DEPARTMENT OF ECOLOGY
State of Washington

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

Inspection Date	Permit Number	County	Receiving Waters	Ecology Inspector
06/18/2010	NA	King	Marine Waters	Amy Jankowiak, Compliance Specialist
Entry Time 9:02 am Exit Time 11:20 am	Photos Taken ☒ Yes ☐ No	Samples Taken ☐ Yes ☒ No	Inspection Announced ☒ Yes ☐ No	Discharges to: ☒ Surface Water ☐ Ground Water ☐ Dewater ☐ POTW

Name and Location of Site Inspected:
RHAPSODY OF THE SEAS, Royal Caribbean International
Passenger Vessel
Pier 91, Seattle

Additional Participants/Inspectors:

On-Site Representative(s): *Name/Title/Phone/e-mail*
Lizel De Bruin, Environmental Officer
RH_EnvironmentalOfficer@rccl.com

Responsible Official(s): *Name/Title/Address/Phone/e-mail*
Rich Pruitt, Director Environmental Programs
Royal Caribbean Cruises Ltd
1080 Caribbean Way, Miami, FL 33132
Office: 305-982-2179; cell: 305-495-2845; RPruitt@rccl.com

Other Facility Data:
Notification made to Rich Pruitt, June 15, 2010

Section A: Areas Evaluated

☒ Black/Gray Wastewater System	☒ Residual Solids	☒ Records/Reports	☒ Hazardous Waste/ Solid Waste	☐ Sampling/Monitoring
☒ Discharge Locations	☒ Operation & Maintenance	☒ Sludge Handling/ Disposal	☒ Oily Bilge Water	☒ Other

Section B: 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	
☐ Auto Shut Down or Operational Controls to Insure System Shut Down If High Turbidity Occurs	

Turbidity or Equivalent:

Last Calibration:

Trigger Level for Early Alarm: Trigger Level for Shutdown:

Recorded Turbidity/Equivalent Levels Above Triggers:

☐ Daily 24-hour Continuous Monitoring for Disinfection Effectiveness	
☐ Disinfection Effectiveness Monitoring Equipment Functioning Properly	

Disinfection Effectiveness Monitoring:

☐ Auto Shut Down or Operational Controls to Insure System Shut Down If Disinfection System Upset Occurs	
☐ Disinfection System Operated and Maintained Properly	

Disinfection System:

Section C: For Vessels Discharging Continuously [2.1.3(B)]	
☐ 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	
☐ Auto Shut Down or Operational Controls to Insure System Shut Down if High Turbidity Occurs	
Turbidity or Equivalent: Last Calibration: Trigger Level for Early Alarm: Trigger Level for Shutdown: Recorded Turbidity/Equivalent Levels Above Triggers:	
☐ Daily 24-hour Continuous Monitoring for Disinfection Effectiveness	
☐ Disinfection Effectiveness Monitoring Equipment Functioning Properly	
Disinfection Effectiveness Monitoring:	
☐ Auto Shut Down or Operational Controls to Insure System Shut Down if Disinfection System Upset Occurs	
☐ Disinfection System Operated and Maintained Properly	
Disinfection System:	
Section D: General (Approved to Discharge)	
☐ No Discharges Within ½ Miles From Shellfish Beds/ Protocol (President's Point, Apple Tree Cove, Tyee Shoal)	
☐ Discharges Immediately Stopped When High Turbidity Occurs	
☐ Discharges Immediately Stopped When Disinfection System Upset Occurs	
☐ Immediate Notifications Made to WA Department of 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 1/40 Calls for Continuous	
Section E: General	
☒ Wastewater Discharge Records Review	Discharge records were reviewed (black water/gray water/residual solids) and are maintained properly. All discharges occurred outside of MOU waters (reviewed from 9/4/2009, last inspection, to date). Policy is to only discharge black water or gray water 13nm from land, at sea. This includes a 1nm buffer from company policy of 12nm, and CLIA guidelines.
☒ Residual Solids Managed Properly/Disposal Protocol per MOU	Sewage sludge is currently collected from the Haaman black water treatment system, drummed and landed ashore (only needs to be done periodically). Screened materials are incinerated.
☒ Hazardous Waste Managed Properly	Hazardous waste is typically off-loaded in Seattle or in Victoria about once every six months. Hazardous waste records were reviewed and appear to be consistent with MOU requirements. In Seattle, Clean Harbors is currently used for off-loads. The last off-load was May 21, 2010.
☒ WA Hazardous Waste Guidelines Followed (Appendix vii)	Hazardous waste is typically off-loaded in Seattle or in Victoria about once every six months. Hazardous waste records were reviewed and

	appear to be consistent with MOU requirements. In Seattle, Clean Harbors is currently used for off-loads. The last off-load was May 21, 2010.
☒ Solid Waste Managed Properly	Solid waste appears to be managed properly. The various solids waste streams are collected, sorted, stored, and sent ashore for proper disposal or incinerated where appropriate. Incineration occurs at sea only (>13nm). Records reviewed showed only food waste being discharged and only outside of MOU waters.
☒ Oily Bilge Water Managed Properly	Oily bilge water is treated and discharged at less than 5ppm (federal standard is 15ppm) and outside of MOU waters (>13nm).

Other:

Section F: Sampling Results

Parameter	Results
Biochemical Oxygen Demand 5-Day (BOD_5)	
Total Suspended Solids (TSS)	
Fecal Coliform	
Residual Chlorine	
pH	
Ammonia, Nitrogen	

Section G: Summary of Findings/Comments

Introduction

Amy Jankowiak, Washington State Department of Ecology (Ecology) Northwest Regional Office, Water Quality Program, conducted the inspection of the Royal Caribbean RHAPSODY OF THE SEAS on June 18, 2010. The main contact on board the RHAPSODY OF THE SEAS included Lizel De Bruin, Environmental Officer. Prior notification of the visit was given on June 15, 2010 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 RHAPSODY OF THE SEAS (photo #01) arrived on May 14th, 2010 at the Port of Seattle to begin the 2010 cruise season which consists of 18 calls to Seattle. They currently have both a traditional marine sanitation device for black water that includes screening, aeration and chlorination and have recently installed a new advanced wastewater treatment system for both black and gray water. The new AWTS underwent start-up last year, but experienced some problems and is now being revamped. No discharges are occurring from the system in MOU waters. The new AWTS is a NAVALIS Environmental Systems® treatment system includes equalization, aeration, solids separation, ultrafiltration, advanced oxidation 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.

The RHAPSODY OF THE SEAS' maiden voyage was in 1997, and is 915 feet long with a width of 105.6 feet. The vessel is not equipped for shore power, but does use two different types of low-content sulfur fuel (IFO380 with variance around 1.4% sulfur content or MDO with a range of 5-8 ppm).

Inspection

I arrived and boarded the ship at 9:02 am and began with introductions and a plan for the day with Lizel De Bruin, the Environmental Officer. Ms. De Bruin is new to the vessel, but has been an environmental officer for a number of years. We first discussed the various waste streams and discharge protocols. We then reviewed discharge records for hazardous waste, garbage and black water and gray water. A copy of the current MOU was available. We then headed to the control room for a discussion of the two wastewater treatment systems. We then viewed the black water and gray water systems. We then toured the oily water separator, the hazardous waste storage and garbage and recycling areas, and the dry cleaning system. The inspection was then finalized and we disembarked the vessel at about 11:20 am.

Discharge Types and Protocols:

All wastewater discharges occur outside of 13 nautical miles (they add a one mile buffer beyond their normal policy) and out at sea. The vessel has sufficient holding capacity for a typical turnaround in Seattle. The vessel is also currently

holding discharges while in Alaska and is closer to holding capacities for the time frame in Alaskan waters. The discharge ports (photos #26 and #27) have padlocks on them and the keys are kept in the control room under the Watchkeeper's eye. There is also an electronic reporting of discharges that occurs automatically and prints out. The electronic recording (Norcontrol) is a recording of each action and alarm on all technical machinery. All discharges are logged in the respective log books. All entries are checked by the log writer, Environmental Officer and the Chief Engineer to minimize discrepancies.

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 wastewater discharge records that were reviewed appeared to be in compliance with the MOU and did not occur in MOU waters. Records were reviewed for the time period since the last inspection, September 4, 2009 to date.

The vessel currently has both a traditional marine sanitation device (MSD) for black water that includes screening, aeration and chlorination and in 2009 installed a new advanced wastewater treatment system, NAVALIS®, for both black and gray water. The new AWTS was undergoing start-up in 2009 with the manufacturers. The system experienced some problems and is currently being revamped. The system is operating for the purposes of testing, but no discharges are occurring. All black water is going through the Hamann traditional MSD.

Black water includes toilet waste and infirmary drains. Gray water includes sink and shower water, laundry water, spa water and galley water. Gray water is collected and held separately from black water and is then discharged outside of MOU waters, and outside of 13 nautical miles (nm) from shore along with the MSD treated black water. Screenings from the MSDs is collected and incinerated. Bioresidue, or sewage sludge collected from the treatment systems are currently collected, drummed and sent ashore for proper treatment via drums. Once the NAVALIS® black and gray water advanced wastewater treatment system is fully operating, the bioresidue can be dried and incinerated.

Food waste is collected in various locations and is sent to the pulping system. Water in the pulper is recycled and occasionally discharged along with galley water as gray water more than 13 nm and out at sea. Some silverware and other metal pieces were recently found in the pulping system pipes and caused a leak. The leak was contained and the system was operating. Pulped food waste is discharged outside of 13 nm. Used water from the pulpers is sent to the black water collection tanks. Some food wastes such as pineapple rinds, banana peels, coffee, cake and breads which clog up the pulpers is sent to the incinerators or sent ashore per USDA. Used cooking oil (photo #18) is landed ashore for biodiesel recycling.

Oily bilge water is treated with a Marinfloc® sytstem (photo #15) and discharged at less than 5 ppm at greater than 13 nm. A white box is used for additional monitoring assurance. The white box (photo #16) is programmed to prevent discharge at less than 5 ppm. When the white box is opened, the effluent is routed back to the dirty bilge tank. The white box is padlocked and requires two keys. The Engineer on Watch has one key and the Chief Engineer has the other. Sink water from the engine area goes to the oily bilge water system. Oily sludge (photo #21) is drummed and offloaded in Victoria for proper disposal.

Pool water, which is salt water with chlorine can be held for about 7 days and is discharged overboard outside of MOU waters and is pH controlled. If the pool needs to be emptied while in MOU waters, the pool is closed and covered until they are out at sea. If there sanitation incidents on deck, the area is sanitized and steam units are used. Spa water is drained and cleaned daily. Prior to draining the system, the water is chlorinated to at least 10ppm, circulated for one hour and then the filters back-flushed. After back-flushing, the spas are cleaned with soap and chlorine rinse o fat least 10ppm. They are then drained to the gray water system and processed as such.

Potable water is either bunkered or produced by desalinization when out at sea. One of two evaporators is used for desal and the brine is discharged. The evaporators can produce 600 cubic meters per day, per unit.

Oily rags, medical waste (except sharps), food-contaminated cardboard, some plastics, some paper and wastewater system screenings are all incinerated (photos #24 and #25).

Plastics, paper, cardboard, glass, pallets, aluminum, tin, scrap metals, and batteries are all recycled (photos #22 and #23). Fluorescent lamps are recycled after being crushed in a "bulb eater" that has a mercury vapor removal system. Recycling currently takes place in Canada. Dry garage is offloaded as non-hazardous waste. Some materials are also donated when feasible. Garbage records looked to be in good order. Chemical containers are returned to the vendor for reuse (photo #17). Unitor chemicals are used for cleaning and phosphate-free Ecolab® products are used for the laundry.

Dry cleaning no longer uses Perchloroethylene (PERC). The newer system (photo #28) uses a hydrocarbon solvent called Exxon DF 2000 Fluid (photo #29). It is less toxic than its predecessor and produces much less volume of waste.

The liquid waste is drummed and off-loaded as non-hazardous waste. Other hazardous waste materials (photo #19) include photo waste filters (photo liquid waste from the silver recovery system is sent off as non-hazardous waste), spent chemicals, paints and paint thinners, aerosol condensate and filters from the fluorescent bulb mercury removal system. Hazardous waste is typically off-loaded in Seattle or in Victoria about once every six months. Hazardous waste records were reviewed and appear to be consistent with MOU requirements. In Seattle, Clean Harbors is currently used for off-loads. The last off-load was May 21, 2010.

Medical drains drain to the black water system. Medical sharps are collected in sharps containers and are off-loaded as bio-hazardous waste. Other medical wastes are collected in color-coded bags and are off-loaded or incinerated.

Photo waste is collected and run through a silver recovery system. Once the waste is less than 5 ppm, it is drummed and off-loaded as non-hazardous waste (photo #20). X-rays are now done digitally and do not have any waste materials. The old x-ray machine and chemicals is readied for off-loading as hazardous waste.

Cleaning of the outside of the vessel is done with phosphate-free cleaners and fresh water. When spot painting and chipping is to occur on the ships side, a request is submitted to the ports for approval for proposed work alongside if not able to do the work during sea days. Canvas, catchers, scoops and protection is rigged before work is started and the Boatswain and 1st Officer Deck Maintenance take charge of the actions with checks done by the Staff Captain and Environmental Officer to ensure procedures are followed and carried out in accordance with work permits.

HAMANN® Black water System traditional marine sanitation device (photo #13):
Black water or bioresidue is collected by vacuum. The liquid is coarsely screened and then screened by a drum screen. All solids collected are either incinerated or drummed and off-loaded. The screened liquid is sent to one of two treatment tanks where it is mixed with seawater. The type I marine sanitation device (MSD) consists of aeration, baffles, a minimizing pump and then chlorination by sodium hypochlorite (photo #14). The liquid is then held for discharge. Any solids collected from the MSD is also collected into the drums for shore side off-loading.

NAVALIS® Black and Gray water Advanced Wastewater Treatment System:

When the NAVALIS® system (photo #02) is operating, it operates as follows: Black water first goes through one of two shaker screens removing solids and foreign objects. Solids (photo #12) are separated and taken to the solids tank (photo #6), where they are burned in the incinerators or landed ashore as bio-residuals. The liquid is gravity fed to the roughing reactor, Aerated Equalization Tank (AET) (photos #03 and #04).

Gray water also goes through a shaker screen and then combines (photo #07) with black water in the AET. Liquid from the AET is pumped to the hydraulic separator (photo #05) where polymer is introduced and helps with the combination of any remaining sludge. The material in the upper layer of the hydraulic separator is pumped to the sludge reduction tank (SRT). The liquid from the bottom layer of the hydraulic separator is pumped to the Intermediate Tank. From there it is pumped through the Tubular Filter to the membrane feed tank.

The water in the SRT is left to settle; the water is reintroduced to the system while the remaining residuals are pumped to the residual holding tank (photo #06). From the membrane feed tank (photo #08), the effluent is then put through the ceramic membrane ultrafilters (photo #09) and then onto the Reactor where it is treated with ozone (photo #10). The ultrafilters are inside-out filters where liquid enters through the center and then is filtered outwards through the ceramic.

Effluent is then circulated through the ultraviolet disinfection system (photo #11). The treated effluent is then either discharged while in sea condition or placed in holding tanks when not at sea.

Conclusions and Recommendations
Staff was very knowledgeable of the protocols and systems for treatment and discharges. Discharge protocols were clear.

The installation of an advanced purification system is applauded for the overall environmental benefits that it will provide. Hopefully, the issues with the advanced system will be resolved and the system can be used on a continuous basis. And keeping the traditional MSD on board for additional bioresidue treatment is also an advantage.

Attachments: Photographs

Copies to:

Rich Pruitt, RCCL
Lizel De Bruin, RCCL
Mark Toy, Department of Health
John Hansen, NorthWest CruiseShip Association
Karen Burgess, Ecology
Kevin Fitzpatrick, Ecology
Amy Jankowiak, Ecology
Central Files: Royal Caribbean – RHAPSODY OF THE SEAS; WQ 6.1

Section H: Signatures

Name and Signature of Inspector:	Agency/Office/Telephone:	Date
Amy Jankowiak	Department of Ecology Northwest Regional Office Water Quality Program Municipal Compliance Specialist 425-649-7195	7/22/10
Name and Signature of Reviewer:	**Agency/Office/Telephone:**	**Date**
Kevin C. Fitzpatrick	Department of Ecology Northwest Regional Office Water Quality Section Manager 425-649-7033	7/22/10

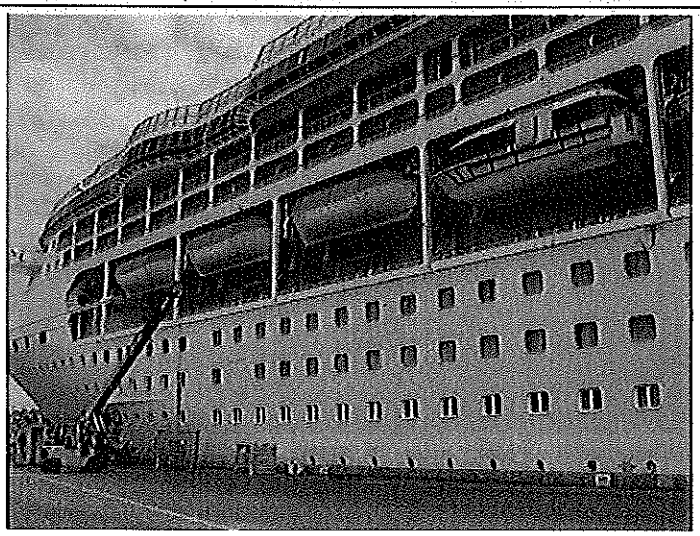


PHOTO #:01 DATE: JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P6180062
DESCRIPTION:

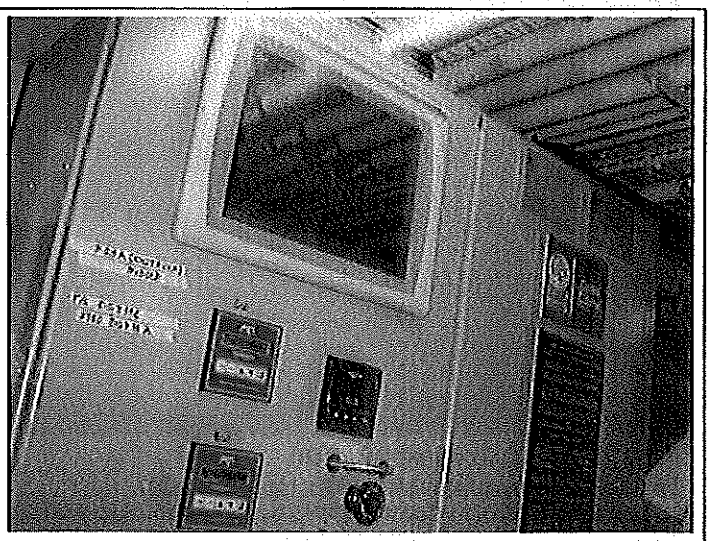


PHOTO #:02 DATE: JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P6180024
DESCRIPTION: NAVALIS® SYSTEM CONTROLS

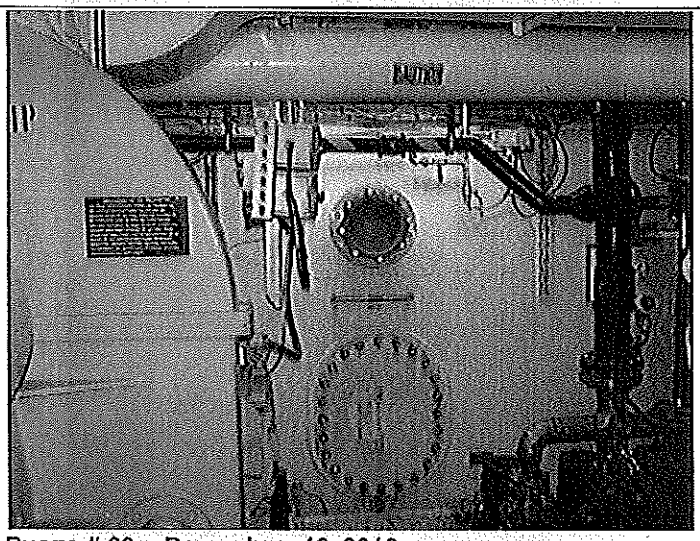


PHOTO #:03 DATE: JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P6180025
DESCRIPTION: NAVALIS® SYSTEM BIO TANK

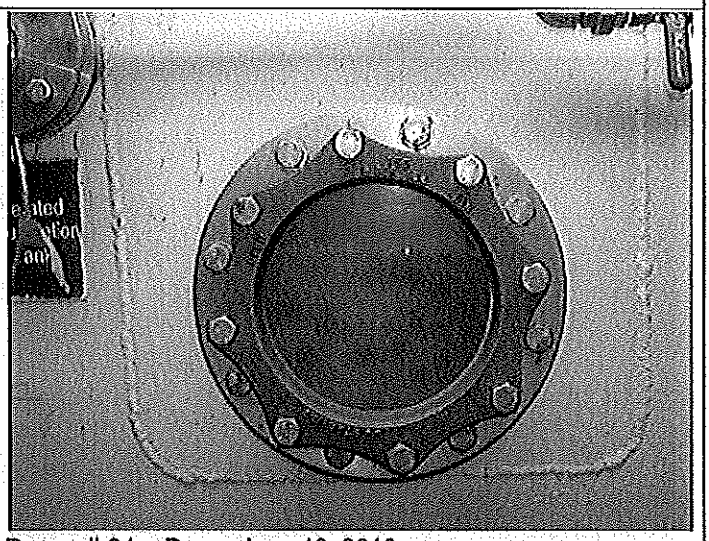


PHOTO #:04 DATE: JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P6180026
DESCRIPTION: NAVALIS® SYSTEM BIO TANK

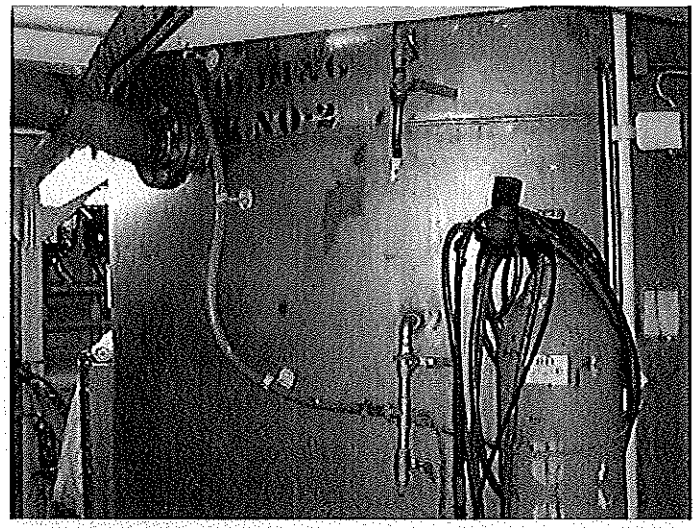


PHOTO #:05 DATE: JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P6180027
DESCRIPTION: NAVALIS® SYSTEM BLACK WATER TANK – SOLIDS SEPARATION (POLYMER ADDED)

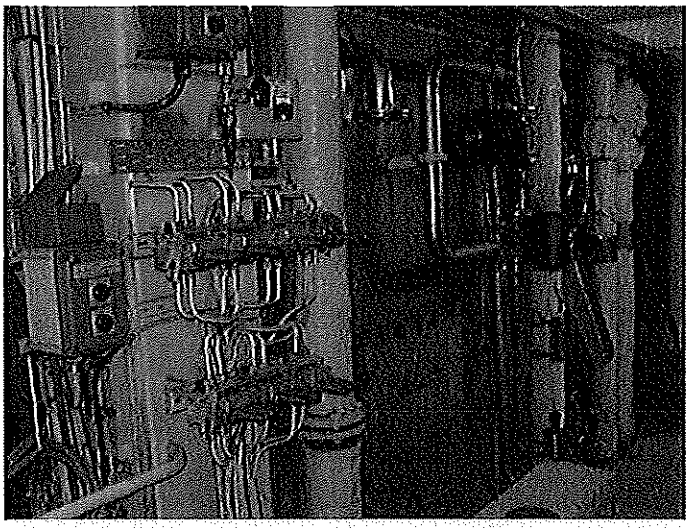


PHOTO #:06 DATE: JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P6180028
DESCRIPTION: NAVALIS® SYSTEM RESIDUE HOLDING TANK

PHOTO #:07 DATE: JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P6180029
DESCRIPTION: NAVALIS® SYSTEM GRAY WATER COMBINES WITH BLACKWATER

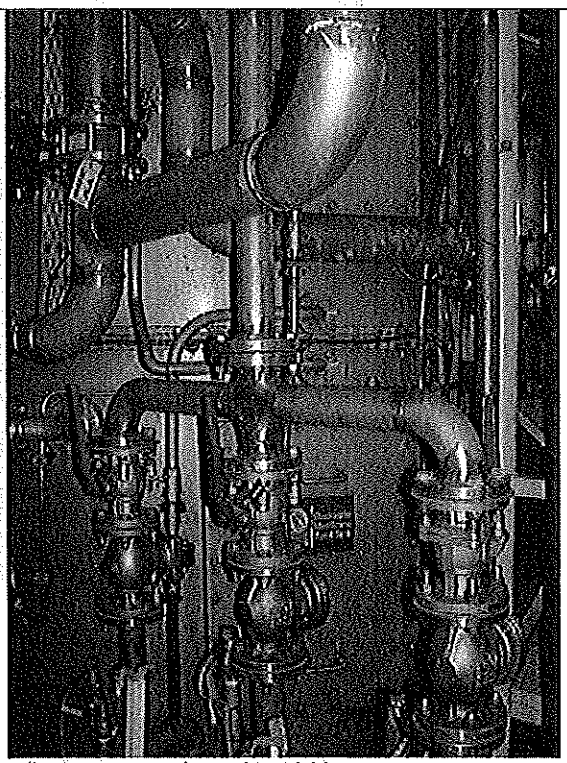


PHOTO #:08 DATE: JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P6180030
DESCRIPTION: NAVALIS® SYSTEM MEMBRANE FEED TANK (JUST PRIOR TO FILTERS)

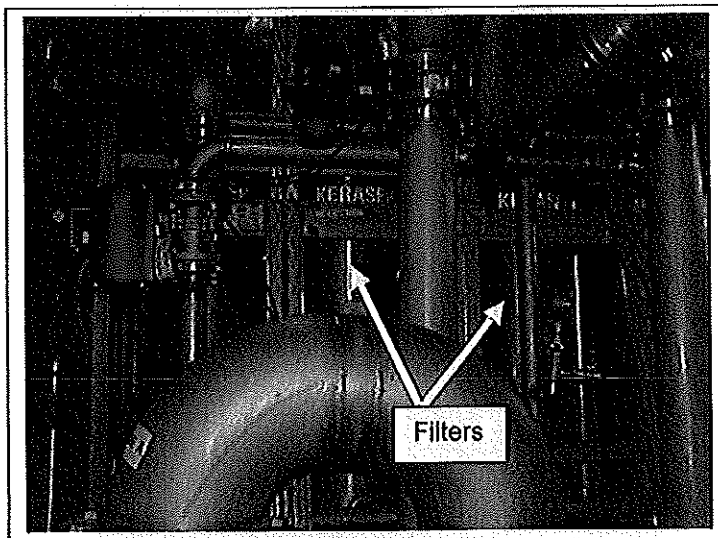


PHOTO #:09 DATE: JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P6180032
DESCRIPTION: NAVALIS® SYSTEM FILTERS

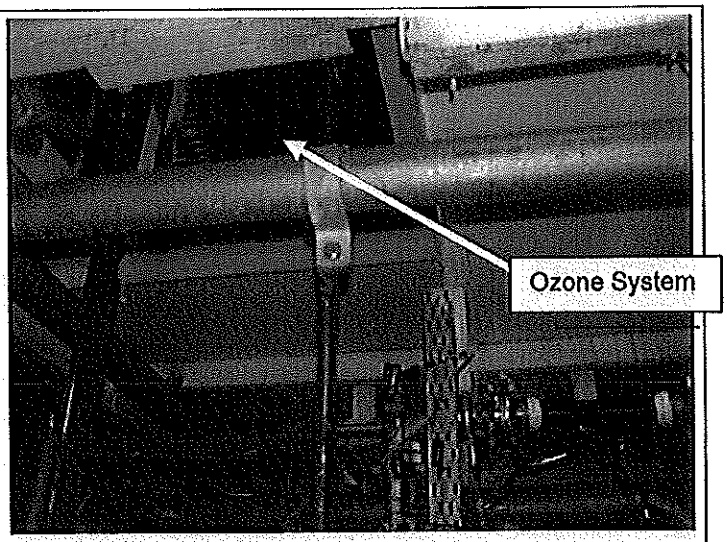


PHOTO #:10 DATE; JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P6180033
DESCRIPTION: NAVALIS® SYSTEM OZONE (STEEL BOX AT TOP OF LADDER)

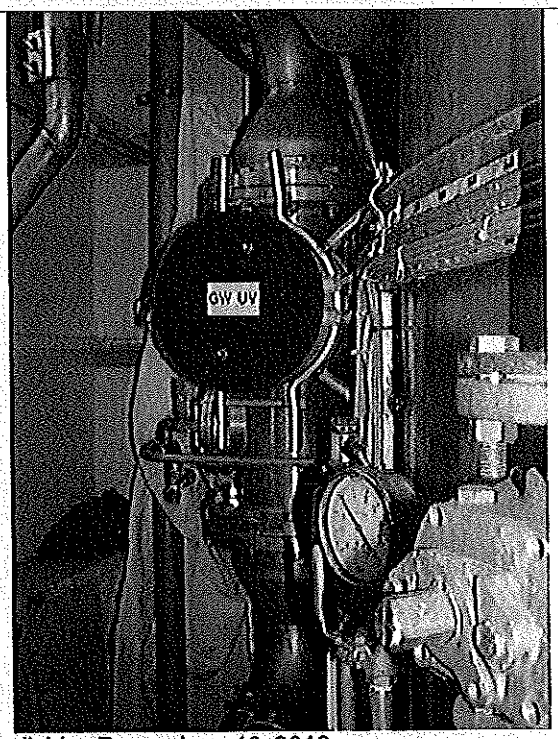


PHOTO #:11 DATE: JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P6180035
DESCRIPTION: NAVALIS® SYSTEM ULTRAVIOLET DISINFECTION SYSTEM

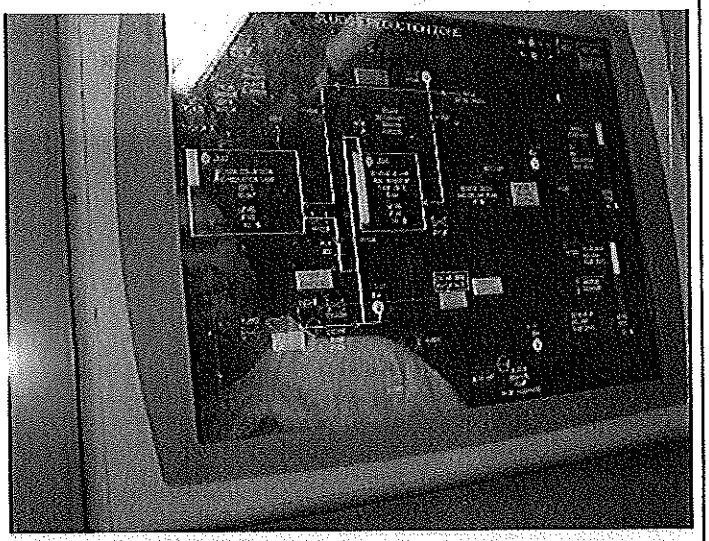


PHOTO #:12 DATE: JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P6180036
DESCRIPTION: NAVALIS® SYSTEM CONTROLS FOR SOLIDS STREAM

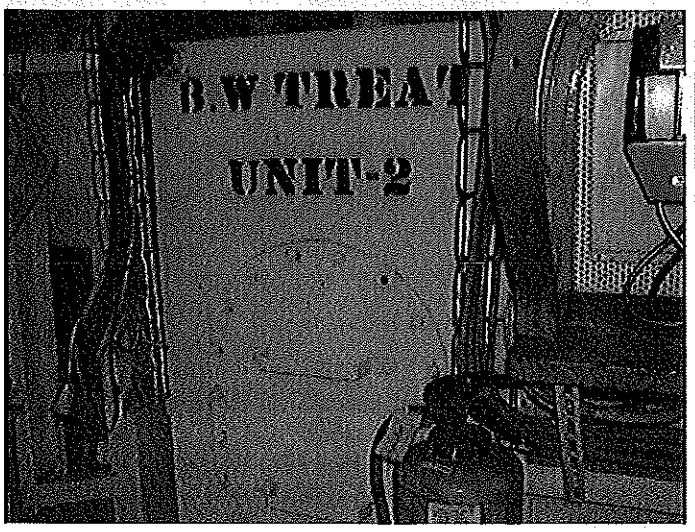


PHOTO #:13 DATE: JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P6180037
DESCRIPTION: HAAMAN TRADITIONAL MSD BLACKWATER TREATMENT TANK

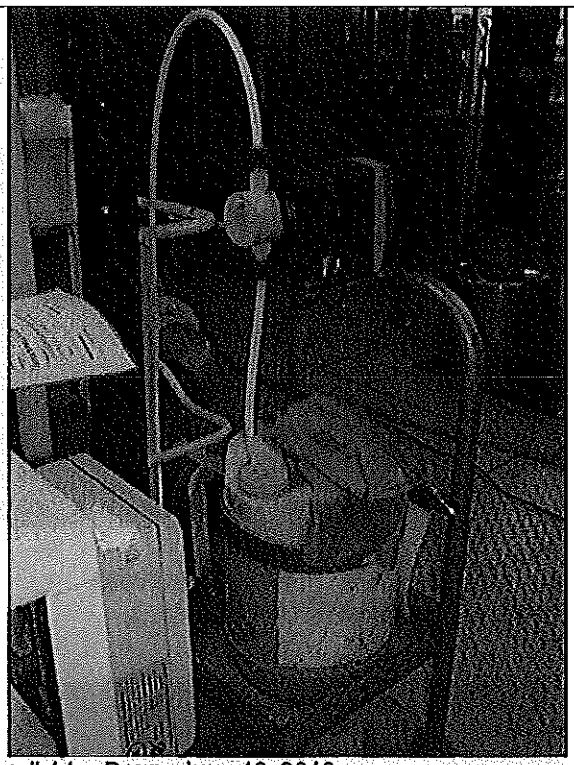


PHOTO #:14 DATE: JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P6180038
DESCRIPTION: HAAMAN TRADITIONAL MSD CHLORINE ADDITION

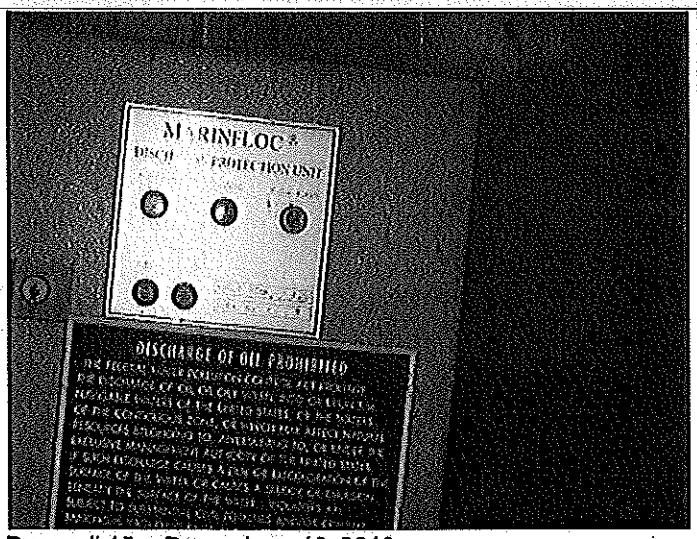


PHOTO #:15 DATE: JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P6180040
DESCRIPTION: OILY WATER SEPARATOR SYSTEM (OWS)

PHOTO #:16 DATE: JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P6180041
DESCRIPTION: OWS WHITE BOX

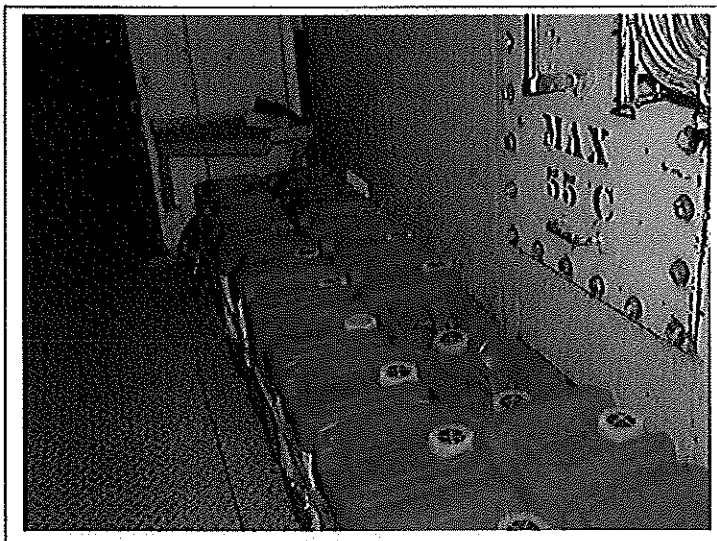


PHOTO #:17 DATE: JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P6180043
DESCRIPTION: EMPTY CONTAINERS TO BE RETURNED

PHOTO #:18 DATE: JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P6180045
DESCRIPTION: USED COOKING OIL

PHOTO #:19 DATE: JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P6180047
DESCRIPTION: HAZARDOUS WASTE (INCLUDING OLD X-RAY EQUIPMENT)

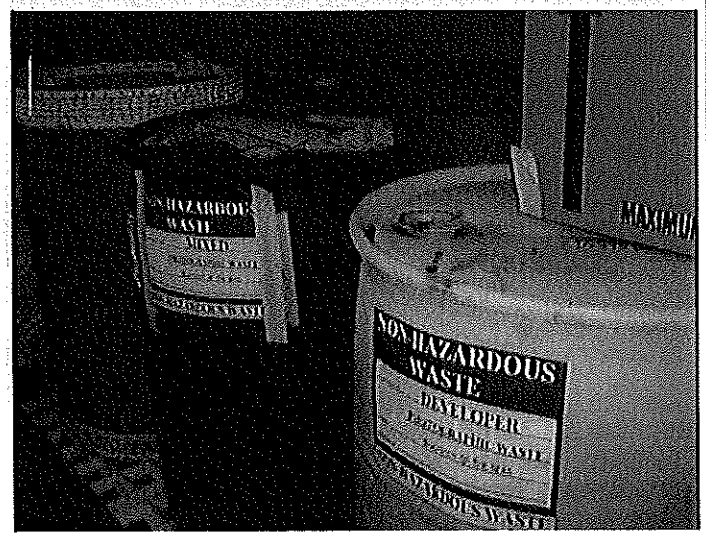


PHOTO #:20 DATE: JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P6180048
DESCRIPTION: PHOTO WASTE

PHOTO #:21 DATE: JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P6180049
DESCRIPTION: OILY SLUDGE FOR OFF-LOADING

PHOTO #:22 DATE: JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P6180050
DESCRIPTION: GARBAGE/RECYCLE AREA

PHOTO #:23 DATE: JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P6180052
DESCRIPTION: RECYCLING SEPARATION AREA (YELLOW BINS); FOOD WASTE PULPERS (STEEL EQUIPMENT)

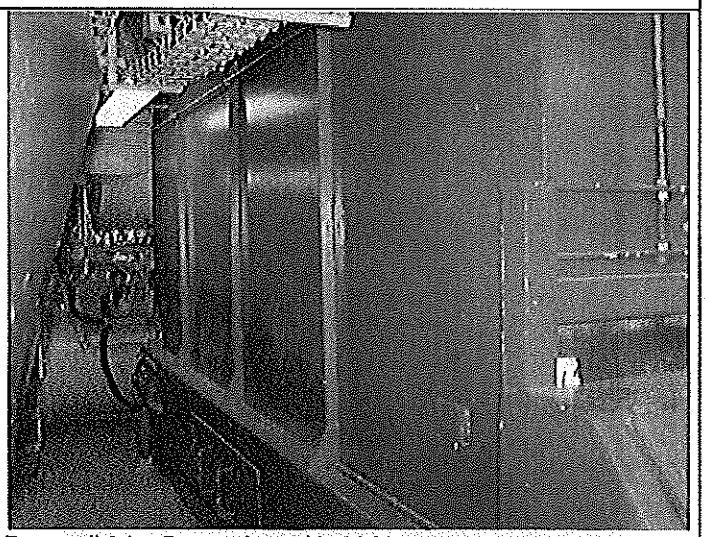


PHOTO #:24 DATE: JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P6180055
DESCRIPTION: INCINERATORS

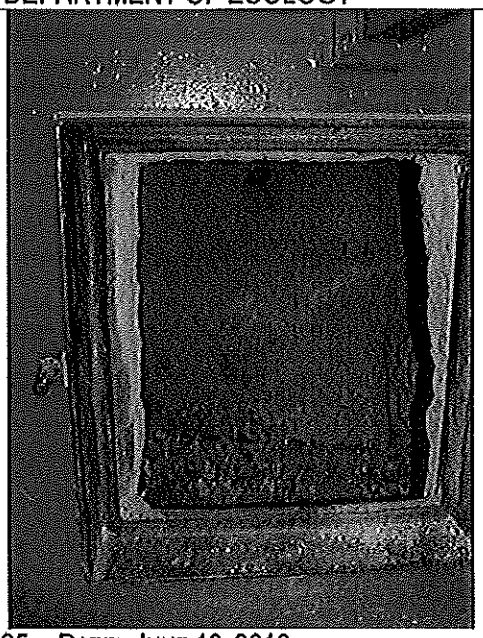


PHOTO #:25 DATE: JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P6180056
DESCRIPTION: INSIDE OF INCINERATOR

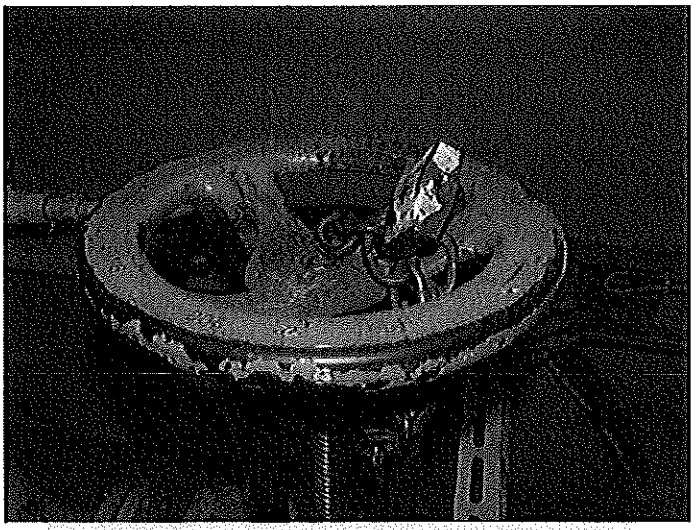


PHOTO #:26 DATE: JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P6180057
DESCRIPTION: PORT LOCK

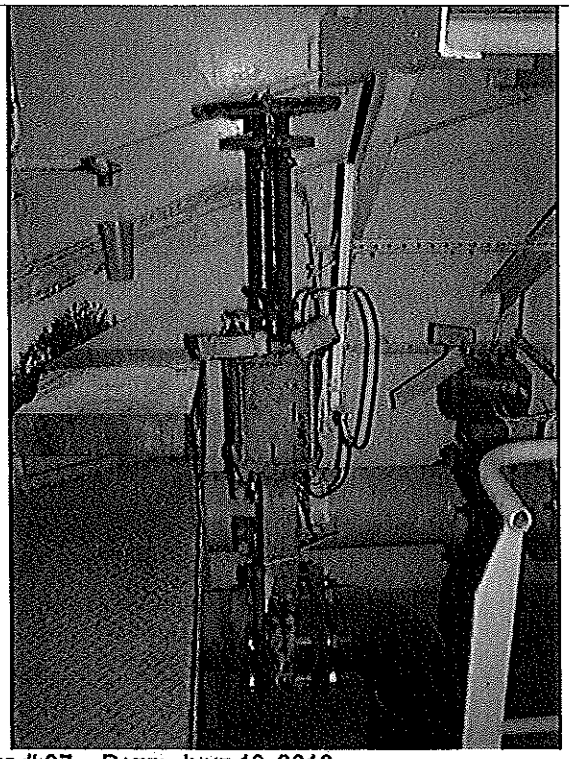


PHOTO #:27 DATE: JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P6180058
DESCRIPTION: GRAYWATER DISCHARGE PORT

PHOTO #:28 DATE: JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P6180060
DESCRIPTION: DRY CLEANING SYSTEM

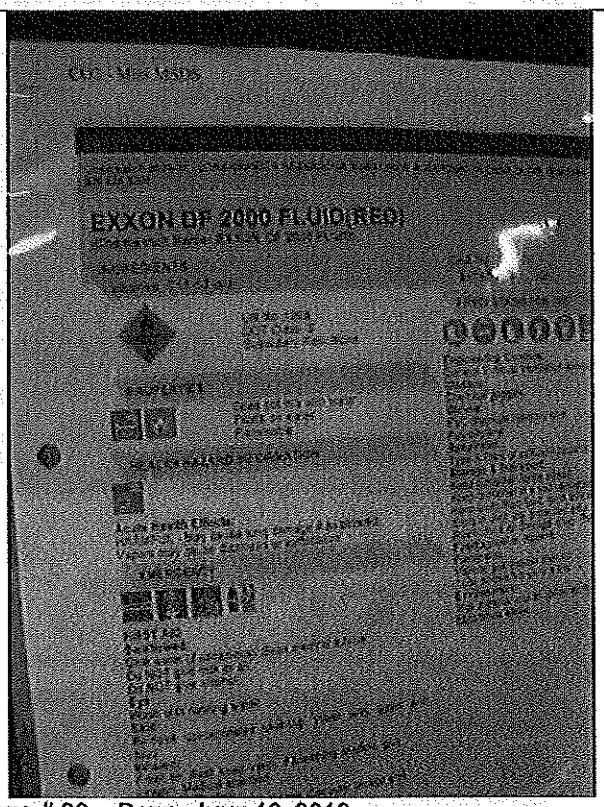


PHOTO #:29 DATE: JUNE 18, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P6180061
DESCRIPTION: DRY CLEANING SYSTEM CHEMICAL MSDS (EXXON DF 2000 FLUID)

DEPARTMENT OF ECOLOGY
State of Washington

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

Inspection Date	Permit Number	County	Receiving Waters	Ecology Inspector
July 6, 2010	NA	King	Marine Waters	Amy Jankowiak, Compliance Specialist
Entry Time 9:02 am Exit Time 10:55 am	Photos Taken ☒ Yes ☐ No	Samples Taken ☐ Yes ☒ No	Inspection Announced ☒ Yes ☐ No	Discharges to: ☒ Surface Water ☐ Ground Water ☐ Dewater ☐ POTW

Name and Location of Site inspected:
CARNIVAL SPIRIT, Carnival Cruise Lines
Passenger Vessel
Pier 91, Seattle

Additional Participants/Inspectors:
Tonya Lane, Municipal Engineer, Ecology

On-Site Representative(s): *Name/Title/Phone/e-mail*
Kristijan Belanek, Environmental Officer
spenvoff@carnival.com

Responsible Official(s): *Name/Title/Address/Phone/e-mail*
Michelle Matejka
MSOP 307N
Carnival Cruise Lines
3655 NW 87th Avenue, Miami, FL 33178
MMatejka@carnival.com

Other Facility Data:
Notification made to Michelle Matejka on July 2, 2010.

Section A: Areas Evaluated

☒ Black/Gray Wastewater System	☒ Residual Solids	☒ Records/Reports	☒ Hazardous Waste/ Solid Waste	☐ Sampling/Monitoring
☒ Discharge Locations	☒ Operation & Maintenance	☒ Sludge Handling/ Disposal	☒ Oily Bilge Water	☒ Other

Section B: 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	
☐ Auto Shut Down or Operational Controls to Insure System Shut Down if High Turbidity Occurs	

Turbidity or Equivalent:

Last Calibration:

Trigger Level for Early Alarm: Trigger Level for Shutdown:

Recorded Turbidity/Equivalent Levels Above Triggers:

☐ Daily 24-hour Continuous Monitoring for Disinfection Effectiveness	
☐ Disinfection Effectiveness Monitoring Equipment Functioning Properly	

Disinfection Effectiveness Monitoring:

☐ Auto Shut Down or Operational Controls to Insure System Shut Down if Disinfection System Upset Occurs	
☐ Disinfection System Operated and Maintained Properly	

Disinfection System:

Section C: For Vessels Discharging Continuously [2.1.3(B)]	
☐ 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	
☐ Auto Shut Down or Operational Controls to Insure System Shut Down if High Turbidity Occurs	
Turbidity or Equivalent: Last Calibration: Trigger Level for Early Alarm: Trigger Level for Shutdown: Recorded Turbidity/Equivalent Levels Above Triggers:	
☐ Daily 24-hour Continuous Monitoring for Disinfection Effectiveness	
☐ Disinfection Effectiveness Monitoring Equipment Functioning Properly	
Disinfection Effectiveness Monitoring:	
☐ Auto Shut Down or Operational Controls to Insure System Shut Down if Disinfection System Upset Occurs	
☐ Disinfection System Operated and Maintained Properly	
Disinfection System:	
Section D: General (Approved to Discharge)	
☐ No Discharges Within ½ Miles From Shellfish Beds/ Protocol (President's Point, Apple Tree Cove, Tyee Shoal)	
☐ Discharges Immediately Stopped When High Turbidity Occurs	
☐ Discharges Immediately Stopped When Disinfection System Upset Occurs	
☐ Immediate Notifications Made to WA Department of 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 1/40 Calls for Continuous	
Section E: General	
☒ Wastewater Discharge Records Review	Discharge records were reviewed (black water/gray water/residual solids) and are maintained properly. All discharges occurred outside of MOU waters (reviewed from beginning of cruise season, to date). Policy is to only discharge black water at greater than 12nm and outside of MOU waters and gray water at greater than 4nm and outside of MOU waters.
☒ Residual Solids Managed Properly/Disposal Protocol per MOU	Sewage sludge and screenings are currently collected from the Triton black water treatment system, drummed and landed ashore (only needs to be done periodically).
☒ Hazardous Waste Managed Properly	Hazardous waste is typically off-loaded in Seattle. Hazardous waste records were reviewed and appear to be consistent with MOU requirements. In Seattle, Clean Harbors is currently used for off-loads.
☒ WA Hazardous Waste Guidelines Followed (Appendix vii)	Hazardous waste is typically off-loaded in Seattle. Hazardous waste records were reviewed and appear to be consistent with MOU requirements. In Seattle, Clean Harbors is currently used for off-

	loads.
☒ Solid Waste Managed Properly	Solid waste appears to be managed properly. The various solids waste streams are collected, sorted, stored, and sent ashore for proper disposal. Records reviewed showed only food waste being discharged and only outside of MOU waters.
☒ Oily Bilge Water Managed Properly	Oily bilge water is treated and discharged at less than 15ppm and outside of MOU waters.

Other:

Section F: Sampling Results

Parameter	Results
Biochemical Oxygen Demand 5-Day (BOD_5)	
Total Suspended Solids (TSS)	
Fecal Coliform	
Residual Chlorine	
pH	
Ammonia, Nitrogen	

Section G: Summary of Findings/Comments

Introduction

Amy Jankowiak, Washington State Department of Ecology (Ecology) Northwest Regional Office (NWRO), Water Quality Program, and Tonya Lane, Ecology, NWRO, Water Quality Program, conducted the inspection of the Carnival Cruise Line, CARNIVAL SPIRIT on July 6, 2010. The main contact on board the CARNIVAL SPIRIT was Kristijan Belanek, Environmental Officer. Prior notification of the visit was given on July 2, 2010 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 CARNIVAL SPIRIT (photo #01) arrived on May 11th, 2010 at the Port of Seattle to begin the 2010 cruise season which consists of 18 calls on Tuesdays to Seattle. This is the first season that the cruise line is calling to Seattle. They currently have both a traditional marine sanitation device for black water that includes screening, aeration and chlorination and an advanced wastewater treatment system (AWTS) installed for gray water, which is not currently used. The AWTS is not functioning and producing results to the levels required, and is therefore not used, except for brief times in Alaskan waters. No discharges are occurring from either system in MOU waters. Approval for 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.

The CARNIVAL SPIRIT was built in 2001 and is 963 feet long with an estimated capacity of 2680 passengers and 961 crew.

Inspection

We arrived and boarded the ship at 9:02 am and began with introductions and a plan for the day with Kristijan Belanek, the Environmental Officer. We first discussed the various waste streams and discharge protocols. We then reviewed discharge records for hazardous waste, garbage and black water and gray water. A copy of the current MOU was available. We then discussed the two wastewater treatment systems. We then viewed the oily water separator system, and the black water and gray water systems. We then toured the hazardous waste storage and garbage and recycling areas, and the food pulper system. The inspection was then finalized and we disembarked the vessel at about 10:55 am.

Discharge Types and Protocols:

All black water discharges occur more than 12 nautical miles (nm) from the nearest land and outside of MOU waters. All gray water discharges occur more than 4nm from the nearest land and outside of MOU waters. Logs of discharges occur electronically. When the vessel is greater than 3nm from land, the bridge contacts the engineers in the control room, and again at 4nm and 12 nm. The valves are then opened upon confirmation of location. There are padlocks on discharge ports and the Engineer on Duty has control of the keys. Residual solids from the black water system, also known as biomass, bioresidue or sewage sludge, are drummed and landed ashore for proper treatment. Screenings from the

wastewater system are also drummed and landed ashore for proper disposal. The month of May included two offloads of bioresidue to Clean Harbors in Seattle, Washington.

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 wastewater discharge records that were reviewed appeared to be in compliance with the MOU and did not occur in MOU waters. Some of the locations of the discharges were later confirmed on the Bridge as being outside of MOU waters. Records were reviewed for the time period since the beginning of the cruise season to date.

Black water includes toilet waste and infirmary drains. Black water is treated with a Triton system, a traditional marine sanitation device (photos #04, #05, #06 and #07) that includes screening, aeration and chlorination. There are four of the units on board the vessel. Gray water includes sink and shower water, laundry water, hair salon water, spa water and galley water. Gray water is collected and held separately from black water and is then discharged more than 4nm from the nearest land and outside of MOU waters. When the vessel is operating the AWTS, a Rochem reverse osmosis system, the system collects accommodation gray water only and processes through the system. Gray water is collected (photo #08) and run through a pre-filter SWECO system (photos #09 and #10). Water is sent to a Pre-Reverse Osmosis tank (photo #11) and then onto the Reverse Osmosis filters (photo #12). The solids from the SWECO filter are collected, drummed (photo #15) and off-loaded. The liquid from the filters then goes to a permeate tank (photo #13) prior to disinfection with ultraviolet light (photo #14). The AWTS does not operate while in MOU waters. The vessel is typically able to hold black water for about 5 days and gray water for about 4-5 days.

Food waste is collected in various locations and is sent to the pulping system (photo #20). Water in the pulper is recycled and occasionally discharged along with galley water as gray water more than 4 nm from the nearest land and outside of MOU waters. Some food wastes such as pineapple rinds, banana peels, and coffee, which clogs up the pulpers, is sent to the incinerators. Used cooking oil is reused as biofuel by being burned with heavy fuel.

Oily bilge water is treated with a Hamworthy oily water separator system (photo #02) and discharged at less than 15 ppm outside of MOU waters. A white box (photo #03) is used for additional monitoring assurance. Oily sludge is drummed and offloaded for proper disposal.

Pool water, which is salt water with chlorine is recirculated if inside of MOU waters and is discharged at sea. PH is controlled automatically. Pool water can be held for about 7 days and is discharged overboard outside of MOU waters and is pH controlled. Spa water is drained to the gray water holding tanks and discharged along with gray water.

Potable water is either bunkered or produced by desalinization with evaporators when out at sea. The brine is discharged.

Medical waste (except sharps), food-contaminated cardboard, some plastics, some food, and some paper are all incinerated. The incinerators (photo #16) are only used when outside of MOU waters at greater than 12nm. The incinerator ash is tested regularly and has passed all tests. Narcotics are sent to the black water system and discharged outside of MOU waters. Tablets are crushed. Some medications are returned to the vendor.

Plastics, some paper, some cardboard, glass (photo #17), pallets, aluminum (photo #22), tin, scrap metals, laundry bins, and batteries are all recycled. Fluorescent lamps are also recycled. They are not crushed on board. Some materials are also donated when feasible. Garbage records looked to be in good order. Food waste is the only solid material being discharged out at sea.

Dry cleaning is not offered on the vessel. Laundry uses Eco-Lab products. Photo waste has been reduced to about 20% of what it used to be by the use of more digital technologies. The photo waste is offloaded as hazardous waste. X-ray's are done digitally, and do not have a waste product. Other hazardous waste materials (photo #19) including paints and thinners, and batteries, and aerosol condensate (photo #21), are off-loaded, typically in Seattle. Hazardous waste records were reviewed and appear to be consistent with MOU requirements. In Seattle, Clean Harbors is currently used for off-loads.

Cleaning of the outside of the vessel is done with fresh water. Spot painting and chipping does not occur in Seattle and tarps are used when work does occur.

Conclusions and Recommendations

Staff was very knowledgeable of the protocols and systems for treatment and discharges. Discharge protocols were clear.

The installation of an advanced purification system is applauded for the overall environmental benefits that it could provide. Hopefully, the issues with the advanced system will be resolved and the system can be used on a continuous basis.

Staff was very aware of the requirements of the MOU, even as this is the first season for the cruise line in Washington State waters.

Attachments: Photographs

Copies to:

Michelle Matejka, Carnival Cruise Lines
Kristijan Belanek, Carnival Cruise Lines
Mark Toy, Department of Health
John Hansen, NorthWest CruiseShip Association
Karen Burgess, Ecology
Kevin Fitzpatrick, Ecology
Amy Jankowiak, Ecology
Central Files: Carnival Cruise Lines – CARNIVAL SPIRIT; WQ 6.1

Section H: Signatures

Name and Signature of Inspector:	Agency/Office/Telephone:	Date
Amy Jankowiak	Department of Ecology Northwest Regional Office Water Quality Program Municipal Compliance Specialist 425-649-7195	8/3/10
Name and Signature of Reviewer:	**Agency/Office/Telephone:**	**Date**
Kevin C. Fitzpatrick	Department of Ecology Northwest Regional Office Water Quality Section Manager 425-649-7033	8/3/10

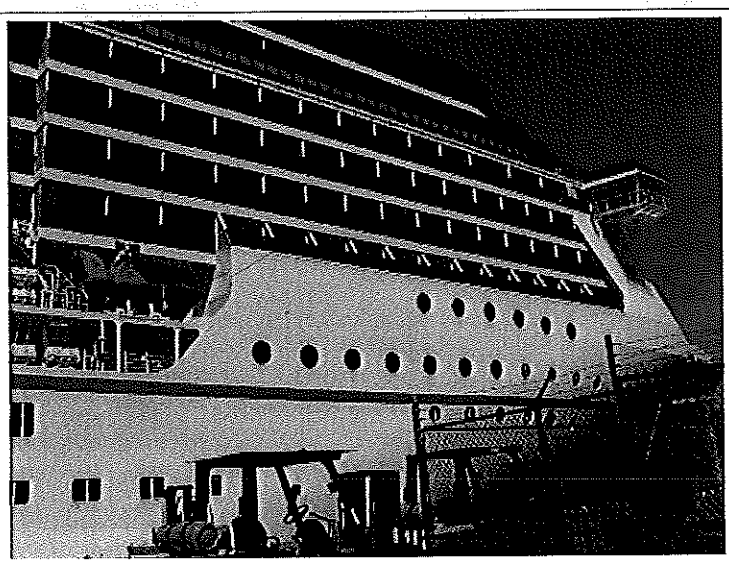


PHOTO #:01 DATE: JULY 6, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P7060083
DESCRIPTION: CARIVAL SPIRIT PASSENGER VESSEL

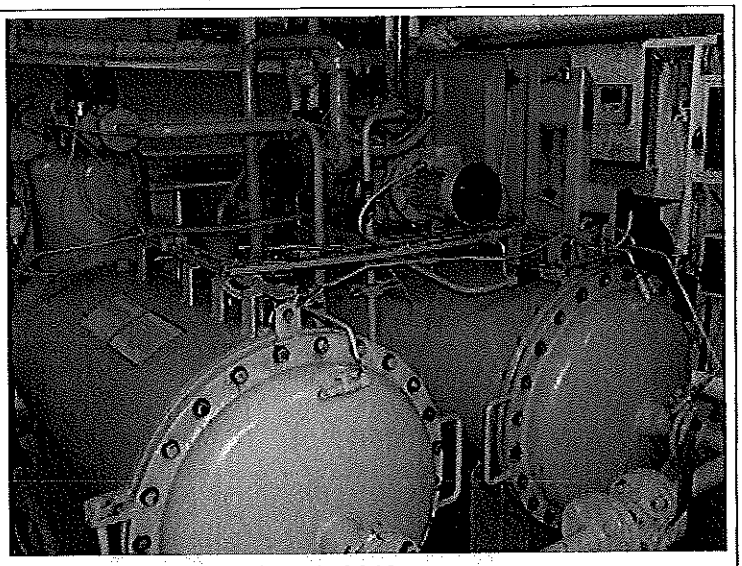


PHOTO #:02 DATE: JULY 6, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P7060061
DESCRIPTION: OILY WATER SEPARATOR

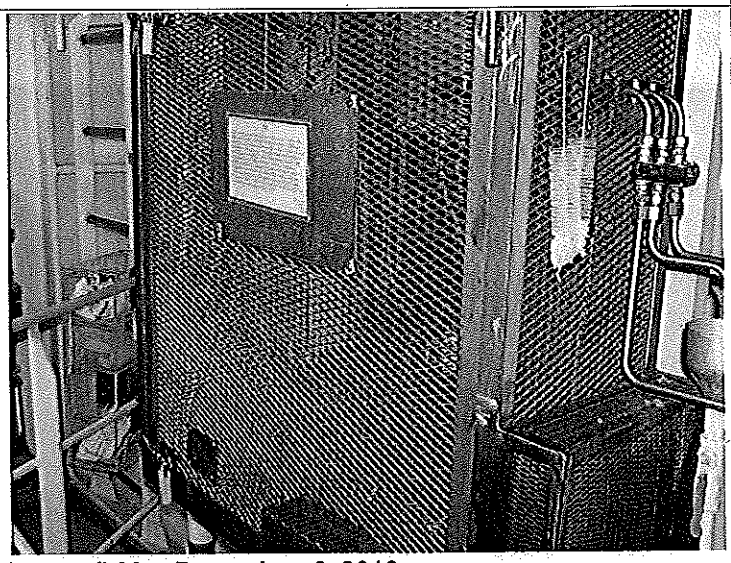


PHOTO #:03 DATE: JULY 6, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P7060062
DESCRIPTION: OILY WATER SEPARATOR WHITE BOX

PHOTO #:04 DATE: JULY 6, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P7060063
DESCRIPTION: BLACK WATER TREATMENT SYSTEM (TRITON) (1 OF 4)

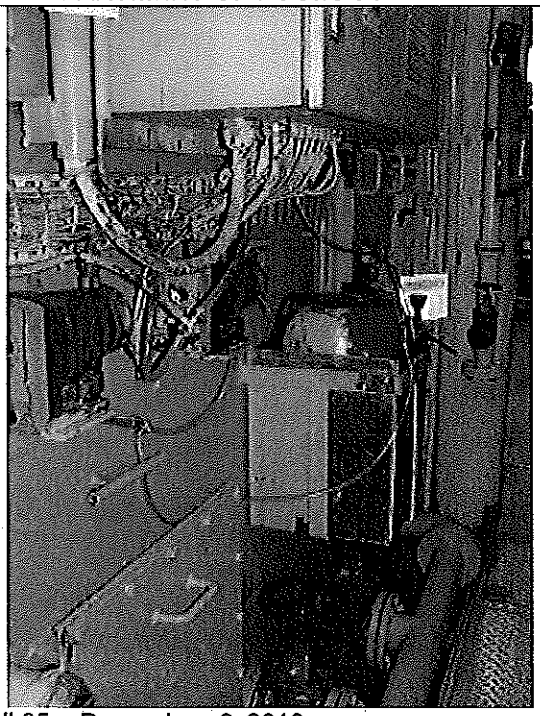


PHOTO #:05 DATE: JULY 6, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P7060064
DESCRIPTION: BLACK WATER TREATMENT SYSTEM (TRITON) (1 OF 4)

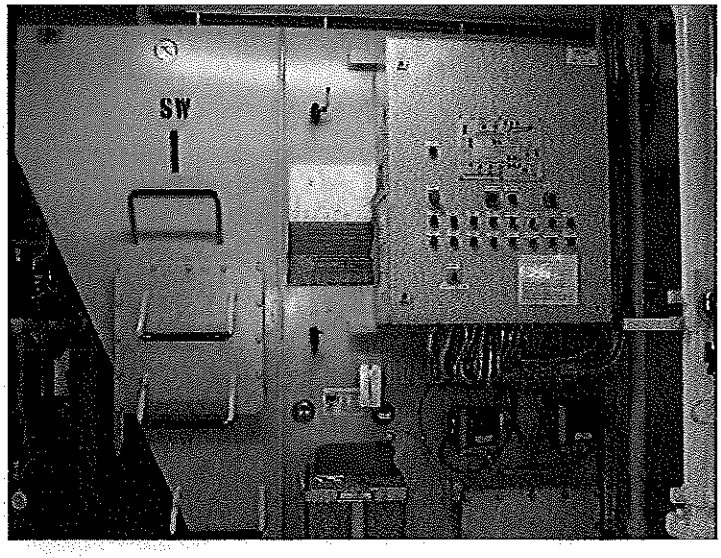


PHOTO #:06 DATE: JULY 6, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P7060065
DESCRIPTION: BLACK WATER TREATMENT SYSTEM (TRITON) (2 OF 4)

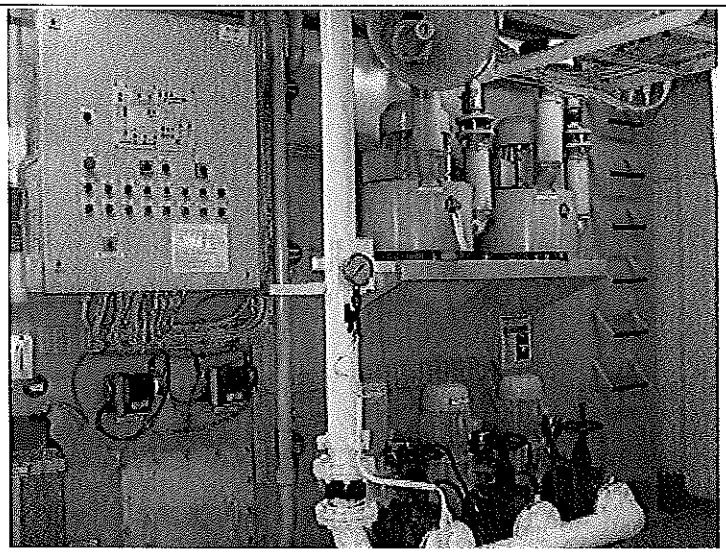


PHOTO #:07 DATE: JULY 6, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P7060066
DESCRIPTION: BLACK WATER TREATMENT SYSTEM (TRITON) (2 OF 4)

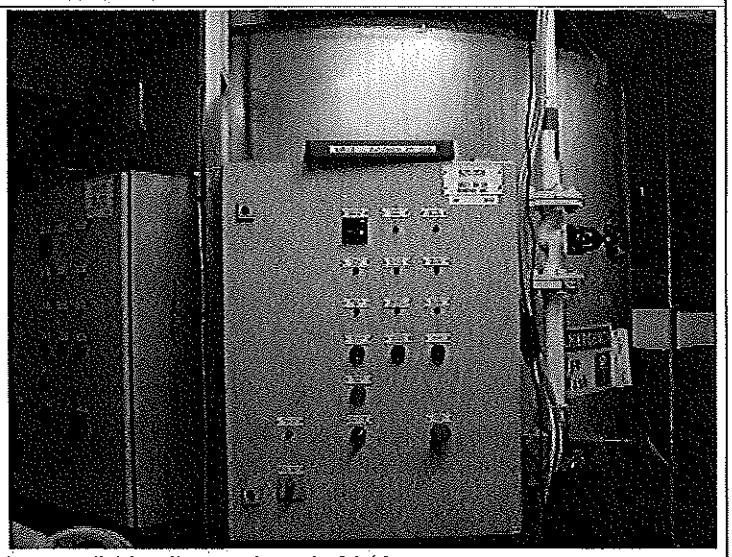


PHOTO #:08 DATE: JULY 6, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P7060067
DESCRIPTION: GRAY WATER TREATMENT SYSTEM TANK FOR NON-WORKING AWTS

PHOTO #:09 DATE: JULY 6, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P7060068
DESCRIPTION: GRAY WATER TREATMENT SYSTEM SWECO (PRE-FILTER) FOR NON-WORKING AWTS

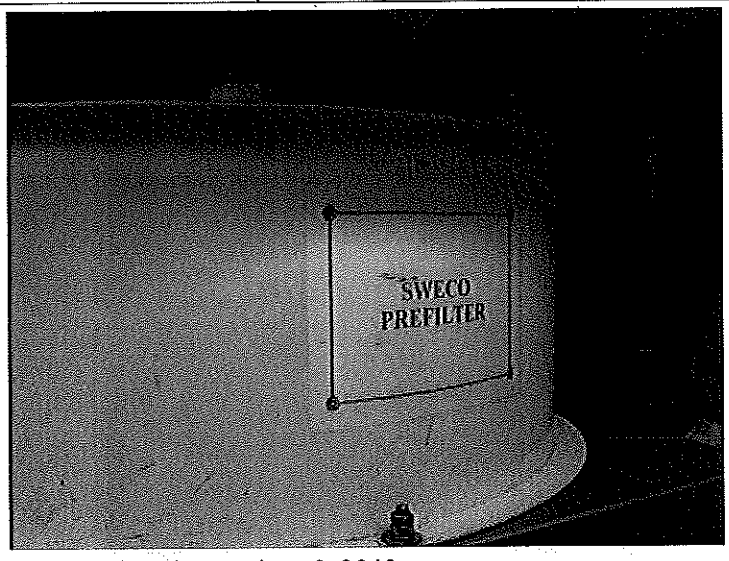


PHOTO #:10 DATE: JULY 6, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P7060069
DESCRIPTION: GRAY WATER TREATMENT SYSTEM SWECO (PRE-FILTER) FOR NON-WORKING AWTS

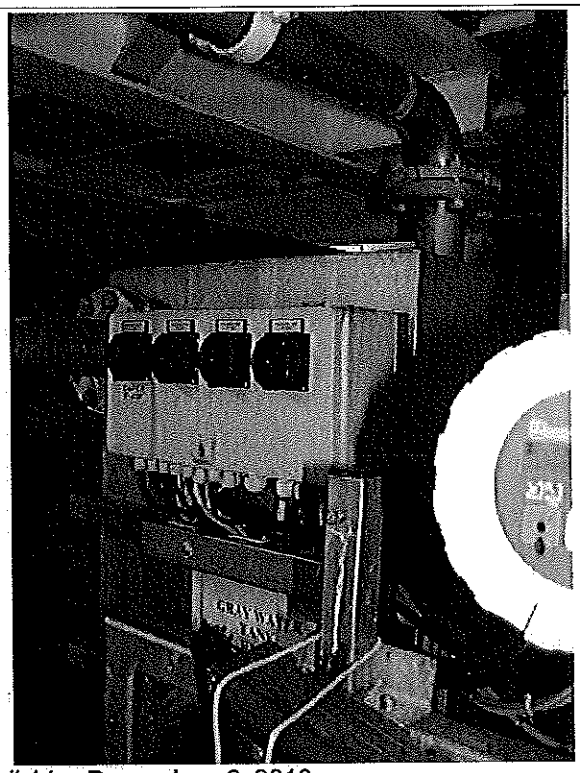


PHOTO #:11 DATE: JULY 6, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P7060070
DESCRIPTION: GRAY WATER TREATMENT SYSTEM PRE-RO TANK (FOR NON-WORKING AWTS)

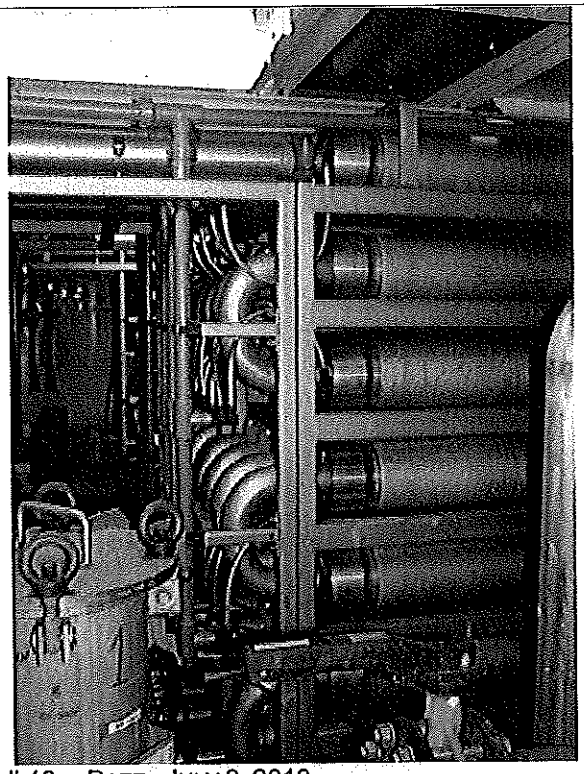


PHOTO #:12 DATE: JULY 6, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P7060071
DESCRIPTION: GRAY WATER TREATMENT SYSTEM REVERSE OSMOSIS FILTERS (FOR NON-WORKING AWTS)

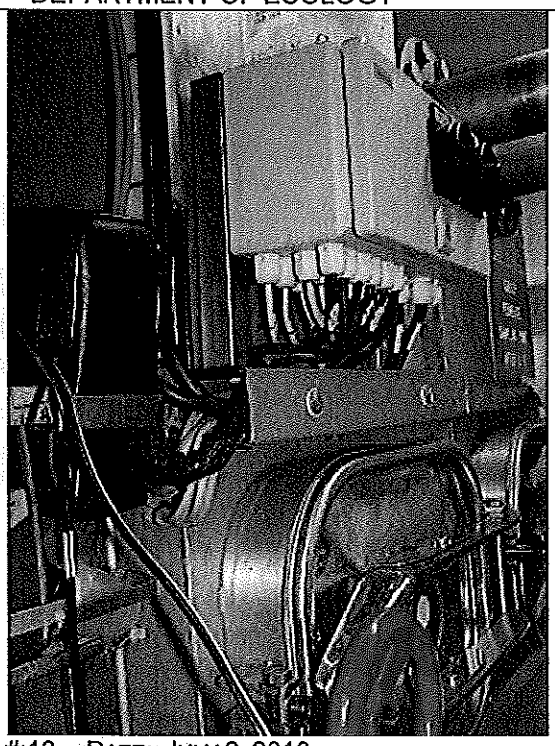


PHOTO #:13 DATE: JULY 6, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P7060072
DESCRIPTION: GRAY WATER TREATMENT SYSTEM PERMEATE TANK (FOR NON-WORKING AWTS)

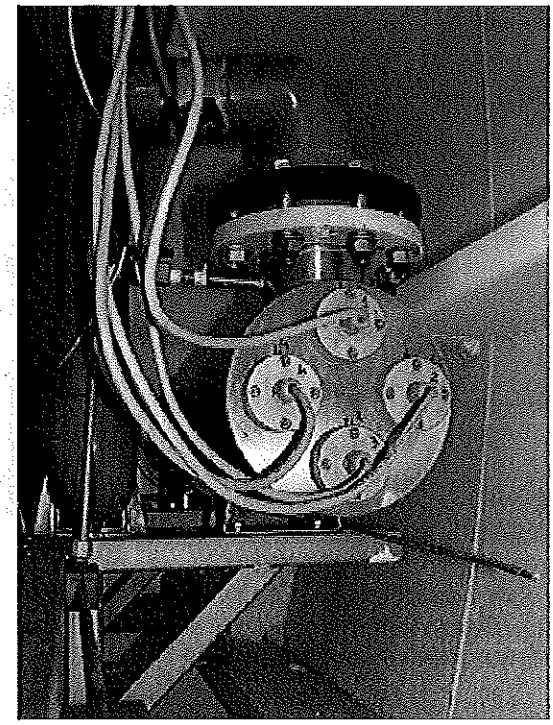


PHOTO #:14 DATE: JULY 6, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P7060073
DESCRIPTION: GRAY WATER TREATMENT SYSTEM ULTRAVIOLET LIGHT DISINFECTION SYSTEM (FOR NON-WORKING AWTS)

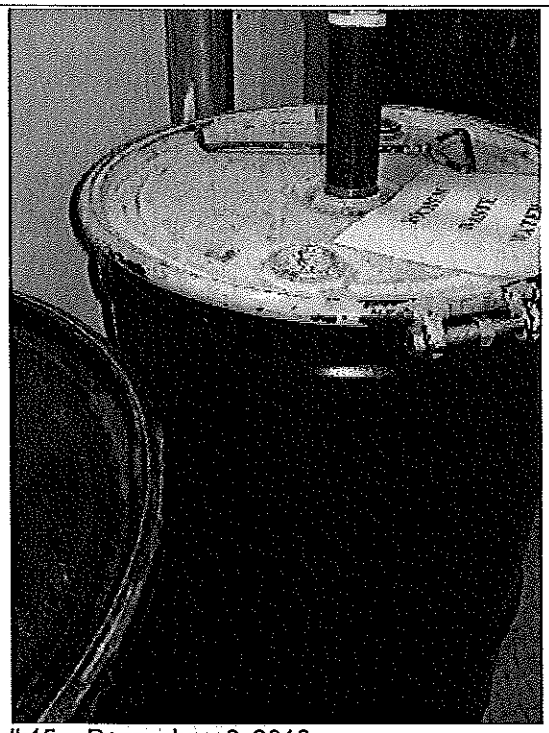


PHOTO #:15 DATE: JULY 6, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P7060075
DESCRIPTION: SCREENINGS FROM GRAY WATER TREATMENT SYSTEM

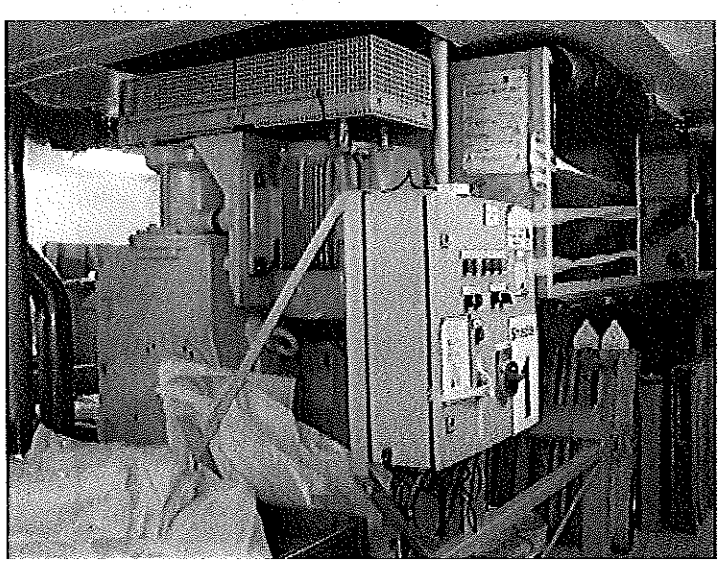


PHOTO #:16 DATE: JULY 6, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P7060076
DESCRIPTION: SHREDDER FOR THE INCINERATOR

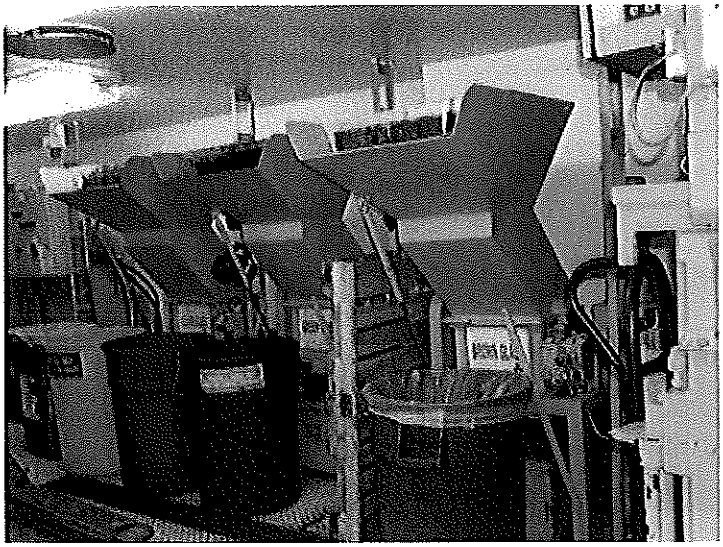


PHOTO #:17 DATE: JULY 6, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P7060077
DESCRIPTION: GLASS RECYCLING

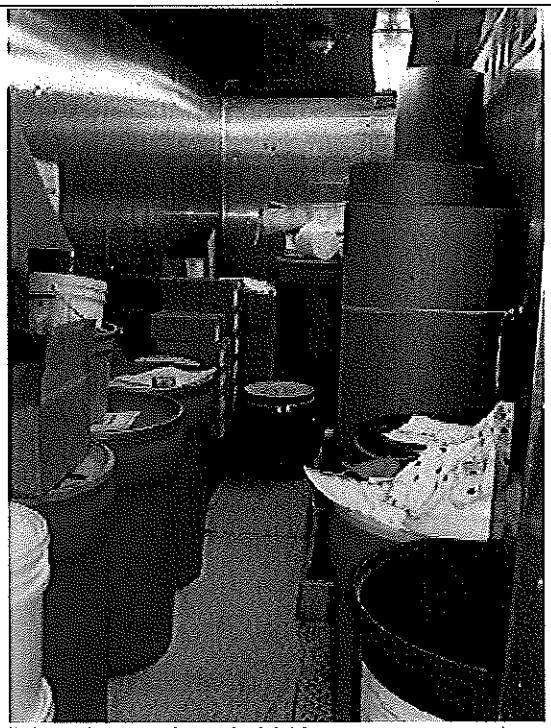


PHOTO #:18 DATE: JULY 6, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P7060078
DESCRIPTION: HAZARDOUS WASTE STORAGE

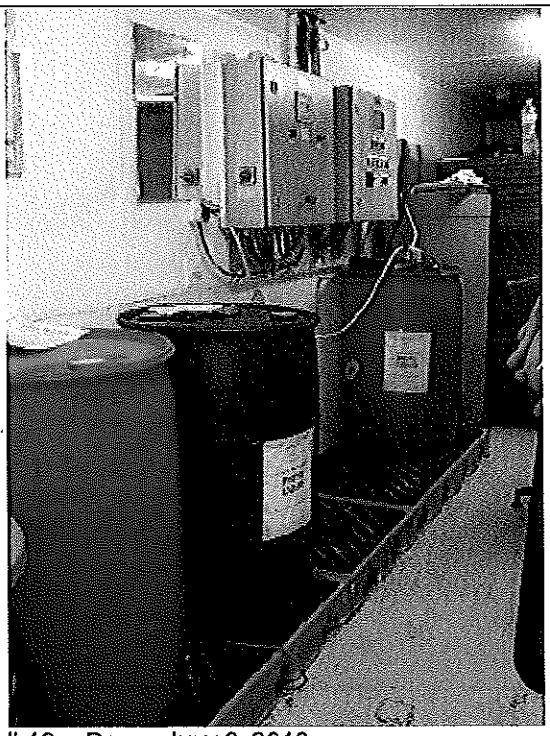


PHOTO #:19 DATE: JULY 6, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P7060079
DESCRIPTION: PHOTO WASTE

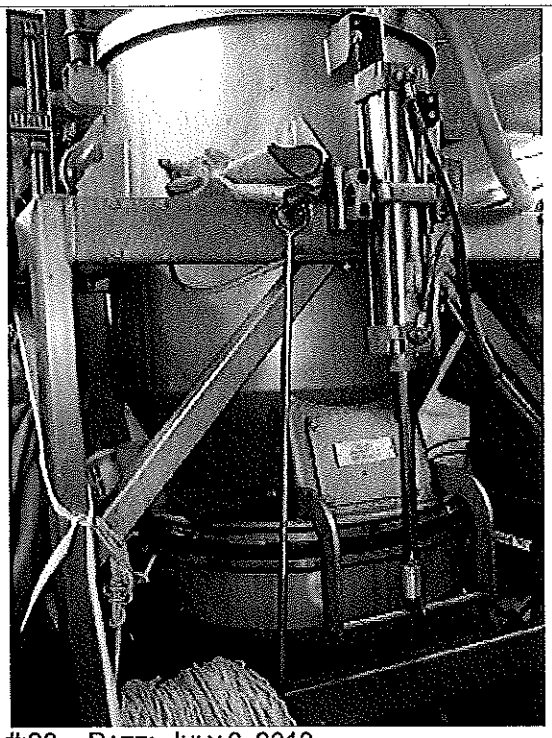


PHOTO #:20 DATE: JULY 6, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P7060080
DESCRIPTION: FOOD PULPER SYSTEM

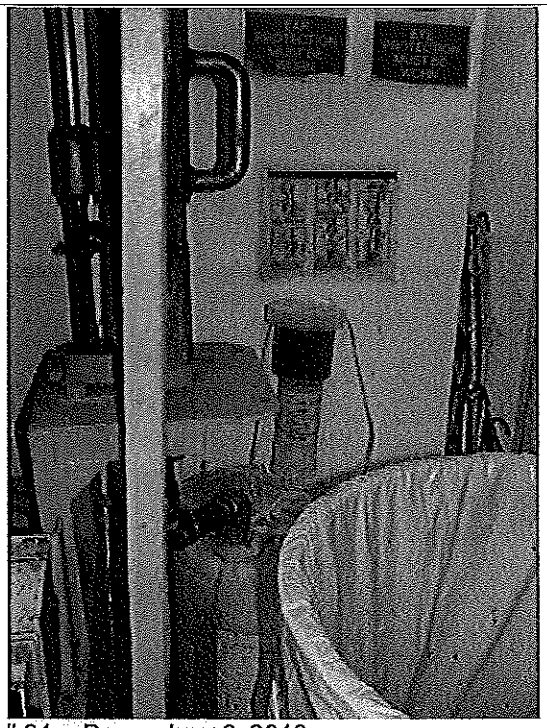


PHOTO #:21 DATE: JULY 6, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P7060081
DESCRIPTION: AEROSOL WASTE COLLECTION SYSTEM

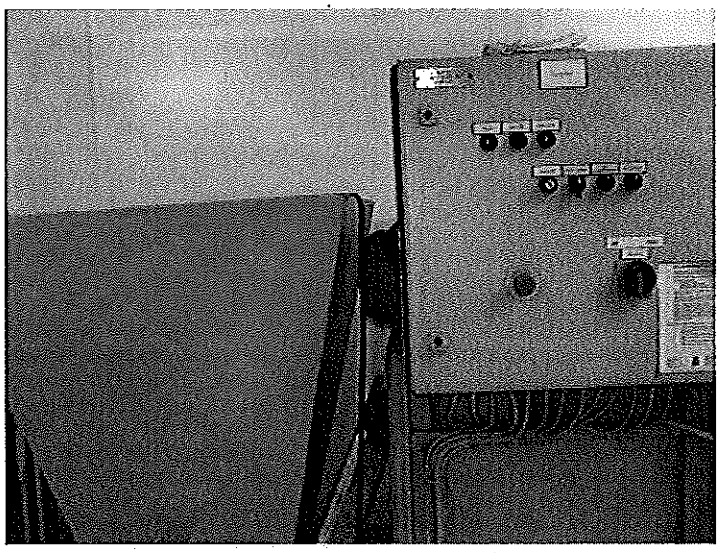


PHOTO #:22 DATE: JULY 6, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P7060082
DESCRIPTION: ALUMINUM CAN "DENSIFIER"

DEPARTMENT OF ECOLOGY
State of Washington

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

Inspection Date	Permit Number	County	Receiving Waters	Ecology Inspector
July 31, 2010	NA	King	Marine Waters	Amy Jankowiak, Compliance Specialist
Entry Time 9:03 am Exit Time 11:10 am	Photos Taken ☒ Yes ☐ No	Samples Taken ☐ Yes ☒ No	Inspection Announced ☒ Yes ☐ No	Discharges to: ☒ Surface Water ☐ Ground Water ☐ Dewater ☐ POTW

Name and Location of Site Inspected:
ROTTERDAM, Holland America Line
Passenger Vessel
Pier 91, Seattle

Additional Participants/Inspectors:
Kevin C. Fitzpatrick, Water Quality Program Section Manager, Ecology

On-Site Representative(s): *Name/Title/Phone/e-mail*
Roger Walker, Safety Environment Health Officer
Jon Turvey, Senior Manager, Auditing, Training and ISO 14001 Coordination
206-298-3849

Responsible Official(s): *Name/Title/Address/Phone/e-mail*
William J. Morani Jr., Vice President – Environmental Management Systems
Holland America Line
300 Elliott Ave. West, Seattle WA 98119
206-281-3535

Other Facility Data:
Notification made to Jon Turvey on July 22, 2010

Section A: Areas Evaluated

☒ Black/Gray Wastewater System	☒ Residual Solids	☒ Records/Reports	☒ Hazardous Waste/ Solid Waste	☐ Sampling/Monitoring
☒ Discharge Locations	☒ Operation & Maintenance	☒ Sludge Handling/ Disposal	☒ Oily Bilge Water	☒ Other

Section B: 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	
☐ Auto Shut Down or Operational Controls to Insure System Shut Down if High Turbidity Occurs	

Turbidity or Equivalent:

Last Calibration:

Trigger Level for Early Alarm: Trigger Level for Shutdown:

Recorded Turbidity/Equivalent Levels Above Triggers:

☐ Daily 24-hour Continuous Monitoring for Disinfection Effectiveness	
☐ Disinfection Effectiveness Monitoring Equipment Functioning Properly	

Disinfection Effectiveness Monitoring:

☐ Auto Shut Down or Operational Controls to Insure System Shut Down if Disinfection System Upset Occurs	
☐ Disinfection System Operated and Maintained Properly	

Disinfection System:

Section C: For Vessels Discharging Continuously [2.1.3(B)]	
☐ 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	
☐ Auto Shut Down or Operational Controls to Insure System Shut Down if High Turbidity Occurs	
Turbidity or Equivalent: Last Calibration: Trigger Level for Early Alarm: Trigger Level for Shutdown: Recorded Turbidity/Equivalent Levels Above Triggers:	
☐ Daily 24-hour Continuous Monitoring for Disinfection Effectiveness	
☐ Disinfection Effectiveness Monitoring Equipment Functioning Properly	
Disinfection Effectiveness Monitoring:	
☐ Auto Shut Down or Operational Controls to Insure System Shut Down if Disinfection System Upset Occurs	
☐ Disinfection System Operated and Maintained Properly	
Disinfection System:	
Section D: General (Approved to Discharge)	
☐ No Discharges Within ½ Miles From Shellfish Beds/ Protocol (President's Point, Apple Tree Cove, Tyee Shoal)	
☐ Discharges Immediately Stopped When High Turbidity Occurs	
☐ Discharges Immediately Stopped When Disinfection System Upset Occurs	
☐ Immediate Notifications Made to WA Department of 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 1/40 Calls for Continuous	
Section E: General	
☒ Wastewater Discharge Records Review	Discharge records were reviewed (black water/gray water/residual solids) and are maintained properly. All discharges occurred outside of MOU waters (reviewed from beginning of cruise season, to date). Policy is to only discharge black water at greater than 12nm and outside of MOU waters and gray water at greater than 4nm and outside of MOU waters.
☒ Residual Solids Managed Properly/Disposal Protocol per MOU	Sewage sludge and screenings are currently collected from the Triton black water treatment system, drummed and landed ashore or are discharged outside of 12 nm and outside of MOU waters. (only needs to be done about once every six months).
☒ Hazardous Waste Managed Properly	Hazardous waste is off-loaded in Victoria, Canada, and not in Washington State. Hazardous waste records were reviewed and appear to be consistent with MOU requirements.
☒ WA Hazardous Waste Guidelines Followed (Appendix vii)	Hazardous waste is off-loaded in Victoria, Canada, and not in Washington State. Hazardous waste records were reviewed and appear to be consistent with MOU requirements.

☒ Solid Waste Managed Properly	Solid waste appears to be managed properly. The various solids waste streams are collected, sorted, stored, and sent ashore for proper disposal. Records reviewed showed only food waste and crushed glass as being discharged and only outside of MOU waters.
☒ Oily Bilge Water Managed Properly	Oily bilge water is treated and discharged at less than 15ppm and outside of MOU waters.

Other:

Section F: Sampling Results

Parameter	Results
Biochemical Oxygen Demand 5-Day (BOD_5)	
Total Suspended Solids (TSS)	
Fecal Coliform	
Residual Chlorine	
pH	
Ammonia, Nitrogen	

Section G: Summary of Findings/Comments

Introduction

Amy Jankowiak, Washington State Department of Ecology (Ecology) Northwest Regional Office (NWRO), Water Quality Program, and Kevin C. Fitzpatrick, Ecology, NWRO, Water Quality Program Section Manager, conducted the inspection of the Holland America Line, ROTTERDAM on July 31, 2010. The main contact on board the ROTTERDAM was Roger Walker, Safety, Environmental and Health Officer. Jon Turvey, Senior Manager, Auditing, Training and ISO 14001 Coordination for Holland America Line also joined us for the inspection. Prior notification of the visit was given on July 22, 2010 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 ROTTERDAM (photo #01) arrived on May 15th, 2010 at the Port of Seattle to begin the 2010 cruise season which consists of 18 calls on Saturdays to Seattle. This is the first season that this vessel is calling to Seattle. The vessel has a traditional marine sanitation device for black water that includes screening, aeration and chlorination. Gray water is held and discharged without treatment. No discharges of black water or gray water are occurring in MOU waters. Approval for 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.

The ROTTERDAM was built in 1997 and is 778 feet long with an estimated capacity of 1316 passengers and 593 crew.

Inspection

We arrived at the ship boarding area at 9:03 am, met with Jon Turvey. Prior to boarding the vessel, we noticed that vessel crew was conducting painting in the anchor area on the outside, above water line area (photo #02). Upon a closer look, there was a tarp under the cherry picker basket, however, the basket and tarp was a fair distance from the vessel. The crew was using long-handles for painting and there was a potential for paint drips to fall in the water. Mr. Turvey asked the crew to stop their work. The 5-gallon paint bucket was sitting directly on the metal screen of the basket overtop the tarp, without secondary containment. We discussed the need for some more appropriate best management practices (BMPs) and Jon requested that the crew stop their work until he could speak with the Chief Officer. We then boarded the vessel and met with Roger Walker, the SEH Officer. Jon filled in Mr. Walker on the paint practices and then spoke with the Chief Officer. The Chief Officer had the crew suspend the work until new BMPs could be implemented.

We then sat down to discuss the various waste streams and discharge protocols and reviewed discharge records (photos #03 and #04) for hazardous waste, oily bilge water, garbage and black water and gray water. We then verified some of the discharge locations with Bridge navigation. We then viewed the garbage and recycling area (photo #07) and hazardous waste storage. We also looked at the food waste pulping system. We then toured the Triton black water treatment system and oily water separators. We finished the inspection with a tour and discussion of food waste source separation and management. The inspection was then finalized and we disembarked the vessel at about 11:10 am.

Discharge Types and Protocols:

Ballast water exchanges do not occur in Washington Straits. Ballast tanks are sometimes used as gray water tanks and are cleaned out prior to a change in use out at Sea.

Paint chipping for the outside of the vessel is restricted once inside MOU waters. If needed, paint is peeled off by hand.

All black water discharges occur more than 12 nautical miles (nm) from the nearest land and outside of MOU waters. No discharges occur in the Olympic Coast National Marine Sanctuary. Black water is treated with a traditional Type II marine sanitation device. The Triton system includes screening, aeration and chlorination. There are three tanks of about 46 cubic meters each. All gray water discharges occur more than 4nm from the nearest land and outside of MOU waters.

Logs of discharges occur electronically. The bridge and the Engine Control Room crew communicate about locations to confirm areas for discharge. The vessel uses a 3 light indicator system to indicate the status of discharge location.

Residual solids from the black water system, also known as biomass, bioresidue or sewage sludge, are currently collected from the Triton black water treatment system, drummed and landed ashore or are discharged outside of 12 nm and outside of MOU waters. (only needs to be done about once every six months).

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 wastewater discharge records that were reviewed appeared to be in compliance with the MOU and did not occur in MOU waters. Some of the locations of the discharges were later confirmed on the Bridge (photo #05) as being outside of MOU waters. Records were reviewed for the time period since the beginning of the cruise season to date.

Black water includes toilet waste and infirmary drains. Black water is treated with a Triton system (photos #12 and #13), a traditional marine sanitation device that includes screening, aeration and chlorination (photo #14). There are three units on board the vessel. Gray water includes sink and shower water, laundry water, hair salon water, spa water and galley water. Gray water is collected and held separately from black water and is then discharged more than 4nm from the nearest land and outside of MOU waters.

Food waste is collected in various locations and is sent to the pulping system (photo #09). The food is separated in the main kitchens into three bins, garbage (gray), recycle (blue) and food (yellow) (photos #21 and #22). The Environmental Officer oversees the source separation and training. Some food wastes such as pineapple rinds, banana peels, and coffee, which clogs up the pulpers, is sent to the incinerators. The pulped food waste is discharged out at Sea. Used cooking oil (photo #06) is reused as biofuel by being burned with heavy fuel.

Oily bilge water is treated with a FACET and SERAP two-part oily water separator system (photos #16 and #19). The FACET system brings the oil content down to less than 50ppm and the SERAP filter (photos #15, #17 and #18) brings the content down to less than 15 ppm. Discharges occur at less than 15 ppm and outside of MOU waters. A white box is used for additional monitoring assurance. Oily sludge is drummed and offloaded for proper disposal.

Pool water, with bromine is sent to the gray water tanks and is then discharged outside of MOU waters. Spa water is also drained to the gray water holding tanks and discharged along with gray water.

Potable water is either bunkered or produced by exhaust heat from the engines and a steam evaporator. The brine is then discharged. The water is only made when out at Sea.

Food-contaminated cardboard, some plastics, some food, and some dry waste are all incinerated. The incinerators are only used when outside of four nautical miles and 90 minutes after departure; 1 hour before arrival. Narcotics are incinerated with witness. Many medications are returned to the vendor for credit.

Plastics, some paper, some cardboard, aluminum, tin, and scrap metals, are all recycled (photo #10). Glass is crushed and discharged out at sea. Fluorescent lamps are crushed on board with a mercury vapor removal system (photo #11). Some materials are also donated when feasible. Garbage records looked to be in good order. Food waste and crushed glass are the only solid materials being discharged out at sea. Holland America Line has been working with Costco on methods to minimize packaging material for materials brought on board. Materials off-loaded for recycling are off-loaded in Victoria, Canada.

Dry cleaning no longer uses PERC, instead, a Miele system is used. Miele is a no-solvent based cleaner. Photo waste goes through a silver recovery system and is then off-loaded at less than 5ppm. X-ray's are done digitally, and do not have a waste product. Other hazardous waste materials (photo #08) including paints and thinners, and batteries, and

aerosol condensate, are off-loaded in Victoria, Canada. Hazardous waste records were reviewed and appear to be consistent with MOU requirements.

Conclusions and Recommendations
Staff was very knowledgeable of the protocols and systems for treatment and discharges. Discharge protocols were clear.

It is recommended that the crew continue to take care with implementing best management practices when conducting any ship painting or maintenance while in port.

Staff was very aware of the requirements of the MOU.

Attachments: Photographs

Copies to:

Roger Walker, HAL
Jon Turvey, HAL
William Morani, Jr., HAL
Bob Diaz, HAL
Mark Toy, Department of Health
John Hansen, NorthWest CruiseShip Association
Karen Burgess, Ecology
Kevin Fitzpatrick, Ecology
Amy Jankowiak, Ecology
Central Files: Holland America Line - ROTTERDAM; WQ 6.1

Section H: Signatures

Name and Signature of Inspector:	Agency/Office/Telephone:	Date
Amy Jankowiak	Department of Ecology Northwest Regional Office Water Quality Program Municipal Compliance Specialist 425-649-7195	9/9/10
Name and Signature of Reviewer:	Agency/Office/Telephone:	Date
Kevin C. Fitzpatrick	Department of Ecology Northwest Regional Office Water Quality Section Manager 425-649-7033	9/9/10

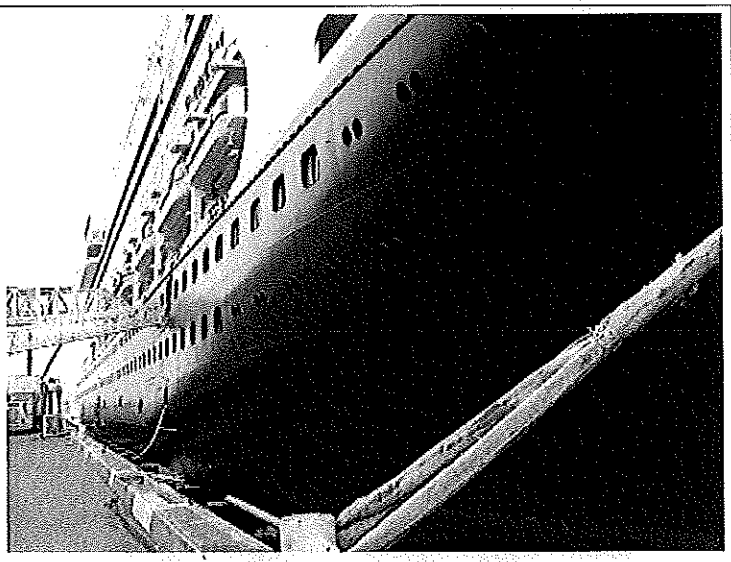


PHOTO #:01 DATE: JULY 31, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P7310002
DESCRIPTION: ROTTERDAM VESSEL

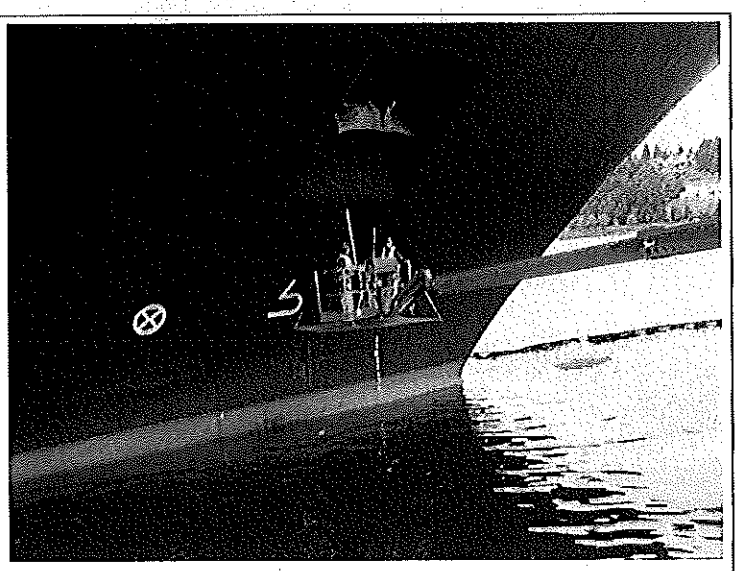


PHOTO #:02 DATE: JULY 31, 2010
TAKEN BY: KEVIN C. FITZPATRICK FILE NO.: P7310001
DESCRIPTION: PAINTING ON ROTTERDAM WITH CHERRY PICKER AND TARP

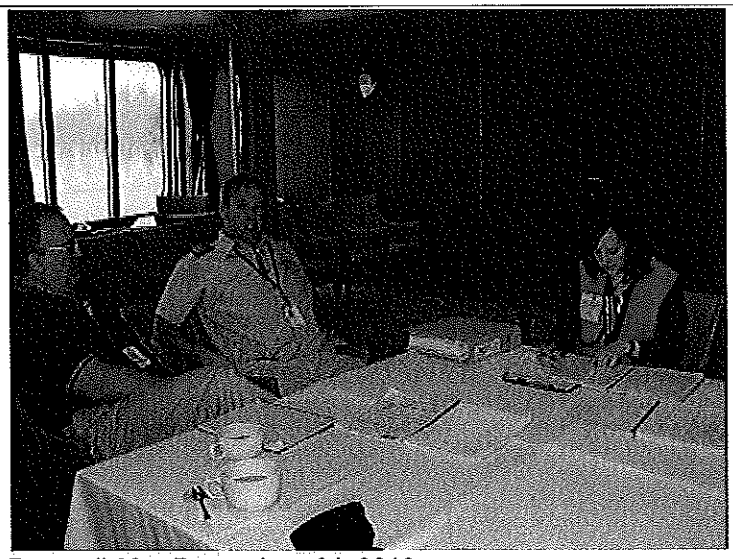


PHOTO #:03 DATE: JULY 31, 2010
TAKEN BY: KEVIN C. FITZPATRICK FILE NO.: P7310005
DESCRIPTION: RECORDS REVIEW WITH ROGER WALKER, SEH OFFICER, JON TURVEY, HAL HQ, AND AMY JANKOWIAK, ECOLOGY

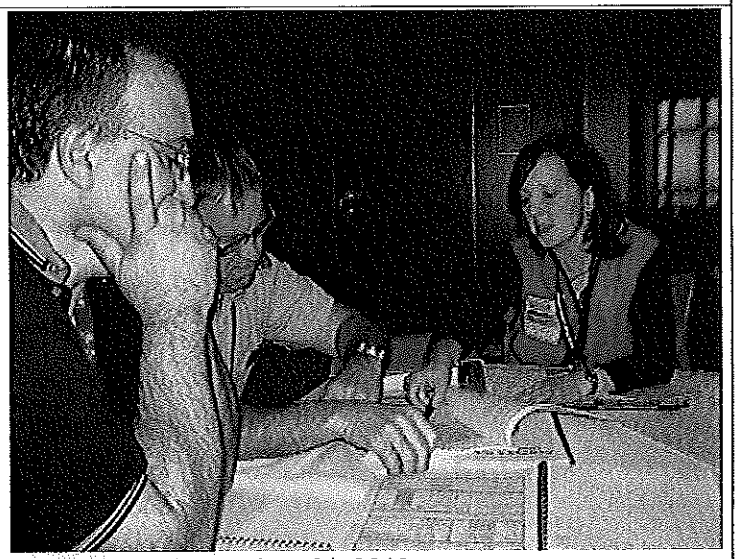


PHOTO #:04 DATE: JULY 31, 2010
TAKEN BY: KEVIN C. FITZPATRICK FILE NO.: P7310006
DESCRIPTION: RECORDS REVIEW AND LOCATION VERIFICATION

PHOTO #:05 DATE: JULY 31, 2010
TAKEN BY: KEVIN C. FITZPATRICK FILE NO.:P7310008
DESCRIPTION: NAVIGATION/DISCHARGE LOCATION VERIFICATION ON BRIDGE

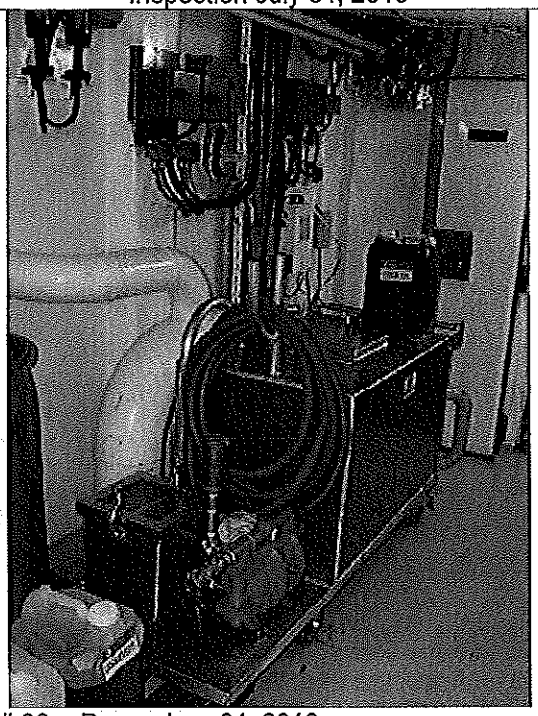


PHOTO #:06 DATE: JULY 31, 2010
TAKEN BY: KEVIN C. FITZPATRICK FILE NO.: P7310009
DESCRIPTION: USED COOKING OIL FILTER SYSTEM

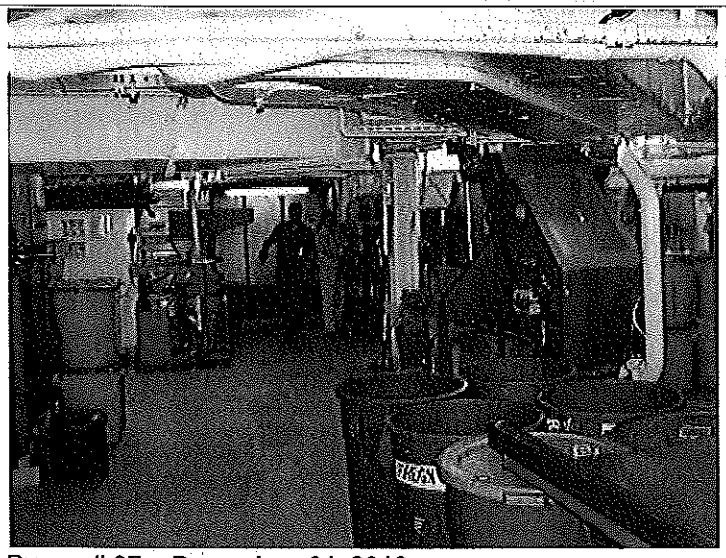


PHOTO #:07 DATE: JULY 31, 2010
TAKEN BY: KEVIN C. FITZPATRICK FILE NO.: P7310011
DESCRIPTION: GARBAGE/RECYCLING ROOM

PHOTO #:08 DATE: JULY 31, 2010
TAKEN BY: KEVIN C. FITZPATRICK FILE NO.: P7310012
DESCRIPTION: HAZARDOUS WASTE STORAGE

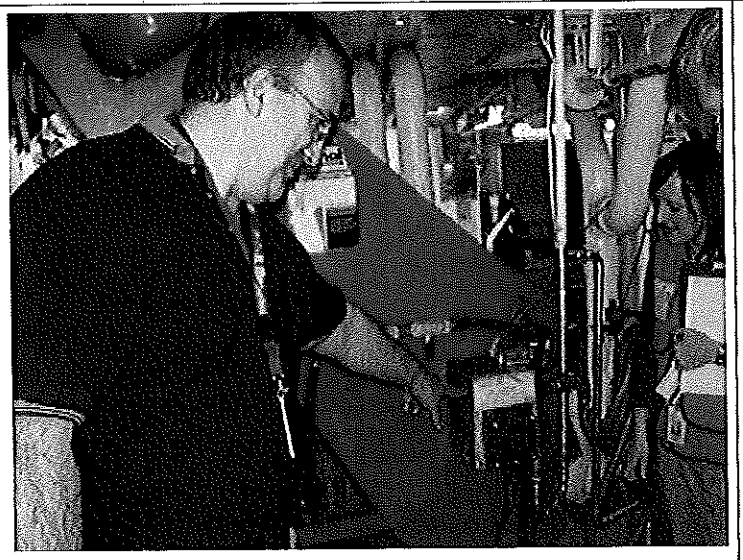


PHOTO #:09 DATE: JULY 31, 2010
TAKEN BY: KEVIN C. FITZPATRICK FILE NO.:P7310013
DESCRIPTION: FOOD WASTE PRESS

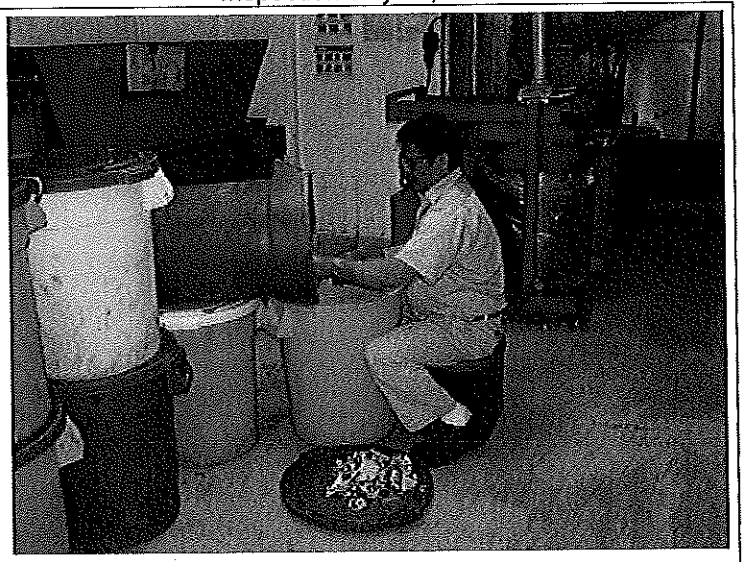


PHOTO #:10 DATE: JULY 31, 2010
TAKEN BY: KEVIN C. FITZPATRICK FILE NO.: P7310014
DESCRIPTION: GARBAGE/RECYCLING SORTING

PHOTO #:11 DATE: JULY 31, 2010
TAKEN BY: KEVIN C. FITZPATRICK FILE NO.: P7310015
DESCRIPTION: FLUORESCENT BULB CRUSHER AND MERCURY VAPOR REMOVAL SYSTEM.

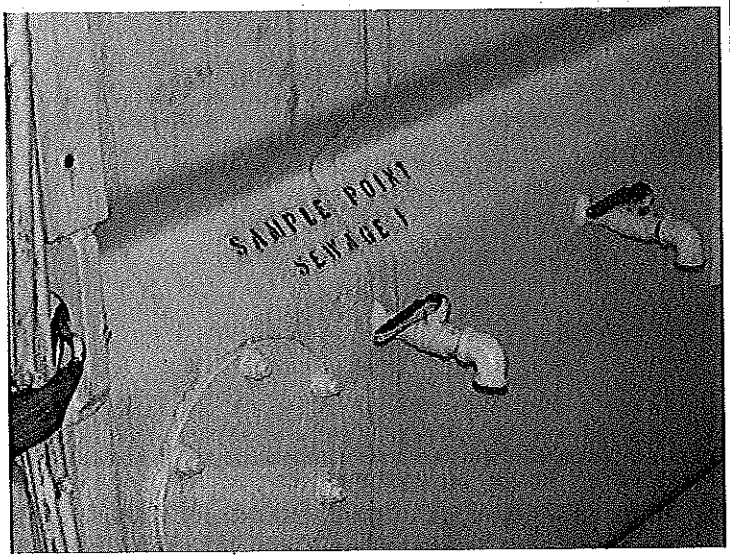


PHOTO #:12 DATE: JULY 31, 2010
TAKEN BY: KEVIN C. FITZPATRICK FILE NO.: P7310017
DESCRIPTION: TRITON BLACK WATER TREATMENT SYSTEM SAMPLE POINT.

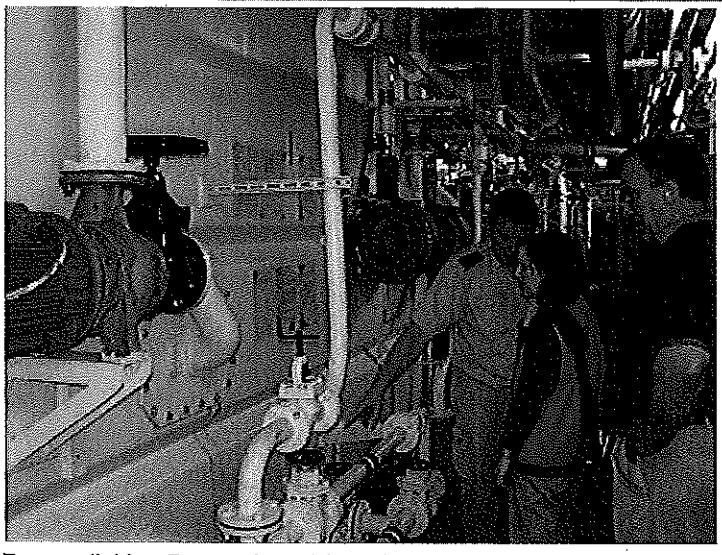


PHOTO #:13 DATE: JULY 31, 2010
TAKEN BY: KEVIN C. FITZPATRICK FILE NO.:P7310018
DESCRIPTION: TRITON BLACK WATER TREATMENT SYSTEM

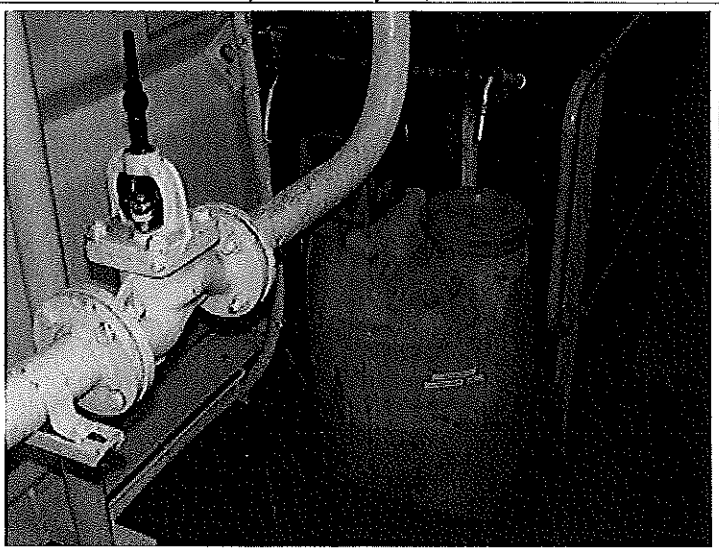


PHOTO #:14 DATE: JULY 31, 2010
TAKEN BY: KEVIN C. FITZPATRICK FILE NO.: P7310019
DESCRIPTION: TRITON CHLORINE ADDITION

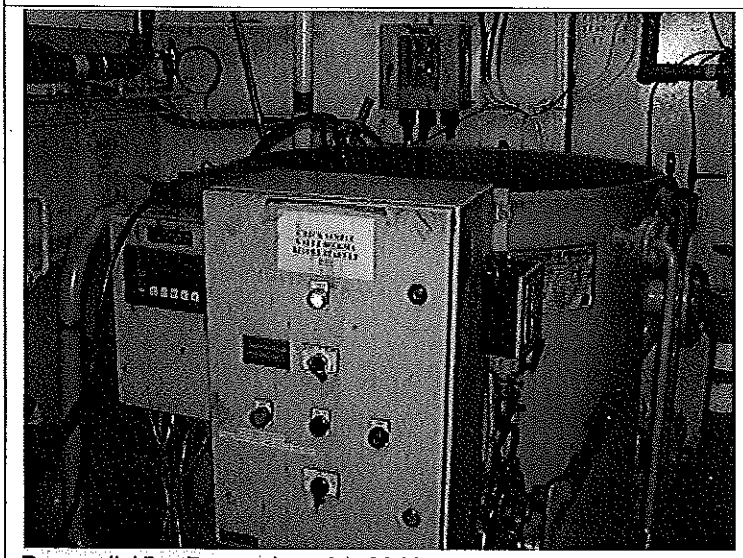


PHOTO #:15 DATE: JULY 31, 2010
TAKEN BY: KEVIN C. FITZPATRICK FILE NO.: P7310020
DESCRIPTION: OILY WATER SEPARATOR (OWS) SERAP FILTER SYSTEM

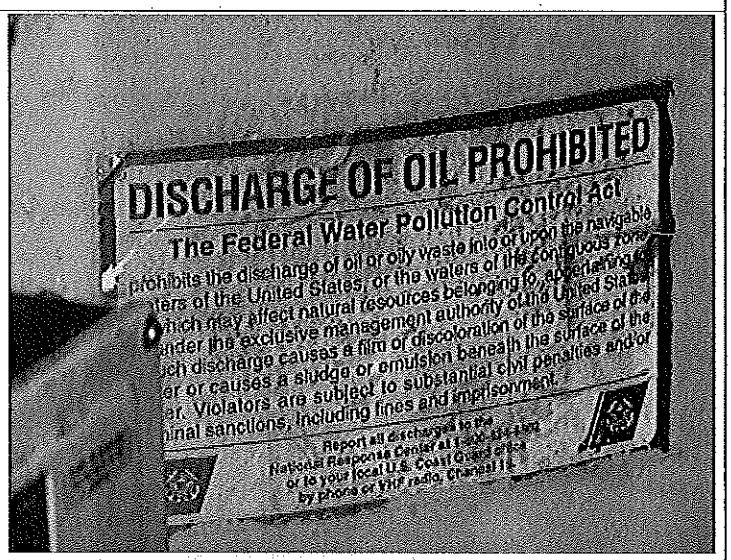


PHOTO #:16 DATE: JULY 31, 2010
TAKEN BY: KEVIN C. FITZPATRICK FILE NO.: P7310021
DESCRIPTION: OWS SIGNAGE

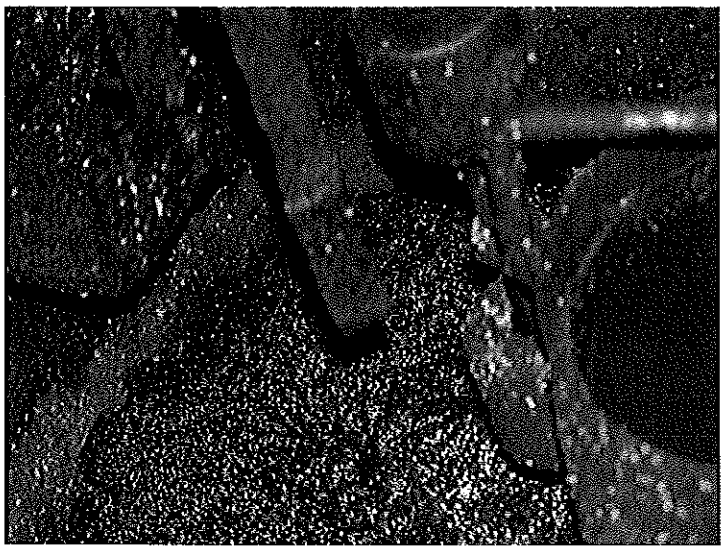


PHOTO #:17 DATE: JULY 31, 2010
TAKEN BY: KEVIN C. FITZPATRICK FILE NO.:P7310023
DESCRIPTION: INSIDE OF OWS SERAP FILTER SYSTEM (DURING AERATION CYCLE)

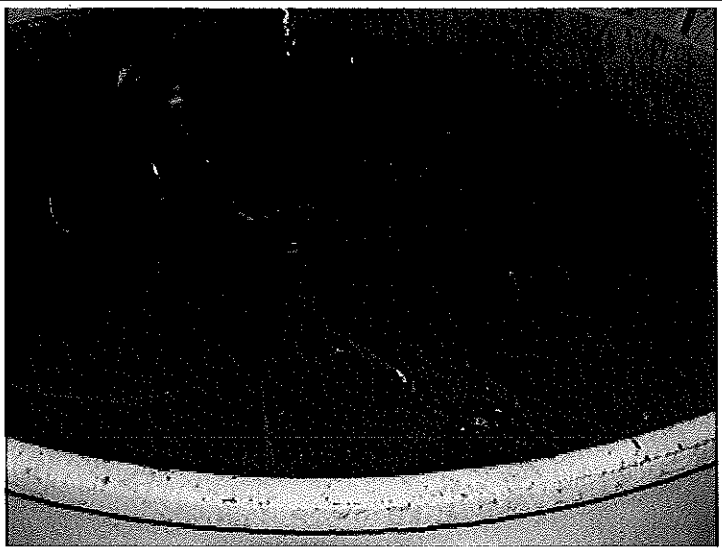


PHOTO #:18 DATE: JULY 31, 2010
TAKEN BY: KEVIN C. FITZPATRICK FILE NO.: P7310025
DESCRIPTION: INSIDE OF OWS SERAP FILTER SYSTEM (DURING AERATION CYCLE)

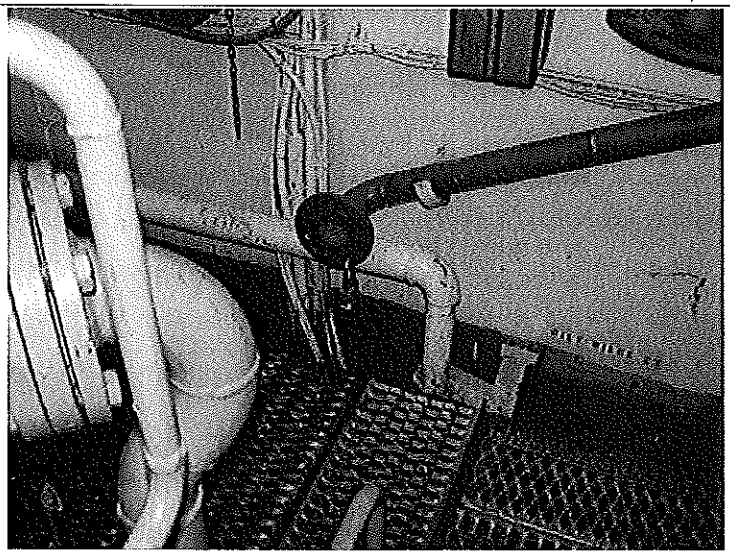


PHOTO #:19 DATE: JULY 31, 2010
TAKEN BY: KEVIN C. FITZPATRICK FILE NO.: P7310024
DESCRIPTION: OWS PIPING

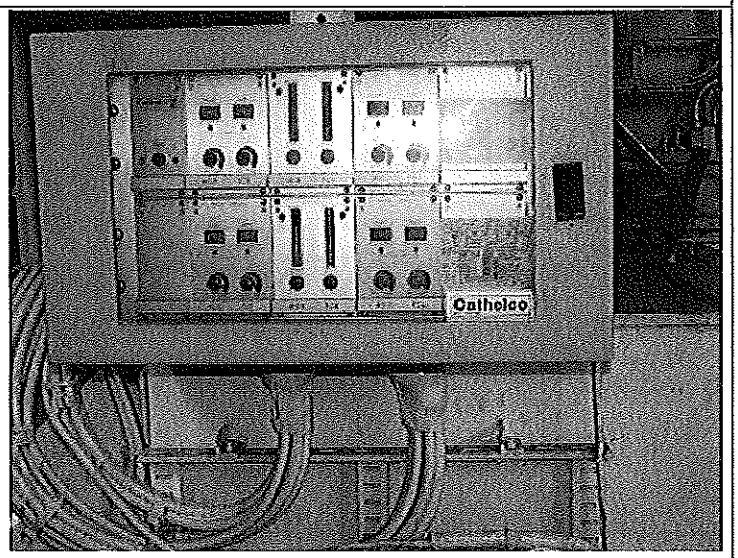


PHOTO #:20 DATE: JULY 31, 2010
TAKEN BY: KEVIN C. FITZPATRICK FILE NO.: P7310026
DESCRIPTION: CATHELCO ANTI-FOULING SYSTEM

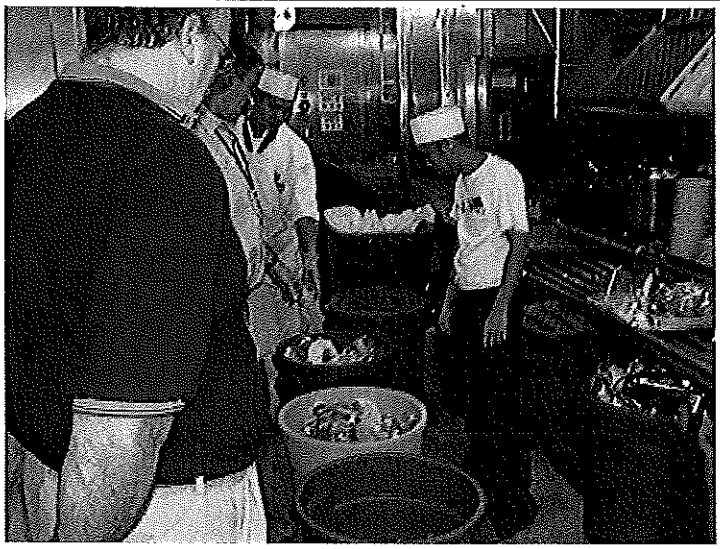


PHOTO #:21 DATE: JULY 31, 2010
TAKEN BY: KEVIN C. FITZPATRICK FILE NO.:P7310027
DESCRIPTION: FOOD WASTE SEPARATION AT THE SOURCE

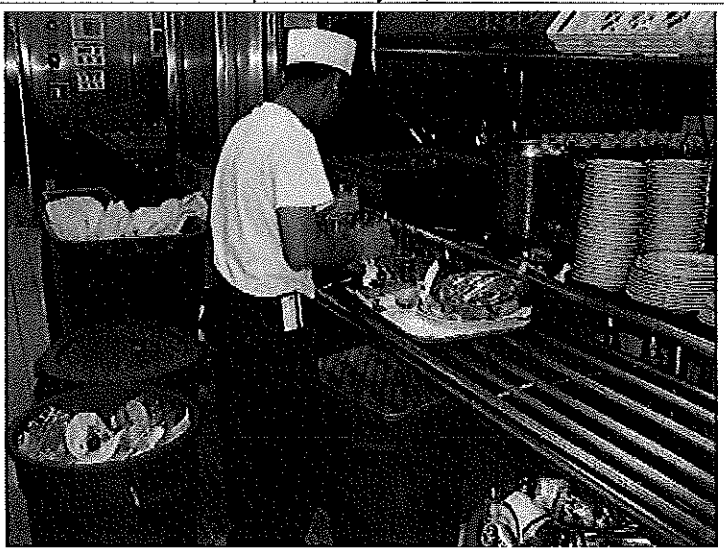


PHOTO #:22 DATE: JULY 31, 2010
TAKEN BY: KEVIN C. FITZPATRICK FILE NO.: P7310028
DESCRIPTION: FOOD WASTE SEPARATION AT THE SOURCE

DEPARTMENT OF ECOLOGY
State of Washington

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

Inspection Date	Permit Number	County	Receiving Waters	Ecology Inspector
08/16/2010	NA	King	Marine	Amy Jankowiak
Entry Time 9:05 am Exit Time 11:21 am	Photos Taken ☒ Yes ☐ No	Samples Taken ☐ Yes ☒ No	Inspection Announced ☒ Yes ☐ No	Discharges to: ☒ Surface Water ☐ Ground Water ☐ Dewater ☐ POTW

Name and Location of Site Inspected:
ROYAL PRINCESS, Princess Cruises
Pier 91
Seattle, Washington

Additional Participants/Inspectors:
Nathan Hasselblad, Intern, Ecology
Alice Opalka, Intern, Ecology

On-Site Representative(s): *Name/Title/Phone/e-mail*
Dario Scala, Environmental Officer
Rpdoseo1@princescruises.com

Responsible Official(s): *Name/Title/Address/Phone/e-mail*
Andrew Lorenzana, Environmental Operations Manager
Princess Cruises
24200 Magic Mountain Parkway, Santa Clarita, CA 91355-1283
661-753-2755; alorenzana@princesscruises.com

Other Facility Data:
Notification made to Andrew Lorenzana on August 12, 2010

Section A: Areas Evaluated

☒ Black/Gray Wastewater System	☒ Residual Solids	☒ Records/Reports	☒ Hazardous Waste/ Solid Waste	☒ Sampling/Monitoring
☒ Discharge Locations	☒ Operation & Maintenance	☒ Sludge Handling/ Disposal	☒ Oily Bilge Water	☐ Other

Section B: 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	
☐ Auto Shut Down or Operational Controls to Insure System Shut Down if High Turbidity Occurs	

Turbidity or Equivalent:

Last Calibration:

Trigger Level for Early Alarm: Trigger Level for Shutdown:

Recorded Turbidity/Equivalent Levels Above Triggers:

☐ Daily 24-hour Continuous Monitoring for Disinfection Effectiveness	
☐ Disinfection Effectiveness Monitoring Equipment Functioning Properly	

Disinfection Effectiveness Monitoring:

☐ Auto Shut Down or Operational Controls to Insure System Shut Down if Disinfection System Upset Occurs	
☐ Disinfection System Operated and Maintained Properly	

Disinfection System:

Section C: For Vessels Discharging Continuously [2.1.3(B)]

☐	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	
☐	Auto Shut Down or Operational Controls to Insure System Shut Down if High Turbidity Occurs	
	Turbidity or Equivalent: Last Calibration: Trigger Level for Early Alarm: Trigger Level for Shutdown: Recorded Turbidity/Equivalent Levels Above Triggers:	
☐	Daily 24-hour Continuous Monitoring for Disinfection Effectiveness	
☐	Disinfection Effectiveness Monitoring Equipment Functioning Properly	
	Disinfection Effectiveness Monitoring:	
☐	Auto Shut Down or Operational Controls to Insure System Shut Down if Disinfection System Upset Occurs	
☐	Disinfection System Operated and Maintained Properly	
	Disinfection System:	
	Section D: General (Approved to Discharge)	
☐	No Discharges Within ½ Miles From Shellfish Beds/ Protocol (President's Point, Apple Tree Cove, Tyee Shoal)	
☐	Discharges Immediately Stopped When High Turbidity Occurs	
☐	Discharges Immediately Stopped When Disinfection System Upset Occurs	
☐	Immediate Notifications Made to WA Department of 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 1/40 Calls for Continuous	
	Section E: General	
☐	Wastewater 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 2010 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 Hazardous 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. Records were reviewed for garbage off-loads.
☐	Oily Bilge Water Managed Properly	Oily bilge water is treated and discharged at less than 15 ppm and outside of MOU waters.
Other:		

Section F: Sampling Results	
Parameter	Results
Biochemical Oxygen Demand 5-Day (BOD_5)	
Total Suspended Solids (TSS)	
Fecal Coliform	
Residual Chlorine	
pH	
Ammonia, Nitrogen	

Section G: 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 Princess Cruises ROYAL PRINCESS on August 16, 2010. Nathan Hasselblad and Alice Opalka, both interns with the Department of Ecology also attended the inspection. The main contact on board the ROYAL PRINCESS was Dario Scala, Environmental Officer for the ROYAL PRINCESS. Prior notification of the visit was given on August 12, 2010 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 ROYAL PRINCESS is not approved to discharge in MOU waters. The vessel has not been discharging and is holding effluent until outside MOU waters.

The ROYAL PRINCESS was built in 2001 and has been in service with Princess cruises since 2007. The vessel is 592 feet long with a passenger capacity of 710 and a crew capacity of 374.

The ROYAL PRINCESS is scheduled for 10 port calls in Seattle and conducts two week cruises to Alaska turning around on Mondays between May 24, 2010 through September 13, 2010. The itinerary includes: Seattle – Ketchikan – Juneau – Icy Strait Point – Glacier Bay – Seward – Kodiak – Skagway – Tracy Arm – Victoria – Seattle.

Inspection

We arrived and boarded the ship (photo #01) at about 9:05 am and began with introductions and a plan for the day with Dario Scala, the Environmental Officer. Mr. Scala has been an Environmental Officer for about 7 years and is also an engineer. We met with other staff on the Bridge and viewed the navigation system. We then discussed various waste streams, and the discharge protocols. We then reviewed the various discharge and environmental records. We then toured the garbage and recycling area and the hazardous waste storage. Next, we discussed the Hamworthy advanced wastewater treatment system (AWTS) and then viewed the system. We then viewed the discharge valving and ports for the Hamworthy system and the oily water separator white box. The inspection was then finalized with a debriefing and we disembarked the vessel at about 11:21 am.

Discharge Types and Protocols:

No discharges of any kind occur in Washington state waters. Prior to entering Washington waters and within 12 miles from land, every discharge port is closed. Discharges of treated wastewater from the advanced wastewater treatment system is allowed in Canadian waters with permission. If the vessel is in an area where a discharge is allowed, the Bridge and the staff in the Engine Control Room (ECR) (photo #09) communicate by phone and with written verification by e-mail prior to any discharges. The Watchkeepers have the authority to then discharge and have "key" access for the overboard ports. There are hydraulic and solenoid valves. For blackwater and graywater, 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 wastewater discharge records that were reviewed appeared to be in compliance with the MOU and also did not occur in MOU waters. Some coordinates that appeared to be possibly in or near MOU waters were written down and later verified to be in Canadian waters near the Canada/US border across from Victoria. In Juneau Alaska, the vessel sometimes offloads gray water and some AWTS permeate. The vessel has approximately 3 days of holding capacity. The AWTS treats combined black water and gray water, with the exception of laundry and galley water which is held separately and not treated. It is then discharged outside of MOU waters and greater than 12 nautical miles from land.

Ballast water exchanges occur outside of MOU waters.

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 (photo #07). The water is recirculated and eventually held and sent to the galley gray water holding tank and discharged outside of MOU waters. The solid food material from the pulpers is discharged outside of 12 nautical miles and outside MOU waters. Records reviewed were consistent with this protocol. Used cooking oil, is collected (photo #08) and recycled for biodiesel.

Oily bilge water is treated with an oily water separator and discharged at less than 15 ppm after first going through a white box (photo #21) for monitoring. The vessel typically meets 4-5 ppm. The chief Engineer has the keys for the white box and it was locked during the inspection.

Some potable water is bunkered, while the rest is produced by desalination with two evaporators. The brine is discharged.

The vessel does not offer dry cleaning services. Phosphate-free detergents are used in the laundry. Silver is captured from the photo and x-ray waste, and is treated to less than 5 ppm and is then incinerated. Hazardous wastes include chemicals, oily rags, printer cartridges, paints, batteries, bulbs (no crusher on board), sludge oil, aerosols (punctured), and sharps. All hazardous waste (photos #04 and #05) is off-loaded in Victoria.

Expired medications and narcotics are incinerated (narcotics with witness). Most cardboards, paper and some food waste is also incinerated (photo #03). Incineration occurs once the vessel is going 6 knots.

Plastics, garbage, and other materials are collected and sorted on a sorting table (photo #02). Most materials are then condensed and recycled on-shore. Glass, aluminum (photo #06), tin, and plastics are all recycled along with other materials.

Black water and Gray water System:
Blackwater, which includes toilet waste (and the medical 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. The Hamworthy system, which was just installed in the spring of 2010, consists of two separate membrane bioreactors (MBRs). Both MBRs are typically run at the same time, although one of the MBRs can go off-line for maintenance. Black water, which includes toilet waste and the medical drains is collected by vacuum (photo #10) to one of two collection tanks and then combines with gray water which includes sink and shower water and has been piped to one of the collection tanks. Combined gray and black water flow moves to the screen press (photo #13). The solids are screened into bags (photos #15 and #16) and are then sent to the incinerator. The liquid moves to the 1st stage (photo #12) of the membrane bioreactor where aeration occurs. From the 1st stage, flow moves to the 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 (2 banks with 6 membranes each) (photo #11). Effluent from the membrane modules are sent to a permeate tank where turbidity is monitored. Flow then combines with the other two MBR's for ultraviolet (UV) disinfection (photo #17). Disinfected effluent either goes directly overboard (photo #19) or to a holding tank (photo #20) if not in an approved area for discharge. The held effluent will eventually go back through the UV system before discharge. Currently, effluent is held and discharged outside of MOU waters. There is a sample port for treated effluent after UV disinfection (photo #18).

Turbidity is measured continuously on each of the MBR permeate tanks. The meters are alarmed at 40 NTU maximum. The UV system consists of 6 bulbs which are alarmed. If the bulbs fail or the power goes out, the system alarms. There are spare bulbs available on board. The maintenance system provides details of when all maintenance is needed. Representatives from Hamworthy visit the ship periodically.

The staff have a small laboratory on board where they sample for such parameters as chlorine, total suspended solids (TSS), and fecal coliform. The on-board sampling allows for immediate results and a chance for immediate corrections to the system.

Conclusions and Recommendations

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

the vessel were very knowledgeable of the systems and protocols.

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.

Attachments:
Photographs

Copies to:
Andrew Lorenzana, Princess Cruises
Dario Scala, Environmental Officer
Amy Jankowiak, Ecology
Karen Burgess, Ecology
Mark Toy, Health
Kevin Fitzpatrick, Ecology
Central Files: Princess Cruises – ROYAL PRINCESS; WQ 6.1

Section H: Signatures

Name and Signature of Inspector:	Agency/Office/Telephone:	Date
Amy Jankowiak	Department of Ecology Northwest Regional Office Water Quality Program Municipal Compliance Specialist 425-649-7195	9/16/10
Name and Signature of Reviewer:	Agency/Office/Telephone:	Date
Kevin C Fitzpatrick	Department of Ecology Northwest Regional Office Water Quality Section Manager 425-649-7033	9/16/10

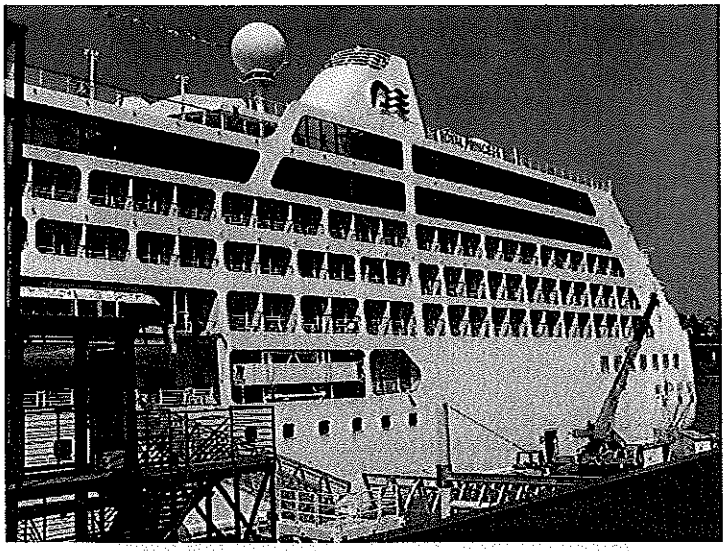


PHOTO #:01 DATE: AUGUST 16, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P8160027
DESCRIPTION: ROYAL PRINCESS VESSEL

PHOTO #:02 DATE: AUGUST 16, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P8160002
DESCRIPTION: GARBAGE AND RECYCLING ROOM

PHOTO #:03 DATE: AUGUST 16, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P8160003
DESCRIPTION: INCINERATOR RECEPTION

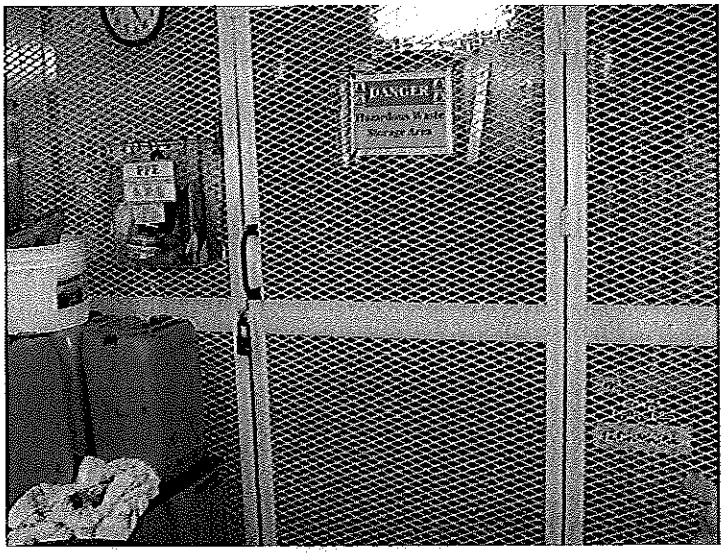


PHOTO #:04 DATE: AUGUST 16, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P8160004
DESCRIPTION: HAZARDOUS WASTE STORAGE LOCKER

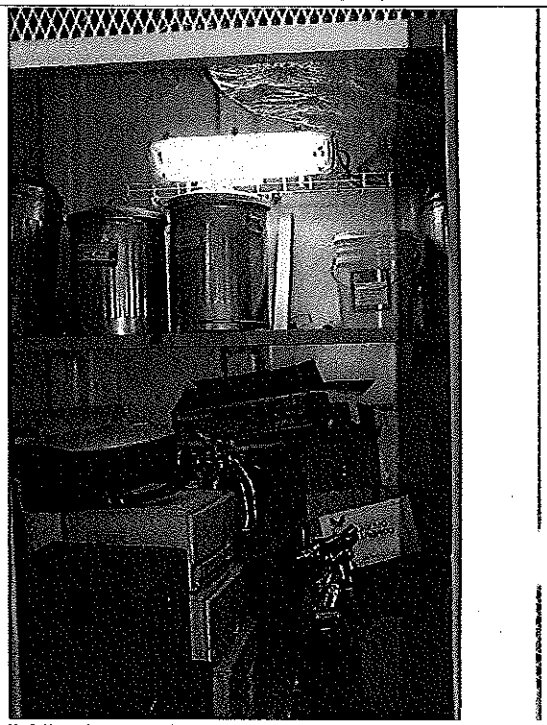


PHOTO #:05 DATE: AUGUST 16, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P8160005
DESCRIPTION: HAZARDOUS WASTE MATERIALS

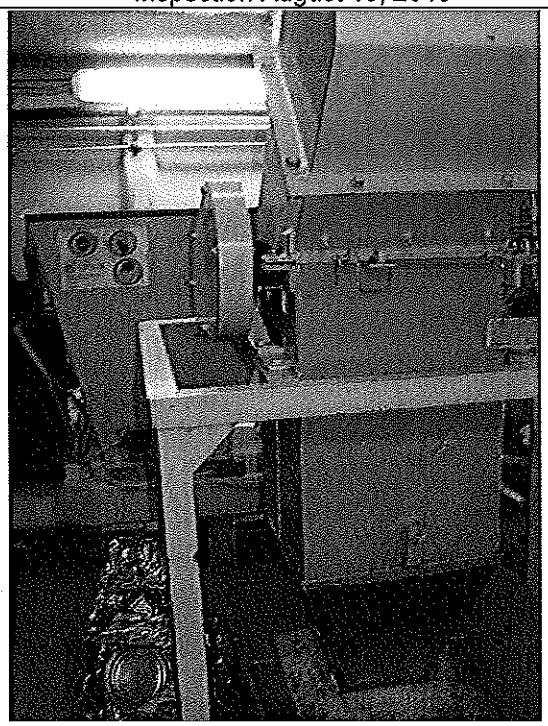


PHOTO #:06 DATE: AUGUST 16, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P8160006
DESCRIPTION: ALUMINUM CRUSHER (FOREGROUND), GLASS CRUSHER (BACK LEFT)

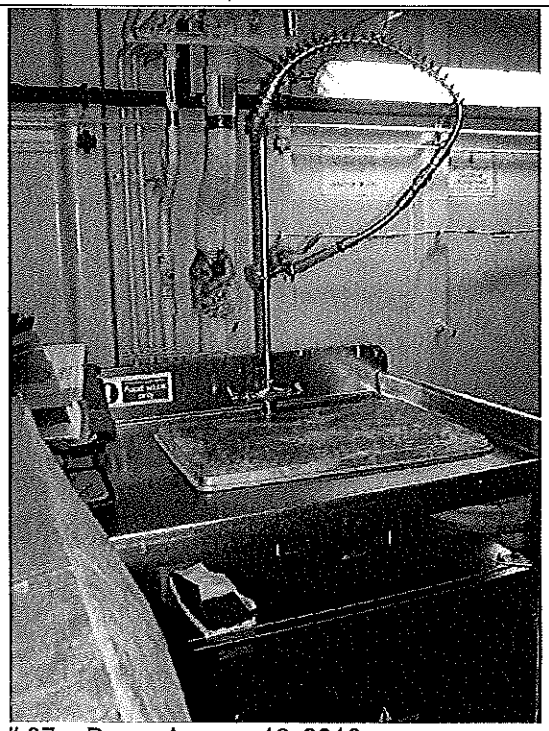


PHOTO #:07 DATE: AUGUST 16, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P8160007
DESCRIPTION: FOOD WASTE/PULPER (BELOW)

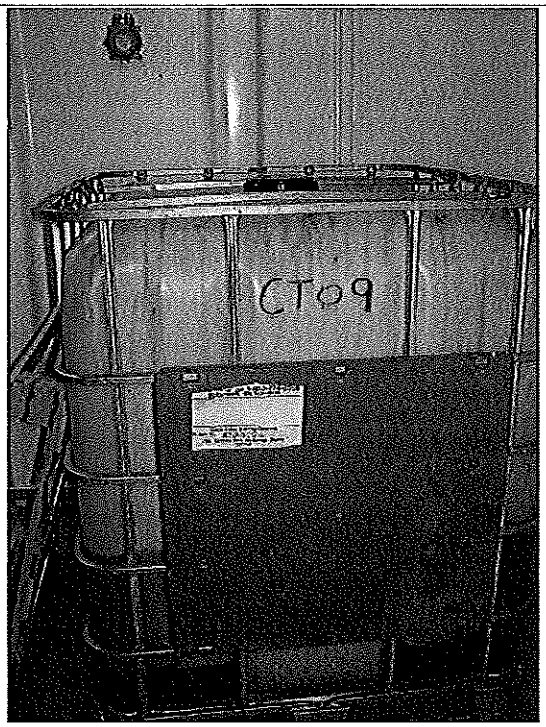


PHOTO #:08 DATE: AUGUST 16, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P8160008
DESCRIPTION: USED COOKING OIL

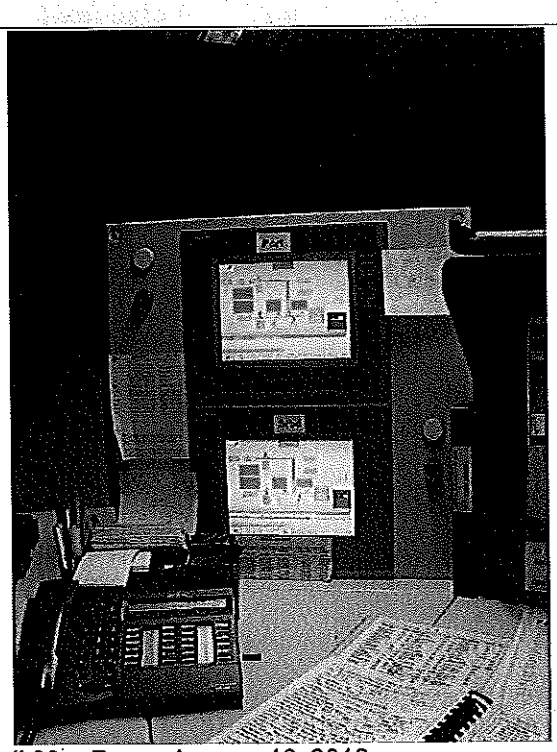


PHOTO #:09 DATE: AUGUST 16, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P8160009
DESCRIPTION: MBR TREATMENT SYSTEM DIAGRAMS IN ENGINE CONTROL ROOM

PHOTO #:10 DATE: AUGUST 16, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P8160011
DESCRIPTION: BLACK WATER VACUUM COLLECTION TANK

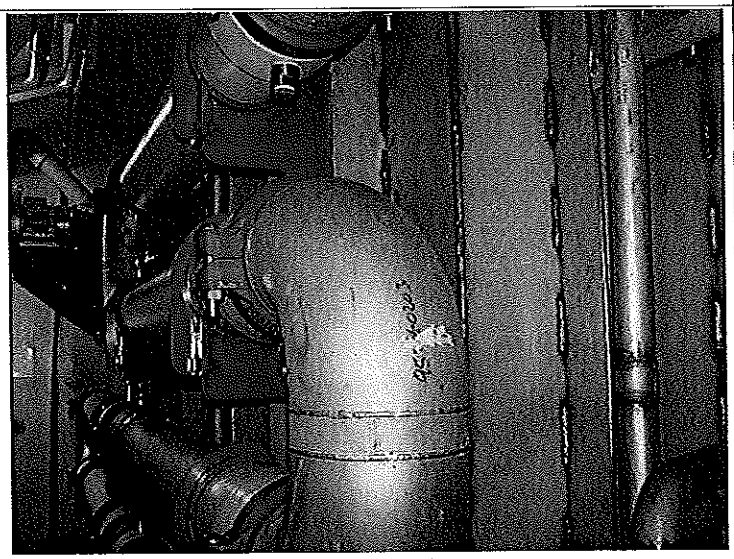


PHOTO #:11 DATE: AUGUST 16, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P8160012
DESCRIPTION: MBR FILTERS

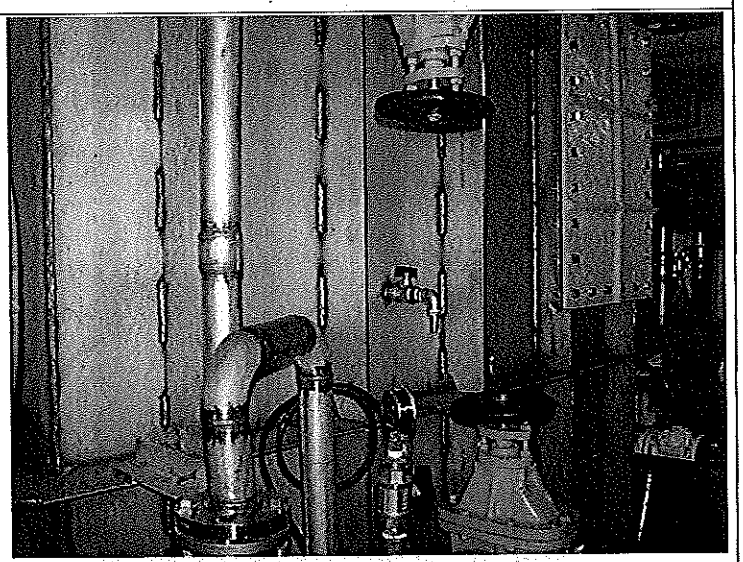


PHOTO #:12 DATE: AUGUST 16, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P8160013
DESCRIPTION: HAMWORTHY TREATMENT TANKS (1ST AND 2ND STAGE)

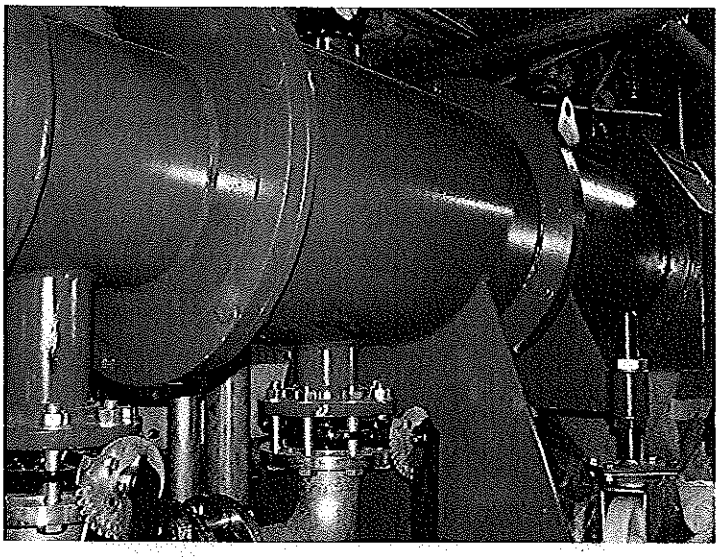


PHOTO #:13 DATE: AUGUST 16, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P8160014
DESCRIPTION: HAMWORTHY FILTER PRESS

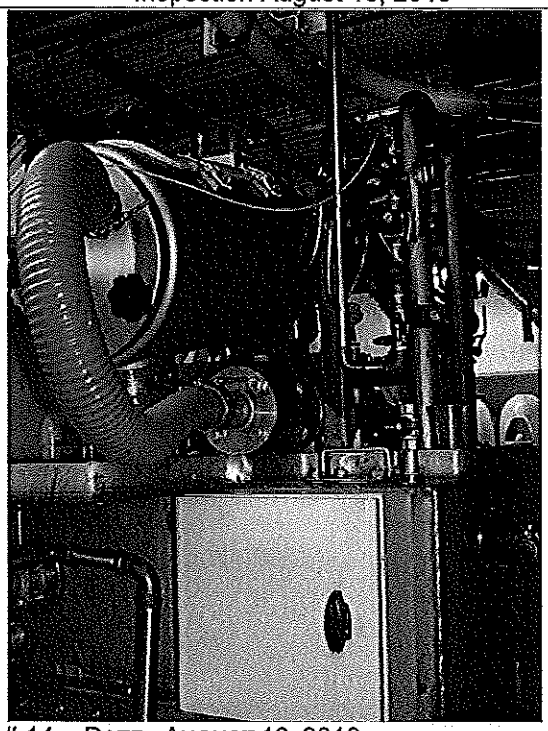


PHOTO #:14 DATE: AUGUST 16, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P8160015
DESCRIPTION: HAMWORTHY 1ST STAGE FILTER

PHOTO #:15 DATE: AUGUST 16, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P8160016
DESCRIPTION: HAMWORTHY FILTER PRESS SCREENINGS

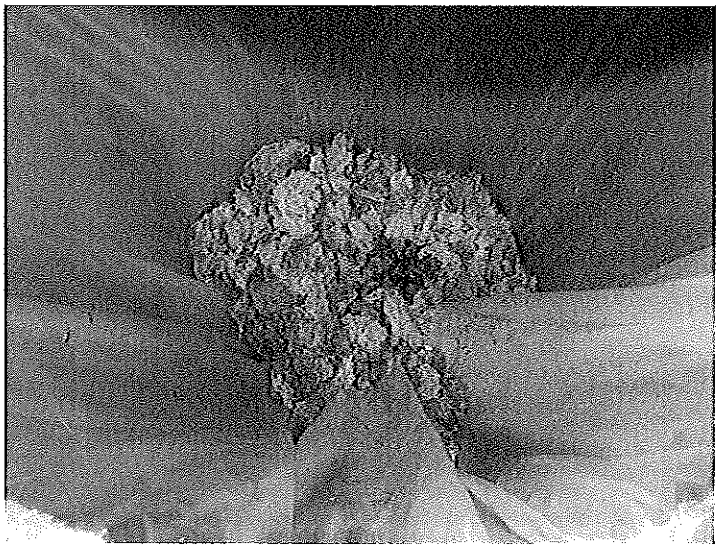


PHOTO #:16 DATE: AUGUST 16, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P8160019
DESCRIPTION: HAMWORTHY FILTER PRESS SCREENINGS

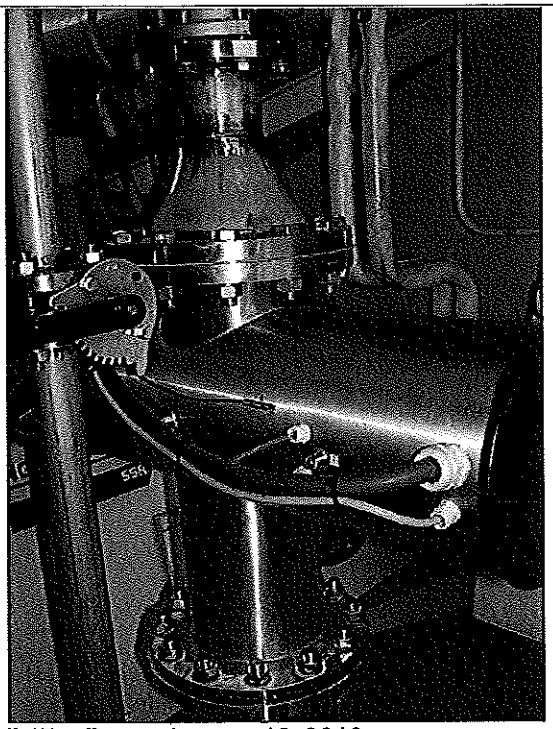


PHOTO #:17 DATE: AUGUST 16, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P8160020
DESCRIPTION: HAMWORTHY ULTRAVIOLET DISINFECTION UNIT

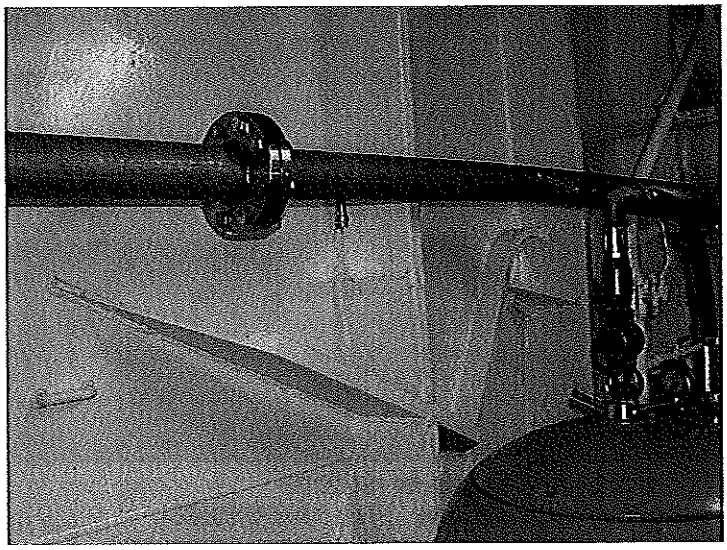


PHOTO #:18 DATE: AUGUST 16, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P8160021
DESCRIPTION: HAMWORTHY DISCHARGE SAMPLE POINT

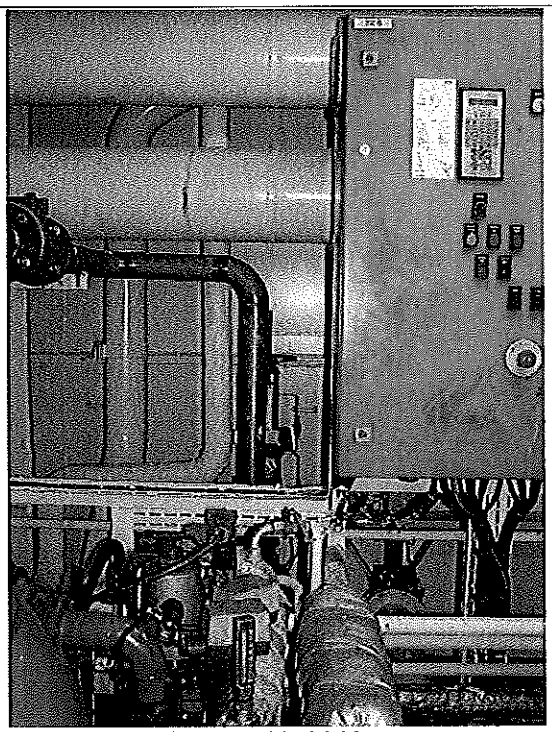


PHOTO #:19 DATE: AUGUST 16, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P8160022
DESCRIPTION: HAMWORTHY DISCHARGE PORT

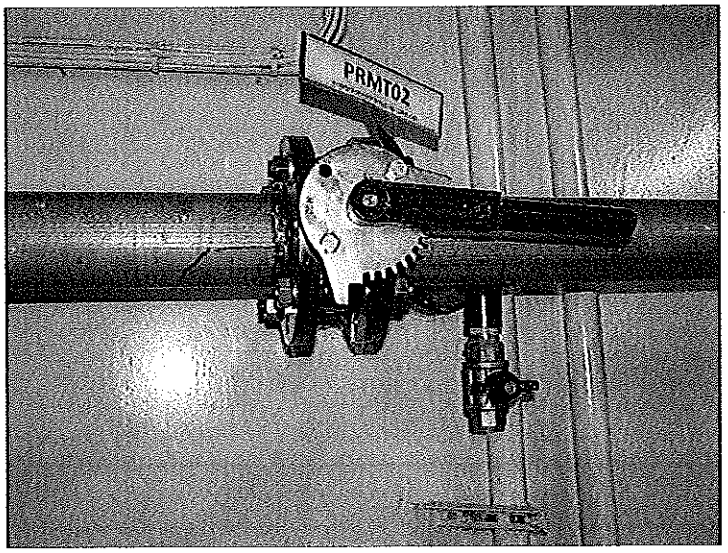


PHOTO #:20 DATE: AUGUST 16, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.: P8160023
DESCRIPTION: VALVING FROM HAMWORTHY FROM PERMEATE TO HOLDING OR DISCHARGE

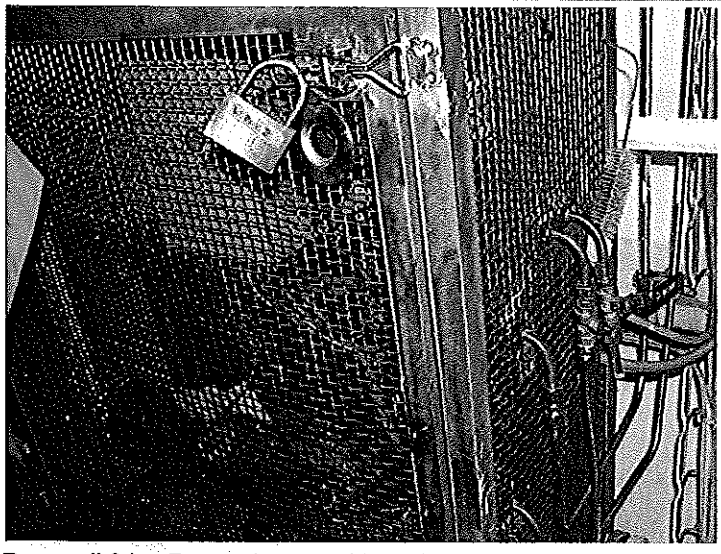


PHOTO #:21 DATE: AUGUST 16, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P8160024
DESCRIPTION: WHITE BOX FOR OILY WATER SEPARATOR

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

Inspection Date	Permit Number	County	Receiving Waters	Ecology Inspector
08/29/2010	NA	King	Marine	Amy Jankowiak
Entry Time 9:05 am **Exit Time** 12:38 pm	**Photos Taken** ☒ Yes ☐ No	**Samples Taken** ☒ Yes ☐ No	**Inspection Announced** ☒ Yes ☐ No	**Discharges to:** ☒ Surface Water ☐ Ground Water ☐ Dewater ☐ POTW

Name and Location of Site Inspected:
NORWEGIAN PEARL, Norwegian Cruise Line
Pier 66, Seattle

Additional Participants/Inspectors:
Lori LeVander, Ecology
Mark Henderson, Ecology

On-Site Representative(s): *Name/Title/Phone/e-mail*
Matilda Ivanova, Environmental Officer

Responsible Official(s): *Name/Title/Address/Phone/e-mail*
Randall R. Fiebrandt, Director, Environmental Operations
Norwegian Cruise Line
7665 Corporate Center Drive, Miami, FL 33126
rfiebrandt@ncl.com 305-436-4956

Other Facility Data:
Notification made to Randy Fiebrandt on August 25, 2010

Section A: Areas Evaluated

☒ Black/Gray Wastewater System	☒ Residual Solids	☒ Records/Reports	☒ Hazardous Waste/ Solid Waste	☒ Sampling/Monitoring
☒ Discharge Locations	☒ Operation & Maintenance	☒ Sludge Handling/ Disposal	☒ Oily Bilge Water	☒ Other

Section B: For Vessels Discharging ≥ 1nm from Berth and ≥ 6 Knots Only [2.1.3(A)]

☒ 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 Monitoring for Turbidity or Equivalent Monitoring	Has continuous TSS monitoring.
☒ Turbidimeter or Equivalent Monitoring Equipment Functioning Properly	Appears to be functioning properly.
☒ Auto Shut Down or Operational Controls to Insure System Shut Down If High Turbidity Occurs	A value of 28 mg/l or greater triggers to hold and 30 mg/l for automatic shut down of discharge and recirculation back to mixing tank.

Turbidity or Equivalent:

Last Calibration: per AMOS

Trigger Level for Early Alarm: 25 mg/l Trigger Level for Shutdown: 30 mg/l

Recorded Turbidity/Equivalent Levels Above Triggers: not recently

☒ Daily 24-hour Continuous Monitoring for Disinfection Effectiveness	Monitors for alarm intensity.
☒ Disinfection Effectiveness Monitoring Equipment Functioning Properly	Appears to be functioning properly.
☒ Auto Shut Down or Operational Controls to Insure System Shut Down If Disinfection System Upset Occurs	Discharge is stopped and recirculates back to mixing tank when intensity does not meet set points.
☒ Disinfection System Operated and Maintained Properly	Appears to be functioning properly.

Disinfection System:

There are three UV units, of which two are typically used in series with 14 bulbs each, and the third is kept in standby. 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 for bulb failure and intensity. The alarm level is set at 10 W/m2. Pressure and temperature are also monitored with alarms. 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, or is re-circulated to the mixing tank.

Section C: For Vessels Discharging Continuously [2.1.3(B)]

☐ 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	
☐	Auto Shut Down or Operational Controls to Insure System Shut Down If High Turbidity Occurs	
	Turbidity or Equivalent: Last Calibration: Trigger Level for Early Alarm: Trigger Level for Shutdown: Recorded Turbidity/Equivalent Levels Above Triggers:	
☐	Daily 24-hour Continuous Monitoring for Disinfection Effectiveness	
☐	Disinfection Effectiveness Monitoring Equipment Functioning Properly	
	Disinfection Effectiveness Monitoring:	
☐	Auto Shut Down or Operational Controls to Insure System Shut Down If Disinfection System Upset Occurs	
☐	Disinfection System Operated and Maintained Properly	
	Disinfection System:	
	Section D: General (Approved to Discharge)	
☐	No Discharges Within ½ Miles From Shellfish Beds/ Protocol (President's Point, Apple Tree Cove, Tyee Shoal)	
☐	Discharges Immediately Stopped When High Turbidity Occurs	
☐	Discharges Immediately Stopped When Disinfection System Upset Occurs	
☐	Immediate Notifications Made to WA Department of 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 1/40 Calls for Continuous	
	Section E: General	
☒	Wastewater 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. Records were reviewed for hazardous waste discharges.
☒	WA Hazardous 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.
☒	Oily Bilge Water Managed Properly	Oily bilge water is treated and discharged at less than 15 ppm (usually less than 1 ppm) and outside of MOU waters.
Other:		

Section F: Sampling Results	
Parameter	**Results**
Biochemical Oxygen Demand 5-Day (BOD_5)	2.6 mg/l

Total Suspended Solids (TSS)	15 mg/l
Fecal Coliform	2 CFU/100 ml
Residual Chlorine	Non Detect (<0.1 mg/l)
pH	6.77 standard units
Ammonia, Nitrogen	29.5 mg/l

Section G: 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 August 29, 2010 along with Lori LeVander, Ecology NWRO-WQ and Mark Henderson, Ecology Bellingham Field Office. The main contact on board the NORWEGIAN PEARL was Matilda Ivanova, Environmental Officer. Prior notification of the visit was given on August 25, 2010 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 at greater than one nautical mile and greater than six knots on May 4, 2010.

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 2700-3000 passengers and 1000-1100 crew this season.

Inspection
We arrived and boarded the ship (photo #27) at about 9:05 am and began with introductions and a plan for the day with Matilda Ivanova, Environmental Officer in the Engine Control Room (ECR) area and discussed various waste streams, and the discharge protocols. Ms. Ivanova is an experienced Environmental Officer with Norwegian Cruise Line. Discharge records were reviewed for black water and gray water discharges, garbage and recycling, and hazardous waste. We then discussed the black water and gray water system. Next, we viewed garbage and recycling area, the food waste pulper system, the cold garbage and storage areas and the photo laboratory. We then visited the Bridge and reviewed notification procedures and navigation (photos #21, #22, #23, #24, #25 and #26). Next we viewed the laundry area. We then went to the bottom deck to view the Scanship advanced wastewater treatment system (AWTS). Samples of the black and gray water effluent were taken before debriefing and finalizing the inspection at about 12:38 pm.

Discharge Types and Protocols:

The Bridge staff notifies the ECR staff 30 minutes in advance of entering shellfish areas to stop discharges. The bridge then notifies the ECR when discharges are again allowed. Discharges do not occur again until the vessel is underway and outside of the shellfish areas. The Environmental Officer confirms the discharge locations. Only the Environmental Officer and the Captain have the keys for discharge ports which are padlocked. The latitude and longitude coordinates are recorded in the *Sewage and Graywater Discharge Record Book* and in the deck log for black water, gray water and untreated wastewater as well as other types of discharges including food waste and oily bilge outside of 12 miles. 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. Discharges typically stop when coming into MOU waters around 3:30am and begin again at about 7:30 or 8:00 pm on the way back out.

Black water, which includes toilet waste, galley waste and infirmary drains and gray water which includes sink and shower water and laundry water is treated with a Scanship advanced wastewater treatment system and is discharged per the above protocol. Food pulper water is separated and sent to the biosludge tank.

Screenings and grit as well as the biomass (sewage sludge) from the Scanship system is collected, dried (photos #01 and #02) and incinerated along with some food waste. The Scanship dryers and incinerator process are working well. The system produces approximately two cubic meters of biomass per week and six cubic meters of food waste to the dryer/incinerator per week.

Other materials that are incinerated (photo #05) include some plastics, contaminated cardboard, some paper, oily rags, and biohazardous waste. The ash is landed ashore and tested once a year. Fuel use while in Port is MGO only.

The food waste is collected and pulped (photos #07 and #08). The reject water is recycled. The liquid from the pulper is sent to the biosludge tank and is then dried and incinerated. Some of the solid food waste is held and discharged outside of 12 nautical miles and outside of MOU waters and the Olympic Coast National Marine Sanctuary. Cooking oil is collected (photo #11) and recycled as biodiesel. Biogel, an enzyme is used for the grease traps.

Oily bilge water is treated with two Marinfloc systems for separating oil. The oily bilge is treated to less than 15 part per

million (ppm) oil content, although the results are typically less than one ppm. From the oily water separator, the oil content is again measured in the locked "white box". 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. Discharges occur when underway at a minimum of six knots.

Pool water uses salt water and chlorine for disinfection. Approximately twice a week, the pool water is typically discharged directly overboard when greater than 12 nautical miles. The discharges usually occur on Mondays and Friday nights, therefore usually not in MOU waters. If a discharge needs to occur within 12 nautical miles, the discharge is dechlorinated first to non-detect levels. Spa water is freshwater with chlorine for disinfection. When emptied, they go to the graywater tanks for treatment first. If there are accidents in the pools or spas, they are shut down until the material is removed, chlorinated and dechlorinated to appropriate levels and logged.

Laundry uses a number of different chemicals and all laundry wastewater is sent to graywater for Scanship treatment. Dry cleaning (photo #28) uses PERC which is off-loaded as hazardous waste in Canada.

Silver is captured from the photo waste (photos #14 and #18), treated with a silver recovery system (photo #16) to less than 5 ppm (photo #15) and is off-loaded (photo #19) as regulated waste in Victoria. X-ray/developer waste is off-loaded untreated (can not combine with photo waste) as hazardous waste. The photo laboratory has a regular sink for cleaning (photo #17). The sink has signage (photo #20) to remind staff not to put any chemicals into the sink. There is a stringent policy on board for handling chemicals properly and is enforced.

Other hazardous wastes include some batteries, paints, mercury filters, some aerosols (punctured), and medical sharps. Fluorescent bulbs are crushed with a system that removes mercury (photos #12 and #13). The bulbs are then off-loaded as regulated waste. Narcotics are incinerated with witnesses and expired medications are off-loaded. All hazardous wastes are off-loaded in Canada.

Plastics, garbage (photo#09), and other materials are collected and sorted on a sorting table (photos #03 amd #06). Most materials are then condensed and recycled on-shore. Some recycling is off-loaded in Seattle. Crushed glass, aluminum, tin, scrap metal, some plastics, some cardboard, wood pallets and some paper are all recycled along with other materials. Some chemical containers are also reused or recycled (photo#10). Some other materials such as blankets are donated.

Records were reviewed for black water and gray water discharges, as well as for garbage/incineration/sea discharges and hazardous waste. All records appeared to be in compliance with the MOU.

Paint chipping, painting and any outside vessel work is only done occasionally in port. If conducting any of this maintenance, the line first asks for permission from the Port Agent/Terminal Manager, and this is usually not done in Seattle as the turnaround is already so busy.

Black water and Gray water System (Scanship System):
Black water, which includes toilet waste, galley waste and infirmary drains moves by vacuum to a collection tank. From the collection tanks, it goes to the drum screens. There are two drum screens which provide pre-screening (photos #29 and #30). 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. Gray water consists of sink, shower, and laundry water. From the mixing tank, the liquid moves to the biostep (photos #31 and #34) for biological treatment (biofilm on rotating plastic pieces – 2 tanks in series, air added (photo #32)). A defoamer can be used to control foam (photo #33).

After the biostep, liquid moves to a buffer tank where coagulant and a decoagulant are added. Liquid then moves to the flocculation tanks (photo #35). Coagulant is injected and then polymer (photo #40) is injected in the second cylinder of the flocculation tank. Clarification then occurs via flotation tanks (photos #36 and #37). An air and water mixture 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 skim the solids into a sludge pocket which is then pumped to the sludge tank. Liquid flow then moves to the polishing filters for ultrafiltration (photos #38 and #39).

Flow then moves to ultraviolet (UV) light disinfection (photo #45). There are three UV units, of which two are typically used in series with 14 bulbs each, and the third is kept in standby. 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 for bulb failure and intensity. The alarm level is set at 10 W/m2. Pressure and temperature are also monitored with alarms. 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 #42), or is re-circulated to the mixing tank.

The cleaning chemicals used on board were recently switched and now produce better results with the Scanship system.

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 #41). If TSS exceeds 25 mg/l, the system alarms and staff responds to investigate. If the TSS is at > 28 mg/l for less than one minute, it only alarms. If the TSS is greater than 30 mg/l, the system automatically stops discharging and holds. When the TSS returns to less than 25 mg/l, the system starts discharging again. PH is also monitored for adjustments. The pH levels also trigger the chemical additions of coagulant and polymer. There are several monitors (photo #04) throughout the system that are used to access controls as well as in the ECR.

Samples were taken (photos #44 and #46) 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 #43). The samples were put on ice immediately and were transported to AmTest laboratory in Kirkland, Washington that morning. 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 2010.

Conclusions and Recommendations

The staff on board the vessel were very knowledgeable of the systems and protocols.

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 H: Signatures

Name and Signature of Inspector:	Agency/Office/Telephone:	Date
Amy Jankowiak	Department of Ecology Northwest Regional Office Water Quality Program Municipal Compliance Specialist 425-649-7195	9/30/10
Name and Signature of Reviewer:	Agency/Office/Telephone:	Date
Kevin C Fitzpatrick	Department of Ecology Northwest Regional Office Water Quality Section Manager 425-649-7033	9/30/10

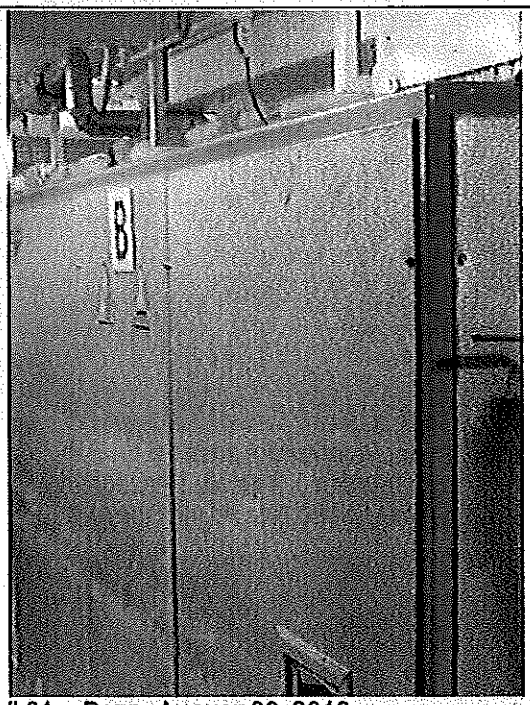


PHOTO #:01 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.:P8290050
DESCRIPTION: DRYERS FOR SCANSHIP BIOMASS

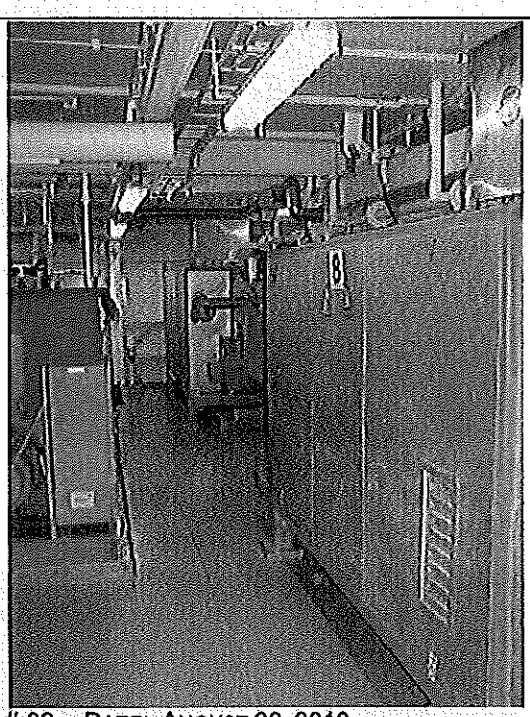


PHOTO #:02 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290053
DESCRIPTION: DRYERS FOR SCANSHIP BIOMASS

PHOTO #:03 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290055
DESCRIPTION: GARBAGE AND RECYCLING SORTING AREA

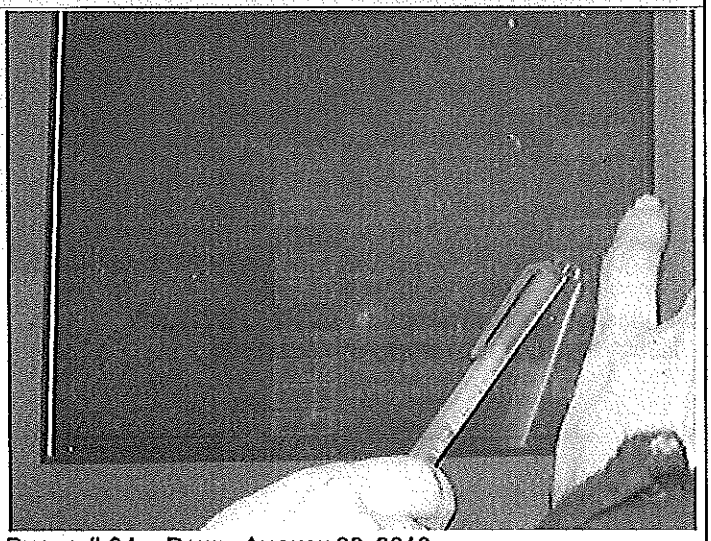


PHOTO #:04 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290056
DESCRIPTION: ALARM SETTINGS FOR SCANSHIP SYSTEM

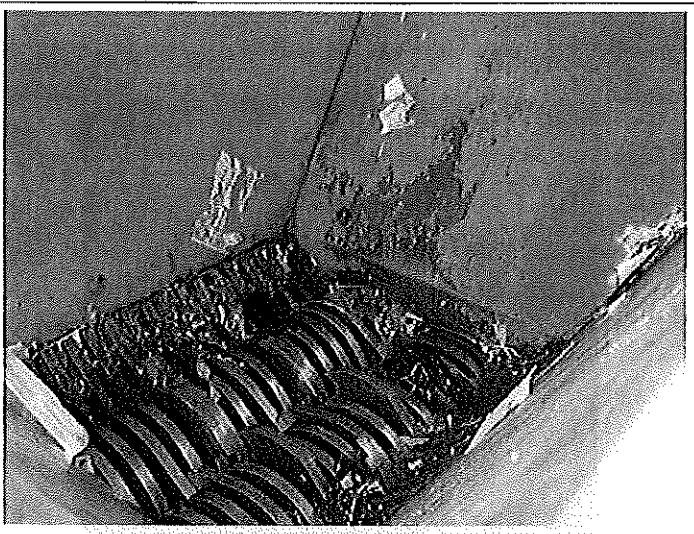


PHOTO #:05 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.:P8290058
DESCRIPTION: INCINERATOR SILO

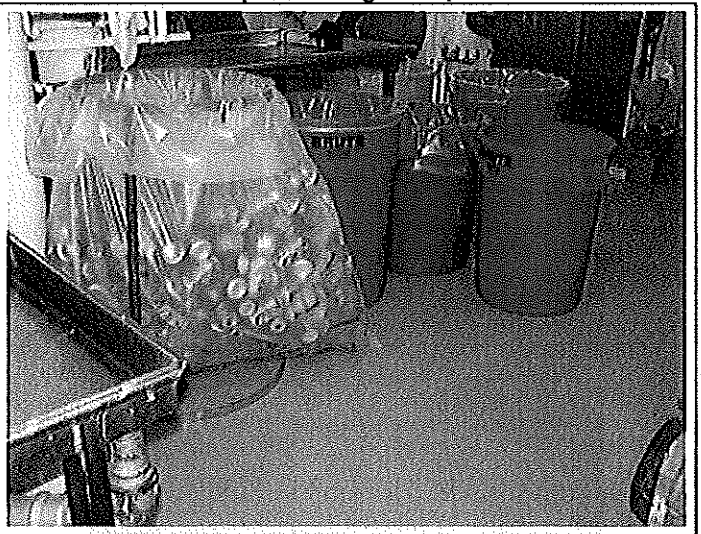


PHOTO #:06 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290059
DESCRIPTION: GARBAGE AND RECYCLING SORTING

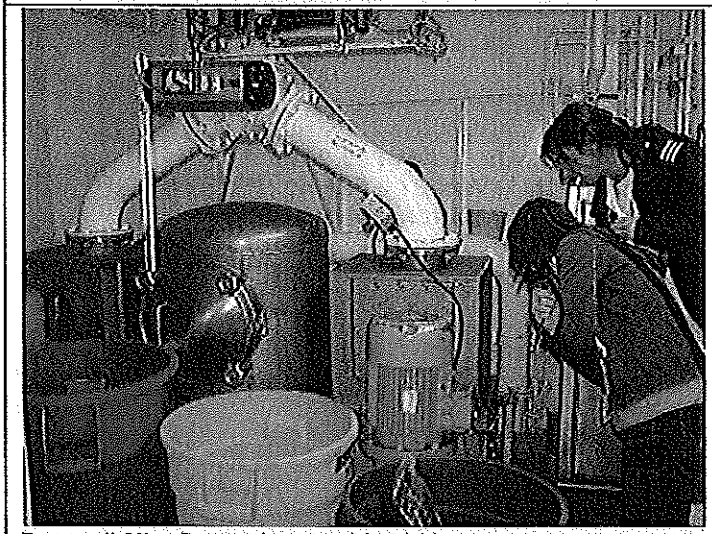


PHOTO #:07 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290063
DESCRIPTION: FOOD WASTE PULPER SYSTEM

PHOTO #:08 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290064
DESCRIPTION: FOOD WASTE PULPER TANK

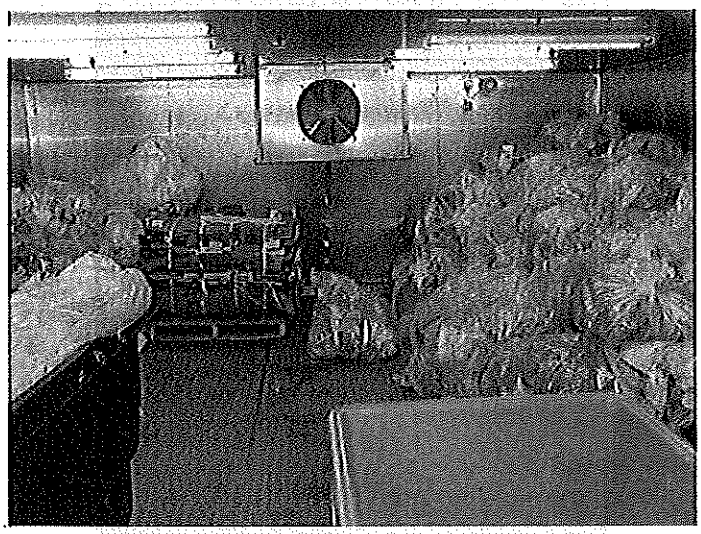


PHOTO #:09 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.:P8290067
DESCRIPTION: COLD STORAGE - GARBAGE

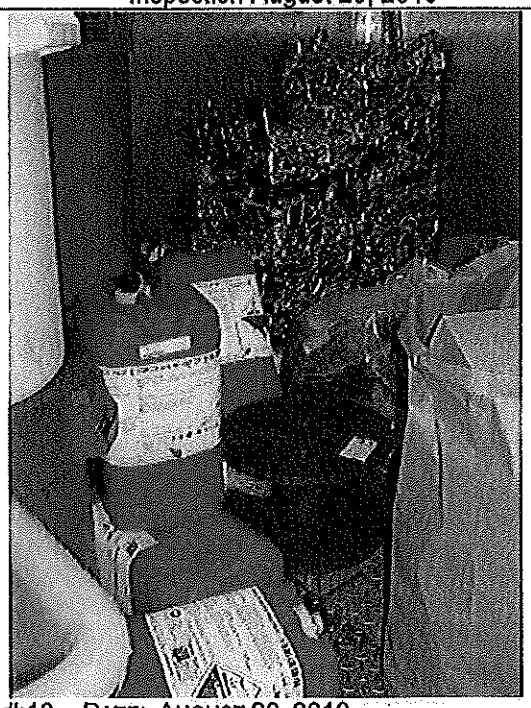


PHOTO #:10 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290069
DESCRIPTION: COLD STORAGE – CHEMICAL CONTAINERS FOR RECYCLING

PHOTO #:11 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290073
DESCRIPTION: USED COOKING OIL CONTAINER (FRONT LEFT) AND STORAGE ROOM

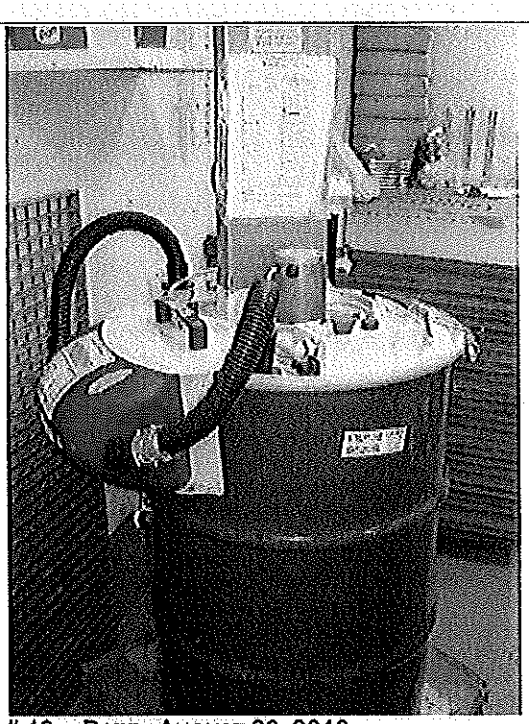


PHOTO #:12 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290078
DESCRIPTION: FLUORESCENT BULB CRUSHER AND MERCURY VAPOR REMOVAL SYSTEM (BULB EATER)

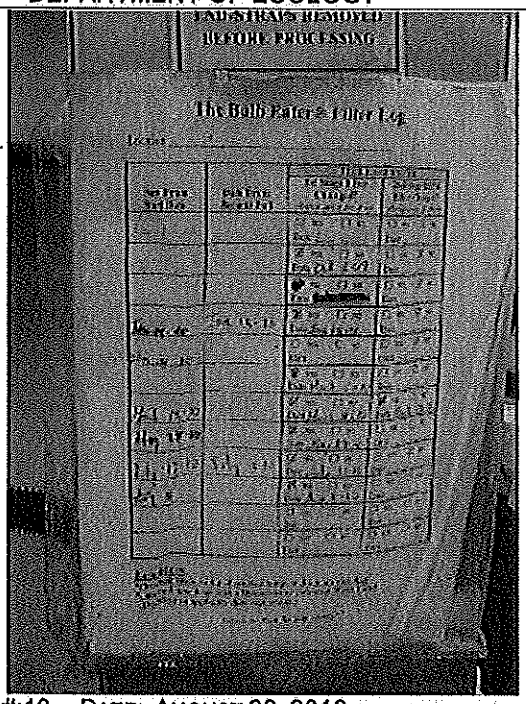


PHOTO #:13 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.:P8290079
DESCRIPTION: BULB EATER LOG

PHOTO #:14 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290085
DESCRIPTION: PRINTER IN PHOTO ROOM

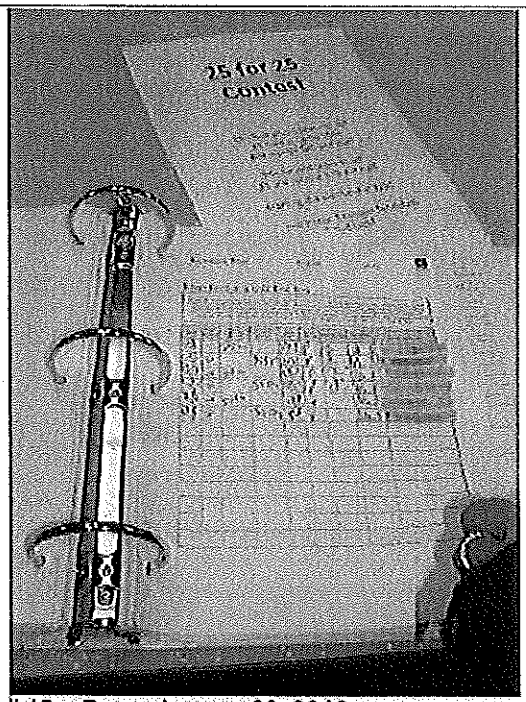


PHOTO #:15 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290087
DESCRIPTION: SILVER RECOVERY SYSTEM TEST LOG BOOK

PHOTO #:16 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290088
DESCRIPTION: SILVER RECOVERY SYSTEM

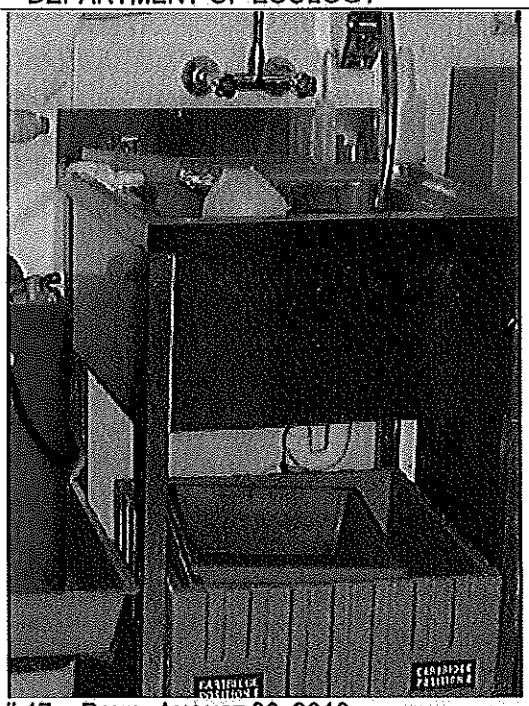


PHOTO #:17 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.:P8290089
DESCRIPTION: PHOTO ROOM SINK

PHOTO #:18 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290090
DESCRIPTION: PHOTO CHEMICALS

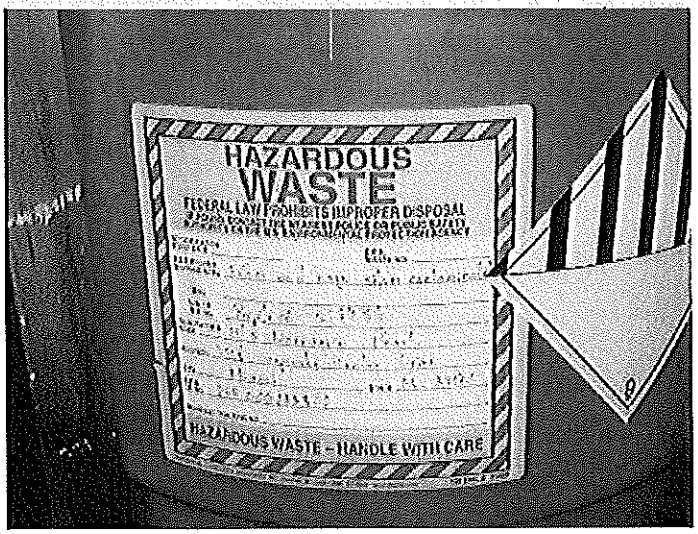


PHOTO #:19 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290092
DESCRIPTION: PHOTO WASTE LABEL

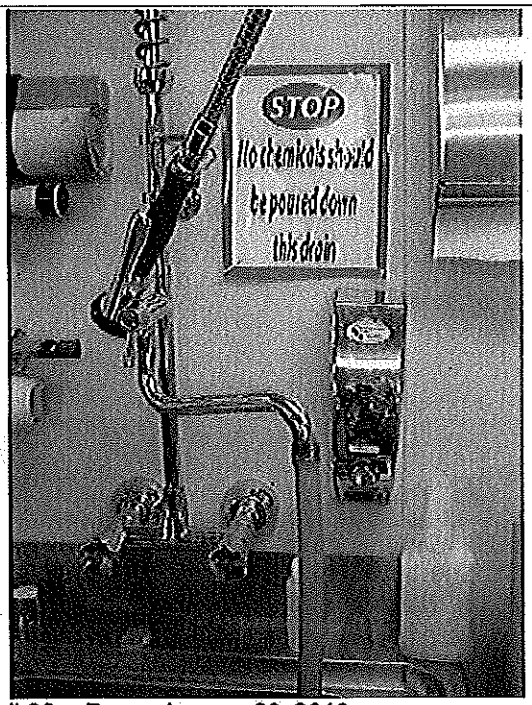


PHOTO #:20 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290095
DESCRIPTION: PHOTO ROOM SINK SIGNAGE

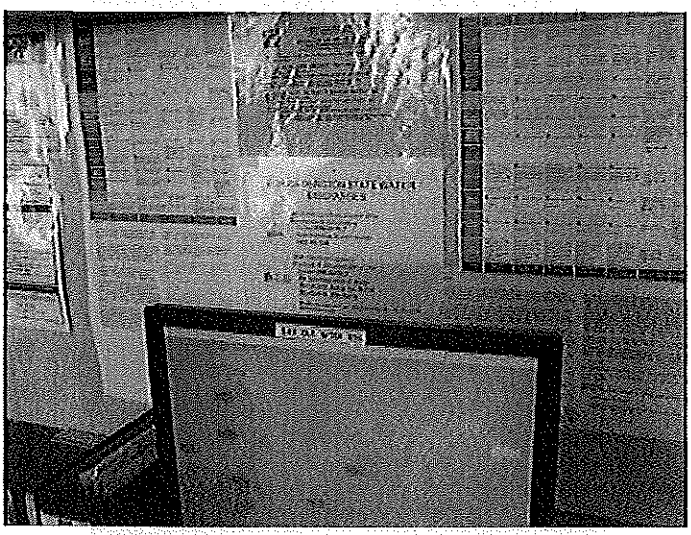


PHOTO #:21 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.:P8290096
DESCRIPTION: NOTIFICATION SIGNAGE ON THE BRIDGE

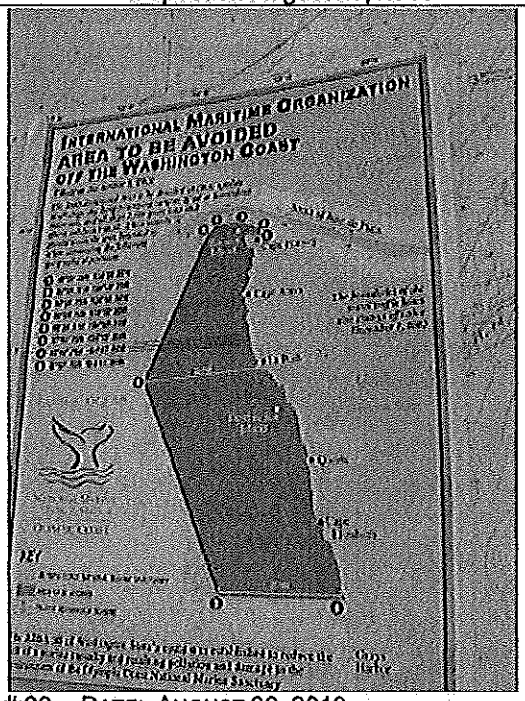


PHOTO #:22 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290099
DESCRIPTION: OCNMS MAP ON NAVIGATION CHART

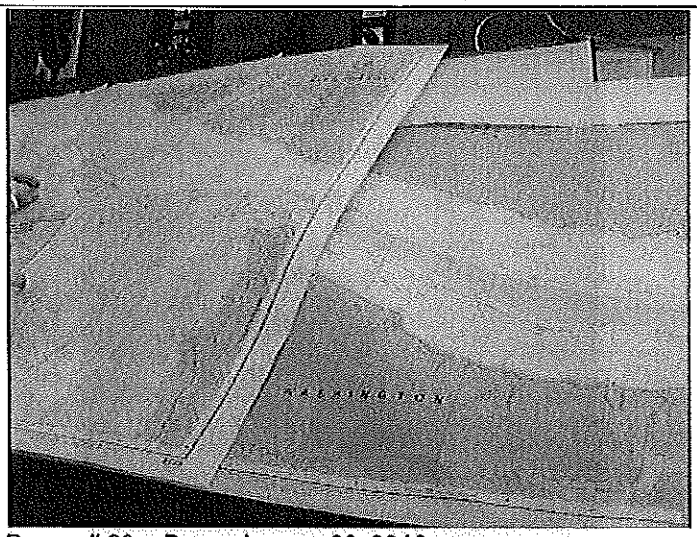


PHOTO #:23 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290101
DESCRIPTION: NAVIGATION CHARTS

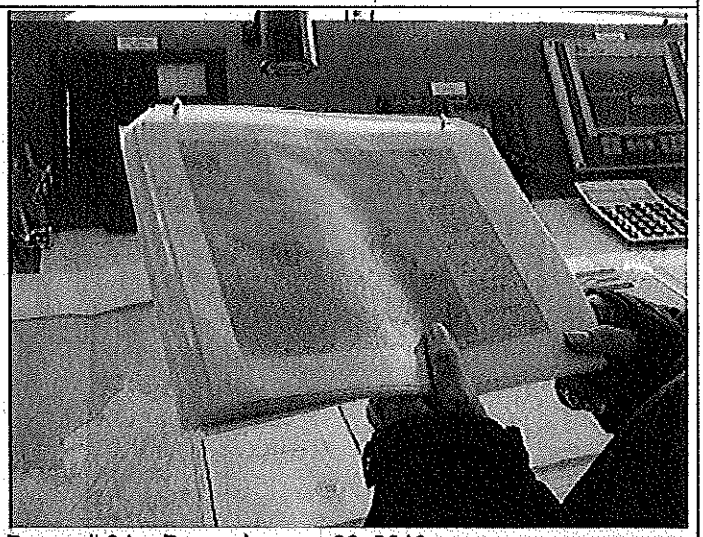


PHOTO #:24 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290102
DESCRIPTION: NAVIGATION CHARTS – QUICK LOOK BOOK

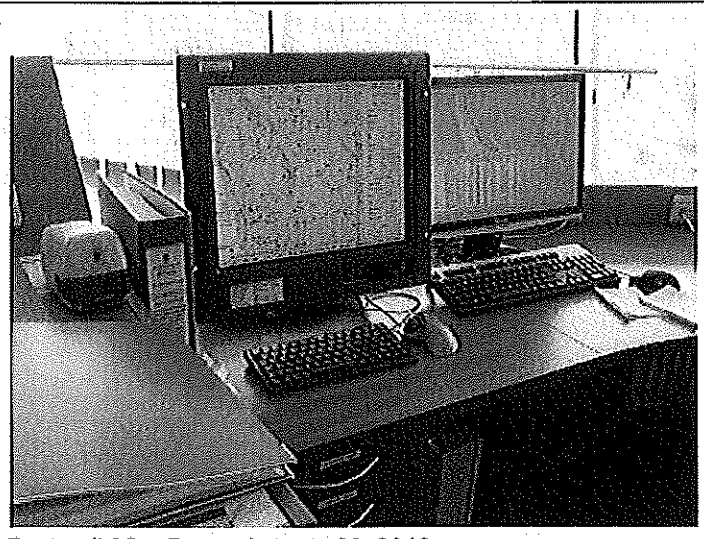


PHOTO #:25 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.:P8290104
DESCRIPTION: ELECTRONIC CHARTING ON THE BRIDGE

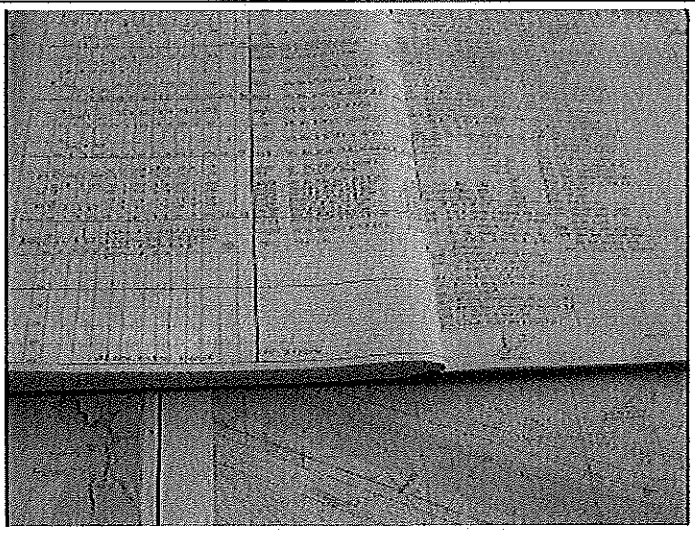


PHOTO #:26 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290108
DESCRIPTION: LOG BOOK

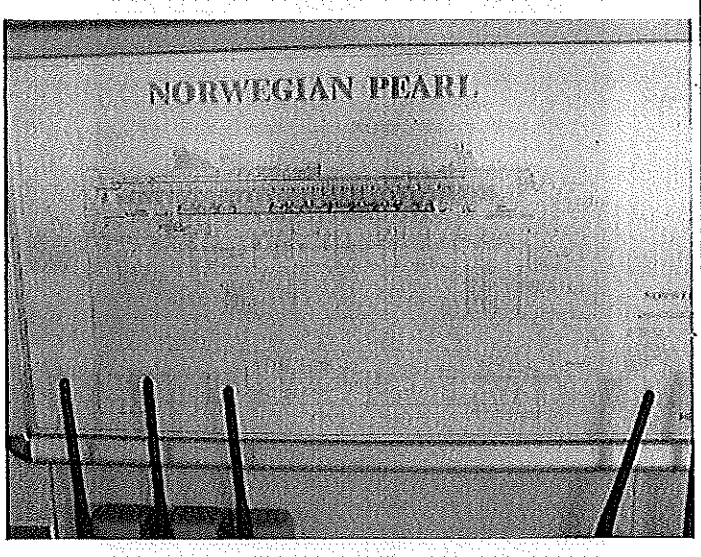


PHOTO #:27 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290118
DESCRIPTION: SHIP DIAGRAM

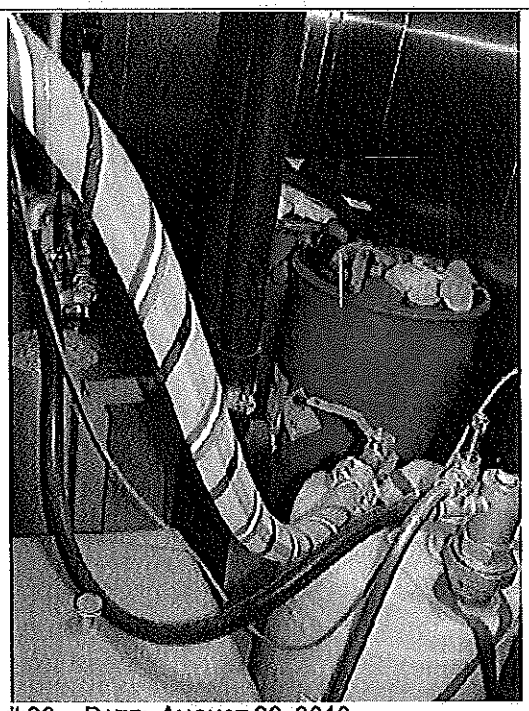


PHOTO #:28 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290119
DESCRIPTION: DRY CLEANING SYSTEM

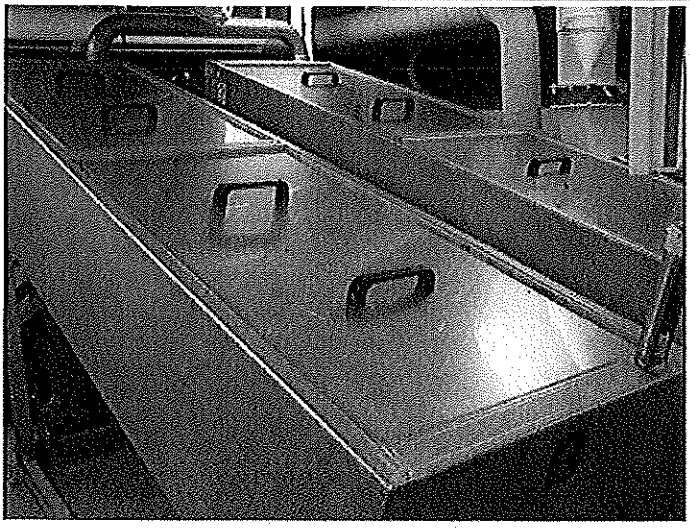


PHOTO #:29 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.:P8290123
DESCRIPTION: SCANSHIP DRUM SCREENS

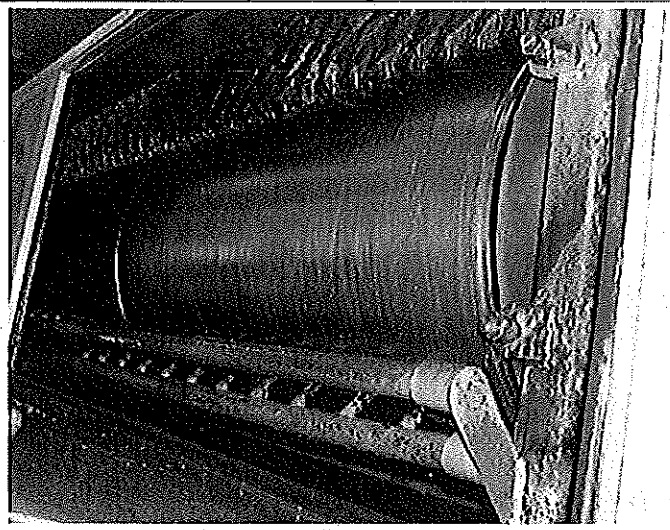


PHOTO #:30 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290127
DESCRIPTION: INSIDE OF DRUM SCREENS

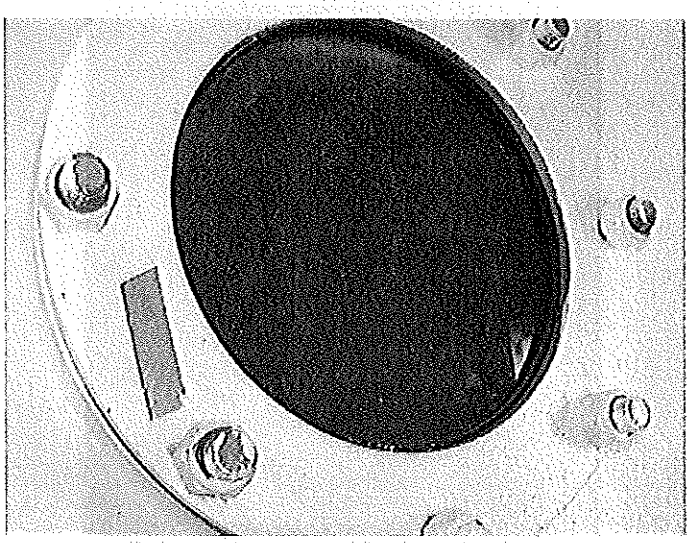


PHOTO #:31 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290132
DESCRIPTION: SCANSHIP BIOSTEP

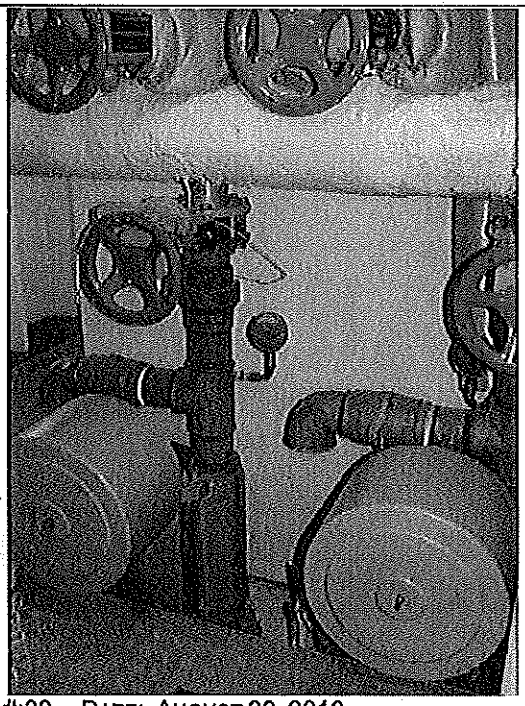


PHOTO #:32 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290133
DESCRIPTION: SCANSHIP BLOWERS FOR BIOSTEP

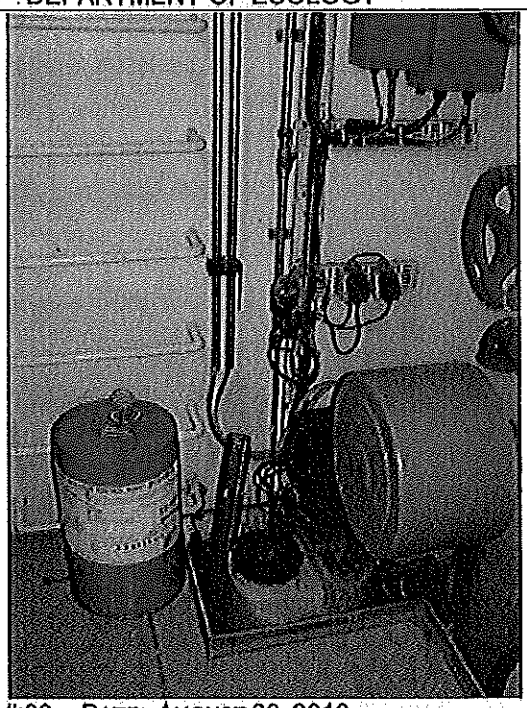


PHOTO #:33 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.:P8290136
DESCRIPTION: DEFOAMER FOR BIOSTEP

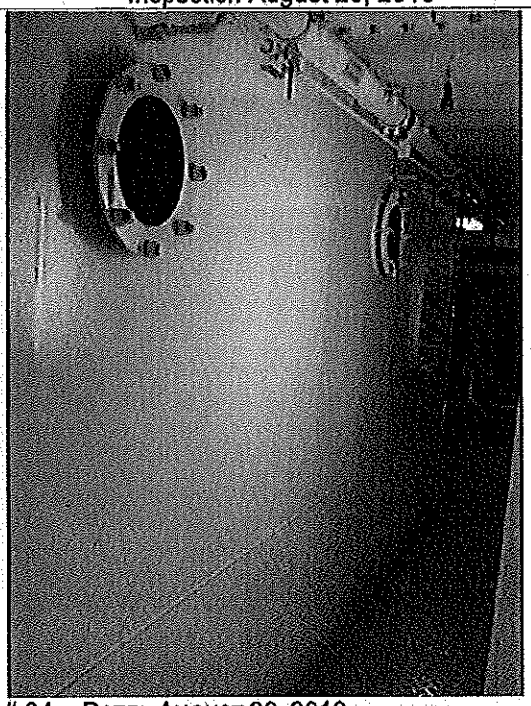


PHOTO #:34 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290138
DESCRIPTION: BIOSTEP

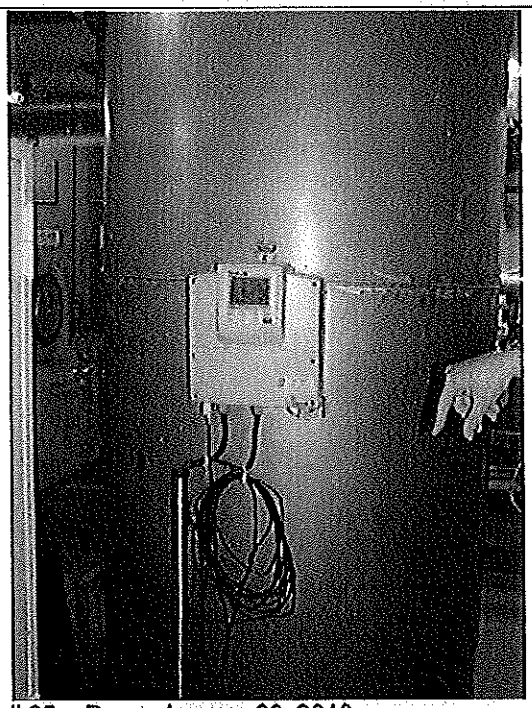


PHOTO #:35 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290139
DESCRIPTION: FLOC TANK AND pH METER

PHOTO #:36 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290140
DESCRIPTION: FLOTATION TANK

PHOTO #:37 DATE: AUGUST 29, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P8290141
DESCRIPTION: FLOTATION TANK – LID OPEN

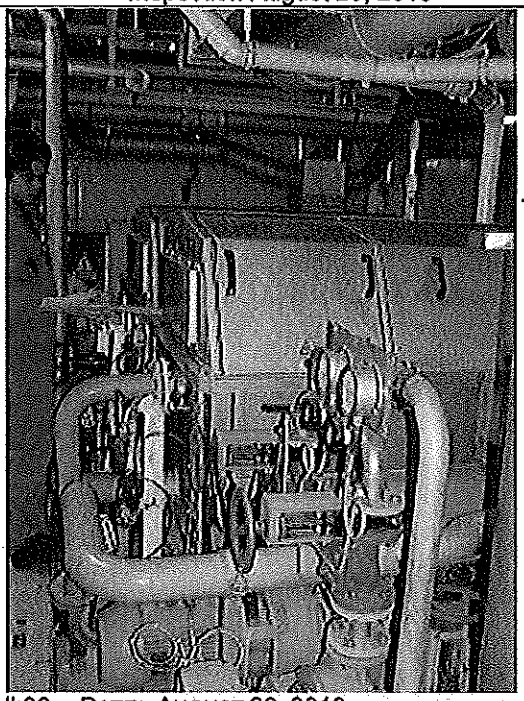


PHOTO #:38 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290142
DESCRIPTION: ULTRAFILTERS

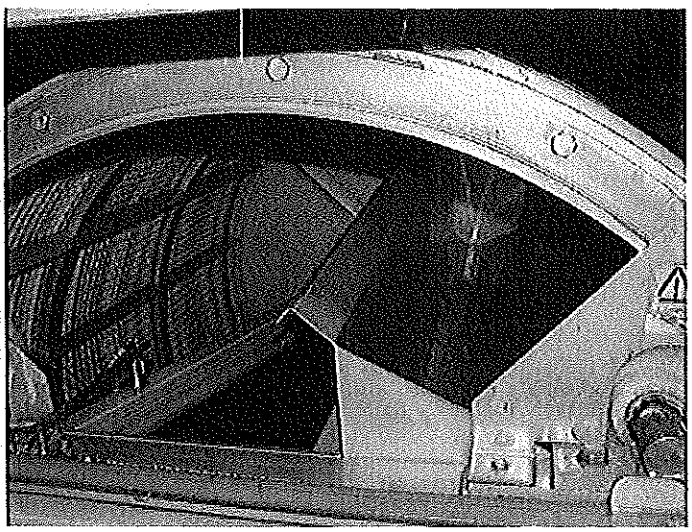


PHOTO #:39 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290144
DESCRIPTION: INSIDE OF ULTRAFILTER

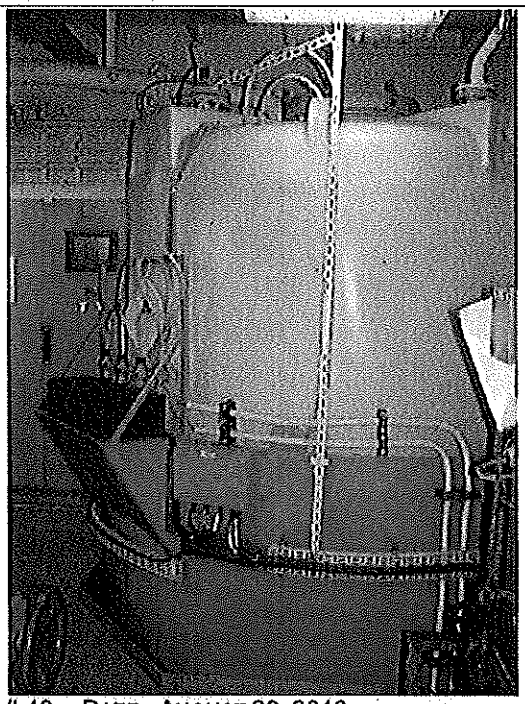


PHOTO #:40 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290147
DESCRIPTION: POLYMER TANK

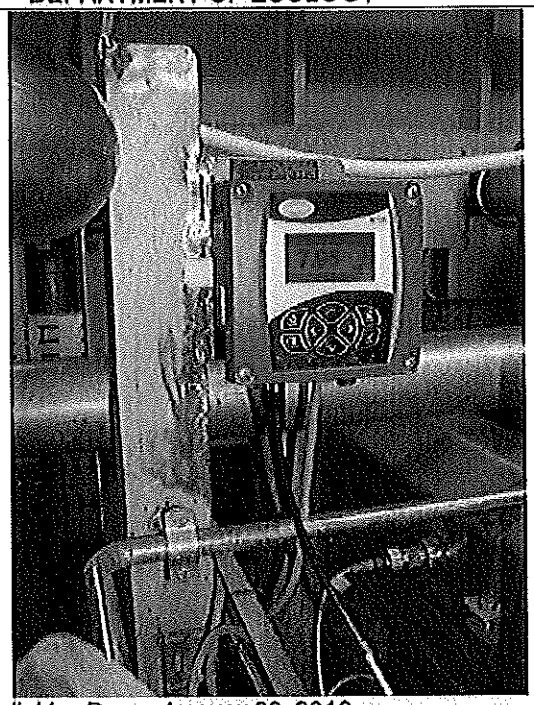


PHOTO #:41 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.:P8290151
DESCRIPTION: TSS METER

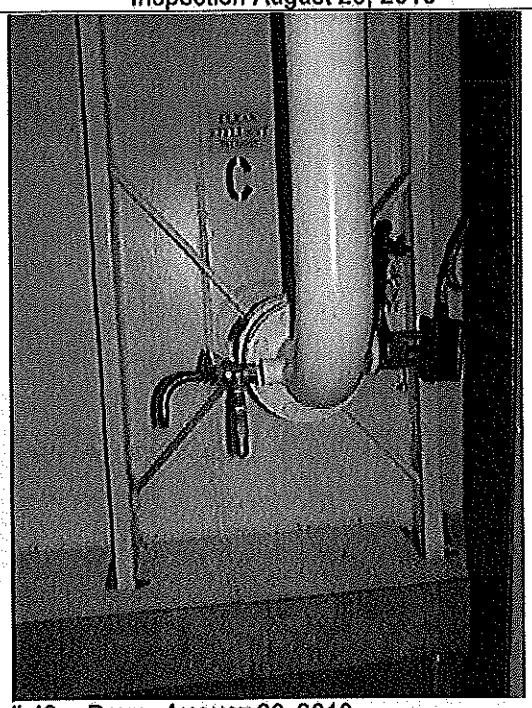


PHOTO #:42 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290155
DESCRIPTION: DISCHARGE PORT

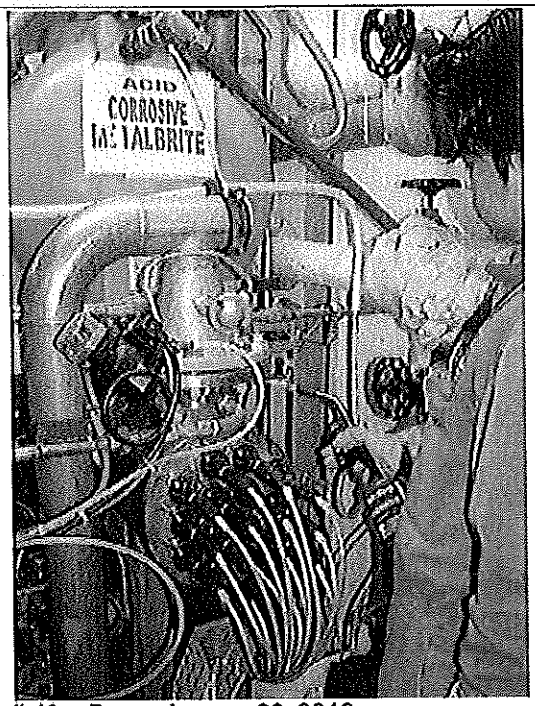


PHOTO #:43 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290158
DESCRIPTION: DISINFECTING THE SAMPLE PORT

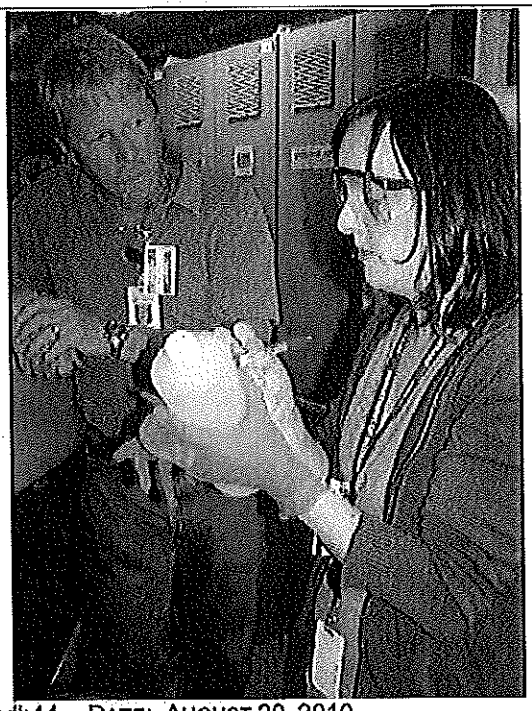


PHOTO #:44 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290161
DESCRIPTION: SAMPLING

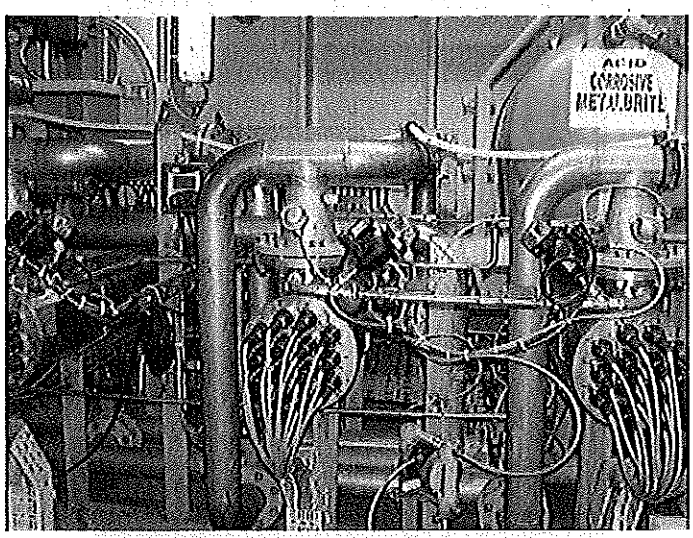


PHOTO #:45 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.:P8290165
DESCRIPTION: ULTRAVIOLET DISINFECTION SYSTEM

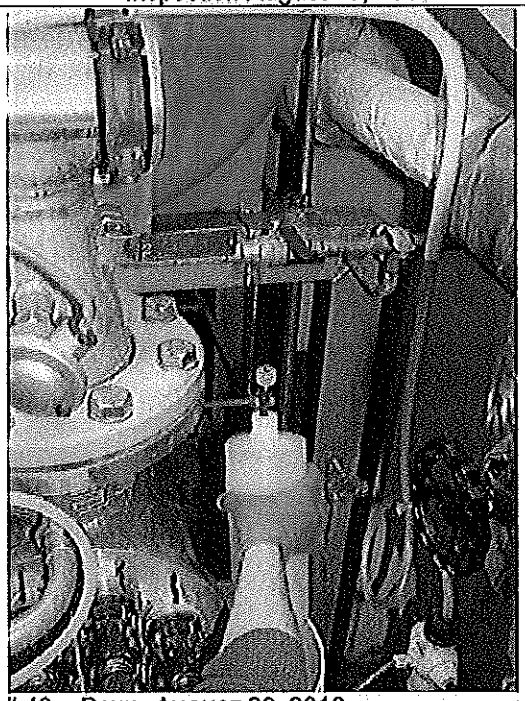


PHOTO #:46 DATE: AUGUST 29, 2010
TAKEN BY: LORI LEVANDER FILE NO.: P8290167
DESCRIPTION: SAMPLING

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

DOE
3190 106th Ave SE
Bellevue, WA 98008
Attention: Amy Jankaviak
All results reported on an as received basis.

Date Received: 08/30/10
Date Reported: 9/30/10

AMTEST Identification Number 10-A014546
Client Identification Norweglan Pearl
Sampling Date 08/29/10, 12:09

Microbiological

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Fecal Coliforms	2.	CFU/100 ml		1.	SM 9222D	DC	08/30/10 11:45

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
pH	6.77	unit	*		EPA 150.1	KF	08/29/10
Chlorine Residual	< 0.1	mg/l		0.10	EPA 330.5	KF	08/29/10
Total Suspended Solids	15.	mg/l		1.0	SM 2540D	NLN	08/30/10

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
BOD	2.6	mg/l		2.0	SM 5210B	DC	08/30/10

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	29.5	mg/l		0.005	EPA 350.1	KK	09/02/10

* = The method specifies the test is to be performed in the field; therefore the result is an estimate.

Kathy Fuglel
President

Jankowiak, Amy (ECY)

From: Kathy Fugiel [kathyf@amtestlab.com]
Sent: Thursday, September 30, 2010 1:08 PM
To: Jankowiak, Amy (ECY)
Subject: Re: Norwegian Pearl results
Attachments: B10-A014546.pdf; QCB10-A014546.pdf

I was all set to email it to you today.

Kathy

----- Original Message -----
From: Jankowiak, Amy (ECY)
To: Kathy Fugiel
Sent: Thursday, September 30, 2010 8:00 AM
Subject: Norwegian Pearl results

Kathy,

Just checking to see if you have the Norwegian Pearl results from the Aug 29th sampling yet.

Thanks,

Amy Jankowiak
Department of Ecology, Northwest Regional Office
Water Quality Program
3190 160th Avenue SE, Bellevue WA 98008
(425) 649-7195 ajan461@ecy.wa.gov

DEPARTMENT OF ECOLOGY
State of Washington

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

Inspection Date	Permit Number	County	Receiving Waters	Ecology Inspector
09/12/2010	NA	King	Marine Waters	Amy Jankowiak, Compliance Specialist
Entry Time 8:55 am **Exit Time** 10:40 am	**Photos Taken** ☒ Yes ☐ No	**Samples Taken** ☐ Yes ☒ No	**Inspection Announced** ☒ Yes ☐ No	**Discharges to:** ☒ Surface Water ☐ Ground Water ☐ Dewater ☐ POTW

Name and Location of Site Inspected:
SAPPHIRE PRINCESS, Princess Cruises
Pier 91
Seattle, Washington

Additional Participants/Inspectors:

On-Site Representative(s): ***Name/Title/Phone/e-mail***
Zeljko Speranda, Environmental Officer

Responsible Official(s): ***Name/Title/Address/Phone/e-mail***
Andrew Lorenzana, Environmental Operations Manager
Princess Cruises
24200 Magic Mountain Parkway, Santa Clarita, CA 91355-1283
661-753-2755; alorenzana@princesscruises.com

Other Facility Data:
Notification made to Andrew Lorenzana on September 9, 2010

Section A: Areas Evaluated

☒ Black/Gray Wastewater System	☒ Residual Solids	☒ Records/Reports	☒ Hazardous Waste/ Solid Waste	☒ Sampling/Monitoring
☒ Discharge Locations	☒ Operation & Maintenance	☒ Sludge Handling/ Disposal	☒ Oily Bilge Water	☒ Other

Section B: 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	
☐ Auto Shut Down or Operational Controls to Insure System Shut Down if High Turbidity Occurs	

Turbidity or Equivalent:

Last Calibration:

Trigger Level for Early Alarm: Trigger Level for Shutdown:

Recorded Turbidity/Equivalent Levels Above Triggers:

☐ Daily 24-hour Continuous Monitoring for Disinfection Effectiveness	
☐ Disinfection Effectiveness Monitoring Equipment Functioning Properly	

Disinfection Effectiveness Monitoring:

☐ Auto Shut Down or Operational Controls to Insure System Shut Down if Disinfection System Upset Occurs	
☐ Disinfection System Operated and Maintained Properly	

Disinfection System:

Section C: For Vessels Discharging Continuously [2.1.3(B)]

☐	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	
☐	Auto Shut Down or Operational Controls to Insure System Shut Down if High Turbidity Occurs	
	Turbidity or Equivalent: Last Calibration: Trigger Level for Early Alarm: Trigger Level for Shutdown: Recorded Turbidity/Equivalent Levels Above Triggers:	
☐	Daily 24-hour Continuous Monitoring for Disinfection Effectiveness	
☐	Disinfection Effectiveness Monitoring Equipment Functioning Properly	
	Disinfection Effectiveness Monitoring:	
☐	Auto Shut Down or Operational Controls to Insure System Shut Down if Disinfection System Upset Occurs	
☐	Disinfection System Operated and Maintained Properly	
	Disinfection System:	
	Section D: General (Approved to Discharge)	
☐	No Discharges Within ½ Miles From Shellfish Beds/ Protocol (President's Point, Apple Tree Cove, Tyee Shoal)	
☐	Discharges Immediately Stopped When High Turbidity Occurs	
☐	Discharges Immediately Stopped When Disinfection System Upset Occurs	
☐	Immediate Notifications Made to WA Department of 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 1/40 Calls for Continuous	
	Section E: General	
☒	Wastewater 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 2010 cruise season to present.
☒	Residual Solids Managed Properly/Disposal Protocol per MOU	Screenings are incinerated and biomass is 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 Hazardous 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. Records were reviewed for garbage off-loads.
☒	Oily Bilge Water Managed Properly	Oily bilge water is treated and discharged at less than 15 ppm and outside of MOU waters.
Other:		

Section F: Sampling Results	
Parameter	**Results**
Biochemical Oxygen Demand 5-Day (BOD_5)	
Total Suspended Solids (TSS)	
Fecal Coliform	
Residual Chlorine	
pH	
Ammonia, Nitrogen	

Section G: 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 Princess Cruises SAPPHIRE PRINCESS on September 12, 2010. The main contact on board the SAPPHIRE PRINCESS was Zeljko Speranda, Environmental Officer for the SAPPHIRE PRINCESS. Prior notification of the visit was given on September 9, 2010 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 SAPPHIRE PRINCESS is not approved to discharge in MOU waters. The vessel has not been discharging and is holding effluent until outside MOU waters.

The SAPPHIRE PRINCESS was built in May of 2004 and was the first ship to be christened in Seattle. The vessel is 951 feet long with a passenger capacity of 2670 and a crew capacity of 1100. The ship's wastewater treatment system, Hamworthy, was installed at the time the ship was built in 2004.

The SAPPHIRE PRINCESS is scheduled for 20 port calls in Seattle and conducts one week cruises to Alaska turning around on Sundays between May 13, 2010 through September 19, 2010.

Inspection

I arrived and boarded the ship (photo #01) at about 8:55 am and began with introductions and a plan for the day with Zeljko Sperenda, the Environmental Officer. We discussed various waste streams, and the discharge protocols. We then reviewed the various discharge and environmental records. We toured the dry cleaning system and the Hamworthy advanced wastewater treatment system (AWTS). We also viewed the oily water separator system and its white box. The inspection was then finalized with a debriefing and we disembarked the vessel at about 10:40 am.

Discharge Types and Protocols:

No discharges of any kind occur in Washington state waters. Prior to entering Washington waters and within 12 miles from land, every discharge port is closed. If the vessel is in an area where a discharge is allowed, the Bridge and the staff in the Engine Control Room (ECR) communicate by phone and with written verification by e-mail prior to any discharges. The Watchkeepers have the authority to then discharge and have "key" access for the overboard ports. For blackwater and graywater, 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 wastewater discharge records that were reviewed appeared to be in compliance with the MOU and also did not occur in MOU waters. The AWTS, Hamworthy treats both black water, which includes toilet waste and gray water which includes sink and shower water, and laundry water. The Hamworthy system has 3 units. Two treat gray water, and one treats mostly black water with some gray water. They combine prior to disinfection and are then held and not discharged while in MOU waters.

Screenings 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. The pools and spas use fresh water and chlorine to disinfect. The pool and spa water is dechlorinated prior to discharge.

Food waste is collected in various locations, is sent through a pulper. The water is recirculated and eventually sent to a holding tank and is discharged outside of MOU waters. The solid food material from the pulpers is discharged outside of 12 nautical miles and outside MOU waters. Records reviewed were consistent with this protocol. Used cooking oil, is collected and recycled for biodiesel.

Oily bilge water is treated with an oily water separator (photos #17 and #18) and discharged at less than 15 ppm after first going through a white box (photos #19 and #20) for monitoring. The vessel typically meets 4-5 ppm. The chief Engineer has the keys for the white box and it was locked during the inspection.

Some potable water is bunkered, while the rest is produced by desalination with two evaporators while out at Sea. The brine is discharged out at Sea.

The vessel has switched from a PERC using dry cleaning system to a non-perc wet-dry cleaning system that does not have any byproduct chemical. This "Aqua Care Process" (photos #02 and #03) uses a SoftenAll fabric softener with isopropanol and Soft'N Brite a non-hazardous gentle detergent, both by Laidlaw. The chemicals do not have any hazardous components. Phosphate-free detergents are used in the laundry.

Silver is captured with a silver recovery system from the photo waste, is treated to less than 5 ppm and is then incinerated. X-rays are now done digitally without any chemical byproduct. Hazardous wastes include chemicals, oily rags, paints and thinners, printer cartridges, paints, batteries, bulbs (no crusher on board), sludge oil, aerosols (punctured), and sharps. All hazardous waste is off-loaded in Victoria.

Expired medications and narcotics are incinerated (narcotics with witness) along with biohazardous waste. Most cardboards, some plastics, paper and some food waste and dry garbage is also incinerated. Incineration occurs once the vessel is going 6 knots and greater than 4 nautical miles. Ash from the incinerators is off-loaded and tested yearly. The drains in the medical area are blocked and do not discharge anywhere.

Plastics, garbage, and other materials are collected and sorted on a sorting table. Most materials are then condensed and recycled on-shore. Glass, aluminum, tin, scrap metals, some cardboard and plastics are all recycled along with other materials.

Above water-line work that occurs at the Port of Seattle is done so with permission and with the use of proper Best Management Practices including tarps. Washing is done with fresh water.

Black water and Gray water System:
Blackwater, which includes toilet waste and graywater which includes sink and shower water and laundry water is treated with a Hamworthy advanced wastewater treatment system and is currently discharged outside of MOU waters. The Hamworthy system, consists of three separate membrane bioreactors (MBRs). Two are used to treat gray water and one treats black water with a small amount of gray water. Black water is collected by vacuum. The wastewater flow moves to the screen press (photos #04 and #05). The solids are screened into bags (photo #06) and are then sent to the incinerator. The liquid moves to the 1st stage of the membrane bioreactor (photo #07) where aeration occurs (photo #08). From the 1st stage, flow moves to the Inter-stage filters (photo #09). The inter-stage filtered solids are returned back to the screen press. The liquid (photo #10) moves onto the 2nd stage of the MBR for further aeration. From the 2nd stage MBR, flow is sent to the membrane modules (photos #11, #13 and #14) for ultrafiltration. 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 for ultraviolet (UV) disinfection (photos #21, #22 and #23). Disinfected effluent goes to a permeate tank (photo #24) and either goes directly overboard (photo #25) or to a holding tank if not in an approved area for discharge. The held effluent will eventually go back through the UV system before discharge. Currently, effluent is held and discharged outside of MOU waters. There is a sample port for treated effluent after UV disinfection.

Turbidity is measured continuously on each of the MBR permeate tanks. The readings at the time of the inspection were 1.1 NTU on the #1 GW MBR, 0.2 NTU on the #2 GW MBR, and 0.7 on the #3 BW MBR. The meters are alarmed at 25 NTU maximum and the discharge is automatically stopped at this level. The UV system consists of 6 bulbs which are alarmed. If the lamps are off or there is low flow, the system alarms. There are typically 6 spare bulbs available on board. The maintenance system provides details of when all maintenance is needed. Representatives from Hamworthy visit the ship periodically. There is a tank used for cleaning the membranes by hand where chemicals are used, including an organic acid cleaner (photo #16). Automatic cleaning of the membranes occurs by backwashing.

The staff have a small laboratory on board where they sample for such parameters as total and free chlorine, total suspended solids (TSS), pH and total coliform weekly. Ammonia is being tested daily on the vessel. The on-board sampling allows for immediate results and a chance for immediate corrections to the system.

A copy of the current MOU was available on the vessel and non-compliance notification procedures were known.

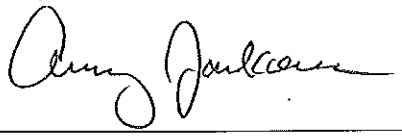
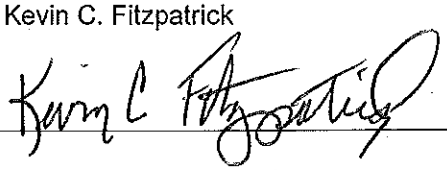
Conclusions and Recommendations

It is recommended that staff continue to work towards high functioning wastewater treatment systems. The staff on board the vessel were very knowledgeable of the systems and protocols.

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.

Attachments:
Photographs

Copies to:
Andrew Lorenzana, Princess Cruises
Zeljko Speranda, Environmental Officer
Amy Jankowiak, Ecology
Karen Burgess, Ecology
Mark Toy, Health
Kevin Fitzpatrick, Ecology
Central Files: Princess Cruises – SAPPHIRE PRINCESS; WQ 6.1

Section H: Signatures		
Name and Signature of Inspector: Amy Jankowiak 	Agency/Office/Telephone: Department of Ecology Northwest Regional Office Water Quality Program Municipal Compliance Specialist 425-649-7195	Date 9/28/10
Name and Signature of Reviewer: Kevin C. Fitzpatrick 	Agency/Office/Telephone: Department of Ecology Northwest Regional Office Water Quality Section Manager 425-649-7033	Date 9/28/10

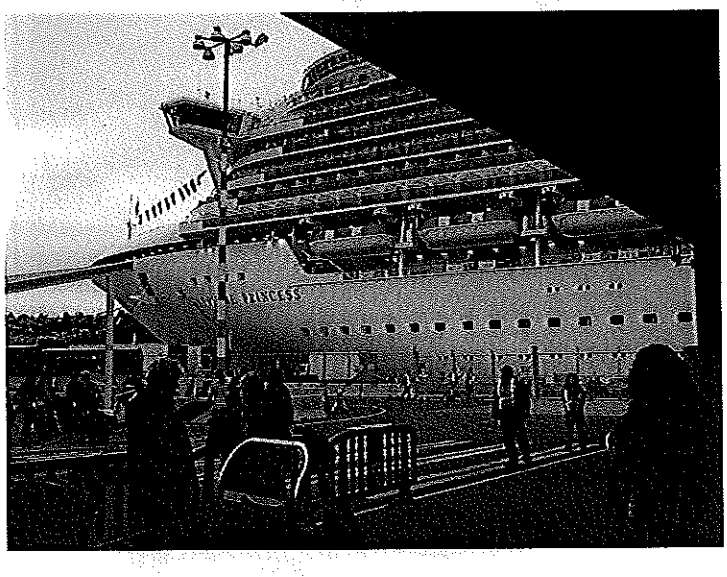


PHOTO #:01 DATE: SEPTEMBER 12, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9120005
DESCRIPTION: SAPPHIRE PRINCESS VESSEL

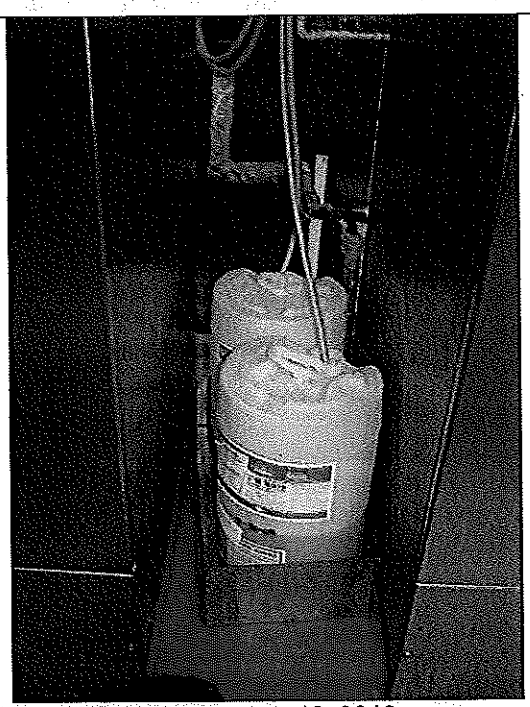


PHOTO #:02 DATE: SEPTEMBER 12, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9120006
DESCRIPTION: DRY CLEANING WET CHEMICALS

PHOTO #:03 DATE: SEPTEMBER 12, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9120007
DESCRIPTION: DRY – WET CLEANING MACHINES

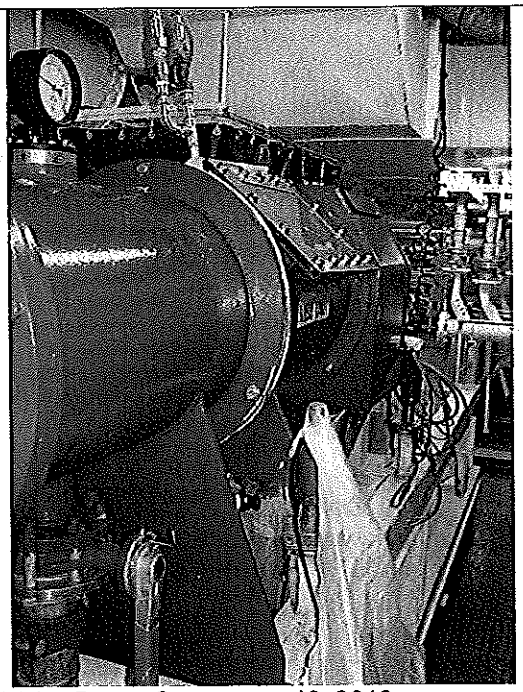


PHOTO #:04 DATE: SEPTEMBER 12, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9120008
DESCRIPTION: SCREEN PRESS

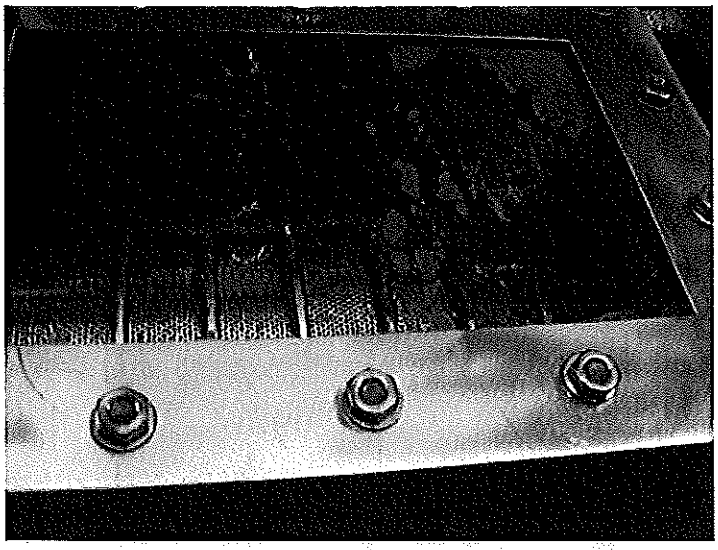


PHOTO #:05 DATE: SEPTEMBER 12, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9120010
DESCRIPTION: VIEW INSIDE SCREEN PRESS

PHOTO #:06 DATE: SEPTEMBER 12, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9120012
DESCRIPTION: SCREEN PRESS SCREENINGS TO BAG

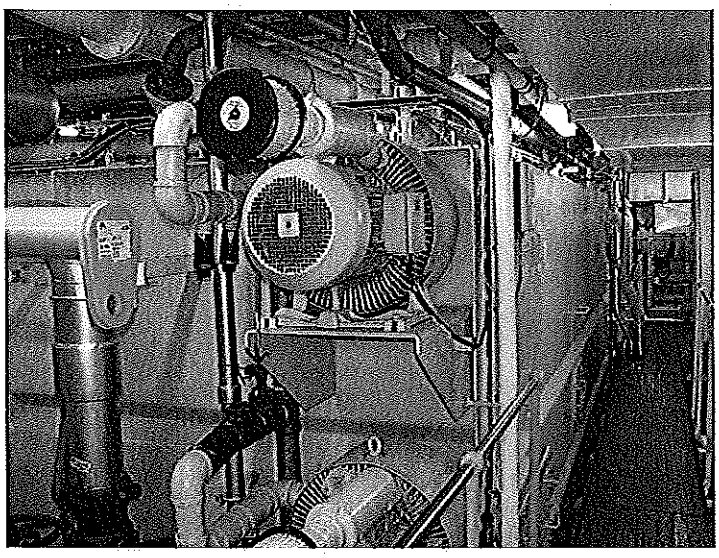


PHOTO #:07 DATE: SEPTEMBER 12, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9120013
DESCRIPTION: 1ST AND 2ND STAGE TANKS OF BIOREACTOR

PHOTO #:08 DATE: SEPTEMBER 12, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9120015
DESCRIPTION: VIEW INSIDE 1ST STAGE OF BIOREACTOR

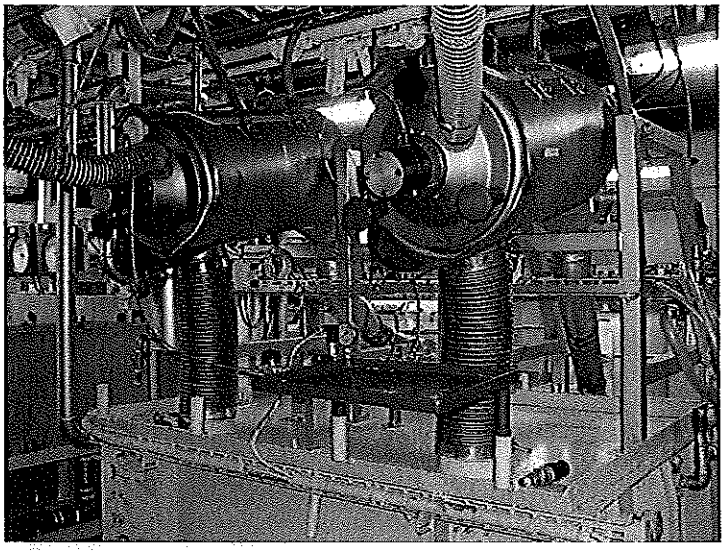


PHOTO #:09 DATE: SEPTEMBER 12, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9120016
DESCRIPTION: INTER-STAGE FILTERS

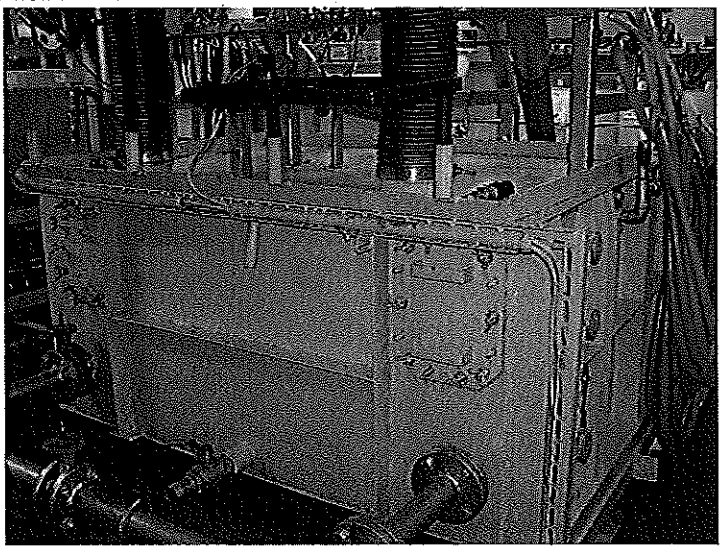


PHOTO #:10 DATE: SEPTEMBER 12, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9120017
DESCRIPTION: INTERSTAGE FILTER PERMEATE TANK

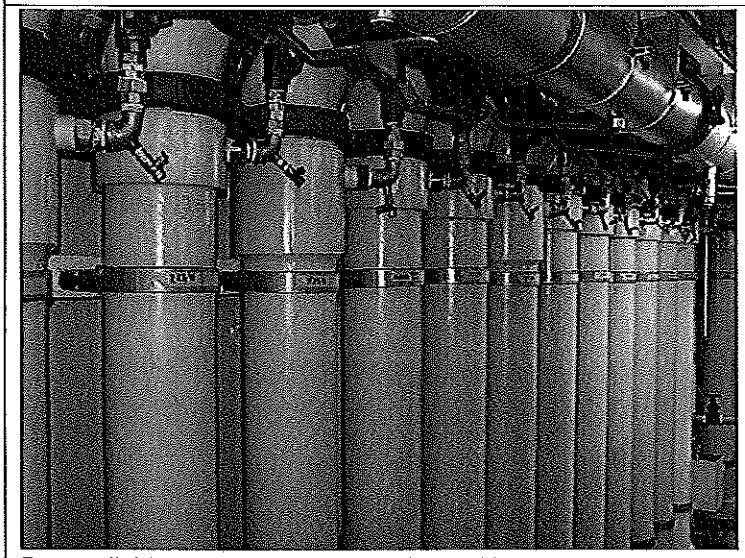


PHOTO #:11 DATE: SEPTEMBER 12, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9120018
DESCRIPTION: MEMBRANE FILTERS

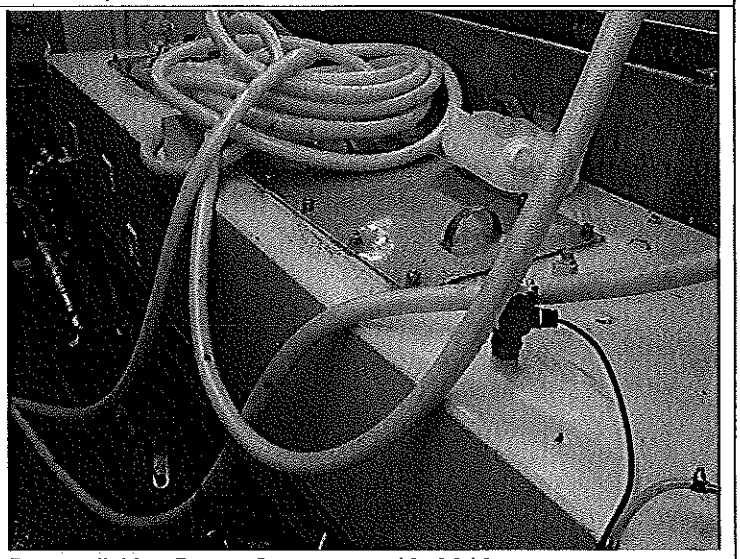


PHOTO #:12 DATE: SEPTEMBER 12, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9120019
DESCRIPTION: MEMBRANE FILTER PERMEATE TANK

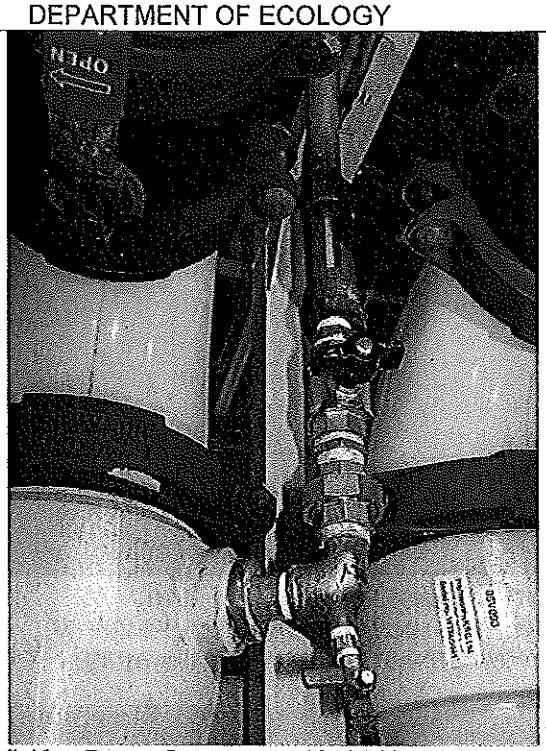


PHOTO #:13 DATE: SEPTEMBER 12, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9120021
DESCRIPTION: MEMBRANE FILTERS VIEWING TUBE

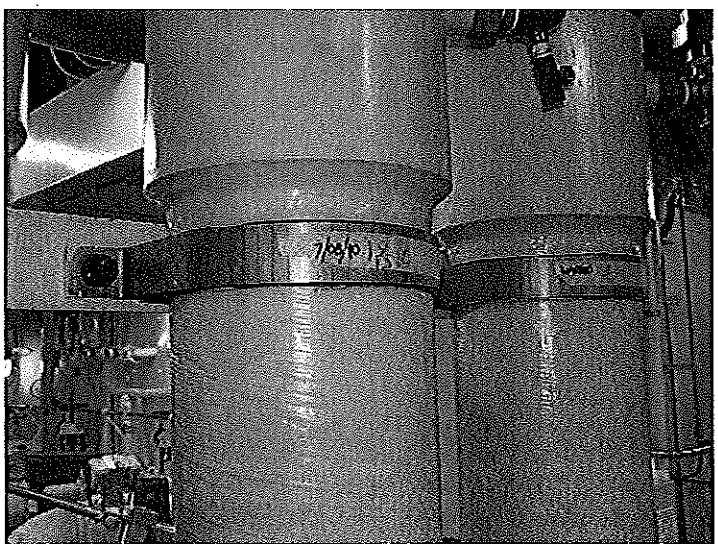


PHOTO #:14 DATE: SEPTEMBER 12, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9120022
DESCRIPTION: MEMBRANE FILTERS CLEANING DATES NOTED

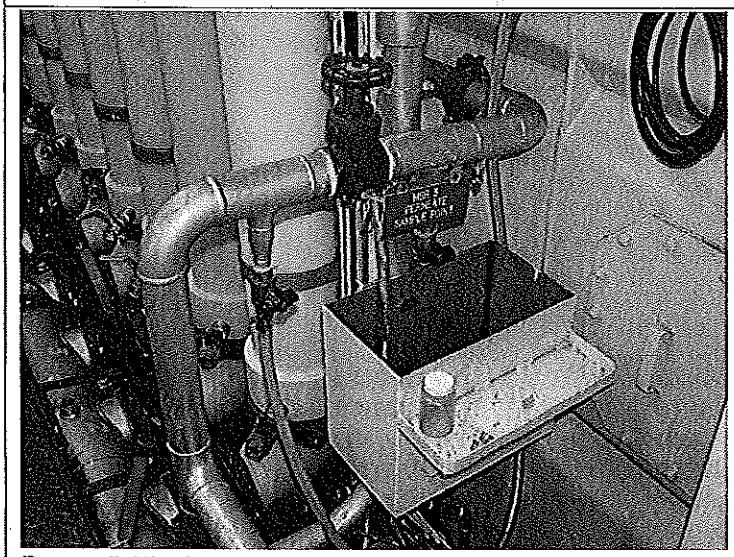


PHOTO #:15 DATE: SEPTEMBER 12, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9120023
DESCRIPTION: MBR SAMPLE POINT

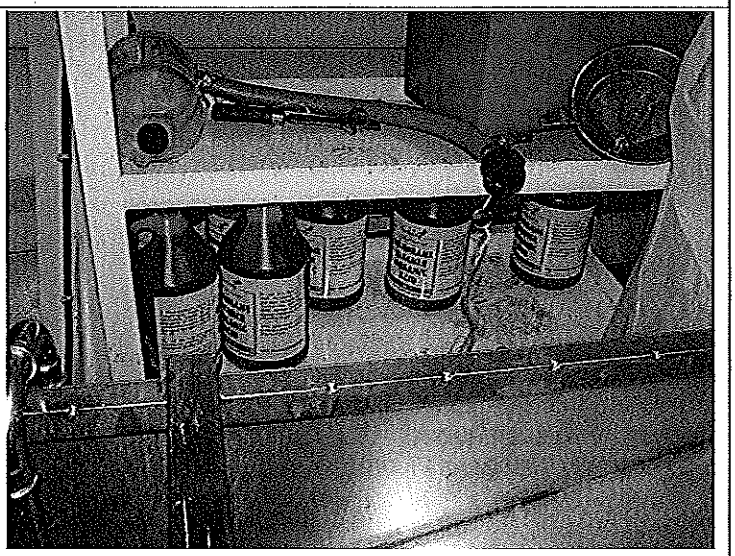


PHOTO #:16 DATE: SEPTEMBER 12, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9120024
DESCRIPTION: MEMBRANE FILTERS CLEANING CHEMICALS (MEMBRANE CLEANER ORGANIC ACID)

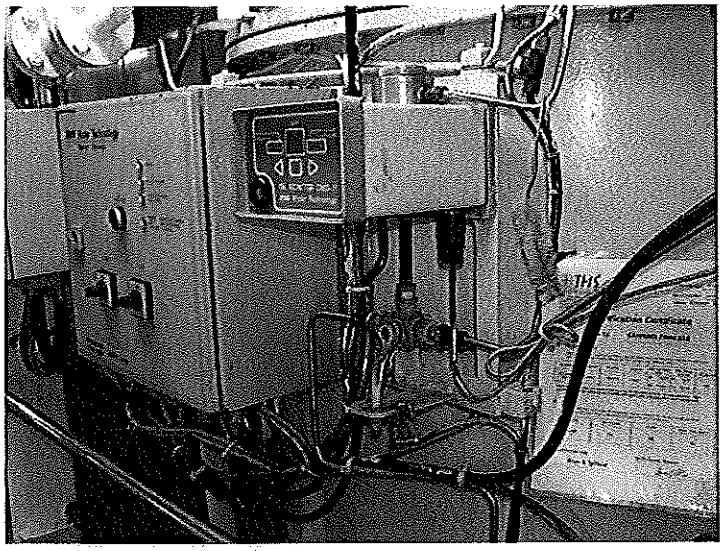


PHOTO #:17 DATE: SEPTEMBER 12, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9120025
DESCRIPTION: OILY WATER SEPARATOR

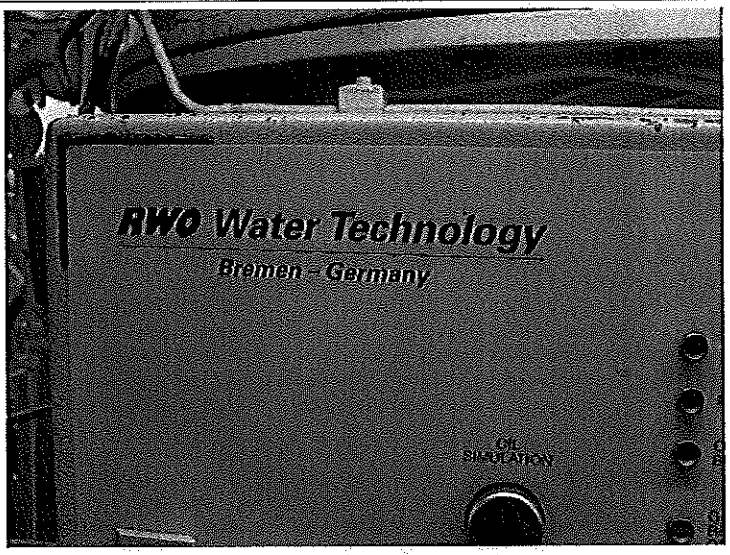


PHOTO #:18 DATE: SEPTEMBER 12, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9120026
DESCRIPTION: OILY WATER SEPARATOR

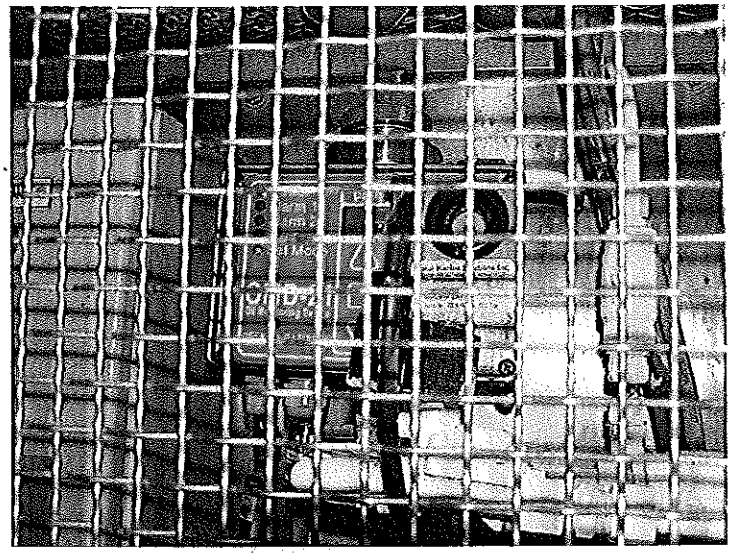


PHOTO #:19 DATE: SEPTEMBER 12, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9120028
DESCRIPTION: OILY WATER SEPARATOR WHITE BOX

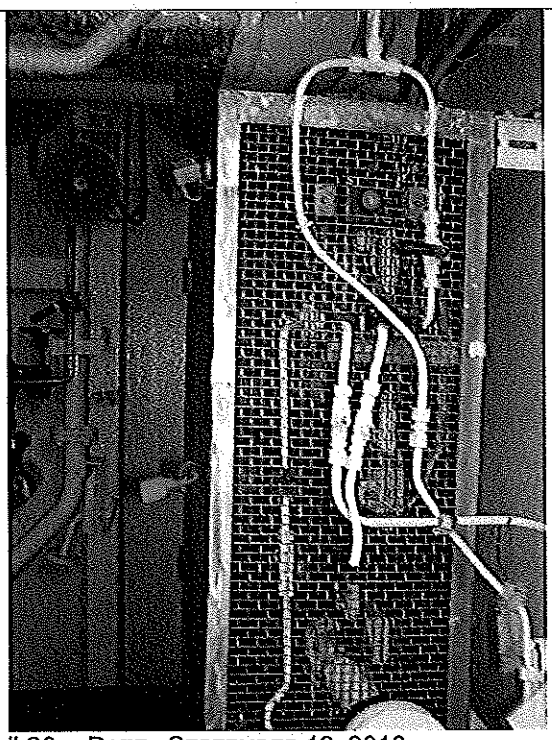


PHOTO #:20 DATE: SEPTEMBER 12, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9120029
DESCRIPTION: OILY WATER SEPARATOR WHITE BOX

PHOTO #:21 DATE: SEPTEMBER 12, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9120030
DESCRIPTION: ULTRAVIOLET LIGHT DISINFECTION UNIT

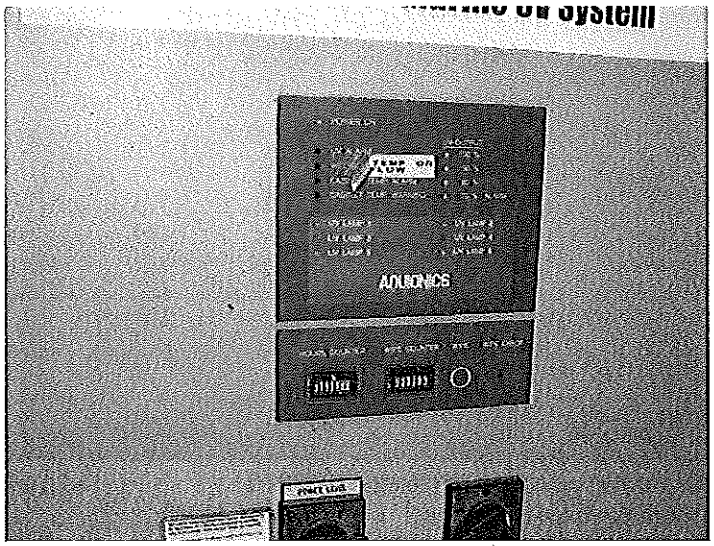


PHOTO #:22 DATE: SEPTEMBER 12, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9120031
DESCRIPTION: UV SYSTEM ELECTRONICS

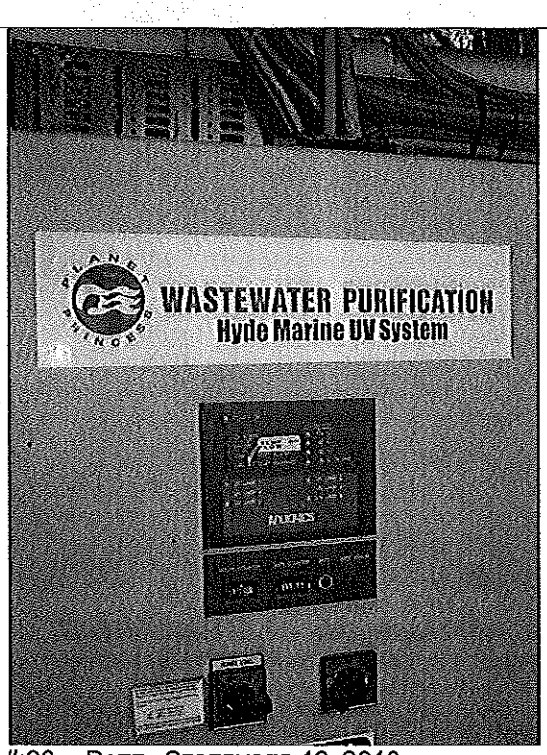


PHOTO #:23 DATE: SEPTEMBER 12, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9120032
DESCRIPTION: UV SYSTEM ELECTRONICS

PHOTO #:24 DATE: SEPTEMBER 12, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9120033
DESCRIPTION: VIEW OF UV PERMEATE IN UV PERMEATE TANK

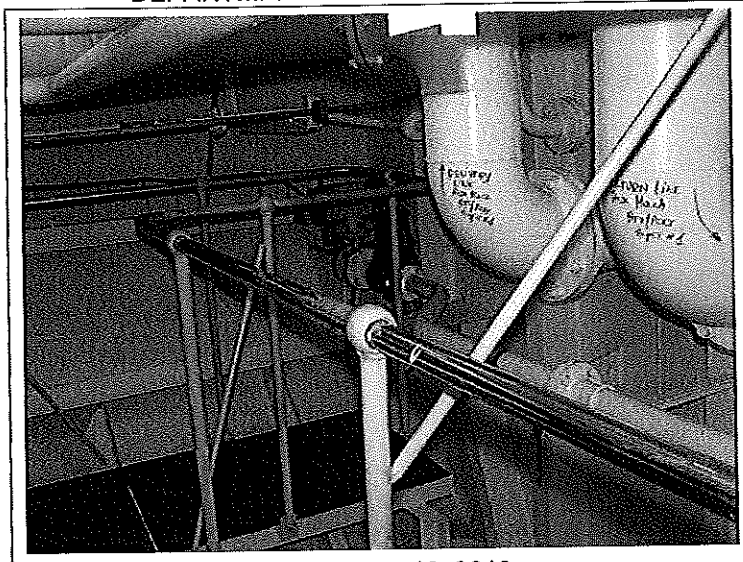


PHOTO #:25 . DATE: SEPTEMBER 12, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9120034
DESCRIPTION: DISCHARGE PORT

DEPARTMENT OF ECOLOGY
State of Washington

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

Inspection Date	Permit Number	County	Receiving Waters	Ecology Inspector
09/20/2010	NA	King	Marine Waters	Amy Jankowiak, Compliance Specialist
Entry Time 8:50 Exit Time 10:48	Photos Taken ☒ Yes ☐ No	Samples Taken ☐ Yes ☒ No	Inspection Announced ☒ Yes ☐ No	Discharges to: ☒ Surface Water ☐ Ground Water ☐ Dewater ☐ POTW

Name and Location of Site Inspected:
MILLENNIUM, Celebrity Cruises
Passenger Vessel
Pier 66, Seattle, Washington

Additional Participants/Inspectors:
Cheryl Thompson, Ecology

Ronald Rausch, the Environmental Officer was out on Compassionate Leave.

On-Site Representative(s): *Name/Title/Phone/e-mail*
Pantelis Ampatzis, Safety Officer
Antonis K. Athanasiou, Staff Captain;
ML_StaffCaptain@Celebritycruises.com

Responsible Official(s): *Name/Title/Address/Phone/e-mail*
Rich Pruitt, Director Environmental Programs
Royal Caribbean International
1080 Caribbean Way, Miami, FL 33132
Office: 305-982-2179; Cell: 305-495-2845; RPruitt@rccl.com

Other Facility Data:

Prior notification was made to Rich Pruitt on September 16, 2010.

Section A: Areas Evaluated

☒ Black/Gray Wastewater System	☒ Residual Solids	☒ Records/Reports	☒ Hazardous Waste/ Solid Waste	☒ Sampling/Monitoring
☒ Discharge Locations	☒ Operation & Maintenance	☒ Sludge Handling/ Disposal	☒ Oily Bilge Water	☒ Other

Section B: 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	
☐ Auto Shut Down or Operational Controls to Insure System Shut Down if High Turbidity Occurs	

Turbidity or Equivalent:
Last Calibration:
Trigger Level for Early Alarm: Trigger Level for Shutdown:
Recorded Turbidity/Equivalent Levels Above Triggers:

☐ Daily 24-hour Continuous Monitoring for Disinfection Effectiveness	
☐ Disinfection Effectiveness Monitoring Equipment Functioning Properly	

Disinfection Effectiveness Monitoring:

☐ Auto Shut Down or Operational Controls to Insure System Shut Down if Disinfection System Upset Occurs	
☐ Disinfection System Operated and Maintained Properly	

Disinfection System:

Section C: For Vessels Discharging Continuously [2.1.3(B)]

☐	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	
☐	Auto Shut Down or Operational Controls to Insure System Shut Down if High Turbidity Occurs	
	Turbidity or Equivalent: Last Calibration: Trigger Level for Early Alarm: Trigger Level for Shutdown: Recorded Turbidity/Equivalent Levels Above Triggers:	
☐	Daily 24-hour Continuous Monitoring for Disinfection Effectiveness	
☐	Disinfection Effectiveness Monitoring Equipment Functioning Properly	
	Disinfection Effectiveness Monitoring:	
☐	Auto Shut Down or Operational Controls to Insure System Shut Down if Disinfection System Upset Occurs	
☐	Disinfection System Operated and Maintained Properly	
	Disinfection System:	
	Section D: General (Approved to Discharge)	
☐	No Discharges Within ½ Miles From Shellfish Beds/ Protocol (President's Point, Apple Tree Cove, Tyee Shoal)	
☐	Discharges Immediately Stopped When High Turbidity Occurs	
☐	Discharges Immediately Stopped When Disinfection System Upset Occurs	
☐	Immediate Notifications Made to WA Department of 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 1/40 Calls for Continuous	
	Section E: General	
☒	Wastewater 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 2010 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 Hazardous 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 5 ppm (and at greater than 12 nautical miles.
Other:		

Section F: Sampling Results	
Parameter	Results
Biochemical Oxygen Demand 5-Day (BOD_5)	
Total Suspended Solids (TSS)	
Fecal Coliform	
Residual Chlorine	
pH	
Ammonia, Nitrogen	

Section G: 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 September 20, 2010 along with Cheryl Thompson, Water Quality Program. The main contacts on board the MILLENNIUM Pantelis Ampatzis, Safety Officer and Antonis K. Athanasiou, Staff Captain. Ronald Raasch, the Environmental Officer was out on Compassionate Leave. Prior notification of the visit was given on September 16, 2010 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. Passenger capacity on the day of the inspection was 1991 with a crew of 899.

The MILLENNIUM runs most of the cruise season out of Vancouver, British Columbia up to Alaska. The vessel conducted two calls to Seattle, once at the beginning of the season on May 3, 2010 and once on September 20, 2010. The vessel will be repositioning to the Caribbean for the winter as it leaves Seattle.

Inspection

We arrived and boarded the ship (photos #01 and #02) at 8:50 am and began with introductions and a plan for the day. We then discussed and viewed the advanced wastewater treatment system with staff that operate the system. 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 to the Bridge to review additional discharge records for hazardous waste and garbage. We then headed to the galley and the garbage and recycling areas. We toured the medical facilities and then concluded with a de-briefing and disembarked the vessel at about 10:48 am.

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. 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. All wastewater discharge records that were reviewed appeared to be in compliance with the MOU and also did not occur in MOU waters. The discharge ports are padlocked.

Sewage residuals (sludge or biomass) are collected in the bio-residue tank and are then sent to the Hamann type II MSD system for treatment and 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.

There is one large main galley (photos #20 and #21), one smaller galley and a crew galley. The food waste is separated in the galleys and sent to the pulpers (photo #22). The food waste is pulped and discharged outside of MOU waters and outside 12 nautical miles. The water from the pulper is recycled and occasionally held and discharged outside of MOU waters and outside of 12 nm and other protected waters at a minimum speed of six knots. The food waste disposal areas are monitored regularly by the Environmental Officer. The galley water goes to the gray water holding tanks. Cooking oil is collected to tanks and is off-loaded shore-side for recycling. Garbage records verified that food waste is the only waste

discharged to sea and is done so outside of MOU waters.

Pool and spa water is de-chlorinated and discharged outside of 12 nautical miles. The pools use seawater and both pools and spas use chlorine for disinfection. The spas are emptied daily to tanks and held for discharge outside 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 when underway.

Laundry water is sent to the gray water holding tanks and is phased into the AWP. Dry cleaning is done with a system using Perchloroethylene (PERC) which is collected and off-loaded as hazardous waste.

Fluorescent light bulbs are off-loaded as hazardous waste (no bulb crusher). Materials such as paint and thinners, batteries, 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. Photo waste goes through a silver recovery system to less than five (5) ppm and is then off-loaded as non-hazardous waste. X-rays are now done digitally (photo #30) and do not produce any chemical byproduct.

Materials such as aluminum (photo #25), tin (photo #26), cardboard (photos #24 and #29), paper, glass (photo #28), some plastics, and scrap metal are recycled (photo #24). Some papers, some plastics, some biohazardous materials, sharps, expired medications and narcotics and oily rags are incinerated. Incinerators are used when the vessel is greater than four nautical miles from port. Ash (photo #27) is offloaded as hazardous waste.

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 #03). PH is adjusted in the mixing tank. From the mixing tank, the wastewater is screened with one of two separate primary screens (photos #11 and #12). The screens are cylinders of mesh filters. The solids are sent to the bio-residue tank (photo #08), while the liquid moves (photo #04) onto the bioreactors. There are three bioreactor stages (photos #05, #06 and #07). Air is blown (photo #09) into the bioreactors and both air and levels are monitored with sensors. The wastewater is then conveyed to the Dissolved Air Flotation (DAF) units (photos #13 and #14). On the way to the DAFs, polymer is mixed in the line (photo #15). There are two DAFs. From the DAFs, liquid moves to the polishing filters (photos #16 and #17). 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 of six bulbs each (photo #19). Total suspended solids (TSS) are monitored (photo #18) both prior to UV and immediately after UV. Effluent from the UV is also monitored for pH. The UV units are self-cleaning with an automatic wiper. The vessel can either discharge the disinfected effluent, or send the treated wastewater to holding tanks. The AWP is in constant operation.

The vessel has a small laboratory on board and samples and analyzes for Total Suspended Solids (TSS), total and free chlorine, Chemical Oxygen Demand (COD) and pH daily and samples Biochemical Oxygen Demand (BOD) twice weekly and fecal coliform once weekly. At the time of the inspection, the TSS sensors were reading at 31 FTU and 7 FTU. The TSS often spikes when in port when cleaning on the vessel is occurring. At 20 FTU, the system automatically recirculates for re-treatment. The recirculation was occurring during the inspection. The vessel was not discharging.

If any painting or paint chipping is done on the vessel while in port, the vessel first requests permission from the local authorities and uses proper best management practices. The vessel uses tarps that have been fashioned with magnets to hold them close to the vessel while conducting such work and to prevent any discharges.

Conclusions and Recommendations
Staff was very knowledgeable of the environmental systems and protocols.

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 testing is ideal.

Attachments:

Photographs

Copies to:
Rich Pruitt, RCCL
Pantelis Ampatzis, Safety Officer MILLENNIUM
Antonis K. Athanasiou, Staff Captain MILLENNIUM
Ronald Raasch, MILLENNIUM EO
Amy Jankowiak, Ecology
Kevin Fitzpatrick, Ecology
Mark Toy, Dept. of Health
Central Files: Celebrity Cruises – MILLENNIUM; WQ 6.1

Section H: Signatures

Name and Signature of Inspector:	Agency/Office/Telephone:	Date
Amy Jankowiak	Department of Ecology Northwest Regional Office Water Quality Program Municipal Compliance Specialist 425-649-7195	9/28/10
Name and Signature of Reviewer:	Agency/Office/Telephone:	Date
Kevin C. Fitzpatrick	Department of Ecology Northwest Regional Office Water Quality Section Manager 425-649-7033	9/28/10

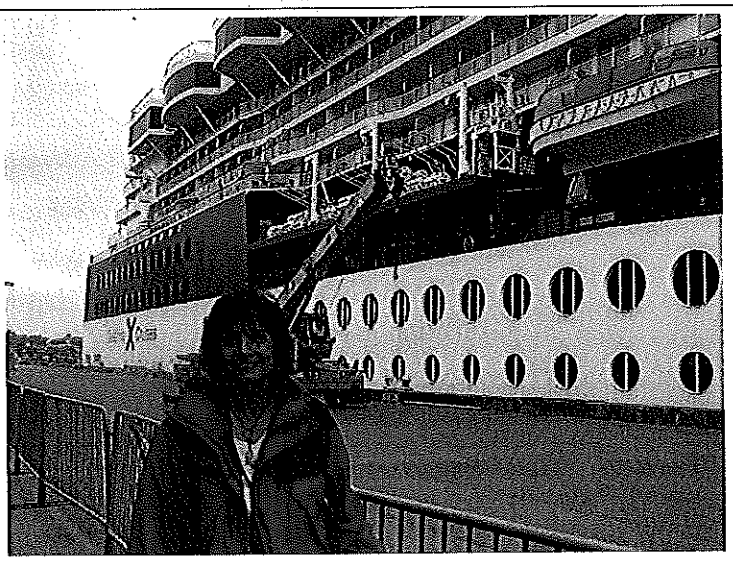


PHOTO #:01 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200034
DESCRIPTION: MILLENNIUM VESSEL (CHERYL THOMPSON)

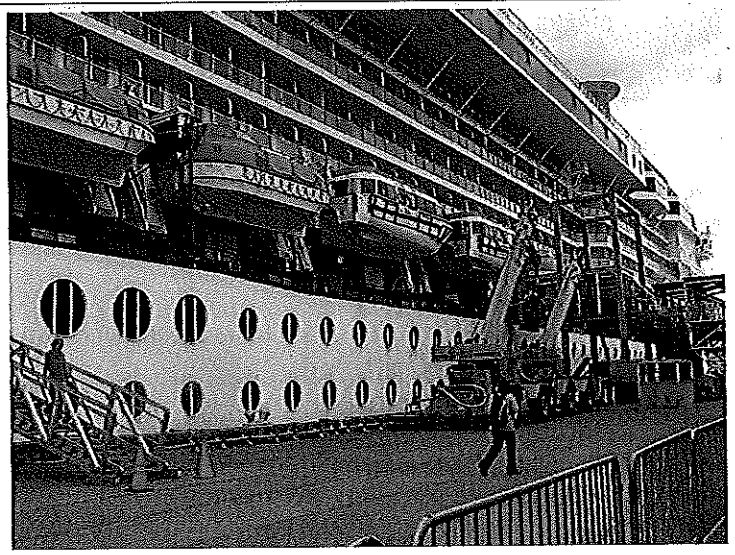


PHOTO #:02 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200035
DESCRIPTION: MILLENNIUM VESSEL

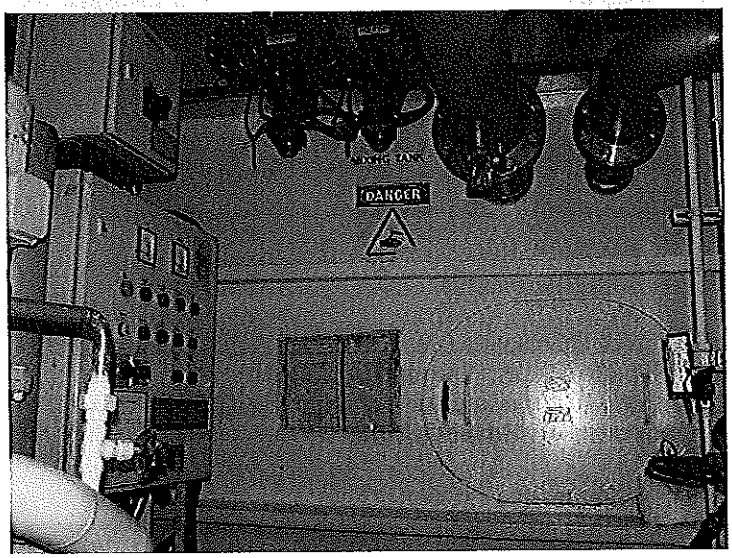


PHOTO #:03 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200002
DESCRIPTION: MIXING TANK

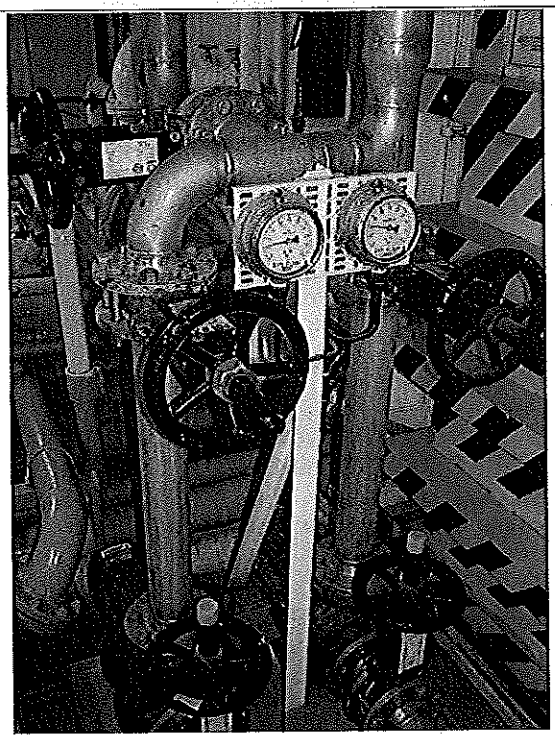


PHOTO #:04 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200003
DESCRIPTION: PUMPS FOR BIOREACTOR

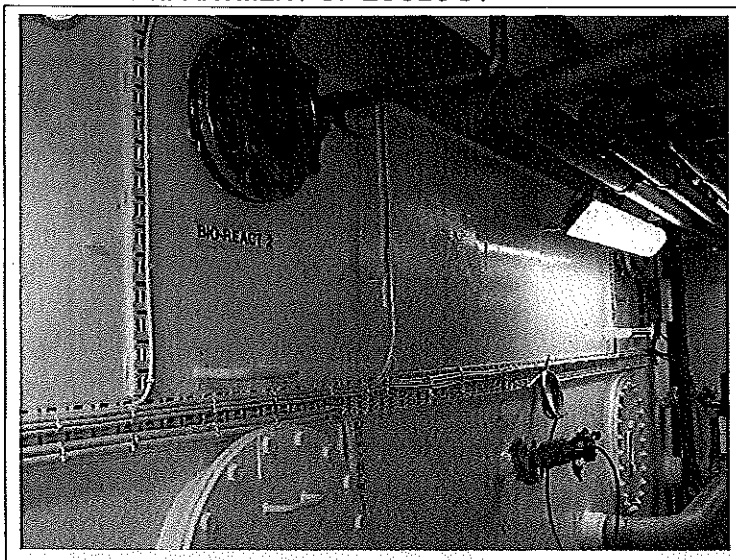


PHOTO #:05 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200004
DESCRIPTION: BIO-REACTORS (#2 AND #3)

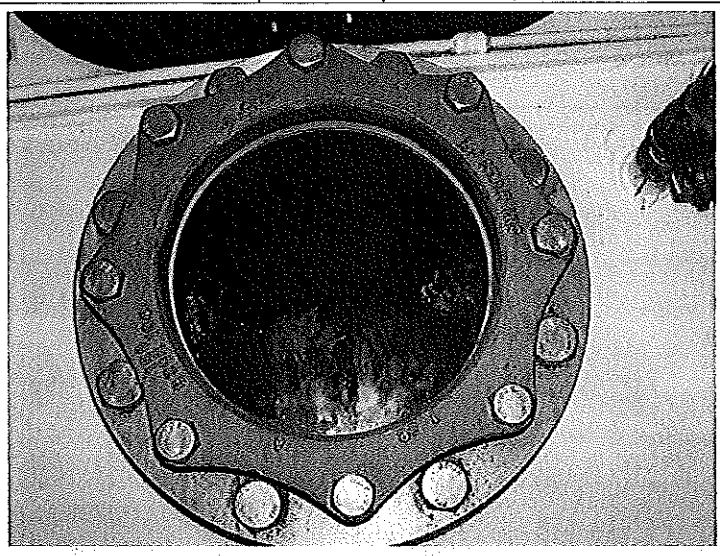


PHOTO #:06 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200005
DESCRIPTION: VIEW INSIDE OF BIO-REACT 1

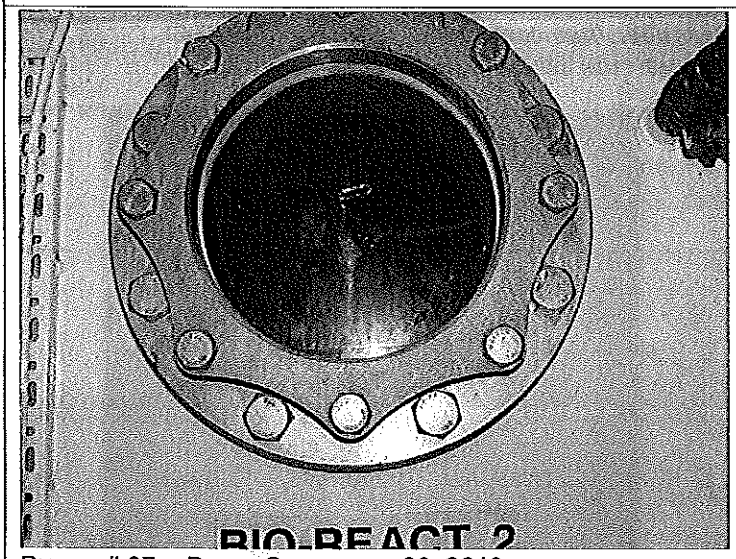


PHOTO #:07 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200006
DESCRIPTION: VIEW INSIDE OF BIO-REACT 2

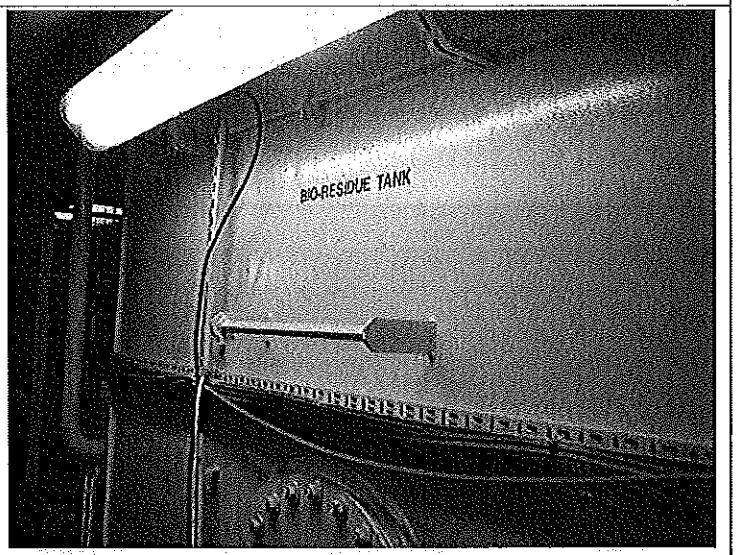


PHOTO #:08 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200007
DESCRIPTION: BIO-RESIDUE TANK

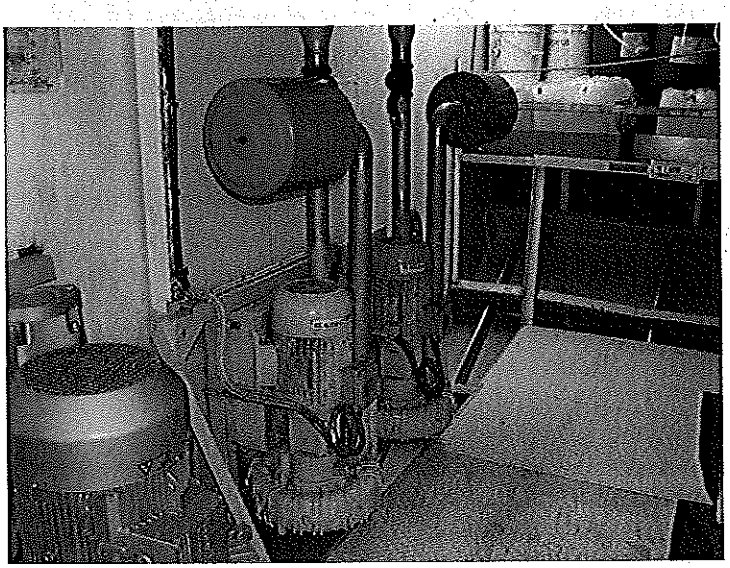


PHOTO #:09 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200009
DESCRIPTION: BLOWERS FOR BIOREACTORS

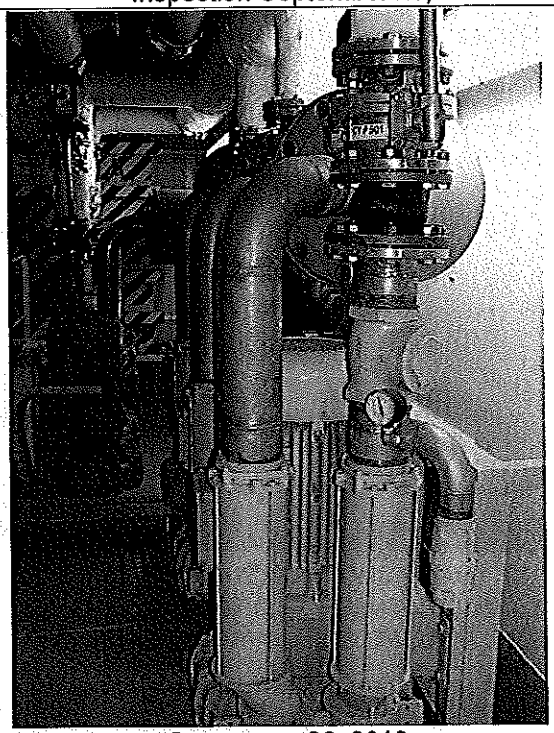


PHOTO #:10 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200010
DESCRIPTION: PUMPS

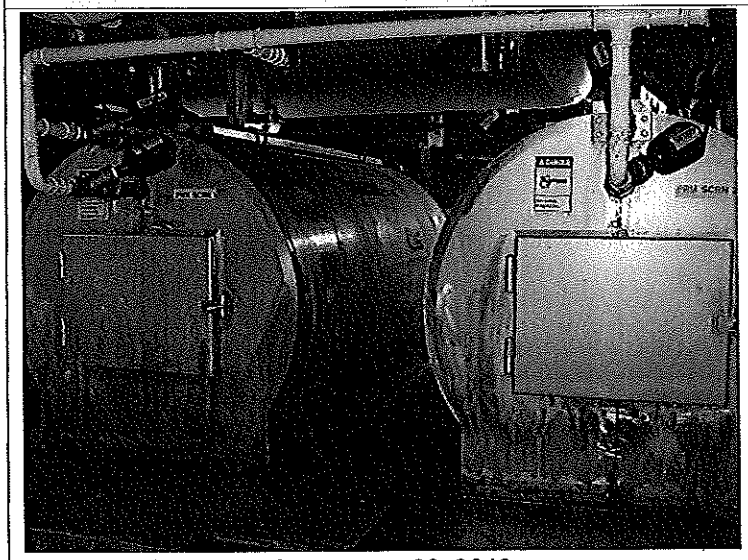


PHOTO #:11 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200011
DESCRIPTION: PRIMARY SCREENS

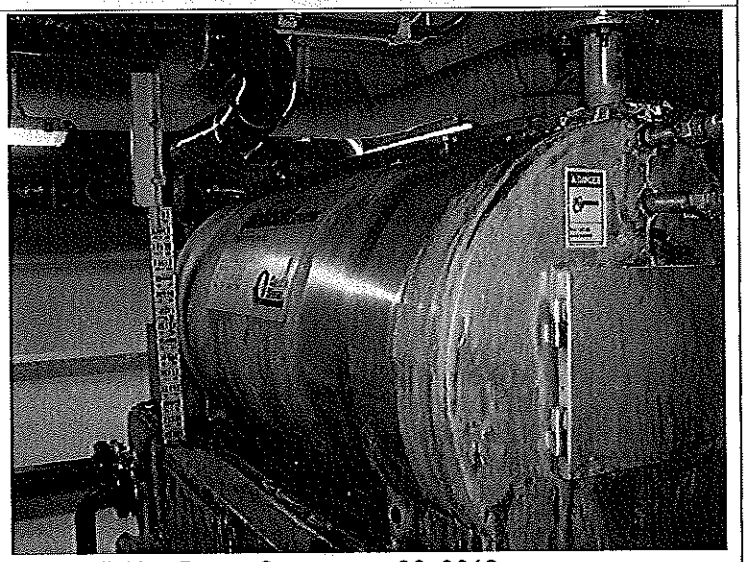


PHOTO #:12 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200012
DESCRIPTION: PRIMARY SCREENS

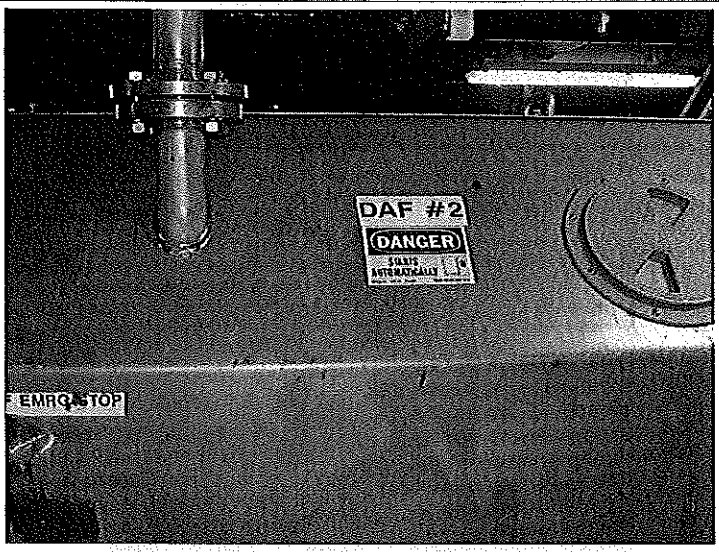


PHOTO #:13 DATE: SEPTEMBER 20, 2010 13
TAKEN BY: AMY JANKOWIAK FILE NO.:P92000
DESCRIPTION: DISSOLVED AIR FLOTATION (DAF)

PHOTO #:14 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200014
DESCRIPTION: INSIDE VIEW OF DAF

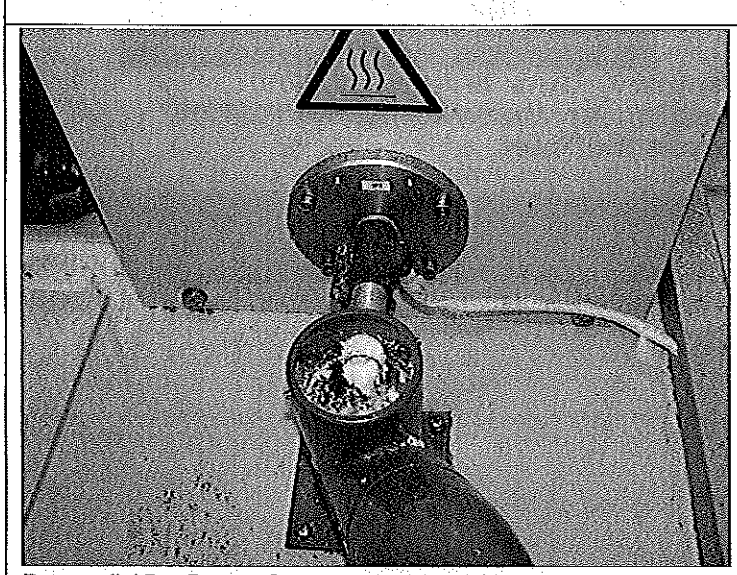


PHOTO #:15 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200015
DESCRIPTION: POLYMER INJECTION

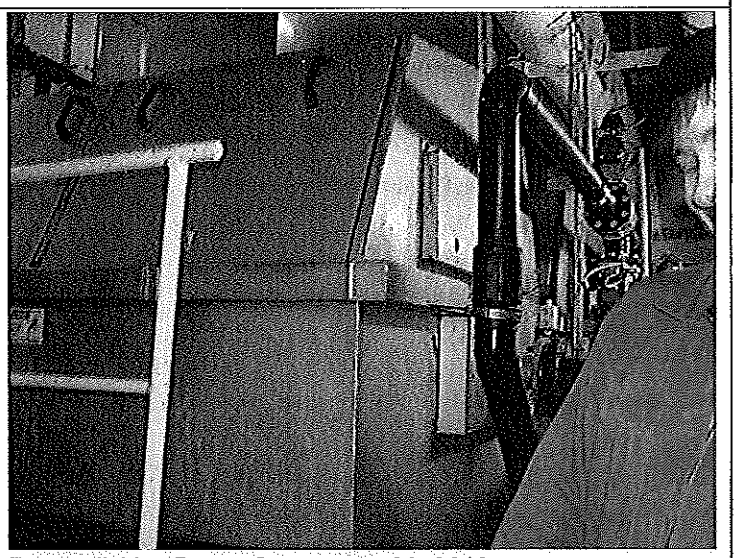


PHOTO #:16 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200016
DESCRIPTION: POLISHING FILTERS

PHOTO #:17 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200017
DESCRIPTION: VIEW INSIDE OF POLISHING FILTER

PHOTO #:18 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200018
DESCRIPTION: TSS/TURBIDITY METERS

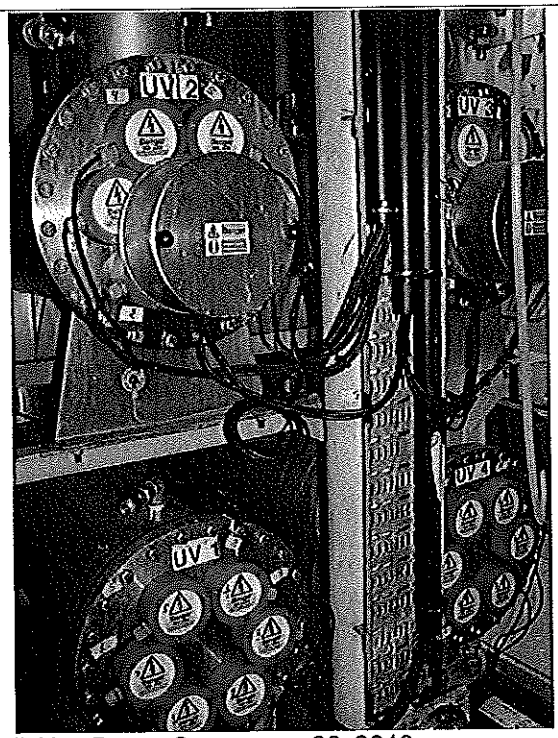


PHOTO #:19 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200020
DESCRIPTION: ULTRAVIOLET DISINFECTION UNITS

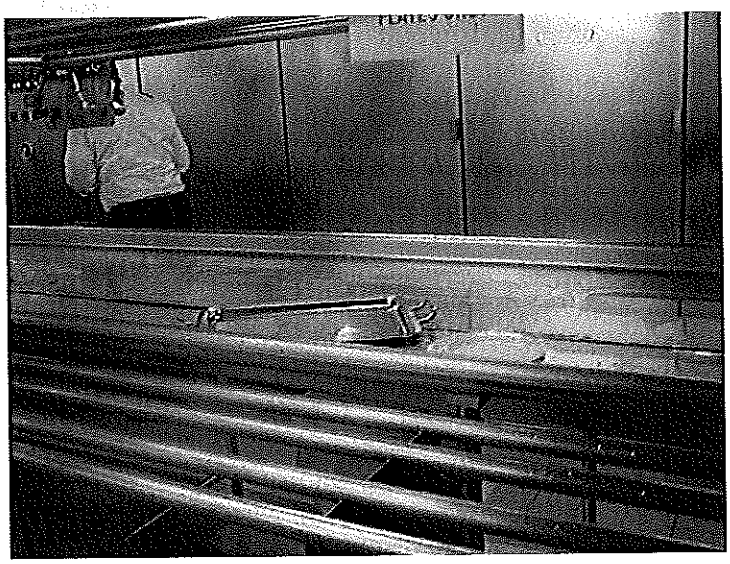


PHOTO #:20 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200022
DESCRIPTION: MAIN GALLEY

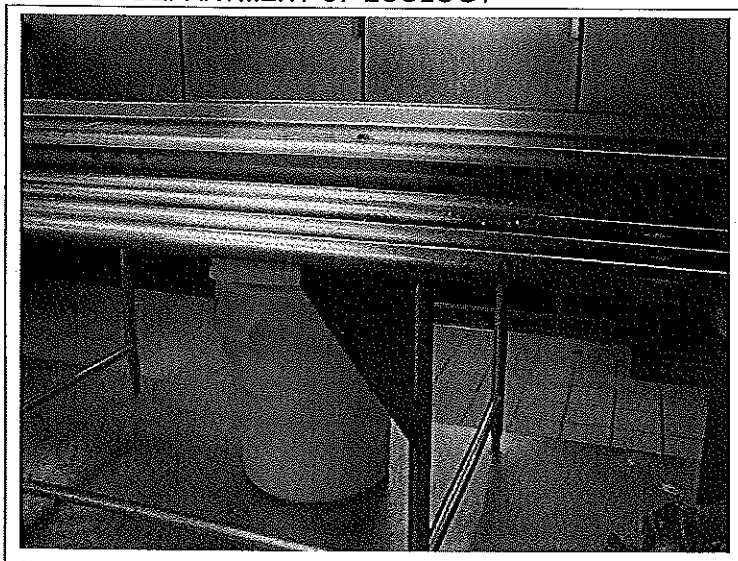


PHOTO #:21 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200023
DESCRIPTION: GALLEY FOOD WASTE SORTING

PHOTO #:22 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200024
DESCRIPTION: GALLEY PULPER

PHOTO #:23 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200025
DESCRIPTION: COMPACTED CARDBOARD FOR OFF-LOADING

PHOTO #:24 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200026
DESCRIPTION: GARBAGE AND RECYCLING SORTING AREA

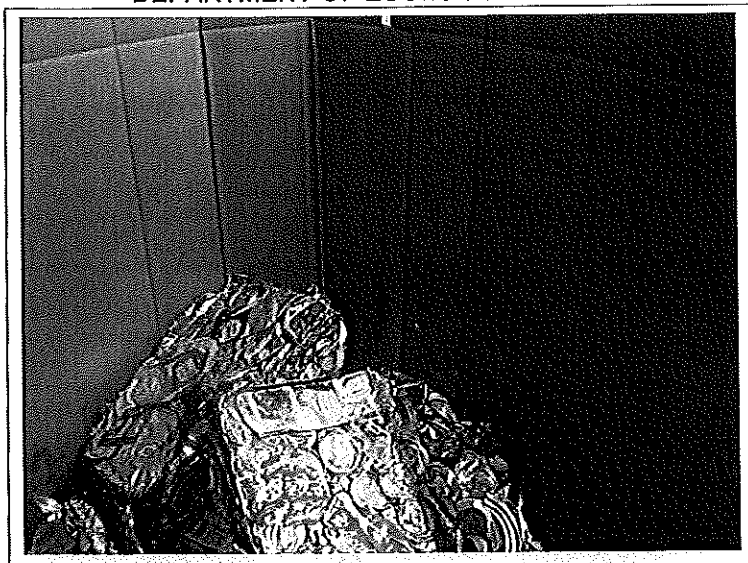


PHOTO #:25 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200028
DESCRIPTION: COMPACTED ALUMINUM

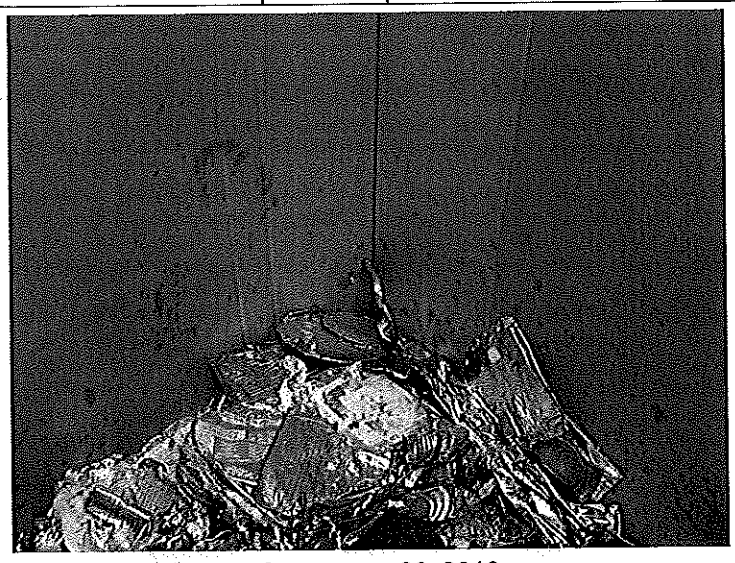


PHOTO #:26 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200029
DESCRIPTION: CLEANED AND COMPACTED TIN

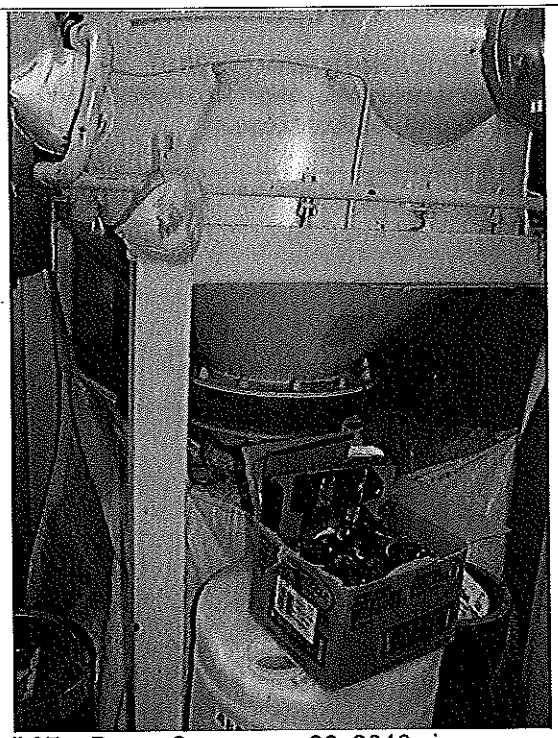


PHOTO #:27 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200030
DESCRIPTION: BATTERY COLLECTION (FRONT); INCINERATOR ASH BAGGING

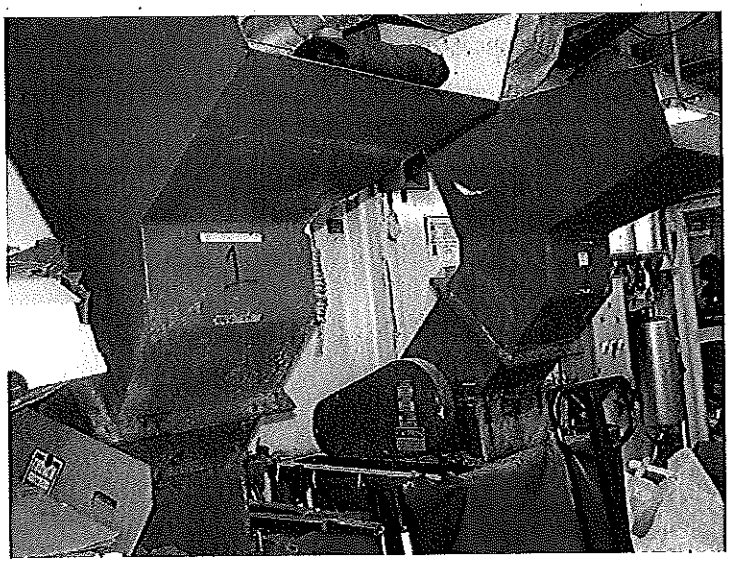


PHOTO #:28 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200031
DESCRIPTION: GLASS CRUSHERS

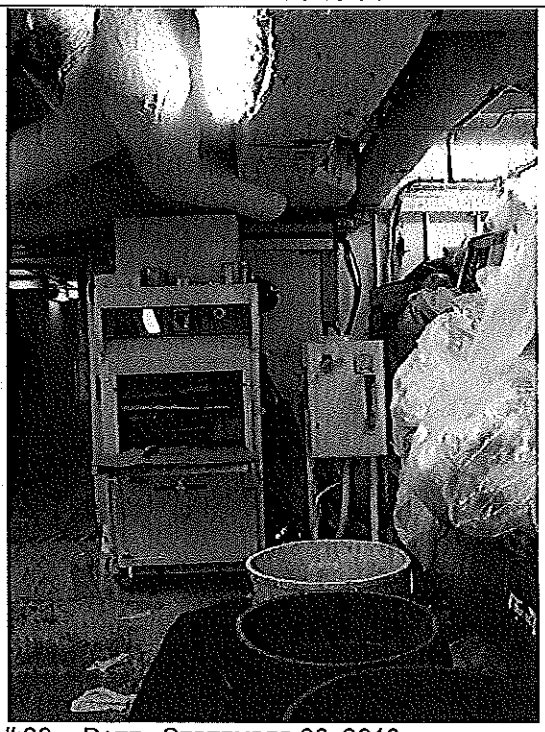


PHOTO #:29 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200032
DESCRIPTION: CARDBOARD COMPACTOR

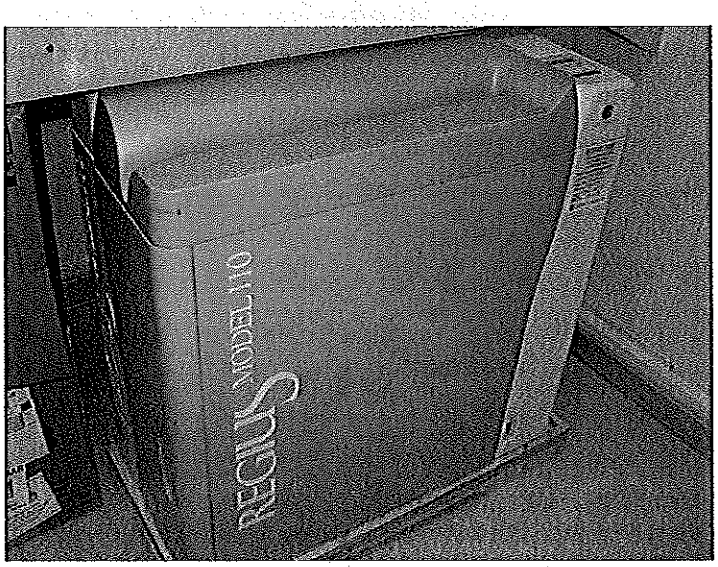


PHOTO #:30 DATE: SEPTEMBER 20, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9200033
DESCRIPTION: DIGITAL X-RAY MACHINE

DEPARTMENT OF ECOLOGY
State of Washington

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

Inspection Date	Permit Number	County	Receiving Waters	Ecology Inspector
September 24, 2010	NA	King	Marine Waters	Amy Jankowiak, Compliance Specialist
Entry Time 9:12 am Exit Time 12:28 pm	Photos Taken ☒ Yes ☐ No	Samples Taken ☐ Yes ☒ No	Inspection Announced ☒ Yes ☐ No	Discharges to: ☒ Surface Water ☐ Ground Water ☐ Dewater ☐ POTW

Name and Location of Site Inspected:
AMSTERDAM, Holland America Line
Passenger Vessel
Pier 91, Seattle

Additional Participants/Inspectors:
Cheryl Thompson, Water Quality Program Ecology

Jeanne Tran, Water Quality Program Ecology

On-Site Representative(s): *Name/Title/Phone/e-mail*
Jonathan Bailey, Safety, Environment and Health Officer
Jon Turvey, Senior Manager, Auditing, Training and ISO 14001 Coordination
206-298-3849

Responsible Official(s): *Name/Title/Address/Phone/e-mail*
William J. Morani Jr., Vice President – Environmental Management Systems
Holland America Line
300 Elliott Ave. West, Seattle WA 98119
206-281-3535

Other Facility Data:
Notification made to Jon Turvey on September 21, 2010

Section A: Areas Evaluated

☒ Black/Gray Wastewater System	☒ Residual Solids	☒ Records/Reports	☒ Hazardous Waste/ Solid Waste	☒ Sampling/Monitoring
☒ Discharge Locations	☒ Operation & Maintenance	☒ Sludge Handling/ Disposal	☒ Oily Bilge Water	☒ Other

Section B: 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	
☐ Auto Shut Down or Operational Controls to Insure System Shut Down if High Turbidity Occurs	

Turbidity or Equivalent:

Last Calibration:

Trigger Level for Early Alarm: Trigger Level for Shutdown:

Recorded Turbidity/Equivalent Levels Above Triggers:

☐ Daily 24-hour Continuous Monitoring for Disinfection Effectiveness	
☐ Disinfection Effectiveness Monitoring Equipment Functioning Properly	

Disinfection Effectiveness Monitoring:

☐ Auto Shut Down or Operational Controls to Insure System Shut Down If Disinfection System Upset Occurs	
☐ Disinfection System Operated and Maintained Properly	

Disinfection System:

Section C: For Vessels Discharging Continuously [2.1.3(B)]	
☐ 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	
☐ Auto Shut Down or Operational Controls to Insure System Shut Down if High Turbidity Occurs	
Turbidity or Equivalent: Last Calibration: Trigger Level for Early Alarm: Trigger Level for Shutdown: Recorded Turbidity/Equivalent Levels Above Triggers:	
☐ Daily 24-hour Continuous Monitoring for Disinfection Effectiveness	
☐ Disinfection Effectiveness Monitoring Equipment Functioning Properly	
Disinfection Effectiveness Monitoring:	
☐ Auto Shut Down or Operational Controls to Insure System Shut Down if Disinfection System Upset Occurs	
☐ Disinfection System Operated and Maintained Properly	
Disinfection System:	
Section D: General (Approved to Discharge)	
☐ No Discharges Within ½ Miles From Shellfish Beds/ Protocol (President's Point, Apple Tree Cove, Tyee Shoal)	
☐ Discharges Immediately Stopped When High Turbidity Occurs	
☐ Discharges Immediately Stopped When Disinfection System Upset Occurs	
☐ Immediate Notifications Made to WA Department of 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 1/40 Calls for Continuous	
Section E: General	
☒ Wastewater Discharge Records Review	Discharge records were reviewed (black water/gray water/residual solids) and are maintained properly. All discharges occurred outside of MOU waters (reviewed from beginning of cruise season, to date). Policy is to only discharge black and gray water at greater than 12nm and outside of MOU waters, and outside the Olympic Coast National Marine Sanctuary.
☒ Residual Solids Managed Properly/Disposal Protocol per MOU	Sewage sludge and screenings are currently collected from the black water treatment system, drummed and landed ashore.
☒ Hazardous Waste Managed Properly	Hazardous waste is off-loaded in Victoria, Canada, and not in Washington State. Hazardous waste records were reviewed and appear to be consistent with MOU requirements.
☒ WA Hazardous Waste Guidelines Followed (Appendix vii)	Hazardous waste is off-loaded in Victoria, Canada, and not in Washington State. Hazardous waste records were reviewed and appear to be consistent with MOU requirements.
☒ Solid Waste Managed Properly	Solid waste appears to be managed properly. The various solids waste streams are collected, sorted, stored, and sent ashore for

	proper disposal. Records reviewed showed only food waste and crushed glass as being discharged and only outside of MOU waters.
☒ Oily Bilge Water Managed Properly	Oily bilge water is treated and discharged at less than 15ppm and outside of MOU waters.

Other:

Section F: Sampling Results

Parameter	Results
Biochemical Oxygen Demand 5-Day (BOD_5)	
Total Suspended Solids (TSS)	
Fecal Coliform	
Residual Chlorine	
pH	
Ammonia, Nitrogen	

Section G: 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 Holland America Line AMSTERDAM on September 24, 2010 along with Cheryl Thompson, Ecology NWRO-WQ and Jeanne Tran, Ecology NWRO-WQ. The main contacts on board the AMSTERDAM included Jonathan Bailey, the Safety, Environment and Health (SHE) Officer. Jon Turvey, Senior Manager, Auditing, Training and ISO 14001 Coordination for Holland America Line also joined us for the inspection. Prior notification of the visit was given on September 21, 2010 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 arrived on April 26, 201 at the Port of Seattle to begin the 2010 cruise season which consists of 14 calls on Mondays to Seattle (one call on Friday at the end of the season). The vessel has a traditional marine sanitation device for black water that includes screening, aeration and chlorination. Gray water is held and discharged without treatment. No discharges of black water or gray water are occurring in MOU waters. Approval for 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.

The AMSTERDAM was delivered in 2000, is 780 feet long, with about a 26-foot draft. Passenger capacity is about 1400 with about 650 crew.

Inspection

We arrived and boarded the ship at 9:12 am and began with introductions and a plan for the day. We then discussed discharge protocols for various waste streams, and reviewed discharge records for hazardous waste, oily bilge water, garbage and black water and gray water. We then went to the Bridge to view discharge valve monitoring. We then toured the main galley and the garbage and recycling area and food waste system. We then went to the Engine Control Room (ECR) to view operations and finalize record reviewing. Then we toured the marine sanitation devices and the oily water separators for bilge water. We viewed the evaporator filters and the displays for Environmental Objectives and finished with a tour of the main operations of the cruise ship, including the spa areas, the hair salon and some of the deck areas. The inspection was then finalized and we disembarked the vessel at about 12:28 pm.

Discharge Types and Protocols:

Only upon verification of location between the Bridge (photo #01) and the Engine Control Room (ECR) (photo #18), will a discharge occur at greater than 12 nautical miles and outside of MOU waters and outside of the Olympic Coast National Marine Sanctuary. The Bridge authorizes the 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 (photo #02) on the bridge and the ECR has lights monitoring discharges. 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 (photo #03), but are locations are always verified prior to discharges. All

discharge records that were reviewed appeared to be in compliance with the MOU. The information related to the opening and closing of discharge ports is also electronically recorded in the PriLog. An "event" is recorded such as an opening and closing of a valve, as well as alarms such as high tank levels in the PriLog.

Blackwater, which includes toilet waste, is treated by a traditional marine sanitation device (photos #20 and #21), and graywater, which includes sink and shower water, laundry water, galley and pulper water, is always discharged at greater than 12 nautical miles and outside of MOU waters. There are three MSDs on board the vessel. Blackwater is collected (photo #29) by vacuum to a tank, then goes through prefiltration. Liquid moves to the next part of the tank for aeration. The liquid is then chlorinated and held until discharge. The chlorine is dosed with a pump and a timer at a rate of 2.3 LTR (photos #22 and #23), twice a day. The solids from the MSD are collected and off-loaded in drums Victoria. This occurs about every couple of months. There are three of the blackwater treatment systems on board the vessel. Graywater is collected and strained. The strained material is also collected and off-loaded in Victoria. The graywater does not receive any further treatment and is held until discharge outside of MOU waters.

The vessel was connected to shore power at the time of the inspection and typically uses 1.5 percent sulfur content fuel or MGO.

Ballast water exchanges do not occur in MOU waters. Exchanges occur at least 200 miles out and 200 meters deep. Ballast tanks are sometimes used as gray water tanks and are cleaned out (decontaminated with chlorine) prior to a change in use out at Sea. The more stringent requirements of ballast or gray water are used when the tanks are changing use. The ballast and the bilge tanks are not mixed.

Outside maintenance work on the vessel, including paint chipping and painting is done using a cherry picker (photos #4, #37 and #38) that folds out and if applicable, a float in the water with a paint mat. There have been some concerns about the best management practices (BMPs) used for outside vessel work throughout the season from various vessels. BMPs will be discusses with the MOU parties during the off-season.

There are three galleys on board the vessel including the main galley, the Lido galley and the crew galley. There are also a few other food preparation areas. Food waste is collected in the various locations and sent (photo #06) to the pulping system (photo #15). The food is separated in the main kitchens into three bins, garbage (gray), recycle (blue) and food (yellow) (photo #07). The Environmental Officer oversees the source separation and training. Some food wastes such as pineapple rinds, banana peels, and coffee, which clogs up the pulpers, is offloaded as food waste in Victoria. The pulped food waste (photo #12) is discharged out at Sea (outside MOU waters, >12 nm and outside the OCNMS). The galley water (photo #08), along with pulper water is sent to the gray water holding tanks to be discharged along with the gray water. Used cooking oil is reused (photo #11) as biofuel by being burned with heavy fuel.

Oily bilge water is treated with a FACET and SERAP two-part oily water separator system. The FACET (photo #25 and #26) system brings the oil content down to less than 50ppm and the SERAP (photo #27 and #28) filter brings the content down to less than 15 ppm. Discharges occur at less than 15 ppm and outside of MOU waters. A white box (photo #24) is used for additional monitoring assurance. Oily sludge is drummed and offloaded for proper disposal.

Some pools use salt water and some fresh. Spas use fresh water. Both are disinfected with bromine. Pool water is discharged outside of 12 nautical miles and outside of MOU waters. Spa water is sent to the gray water holding tanks and is discharged outside of 12 nautical miles and outside of MOU waters.

Potable water is either bunkered or produced by exhaust heat from the boilers and a steam evaporator. The brine is then discharged. The water is only made once underway.

Oily sludge, some paper, food-contaminated cardboard, some oily rages, narcotics, with witness, and some plastics are all incinerated (photo #14). The incinerators are only used when outside of Admiralty Inlet. Opacity is monitored with a new electronic system (photo #19) and is alarmed via the PriLog.

Garbage and recycling materials are sorted in the garbage/recycling area (photo #09). Sorting cans are cleaned (water to graywater tanks) out (photo #13). Plastics, some paper, some cardboard, aluminum, tin, and scrap metals, and some batteries (photo #16) are all recycled. Chemical containers are rinsed out (to gray water) and re-used. Oil drums are cleaned out with cloths and recycled with metals. Glass bottle necks are removed (photo #10) and glass is crushed and discharged out at sea. Fluorescent lamps are crushed on board with a mercury vapor removal system. Some materials are also donated when feasible. The recycling percentages are tracked along with various other environmental goals and are posted for crew to view (photos #30 and #31). Garbage records looked to be in good order. Food waste and crushed glass are the only solid materials being discharged out at sea. Holland America Line has been working on finding other uses for materials such as using crushed glass for road construction in Alaska and looking at options for reusing wood pallets. Materials off-loaded for recycling are off-loaded in Victoria, Canada. General garbage is also landed ashore in

Victoria. Some medications are returned to the vendor for credit.

Dry cleaning no longer uses PERC, instead, a wet cleaning, dry cleaning system is used. Photo waste goes through a silver recovery system and is then off-loaded at less than 5ppm. X-ray's are done digitally, and do not have a waste product. Other hazardous waste materials including paints and thinners, some oily rags, medical sharps, and some batteries, and aerosol condensate (photo #17), are off-loaded in Victoria, Canada. Hazardous waste records were reviewed and appear to be consistent with MOU requirements.

A copy of the current MOU and notification procedures were on board and available.

Conclusions and Recommendations

The protocols and procedures for discharge are clear and inclusive of verification.

The staff was very knowledgeable of the systems and procedures related to compliance with the MOU.

It is recommended that best management practices for outside vessel maintenance be discussed with the MOU parties for all MOU covered vessels.

Attachments:
Photographs

Copies to:
William Morani, Jr., HAL
Robert Diaz, HAL
John Turvey, HAL
Jonathan Bailey, HAL
John Hansen, NorthWest CruiseShip Association
Mark Toy, Dept. of Health
Karen Burgess, Ecology
Kevin Fitzpatrick, Ecology
Amy Jankowiak, Ecology
Central Files: Holland America Line - AMSTERDAM; WQ 6.1.

Section H: 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	10/26/10
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	10/26/10

PHOTO #:01 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240001
DESCRIPTION: BRIDGE – DISCHARGE VALVE DISPLAY

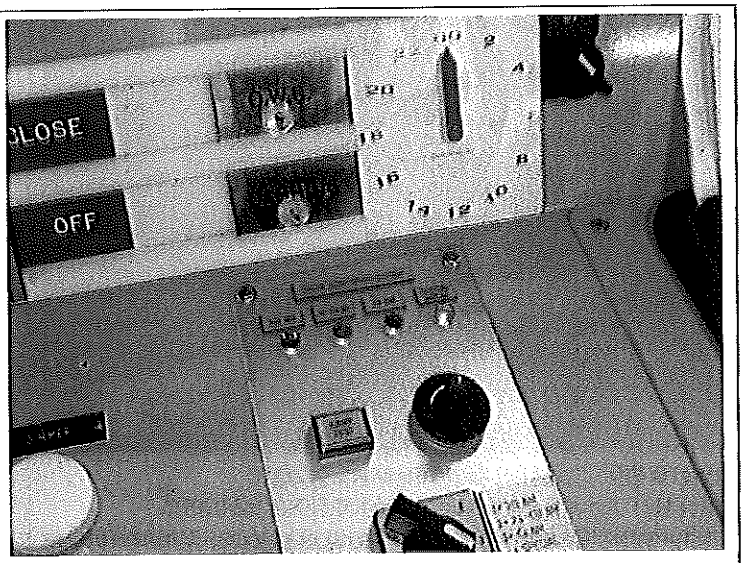


PHOTO #:02 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240002
DESCRIPTION: BRIDGE – VALVE MONITORING SYSTEM

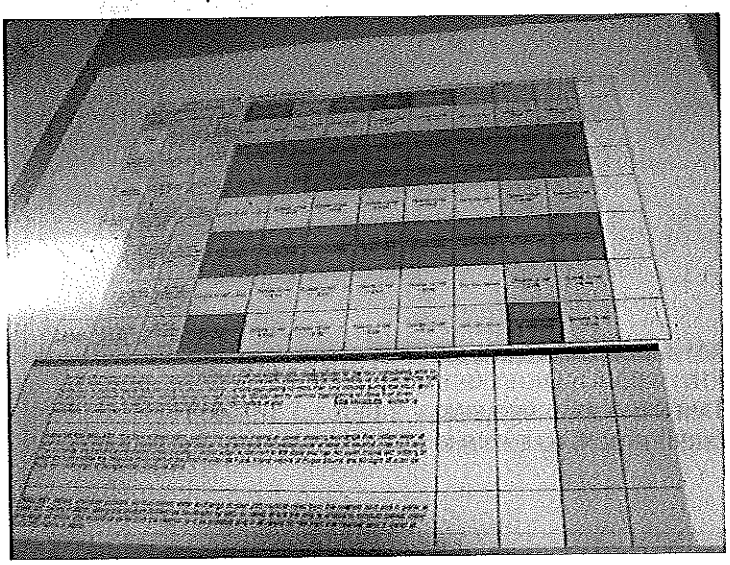


PHOTO #:03 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240003
DESCRIPTION: BRIDGE – DISCHARGE SCHEDULE

PHOTO #:04 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240004
DESCRIPTION: BRIDGE – VIEW BELOW

PHOTO #:05 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240005
DESCRIPTION: CHERRY PICKER USED FOR VESSEL MAINTENANCE

PHOTO #:06 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240009
DESCRIPTION: GALLEY – FOOD GOING TO PULPER

PHOTO #:07 DATE: SEPTEMBER 24, 2010
Taken By: AMY JANKOWIAK FILE NO.:P9240010
DESCRIPTION: GALLEY - FOOD WASTE SORTING

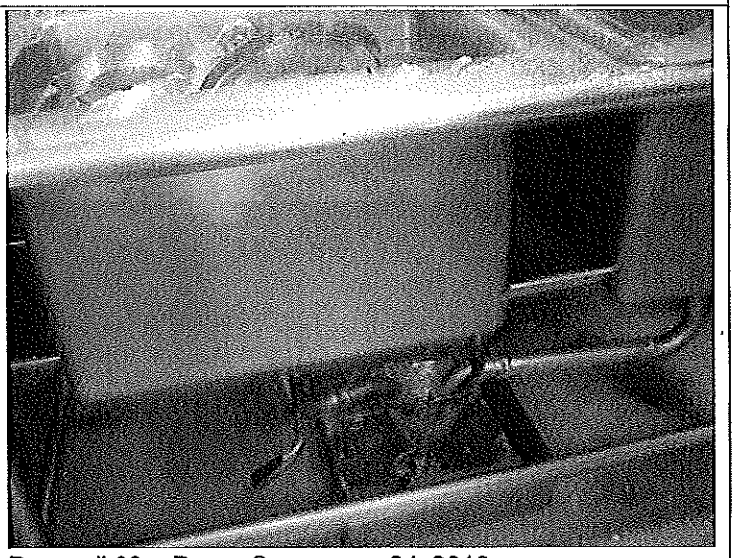


PHOTO #:08 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240011
DESCRIPTION: GALLEY SINKS TO GRAY WATER

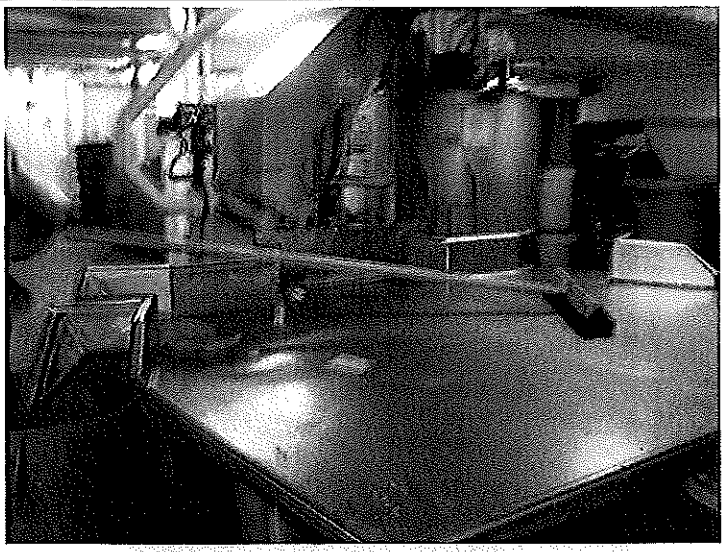


PHOTO #:09 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240012
DESCRIPTION: GARBAGE/RECYCLING SORTING AREA

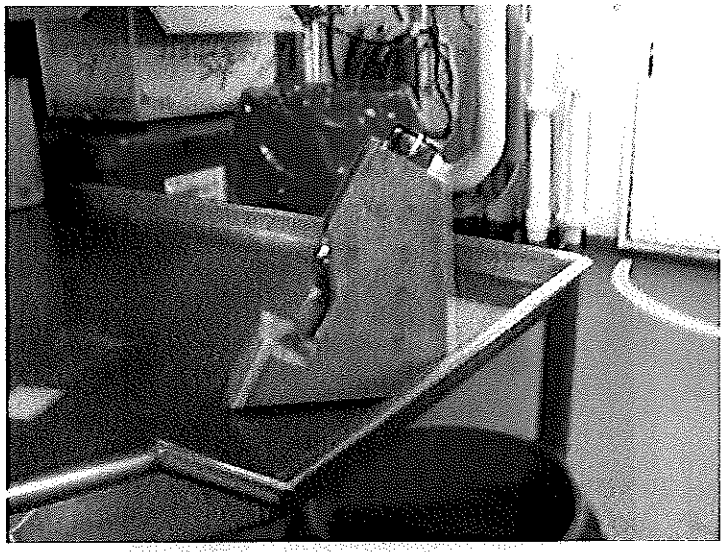


PHOTO #:10 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240013
DESCRIPTION: GLASS BOTTLE NECK REMOVAL DEVICE (MADE ON VESSEL)

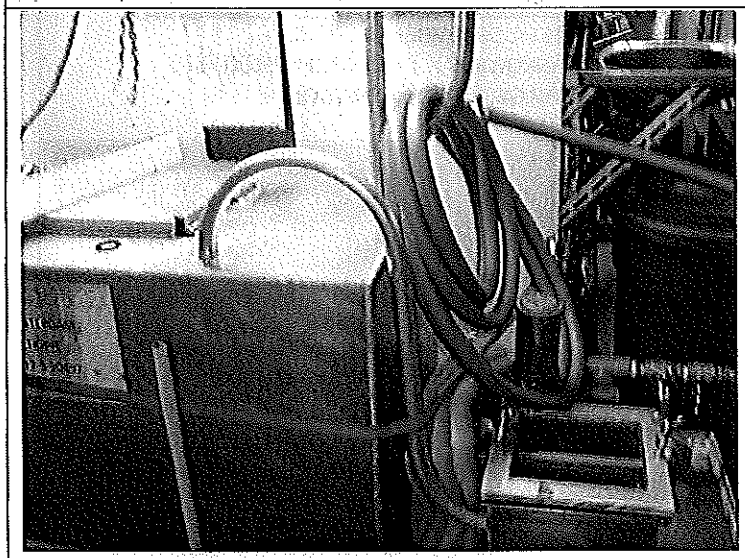


PHOTO #:11 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240015
DESCRIPTION: USED COOKING OIL FILTRATION SYSTEM

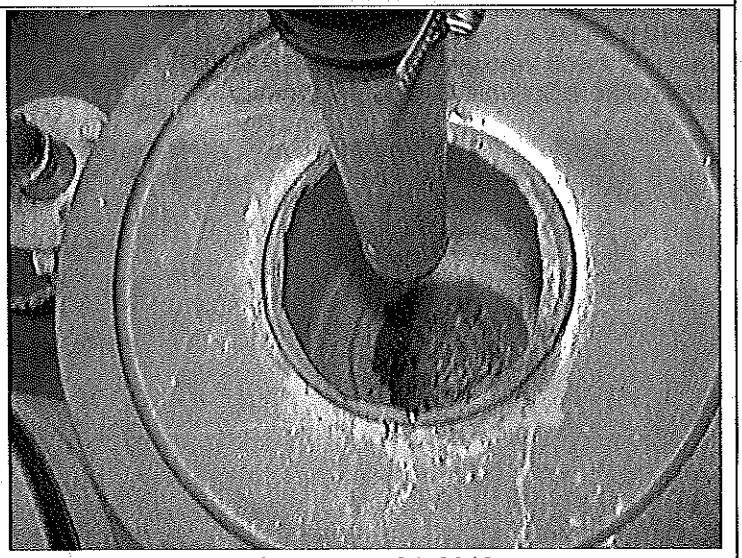


PHOTO #:12 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240016
DESCRIPTION: FOOD WASTE FROM PULPERS

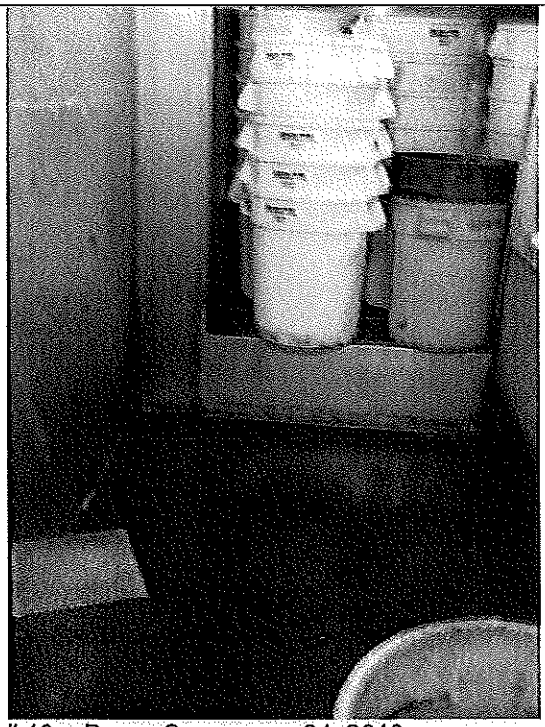


PHOTO #:13 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240017
DESCRIPTION: SORTING CAN CLEANING AREA

PHOTO #:14 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240018
DESCRIPTION: GARBAGE FOR INCINERATION

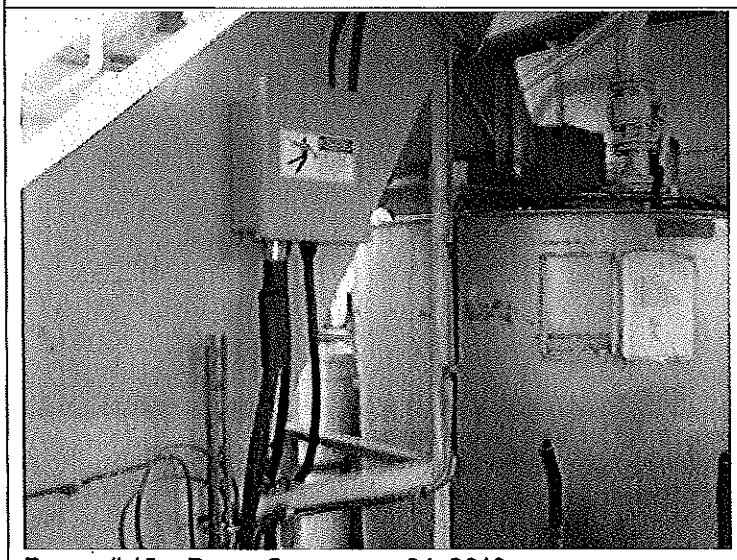


PHOTO #:15 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240019
DESCRIPTION: SOMAT PRESS FOR FOOD WASTE

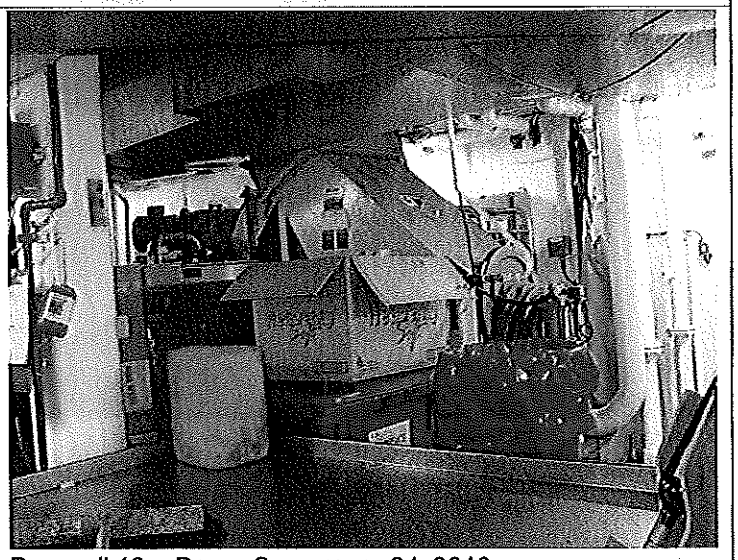


PHOTO #:16 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240020
DESCRIPTION: SECOND SOMAT PRESS (BACK), BATTERIES FOR RECYCLING(GREEN CAN)

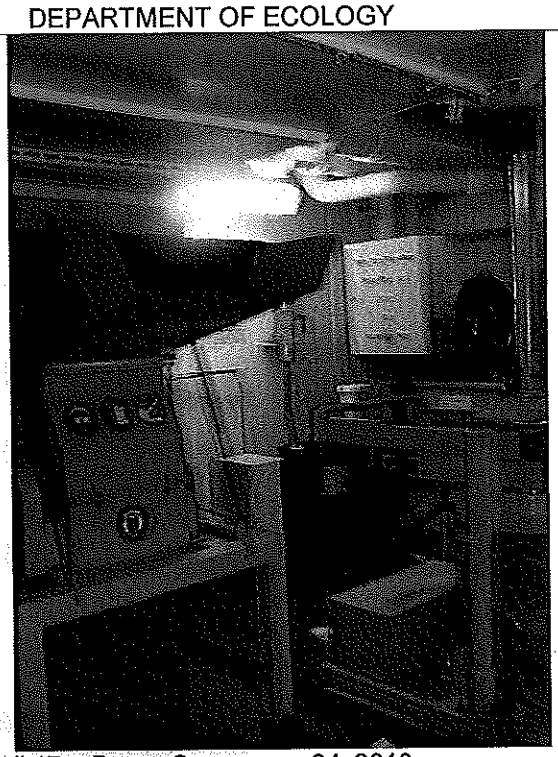


PHOTO #:17 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240021
DESCRIPTION: AERSOL CAN PUNCTURING DEVICE

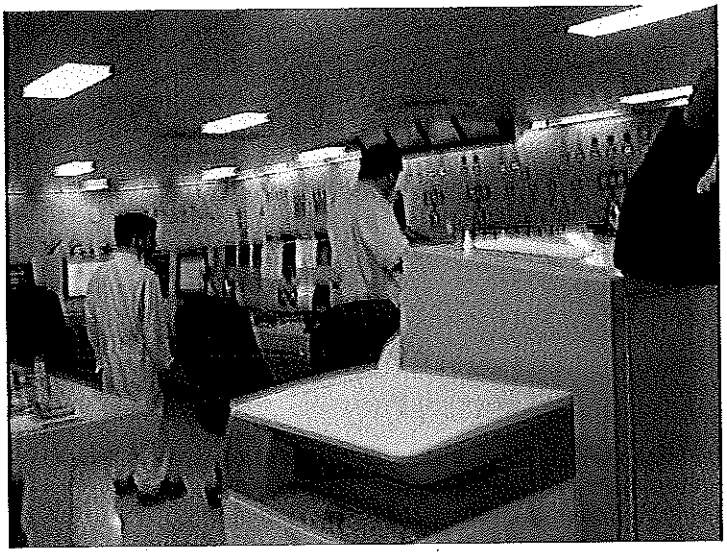


PHOTO #:18 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240023
DESCRIPTION: ENGINE CONTROL ROOM

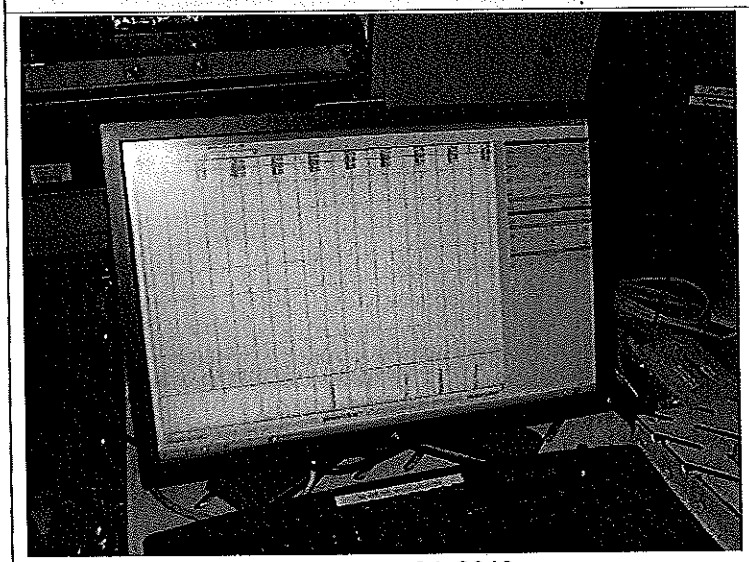


PHOTO #:19 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240024
DESCRIPTION: STACK OPACITY MONITORING

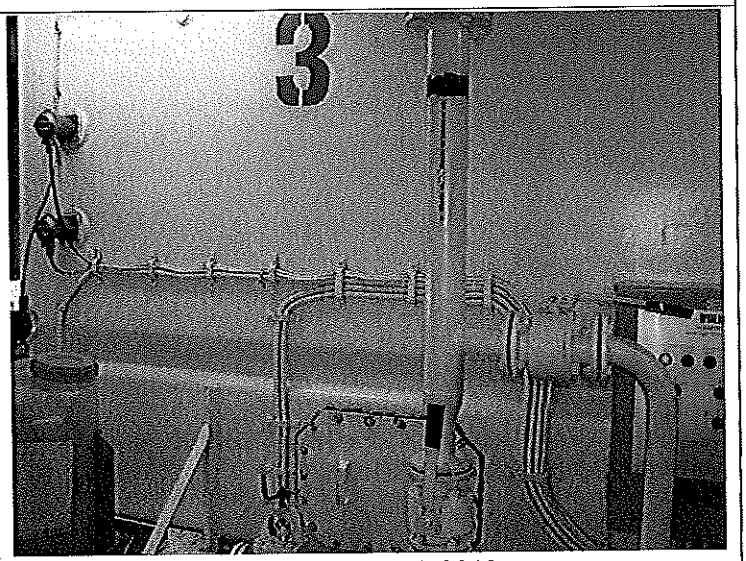


PHOTO #:20 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240025
DESCRIPTION: NUMBER 3 (OF 3) MARINE SANITATION DEVICE (MSD)

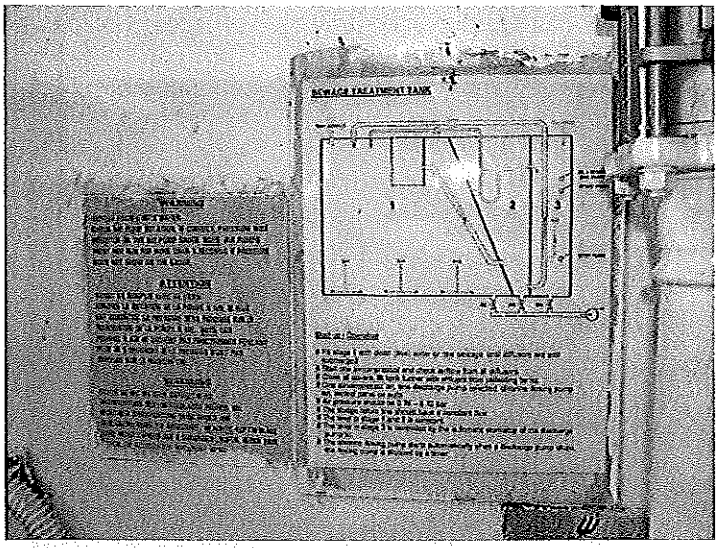


PHOTO #:21 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240026
DESCRIPTION: MSD DRAWING

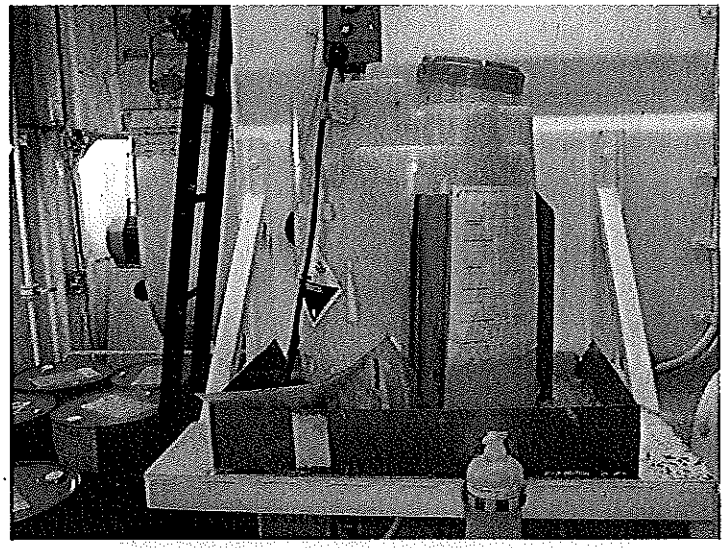


PHOTO #:22 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240027
DESCRIPTION: MSD CHLORINE ADDITION

PHOTO #:23 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240029
DESCRIPTION: MSD CHLORINE DOSING

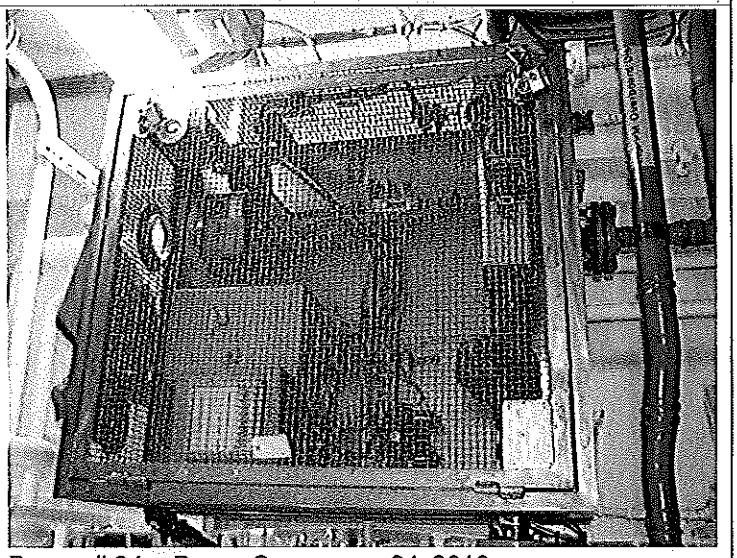


PHOTO #:24 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240030
DESCRIPTION: OILY WATER SEPARATOR (OWS) WHITE BOX

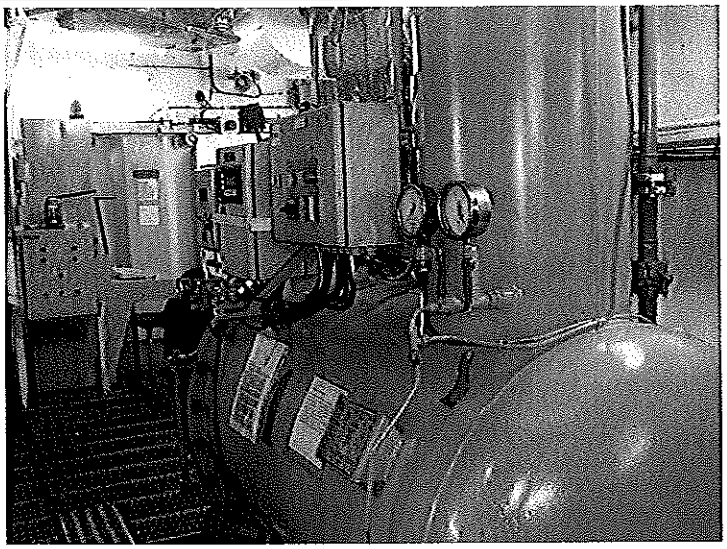


PHOTO #:25 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240031
DESCRIPTION: OWS FACET 50 PPM SYSTEM

PHOTO #:26 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240032
DESCRIPTION: OWS FACET CONTROLS

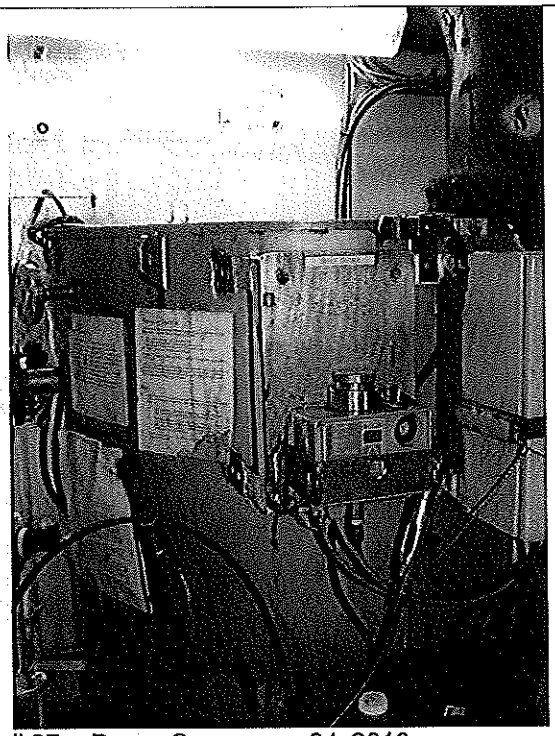


PHOTO #:27 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240034
DESCRIPTION: OWS SERAP 15 PPM SYSTEM

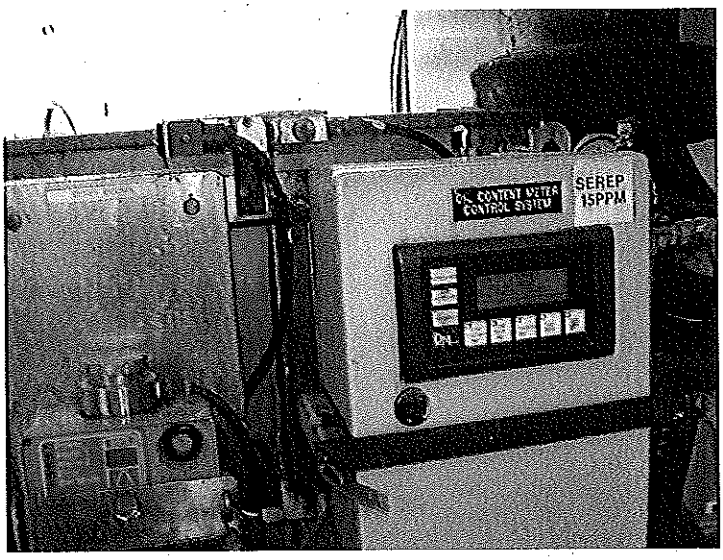


PHOTO #:28 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240035
DESCRIPTION: OWS SERAP CONTROLS

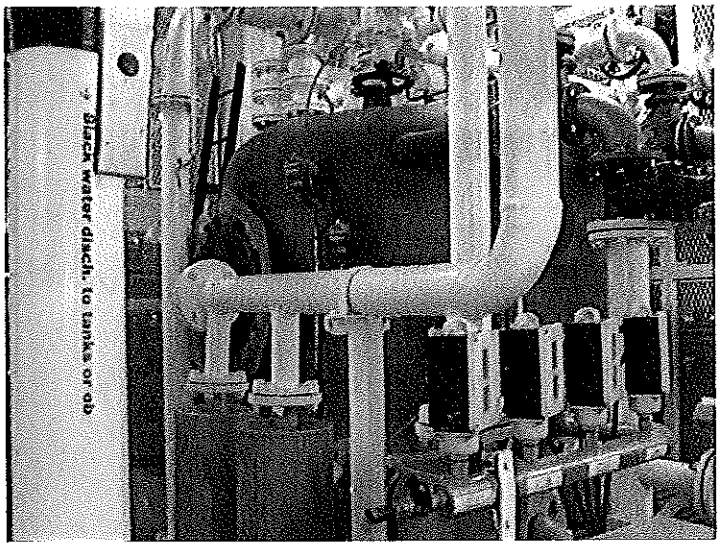


PHOTO #:29 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240038
DESCRIPTION: BLACK WATER COLLECTION TANK

PHOTO #:30 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240040
DESCRIPTION: ENVIRONMENTAL OBJECTIVES AND TARGETS DISPLAY

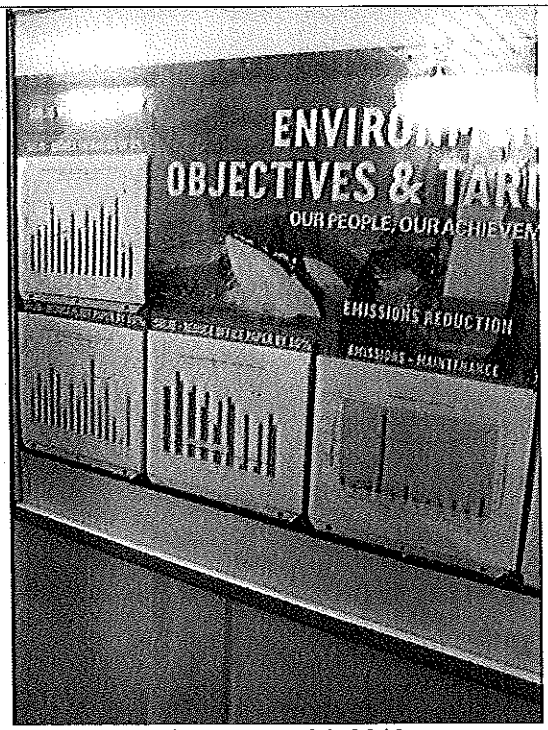


PHOTO #:31 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240041
DESCRIPTION: ENVIRONMENTAL OBJECTIVES AND TARGETS DISPLAY

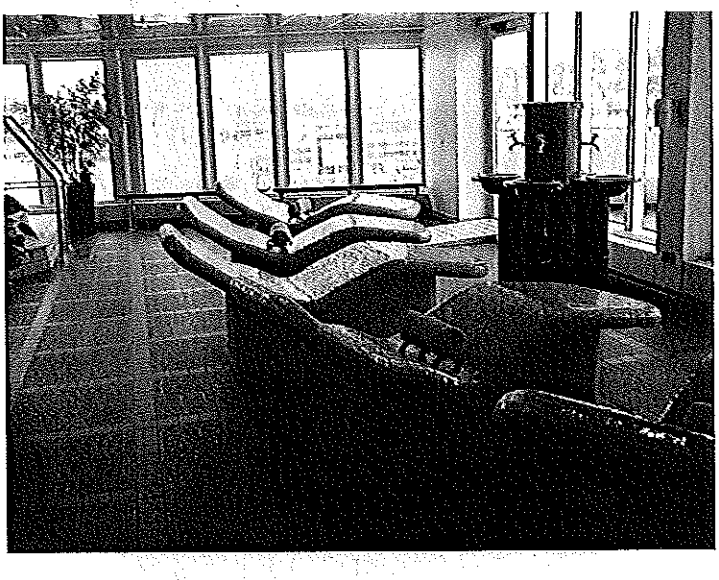


PHOTO #:32 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240042
DESCRIPTION: SPA AREA

PHOTO #:33 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240043
DESCRIPTION: HAIR SALON CHEMICALS

PHOTO #:34 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240044
DESCRIPTION: RECYCLE BINS FOR PASSENGERS

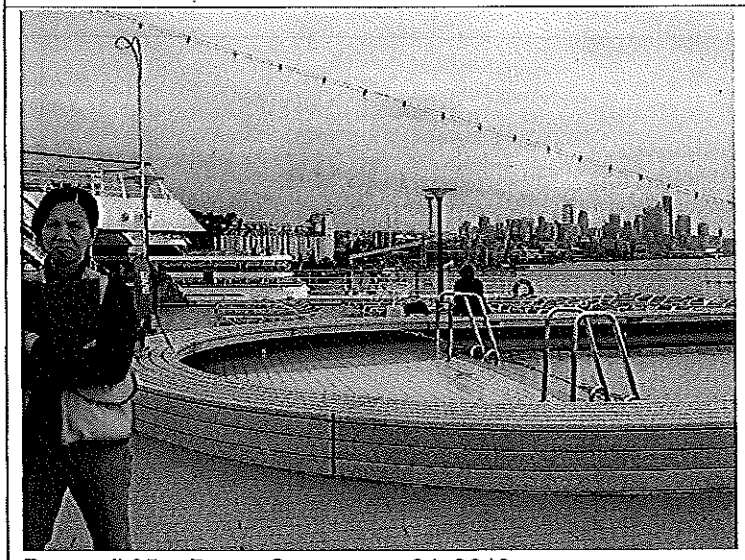


PHOTO #:35 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240045
DESCRIPTION: VIEW FROM LIDO DECK

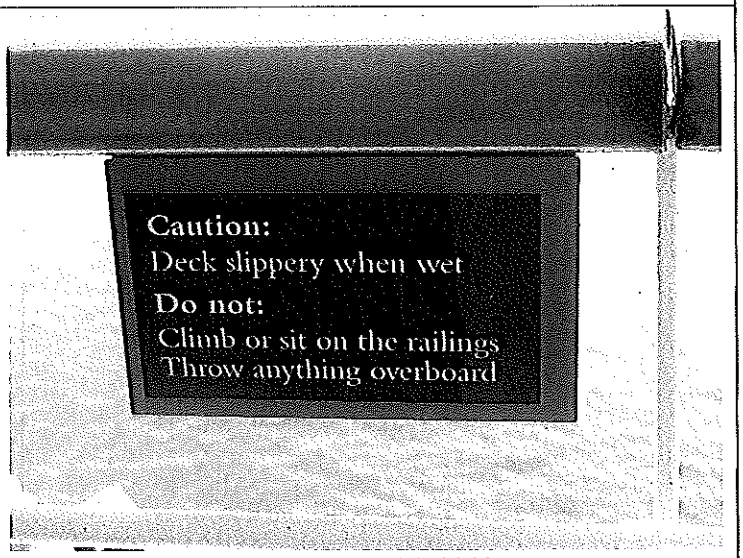


PHOTO #:36 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240047
DESCRIPTION: DO NOT THROW ANYTHING OVERBOARD SIGNAGE

PHOTO #:37 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240049
DESCRIPTION: CHERRY PICKER PREP FOR PAINT TOUCH UP ON OUTSIDE OF VESSEL

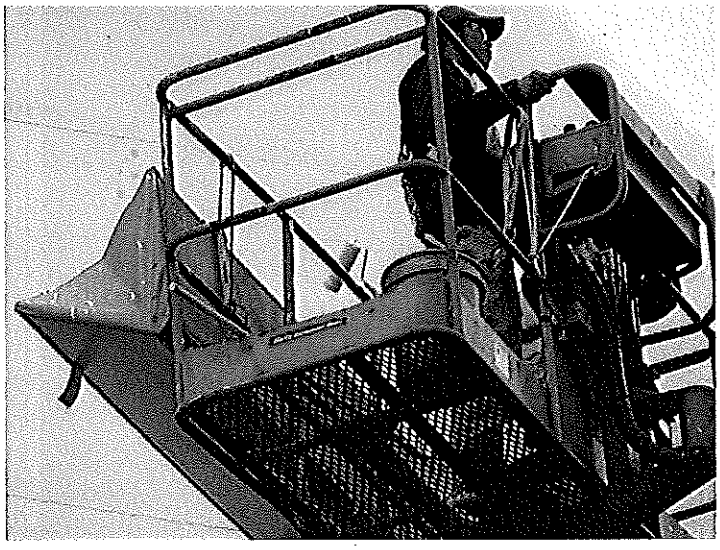


PHOTO #:38 DATE: SEPTEMBER 24, 2010
TAKEN BY: AMY JANKOWIAK FILE NO.:P9240050
DESCRIPTION: CHERRY PICKER PREP FOR PAINT TOUCH UP ON OUTSIDE OF VESSEL