Karen Burgess, Ecology
Mark Toy, Health
Kevin Fitzpatrick, Ecology
Central Files: Princess Cruises – GOLDEN PRINCESS; WQ 6.1

Section I: Signatures		
Name and Signature of Inspector Amy Jankowiak Amy Jankowiak	Agency/Office/Telephone Department of Ecology/Northwest Regional Office/Water Quality Program/Municipal Compliance Specialist/(425) 649-7195	Date 8/14/08
Name and Signature of Reviewer Karen Burgess Karen Burgess	Agency/Office/Telephone Department of Ecology/Northwest Regional Office/Water Quality Section Manager/(425) 649-7207	Date 8/15/08
Name and Signature of Reviewer Kevin C. Fitzpatrick Karen Burgess for	Agency/Office/Telephone Department of Ecology/Northwest Regional Office/Water Quality Section Manager/(425) 649-7033	Date 8/15/08

PHOTO #:01 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.:P7260002
DESCRIPTION: GARBAGE TO BE SORTED

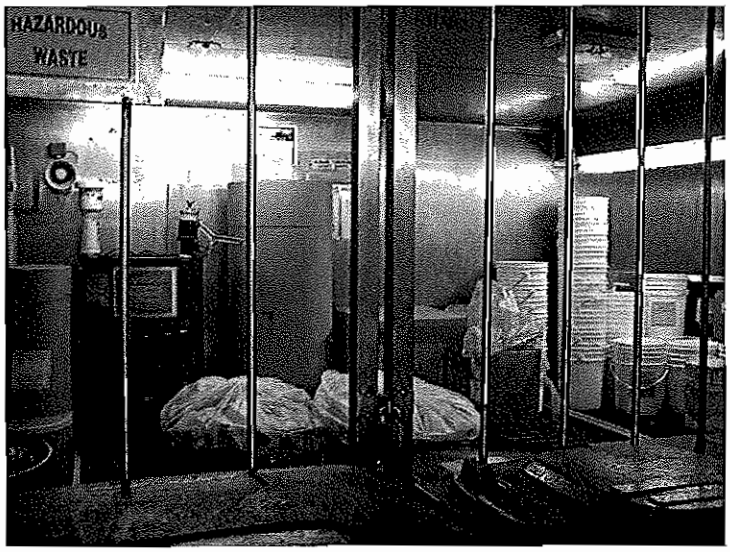

PHOTO #:02 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.: P7260003
DESCRIPTION: HAZARDOUS WASTE STORAGE

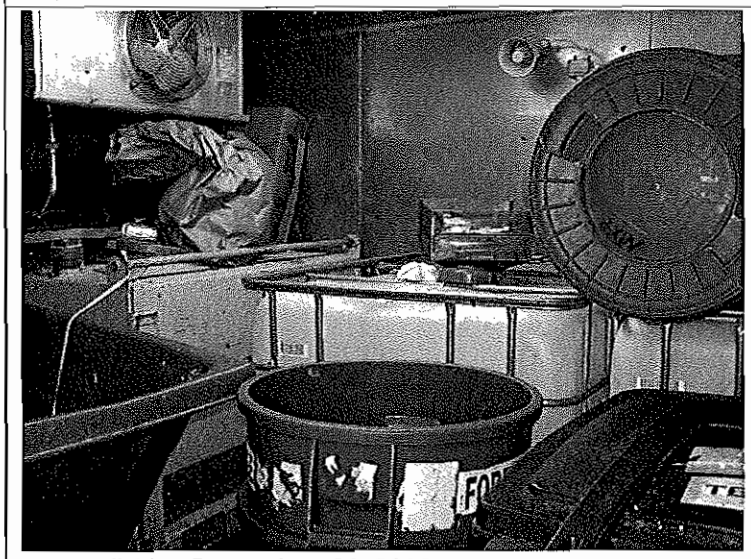

PHOTO #:03 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.: P7260004
DESCRIPTION: COOKING OIL CONTAINERS (SQUARE IN BACK)

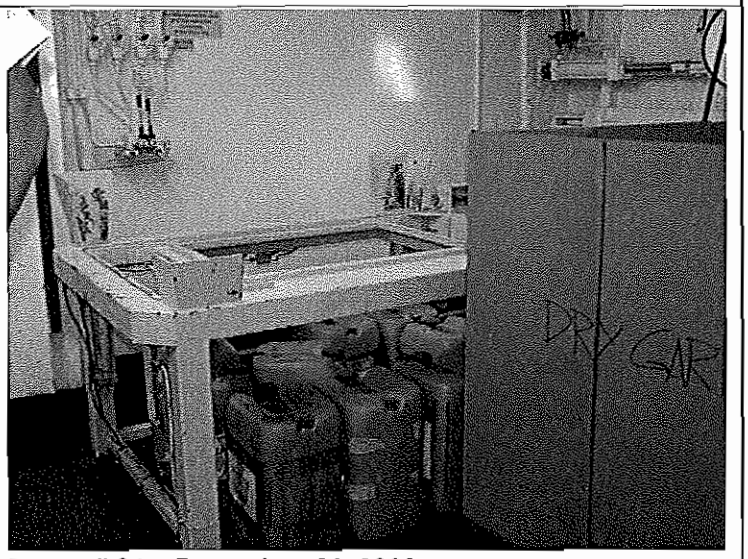

PHOTO #:04 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.: P7260005
DESCRIPTION: PHOTO WASTE STORAGE AREA

PHOTO #:05 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.:P7260006
DESCRIPTION: WASTE SORTING AREA

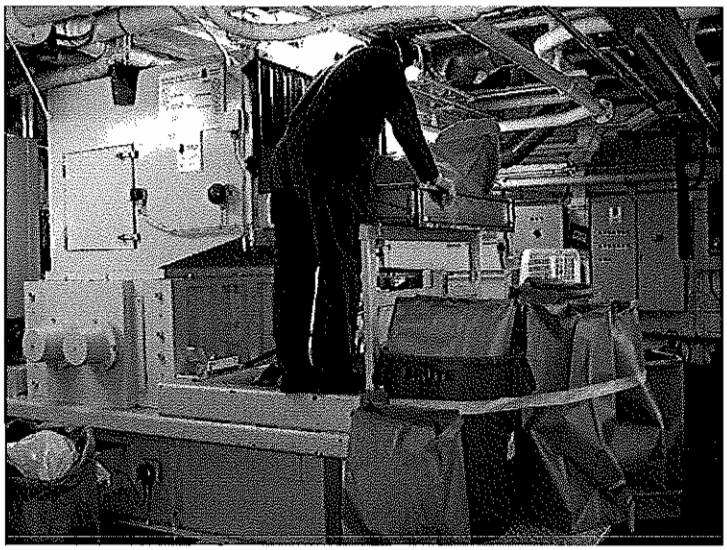

PHOTO #:06 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.: P7260008
DESCRIPTION: MATERIALS BE SHREDDED FOR INCINERATION

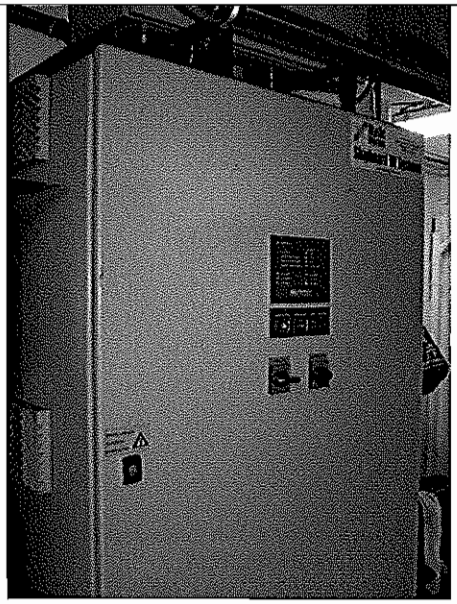

PHOTO #:07 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.: P7260009
DESCRIPTION: HAMWORTHY ULTRAVIOLET LIGHT (UV) DISINFECTION SYSTEM CONTROL PANAL

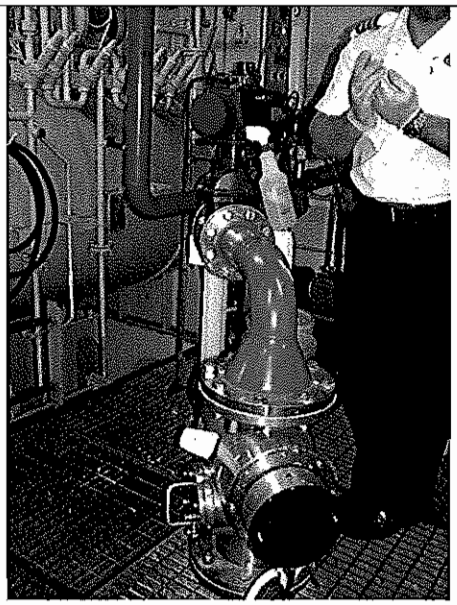

PHOTO #:08 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.: P7260010
DESCRIPTION: UV DISINFECTION SYSTEM AND SAMPLE PORT

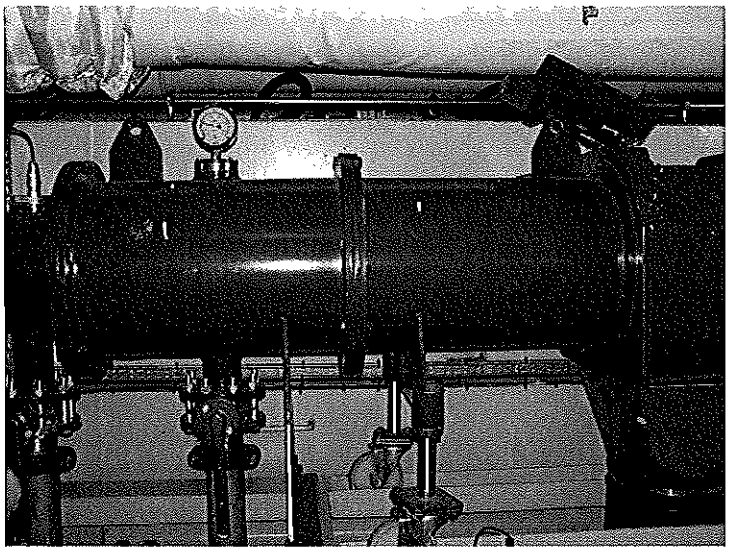

PHOTO #:09 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.:P7260011
DESCRIPTION: SCREEN PRESS

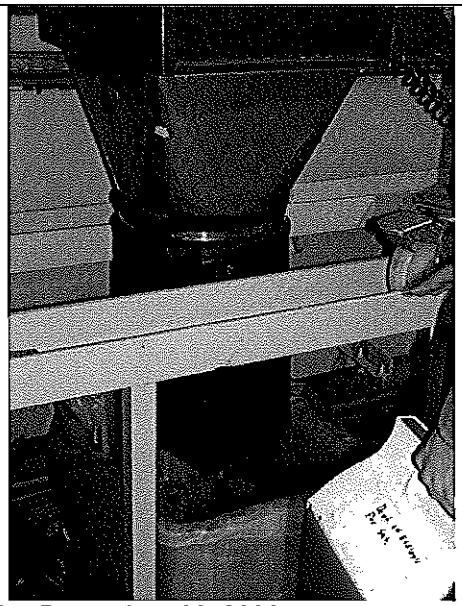

PHOTO #:10 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.: P7260013
DESCRIPTION: SCREEN PRESS SCREENINGS

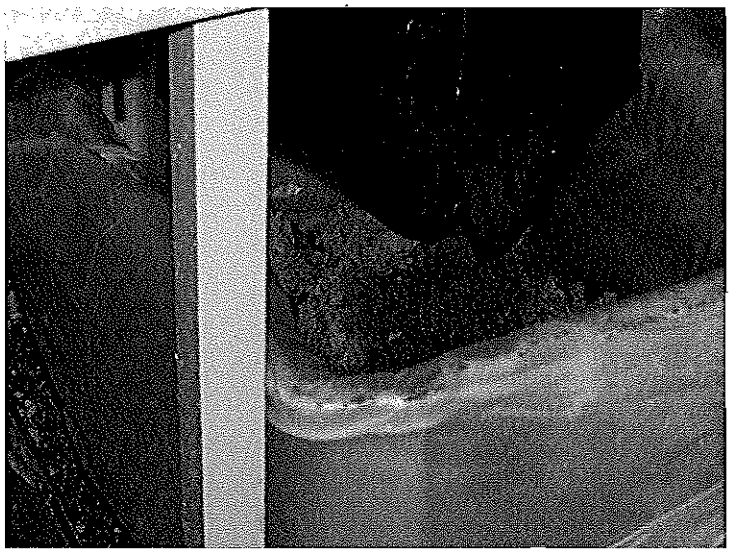

PHOTO #:11 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.: P7260014
DESCRIPTION: SCREEN PRESS SCREENINGS (TO INCINERATION)

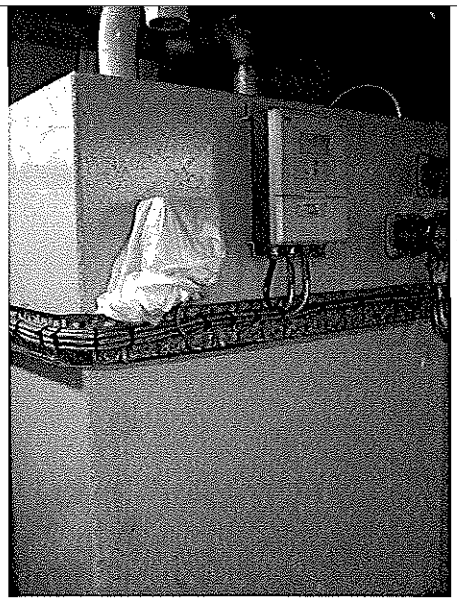

PHOTO #:12 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.: P7260015
DESCRIPTION: MBR PERMEATE TANK

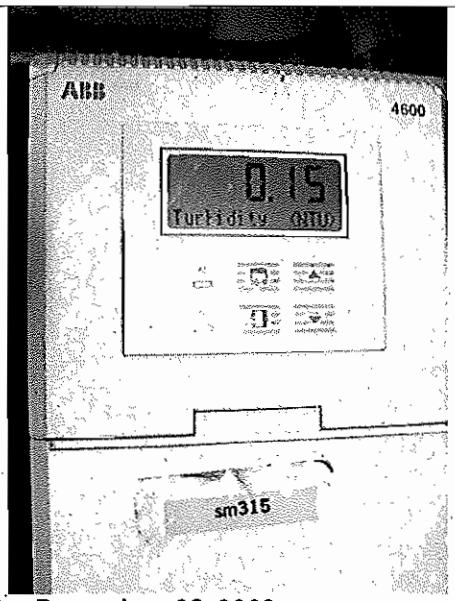

PHOTO #:13 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.:P7260016
DESCRIPTION: TURBIDITY ON PERMEATE TANK

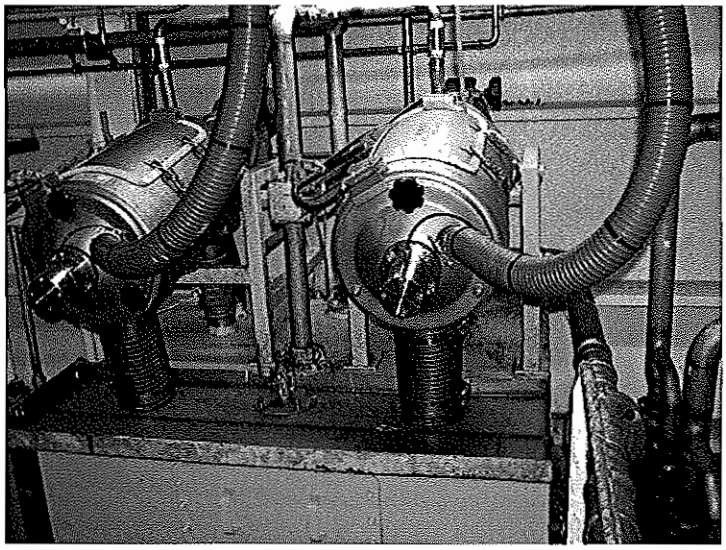

PHOTO #:14 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.: P7260017
DESCRIPTION: RUSSELL FILTERS (INTERSTAGE FILTERS)

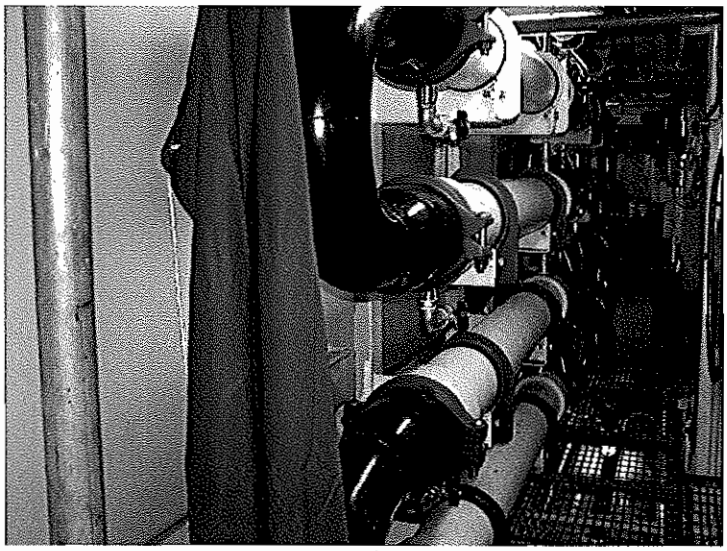

PHOTO #:15 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.: P7260018
DESCRIPTION: MEMBRANES (IN FRON OF BIOREACTOR TANKS)

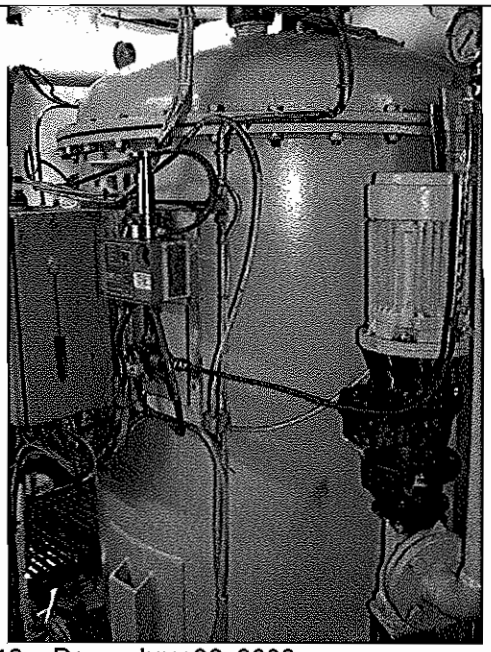

PHOTO #:16 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.: P7260019
DESCRIPTION: OILY WATER SEPARATOR

AMTEST Identification Number 08-A009613
Client Identification GOLPRIN-EFF
Sampling Date 07/26/08, 10:45

Microbiological

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Fecal Coliforms	1.	CFU/100 ml		1.	SM 9222D	NG	07/26/08 17:00

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
pH	6.95	unit			EPA 150.1	NG	07/26/08
Chlorine Residual	4.61	mg/l		0.10	EPA 330.5	AY	07/26/08
Total Suspended Solids	3.0	mg/l		1.0	SM 2540D	SL	07/29/08

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
BOD	<.10	mg/l		10.	SM 5210B	NG	07/26/08

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	38.	mg/l		0.005	EPA 350.1	TS	08/07/08

Kathy Fugiel
President

State of Washington Department of Ecology

Cruise Ship Memorandum of Understanding, Cruise Operations in Washington State Inspection Report

Northwest Regional Office
3190 160th Ave SE
Bellevue, WA 98008
Phone: (425) 649-7000 Fax: (425) 649-7098

Section A: General Information

Vessel Name:	NORWEGIAN STAR	Date:	July 26, 2008
Vessel Operator:	NCL (Bahamas) Ltd.	Entry Time:	12:40 PM
Vessel Type	Passenger Ship	Exit Time:	2:27 PM
Location:	Terminal 66, Seattle	Notification (name & date):	Randy Fiebrandt on July 22, 2008
On-board contact(s):	Davor Baletin, Environmental Officer, Joebert Orrica, Environmental Engineer		
Inspector(s):	Amy Jankowiak, Department of Ecology, Water Quality Program; Karen Burgess, Department of Ecology, Water Quality Program; and Mark Toy, Department of Health		
# passengers/crew:	~2700/~1100		

The NORWEGIAN STAR arrived on May 3, 2008 at the Port of Seattle to begin the 2008 cruise season. Scanship is a biological reactor and ultrafiltration system. The system includes prefiltration, biological treatment via a biofilm process, chemical precipitation, clarification through flotation tanks, polishing filtration and UV disinfection. Approval for continuous discharge from Ecology was granted in 2004, 2005, 2006, 2007 and May 12, 2008.

Section B: Areas Evaluated

☒	Black/Gray wastewater system	☒	Residual solids	☒	Records/Reports	☒	Hazardous Waste/Solid Waste	☒	Sampling/ Monitoring
☒	Discharge locations	☒	Operations & Maintenance	☒	Sludge Handling/ Disposal	☒	Oily bilge water	☒	Other

Section C: For vessels discharging ≥ 1nm from berth and ≥ 6 knots only [2.1.3(A)]

☐	Schematics match black/gray wastewater system	
☐	Operations as described in submitted documentation	
☐	Daily 24-hour continuous monitoring for turbidity or equivalent monitoring	
☐	Turbidimeter or equivalent monitoring equipment functioning properly	
	Turbidity or equivalent : Last calibration – Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:	
☐	Auto shut down or operational controls to insure system shut down if high turbidity occurs	
☐	Disinfection system operated and maintained properly	
	Disinfection System:	

Section D: For vessels discharging continuously [2.1.3(B)]

☒	Schematics match black/gray wastewater system	Schematics appeared to be consistent with they system on board.
☒	Operations as described in submitted documentation	Operations were as described.
☒	Daily 24-hour continuous turbidity or equivalent monitoring	Has continuous TSS monitoring.
☒	Turbidimeter or equivalent monitoring equipment functioning properly	Appears to be functioning properly.
	Turbidity or equivalent :	

	Last calibration – Calibrations are triggered by the AMOS maintenance system Trigger level for early alarm: 20 mg/l Trigger level for shutdown (recirculation): 28 mg/l switches automatically to hold and 30 mg/l to shut down. Recorded turbidity/equivalent levels above triggers: None to the best of their knowledge	
☒	Auto shut down or operational controls to insure system shut down if a high turbidity occurs	A value of 28 mg/l or greater triggers automatic shut down of that MBR.
☒	Disinfection immediately prior to discharge	Protocol: When discharging, UV occurs immediately prior to discharge.
☒	Disinfection system operated and maintained properly	The UV system appeared to be operational and maintained well.
	Disinfection System: The disinfection system consists of 3 UV units, of which two are typically used with 14 bulbs each. There are typically about 20 spare bulbs on board. In April some of the bulbs were replaced per the AMOS maintenance system. The bulbs are alarmed for bulb failure and intensity at 10 watts. At the time of the inspection, the two operating UV units were at 46 W/m2 and 54 W/m2. The UV sleeves are cleaned by dosing Metal Bright cleaner automatically.	

Section E: General (Approved to Discharge)		
☒	No discharges within ½ mile from shellfish beds/protocol (President's Point, Apple Tree Cove, Tyee Shoal)	There is a clear protocol in place to discharge until close to area where shellfish beds are located and then to begin discharging when at Port and the same on the way out. This way they keep discharges completely out of the are of ½ mile from shellfish beds.
☒	Discharges immediately stopped when high turbidity occurs	They do have their systems set up to automatically shut down the discharge if high TSS (equivalent to turbidity) occurs.
☒	Immediate notifications made to Health for disinfection system upset	There are notification numbers posted and a copy of the current MOU was on board. A new notification list included DOH numbers is also posted.
☒	Sampling conducted 2/month, 1/month in Seattle (BOD, TSS, fecal coliform, pH, chlorine residual)	Sampling is being conducted as required, as of the date of the inspection.
☒	Whole Effluent Toxicity Testing 1 per 2 years (homeported) or once/40 calls for continuous	Wet testing is being scheduled for this season.
☒	Discharges immediately stopped when GI >2% passengers or crew	The new requirements were well known and the Health numbers will also be supplied to the medical staff.
☒	Immediate notifications to Health for GI>2% passengers or crew	The new requirements were well known and the Health numbers will also be supplied to the medical staff.

Section F: General		
☒	Discharge records review	Discharge records were reviewed (blackwater/graywater/residual solids) and are maintained properly.
☒	Residual solids managed properly/ disposal protocol per MOU	Residual solids are held to be discharged at greater than 12 nautical miles and outside of MOU waters and the Olympic Coast National Marine Sanctuary.
☒	Hazardous Waste managed properly	All hazardous waste that is collected is being sent off-shore in Victoria, Canada. Records were reviewed for hazardous waste discharges.
☒	WA Haz Waste guidelines followed (appendix vii)	All hazardous waste that is collected is being sent off-shore in Victoria, Canada. Records were reviewed for hazardous waste discharges.
☒	Solid Waste managed properly	Solid waste is being managed properly. The various solid waste streams are collected, sorted, stored, and sent ashore or incinerated as appropriate.
☒	Oily bilge water managed properly	Oily bilge water is treated and discharged at less than 15 ppm and outside of MOU waters.
Other:		

Health = Washington State Department of Health

Section G: Sample Results

Parameter	Results
Biochemical Oxygen Demand 5-Day (BOD)	<10 mg/l
Total Suspended Solids (TSS)	10 mg/l
Fecal Coliform	390 CFU/100 ml
Residual Chlorine	0.76 mg/l
pH	7.30 unit
Ammonia, Nitrogen	75 mg/l

Section H: Summary of Findings/Comments

Introduction

Amy Jankowiak, Washington State Department of Ecology (Ecology) Northwest Regional Office, Water Quality Program (NWRO-WQ) along with Karen Burgess, Ecology, NWRO-WQ, and Mark Toy, Washington State Department of Health, Office of Shellfish and Water Protection conducted the inspection of the Norwegian Cruise Line NORWEGIAN STAR on July 26, 2008. The main contacts on board the NORWEGIAN STAR included Davor Baletin, Environmental Officer; and Joebert Orrica, Environmental Engineer. Prior notification of the visit was given on July 22, 2008 for security protocol. The purpose of the inspection was to evaluate compliance with the *Memorandum of Understanding Cruise Operations in Washington State* (MOU), as amended. A copy of the current MOU was on-board. The NORWEGIAN STAR received approval to discharge continuously on May 12, 2008.

The NORWEGIAN STAR was built in 2001, is 965 feet long with 15 guest decks, with about a 28-foot draft. There are typically about 2700 passengers and 1100 crew. It is my understanding that the ship's wastewater system, Scanship, was installed in 2004.

Inspection

We arrived and boarded the ship at about 12:40 pm and began with introductions and a plan for the day with Davor Baletin, Environmental Officer. We then headed to the Engine Control Room (ECR) area and discussed various waste streams, and the discharge protocols. Discharge records were reviewed for blackwater and graywater discharges and later for hazardous waste off-loads. We then discussed the blackwater and graywater system in detail. Next, we viewed the garbage sorting area and hazardous waste storage. We then toured the Hamworthy system and took samples. The inspection was then finalized and we disembarked the vessel at about 2:27 pm.

Discharge Types and Protocols:

If a discharge is allowed, the Bridge authorizes any discharge. The bridge contacts the Environmental Officer who has the key to unlock the discharge ports. The Chief Engineer and the Captain are the only other ones with a key. The latitude and longitude coordinates are recorded in the *Sewage and Graywater Discharge Record Book* and in the deck log. The date, time and location of both the start and the stop of the discharges are recorded, along with port location, effluent type, and volumes. All discharge records that were reviewed appeared to be in compliance with the MOU.

Blackwater, which includes toilet waste and infirmary drains and graywater which includes sink and shower and laundry water is treated with a Scanship advanced wastewater treatment system (photo #10) and is discharged continuously with the exception of the area near shellfish beds. There is a clear protocol in place to discharge until close to area where shellfish beds are located and then to begin discharging when at Port and the same on the way out. This way they keep discharges completely out of the area of ½ mile from shellfish beds. When there is a GI outbreak of more than 2% of total persons on board, discharges are stopped and notifications made.

Screenings and grit from drum screen and well as biomass (sewage sludge) from the Scanship system is held and then discharged outside of MOU waters, >12 nautical miles from shore, and outside of the Olympic Coast National Marine Sanctuary.

Pool and spa water is discharged outside of 12 nautical miles. Ballast water is only exchanged during repositioning cruises to and from Los Angeles, CA and occurs outside of 50 miles.

Food waste is collected in various locations, is sent through a pulper (photo #05). The water is recirculated and eventually held and discharged outside of 4 nautical miles. Pulped solid waste is discharged outside of 4 nautical miles, and non-pulped waste is discharged outside of 12 nautical miles. Grease, or cooking oil is collected (photo #07) sent to the sludge tank for discharge outside of MOU waters (approximately 100 liters per day).

Oily bilge water is sent to a dirty bilge tank and then onto the Marinfloc for separating oil. Liquid from the Marinfloc goes to the Clean bilge tank and onto the oily water separator. From the oily water separator, the oil content is again measured in the locked "white box". If the parts per million exceed 15, there the discharge valve closes and sends the waste either to the clean bilge tank where it then again goes through the oily water separator or it can be sent all the way back to the dirty bilge tank. Residue and oily sludge is off-loaded in Prince Rupert.

Potable water that is bunkered is sampled after chlorination (pH, chlorine, coliform...). After chlorination, water is sent to a potable only tank. Water is also produced by desalination using a reverse osmosis system. Three evaporators are used that are run by engine heat. The reverse osmosis water for general use is chlorinated at least 2 ppm and is sent to a tank designated for consumption. At the farthest point, the chlorine residual is to be between 0.2 ppm and 5 ppm. The salt that is collected through the production process is sent back to the salt water. A descaler chemical is used on the evaporators and

is adjusted for pH before discharge at Sea.

Dry cleaning uses PERC which is off-loaded as hazardous waste in Prince Rupert. Silver is captured from the photo waste, treated to less than 5 ppm and is off-loaded as non-hazardous waste. Some of the X-ray waste is hazardous and off-loaded as such, while some is non-hazardous and off-loaded as such. Other hazardous wastes include batteries, paints, carbon filters, aerosols (punctured), and sharps. Fluorescent bulbs are crushed with a system that removes mercury (photo #04) by filter which is sent off as hazardous waste. Medical, red bag waste is typically incinerated or can be off-loaded as bio-medical waste. All hazardous waste (photo #09) is off-loaded in Prince Rupert. Narcotics are logged and incinerated. Unexpired pharmaceuticals are returned to the vendor. Expired medications are landed as non-hazardous waste, although some P-listed may be landed as hazardous. Other materials incinerated include paper, cardboard, oily rags and some burnable plastics.

Plastics, garbage, and other materials are collected and sorted on a sorting table. Crew do their own sorting of their own wastes (photo #06). Most materials are then condensed and recycled on-shore. Glass (photo #01), aluminum, tin, scrap metal and plastics, and some cardboard (photo #02) are all recycled along with other materials. Some materials are donated such as mattresses.

Black water and Gray water System:
Blackwater, which includes toilet waste and infirmary drains toes to one of 4 collection tanks and graywater which includes sink and shower and laundry water combines in tanks before combining and entering the drum screens. There are two drum screens (photo #11) which provide pre-screening. Solids from the drum screens go to the sludge tank. Liquid flow from the drum screens then enters the biostep tanks (photo #12) for biological treatment (biofilm on rotating plastic pieces – 2 tanks in series, air added). After biostep, flocculants and polymers (photo #08) are added. Clarification then occurs via flotation tanks (photos #13 and #14). The flotation tanks are cleaned by manual spray about once a week. Solids from the flotation tanks are sent to the sludge tank along with the screenings to be held for later discharge. Liquid flow then moves to the polishing filters (photos #15, #16, and #17) for ultrafiltration (2 rotating mesh drums), and then to ultraviolet disinfection. The polishing filters are cleaned about once a day. Flow then moves to ultraviolet light (UV) disinfection (photos #18 and #20). There are three UV units, of which two are typically used with 14 bulbs each. There are typically about 20 spare bulbs on board. In April some of the bulbs were replaced per the AMOS maintenance system. The bulbs are alarmed for bulb failure and intensity at 10 watts. At the time of the inspection, the two operating UV units were at 46 W/m2 and 54 W/m2. The UV sleeves are cleaned by dosing Metal Bright cleaner automatically. Flow from the UV units is either discharged directly overboard via the discharge port (photo #19) or is held for discharge later outside of MOU waters.

The cruise line uses a system called AMOS for work orders and maintenance. Manufacturer recommendations for maintenance of each piece of equipment is included in the AMOS system which triggers staff when maintenance is required. Scanship also monitors maintenance on the system. Any needed calibrations, cleaning, and other needed maintenance would be included in AMOS. Total suspended solids (TSS) (equivalent to turbidity) is monitored continuously at UV disinfection. If TSS exceed 20 mg/l, the system alarms and staff responds to investigate. At 28 mg/l, the system alarms and switches automatically to hold that discharge. At 30 mg/l, the effluent from the system is shut down. PH is also monitored for adjustments.

Samples were taken for Biochemical Oxygen Demand (BOD 5-Day), Total Suspended Solids (TSS), pH, chlorine residual, fecal coliform and ammonia from the combined effluent of the Scanship system after UV disinfection. The sample port was disinfected by heat prior to pulling samples (photo #21). The samples were put on ice immediately and were transported to AmTest laboratory in Redmond, Washington that afternoon. Chain of Custody and sampling procedures were followed. All results are in Section F. The results are typical of the results submitted to Ecology thus far for 2008 with the exception of fecal coliform and ammonia. Both the fecal and ammonia were higher with Ecology's testing than they have been for the other results submitted to date.

Conclusions and Recommendations

The protocols for discharging away from the shellfish beds was very clear.

It is recommended that staff continue to work towards a high functioning wastewater treatment system.

Attachments:
Photographs
Laboratory Report

Copies to:
Randy Fiebrandt, NCL
Davor Baletin, NCL

Amy Jankowiak, Ecology
Karen Burgess, Ecology
Mark Toy, Health
Kevin Fitzpatrick, Ecology
Central Files: Norwegian Cruise Line – NORWEGIAN STAR; WQ 6.1

Section I: Signatures		
Name and Signature of Inspector Amy Jankowiak Amy Jankowiak	Agency/Office/Telephone Department of Ecology/Northwest Regional Office/Water Quality Program/Municipal Compliance Specialist/(425) 649-7195	Date 8/14/08
Name and Signature of Reviewer Karen Burgess Karen Burgess	Agency/Office/Telephone Department of Ecology/Northwest Regional Office/Water Quality Section Manager/(425) 649-7207	Date 8/15/08
Name and Signature of Reviewer Kevin C. Fitzpatrick Karen Burgess for	Agency/Office/Telephone Department of Ecology/Northwest Regional Office/Water Quality Section Manager/(425) 649-7033	Date 8/15/08

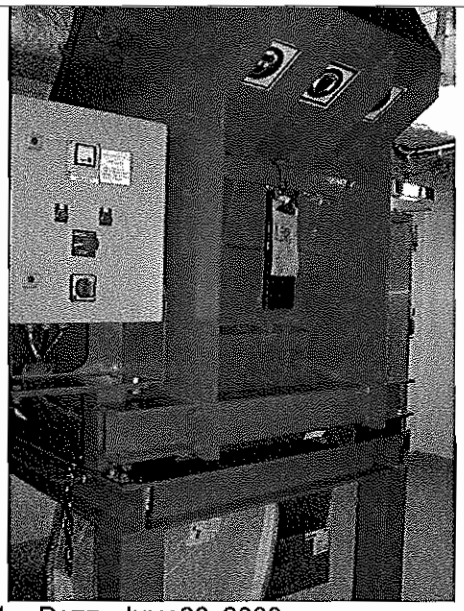

PHOTO #:01 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.:P7260021
DESCRIPTION: GLASS CRUSHER

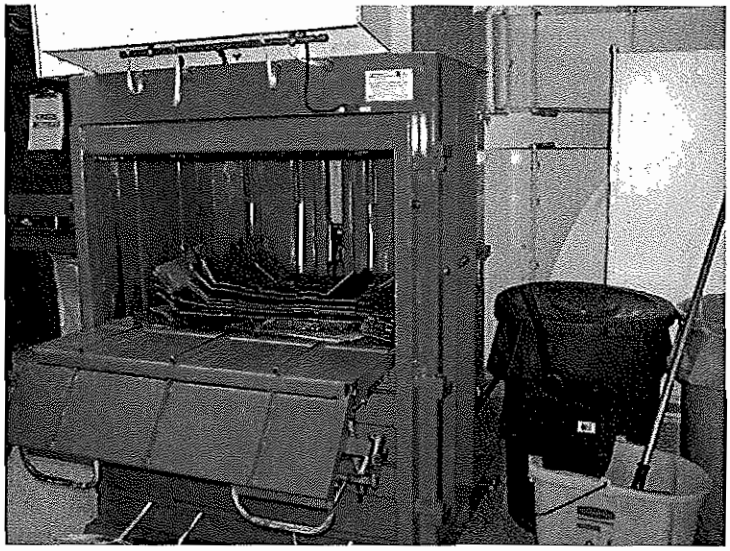

PHOTO #:02 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.: P7260022
DESCRIPTION: CARDBOARD CRUSHER

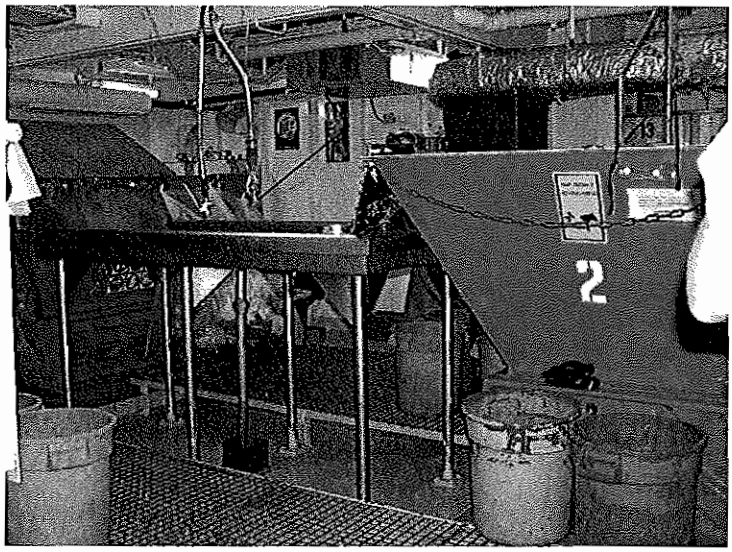

PHOTO #:03 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.: P7260023
DESCRIPTION: SORTING AREA TO INCINERATORS

PHOTO #:04 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.: P7260025
DESCRIPTION: FLUORESCENT BULB CRUSHER/MERCURY REMOVAL SYSTEM

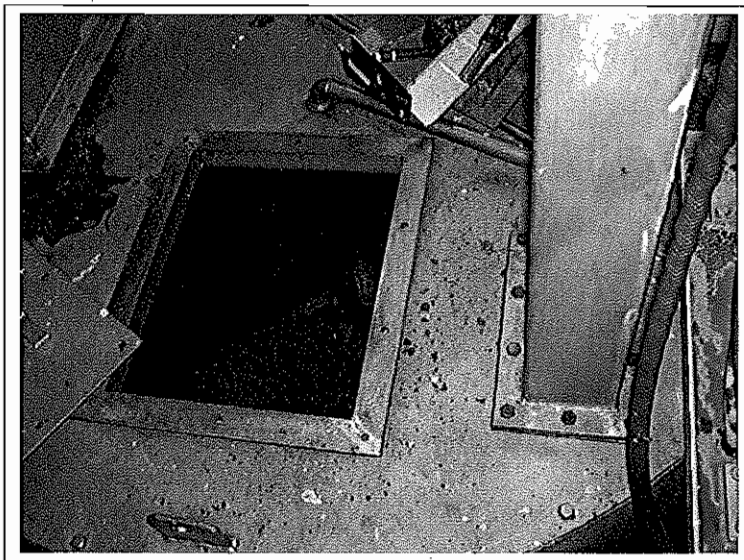

PHOTO #:05 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.:P7260026
DESCRIPTION: FOOD PULPER (1 OF 2)

PHOTO #:06 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.: P7260028
DESCRIPTION: CREW WASTE SORTING AREA

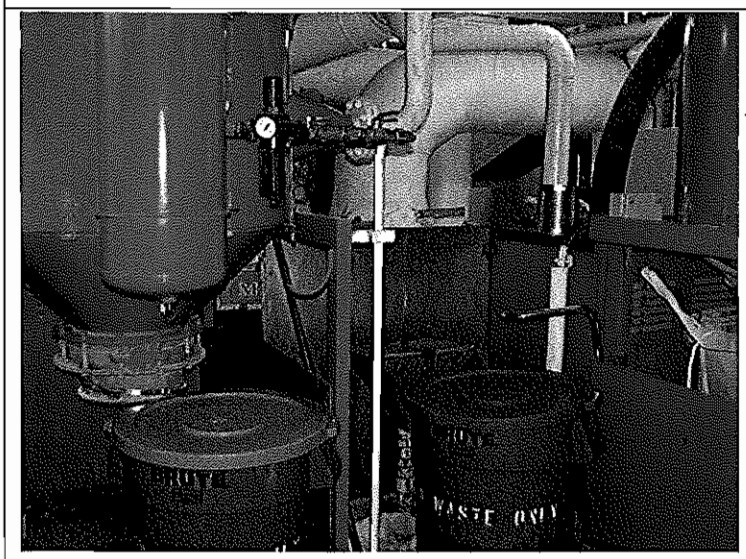

PHOTO #:07 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.: P7260029
DESCRIPTION: GREASE/COOKING OIL STORAGE

PHOTO #:08 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.: P7260030
DESCRIPTION: POLYMER (FOR SCANSHIP SYSTEM) STORAGE

PHOTO #:09 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.:P7260031
DESCRIPTION: HAZARDOUS WASTE STORAGE

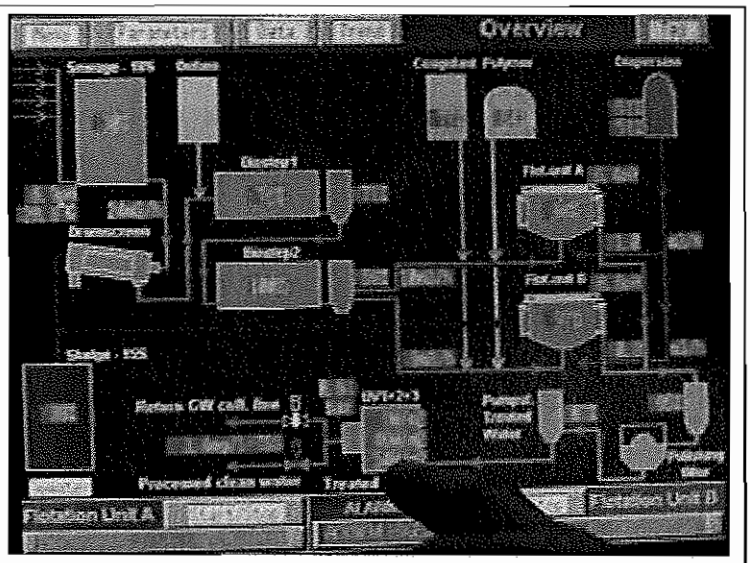

PHOTO #:10 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.: P7260020
DESCRIPTION: SCANSHIP SYSTEM SCREEN IN ECR

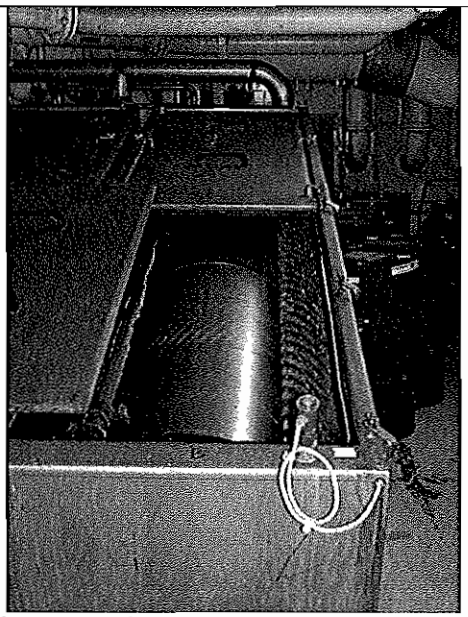

PHOTO #:11 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.: P7260032
DESCRIPTION: DRUMSCREENS

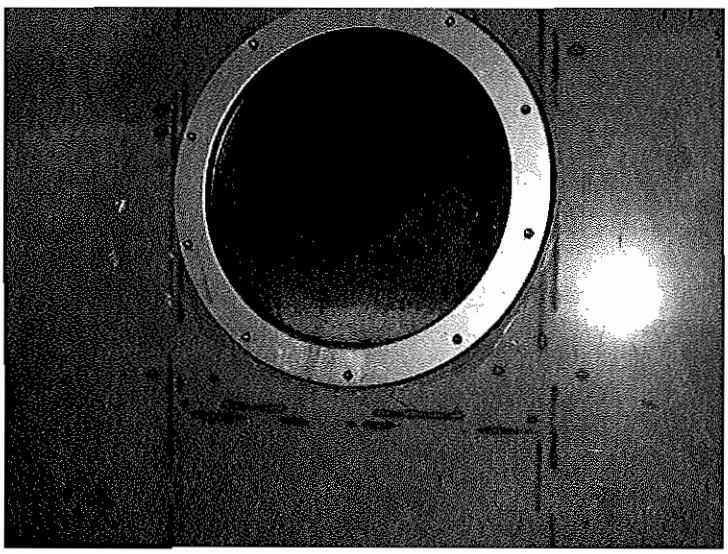

PHOTO #:12 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.: P7260034
DESCRIPTION: BIOSTEP TANK (1 OF 2)

PHOTO #:13 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.:P7260035
DESCRIPTION: FLOTATION TANKS

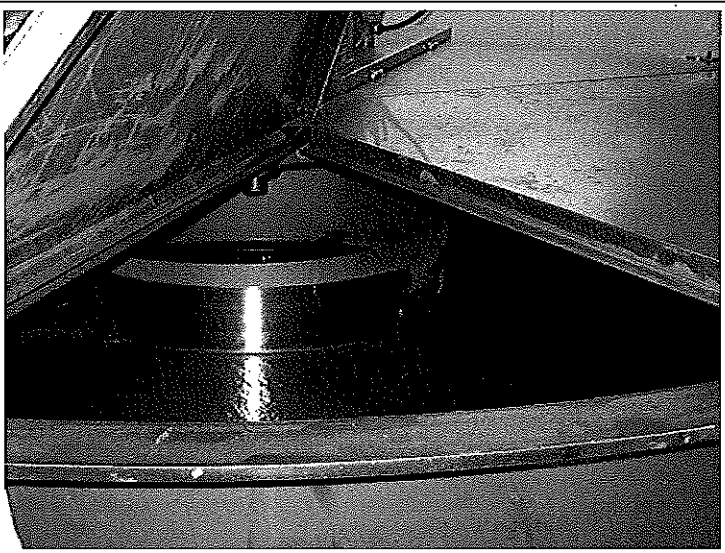

PHOTO #:14 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.: P7260036
DESCRIPTION: INSIDE OF ONE OF THE FLOTATION TANKS

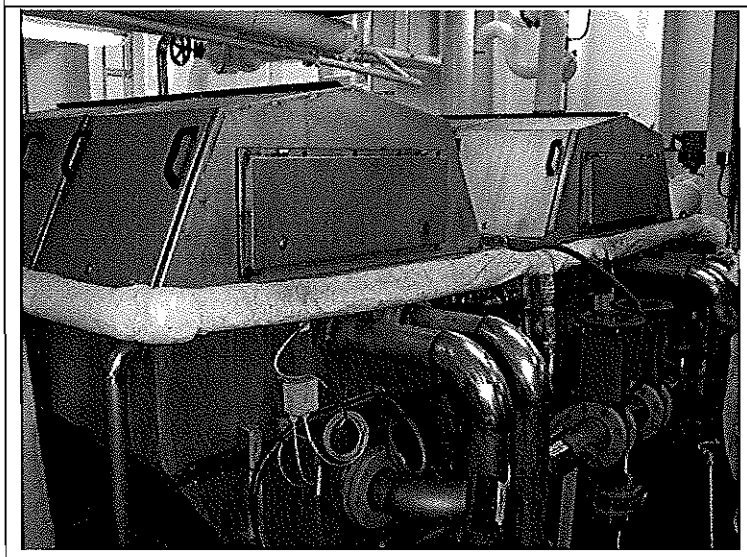

PHOTO #:15 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.: P7260037
DESCRIPTION: POLISHING FILTERS

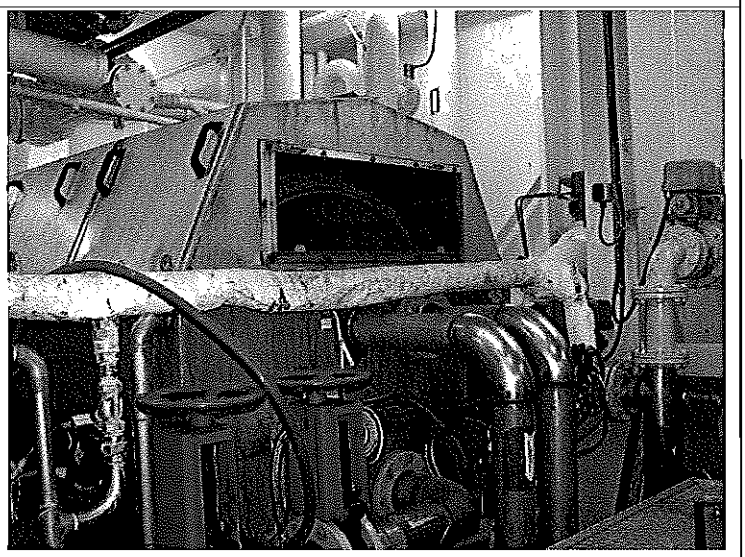

PHOTO #:16 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.: P7260038
DESCRIPTION: POLISHING FILTERS

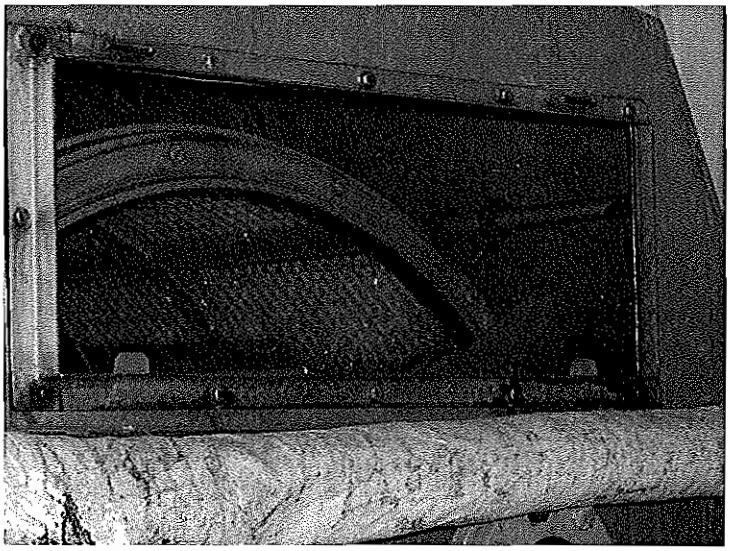

PHOTO #:17 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.:P7260039
DESCRIPTION: INSIDE OF ONE OF THE POLISHING FILTERS

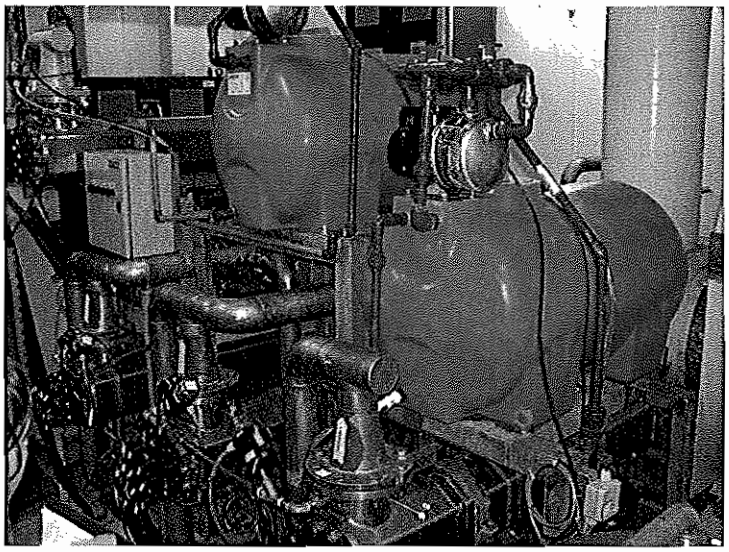

PHOTO #:18 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.: P7260040
DESCRIPTION: ULTRAVIOLET (UV) LIGHT DISINFECTION SYSTEM

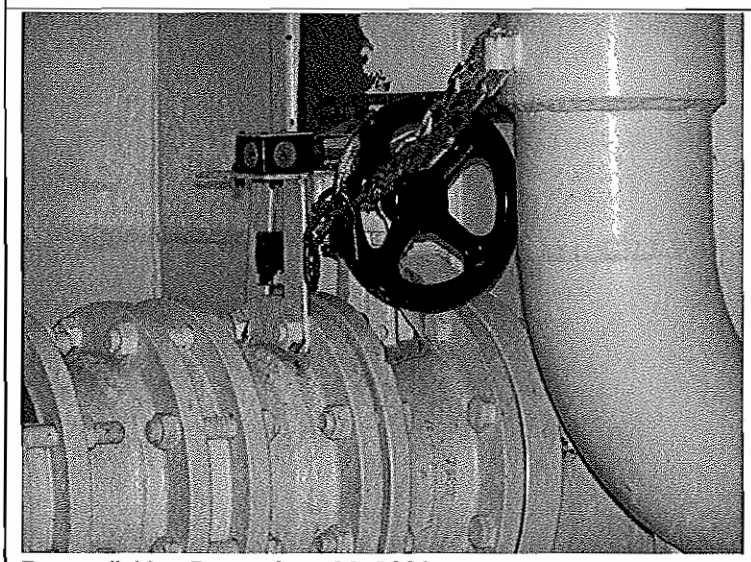

PHOTO #:19 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.: P7260041
DESCRIPTION: DISCHARGE PORT (WITH LOCK)

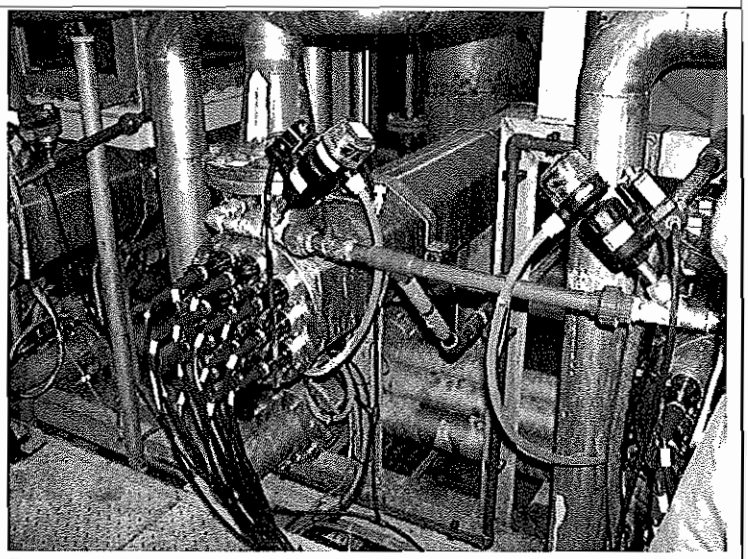

PHOTO #:20 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.: P7260042
DESCRIPTION: UV DISINFECTION SYSTEM

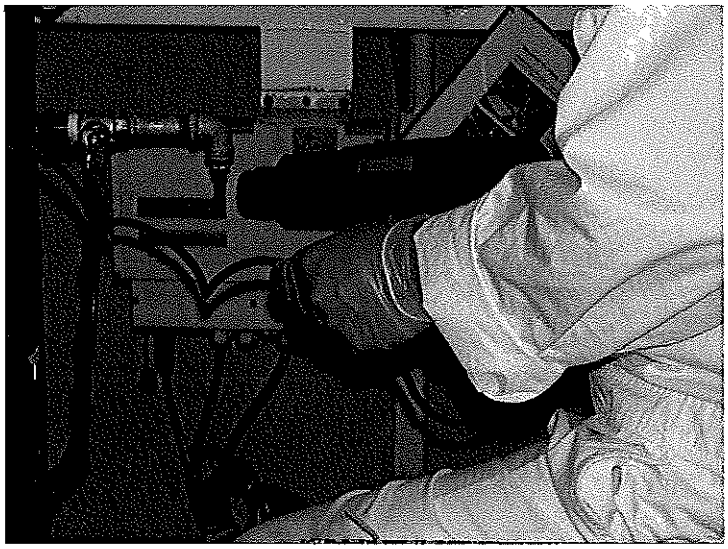

PHOTO #:21 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE NO.:P7260043
DESCRIPTION: SAMPLE PORT (AFTER UV)

Am Test Inc.
14603 N.E. 87th St.
Redmond, WA 98052
(425) 885-1664
www.amtestlab.com

AMTEST LABORATORIES

Professional Analytical Services

ANALYSIS REPORT

DEPARTMENT OF ECOLOGY
3190 160TH AVE SE
BELLEVUE, WA 98008
Attention: AMY JANKOWIAK
Project Name: NOWEGIAN STAR
All results reported on an as received basis.

Date Received: 07/26/08
Date Reported: 8/12/08

AMTEST Identification Number 08-A009612
Client Identification NORSTAR-EFF
Sampling Date 07/26/08, 14:09

Microbiological

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Fecal Coliforms	390.	CFU/100 ml		1.	SM 9222D	NG	07/26/08 17:00

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
pH	7.30	unit			EPA 150.1	NG	07/26/08
Chlorine Residual	0.76	mg/l		0.10	EPA 330.5	AY	07/26/08
Total Suspended Solids	10.	mg/l		1.0	SM 2540D	SL	07/29/08

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
BOD	< 10	mg/l		10.	SM 5210B	NG	07/26/08

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	75.	mg/l		0.005	EPA 350.1	TS	08/07/08

State of Washington Department of Ecology

Cruise Ship Memorandum of Understanding, Cruise Operations in Washington State Inspection Report

Northwest Regional Office
3190 160th Ave SE
Bellevue, WA 98008
Phone: (425) 649-7000 Fax: (425) 649-7098

Section A: General Information

Vessel Name:	AMSTERDAM	Date:	August 22, 2008
Vessel Operator:	Holland America Line	Entry Time:	9:35 AM
Vessel Type	Passenger Ship	Exit Time:	11:02 AM
Location:	Pier 30, Seattle	Notification (name & date):	Jon Turvey, Bill Morani; Bob Diaz; August 19, 2008
On-board contact(s):	Robert Vos, Environmental Officer; Dan Grabb, Manager ECP Audit/Support, HAL		
Inspector(s):	Amy Jankowiak, Department of Ecology, Water Quality Program; Marietta Sharp, Department of Ecology Solid Waste Program		
# passengers/crew:	1400/650		

The AMSTERDAM arrived on May 16th, 2008 at the Port of Seattle to begin the 2008 cruise season. The ship does not have an advanced wastewater treatment system. A traditional marine sanitation device is used for blackwater. All discharges are being held and then discharged outside of MOU waters.

Section B: Areas Evaluated

☒	Black/Gray wastewater system	☒	Residual solids	☒	Records/Reports	☒	Hazardous Waste/Solid Waste	☐	Sampling/ Monitoring
☒	Discharge locations	☒	Operations & Maintenance	☒	Sludge Handling/ Disposal	☒	Oily bilge water	☒	Other

Section C: For vessels discharging ≥ 1nm from berth and ≥ 6 knots only [2.1.3(A)]

☐	Schematics match black/gray wastewater system	Not Applicable
☐	Operations as described in submitted documentation	Not Applicable
☐	Daily 24-hour continuous monitoring for turbidity or equivalent monitoring	Not Applicable
☐	Turbidimeter or equivalent monitoring equipment functioning properly	Not Applicable
	Turbidity or equivalent : Not Applicable Last calibration – Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:	
☐	Auto shut down or operational controls to insure system shut down if high turbidity occurs	Not Applicable
☐	Disinfection system operated and maintained properly	Not Applicable
	Disinfection System:	

Section D: For vessels discharging continuously [2.1.3(B)]

☐	Schematics match black/gray wastewater system	Not Applicable
☐	Operations as described in submitted documentation	Not Applicable
☐	Daily 24-hour continuous turbidity or equivalent monitoring	Not Applicable
☐	Turbidimeter or equivalent monitoring equipment functioning properly	Not Applicable
	Turbidity or equivalent :	

	Last calibration Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:	
☐	Auto shut down or operational controls to insure system shut down if a high turbidity occurs	Not Applicable
☐	Disinfection immediately prior to discharge	Not Applicable
☐	Disinfection system operated and maintained properly	Not Applicable
	Disinfection System:	

Section E: General (Approved to Discharge)		
☐	No discharges within ½ mile from shellfish beds/protocol (President's Point, Apple Tree Cove, Tyee Shoal)	Not applicable
☐	Discharges immediately stopped when high turbidity occurs	Not applicable
☐	Immediate notifications made to Health for disinfection system upset	Not applicable
☐	Sampling conducted 2/month, 1/month in Seattle (BOD, TSS, fecal coliform, pH, chlorine residual)	Not applicable
☐	Whole Effluent Toxicity Testing 1 per 2 years (homeported) or once/40 calls for continuous	Not applicable
☐	Discharges immediately stopped when GI >2% passengers or crew	Not applicable
☐	Immediate notifications to Health for GI>2% passengers or crew	Not applicable

Section F: General		
☒	Discharge records review	Discharge records were reviewed (blackwater/graywater/residual solids) and are maintained properly. No discharges in MOU waters were present from the date of last year's inspection to present (vessel last inspection was August 17, 2007).
☒	Residual solids managed properly/ disposal protocol per MOU	Screened solids are collected and sent to shore in Victoria. Biomass from the bottom of the MSD is collected and discharged outside of MOU waters, at greater than 12 nautical miles and outside of the Olympic Coast National Marine Sanctuary.
☒	Hazardous Waste managed properly	All hazardous waste that is collected is being sent off-shore in Victoria, Canada. Records were reviewed for hazardous waste off-loads.
☒	WA Haz Waste guidelines followed (appendix vii)	All hazardous waste that is collected is being sent off-shore in Victoria, Canada. Records were reviewed for hazardous waste off-loads.
☒	Solid Waste managed properly	Solid waste is being managed properly. The various solid waste streams are collected, sorted, stored, and sent ashore or incinerated as appropriate.
☒	Oily bilge water managed properly	Oily bilge water is treated and discharged at less than 15 ppm and outside of MOU waters.
Other:		

Health = Washington State Department of Health

Section G: Sample Results	
Parameter	Results
Biochemical Oxygen Demand 5-Day (BOD)	Not Applicable
Total Suspended Solids (TSS)	Not Applicable
Fecal Coliform	Not Applicable
Residual Chlorine	Not Applicable
pH	Not Applicable
Ammonia, Nitrogen	Not Applicable

Section H: Summary of Findings/Comments

Introduction

Amy Jankowiak, Washington State Department of Ecology (Ecology) Northwest Regional Office, Water Quality Program and Marietta Sharp, Ecology, Solid Waste Program (biosolids), conducted the inspection of the Holland America Line (HAL) AMSTERDAM on August 22, 2008. The main contacts on board the AMSTERDAM included Robert Vos, Environmental Officer, and Dan Grabb, HAL. Prior notification of the visit was given on August 19, 2008 for security protocol. The purpose of the inspection was to evaluate compliance with the *Memorandum of Understanding Cruise Operations in Washington State* (MOU), as amended. The AMSTERDAM is currently not approved for and is not discharging black or graywater into MOU waters.

The HOLLAND AMSTERDAM was delivered in 2000, and is 780 feet long with about a 26-foot draft. There passenger capacity is about 1400 and the crew capacity is about 650. The vessel is powered with on-shore power during port calls in Seattle.

Inspection

We arrived and boarded the ship at about 9:35 am and began with introductions and a plan for the day with the Robert Vos, the Environmental Officer and Dan Grabb with Holland America Line. We then discussed various waste streams, and the discharge protocols. We went to the Deck to view the maps depicting discharge locations. Discharge records were reviewed for blackwater and graywater discharges, hazardous waste off-loads, oil and garbage. We then viewed and discussed the black water treatment system. We toured the garbage and recycling area and the dry cleaning. The inspection was then finalized and we disembarked the vessel at about 11:02 am.

Discharge Types and Protocols:

All discharges to water occur at greater than 12 nautical miles (nm) and outside of MOU waters. No discharges occur in the Olympic Coast National Marine Sanctuary (OCNMS). Only upon verification of location between the Bridge and the Engine Control Room (ECR), will a discharge occur at greater than 12 nm and outside of MOU waters. If a discharge is allowed, the Bridge authorizes any discharge. The latitude and longitude coordinates are recorded in the *Sewage and Graywater Discharge Record Book* and in the deck log. On the deck, a map shows the area where discharges may occur which is outside of MOU waters, outside of 12 nm from shore, and outside of the OCNMS. Discharges also do not occur in Canadian waters. The discharge ports have a lock on them, and only when permission is granted by the bridge, will staff unlock the discharge ports.

The date, time and location of both the start and the stop of the discharges are recorded, along with port location, effluent type, volumes, and speed. All discharge records that were reviewed appeared to be in compliance with the MOU. Records were reviewed from the time of the last inspection of August 17, 2007 to present.

Blackwater, which includes toilet waste and infirmary drains, is treated with a Hamworthy marine sanitation device (MSD) and is then discharged outside of MOU waters. Graywater, which includes galley wastewater and laundry water is collected and roughly filtered then liquid is held without further treatment to be discharged outside of MOU waters.

Screening solids collected during prefiltration of the MSD and from the rough filter on graywater are collected and off-loaded in Victoria. The solids collected at the bottom of the MSD, known by the cruise lines as "biomass" is collected into a tank and then discharged outside of MOU waters, >12 nm from shore, and outside of the Olympic Coast National Marine Sanctuary.

Oily bilge water is sent to the 50 ppm oily water separator (FACET), then to the intermediate tank and then to the 15 ppm oily water separator (SEREP). The effluent that meets 15 ppm is either discharged at greater than 12 nm and outside of MOU waters or is sent to a clean tank and later discharged. All effluent first goes through the "white box" prior to discharge.

Food waste is collected in various bins. Water is then extracted from the food. The liquid food waste is sent to the graywater tanks. The solid food is discharged through a chute a couple of times a week. Grease is collected separately and off-loaded to shore, often for biodiesel use in Victoria.

Laundry water is sent to the graywater tanks. Dry cleaning has been switched from a system using Perchloroethylene (PERC) to an organic oil based system (like banana oil).

Pool and spa water is discharged outside of MOU waters.

Potable water is bunkered now and then, while the rest is produced by desalination. Steam from the engines heat up the sea water. A boiler is also used. The condensate is then chlorinated and adjusted for pH prior to distribution. Salt collected from the evaporators is sent back to the sea. Scaling is treated with acid and is then neutralized prior to discharge at sea.

Drains from the infirmary are sent to the blackwater MSD. X-ray's are done digitally, and therefore there is no x-ray waste. Medical waste that is not hazardous is collected in white bags and incinerated. Red bags are used for material containing bodily fluids, and along with sharps are collected and sent to shore with hazardous waste. Medications that are expired or not used are sent back to the manufacturer. Narcotics are sent to the MSD with witnesses.

Silver is captured from the photo waste, collected and off-loaded as non-hazardous waste in Victoria. Digital photos are used primarily. All hazardous wastes to shore are off-loaded in Victoria about once a month.

Paint waste, electronics, and flares or pyrotechnics are also off-loaded with hazardous waste in Victoria.

Plastics, garbage, and other materials are collected and sorted into various color-coded cans and sorted on a sorting table (crew now sorts their own wastes). The materials are then condensed and recycled on-shore. The oily rags, food-contaminated wood pallets and food-contaminated cardboard is incinerated. Cardboard is collected and off-loaded for recycling. Glass is shredded to a small size and then discharged outside of MOU waters and outside 12 nm. Aluminum, tin, paper, batteries and plastics are all recycled along with other materials. The amount of materials collected and recycled is maximized in order to minimize the amount of materials incinerated or land filled. Fluorescent light bulbs are collected and crushed in a system that collects the mercury vapors. The material is then off-loaded with hazardous waste.

Holland America Line is ISO 14001 Certified. The AMSTERDAM is equipped for shore power in Seattle and was connected during the inspection.

Blackwater System:

There are four (4) marine sanitation devices (MSD) on board to treat blackwater. Blackwater consists of toilet waste and infirmary drains. All of the MSDs are used at the same time except for cleaning. When cleaning an MSD, the tanks are emptied and discharged overboard outside of MOU waters. Blackwater is collected by vacuum and then goes through pre-filtration. The solids are collected and sent ashore in Victoria. The liquid flow then enters the MSD tank for aeration and baffles through the large tank to a final area where chlorine (sodium hypochlorite) is added.

Sampling is not required per the MOU when not approved and not discharging. No samples were taken by Ecology.

Conclusions and Recommendations

Staff seemed very knowledgeable of the protocols and records were very orderly.

The efforts made towards waste minimization and energy conservation are impressive.

It is recommended that staff continue to work towards high functioning treatment systems.

Copies to:
Dan Grabb, HAL
William Morani, Jr., HAL
Bob Diaz, HAL
John Turvey, HAL
Tina Stoltz, HAL
Robert Vos, Environmental Officer
Amy Jankowiak, Ecology
Mark Toy, Health
Kevin Fitzpatrick, Ecology
Central Files: Holland America Line – HOLLAND AMSTERDAM; WQ 6.1

Section I: Signatures

Name and Signature of Inspector	Agency/Office/Telephone	Date
Amy Jankowiak Amy Jankowiak	Department of Ecology/Northwest Regional Office/Water Quality Program/Municipal Compliance Specialist/(425) 649-7195	9/29/08
Name and Signature of Reviewer	**Agency/Office/Telephone**	**Date**
Kevin C. Fitzpatrick Kevin C. Fitzpatrick	Department of Ecology/Northwest Regional Office/Water Quality Section Manager/(425) 649-7033	9/29/08

State of Washington Department of Ecology

Cruise Ship Memorandum of Understanding, Cruise Operations in Washington State Inspection Report

Northwest Regional Office
3190 160th Ave SE
Bellevue, WA 98008
Phone: (425) 649-7000 Fax: (425) 649-7098

Section A: General Information

Vessel Name:	RHAPSODY OF THE SEAS	Date:	August 29, 2008
Vessel Operator:	Royal Caribbean International	Entry Time:	9:35 AM
Vessel Type	Passenger Ship	Exit Time:	11:01 AM
Location:	Pier 30, Seattle	Notification (name & date):	Rich Pruitt; August 25, 2008
On-board contact(s):	Geoff Gibbs, Environmental Officer; Nikolay Kolev, 2nd Environmental		
Inspector(s):	Amy Jankowiak, Department of Ecology, Water Quality Program; Marietta Sharp, Department of Ecology, Solid Waste Program		
# passengers/crew:	~2435/~946		

The RHAPSODY OF THE SEAS arrived on May 23rd, 2008 at the Port of Seattle to begin the 2008 cruise season. They currently have a traditional marine sanitation device for blackwater that includes screening, aeration and chlorination. Graywater is coarsely screened. Approval for continuous discharge from Ecology has not been requested nor issued. The vessel has been holding effluent and not discharging in MOU waters since the beginning of the season.

Section B: Areas Evaluated

☒	Black/Gray wastewater system	☒	Residual solids	☒	Records/Reports	☒	Hazardous Waste/Solid Waste	☐	Sampling/ Monitoring
☒	Discharge locations	☒	Operations & Maintenance	☒	Sludge Handling/ Disposal	☒	Oily bilge water	☒	Other

Section C: For vessels discharging ≥ 1nm from berth and ≥ 6 knots only [2.1.3(A)]

☐	Schematics match black/gray wastewater system	Not Applicable
☐	Operations as described in submitted documentation	Not Applicable
☐	Daily 24-hour continuous monitoring for turbidity or equivalent monitoring	Not Applicable
☐	Turbidimeter or equivalent monitoring equipment functioning properly	Not Applicable
	Turbidity or equivalent : Not Applicable Last calibration – Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:	
☐	Auto shut down or operational controls to insure system shut down if high turbidity occurs	Not Applicable
☐	Disinfection system operated and maintained properly	Not Applicable
	Disinfection System:	

Section D: For vessels discharging continuously [2.1.3(B)]

☐	Schematics match black/gray wastewater system	Not Applicable
☐	Operations as described in submitted documentation	Not Applicable
☐	Daily 24-hour continuous turbidity or equivalent monitoring	Not Applicable
☐	Turbidimeter or equivalent monitoring equipment functioning properly	Not Applicable
	Turbidity or equivalent : Not Applicable	

	Last calibration – Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:	
☐	Auto shut down or operational controls to insure system shut down if a high turbidity occurs	Not Applicable
☐	Disinfection immediately prior to discharge	Not Applicable
☐	Disinfection system operated and maintained properly	Not Applicable
	Disinfection System:	

Section E: General (Approved to Discharge)		
☐	No discharges within ½ mile from shellfish beds/protocol (President's Point, Apple Tree Cove, Tyee Shoal)	Not Applicable
☐	Discharges immediately stopped when high turbidity occurs	Not Applicable
☐	Immediate notifications made to Health for disinfection system upset	Not Applicable
☐	Sampling conducted 2/month, 1/month in Seattle (BOD, TSS, fecal coliform, pH, chlorine residual)	Not Applicable
☐	Whole Effluent Toxicity Testing 1 per 2 years (homeported) or once/40 calls for continuous	Not Applicable
☐	Discharges immediately stopped when GI >2% passengers or crew	Not Applicable
☐	Immediate notifications to Health for GI>2% passengers or crew	Not Applicable

Section F: General		
☒	Discharge records review	Discharge records were reviewed (blackwater/graywater/residual solids) and are maintained properly. No discharges in MOU waters were present from the beginning of the 2008 cruise season to present.
☒	Residual solids managed properly/ disposal protocol per MOU	Residual solids are collected into drums for off-loading in Canada.
☒	Hazardous Waste managed properly	Hazardous waste has not been off-loaded yet this season and is collected and stored on-board.
☒	WA Haz Waste guidelines followed (appendix vii)	Hazardous waste has not been off-loaded yet this season and is collected and stored on-board.
☒	Solid Waste managed properly	Solid waste appeared to be managed properly. The various solid waste streams are collected, sorted, stored, and sent ashore or incinerated as appropriate.
☒	Oily bilge water managed properly	Oily bilge water is treated and discharged at less than 5 ppm (above and beyond the requirement of 15 ppm) and at greater than 13 nautical miles.
Other:		

Health = Washington State Department of Health

Section G: Sample Results

Parameter	Results
Biochemical Oxygen Demand 5-Day (BOD)	Not Applicable
Total Suspended Solids (TSS)	Not Applicable
Fecal Coliform	Not Applicable
Residual Chlorine	Not Applicable
pH	Not Applicable
Ammonia, Nitrogen	Not Applicable

Section H: Summary of Findings/Comments

Introduction

Amy Jankowiak, Washington State Department of Ecology (Ecology) Northwest Regional Office, Water Quality Program, and Marietta Sharp, Ecology, Solid Waste Program (biosolids) conducted the inspection of the Royal Caribbean RHAPSODY OF THE SEAS on August 29, 2008. The main contacts on board the RHAPSODY OF THE SEAS included Geoff Gibbs,

Environmental Officer; and Nikolay Kolev, 2nd Environmental. Prior notification of the visit was given on August 25, 2008 for security protocol. The purpose of the inspection was to evaluate compliance with the *Memorandum of Understanding Cruise Operations in Washington State* (MOU), as amended. This is the first season that the RHAPSODY OF THE SEAS has visited Seattle. The RHAPSODY OF THE SEAS has not requested nor has received approval to discharge in MOU waters. The vessel has not been discharging and is holding effluent until outside MOU waters.

The RHAPSODY OF THE SEAS' maiden voyage was in 1997, and is 915 feet long with a width of 105.6 feet.

Inspection

We arrived and boarded the ship (photo #01) at about 9:35 am and began with introductions and a plan for the day with Geoff Gibbs, the Environmental Officer. Mr. Gibbs has been on this vessel previously and is back on the vessel for its last few weeks for this route. We first discussed the various waste streams and discharge protocols (photo #02). We then reviewed discharge records for black water and graywater, and garbage. We then met with Nikolay Kolev, 2nd Environmental, and discussed the current black water and gray water treatment. We then viewed the black water and gray water systems and the oily water separators. We then toured the food waste press, hazardous waste storage area and the new dry cleaning system. The inspection was then finalized and we disembarked the vessel at about 11:01 am.

Discharge Types and Protocols:

If a discharge is to occur (although not occurring in MOU waters), the Bridge contacts the engine control room and confirms location. The control room also logs the information. A pre-determined voyage plan is used as guidance, but locations are always verified prior to discharge. Some of the discharge ports have padlocks on them, others, are opened by the engineer on watch. For black water and gray water, the latitude and longitude coordinates are recorded in the *Sewage and Graywater Discharge Record Book* and in the deck log. The date, time and location of both the start and the stop of the discharges are recorded, along with port location, effluent type, and volumes. All discharge records that were reviewed appeared to be in compliance with the MOU and did not occur in MOU waters.

Blackwater, which includes toilet waste and infirmary drains is currently treated with a traditional marine sanitation device that includes screening, aeration, and chlorination. Graywater which includes sink and shower water, laundry water, hair salon water and air conditioning condensate is coarsely screened only. Both black water and gray water is currently discharged outside of MOU waters, and outside of 13 nautical miles (nm) from shore. Galley water is collected separately and held for discharge at greater than 13 nm and outside of MOU waters.

Screenings and sewage sludge (biomass) from the black water and gray water is collected in drums (photo #24) and sent ashore in Vancouver, B.C.

Oily bilge water is treated with one of two oily water separator systems (photos #12 and #18) and discharged (photo #19) at less than 5 ppm at greater than 13 nm. A white box (photo #13) is used for additional monitoring assurance.

Pool water is discharged overboard periodically outside of 4 nm and outside of MOU waters. Spa water is discharged overboard daily outside of 4 nm and outside of MOU waters.

Paper, plastics, glass, aluminum, tin and cardboard are typical materials that are recycled. Dry garage is offloaded as non-hazardous waste. Food contaminated cardboard is incinerated along with some garbage. Aerosol punctured cans are landed ashore along with florescent bulbs that have been crushed and mercury removed by filter. Aerosol puncturing and bulb crushing is only done while at sea. The materials are either off-loaded as hazardous or non-hazardous depending on the criteria where off-loading. Batteries are landed ashore but not recycled. Photo waste and medical x-ray waste goes through silver recovery and is landed ashore as hazardous waste. Red bagged medical waste and sharps are also landed ashore. White bagged medical waste is incinerated along with oily rags. Expired medications are incinerated at sea. There have not been any hazardous waste off-loads (photos #23 & #24) from this vessel this season. Garbage records looked to be in good order.

Food waste is collected in various locations and is sent to the SOMAT press (photo #22). Pulped food waste and water is collected and discharged (photo #21) outside of 13 nm.

Potable water is almost always bunkered and is only produced by desalinization when out at sea and at a speed of at least 21 knots.

A new dry cleaning system (photo #27) that uses hydrocarbon was just installed to replace a system using Perchloroethylene (PERC). The system uses a chemical called DF-2000 Fluid, an Aliphatic Hydrocarbon (photo #25).

Black water System:

Blackwater is collected by vacuum (photos #03 & #14) to one of four collection tanks (photo #06). From the collection tanks, the liquid is coarsely screened (photo #04) and then pumped (photo #05) and screened by a drum screen (photo #07). All solids collected are drummed and off-loaded in Canada. The screened liquid is sent to one of two treatment tanks (photo #08) where it is mixed with seawater (photo #09). The type I marine sanitation device (MSD) consists of aeration, baffles, a minimizing pump (photo #10) and then chlorination by sodium hypochlorite (photo #11). The liquid is then pumped to one of two holding tanks for discharge. Any solids collected from the MSD is also collected into the drums for shore side off-loading.

Gray water System:
The graywater system collects sink and shower water, laundry water (photo #16), hair salon water and air conditioning condensate. The graywater is collected in one of eight collection tanks (photo #15) and is then coarsely screened and then held (photo #17) for discharge (photo #20).

The vessel is currently undergoing a retrofit for a new blackwater and graywater advanced wastewater purification system. The system should be complete by early 2009. The new system will be a NAVALIS system consisting of equalization, aeration, solids separation, ultrafiltration, advanced oxidation and ultraviolet light disinfection. The new system will treat both black water and gray water. The vessel is expected to be back on this route next season.

Conclusions and Recommendations
Staff was very knowledgeable of the protocols and systems for treatment on board the vessel.

The installation of an advanced purification system is applauded for the overall environmental benefits that it will provide.

Attachments:
Photographs

Copies to:
Rich Pruitt, RCCL
Geoff Gibbs, Environmental Officer
Amy Jankowiak, Ecology
Mark Toy, Health
Kevin Fitzpatrick, Ecology
Central Files: Royal Caribbean – RHAPSODY OF THE SEAS; WQ 6.1

Section I: Signatures		
Name and Signature of Inspector Amy Jankowiak Amy Jankowiak	Agency/Office/Telephone Department of Ecology/Northwest Regional Office/Water Quality Program/Municipal Compliance Specialist/(425) 649-7195	Date 9/29/08
Name and Signature of Reviewer Kevin C. Fitzpatrick Kevin C. Fitzpatrick	Agency/Office/Telephone Department of Ecology/Northwest Regional Office/Water Quality Section Manager/(425) 649-7033	Date 9/29/08

PHOTO #:01 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P8290001
DESCRIPTION: RHAPSODY OF THE SEAS VESSEL, SEATTLE

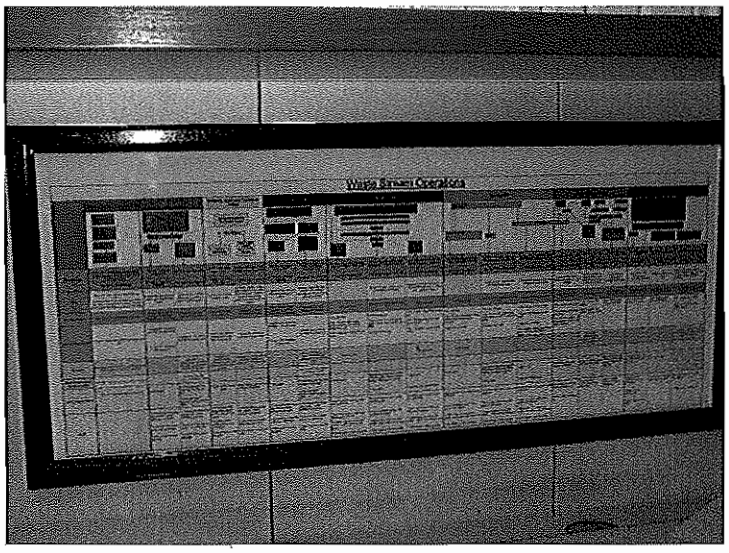

PHOTO #:02 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P8290004
DESCRIPTION: WASTE STREAM OPERATIONS CHART (ECR)

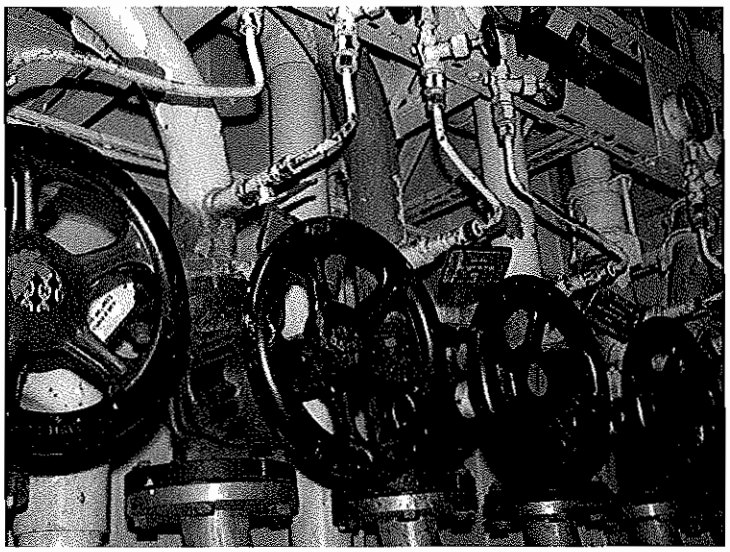

PHOTO #:03 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P8290006
DESCRIPTION: BLACK WATER VACUUM COLLECTION PIPES

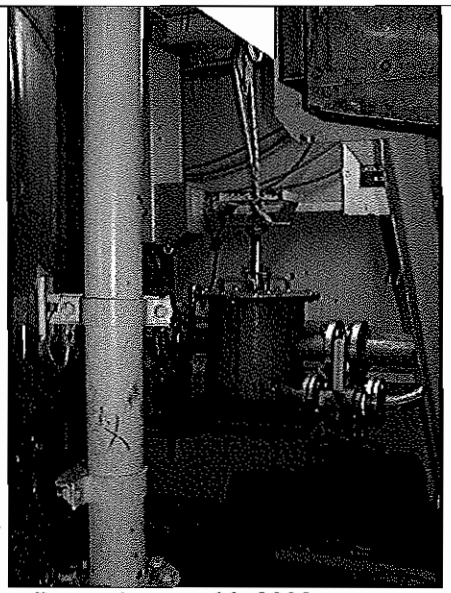

PHOTO #:04 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P8290007
DESCRIPTION: FIRST BLACK WATER FILTER

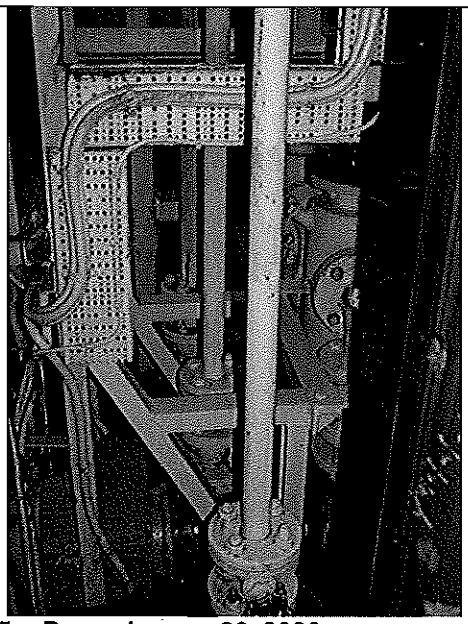

PHOTO #:05 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P8290008
DESCRIPTION: BLACKWATER PUMPS

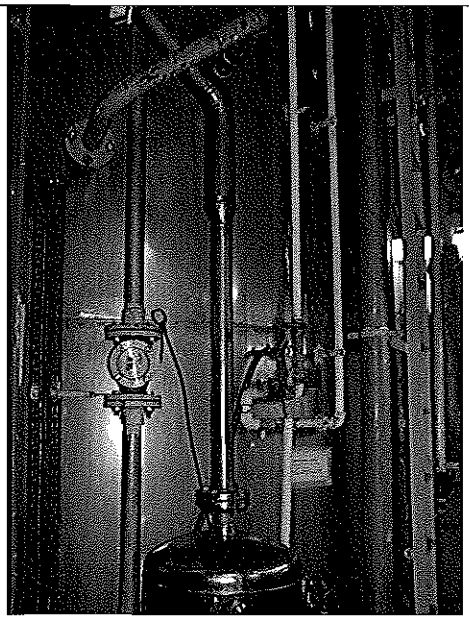

PHOTO #:06 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P8290009
DESCRIPTION: BLACKWATER COLLECTION TANK (1 OF 4)

PHOTO #:07 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P8290010
DESCRIPTION: BLACKWATER DRUM SCREEN (ABOVE EXIT SIGN)

PHOTO #:08 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P8290011
DESCRIPTION: BLACKWATER TREATMENT TANK (UNIT 2 OF 2)

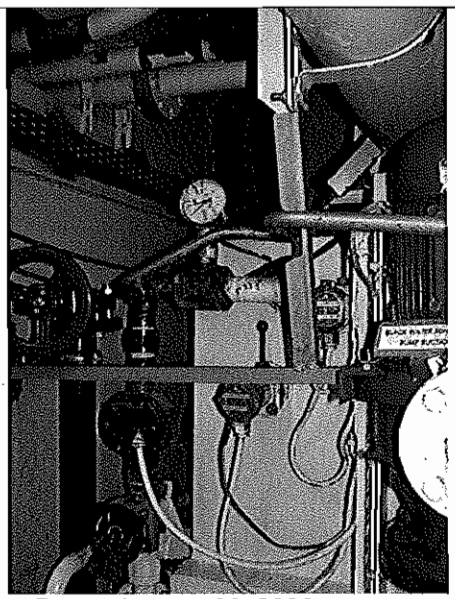

PHOTO #:09 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P8290012
DESCRIPTION: SEAWATER TO BLACKWATER TANK

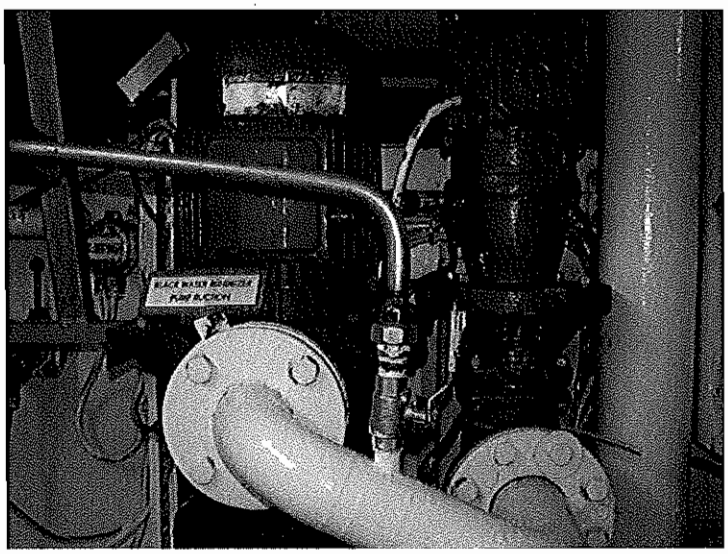

PHOTO #:10 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P8290013
DESCRIPTION: BLACKWATER MINIMIZING PUMP (LEFT) AND DISCHARGE PUMP (RIGHT)

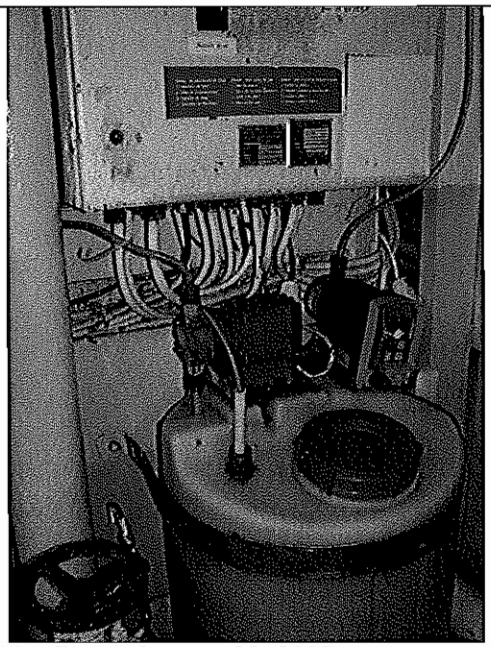

PHOTO #:11 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P8290014
DESCRIPTION: BLACKWATER CHLORINE DOSING

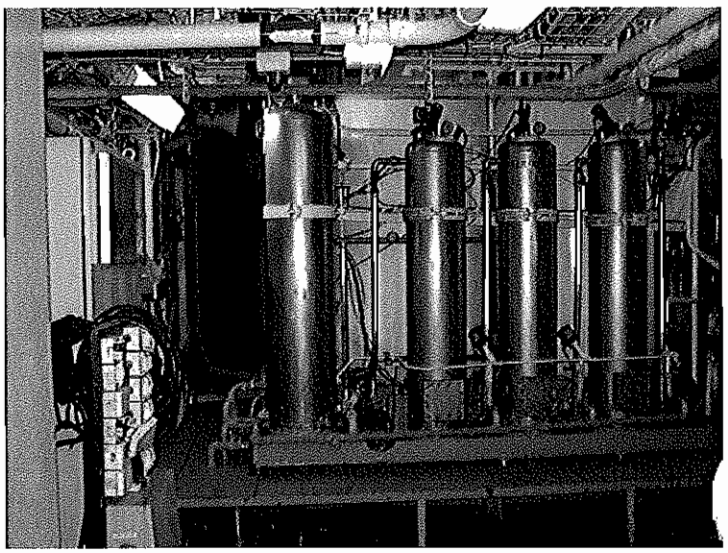

PHOTO #:12 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P8290015
DESCRIPTION: MARINFLOC OILY BILGE WATER SYSTEM (1 OF 2)

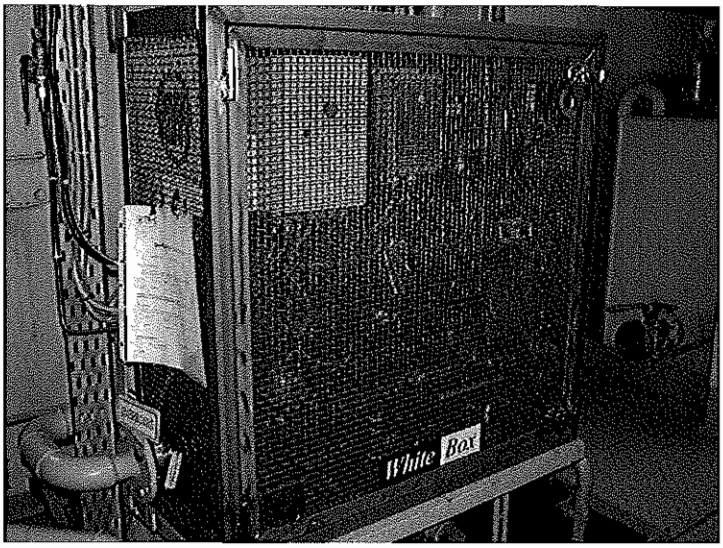

PHOTO #:13 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P8290016
DESCRIPTION: WHITE BOX FOR OILY BILGE SYSTEM

PHOTO #:14 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P8290017
DESCRIPTION: BLACK WATER FROM VACUUM COLLECTION SYSTEM

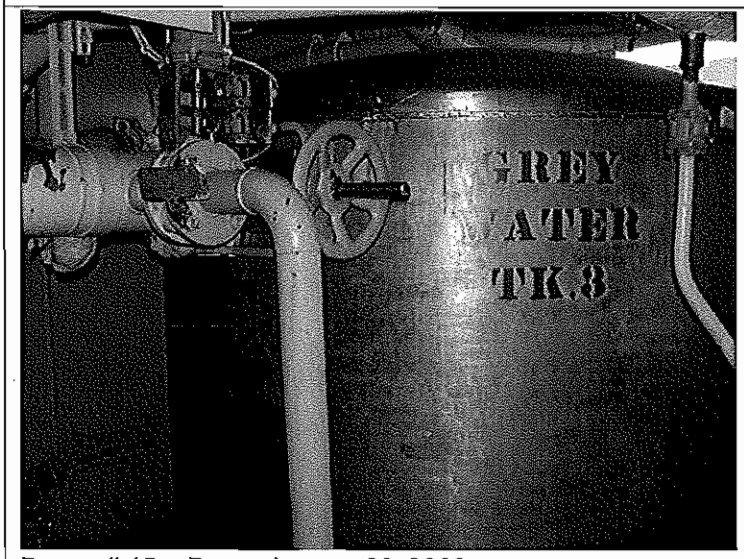

PHOTO #:15 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P8290018
DESCRIPTION: ONE OF THE EIGHT GRAY WATER COLLECTION TANKS

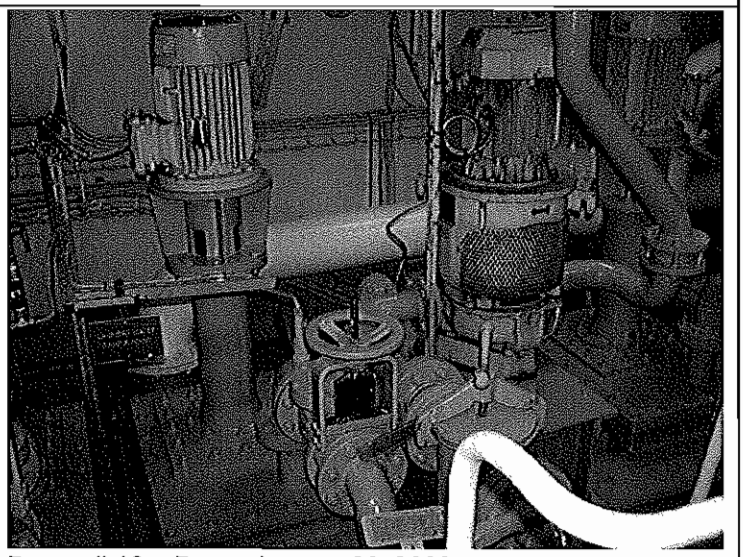

PHOTO #:16 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P8290019
DESCRIPTION: LAUNDRY TO GRAY WATER

PHOTO #:17 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P8290020
DESCRIPTION: GRAY WATER SAMPLE POINT (GRAY WATER HOLDING TANK BELOW)

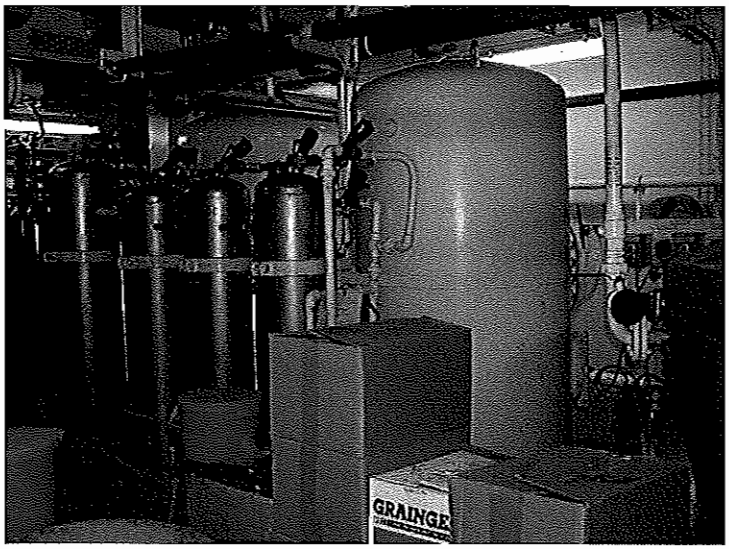

PHOTO #:18 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P8290021
DESCRIPTION: 2NO OILY BILGE WATER SYSTEM

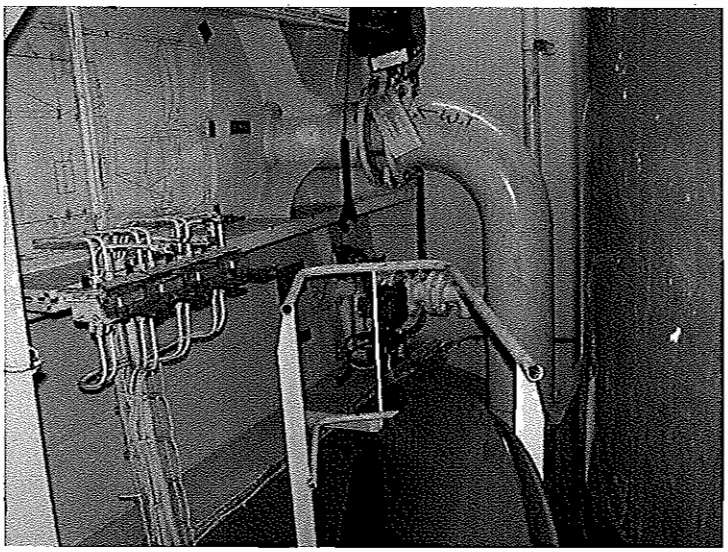

PHOTO #:19 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P8290022
DESCRIPTION: DISCHARGE POINT FOR CLEAN BILGE

PHOTO #:20 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P8290023
DESCRIPTION: GRAY WATER DISCHARGE PORT

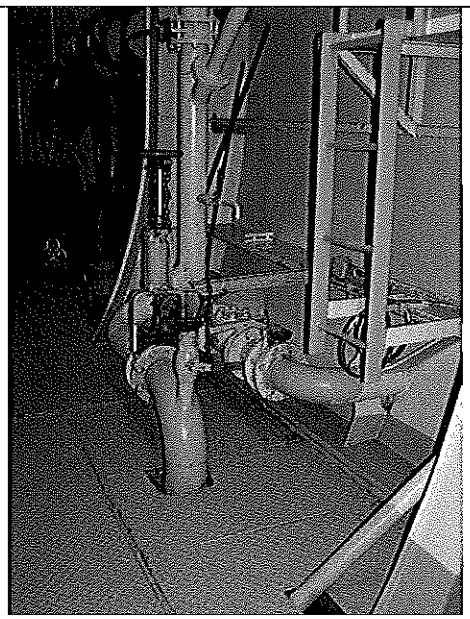

PHOTO #:21 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P8290024
DESCRIPTION: FOOD PUMPER DISCHARGE PORT

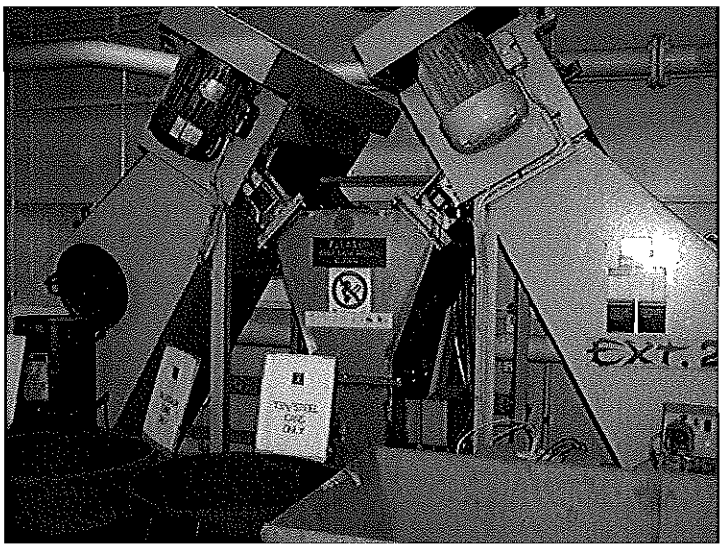

PHOTO #:22 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P8290025
DESCRIPTION: FOOD PULPER SOMAT

PHOTO #:23 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P8290026
DESCRIPTION: HAZARDOUS WASTE/NON-HAZARDOUS WASTE STORAGE AREA

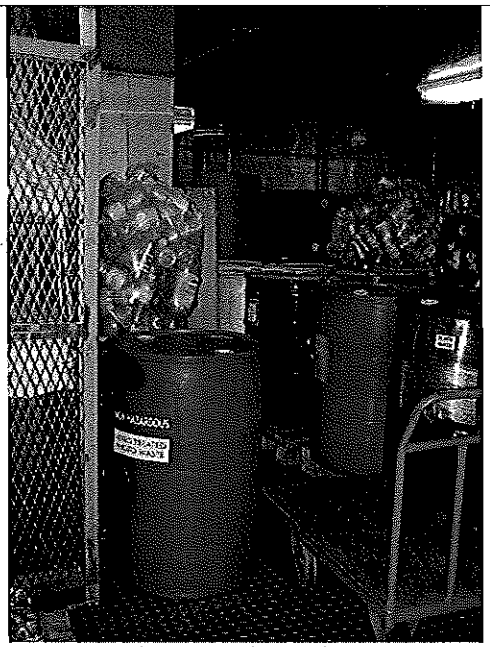

PHOTO #:24 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P8290028
DESCRIPTION: PHOTO WASTES (LEFT BLUE DRUM), BLACKWATER SYSTEM SOLIDS (RIGHT BLACK DRUM), AND OTHER STORED WASTES

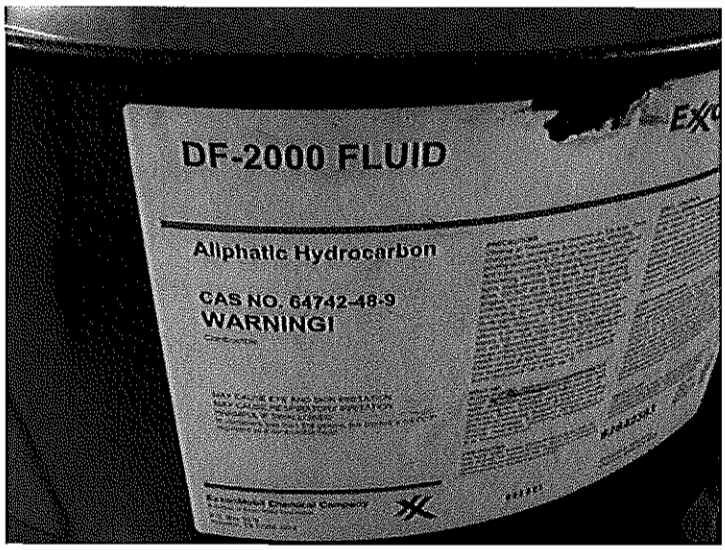

PHOTO #:25 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.:P8290029
DESCRIPTION: DF-2000 FLUID, ALIPHATIC HYDROCARBON FOR NEW DRY CLEANING SYSTEM

PHOTO #:26 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P8290030
DESCRIPTION: DRY CLEANING WASTES (FILTERS, LINT)

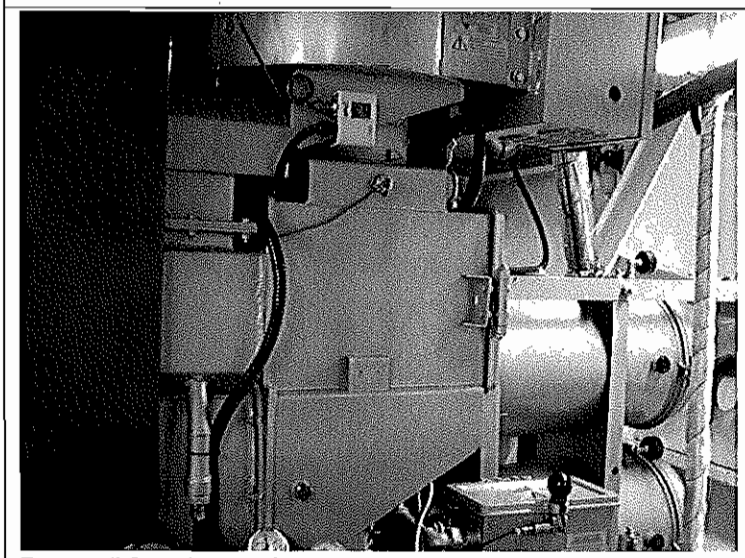

PHOTO #:27 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P8290031
DESCRIPTION: DRY CLEANING SYSTEM

State of Washington Department of Ecology

Cruise Ship Memorandum of Understanding, Cruise Operations in Washington State Inspection Report

Northwest Regional Office
3190 160th Ave SE
Bellevue, WA 98008
Phone: (425) 649-7000 Fax: (425) 649-7098

Section A: General Information			
Vessel Name:	NORWEGIAN PEARL	Date:	September 14, 2008
Vessel Operator:	NCL (Bahamas) Ltd.	Entry Time:	9:28 AM
Vessel Type	Passenger Ship	Exit Time:	12:05 PM
Location:	Terminal 66, Seattle	Notification (name & date):	Randy Fiebrandt on September 11, 2008
On-board contact(s):	Matilda Ivanova, Environmental Officer, Daniel Gaza, Environmental Engineer		
Inspector(s):	Amy Jankowiak, Department of Ecology, Water Quality Program		
# passengers/crew:	~2394/~1100		

The NORWEGIAN PEARL arrived on May 2, 2008 at the Port of Seattle to begin the 2008 cruise season. Scanship is a biological reactor and ultrafiltration system. The system includes prefiltration, biological treatment via a biofilm process, chemical precipitation, clarification through flotation tanks, polishing filtration and UV disinfection. Approval for continuous discharge from Ecology was granted in 2007 and May 12, 2008.

Section B: Areas Evaluated									
☒	Black/Gray wastewater system	☒	Residual solids	☒	Records/Reports	☒	Hazardous Waste/Solid Waste	☒	Sampling/ Monitoring
☒	Discharge locations	☒	Operations & Maintenance	☒	Sludge Handling/ Disposal	☒	Oily bilge water	☒	Other

Section C: For vessels discharging ≥ 1nm from berth and ≥ 6 knots only [2.1.3(A)]		
☐	Schematics match black/gray wastewater system	
☐	Operations as described in submitted documentation	
☐	Daily 24-hour continuous monitoring for turbidity or equivalent monitoring	
☐	Turbidimeter or equivalent monitoring equipment functioning properly	
	Turbidity or equivalent : Last calibration – Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:	
☐	Auto shut down or operational controls to insure system shut down if high turbidity occurs	
☐	Disinfection system operated and maintained properly	
	Disinfection System:	

Section D: For vessels discharging continuously [2.1.3(B)]		
☒	Schematics match black/gray wastewater system	Schematics appeared to be consistent with they system on board.
☒	Operations as described in submitted documentation	Operations were as described.
☒	Daily 24-hour continuous turbidity or equivalent monitoring	Has continuous TSS monitoring.
☒	Turbidimeter or equivalent monitoring equipment functioning properly	Appears to be functioning properly.
	Turbidity or equivalent : Last calibration – Calibrations are done daily	

	Trigger level for early alarm: 20 mg/l Trigger level for shutdown (recirculation): 28 mg/l switches automatically to hold and 30 mg/l to shut down. Recorded turbidity/equivalent levels above triggers: Yes, shutdown is working	
☒	Auto shut down or operational controls to insure system shut down if a high turbidity occurs	A value of 28 mg/l or greater triggers to hold and 30 mg/l for automatic shut down of that MBR.
☒	Disinfection immediately prior to discharge	Protocol: When discharging, UV occurs immediately prior to discharge.
☒	Disinfection system operated and maintained properly	The UV system appeared to be operational and maintained well.
	Disinfection System: The disinfection system consists of 3 UV units, of which two are typically used with 14 bulbs each. There are typically about 1 set (14) of spare bulbs on board. At the time of the inspection, the two operating UV units were at 43 W/m2 and 60 W/m2. The UV sleeves are cleaned by dosing Metal Bright cleaner automatically.	

Section E: General (Approved to Discharge)		
☒	No discharges within ½ mile from shellfish beds/protocol (President's Point, Apple Tree Cove, Tyee Shoal)	The route that is used stays clear of ½ mile of the shellfish areas listed. Only in the case of a safety issue, would they need to enter the area. Discharges are to be stopped in that case.
☒	Discharges immediately stopped when high turbidity occurs	They do have their systems set up to automatically shut down the discharge if high TSS (equivalent to turbidity) occurs.
☒	Immediate notifications made to Health for disinfection system upset	There are notification numbers posted and a copy of the current MOU was on board.
☒	Sampling conducted 2/month, 1/month in Seattle (BOD, TSS, fecal coliform, pH, chlorine residual)	Sampling is being conducted as required, as of the date of the inspection.
☒	Whole Effluent Toxicity Testing 1 per 2 years (homeported) or once/40 calls for continuous	Wet testing samples were taken a week prior to the inspection for WET testing.
☒	Discharges immediately stopped when GI >2% passengers or crew	The new requirements were well known and there is a protocol in place where the staff captain and the medical staff communicate. There have not been any outbreaks this season.
☒	Immediate notifications to Health for GI>2% passengers or crew	The new requirements were well known and there is a protocol in place where the staff captain and the medical staff communicate. There have not been any outbreaks this season.

Section F: General		
☒	Discharge records review	Discharge records were reviewed (black water/gray water/residual solids) and are maintained properly.
☒	Residual solids managed properly/ disposal protocol per MOU	Residual solids are collected, dried and incinerated.
☒	Hazardous Waste managed properly	All hazardous waste that is collected is being sent off-shore in Victoria, Canada (with the exception of these last couple of weeks where they are holding their hazardous waste until repositioned in Miami). Records were reviewed for hazardous waste discharges.
☒	WA Haz Waste guidelines followed (appendix vii)	All hazardous waste is being off-loaded outside of Washington.
☒	Solid Waste managed properly	Solid waste is being managed properly. The various solid waste streams are collected, sorted, stored, and sent ashore or incinerated as appropriate. Only food waste is occasionally discharged (usually incinerated) outside of MOU waters.
☒	Oily bilge water managed properly	Oily bilge water is treated and discharged at less than 15 ppm (usually less than 5 ppm) and outside of MOU waters.
Other:		

Health = Washington State Department of Health

Section G: Sample Results

Parameter	Results
Biochemical Oxygen Demand 5-Day (BOD)	<10 mg/l
Total Suspended Solids (TSS)	5.0 mg/l
Fecal Coliform	<1 CFU/100 ml
Residual Chlorine	0.12 mg/l
pH	6.75 standard unit
Ammonia, Nitrogen	26 mg/l

Section H: Summary of Findings/Comments

Introduction

Amy Jankowiak, Washington State Department of Ecology (Ecology) Northwest Regional Office, Water Quality Program (NWRO-WQ) conducted the inspection of the Norwegian Cruise Line NORWEGIAN PEARL on September 14, 2008. The main contacts on board the NORWEGIAN PEARL included Matilda Ivanova, Environmental Officer, and Daniel Gaza, Environmental Engineer. Prior notification of the visit was given on September 11, 2008 for security protocol. The purpose of the inspection was to evaluate compliance with the *Memorandum of Understanding Cruise Operations in Washington State* (MOU), as amended. A copy of the current MOU was on-board. The NORWEGIAN PEARL received approval to discharge continuously on May 12, 2008.

The NORWEGIAN PEARL was built in 2005, is 965 feet long with 15 guest decks, with about a 27-foot draft. There are typically about 2394 passengers and 1100 crew.

Inspection

I arrived and boarded the ship (photo #01) at about 9:28 am and began with introductions and a plan for the day with Matilda Ivanova, Environmental Officer. We then headed to the Engine Control Room (ECR) area and discussed various waste streams, and the discharge protocols. Discharge records were reviewed for black water and gray water discharges, garbage and recycling, oil, and hazardous waste. We then discussed the black water and gray water system in detail. Next, we viewed the black water and gray water system and took samples. We then toured the garbage sorting area and hazardous waste storage. The inspection was then finalized and I disembarked the vessel at about 12:05 pm.

Discharge Types and Protocols:

The latitude and longitude coordinates are recorded in the *Sewage and Graywater Discharge Record Book* and in the deck log. The date, time and location of both the start and the stop of the discharges are recorded, along with port location, effluent type, and volumes. The route that is used stays clear of ½ mile of the shellfish areas listed in the MOU. Only in the case of a safety issue, would they need to enter the area. Discharges are to be stopped in that case. The new requirements for stopping discharges in case of a GI greater than 2% of passengers or crew and for notifying the Washington State Department of Health were well known. There is a protocol in place where the staff captain and the medical staff communicate. There have not been any outbreaks this season. All discharge records that were reviewed appeared to be in compliance with the MOU.

Black water, which includes toilet waste, galley waste and infirmary drains and gray water which includes sink and shower and laundry water is treated with a Scanship advanced wastewater treatment system and is discharged continuously with the exception of the area near shellfish beds.

Screenings and grit as well as the biomass (sewage sludge) from the Scanship system is collected, dried and incinerated along with food waste. Only occasionally is the solid food waste held for discharge outside of 12 nautical miles and outside of MOU waters and the Olympic Coast National Marine Sanctuary. The liquid from the food waste is typically discharged as above. Cooking oil is collected (photo #32) and recycled as biodiesel. When the grease traps are cleaned out, the waste is placed in drums and off-loaded as regulated waste.

Air conditioning condensate is used as technical water.

Oily bilge water is treated with two Marinfloc systems for separating oil. The oily bilge is treated to less than 15 ppm, although the results are typically less than 5 ppm. From the oily water separator, the oil content is again measured in the locked "white box" (photo #26). The treated oily bilge water is then discharged outside of MOU waters and greater than 12 nautical miles.

Potable water that is regularly bunkered. Water is also produced by desalination using a reverse osmosis system and evaporators. The salt that is collected through the production process is sent back to the salt water. A descaler chemical is used on the evaporators and is adjusted for pH before discharge at sea.

Dry cleaning uses PERC which is off-loaded as hazardous waste in Canada. Silver is captured from the photo waste, treated to less than 5 ppm and is off-loaded as regulated waste (photo #34). Some of the X-ray waste is hazardous and off-loaded as such (fixer), while the rest is sent through the silver recovery unit along with the photo waste and off-loaded as regulated waste. Other hazardous wastes include some batteries, paints, mercury filters, some aerosols (punctured), and sharps. Fluorescent bulbs are crushed with a system that removes mercury (photo #33). The bulbs are then off-loaded as regulated waste. Medical, red bag waste is typically incinerated. Narcotics are incinerated and expired medications along with sharps are off-loaded as hazardous waste. All hazardous wastes (photo #35) are off-loaded in Canada (with the exception of the last few weeks of the season – the hazardous waste is being held until repositioning in Miami). Other materials incinerated include paper, food-contaminated cardboard, and oily rags.

Plastics, garbage, and other materials are collected and sorted on a sorting table (photo #29). Most materials are then condensed and recycled on-shore (photo #30). Crushed glass (photo #27), aluminum (photo #28), tin, scrap metal, plastics, cardboard, wood pallets and some paper are all recycled along with other materials. Broken china (photo #31) is off-loaded as well.

Black water and Gray water System (Scanship System):
Black water, which includes toilet waste, galley waste and infirmary drains moves by vacuum to a buffer tank (photo #02). From the collection tanks, it goes to the prescreeners (also known as drum screens) (photos #03 and #04). There are two drum screens which provide pre-screening. Solids from the drum screens go to the sludge tank. Liquid flow from the drum screens then enters the mixing tank where it combines with the gray water (photo #05) consisting of sink, shower, and laundry water. Air and water are added to the mixing tank and it is monitored in-line entering the mixing tank for flow, pH and temperature (photo #06 and #08). From the mixing tank, the liquid moves to the biostep (photos #07 and #10) for biological treatment (biofilm on rotating plastic pieces – 2 tanks in series, air added). A defoamer (photo #09) can be used to control foam.

After the biostep, liquid moves to the flocculation tanks (photo #11). Coagulant is injected (photos #12 and #17) and then polymer is injected (photo #18) in the second cylinder of the flocculation tank. Clarification then occurs via flotation tanks (photo #13). An air and water mixture (photo #16) is added to the bottom of the flotation tanks to keep turbulence at the bottom and to allow the solids to rise to the top, along with the help of the chemical addition. Skimmers on the top (photo #14) skim the solids into a sludge pocket which is then pumped (photo #19) to the sludge tank. Liquid flow then moves to the polishing filters (photos #15 and #20) for ultrafiltration (2 rotating mesh drums). Spray nozzles help move the liquid through the filters. Sediments collected with the filter are sent to a drain tank and then are pumped back to the mixing tank.

Flow then moves to ultraviolet (UV) light disinfection (photo #21). There are three UV units, of which two are typically used in series with 14 bulbs each. The UV unit not being used goes though a cleaning cycle with Metal Bright cleaner and is then rotated in for use. There is typically about one set (14 bulbs) of spare bulbs on board. The UV system is alarmed (photo #25) for bulb failure and intensity at <18 watts per meter squared. Pressure and temperature is also alarmed. At the time of the inspection, the two operating UV units were at 43 W/m2 and 60 W/m2. The UV sleeves are cleaned by dosing Metal Bright cleaner automatically. Chlorine is available on board (photo #23) as a back-up disinfection system (although hasn't been used). Flow from the UV units is either discharged directly overboard via the discharge port (photo #24), is re-circulated through the Scanship system, or is held for discharge later outside of MOU waters.

Solids from the sludge tank are often combined with food waste and then the material is dried with a dryer and incinerated.

The cruise line uses a system called AMOS for work orders and maintenance. Manufacturer recommendations for maintenance of each piece of equipment is included in the AMOS system which triggers staff when maintenance is required. Scanship also monitors maintenance on the system. Any needed calibrations, cleaning, and other needed maintenance would be included in AMOS. Total suspended solids (TSS) (equivalent to turbidity) is monitored continuously at UV disinfection (photo #22). If TSS exceeds 20 mg/l, the system alarms (photo #25) and staff responds to investigate. At 28 mg/l, the system alarms and switches automatically to hold that discharge. At 30 mg/l, the effluent from the system is shut down. PH is also monitored for adjustments.

There have recently been some higher readings for total suspended solids (TSS) from the Scanship system. The 1st increase is probably linked to cleaning chemicals and the 2nd TSS increase was probably due to mechanical speed issues with the skimmer on the flotation unit. When the readings reached the 20 mg/l threshold, staff was notified and investigated. At 28 mg/l, the discharge valves close temporarily until the TSS goes below 25 mg/l and at 30 mg/l, the discharges were stopped completely. The high TSS water is typically sent back through the treatment system, but as the TSS levels stayed high for a while, the effluent was sent to the holding tanks for discharge outside of MOU waters (and >12 nautical miles).

Samples were taken for Biochemical Oxygen Demand (BOD 5-Day), Total Suspended Solids (TSS), pH, chlorine residual, fecal coliform and ammonia from the combined effluent of the Scanship system after UV disinfection. The sample port was disinfected by heat prior to pulling samples. The samples were put on ice immediately and were transported to AmTest laboratory in Kirkland, Washington that afternoon. Chain of Custody and sampling procedures were followed. All results are in Section F. The results are typical of the results submitted to Ecology thus far for 2008.

Conclusions and Recommendations

The protocols for discharging away from the shellfish beds was very clear.

It is recommended that staff continue to work towards a high functioning wastewater treatment system.

Attachments:
Photographs
Laboratory Report

Copies to:
Randy Fiebrandt, NCL
Matilda Ivanova, NCL
Amy Jankowiak, Ecology
Karen Burgess, Ecology
Mark Toy, Health
Kevin Fitzpatrick, Ecology
Central Files: Norwegian Cruise Line – NORWEGIAN PEARL; WQ 6.1

Section I: Signatures		
Name and Signature of Inspector Amy Jankowiak Amy Jankowiak	Agency/Office/Telephone Department of Ecology/Northwest Regional Office/Water Quality Program/Municipal Compliance Specialist/(425) 649-7195	Date 10/16/08
Name and Signature of Reviewer Kevin C. Fitzpatrick Kevin C. Fitzpatrick	Agency/Office/Telephone Department of Ecology/Northwest Regional Office/Water Quality Section Manager/(425) 649-7033	Date 10/16/08

PHOTO #:01 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140001
DESCRIPTION: NORWEGIAN PEARL VESSEL, PIER 66, SEATTLE

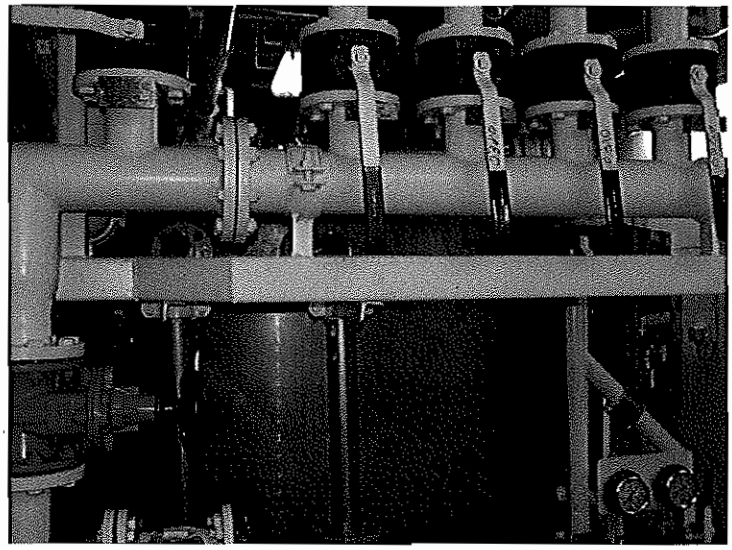

PHOTO #:02 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140002
DESCRIPTION: BLACK WATER BUFFER TANK

PHOTO #:03 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140003
DESCRIPTION: PRE-SCREENS (DRUM SCREENS)

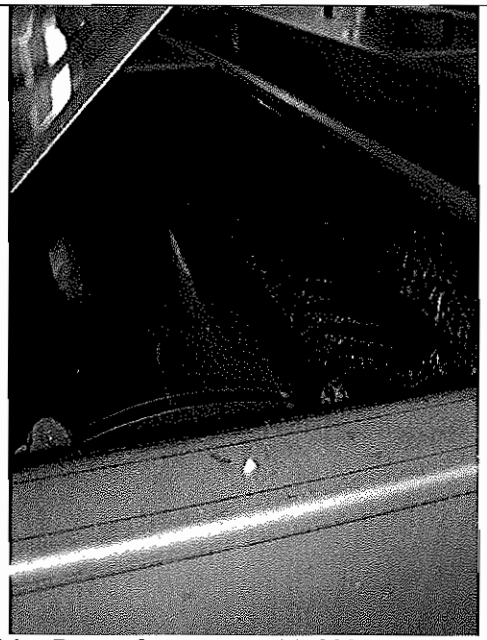

PHOTO #:04 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140004
DESCRIPTION: INSIDE OF PRE-SCREEN (DRUM SCREEN)

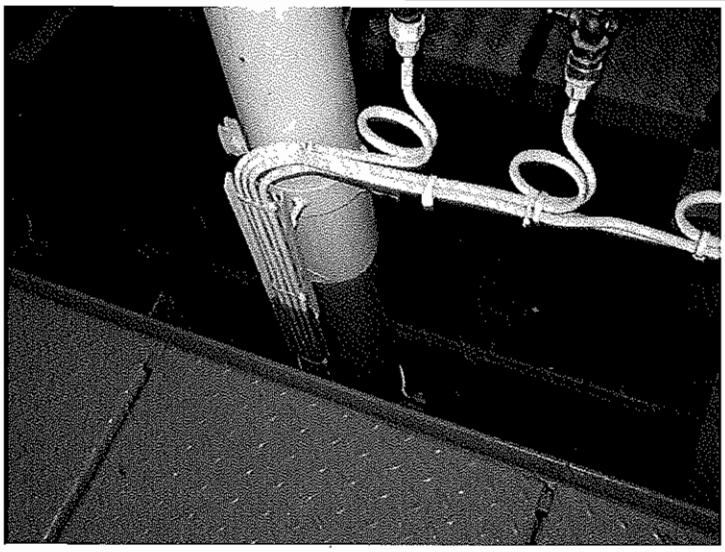

PHOTO #:05 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140005
DESCRIPTION: GRAY WATER PUMPS

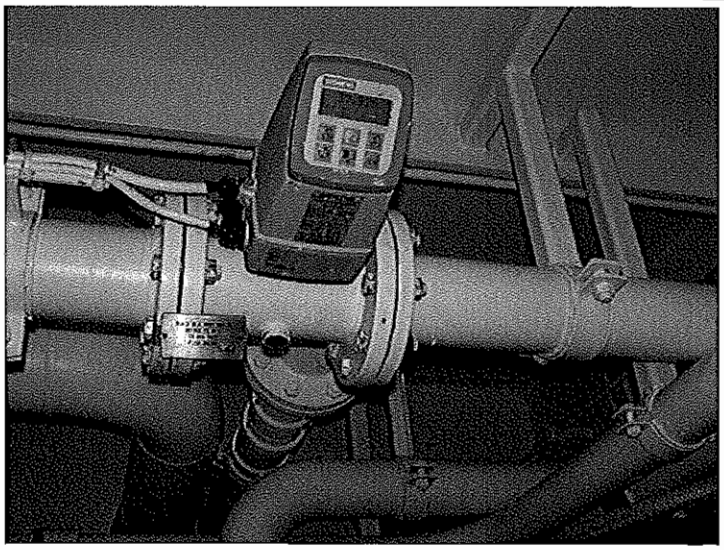

PHOTO #:06 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140006
DESCRIPTION: MIXING TANK FLOW METER

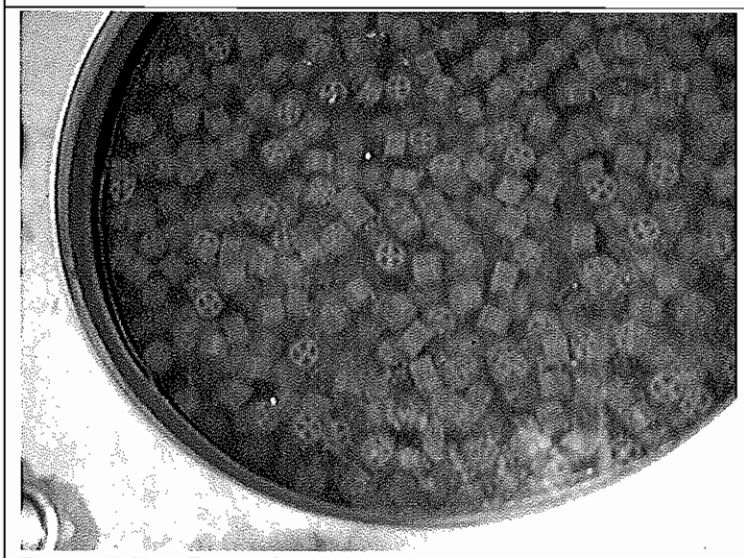

PHOTO #:07 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140007
DESCRIPTION: VIEW OF BIOREACTOR

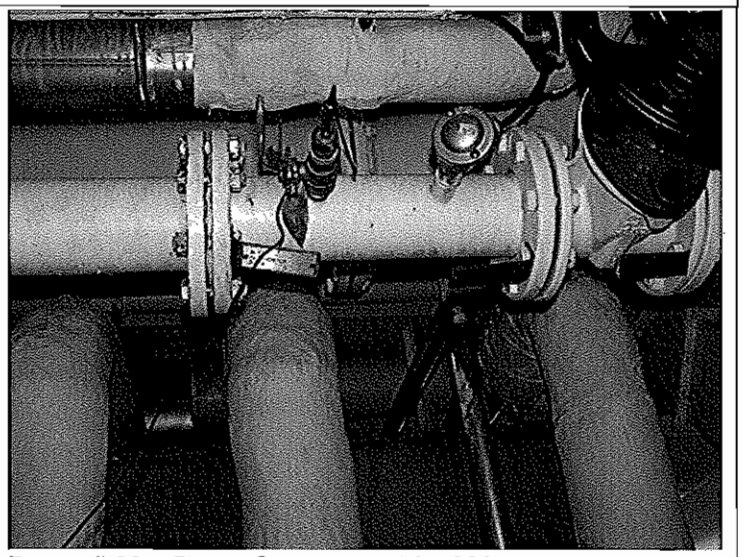

PHOTO #:08 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140008
DESCRIPTION: MIXING TANK pH SENSOR, TEMP SENSORS

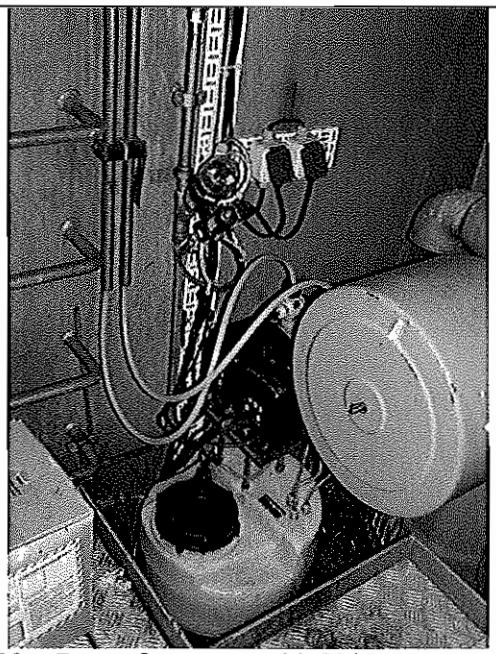

PHOTO #:09 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140009
DESCRIPTION: DEFOAMER ON BOTTOM AND BLOWER ON RIGHT FOR BIOREACTOR

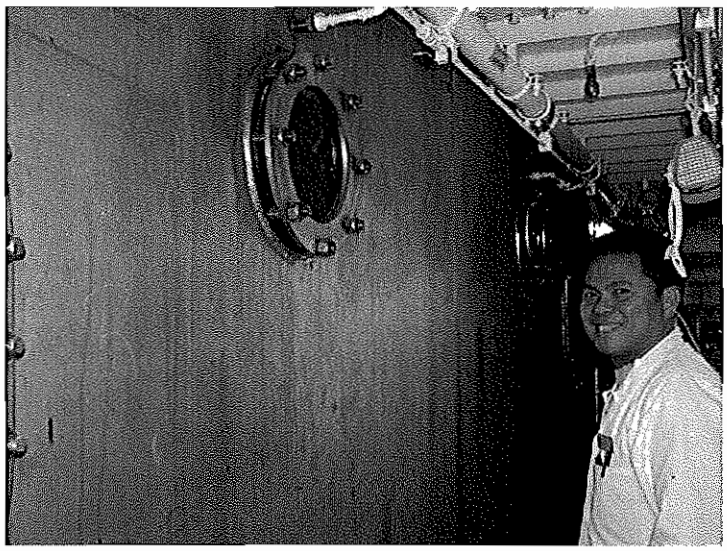

PHOTO #:10 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140011
DESCRIPTION: BIOREACTOR TANK (DANIEL GAZA, ENVIRONMENTAL ENGINEER)

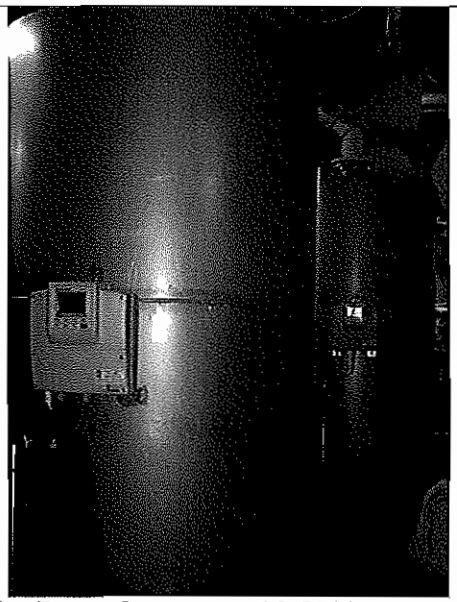

PHOTO #:11 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140013
DESCRIPTION: FLOCCULATION TANKS

PHOTO #:12 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140014
DESCRIPTION: COAGULANT INJECTION

PHOTO #:13 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140015
DESCRIPTION: FLOTATION TANK (STAINLESS STEEL)

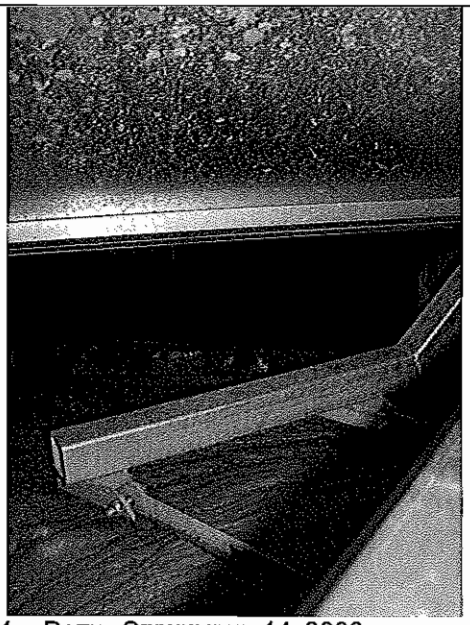

PHOTO #:14 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140016
DESCRIPTION: INSIDE OF FLOTATION TANK

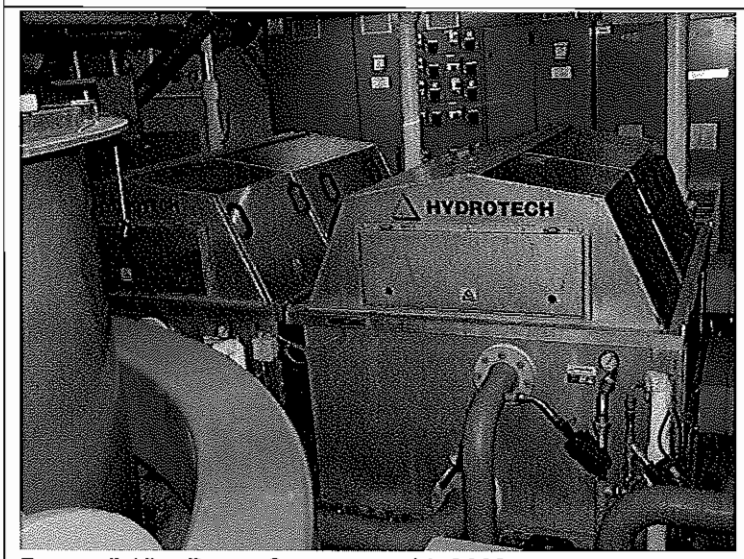

PHOTO #:15 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140017
DESCRIPTION: POLISHING FILTERS

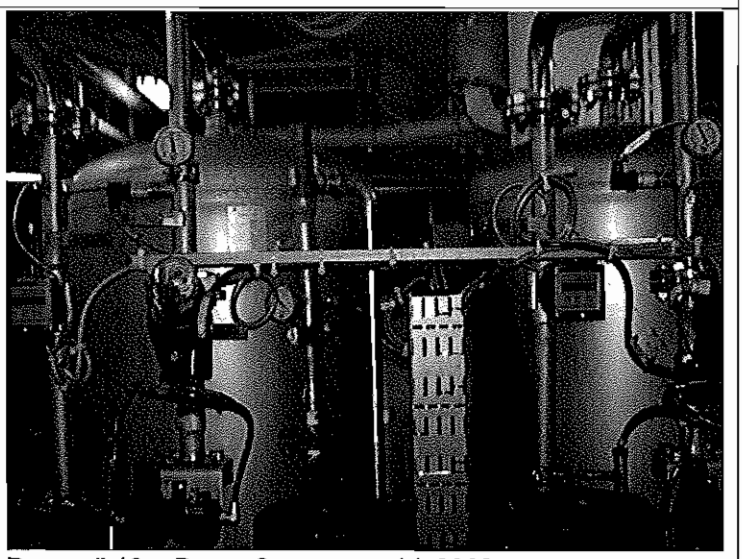

PHOTO #:16 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140018
DESCRIPTION: AIR AND WATER MIXING

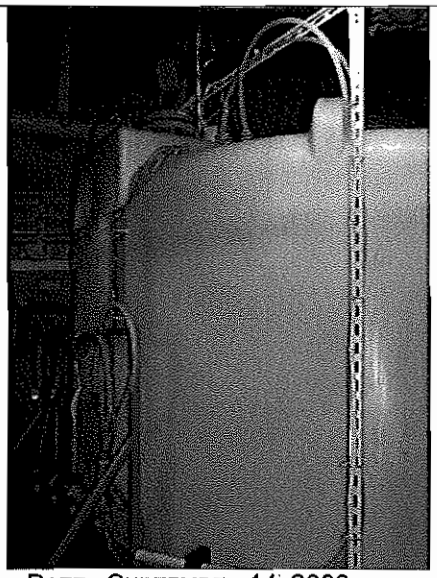

PHOTO #:17 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140019
DESCRIPTION: COAGULANT TANK

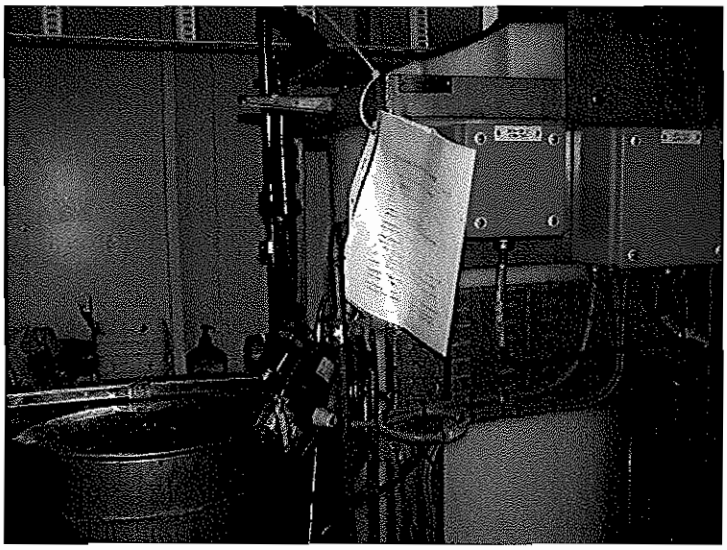

PHOTO #:18 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140020
DESCRIPTION: POLYMER DOSING/TANK

PHOTO #:19 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140021
DESCRIPTION: SLUDGE PUMPS

PHOTO #:20 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140022
DESCRIPTION: POLISHING FILTERS

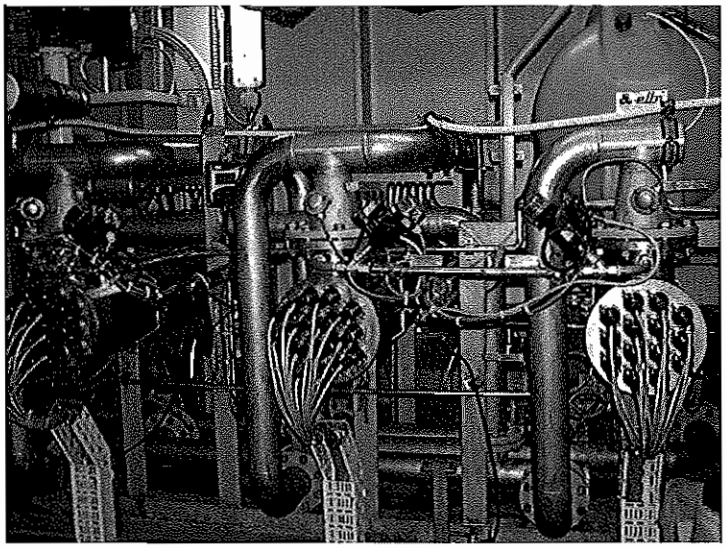

PHOTO #:21 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140023
DESCRIPTION: ULTRAVIOLET DISINFECTION SYSTEM

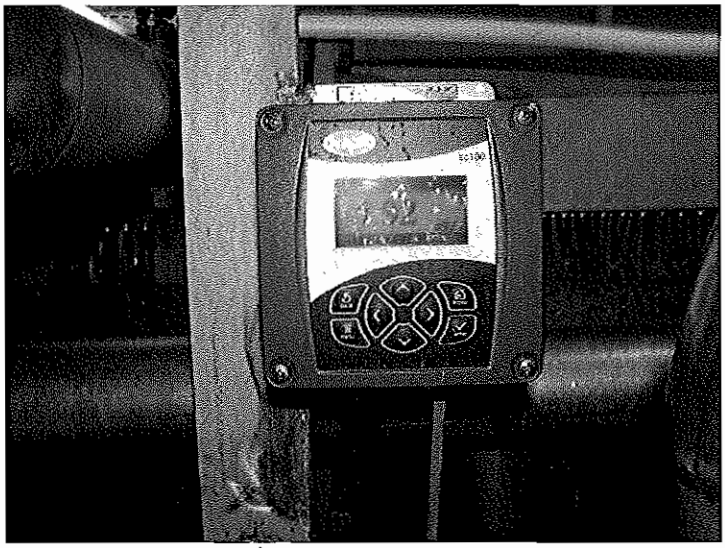

PHOTO #:22 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140024
DESCRIPTION: TSS SENSOR (1.92 MG/L) ON UV EFFLUENT

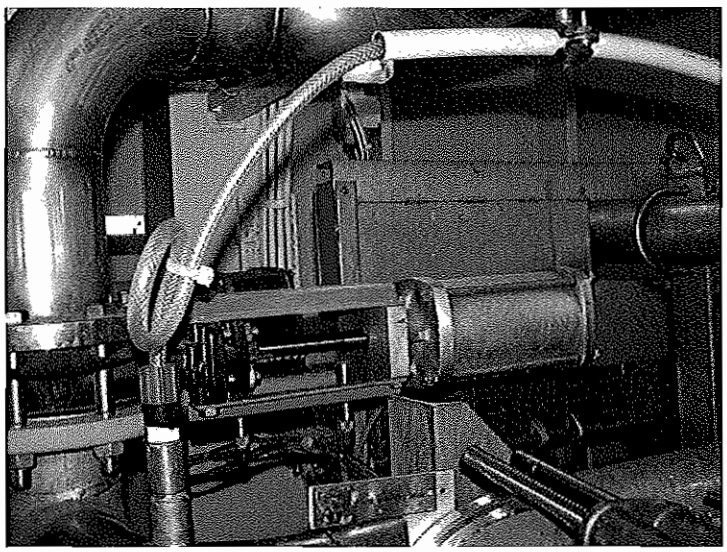

PHOTO #:23 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140025
DESCRIPTION: CHLORINE FOR BACK-UP (HAVEN'T HAD TO USE)

PHOTO #:24 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140026
DESCRIPTION: SCANSHIP EFFLUENT DISCHARGE PORT AND SAMPLE LOCATION.

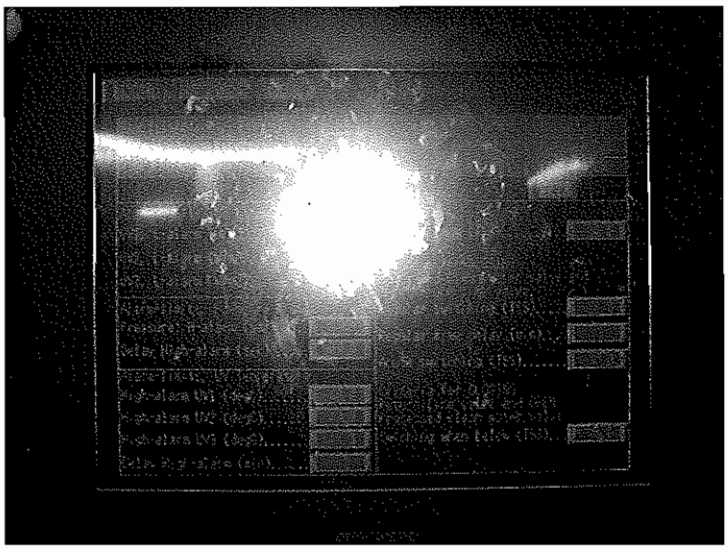

PHOTO #:25 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140027
DESCRIPTION: ALARM SETTING SCREEN FOR UV/TSS

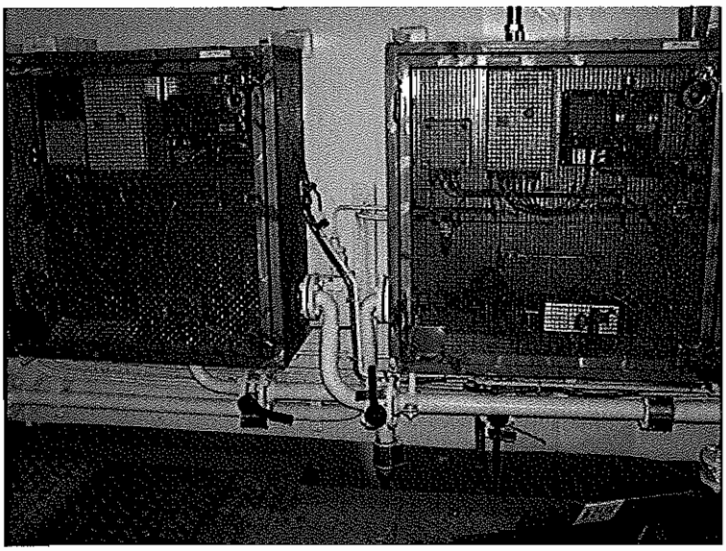

PHOTO #:26 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140010
DESCRIPTION: OILY WATER SEPARATOR WHITE BOXES

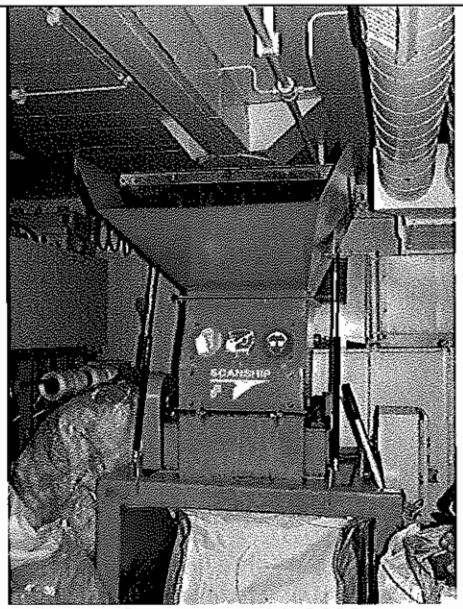

PHOTO #:27 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140028
DESCRIPTION: GLASS CRUSHER

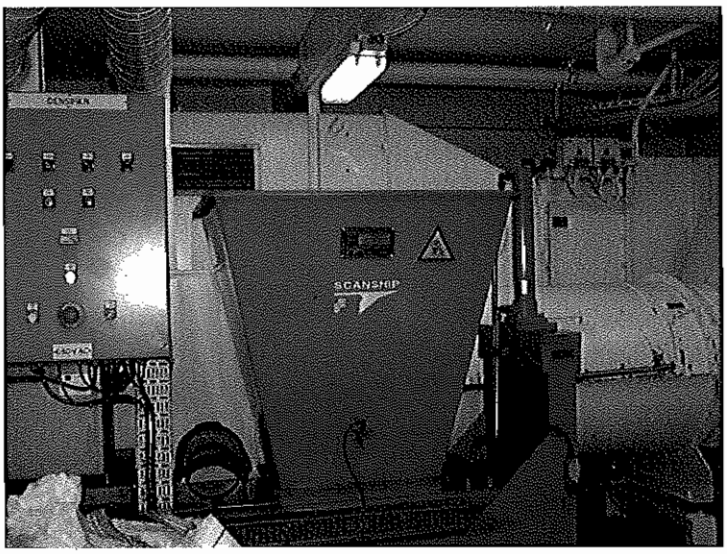

PHOTO #:28 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140029
DESCRIPTION: ALUMINUM CRUSHER

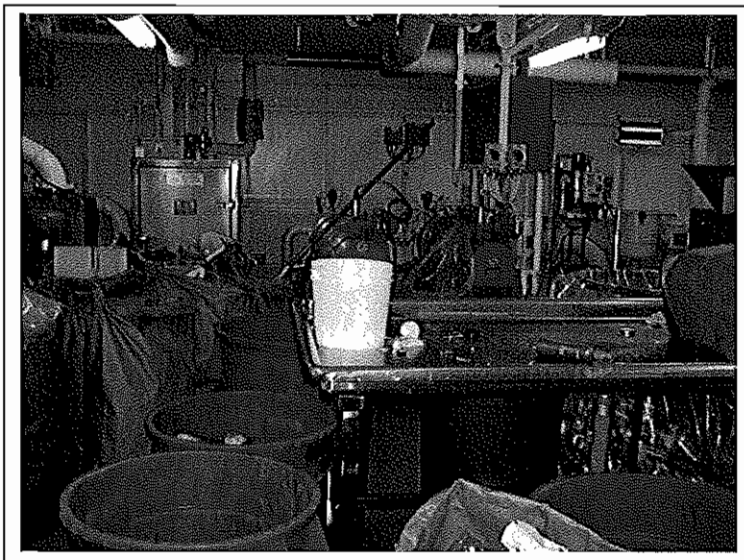

PHOTO #:29 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140030
DESCRIPTION: GARBAGE/RECYCLING SORTING AREA

PHOTO #:30 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140032
DESCRIPTION: COLD STORAGE

PHOTO #:31 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140033
DESCRIPTION: BROKEN CHINA

PHOTO #:32 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140034
DESCRIPTION: COOKING OIL

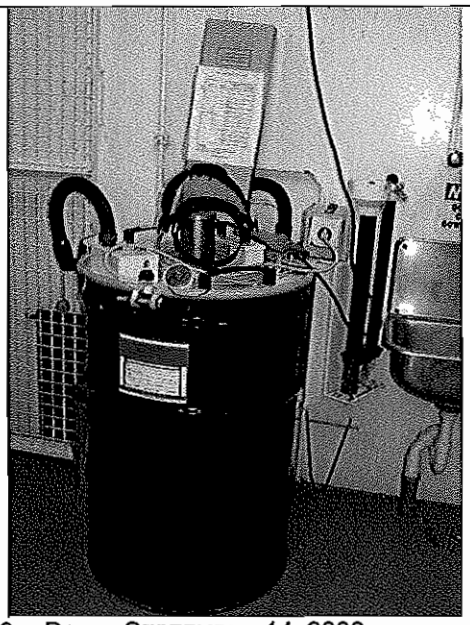

PHOTO #:33 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140035
DESCRIPTION: FLUORESCENT BULB CRUSHER/MERCURY REMOVAL SYSTEM

PHOTO #:34 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140036
DESCRIPTION: HAZARDOUS WASTE STORAGE – PHOTO WASTE

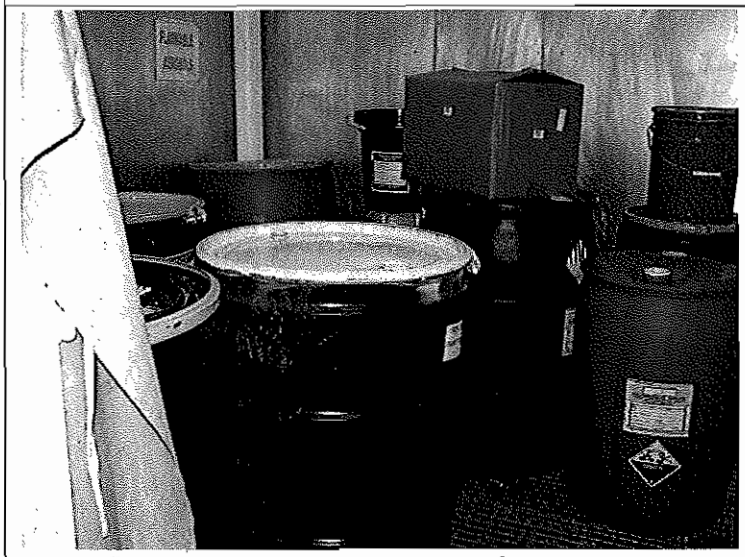

PHOTO #:35 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9140037
DESCRIPTION: HAZARDOUS WASTE STORAGE

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664
www.amtestlab.com

AMTEST LABORATORIES

Professional Analytical Services

ANALYSIS REPORT

Department of Ecology
3190 106th Ave Se
Bellevue, WA 98008
Attention: Amy Jankowiak
Project Name: Norwegian Pearl

Date Received: 09/14/08
Date Reported: 10/ 3/08

AMTEST Identification Number 08-A012781
Client Identification NORPEARL- Eff
Sampling Date 09/14/08, 11:46
All results reported on an as received basis.

Microbiological

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Fecal Coliforms	< 1	CFU/100 ml		1.	SM 9222D	KF	09/14/08 14:00

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
pH	6.75	unit			EPA 150.1	KF	09/14/08
Chlorine Residual	0.12	mg/l		0.10	EPA 330.5	SL	09/15/08
Total Suspended Solids	5.0	mg/l		1.0	SM 2540D	SL	09/16/08

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
BOD	< 10	mg/l		10.	SM 5210B	KF	09/14/08

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	26.	mg/l		0.005	EPA 350.1	TS	09/25/08

State of Washington Department of Ecology

Cruise Ship Memorandum of Understanding, Cruise Operations in Washington State Inspection Report

Northwest Regional Office
3190 160th Ave SE
Bellevue, WA 98008
Phone: (425) 649-7000 Fax: (425) 649-7098

Section A: General Information

Vessel Name:	MERCURY	Date:	September 22, 2008
Vessel Operator:	Celebrity Cruises	Entry Time:	9:06 AM
Vessel Type	Passenger Ship	Exit Time:	11:44 AM
Location:	Terminal 66, Seattle	Notification (name & date):	Rich Pruitt; September 16, 2008
On-board contact(s):	Nikolas Asproudas, Environmental Officer		
Inspector(s):	Amy Jankowiak, Department of Ecology, Water Quality Program		
# passengers/crew:	~1870/~909		

The MERCURY arrived on May 22nd, 2008 at the Port of Seattle to begin the 2008 cruise season. The vessel was here once in May, then returned to Seattle for a handful of calls in April and then returned again in September for shorter 3-4 day cruises between Washington and Canada to finish the season. The vessel has been holding effluent and not discharging in MOU waters since the beginning of the season.

Biopure is a marine sanitation device including aeration, settling, and chlorination for blackwater only. This system is run at all times.

Rochem Advanced Waste Water Purification System: The Rochem combines blackwater from the Biopure system and graywater and includes prefiltration, reverse osmosis in two stages with aeration and UV disinfection. The Rochem system is only run for a couple of hours now and then to maintain functionality. There is not enough capacity in the AWTS to treat all of the wastewater.

Section B: Areas Evaluated

☒	Black/Gray wastewater system	☒	Residual solids	☒	Records/Reports	☒	Hazardous Waste/Solid Waste	☐	Sampling/ Monitoring
☒	Discharge locations	☒	Operations & Maintenance	☒	Sludge Handling/ Disposal	☒	Oily bilge water	☒	Other

Section C: For vessels discharging ≥ 1nm from berth and ≥ 6 knots only [2.1.3(A)]

☐	Schematics match black/gray wastewater system	
☐	Operations as described in submitted documentation	
☐	Daily 24-hour continuous monitoring for turbidity or equivalent monitoring	
☐	Turbidimeter or equivalent monitoring equipment functioning properly	
	Turbidity or equivalent : Last calibration – Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:	
☐	Auto shut down or operational controls to insure system shut down if high turbidity occurs	
☐	Disinfection system operated and maintained properly	
	Disinfection System:	

Section D: For vessels discharging continuously [2.1.3(B)]

☐	Schematics match black/gray wastewater system	
☐	Operations as described in submitted documentation	

☐	Daily 24-hour continuous turbidity or equivalent monitoring	
☐	Turbidimeter or equivalent monitoring equipment functioning properly	
	Turbidity or equivalent : Last calibration – Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:	
☐	Auto shut down or operational controls to insure system shut down if a high turbidity occurs	
☐	Disinfection immediately prior to discharge	
☐	Disinfection system operated and maintained properly	
	Disinfection System:	

Section E: General (Approved to Discharge)		
☐	No discharges within ½ mile from shellfish beds/protocol (President's Point, Apple Tree Cove, Tyee Shoal)	
☐	Discharges immediately stopped when high turbidity occurs	
☐	Immediate notifications made to Health for disinfection system upset	
☐	Sampling conducted 2/month, 1/month in Seattle (BOD, TSS, fecal coliform, pH, chlorine residual)	
☐	Whole Effluent Toxicity Testing 1 per 2 years (homeported) or once/40 calls for continuous	
☐	Discharges immediately stopped when GI >2% passengers or crew	
☐	Immediate notifications to Health for GI>2% passengers or crew	

Section F: General		
☒	Discharge records review	Discharge records were reviewed (blackwater/graywater/residual solids) and are maintained properly. No discharges in MOU waters were present from the beginning of the 2008 cruise season to present.
☒	Residual solids managed properly/ disposal protocol per MOU	Residual solids are incinerated.
☒	Hazardous Waste managed properly	Hazardous waste collected is being landed ashore in Canada. Records reviewed showed no off-loads in Washington State.
☒	WA Haz Waste guidelines followed (appendix vii)	Hazardous waste collected is being landed ashore in Canada. Records reviewed showed no off-loads in Washington State.
☒	Solid Waste managed properly	Solid waste appeared to be managed properly. The various solid waste streams are collected, sorted, stored, and sent ashore or incinerated as appropriate.
☒	Oily bilge water managed properly	Oily bilge water is treated and discharged at less than 15 ppm (and typically less than 5 ppm) and at greater than 12 nautical miles.
Other:		

Health = Washington State Department of Health

Section G: Sample Results

Parameter	Results
Biochemical Oxygen Demand 5-Day (BOD)	Not Applicable
Total Suspended Solids (TSS)	Not Applicable
Fecal Coliform	Not Applicable
Residual Chlorine	Not Applicable
pH	Not Applicable
Ammonia, Nitrogen	Not Applicable

Section H: Summary of Findings/Comments

Introduction
Amy Jankowiak, Washington State Department of Ecology (Ecology) Northwest Regional Office, Water Quality Program, conducted the inspection of the Celebrity Cruises MERCURY on September 22, 2008. The main contact on board the MERCURY included Nikolas Asproudas, Environmental Officer. Prior notification of the visit was given on September 16, 2008 for security protocol. The purpose of the inspection was to evaluate compliance with the *Memorandum of Understanding Cruise Operations in Washington State* (MOU), as amended. The MERCURY has not requested and is not approved for discharge in Washington State.

Inspection
I arrived and boarded the ship (photo #01) at 9:06 am and began with introductions and a plan for the day. We then discussed discharge protocols for various waste streams, reviewed navigation/discharge plans for the short 3-4 day cruises and notification procedures. Discharge records were reviewed for black water and gray water discharges and showed no discharges in Washington waters from the beginning of the cruise season to date. Records were also reviewed for garbage and recycling. We then took a look at the garbage and recycling areas. Next, we headed down to the Biopure system to view the components. We also toured some of the discharge ports (photos #28, #29, & #31) and the oily water separators. I then concluded with a de-briefing and disembarked the vessel at about 11:44 am.

Discharge Protocols:
The MERCURY has not requested, and is not approved to discharge in waters subject to the MOU. All blackwater is treated with a marine sanitation device (MSD), Biopure, and is discharged outside of MOU waters. Currently, untreated graywater is sent to a holding tank and discharged outside of MOU waters along with the MSD treated blackwater. This season, the vessel is running three or four day cruises between Seattle and Canada, and is discharging all blackwater and graywater in pre-designated areas in Canadian waters near Victoria, in Canada (photo #04) at the north end of the Strait of Georgia (photo #03), or off of Washington's coast west of the entrance to the Strait of Juan de Fuca (outside of 12 nautical miles and outside of the Olympic Coast National Marine Sanctuary – photo #02). All discharges are logged in the *Sewage and Graywater Discharge Record Book* based on the coordinates from the bridge.

The Captain of the vessel requested that I look at the plotted discharge location west of the entrance to the Strait of Juan de Fuca to confirm that the locations are allowed by the MOU. As the location is outside of the MOU waters and outside of the Olympic Coast National Marine Sanctuary, the location appears to be compliant with the MOU. The Environmental Officer and vessel staff conducted extensive pre-planning accounting for the vessels itinerary, route, and holding tank capacity in order to assure that all discharges would take place in accordance with regulations and the MOU.

Sewage residuals (sludge or biomass) are strained and incinerated. Food waste is pulped (photo #11) and then either incinerated or discharged at greater than 12 nautical miles from shore. The galley water goes to the graywater holding tanks. Some of the food waste such as bones, meat, and fruit with heavy skins (photo #14) cannot be pulped and is therefore mixed with some cardboard material and incinerated. Cooking oil is collected to tanks (photo #15) and incinerated about every 20 days.

Laundry water is sent to the graywater holding tanks along with shower and sink water from accommodations and throughout the vessel. The graywater is not treated, but held for discharge outside of MOU waters. Spa/Jacuzzi water is discharged outside of MOU waters and at greater than four nautical miles. The vessel bunkers for potable water periodically and produces most by desalinization with evaporators and a reverse osmosis system. A descaler is used for the evaporators. Ballast water can be treated with a ballast treatment system (photo #27), but the vessel does not need to exchange ballast near the MOU waters.

A reduction of laundry water usage and other water conservation efforts have been made in order to minimize the wastewater produced and to allow for longer holding times of the wastewater.

Oily bilge water is treated with the Turbulo (photo #21) and Marinfloc systems (oily water separators – photo #22). There is no white box for the systems.

The drains from the medical facility go to the blackwater system (photo #23). Sharps are collected in sharps containers, are then boxed and landed ashore as biohazard waste. Red bag waste from the medical facility is incinerated. Expired medications and narcotics are logged, and with witnesses incinerated outside of 12 nautical miles.

For all discharges, the bridge first confirms that they are in a proper discharging location and then contacts the engine control room to open the valves. The discharge ports are locked and only the key staff have the keys.

Dry cleaning currently uses Perchloroethylene (PERC) which is collected and off-loaded as hazardous waste. Photo waste is

treated to less than 5 ppm through silver recovery along with x-ray waste. Fluorescent light bulbs are crushed with the bulb eater with mercury vapor removal (photo #13). Materials such as paint, batteries, fluorescent bulb waste, photo/x-ray waste and oily sludge are landed ashore in Canada as hazardous waste. All hazardous waste records showed that all off-loads occurred outside of Washington State.

Materials such as aluminum (photo #10), cardboard (photo #08), paper, glass (photos #07 & #09), plastics (photo #16), scrap metal and electronics are recycled (photo #17). The vessel has improved its recycling percentages from about 10 percent in 2006 to about 70 percent in 2008. The recycled material is usually landed ashore in Vancouver, Canada or Victoria, Canada. Some papers, food-contaminated cardboard, some plastics, some biohazardous materials, some food waste, oily rags, and sewage residuals are incinerated (photos #12 & #30).

Notifications numbers were posted on the bridge (photo #05) for both MOU non-compliance and oil discharges. The MOU non-compliance notification sheet is the most recent version including the numbers for the Washington State Department of Health. A copy of the most recent version of the MOU was on-board and available.

Blackwater and Graywater Systems:
The marine sanitation device (MSD), Biopure, operates by first collecting blackwater into a storage collection tank (photo #24). The wastewater then flows into the Biopure system (four separate identical units) by suction. The system (photo #18) includes aeration, pH adjustment, some settling by addition of polymer, and chlorination for disinfection all in one tank partially divided. Solids cleaned out of the tank are strained and incinerated periodically. Effluent from the Biopure system is sent to a holding tank prior to discharge (or is sent to the AWTS if operating). Staff take on-board samples (photo #19) for COD, TSS, pH and chlorine about weekly for process control.

The advanced wastewater treatment system (AWTS) Rochem, is currently only turned on for a couple of hours to maintain functionality. The vessel is not certified or approved this year for discharge in Alaska.

Samples were not taken, as the vessel does not discharge in MOU waters.

Conclusions and Recommendations
Mr. Asproudas, the Environmental Officer, was very knowledgeable of the wastewater system and other environmental systems and protocols.

The increased attention to minimization of waste is impressive. The increased recycling volumes and decreased water usage shows great responsibility towards reducing waste.

The inspections that occurred in 2006 of the MERCURY vessel yielded the discovery of unauthorized discharges and a fine for the company. The inspection on October 8, 2007 and September 22, 2008 showed a great deal of improvement with understanding the locations of waters of the state, waters of the MOU, and discharge protocols. The Environmental Officer and vessel staff conducted extensive pre-planning accounting for the vessels itinerary, route, and holding tank capacity in order to assure that all discharges would take place in accordance with regulations and the MOU.

At the end of the 2006 season, Celebrity Cruises stated that they would likely install a Hamworthy Membrane Bioreactor advanced wastewater treatment system on board the MERCURY that would have the capacity to treat all of the wastewater produced. A test installation was done on another Celebrity Cruises vessel, but due to technical problems, the Line is reevaluating the technology and configuration. This vessel may not return to this route next season.

Attachments:
Photographs

Copies to:
Rich Pruitt, RCCL
Nikolas Asproudas, MERCURY EO
Amy Jankowiak, Ecology
Kevin Fitzpatrick, Ecology
Mark Toy, Dept. of Health
Central Files: Celebrity Cruises – MERCURY; WQ 6.1

Section I: Signatures

Name and Signature of Inspector	Agency/Office/Telephone	Date
Amy Jankowiak Amy Jankowiak	Department of Ecology/Northwest Regional Office/Water Quality Program/Municipal Compliance Specialist/(425) 649-7195	9/29/08
Name and Signature of Reviewer	**Agency/Office/Telephone**	**Date**
Kevin C. Fitzpatrick Kevin C. Fitzpatrick	Department of Ecology/Northwest Regional Office/Water Quality Section Manager/(425) 649-7033	9/29/08

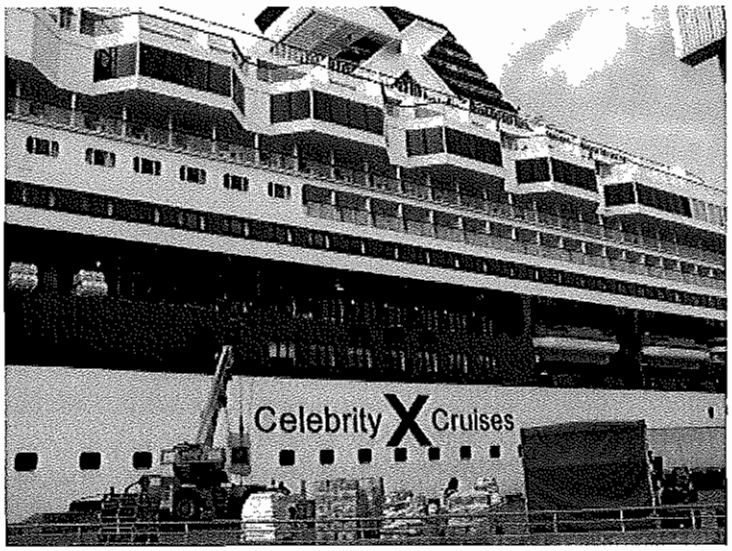

PHOTO #:01 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220046
DESCRIPTION: MERCURY VESSEL, SEATTLE

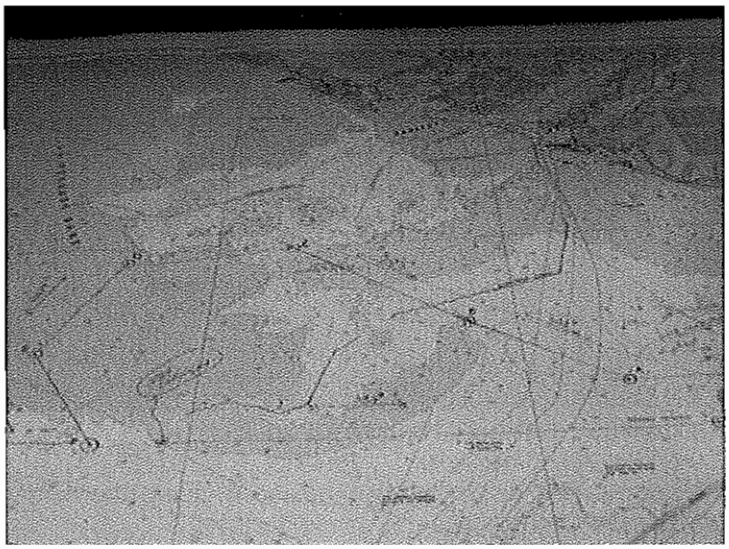

PHOTO #:02 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220012
DESCRIPTION: MAPS SHOWING DISCHARGE LOCATIONS – WEST OF STRAIT OF JUAN DE FUCA

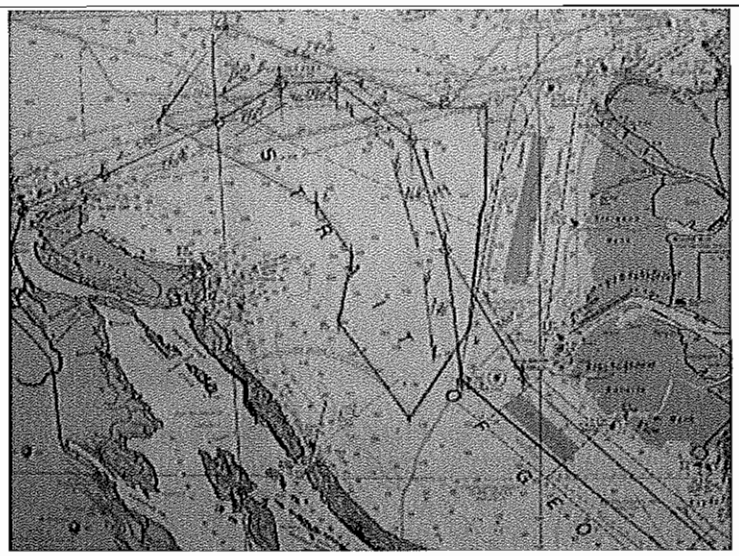

PHOTO #:03 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220014
DESCRIPTION: MAPS SHOWING DISCHARGE LOCATIONS – NORTH END OF STRAIT OF GEORGIA

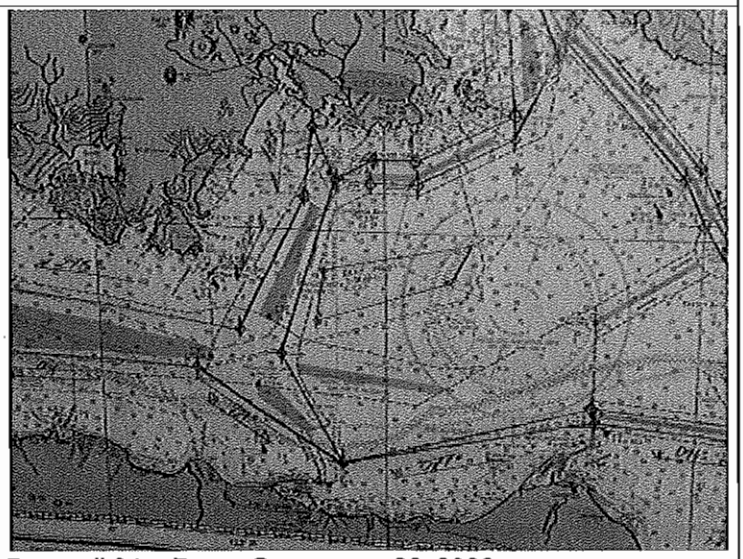

PHOTO #:04 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220015
DESCRIPTION: MAPS SHOWING DISCHARGE LOCATIONS – SOUTH OF VICTORIA

PHOTO #:05 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220013
DESCRIPTION: NOTIFICATION PLACARD AND WASHINGTON/MOU WATERS MAP ON BRIDGE

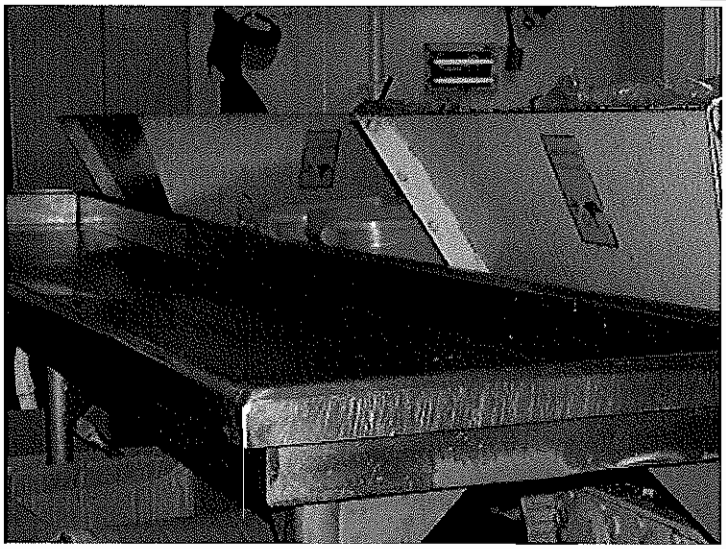

PHOTO #:06 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220016
DESCRIPTION: GARBAGE/RECYCLING SORTING AREA

PHOTO #:07 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220017
DESCRIPTION: GLASS SORTING AREA

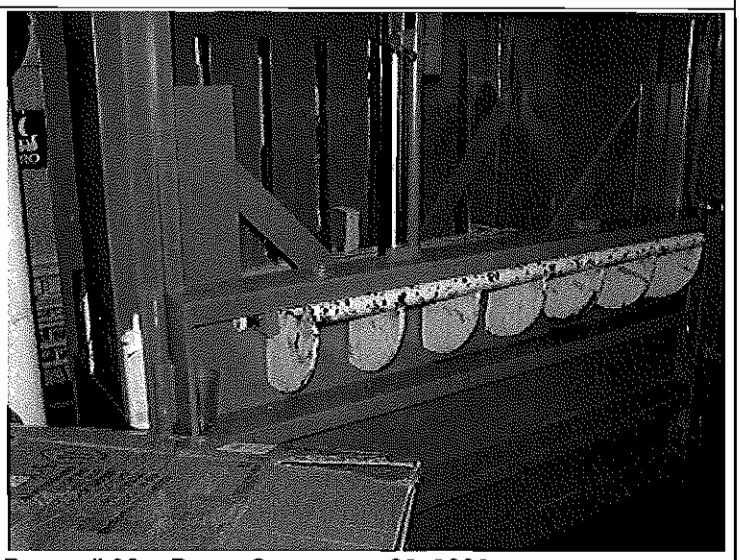

PHOTO #:08 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220018
DESCRIPTION: CARDBOARD COMPACTOR

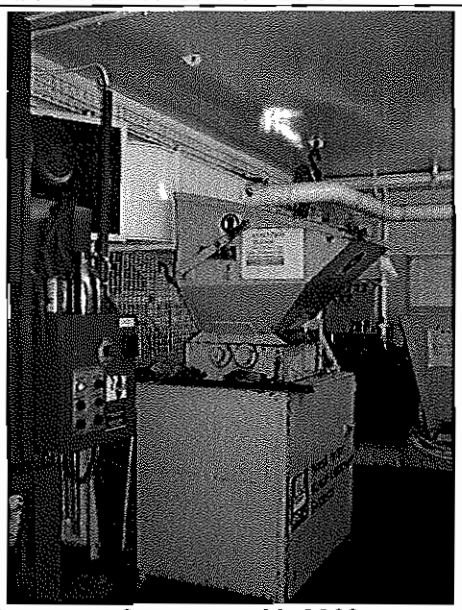

PHOTO #:09 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220019
DESCRIPTION: GLASS CRUSHER

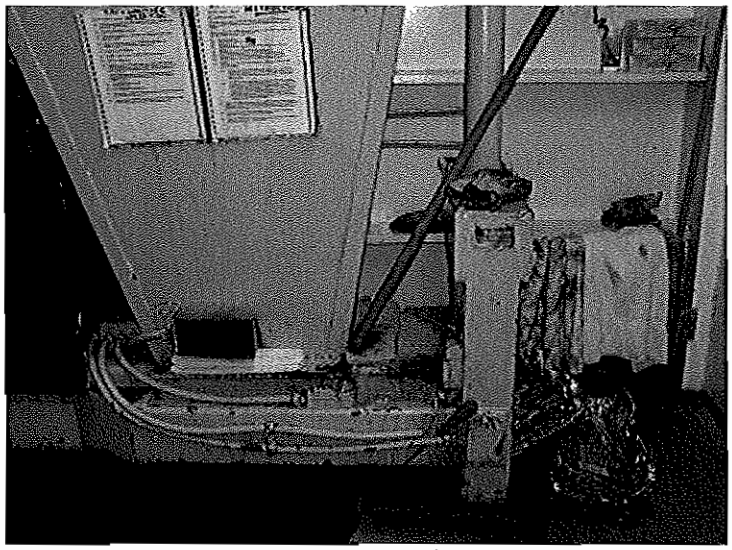

PHOTO #:10 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220020
DESCRIPTION: CAN COMPACTOR

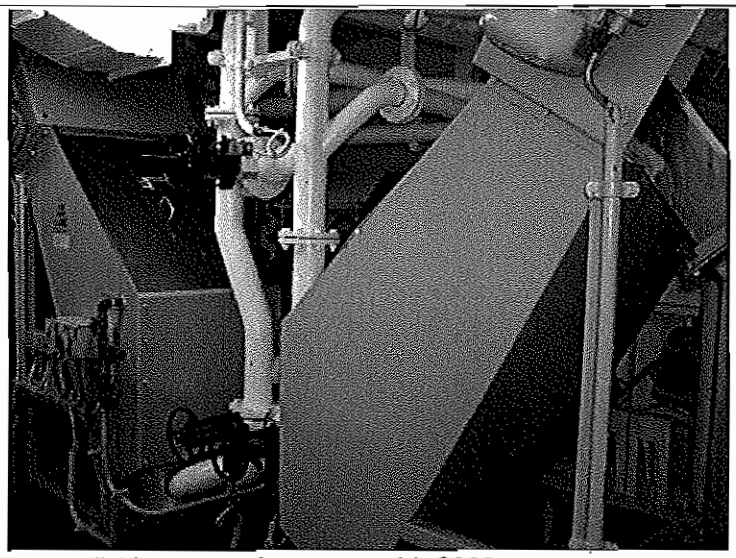

PHOTO #:11 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220021
DESCRIPTION: FOOD EXTRACTORS

PHOTO #:12 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220022
DESCRIPTION: INCINERATOR MATERIAL

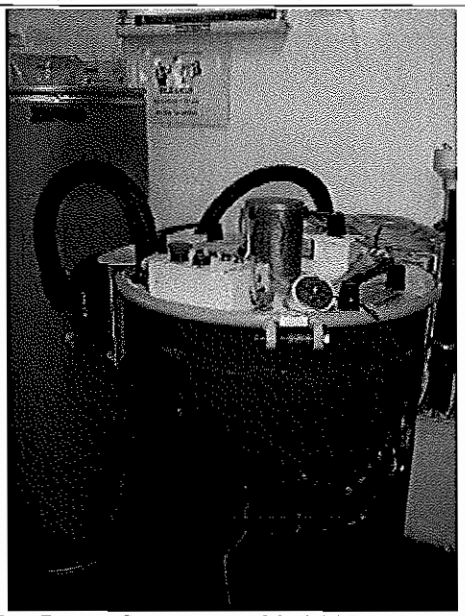

PHOTO #:13 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220023
DESCRIPTION: FLUORESCENT BULB CRUSHER/MERCURY REMOVAL SYSTEM

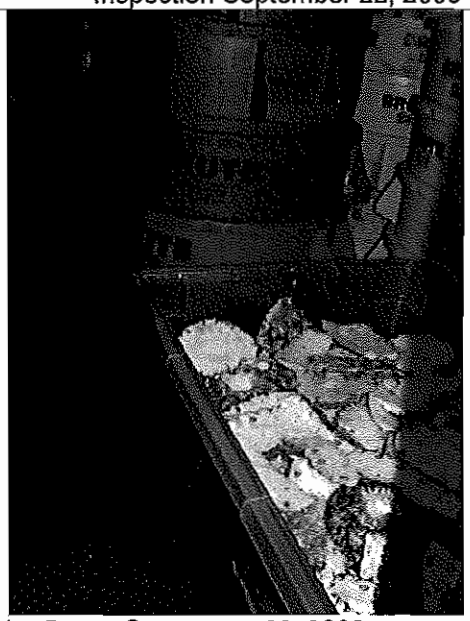

PHOTO #:14 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220024
DESCRIPTION: COLD STORAGE – FOOD WASTE FOR INCINERATION

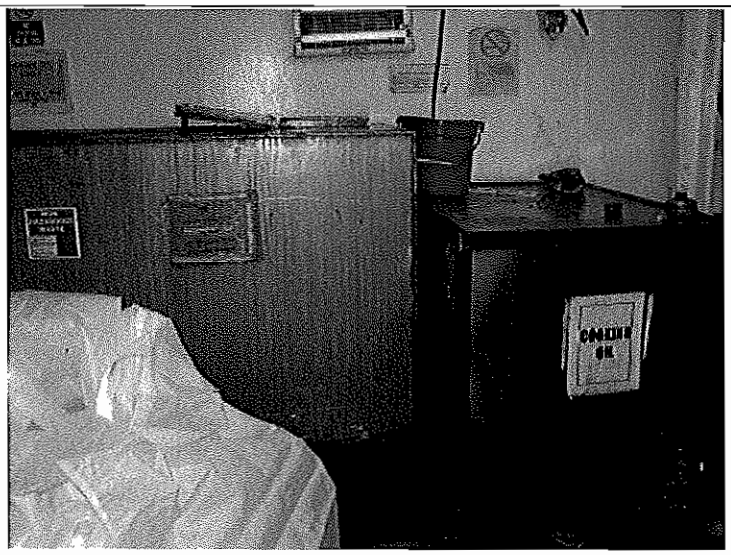

PHOTO #:15 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220025
DESCRIPTION: COOKING OIL STORAGE

PHOTO #:16 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220026
DESCRIPTION: PLASTIC RECYCLABLES FOR OFF-LOADING

PHOTO #:17 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220027
DESCRIPTION: RECYCLABLES FOR OFF-LOADING

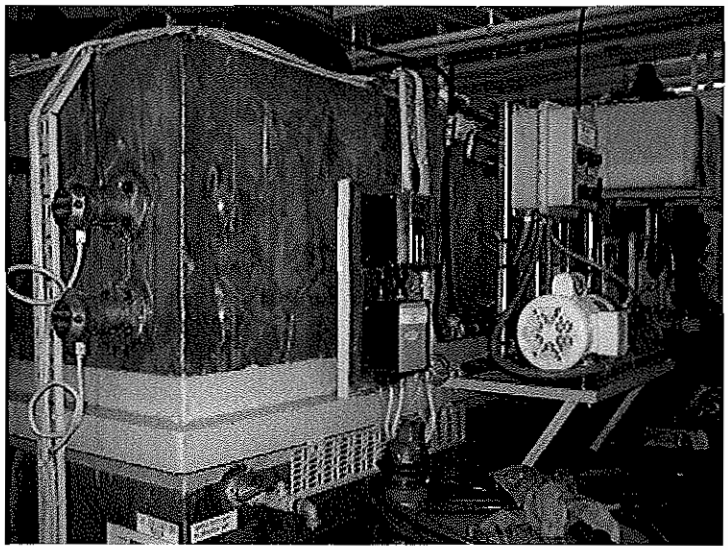

PHOTO #:18 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220028
DESCRIPTION: MARINE SANITATION DEVICE (1 OF 4)

PHOTO #:19 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220029
DESCRIPTION: MARINE SANITATION DEVICE SAMPLING POINT

PHOTO #:20 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220030
DESCRIPTION: MARINE SANITATION DEVICE - BLACKWATER VIEWING LINE

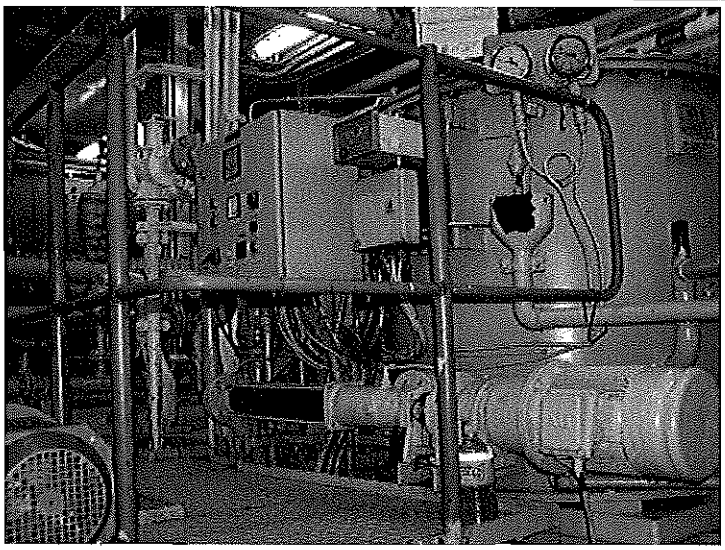

PHOTO #:21 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220031
DESCRIPTION: OILY WATER SEPARATOR (TURBULO)

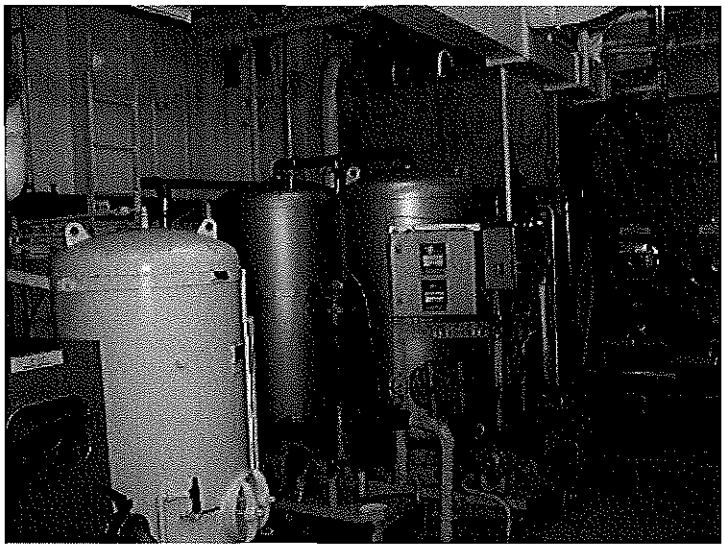

PHOTO #:22 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220032
DESCRIPTION: OILY WATER SEPARATOR (MARIN FLOC)

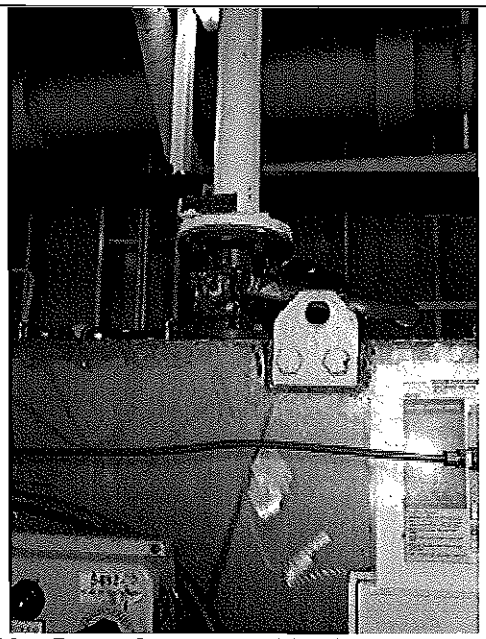

PHOTO #:23 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220033
DESCRIPTION: MARINE SANITATION DEVICE (MEDICAL WASTE ENTERS – RED)

PHOTO #:24 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220034
DESCRIPTION: VACUUM UNIT FOR BLACKWATER

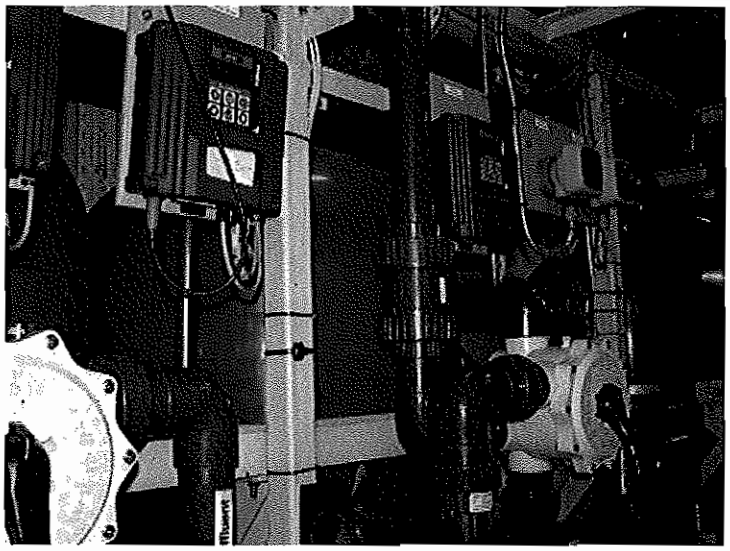

PHOTO #:25 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220035
DESCRIPTION: REVERSE OSMOSIS SYSTEM FOR WATER PRODUCTION

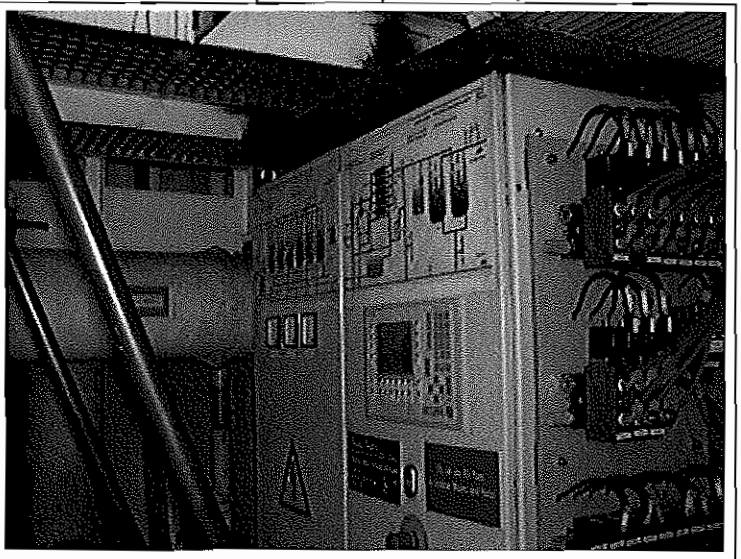

PHOTO #:26 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220036
DESCRIPTION: REVERSE OSMOSIS SYSTEM FOR WATER PRODUCTION

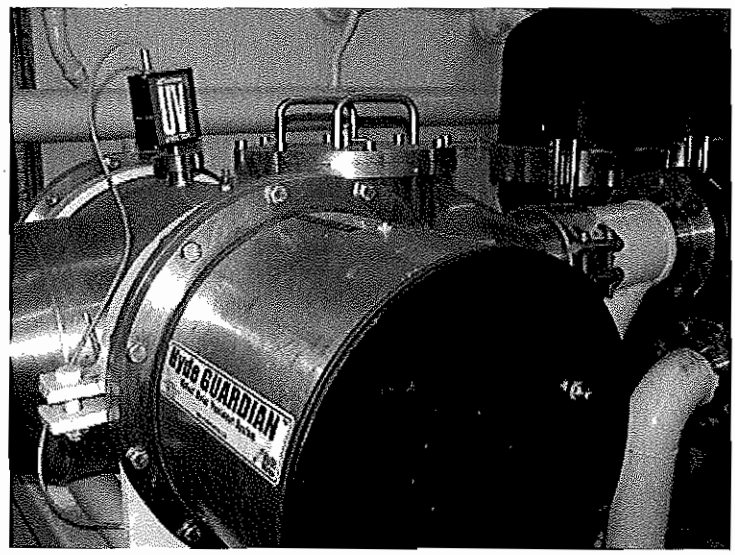

PHOTO #:27 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220039
DESCRIPTION: BALLAST WATER SYSTEM

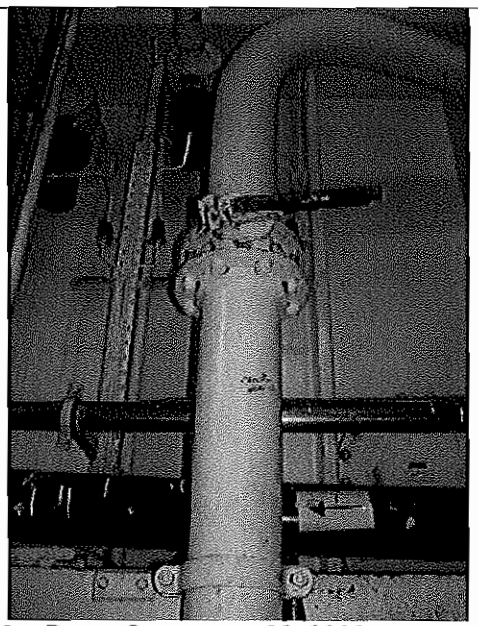

PHOTO #:28 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220040
DESCRIPTION: DISCHARGE VALVE

PHOTO #:29 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220041
DESCRIPTION: DISCHARGE PORT

PHOTO #:30 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220044
DESCRIPTION: INCINERATORS

PHOTO #:31 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: P9220045
DESCRIPTION: FOOD WASTE DISCHARGE PORT

State of Washington Department of Ecology

Cruise Ship Memorandum of Understanding, Cruise Operations in Washington State Inspection Report

Northwest Regional Office
3190 160th Ave SE
Bellevue, WA 98008
Phone: (425) 649-7000 Fax: (425) 649-7098

Section A: General Information

Vessel Name:	MILLENNIUM	Date:	October 1, 2008
Vessel Operator:	Celebrity Cruises	Entry Time:	10:05 AM
Vessel Type	Passenger Ship	Exit Time:	11:50 AM
Location:	Terminal 66, Seattle	Notification (name & date):	Rich Pruitt; September 26, 2008
On-board contact(s):	Ronald Raasch, Environmental Officer		
Inspector(s):	Amy Jankowiak, Department of Ecology, Water Quality Program		
# passengers/crew:	~1950/~999		

The MILLENNIUM made four port calls to Seattle, on May 8th, May 22nd, September 21st, and October 1st. The first couple of calls were on route to Alaska, and the last couple of calls were for shorter 3-4 day cruises between Canada and Washington. The rest of the season, the vessel's route is between Vancouver, B.C. and Alaska. The vessel has been holding effluent and not discharging in MOU waters for all of the calls in MOU waters this season.

Section B: Areas Evaluated

☒	Black/Gray wastewater system	☒	Residual solids	☒	Records/Reports	☒	Hazardous Waste/Solid Waste	☐	Sampling/ Monitoring
☒	Discharge locations	☒	Operations & Maintenance	☒	Sludge Handling/ Disposal	☒	Oily bilge water	☒	Other

Section C: For vessels discharging ≥ 1nm from berth and ≥ 6 knots only [2.1.3(A)]

☐	Schematics match black/gray wastewater system	
☐	Operations as described in submitted documentation	
☐	Daily 24-hour continuous monitoring for turbidity or equivalent monitoring	
☐	Turbidimeter or equivalent monitoring equipment functioning properly	
	Turbidity or equivalent : Last calibration – Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:	
☐	Auto shut down or operational controls to insure system shut down if high turbidity occurs	
☐	Disinfection system operated and maintained properly	
	Disinfection System:	

Section D: For vessels discharging continuously [2.1.3(B)]

☐	Schematics match black/gray wastewater system	
☐	Operations as described in submitted documentation	
☐	Daily 24-hour continuous turbidity or equivalent monitoring	
☐	Turbidimeter or equivalent monitoring equipment functioning properly	
	Turbidity or equivalent :	

	Last calibration – Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:	
☐	Auto shut down or operational controls to insure system shut down if a high turbidity occurs	
☐	Disinfection immediately prior to discharge	
☐	Disinfection system operated and maintained properly	
	Disinfection System:	

Section E: General (Approved to Discharge)		
☐	No discharges within ½ mile from shellfish beds/protocol (President's Point, Apple Tree Cove, Tyee Shoal)	
☐	Discharges immediately stopped when high turbidity occurs	
☐	Immediate notifications made to Health for disinfection system upset	
☐	Sampling conducted 2/month, 1/month in Seattle (BOD, TSS, fecal coliform, pH, chlorine residual)	
☐	Whole Effluent Toxicity Testing 1 per 2 years (homeported) or once/40 calls for continuous	
☐	Discharges immediately stopped when GI >2% passengers or crew	
☐	Immediate notifications to Health for GI>2% passengers or crew	

Section F: General		
☒	Discharge records review	Discharge records were reviewed (blackwater/graywater/residual solids) and are maintained properly. No discharges in MOU waters were present from the beginning of the 2008 cruise season to present.
☒	Residual solids managed properly/ disposal protocol per MOU	Residual solids are discharged outside of MOU waters, outside of 12 nautical miles (at >6knots), and outside the Olympic Coast National Marine Sanctuary.
☒	Hazardous Waste managed properly	Hazardous waste that is collected is being landed ashore in locations outside of Washington State.
☒	WA Haz Waste guidelines followed (appendix vii)	Hazardous waste that is collected is being landed ashore in locations outside of Washington State.
☒	Solid Waste managed properly	Solid waste appeared to be managed properly. The various solid waste streams are collected, sorted, stored, and sent ashore or incinerated as appropriate.
☒	Oily bilge water managed properly	Oily bilge water is treated and discharged at less than 15 ppm (and typically less than 5 ppm) and at greater than 12 nautical miles.
Other:		

Health = Washington State Department of Health

Section G: Sample Results

Parameter	Results
Biochemical Oxygen Demand 5-Day (BOD)	Not Applicable
Total Suspended Solids (TSS)	Not Applicable
Fecal Coliform	Not Applicable
Residual Chlorine	Not Applicable
pH	Not Applicable
Ammonia, Nitrogen	Not Applicable

Section H: Summary of Findings/Comments

Introduction

Amy Jankowiak, Washington State Department of Ecology (Ecology) Northwest Regional Office, Water Quality Program,

conducted the inspection of the Celebrity Cruises MILLENNIUM on October 1, 2008. The main contacts on board the MILLENNIUM included Ronald Raasch, Environmental Officer, and Dimitris Linas, AWP Project Engineer. Prior notification of the visit was given on September 26, 2008 for security protocol. The purpose of the inspection was to evaluate compliance with the *Memorandum of Understanding Cruise Operations in Washington State* (MOU), as amended. The MILLENNIUM has not requested and is not approved for discharge in Washington State.

The MILLENNIUM was placed into service in 2000, and is 964.6 feet long with a width of 105.6 feet.

Inspection

I arrived and boarded the ship (photo #01) at 10:05 am and began with introductions and a plan for the day. We then discussed discharge protocols for various waste streams. Discharge records were reviewed for black water and gray water discharges and showed no discharges in Washington waters from the beginning of the cruise season to date. Next, we headed down to the Hydroxyl system to view the components. We then looked at the garbage and recycling areas. We also reviewed the discharge location navigational maps for the shorter local cruises. I then concluded with a de-briefing and disembarked the vessel at about 11:50 am.

The MILLENNIUM made four port calls to Seattle, on May 8th, May 22nd, September 21st, and October 1st. The first couple of calls were on route to Alaska, and the last couple of calls were for shorter 3-4 day cruises between Canada and Washington. The rest of the season, the vessel's route is between Vancouver, B.C. and Alaska.

Discharge Protocols:

The MILLENNIUM has not requested, and is not approved to discharge in waters subject to the MOU. All black water and gray water is treated with an advanced wastewater treatment system (AWTS), Hydroxyl, and is discharged outside of MOU waters. At the end of the season, for the shorter, local cruises, the vessel is discharging all black water and gray water in pre-designated areas in Canadian waters near Victoria, Canada (photo #28) and at the north end of the Strait of Georgia in Canadian waters. All discharges are logged in the *Sewage and Graywater Discharge Record Book* based on the coordinates from the bridge. When a discharge is to occur, the bridge contacts the Engine Control Room and authorized staff allow the discharge and record the information. The discharge ports are padlocked.

Sewage residuals (sludge or biomass) are collected in the bio-residue tank and are held until discharged at greater than 12 nautical miles from shore, at greater than six knots, and outside of MOU waters and the Olympic Coast National Marine Sanctuary.

Most of the food waste is pulped (photo #24) and discharged outside of MOU waters and outside 12 nautical miles. The water from the pulper is recycled and occasionally drained to the gray water for treatment. The food waste disposal areas are monitored regularly by the Environmental Officer. The galley water goes to the gray water holding tanks. Some of the food waste such as bones, meat, and fruit with heavy skins cannot be pulped and are therefore incinerated. Cooking oil is collected to tanks and is off-loaded shore-side for disposal or recycling.

Pool and spa water is de-chlorinated and discharged outside of 12 nautical miles.

Oily bilge water is treated with the Turbulo system first and then a Marinfloc system second (oily water separators) to less than 5 ppm. There is a white box for the systems.

The vessel bunkers for potable water frequently in Alaska and produces the rest by desalinization with evaporators. A descaler is used for the evaporators.

Laundry water is sent to the gray water holding tanks along with shower and sink water from accommodations and throughout the vessel. Dry cleaning is done with a system using Perchloroethylene (PERC) which is collected and off-loaded as hazardous waste. The system does not use a lot of PERC and produces about one drum per six months.

Photo waste is treated to less than 5 ppm through silver recovery along with x-ray waste.

The drains from the medical facility go to the black water system. Sharps are collected in sharps containers, are then boxed and landed ashore as biohazard waste. Red bag waste from the medical facility is incinerated. Expired medications and narcotics are logged, and with witnesses incinerated outside of 12 nautical miles.

Fluorescent light bulbs are crushed with the bulb eater with mercury vapor removal (photo #25). Materials such as paint and thinners, batteries, fluorescent bulb waste, photo/x-ray waste, chemicals, aerosols and oily sludge are landed ashore outside of Washington State as hazardous waste. All hazardous waste records showed that all off-loads occurred outside of Washington State.

Materials such as aluminum (photo #26), tin, cardboard, paper, glass (photo #23), plastics, and scrap metal are recycled (photo #22). Dry garbage and recycling is off-loaded outside of Washington State, with the exception of one visit. Some papers, food-contaminated cardboard, some plastics, some biohazardous materials, and some food wastes are incinerated.

A copy of the most recent version of the MOU was not on-board or available. A link to the most recent version on Ecology's website was sent to the Environmental Officer following the inspection.

Black water and Gray water Systems:
Black water, which includes toilet waste and infirmary drains is collected in collection tanks. Gray water, which includes sink and shower water, along with laundry water and galley water, is sent to collection tanks. The black water and gray water collection then combines at the Advanced Wastewater Purification (AWP), Hydroxyl, system mixing tank (photo #02). Defoamer can be added to the mixing tank as needed (photo #04). From the mixing tank, the wastewater is screened with one of two primary screens (photo #10). The screens are cylinders of mesh filters. The solids are sent to the bio-residue tank (photo #05), while the liquid moves onto the bioreactors. There are three bioreactor stages (photo #03). Air is blown (photo #06) into the bioreactors and both air and levels are monitored with sensors (photo #07). The wastewater is then conveyed to the Dissolved Air Flotation (DAF) units (photos #11, #12, & #13). On the way to the DAFs, polymer is mixed in the line (photos #09 & #14). There are two DAFs. From the DAFs, liquid moves to the polishing filters (photo #16). The two polishing filters have two layers at 10 microns. Any solids collected from the filters or DAF are sent to the bio-residue tank. From the polishing filters, the liquid moves to ultraviolet (UV) light disinfection. There are four UV units (photo #17) of six bulbs each. Total suspended solids (TSS) are monitored both prior to UV (photo #19) and immediately after UV (photo #18). The TSS sensors have not been working properly. The manufacturer will be coming on board shortly to work on them. Effluent from the UV is also monitored for pH (photo #20). Fewer UV units are used when the effluent is going to the holding tank than when the effluent is being immediately discharged. The UV units are self-cleaning with an automatic wiper. There are six water holding tanks to hold the final effluent. The discharge port is padlocked (photo #21).

Samples were not taken, as the vessel does not discharge in MOU waters.

Conclusions and Recommendations
Mr. Raasch, the Environmental Officer, was very knowledgeable of the environmental systems and protocols.

Mr. Linas, the AWP Project Engineer, was very knowledgeable of the AWP Hydroxyl system.

The pre-planning accounting for the vessels itinerary, route, and holding tank capacity is a good way to assure that all discharges would take place in accordance with regulations and the MOU.

Each vessel that calls to a port in Washington should have a copy of the current MOU available. A copy was not available during the inspection.

Attachments:
Photographs

Copies to:
Rich Pruitt, RCCL
Ronald Raasch, MILLENNIUM EO
Amy Jankowiak, Ecology
Kevin Fitzpatrick, Ecology
Mark Toy, Dept. of Health
Central Files: Celebrity Cruises – MILLENNIUM; WQ 6.1

Section I: Signatures		
Name and Signature of Inspector Amy Jankowiak Amy Jankowiak	Agency/Office/Telephone Department of Ecology/Northwest Regional Office/Water Quality Program/Municipal Compliance Specialist/(425) 649-7195	Date 10/16/08
Name and Signature of Reviewer Kevin C. Fitzpatrick Kevin C. Fitzpatrick	Agency/Office/Telephone Department of Ecology/Northwest Regional Office/Water Quality Section Manager/(425) 649-7033	Date 10/16/08

PHOTO #:01 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: PA010042
DESCRIPTION: MILLENNIUM VESSEL, SEATTLE

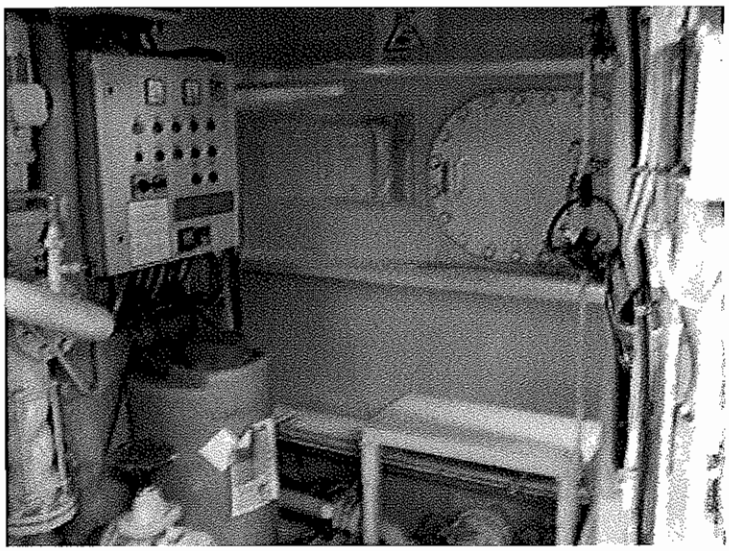

PHOTO #:02 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: PA010012
DESCRIPTION: BLACK WATER AND GRAY WATER MIXING TANK

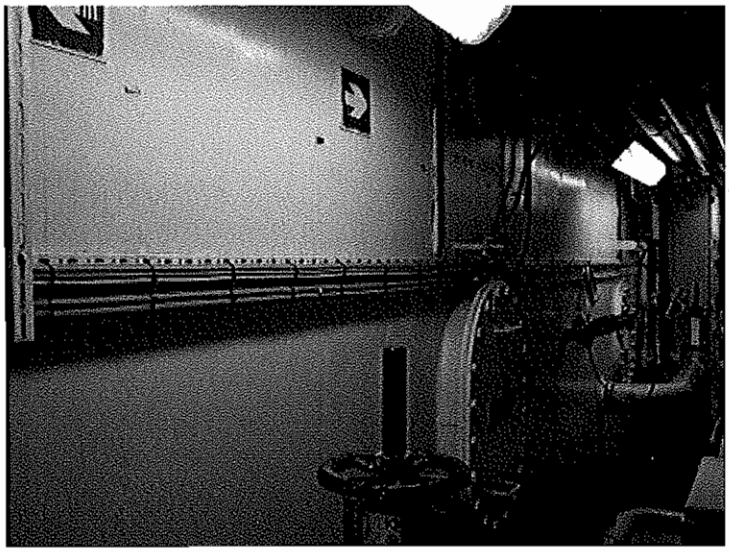

PHOTO #:03 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: PA010014
DESCRIPTION: HYDROXYL BIOREACTORS

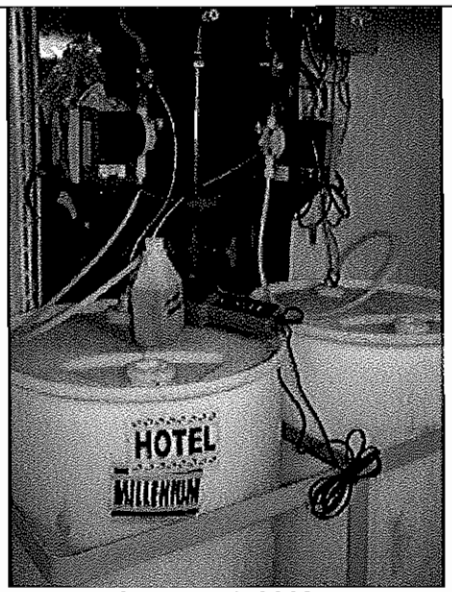

PHOTO #:04 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: PA010016
DESCRIPTION: MIXING TANK DEFOAMER

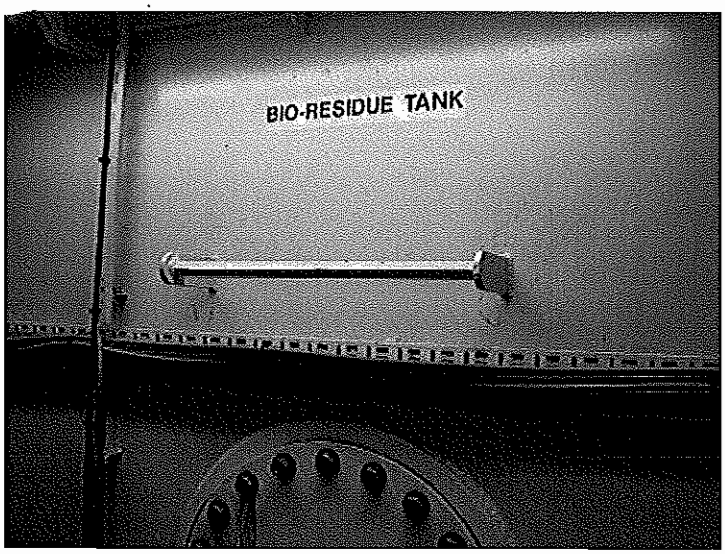

PHOTO #:05 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: PA010017
DESCRIPTION: BIO-RESIDUE TANK (FOR RESIDUAL SOLIDS/BIOMASS)

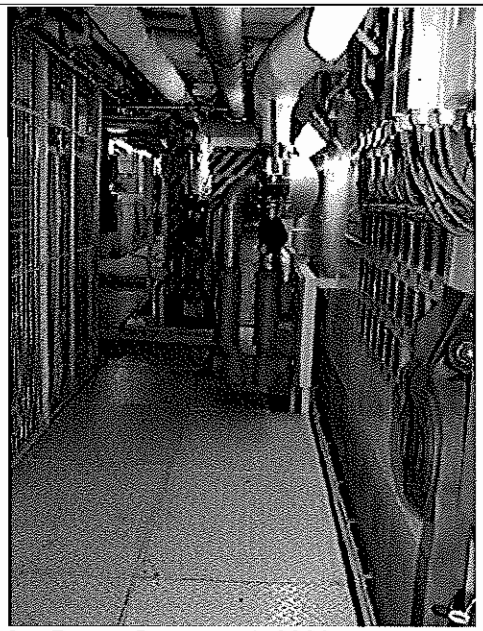

PHOTO #:06 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: PA010018
DESCRIPTION: BLOWERS FOR BIOREACTORS

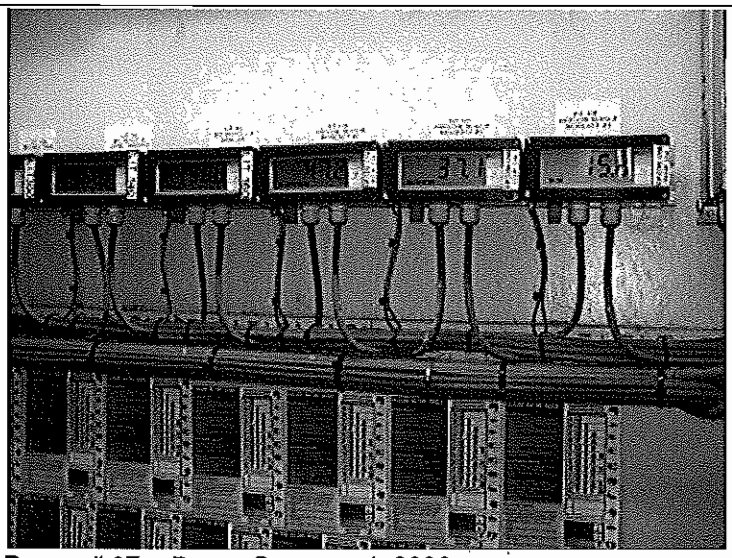

PHOTO #:07 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: PA010019
DESCRIPTION: AIR FLOW AND LEVEL SENSORS FOR BIOREACTORS

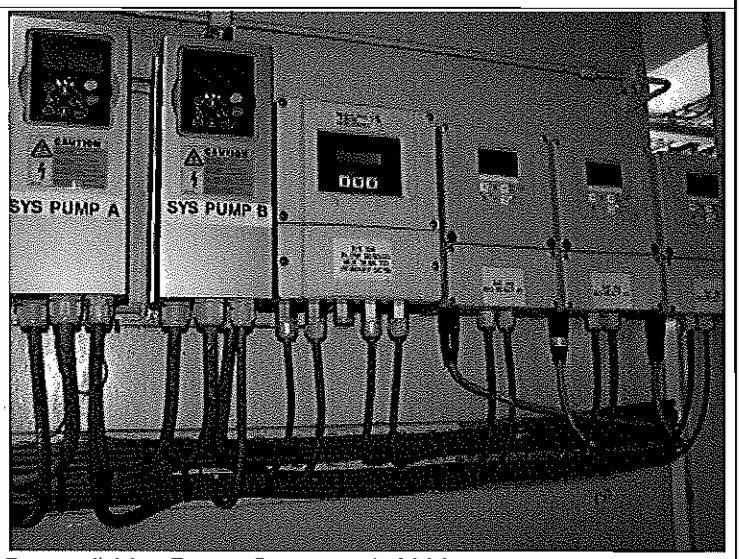

PHOTO #:08 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: PA010020
DESCRIPTION: PUMP SENSORS FOR BIOREACTORS

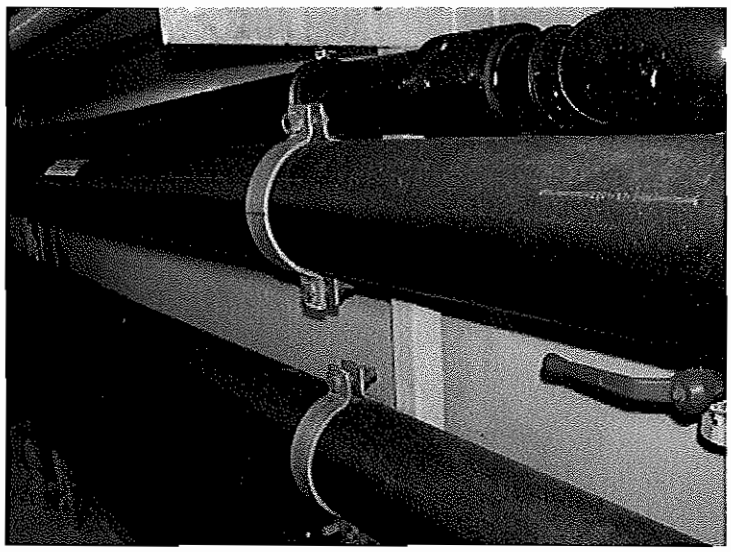

PHOTO #:09 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: PA010021
DESCRIPTION: POLYMER MIXING (PRE-DAF)

PHOTO #:10 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: PA010022
DESCRIPTION: PRIMARY SCREENS (1 OF 2)

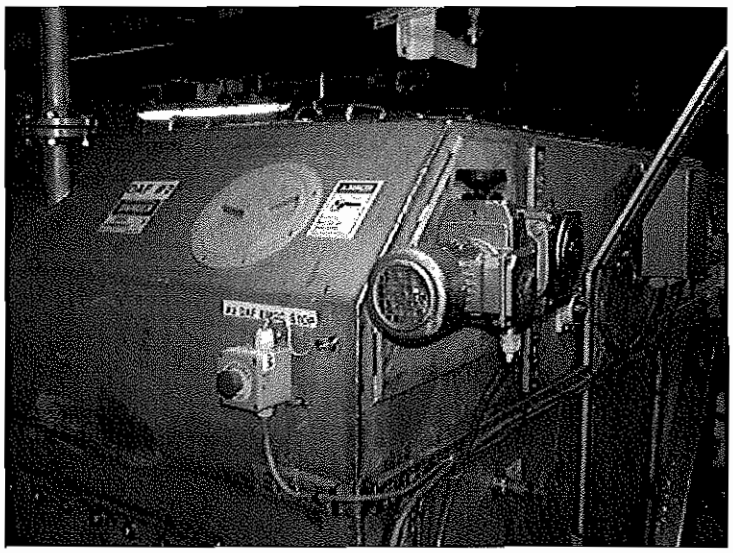

PHOTO #:11 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: PA010023
DESCRIPTION: DISSOLVED AIR FLOTATION (DAF) (1 OF 2)

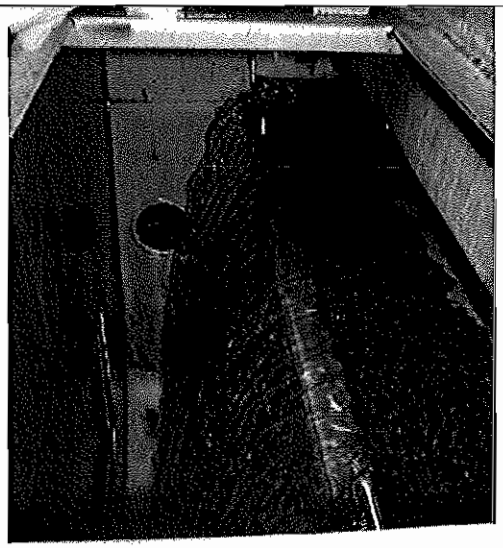

PHOTO #:12 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: PA010024
DESCRIPTION: INSIDE OF DAF

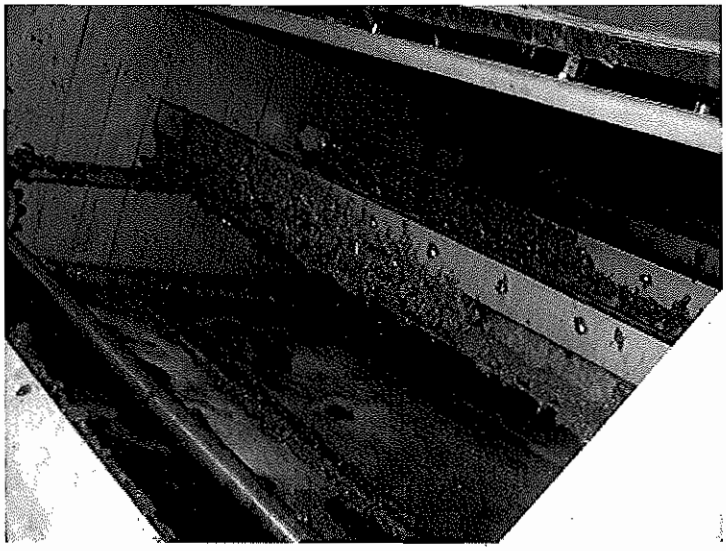

PHOTO #:13 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: PA010025
DESCRIPTION: INSIDE OF DAF

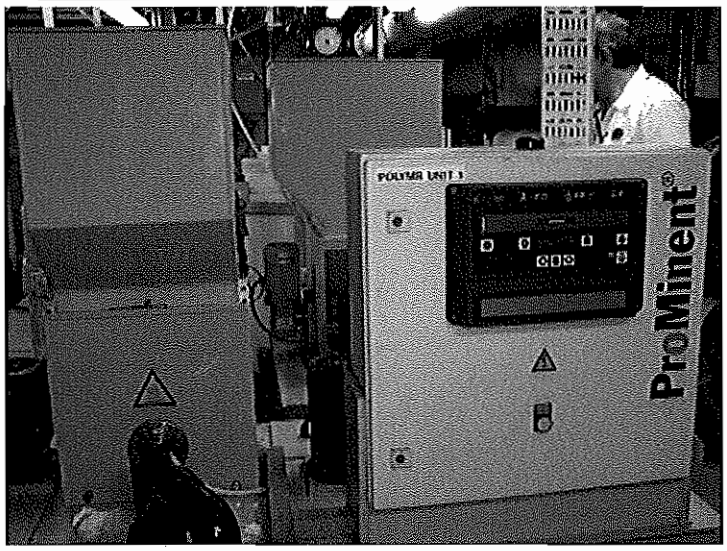

PHOTO #:14 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: PA010026
DESCRIPTION: POLYMER UNITS

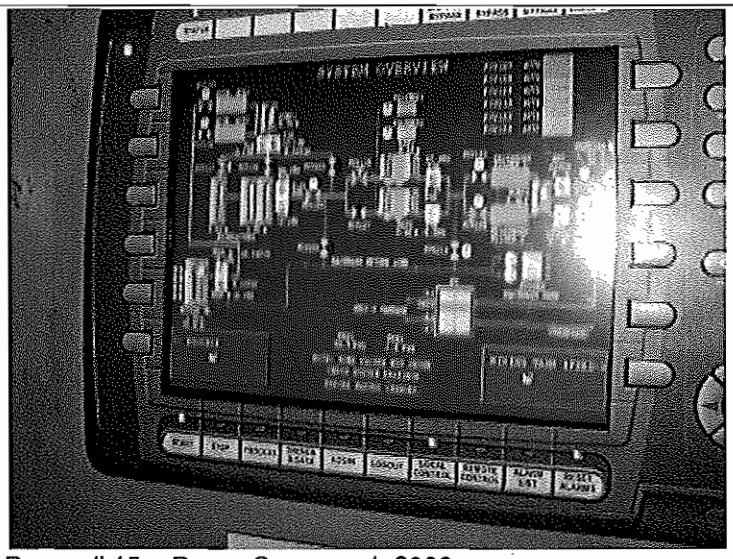

PHOTO #:15 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: PA010027
DESCRIPTION: SYSTEM OVERVIEW/ACCESS ON SYSTEM LEVEL

PHOTO #:16 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: PA010028
DESCRIPTION: POLISHING FILTERS

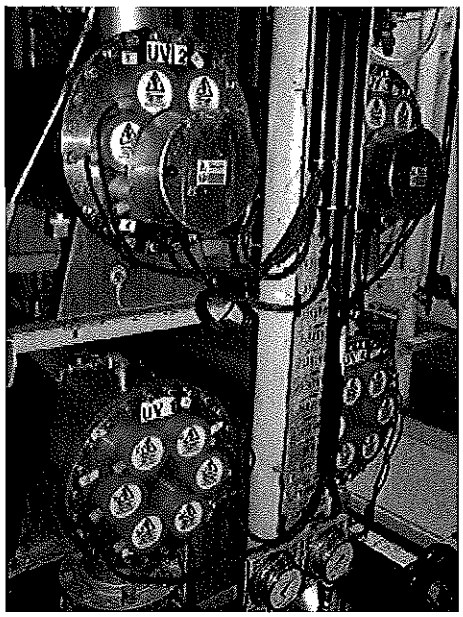

PHOTO #:17 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: PA010029
DESCRIPTION: ULTRAVIOLET DISINFECTION SYSTEM

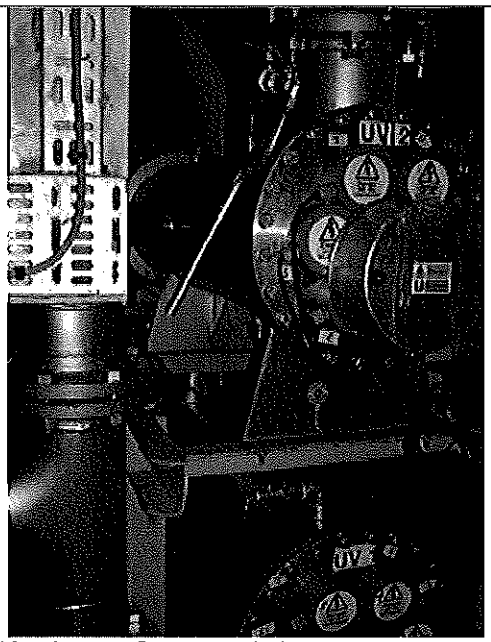

PHOTO #:18 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: PA010030
DESCRIPTION: UV DISINFECTION SYSTEM WITH SAMPLE PORT AND TSS MONITOR UNIT

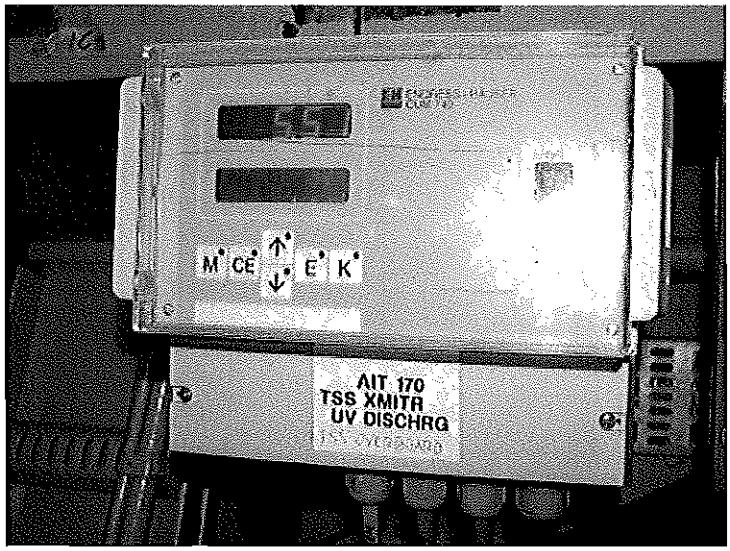

PHOTO #:19 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: PA010031
DESCRIPTION: TSS SENSOR PANEL (PRE UV)

PHOTO #:20 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: PA010032
DESCRIPTION: pH SENSOR FINAL EFFLUENT

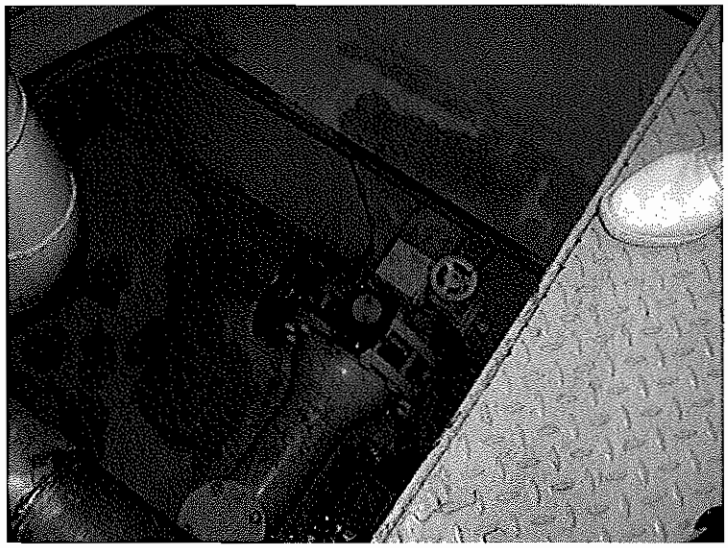

PHOTO #:21 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: PA010033
DESCRIPTION: DISCHARGE PORT FOR HYDROXYL EFFLUENT

PHOTO #:22 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: PA010034
DESCRIPTION: GARBAGE/RECYCLING SORTING AREA

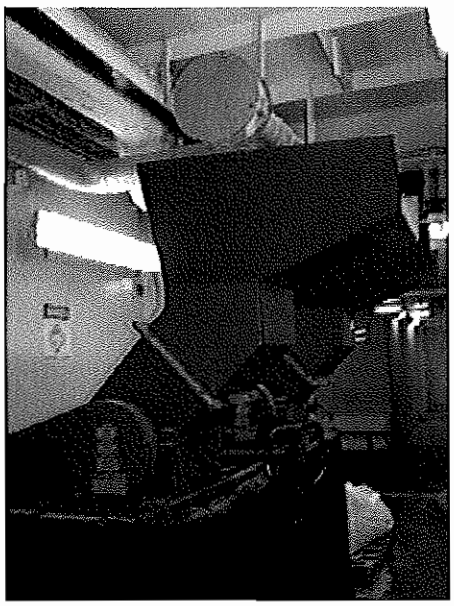

PHOTO #:23 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: PA010036
DESCRIPTION: GLASS CRUSHERS

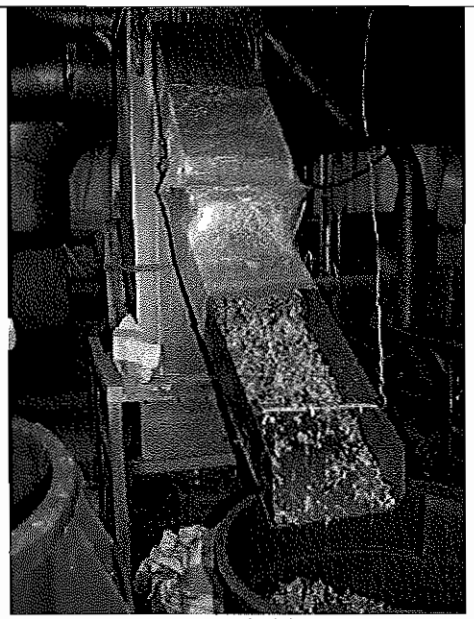

PHOTO #:24 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: PA010037
DESCRIPTION: FOOD WASTE EXTRACTOR

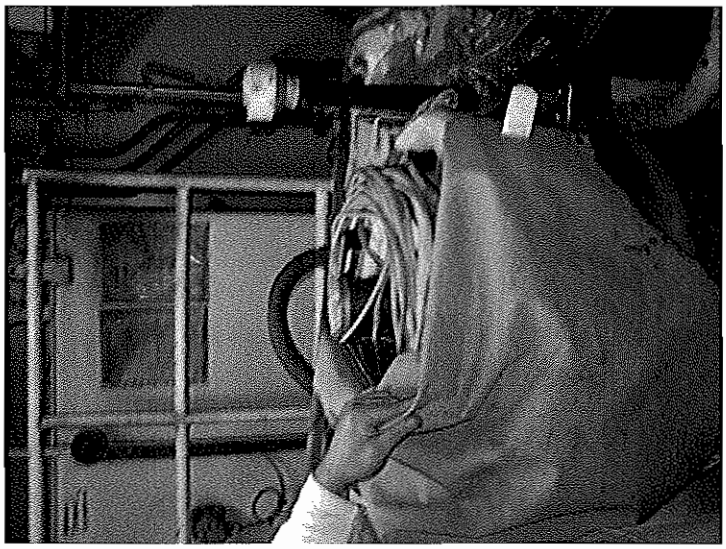

PHOTO #:25 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: PA010038
DESCRIPTION: FLORESCENT BULB CRUSHER/MERCURY REMOVAL SYSTEM

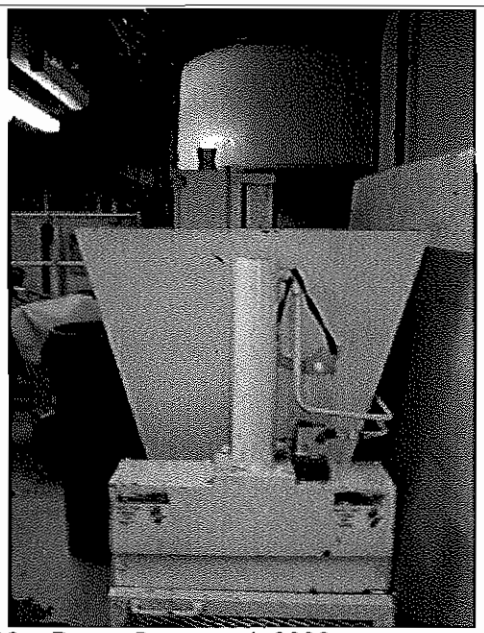

PHOTO #:26 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: PA010039
DESCRIPTION: CAN CRUSHER

PHOTO #:27 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: PA010040
DESCRIPTION: COLD STORAGE

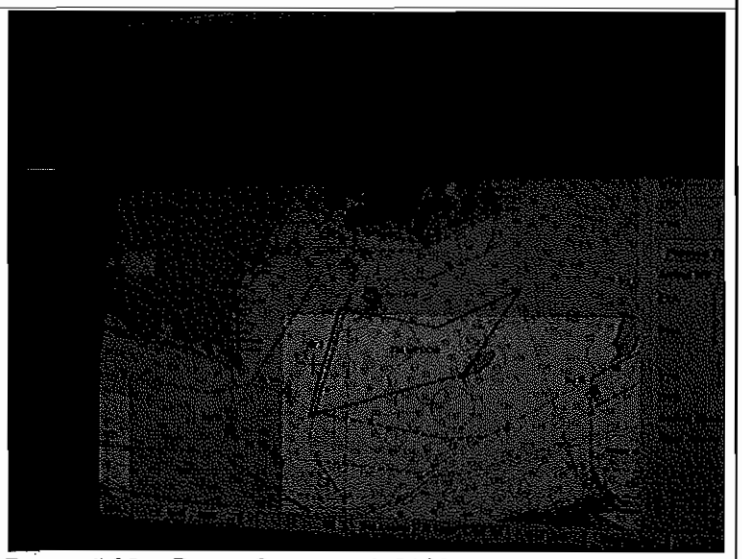

PHOTO #:28 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE NO.: PA010041
DESCRIPTION: CANADA DISCHARGE EXEMPTION AREA

Appendix E. Letters of Compliance from Member Lines

Celebrity Cruises

November 25, 2008

Mr. Ray Hellwig
Washington State Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

Dear Director:

Re: Washington Cruise MOU Compliance Report: 2008 Cruise Season

Section 9 of the Memorandum of Understanding for Cruise Operations in Washington State (April 20, 2004 as amended May 19, 2008), requires an annual submittal detailing the compliance with the MOU for the each vessel within the NWCA that calls to a port in Washington for the previous cruise season. Please accept this letter on behalf of Celebrity Cruises Inc. for the 2008 cruise season.

The following ships in operated Washington waters during 2008:

- *Celebrity Mercury;* Seattle: April 1,8,15,23; September 22,26,29; and October 3,6,10,13,15.
- *Celebrity Infinity;* Seattle: May 9,10,16,23,30, June 6,13,20,27, July 4,11,18,25, August 1,8,15,22,29, and September 5,12,19,30.
- *Millennium; Seattle*: May 8,22, September 20, and October 1.

Celebrity Cruises Inc.'s operations in Washington State addressed the following key provisions of the MOU as follows:

Section 2.1 Wastewater Management. Celebrity Cruises Inc. managed its wastewater in compliance with this section as follows:

In compliance with Section 2.1.1 and 2.1.2, *Celebrity Mercury, Celebrity Infinity*, and *Millennium* held all treated and untreated gray and black water while in Washington waters. The ships all have Type II Certified Advanced Wastewater Purification Systems (respectively Rochem, Zenon, and Hydroxyl), but due to sufficient holding capacities chose to hold as noted above. These ships also did not discharge solid waste or oily bilge water if not in compliance with applicable federal and state laws while in Washington waters. The ships all have Marinfloc Oily Water Separation Systems. Based on a thorough review of ships' logs and records we certify that our ship(s) complied with these provisions of the MOU. Celebrity Cruises Inc. will make these records available to Ecology upon request.

Section 2.1.4 Discharge of Residual Solids. Based on a review of ships' logs and records, Celebrity Cruises Inc. certifies that we complied with the prohibition on discharging residual solids coming from any type of treatment system within 12 nautical miles from shore and within the Olympic Coast National Marine Sanctuary. Celebrity Cruises Inc. will make these records available to Ecology upon request.

Section 2.2.1 through 2.2.4 Hazardous Waste Management. Based on a review of ships' logs and records, Celebrity Cruises Inc. certifies that Hazardous Wastes were managed in accordance with these sections of the MOU. All hazardous waste is landed shoreside to an approved hazardous waste vendor for processing and disposal in accordance with RCRA. Celebrity Cruises Inc. will make these records available to Ecology upon request.

Section 6. Marine Mammal Protection Act, Invasive Species Act, and the Washington Ballast Water Management Act. Based on a review of ships' logs and records, Celebrity Cruises Inc. certifies that the provisions of the above laws were implemented as required by these laws. Celebrity Cruises Inc. will make these records available to Ecology upon request. Further to Marine Mammal protection, the ships are provided with training materials and are under Washington State or U.S. Federal pilotage during their entire stay in MOU waters. Compliance with the Ballast Water laws is achieved through the administration of Celebrity Cruises Inc. Ballast Water Management Policy, which is in compliance with the IMO Ballast Water Convention and 33CFR 151.2000 et al.

Section 9. Immediate self-reporting to Ecology of any incidences of non-compliance with any provisions of the MOU. Celebrity Cruises Inc. experienced no violations of the provisions of the MOU during the 2008 season.

I hereby certify that the above information is true and can be verified through documentation. If you have any questions or concerns, please call me at 305-982-2728.

Sincerely,

APPROVED FOR PAYMENT
JOHN KROUSOULOUDIS
SENIOR VICE PRESIDENT
CELEBRITY MARINE OPS.

John Krousouloudis
Senior Vice President, Marine Operations
Celebrity Cruises, Inc.

Holland America Line

PHONE: 206 281 3535
FAX: 206 281 7110

300 Elliott Avenue West
Seattle, Washington 98119

November 26, 2008

Regional Director
Washington State Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

Re: Washington Cruise MOU Compliance Report: 2008 Cruise Season

Dear Director:

Section 9 of the Memorandum of Understanding for Cruise Operations in Washington State (signed May 19, 2008), requires an annual submittal detailing the compliance with the MOU for the each vessel within the Northwest Cruise Ship Association that calls to a port in Washington for the previous cruise season. Please accept this letter on behalf of Holland America Line (HAL) for the 2008 cruise season.

The following ships operated in Washington waters subject to the MOU during 2008:

- Amsterdam: Seattle, weekly calls May 16 to September 16, 2008
- Oosterdam: Seattle, one call May 29, 2008; weekly calls May 19 to September 27, 2008
- Volendam: Seattle, one call May 15, 2008; one call September 22, 2008
- Westerdam: Seattle, weekly calls May 11 to September 28, 2008
- Zaandam: Seattle, one call April 23, 2008

HAL's operations in Washington State addressed the following key provisions of the MOU as follows:

Section 2.1 Wastewater Management. The HAL vessels listed above managed their wastewater in compliance with this section as follows: In compliance with Section 2.1.1 and 2.1.2, ***HAL held all treated and untreated gray and black water while in Washington waters and did not discharge solid waste or oily bilge water if not in compliance with applicable federal and state laws while in Washington waters.***

Amsterdam has a Hamworthy Type II MSD. Volendam, and Zaandam have Zenon Advanced Wastewater Treatment Systems (AWTS), Oosterdam and Westerdam have Rochem AWTS. Based on a thorough review of ships' logs and records we certify that our ship(s) complied with these provisions of the MOU. HAL will make these records available to Ecology upon request.

Section 2.1.3 (C)(1-3) Shellfish and "upset" conditions. As noted above, and based on a review of HAL's ship's logs and records, HAL held all treated and untreated gray and black water while in Washington waters; therefore HAL certifies compliance with the prohibition on discharging within 0.5 nautical miles of bivalve shellfish beds that are recreationally harvested or commercially approved to harvest as identified annually by the Department of Ecology. The "upset" conditions stoppage and notification requirement comes into effect in 2009.

Section 2.1.3 (C)(4-10) Other discharge approval requirements. HAL did not submit documentation as described in sections 2.1.3 A. or B. of the MOU.

Section 2.1.4 Discharge of Residual Solids. Based on a review of HAL ships' logs and records, HAL certifies that we complied with the prohibition on discharging residual solids coming from any type of treatment system within 12 nautical miles from shore and within the Olympic Coast National Marine Sanctuary. HAL will make these records available to Ecology upon request.

Section 2.2.1 through 2.2.4 Hazardous Waste Management. Based on a review of HAL ship's logs and records, HAL certifies that Hazardous Wastes were managed in accordance with these sections of the MOU. HAL will make these records available to Ecology upon request. Hazardous waste was not offloaded from HAL vessels in Washington State in 2007.

Section 6. Marine Mammal Protection Act, Invasive Species Act, and the Washington Ballast Water Management Act. Based on a review of HAL ship's logs and records, HAL certifies that the provisions of the above laws were implemented as required by these laws. HAL will make these records available to Ecology upon request. All HAL Masters and Navigation Officers are required to complete HAL's computer based Whale Avoidance Training. HAL has developed an internal procedure designed to ensure compliance with all ballast waster regulations, this procedure is MR-704 Ballast Water Management Manual

Section 9. Immediate self-reporting to Ecology of any incidences of non-compliance with any provisions of the MOU. HAL operations in Washington State resulted in no known incidences of non-compliance with the MOU.

I hereby certify that the above information is true and can be verified through documentation. If you have any questions or concerns, please call me at (206) 301-5343.

Sincerely,

William J. Morani, Jr.
Vice President
Environmental Management Systems

WJM/jg

NORWEGIAN CRUISE LINE®
FREESTYLE CRUISING®

November 21, 2008

Regional Director
Washington State Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

Dear Director:

Re: Washington Cruise MOU Compliance Report: 2008 Cruise Season

Section 9 of the Memorandum of Understanding for Cruise Operations in Washington State (signed May 25, 2007), requires an annual submittal detailing the compliance with the MOU for the each vessel within the NWCA that calls to a port in Washington for the previous cruise season. Please accept this letter on behalf of NCL (Bahamas) Ltd for the 2008 cruise season.

The following ships operated in Washington waters during 2008:

- NORWEGIAN STAR – Sailed from Seattle on 5/03, 5/10, 5/17, 5/24, 5/31, 6/07, 6/14, 6/21, 6/28, 7/05, 7/12, 7/19, 7/26, 8/02, 8/09, 8/16, 8/23, 8/30, 9/06, 9/13, and 9/20.
- NORWEGIAN PEARL – Sailed from Seattle on 5/02, 5/04, 5/11, 5/18, 5/25, 6/01, 6/08, 6/15, 6/22, 6/29, 7/06, 7/13, 7/20, 7/27, 8/03, 8/10, 8/17, 8/24, 8/31, 9/07, 9/14 and 9/21.

NCL's operations in Washington State addressed the following key provisions of the MOU as follows:

Section 2.1 Wastewater Management. NCL managed its wastewater in compliance with this section as follows:

- In compliance with Section 2.1.3, NCL submitted information supporting its request to discharge treated wastewater while at berth to Ecology for the following ships - NORWEGIAN STAR and NORWEGIAN PEARL. Both of these ships are equipped with the Scanship Advanced Wastewater Treatment System (AWTS) and were sampled three times a month for the entire season (twice in Alaska, once in Washington). All sample results were submitted to Department of Ecology and were well within the standards detailed in the MOU. Approval to discharge while at berth was received from Ecology on 12 May 2008 for both ships.

- In compliance with Section 2.1.3 ("a" through "g"), NCL complied with each of the requirements to discharge including sampling requirements and meeting effluent limitations.

Section 2.1.3 (C)(1-3) Shellfish and "upset" conditions. Based on a review of NCL ship's logs and records, NCL certifies that we complied with the prohibition on discharging within 0.5 nautical miles of bivalve shellfish beds that are recreationally harvested or commercially approved to harvest as identified annually by the Department of Ecology and that any "upset" conditions were stopped and immediately reported to the Washington State Department of Health.

Section 2.1.3 (C)(4-10) Other discharge approval requirements. Based on a review of NCL ship's logs and records and other knowledge, NCL certifies that the requirements in this section were met.

Section 2.1.4 Discharge of Residual Solids. Based on a review of NCL ships' logs and records, NCL certifies that we complied with the prohibition on discharging residual solids coming from any type of treatment system within waters subject to this MOU, within 12 nautical miles from shore and within the entire boundaries of the Olympic Coast National Marine Sanctuary. NCL will make these records available to Ecology upon request.

Section 2.2.1 through 2.2.4 Hazardous Waste Management. Based on a review of NCL ship's logs and records, NCL certifies that Hazardous Wastes were managed in accordance with these sections of the MOU. NCL will make these records available to Ecology upon request. All hazardous waste was collected and held aboard and discharged ashore in Canada (Victoria or Prince Rupert) in accordance with Canadian and Company policies.

Section 6. Marine Mammal Protection Act, Invasive Species Act, and the Washington Ballast Water Management Act. Based on a review of NCL ship's logs and records, NCL certifies that the provisions of the above laws were implemented as required by these laws. NCL will make these records available to Ecology upon request. Prior to initial entry to Washington the NORWEGIAN STAR and NORWEGIAN PEARL each conducted an open ocean exchange of ballast and held all ballast water aboard during the season. Appropriate Ballast Water Reports were filed with U.S. Coast Guard and the Marine Exchange throughout the season.

Section 9. Immediate self-reporting to Ecology of any incidences of non-compliance with any provisions of the MOU. To my knowledge, there were no incidents of non-compliance.

I hereby certify that the above information is true and can be verified through documentation. If you have any questions or concerns, please call me at 305-436-4956.

Sincerely,

Randall R. Fiebrandt
Director, Environmental Technical Operations
(T) 305-436-4956 (F) 305-436-4159

PRINCESS CRUISES

December 1, 2008

Jeannie Summerhays
Regional Director
Washington State Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

Dear Director:

Re: Washington Cruise MOU Compliance Report: 2008 Cruise Season

The Memorandum of Understanding for Cruise Operations in Washington State originally signed on April 20, 2004 and amendment No. 4 signed on May 19, 2008 on behalf of the member lines by NWCA, requires an annual submittal detailing the compliance with the MOU for the each vessel within the NWCA that calls to a port in Washington for the previous cruise season. Please accept this letter on behalf of Princess Cruises for the 2008 cruise season.

The following ships operated in Washington waters during 2008:

- Golden Princess
- Star Princess

Please see enclosure (1) for the listing of each date and port of call.

Princess Cruises' operations in Washington State addressed the following key provisions of the MOU as follows:

Princess Cruises managed its wastewater in compliance with this section as follows:

- In compliance with Section 2.1.3 (B), Princess Cruises' submitted information supporting our request to discharge treated wastewater continuously to Ecology on March 4, 2008 for Golden Princess and Star Princess. Golden Princess and Star Princess both have Hamworthy Membrane Bio-Reactors. Approval to discharge while at the berth was received from Ecology on May 12, 2008.

Based on a review of Princess Cruises' ship's logs and records, Princess Cruises certifies that we complied with the prohibition of discharging within 0.5 nautical miles of bivalve shellfish beds that are recreationally harvested or commercially approved to harvest as identified annually by the Department of Ecology and that any "upset" conditions were stopped and immediately reported to the Washington State Department of Health.

Based on a review of Princess Cruises' ships' logs and records, we certify that we complied with the prohibition on discharging residual solids coming from any type of treatment system within 12 nautical miles from shore and within the Olympic Coast National Marine Sanctuary. Princess Cruises' will make these records available to Ecology upon request.

Based on a review of Princess Cruises' ship's logs and records, we certify that Hazardous Wastes were managed in accordance with the appropriate sections of the MOU. Princess Cruises' will make these records available to Ecology upon request. Hazardous waste offloaded in Seattle was managed by Waste Management.

Based on a review of 2008 ship's logs and records, we certify that the provisions were implemented as per MOU. Princess Cruises' will make these records available to Ecology upon request. Princess Cruises' ship management system provides instructions to its ships on marine mammal avoidance and its instructions on ballast operations are included in the ships ballast water management plan.

No incidences of non-compliance occurred during the 2008 season.

I hereby certify that the above information is true and can be verified through documentation. If you have any questions or concerns, please call me at 661-753-2745.

Sincerely,

George Wright
Senior Vice President
Marine Operations

Enclosures (1) – Listing of Golden Princess & Star Princess 2008 Port of Call Dates

Date	Port Name		ETA	ETD	Voyage	Itinerary
Golden Princess						
2008						
May, 2008						
10 SA 01/00	Seattle	B	01/0700	00/1600	NP0821	5967.007
17 SA 07/00	Seattle	B	07/0700	00/1600	NP0822	5967.007
24 SA 07/00	Seattle	B	07/0700	00/1600	NP0823	5967.007
31 SA 07/00	Seattle	B	07/0700	00/1600	NP0824	5967.007
June, 2008						
07 SA 07/00	Seattle	B	07/0700	00/1600	NP0825	5967.007
14 SA 07/00	Seattle	B	07/0700	00/1600	NP0826	5967.007
21 SA 07/00	Seattle	B	07/0700	00/1600	NP0827	5967.008
28 SA 07/00	Seattle	B	07/0700	00/1600	NP0828	5967.007
July, 2008						
05 SA 07/00	Seattle	B	07/0700	00/1600	NP0829	5967.007
12 SA 07/00	Seattle	B	07/0700	00/1600	NP0830	5967.007
19 SA 07/00	Seattle	B	07/0700	00/1600	NP0831	5967.007
26 SA 07/00	Seattle	B	07/0700	00/1600	NP0832	5967.007
August, 2008						
02 SA 07/00	Seattle	B	07/0700	00/1600	NP0833	5967.008
09 SA 07/00	Seattle	B	07/0700	00/1600	NP0834	5967.007
16 SA 07/00	Seattle	B	07/0700	00/1600	NP0835	5967.007
23 SA 07/00	Seattle	B	07/0700	00/1600	NP0836	5967.007
30 SA 07/00	Seattle	B	07/0700	00/1600	NP0837	5967.007
September, 2008						
06 SA 07/00	Seattle	B	07/0700	00/1600	NP0838	5967.007
13 SA 07/00	Seattle	B	07/0700	00/1600	NP0839	5967.007
20 SA 07/00	Seattle	B	07/0700	00/1600	NP0840	5967.007
27 SA 00/00	Seattle	B	00/0700	00/1700	NP0841	7775.001

Date	Port Name		ETA	ETD	Voyage	Itinerary
Star Princess						
2008						
May, 2008						
04 SU 08/00	Seattle	B	08/0700	00/1600	TP0811	7945.001
11 SU 07/00	Seattle	B	07/0700	00/1600	TP0812	7945.001
18 SU 07/00	Seattle	B	07/0700	00/1600	TP0813	7945.001
25 SU 07/00	Seattle	B	07/0700	00/1600	TP0814	7945.001
June, 2008						
01 SU 07/00	Seattle	B	07/0700	00/1600	TP0815	7945.001
08 SU 07/00	Seattle	B	07/0700	00/1600	TP0816	7945.001
15 SU 07/00	Seattle	B	07/0700	00/1600	TP0817	7945.001
22 SU 07/00	Seattle	B	07/0700	00/1600	TP0818	7945.002
29 SU 07/00	Seattle	B	07/0700	00/1600	TP0819	7945.001
July, 2008						
06 SU 07/00	Seattle	B	07/0700	00/1600	TP0820	7945.001
13 SU 07/00	Seattle	B	07/0700	00/1600	TP0821	7945.001
20 SU 07/00	Seattle	B	07/0700	00/1600	TP0822	7945.001
27 SU 07/00	Seattle	B	07/0700	00/1600	TP0823	7945.001
August, 2008						
03 SU 07/00	Seattle	B	07/0700	00/1600	TP0824	7945.002
10 SU 07/00	Seattle	B	07/0700	00/1600	TP0825	7945.001
17 SU 07/00	Seattle	B	07/0700	00/1600	TP0826	7945.001
24 SU 07/00	Seattle	B	07/0700	00/1600	TP0827	7945.001
31 SU 07/00	Seattle	B	07/0700	00/1600	TP0828	7945.001
September, 2008						
07 SU 07/00	Seattle	B	07/0700	00/1600	TP0829	7945.001
14 SU 07/00	Seattle	B	07/0700	00/1600	TP0830	7945.001
21 SU 07/00	Seattle - Drydock	B	07/0700	00/1300	TP0831	8136.002

Jeannie Summerhays
Regional Director
Washington State Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

November 25th 2008

Dear Director:

Re: Washington Cruise MOU Compliance Report: 2008 Cruise Season

Section 9 of the Memorandum of Understanding for Cruise Operations in Washington State (signed on 04/28/2006)), requires an annual submittal detailing the compliance with the MOU for the each vessel within the NWCA that calls to a port in Washington for the previous cruise season. Please accept this letter on behalf of Regent Seven Seas Cruises for the 2008 cruise season.

The following ships operated Washington waters during 2008:

- Seven Seas Mariner – Seattle May 19th 2008

Seven Seas Mariner's operations in Washington State addressed the following key provisions of the MOU as follows:

Section 2.1 Wastewater Management. Seven Seas Mariner managed its wastewater in compliance with this section as follows:

[Choose one or more options as appropriate]

- In compliance with Section 2.1.1 and 2.1.2, Seven Seas Mariner held all treated and untreated gray and black water while in Washington waters and did not discharge solid waste or oily bilge water if not in compliance with applicable federal and state laws while in Washington waters. List the ships that held their effluent and describe the type of treatment system each ship in this category has. Based on a thorough review of ships' logs and records we certify that our ship(s) complied with these provisions of the MOU. RSSC will make these records available to Ecology upon request.
  SEVEN SEAS MARINER DID NOT DISCHARGE ANY EFFLUENTS WHILST IN WASHINGTON WATERS.
- Seven Seas Mariner is fitted with an Advance Waste Water Treatment System made by Hamworthy.

Section 2.1.3 (C)(1-3) Shellfish and "upset" conditions. Based on a review of Seven Seas Mariner ship's logs and records, RSSC certifies that we complied with the prohibition on discharging within 0.5 nautical miles of bivalve shellfish beds that are recreationally harvested or commercially approved to harvest as identified annually by the Department of Ecology and that any "upset" conditions were stopped and immediately reported to the Washington State Department of Health.

Section 2.1.3 (C)(4-10) Other discharge approval requirements. Based on a review of Seven Seas Mariner ship's logs and records and other knowledge, RSSC certifies that the requirements in this section were met.

Section 2.1.4 Discharge of Residual Solids. Based on a review of Seven Seas Mariner ships' logs and records, RSSC certifies that we complied with the prohibition on discharging residual solids coming from any type of treatment system within 12 nautical miles from shore and within the Olympic Coast National Marine Sanctuary. RSSC will make these records available to Ecology upon request.

Section 2.2.1 through 2.2.4 Hazardous Waste Management. Based on a review of Seven Seas Mariner ship's logs and records, RSSC certifies that Hazardous Wastes were managed in accordance with these sections of the MOU. RSSC will make these records available to Ecology upon request. Add a description of how hazardous waste is managed while in Washington. NO DISCHARGE OF HAZMAT OCCURRED WHILST IN WASHINGTON STATE.

Section 6. Marine Mammal Protection Act, Invasive Species Act, and the Washington Ballast Water Management Act. Based on a review of Seven Seas Mariner ship's logs and records, RSSC certifies that the provisions of the above laws were implemented as required by these laws. RSSC will make these records available to Ecology upon request. Add a description of how compliance with these laws was achieved. VESSEL DID NOT SAIL IN THE OLYMPIC MARINE SANCTUARY. NO BALLAST WATER EXCHANGE OCCURRED

Section 9. Immediate self-reporting to Ecology of any incidences of non-compliance with any provisions of the MOU. Describe any incidences of non-compliance and when they were reported to Ecology and any corrective actions taken. NOT APPLICABLE AS NO INCIDENTS OCCURRED

I hereby certify that the above information is true and can be verified through documentation. If you have any questions or concerns, please call me at +44 238024 8621.

Sincerely,

Name ALEX GARBARINO
Position/Title SAFETY MANAGER
Company CELTIC PACIFIC UK LTD ON BEHALF OF REGENT SEVEN SEAS CRUISES

Royal Caribbean International
1050 Caribbean Way
Miami, FL 33132

tel. 305 539.6000
www.royalcaribbean.com

November 25, 2008

Mr. Ray Hellwig
Washington State Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

Dear Director:

Re: Washington Cruise MOU Compliance Report: 2008 Cruise Season

Section 9 of the Memorandum of Understanding for Cruise Operations in Washington State (April 20, 2004 as amended May 19, 2008), requires an annual submittal detailing the compliance with the MOU for the each vessel within the NWCA that calls to a port in Washington for the previous cruise season. Please accept this letter on behalf of Royal Caribbean International for the 2008 cruise season.

The following ships operated in Washington waters during 2008:

- *Rhapsody of the Seas;* Seattle: May 23, 30. June 6, 13, 20, 27. July 4, 11, 18, 25. August 1, 8, 15, 22, 20. September 5, 12.

- *Serenade of the Seas;* Seattle: May 6, and September 29.

Royal Caribbean International's operations in Washington State addressed the following key provisions of the MOU as follows:

Section 2.1 Wastewater Management. Royal Caribbean International managed its wastewater in compliance with this section as follows:

In compliance with Section 2.1.1 and 2.1.2, *Rhapsody of the Seas* and *Serenade of the Seas* held all treated and untreated gray and black water while in Washington waters. The *Rhapsody of the Seas* has a Hamman Type II certified Marine Sanitation Device. The *Serenade of the Seas* has a Scanship Advanced Wastewater Purification System, but due to sufficient holding capacity chose to hold as noted above. *Rhapsody of the Seas* and *Serenade of the Seas* also did not discharge solid waste or oily bilge water if not in compliance with applicable federal and state laws while in Washington waters. Both ships have Marinfloc Oily Water Separation Systems. Based on a thorough review of ships' logs and records we certify that our ship(s) complied with these provisions of the MOU. Royal Caribbean International will make these records available to Ecology upon request.

Section 2.1.4 Discharge of Residual Solids. Based on a review of ships' logs and records, Royal Caribbean International certifies that we complied with the prohibition on discharging residual solids coming from any type of treatment system within 12 nautical miles from shore and within the Olympic Coast National Marine Sanctuary. Royal Caribbean International will make these records available to Ecology upon request.

Section 2.2.1 through 2.2.4 Hazardous Waste Management. Based on a review of ships' logs and records Royal Caribbean International certifies that Hazardous Wastes were managed in accordance with these sections of the MOU. All hazardous waste is landed shoreside to an approved hazardous waste vendor for processing and disposal in accordance with RCRA. Royal Caribbean International will make these records available to Ecology upon request.

Section 6. Marine Mammal Protection Act, Invasive Species Act, and the Washington Ballast Water Management Act. Based on a review of ships' logs and records, Royal Caribbean International certifies that the provisions of the above laws were implemented as required by these laws. Royal Caribbean International will make these records available to Ecology upon request. Further to Marine Mammal protection, the ships are provided with training materials and are under Washington State or U.S. Federal pilotage during their entire stay in MOU waters. Compliance with the Ballast Water laws is achieved through the administration of Royal Caribbean International's Ballast Water Management Policy, which is in compliance with the IMO Ballast Water Convention and 33CFR 151.2000 et al.

Section 9. Immediate self-reporting to Ecology of any incidences of non-compliance with any provisions of the MOU. Royal Caribbean International experienced no violations of the provisions of the MOU during the 2008 season.

I hereby certify that the above information is true and can be verified through documentation. If you have any questions or concerns, please call me at 305-982-2469.

Sincerely,

Captain William S. Wright
Senior Vice President, Marine Operations

Appendix F. Annual Cruise Meeting Notes

WASHINGTON ANNUAL CRUISE MEMORANDUM OF UNDERSTANDING & CRUISE SHIP UPDATE MEETING

Date/Time: **January 22, 2009; 9:30 am to 2:30 pm**

Groups: Port of Seattle, WA Department of Ecology, Cruise Line Representatives, WA Department of Health

Location: Department of Ecology, Northwest Regional Office

Attendees:
Norm Davis, Department of Ecology
Randy Fiebrandt, Norwegian Cruise Line
Kevin Fitzpatrick, Department of Ecology
Marie Fritz, Port of Seattle
John Hansen, Northwest Cruiseship Association
Amy Jankowiak, Department of Ecology
Stephanie Jones Stebbins, Port of Seattle
Lincoln Loehr, Northwest Cruiseship Association
Andrew Lorenzana, Princess Cruises
Mike McLaughlin, Port of Seattle
Bill Morani, Holland America Line
Rich Pruitt, Royal Caribbean Cruises
Peter Ressler, Port of Seattle
Marietta Sharp, Department of Ecology
Bob Stone, Royal Caribbean Cruises
Mark Toy, Department of Health
Jon Turvey, Holland America Line

Agenda

9:30 AM – 9:45 AM	**Welcome, Introductions**	**(Amy Jankowiak, All)**
9:45 AM – 10:15 AM	**Compliance with the 2008 season** Findings from 2008 season inspections/records review DOH changes – how it went, what's in store for 2009	**(Amy Jankowiak, Mark Toy)**
10:15 AM – 10:30 AM	**Biomass Update**	**(Port of Seattle, All)**
10:30 AM – 10:45 AM	**Whole Effluent Toxicity Update**	**(Ecology, Cruise line reps)**
10:45 AM – 11:00 AM	**BREAK**	
11:00 AM – 12:00 PM	**EPA Vessel Discharge Permit** Summary of Requirements Comparison to MOU Comments	**(Amy Jankowiak, All)**
12:00 PM – 1:30 PM	**LUNCH**	
1:30 PM – 2:00 PM	**MOU Amendments** Changes due to EPA permit Other changes	**(All)**

2:00 PM – 2:15 PM	**Funding for the MOU** **Where we are**	**(Amy Jankowiak, All)**
2:15 PM – 2:30 PM	**Comments/Open Discussion** **Looking Ahead**	**(All)**

Welcome, Introductions

Welcome and introductions

Compliance with the 2008 Season, Amy Jankowiak, Department of Ecology
DOH Changes, Mark Toy, Department of Health

Began by going through PowerPoint slides on Compliance for the 2008 season. (link to PowerPoint included on Ecology website)

2008 Approvals

- 100% *port calls from large cruise ships under the MOU, 4 vessels approved; 207 port calls*
- >1 nm and > 6 knots
  - NONE
- Continuously
  - NORWEGIAN PEARL
  - NORWEGIAN STAR
  - GOLDEN PRINCESS
  - STAR PRINCESS

Compliance Evaluation consists of:

- Monthly Sampling Data
  - Sampling done per MOU, submitted, meets requirements
- WET Testing
- Inspections
  - Allowed a minimum of once/season to verify compliance with MOU
- Other Provisions
- Compliance/Non-Compliance Notifications
- Annual Compliance Reports

Typical Inspection includes

- Introductions/overview of plan for the day (prior notification given)
- Control room
  - Run-through of how system works
  - Variety of questions on staffing, training, protocols...
  - Review of records
- Tour of treatment system(s)
- Observations of other waste streams on the ship
- Sampling
- Conclude
- Approximately 2-3 hours in length
- Similar to inspections for on-land plants

2008 Inspections

- Inspections Conducted

- 11 inspections conducted (all homeported vessels plus 4 additional)

- Inspection findings
  - Operating well; more sampling on board for process control
  - Discharge protocols thorough with verification
  - Recommendations made –
    - Vessel due for WET testing
    - No discharge until UV operational (the UV system was not yet installed)
    - Copy of the MOU should be available
  - 2 vessels operational problems with AWTS – not discharging
  - 3 of 11 inspected traditional MSDs
  - Waste Minimization efforts impressive
- Copies of discharge documents requested/reviewed

  NWCA vessels not inspected, and for time period since inspection - submitted and reviewed – in compliance

DATE OF INSPECTION	VESSEL
June 7, 2008	HAL OOSTERDAM
June 22, 2008	HAL WESTERDAM
June 22, 2008	STAR PRINCESS
July 18, 2008	CELEBRITY INFINITY
July 26, 2008	NORWEGIAN STAR
July 26, 2008	GOLDEN PRINCESS
August 22, 2008	HAL AMSTERDAM
August 29, 2008	RCCL RHAPSODY OF THE SEAS
September 14, 2008	NORWEGIAN PEARL
September 22, 2008	CELEBRITY MERCURY
October 1, 2008	CELBRITY MILLENIUM

2008 Sampling

- Sampling data received and evaluated. Summary of data and data will be included in the 2008 annual report
  - pH all within 6.0-9.0, but some lower than WA WQ standard of 7.0
  - One BOD result higher (65 mg/l), TSS max of 11 mg/l
  - Chlorine all ND
  - Fecal mostly ND, highest was 12 #/100 ml
  - Ammonia ranged from 6.6 mg/l to 71 mg/l (avg = 32)

There was a discussion about the dissolved metals results that are required in Alaska. One issue is that water bunkered in Seattle is very high in zinc.

- WET testing
  - Required for vessels approved for continuous discharge
    - Once every two years if homeported (20 visits) or
    - Once every 40 port calls or turnarounds
  - Results submitted for NORWEGIAN STAR and NORWEGIAN PEARL
  - WET testing also required for the GOLDEN PRINCESS. Results were not submitted.

An e-mail providing some detail on the vessels results from Ecology's WET expert (Randy Marshall could not be at the meeting) was discussed. The e-mail provides a synopsis of the results from the two vessels. Ammonia levels were higher for the PEARL, though the STAR had more toxic results. Due to other indicators such as conductivity and the relative sensitivity of fish and mysids to the samples, another toxicant besides ammonia may be present. Surfactants from detergents or metals may be possible toxicants.

The cruise line reps requested that Ecology provide feedback to the cruise lines on the sampling results, and do some timely. There was concern from the cruise lines about how

results would be worded in Ecology's annual report. Ecology offered to send the draft language to the cruise lines prior to finalization, but this is an Ecology authored report and Ecology has final say in what goes into the final report.

There was also a discussion about how dilution/mixing should be applied to the results. A study is being finalized (preliminary results out now) from Alaska Department of Environmental Conservation/EPA on dilution from cruise ships while stationary. Preliminary analysis indicates that the average dilution factor at a distance between 5 to 15 meters away from the cruise ships ranged from a factor of 22 to 50. The cruise line reps requested that we look at the results received thus far while applying the dilution factors.

2008 Compliance Notifications

- Compliance notifications
  - No reported incidents for 2008 season to date
  - Compliance letters
    - All in, no exceptions reported

2007 Assessment of Cruise Ship Environmental Effects in Washington

- Recommendations
  - Ecology recommends MOU continue to be used as a complement to environmental regulations until regulations specific to cruise ship waste management in Washington are put in place
    The EPA VGP is a factor now, but there are still no specific State regs on cruise ship wastes.
  - Ecology continue to inspect ships that discharge, including closely looking at wastewater management and other waste streams
    Ecology continues to inspect the vessels
  - Parties of MOU continue to work on WET testing evaluation
    Meetings were held over the last year discussing WET testing. An amendment was made in the MOU with the purpose of focusing on vessels approved to discharge continuously and the guidelines for WET testing were updated.
  - Parties of MOU and KC continue to work together in evaluating options for sewage sludge (biomass) handling
    The Port has been leading a study on this issue.
  - Ecology, cruise lines, and Health work to amend MOU incorporating DOH report recommendations
    Amendments were made in 2008 incorporating the recommendations.
  - Cruise lines to conduct a thorough review of records on an on-going basis and at end of season to evaluate compliance and inspection recommendations to be implemented.

Department of Health, Virus's and the MOU update

- WA Department of Health provided an update on compliance with the virus conditions of the MOU for 2008.
- Discussion on how vessels approved for discharge dealt with the requirement to stay ½ mile away from shellfish beds. 2 of 4 vessels did not discharge at all (Princess Cruises). The other two vessels (Norwegian Cruise Line) had clear protocols in place on how to stay clear of discharging in those areas (the two protocols varied slightly).
- Discussion on virus test kits and the limitations of results from the kits. DOH will e-mail California results to those interested.

- DOH to review shellfish bed areas for 2009 season and should be able to provide an update by March 1, 2009. If there are changes to the beds, the MOU will be updated (if no other MOU amendments, may be able to just update appendix and distribute).
- There was also a discussion about what information is needed for the cruise lines to submit to Ecology on the new UV system requirements for virus protection. Ecology will send a summary of what is required to the cruise lines. There was also a discussion about how tracer dyes might interfere with UV systems.

Biomass Update, Stephanie Jones Stebbins, Port of Seattle

The Port of Seattle provided an update on the *Cruise Vessel Biomass Management Study.* The draft for Phase 1A is open for public comment until February 6, 2009. There was an update given by Port staff to the Commission a couple of weeks ago. Details of the Commission briefing were given. The Port will incorporate comments from the public comment period as they can and hope to have the final report out late February or March. The Port of Seattle will then provide recommendations to the commission on next steps. There was some discussion about what future steps could be taken and how to fund those steps.

Whole Effluent Toxicity Update, Amy Jankowiak, Department of Ecology

As there was already a discussion on WET testing during the Compliance timeslot, no further discussion on WET testing was necessary.

EPA Vessel General permit, Amy Jankowiak, Department of Ecology

Ecology provided an update on the VGP including Ecology's decision to not certify nor to decertify the permit and that EPA has interpreted this as a waive. Therefore the VGP applies to vessels in Washington state waters without any certification conditions. There was also a discussion on appeals to the permit, lawsuits and potential next steps. Ecology stated that if it comes to the State(s) issuing their own permit, Ecology plans to attempt a West Coast approach. The West Coast states (WA, OR, CA, AK, and HI) have discussed this possible approach and are open to it. The idea would be to have as consistent requirements as possible along the west coast waters while also being protective of the waters in the various states.

Ecology had provided a spreadsheet prior to the annual meeting which includes a comparison of requirements for the MOU and requirements for the VGP. There was discussion on the requirements and if contradictions might be there. There was a discussion about how the MOU would be affected by the VGP. Ecology proposed to leave the MOU conditions as is (unless there are contradictions to work out, haven't seen any as yet), but to refer to the VGP. After discussion, there appears to be no need to refer to the VGP, so no amendment due to the VGP is proposed at this time.

MOU Amendments

The previous discussion on the VGP concluded to not propose any MOU amendments due to the permit. As discussed earlier, the Department of Health will review shellfish bed areas for the 2009 season and should be able to provide an update by March 1, 2009. If there are changes to the beds,

the MOU will be updated (if no other MOU amendments, may be able to just update appendix and distribute).

Funding for the MOU, Amy Jankowiak, Department of Ecology and Marie Fritz, Port of Seattle

A detailed synopsis of funding amounts since the inception of funding in 2006 was given by Ecology.

- In 2006, the Port collected $75,000, due to some Ecology constraints on being able to go back to parts of 2006, Ecology only invoiced for $27,744.62. This left a credit of about $47,260.55.
- In 2007, the Port did not collect fees due to the credit available. Ecology invoiced for $22,188.13. This left a credit of about 25,072.42.
- In 2008, the Port collected $88,218.61. The original plan was for the Port to not collect fees for 2008 due to the credit, but the timing didn't work out and fees were collected. Slightly higher fees were collected than the plan of $75,000. Ecology's invoice for 2008 is not yet available. A projected credit of about $75,000-$80,000 is projected after 2008.
- For the 2009 season the Port is not collecting fees.

With the likely credit, at least the 2009 season and the 2010 season should be paid for with the credit. The Port is not likely going to be able to collect any more fees due to the difficulty we have had with collecting and invoicing the same amounts. After the 2010 season, a new funding mechanism will have to be discussed.

Comment/Open Discussion, All

The cruise lines brought up a discussion about air quality issues. There was discussion about whether or not there would be a separate MOU for air quality. The Puget Sound Clean Air Agency would have the lead on these issues, not Ecology. Several years ago, there had been discussion about the potential for a separate MOU, but the discussions did not lead to one. There was some discussion on what the various cruise lines are doing and trying out in relation to energy efficiency and air quality. Holland America Line gave an update on the WET Scrubber study and how this might affect water quality.

The cruise lines support the present regime of air issues being addressed under the NW ports clean air strategy/ Puget Sound Clean Air Agency, separate from the MOU.

WASHINGTON ANNUAL CRUISE MEMORANDUM OF UNDERSTANDING & CRUISE SHIP UPDATE MEETING

Date/Time: **January 22, 2009; 4:00 pm to 5:30 pm (actually finished at about 6:15 pm)**

Location: Department of Ecology, Northwest Regional Office

Attendees:
Norm Davis, Department of Ecology
Fred Felleman, Friends of the Earth
Randy Fiebrandt, Norwegian Cruise Line
Kevin Fitzpatrick, Department of Ecology
Marie Fritz, Port of Seattle
David Fyfe, Northwest Indian Fisheries Commission
John Hansen, Northwest Cruiseship Association
Amy Jankowiak, Department of Ecology
Lincoln Loehr, Northwest Cruiseship Association
Andrew Lorenzana, Princess Cruises
Mike McLaughlin, Port of Seattle
Bill Morani, Holland America Line
Rich Pruitt, Royal Caribbean Cruises
Peter Ressler, Port of Seattle
Marietta Sharp, Department of Ecology
Bob Stone, Royal Caribbean Cruises
Mark Toy, Department of Health
Heather Trim, People for Puget Sound
Jon Turvey, Holland America Line
Mike Young, Cruise Terminals of America

Agenda

4:00 PM – 4:20 PM	**Welcome, Introductions**	(Amy Jankowiak, All)
4:20 PM – 4:30 PM	**Compliance with the 2008 season** Findings from 2008 season inspections/records review DOH changes – how it went, what's in store for 2009	(Amy Jankowiak, Mark Toy, cruise line reps)
4:30 PM – 4:45 PM	**Updates** Biomass EPA Vessel Discharge Permit MOU Amendments MOU Funding	 (Port of Seattle) (Amy Jankowiak, cruise line reps) (Parties of the MOU) (Amy Jankowiak, Port of Seattle)
4:45 PM – 5:00 PM	**Looking Ahead**	(Parties of the MOU)
5:00 PM – 5:30 PM	**Comments/Discussion from interested parties**	(Amy Jankowiak, All)

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Welcome and introductions

Compliance with the 2008 Season, Amy Jankowiak, Department of Ecology
DOH Changes, Mark Toy, Department of Health

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There was a recommendation/request to compare the WET testing results received thus far to the on-land King County plants for the annual report.

There was a comment made about the results received thus far being high in toxicity, and if AWTS' are better than land-based plants, then why the high toxicity.

There was also a discussion about how dilution/mixing should be applied to the results. A study is being finalized (preliminary results out now) from Alaska Department of Environmental Conservation/EPA on dilution from cruise ships while stationary. Preliminary analysis indicates that the average dilution factor at a distance between 5 to 15 meters away from the cruise ships ranged from a factor of 22 to 50.

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Updates: Biomass Update, Peter Ressler, Port of Seattle

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The MOU parties previously discussed how the MOU would be affected by the VGP. Ecology proposed, and the parties agreed to leave the MOU conditions as is (unless there are contradictions to work out, haven't seen any as yet).

Updates: MOU Amendments, parties of the MOU

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The cruise lines support the present regime of air issues being addressed under the NW ports clean air strategy/ Puget Sound Clean Air Agency, separate from the MOU.

Updates: MOU Funding, Amy Jankowiak, Department of Ecology

A synopsis of funding was given by Ecology. Funding is in good shape at least through 2010 and then a funding mechanism may need to be revisited.

Looking Ahead, Parties of the MOU

No expected changes coming legislatively or otherwise.

Comments/Discussion from interested parties, All

Comments and discussion provided.