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

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Bellevue, WA 98008

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Inspection Date	Permit Number	County	Receiving Waters	Ecology Inspector
September 15, 2014	NA	King	Marine Waters	Amy Jankowiak

Entry Time 8:58 am Exit Time 10:35 am	Photos Taken	Samples Taken	Inspection Announced	Discharges to:
	☒ Yes ☐ No	☐ Yes ☒ No	☒ Yes ☐ No	☒ Surface Water ☐ Ground Water ☐ Dewater ☐ POTW

Name and Location of Site Inspected:
CROWN PRINCESS, Princess Cruises
Pier 66
Seattle, Washington

Additional Participants/Inspectors:

On-Site Representative(s): ***Name/Title/Phone/e-mail***
Aleksandar (Alex) L. Nikolov, Environmental Officer
KPDEVOF1@princesscriusess.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 September 10, 2014

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:

NOT APPLICABLE

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, Middle Point (near Pt Townsend))	
☐ 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 appear to be in the OCNMS, MOU waters or Washington state waters (MOU related waters).
☒ Wastewater Discharges protocol per MOU and managed properly	The discharge protocols appear to be consistent with MOU requirements to not occur in MOU related waters.
☒ Residual Solids Managed Properly/Disposal Protocol per MOU	Residual solids appear to be handled per MOU requirements.
☒ Hazardous Waste Managed Properly	Hazardous waste appears to be handled per MOU requirements.
☒ WA Hazardous Waste Guidelines Followed (Appendix vii)	Hazardous waste guidelines appear to be handled per the MOU and guidelines.
☒ Solid Waste Managed Properly (zero garbage discharge)	Solid waste appears to be managed per MOU requirements.
☒ Photo/X-Ray Waste Managed Properly (fluids,	Photo and x-ray waste appears to be handled per MOU requirements.

	cartridges,...) and landed ashore	
☒	Dry-Cleaning Wastes and Byproducts (fluids, sludge, filter materials...) Managed Properly (PERC – haz waste – landed ashore)	Dry cleaning waste products are managed per MOU requirements.
☒	Unused/Outdated Pharmaceuticals Managed Properly (safely disposed of)	Unused or outdated pharmaceuticals appear to be managed per MOU requirements.
☒	Fluorescent and Mercury Vapor Lamp Bulbs Managed Properly (prevent release of mercury)	Fluorescent and mercury vapor lamp bulbs appear to be managed per MOU requirements.
☒	Waste Reduction/Reuse/Recycling Opportunities Maximized (glass, cardboard, aluminum & steel cans)	Waste reduction/reuse/recycling opportunities appear to be maximized per MOU requirements.
☒	Batteries Managed Properly (recycled, reclaimed, disposed of properly)	Batteries appear to be managed per MOU requirements.
☒	Incinerator Ash Managed Properly and minimized volume (haz waste segregation and annual testing)	Incinerator ash appears to be managed per MOU requirements.
☒	Oily Bilge Water Managed Properly (<15 ppm, no visible sheen and underway)	Oily bilge water appears to be managed per MOU requirements.
☒	Ballast Water Managed Properly (per Wash regs –reporting, treated or if open sea exchange >200 nm from outside EEZ, 50nm if not EEZ)	Ballast water appears to be managed properly per MOU requirements.
☒	OCNMS rules and regs followed	The discharge protocol appears to be consistent with MOU requirements to not occur in the OCNMS.
	Additional General Questions	
☒	How is deck runoff and hull cleaning handled (scuppers...) (non-toxic/phosphate free cleaners, biodegradable)	Deck runoff and hull cleaning appears to be handled per MOU requirements.
☒	How is maintenance performed on the outside of the vessel (paint chipping, painting, etc)	Outside vessel maintenance appears to be handled per MOU requirements.
☒	Sculleries and Galleys – type of detergents and degreasers used (phosphate free and non-toxic)?	Galleys appear to use phosphate free and non-toxic detergents and degreasers.
☒	How are food waste discharges handled (prevention of erroneous materials)?	Food waste appears to be handled per MOU requirements.
☒	Medical sinks/floor drains, chem. stor areas wastes go where (plugged, blackwater, bilge)?	Medical sinks/floor drains appear to be handled per MOU requirements.
☒	Where is pool and spa water discharged? Dechlorinated/debrominated and underway?	Pool and spa water appears to be handled per MOU requirements.
☒	What type of fuel is used and percent sulfur content?	Fuel sulfur content meets requirements.

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	

NOT APPLICABLE

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 CROWN PRINCESS on September 15, 2014. The main contact on board the CROWN PRINCESS was Aleksandar (Alex) L. Nikolov, Environmental Officer (EO) for the CROWN PRINCESS. Prior notification of the visit was given on September 10, 2014 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 CROWN PRINCESS is not approved to discharge wastewater in MOU waters.

The CROWN PRINCESS's inaugural cruise was in 2006, was refurbished in 2011, and is 952 feet long with 19 decks. Passenger capacity is currently about 2,500 (3,082 max passenger capacity) with about 1,200 crew.

The CROWN PRINCESS is scheduled for this one port call in Seattle as it repositions to Los Angeles. The vessel was conducting regular cruises out of Vancouver B.C. to Alaska.

Inspection

I arrived and boarded the ship (photo #01) at 8:58 am and first met with Alex Nikolov, EO. The inspection was announced via the typical protocol of sending an e-mail to Andrew Lorenzana, Environmental Operations Manager for Princess Cruises, five days prior to the inspection, although when arriving on the vessel, security nor the EO were expecting me. The EO met with me immediately and did not have any concerns about conducting an inspection even though it was unexpected. We briefly discussed the purpose and plan for the inspection. We first toured the waste management area of garbage and recycling, incineration, food waste and hazardous storage while discussing how the wastes are managed. We reviewed hazardous waste records and then went to the Engine Control Room (ECR) and reviewed garbage records and sewage and graywater logs. We toured the oily bilge water oily water separators, the Hamworthy advanced wastewater treatment system (AWTS) Membrane Bioreactors (MBRs) and the ballast water treatment system. Next we viewed the medical facility's bio-hazardous waste management and completed the inspection with a debriefing and I disembarked the vessel at 10:35 am.

Discharge Types and Protocols:

All discharges to water occur outside of 12 nautical miles, outside of MOU waters, Washington State waters and the Olympic Coast National Marine Sanctuary (OCNMS) (MOU related waters). No discharges occur in the Canadian port of the Strait of Juan de Fuca either. If a discharge is to occur, the bridge notifies the ECR when they are in and out of areas where discharges would be allowed via e-mail to the ECR and to the EO. Discharge ports and the food chute are padlocked and the keys are in the ECR (photo #11) and with the EO. Discharges from ports are also recorded electronically. For black water and gray water, the latitude and longitude coordinates are recorded in the electronic *Sewage and Graywater Discharge Record Book.* The date, time and location of both the start and the stop of the discharges are recorded, along with port location, effluent type, and volumes. The wastewater discharge records for this one port call were reviewed and appeared to be in compliance with the MOU and did not occur in MOU related waters.

The biomass or solids from the black water MBRs is collected first from the screen presses, bagged and incinerated. The biomass or solids from the MBRs are wasted to a holding tank and discharged outside of MOU related waters.

Oily bilge water is treated with a two step oily water separator (OWS) process. Oily bilge water is sent to the first system (photo #15) to treat to less than 50 ppm oily water content and then to a second system (photo #16) to less than 15 ppm. All OWS effluent is sent through a white box (photo #13) to confirm less than 15 ppm prior to discharge. The vessel has a new OWS (photo #17) on the vessel that is soon to be installed and is capable of treating to less than 5 ppm. Discharges (photo #12) of treated oily bilge take place outside of MOU related waters.

The CROWN PRINCESS has 4 pools, 2 splash pools, and 7 Jacuzzi spas. The pools use chlorine and the spas use bromine. Water from all pools and spas are dechlorinated prior to overboard discharge.

The CROWN PRINCESS has a treatment system on board for ballast water that includes filtration (photo #27) and ultraviolet light (UV) disinfection (photo #28), without any chemical treatment. The next ballast discharge is to occur in San Francisco.

Food waste is sorted at the source in galleys and is then sent to the food pulper (photo #08). Food wastes that can't go through the pulper such as pineapple rinds are separated and stored cold until discharge with food waste through the chute (photo #07) outside of MOU related waters. Used cooking oil is sent ashore for recycling as bio-diesel. Galleys use Ecolab phosphate free and non-toxic detergents and degreasers. Grease is not collected via grease traps and a degreaser is used in the MBRs to break down the oils. Galley graywater is held untreated and discharged outside of MOU related waters.

Decks and windows/hull are kept clean and washed with fresh water/no chemicals. Underwater hull work is done in

dryddock. Paint chipping and painting is done in port occasionally. If painting and chipping occurs, permission is first requested and containment including tarps and catchments are used on the cherry picker. The EO provided photos of previous painting. No outside vessel work was being done during the inspection.

Laundry water is sent to the graywater collection tanks for MBR treatment. Dry cleaning uses a wet system with no chemical byproduct. This system eliminates the byproduct of PERC.

No offloads of wastes occurred during the one Seattle port call.

X-rays are done digitally and therefore do not have a waste product. Photo waste (photo #09) goes through a silver recovery system (photo #10), and is treated to less than 5 ppm and is then incinerated with one of two incinerators. Fluorescent bulbs along with other bulbs are collected and offloaded ashore without crushing. Hazardous waste materials typically include items such as used cartridges and filters, bulbs, paints, thinners, chemicals, incinerator ash, and batteries. Bio-hazardous waste includes sharps (photo #30) and red-bagged medical waste (photo #29) which is collected and incinerated. Hazardous waste is stored (photo #03) until offloaded. Hazardous waste logs were reviewed and appear to be consistent with MOU requirements.

Unused or outdated pharmaceuticals and narcotics are logged and incinerated with witness. Drains in the medical facility go to the blackwater tanks.

Solid waste (garbage, recyclables, etc) is sorted at the source (photo #31) and is collected and sorted in the garbage and recycling room and is either reused, recycled, incinerated or offloaded to shore as appropriate. Glass that is color separated (photo #02) and crushed, some cardboard, compacted aluminum (photo #04), scrap metal (photo #05), some plastics, some paper, used cooking oil and other items are recycled. Reduction, reuse and recycling progress is tracked for minimization improvements. The vessel and its vendors are ISO14001 certified. The minimization efforts vary by Port call, length of itinerary (2 week voyages have space constraints for offloads) and by staff efforts.

Oily rags, some food contaminated materials, most cardboard, medical bagged waste, treated photo waste, and some plastics are incinerated (photo #06). Incinerator ash is offloaded as hazardous waste as is tested regularly. Incinerators are used once underway.

The CROWN PRINCESS has the ability to use shore power, but Pier 66 is not equipped. Next season, the CROWN PRINCESS is likely to call regularly to Seattle and at Pier 91 where there is shore power. The CROWN PRINCESS has an exemption from the sulfur content requirements of <1% sulfur content for fuel and uses MGO alongside. The exemption is due to the planned air scrubber work for the vessel.

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 AWTS MBR and is currently discharged outside of MOU related waters. There are three separate Hamworthy systems. Two of the MBRs treat graywater and one MBR treats blackwater.

Black water is collected by vacuum to collection tanks and is then sent to the MBR. Gray water which includes sink and shower water and laundry water is piped to one of the gray water collection tanks prior to going to the MBRs. Black water flow moves to the screen press (photo #19). The solids are screened into bags (photo #20) and are then sent to the incinerator. The liquid moves to the 1st stage of the membrane bioreactor (photo #18) where aeration occurs. From the 1st stage, flow moves to the Inter-stage Russel filters (photo #21). 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 (photo #22) for ultrafiltration. The membranes use a backwash for regular cleaning. Effluent from the membrane modules are sent to a permeate tank (photo #23) where turbidity is monitored. Flow then goes to holding tanks if not in an area of discharge. Flow for discharge is then sent for ultraviolet (UV) disinfection (photo #24) prior to discharge. Currently, effluent is held and discharged outside of MOU waters. There is a sample port (photo #14) for treated effluent (photos #25 and #26).

Turbidity is measured continuously on each of the MBR permeate tanks. The MBRs use a degreaser and a defoamer and no other chemicals. The UV system consists of 6 bulbs which are alarmed. The maintenance system, AMOS, provides details of when all maintenance is needed and there is a dedicated plumber for the MBRs overseen by the Staff Engineer and the EO. Monitoring also occurs on the vessel to assure system operations including total suspended solids(typically less than 20 mg/l), total and free chlorine (typically non-detect), total coliform (typically non-detect), ammonia (typically <10 mg/l for graywater and about 100-120 mg/l for blackwater), and pH (typically 6-8).

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.

Attachments:
Photographs

Copies to:
Aleksandar L. Nikolov, Princess Cruises
Mark Toy, Health
Greg Wirtz, CLIA-NWC
Stephanie Jones Stebbins, Port of Seattle
Kevin Fitzpatrick, Ecology
Mark Henley, Ecology
Amy Jankowiak, Ecology
Central Files: Princess Cruises – CROWN PRINCESS; WQ 6.1

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	9/18/14
Name and Signature of Reviewer:	Agency/Office/Telephone:	Date
Mark Henley	Department of Ecology Northwest Regional Office Municipal Unit Supervisor 425-649-7103	9/18/14

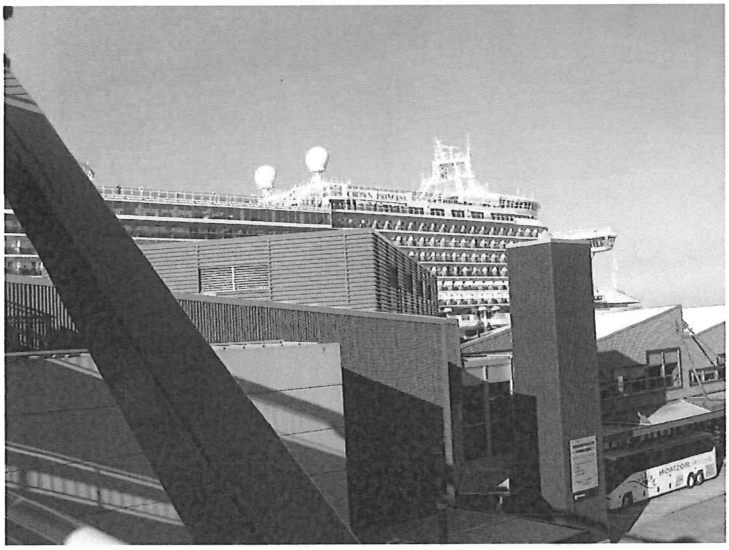

PHOTO #:01 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010015
DESCRIPTION: CROWN PRINCESS VESSEL, PIER 66

PHOTO #:02 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010016
DESCRIPTION: GARBAGE RECYCLING ROOM (GLASS SORTING)

PHOTO #:03 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010017
DESCRIPTION: HAZARDOUS WASTE STORAGE

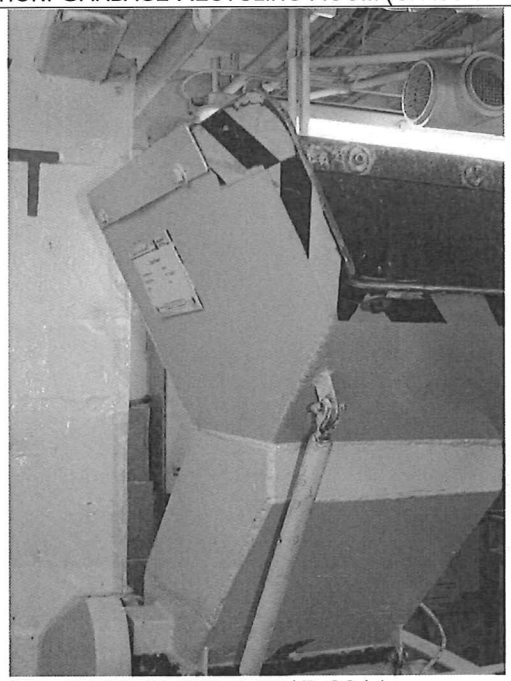

PHOTO #:04 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010018
DESCRIPTION: GARBAGE RECYCLING ROOM - RECYCLING CRUSHER

PHOTO #:05 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010019
DESCRIPTION: GARBAGE RECYCLING ROOM - COMPACTOR

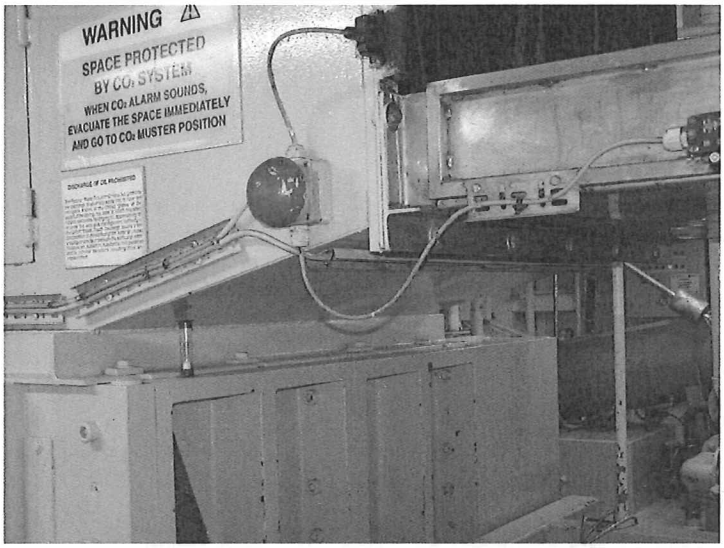

PHOTO #:06 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010020
DESCRIPTION: GARBAGE RECYCLING ROOM - INCINERATOR

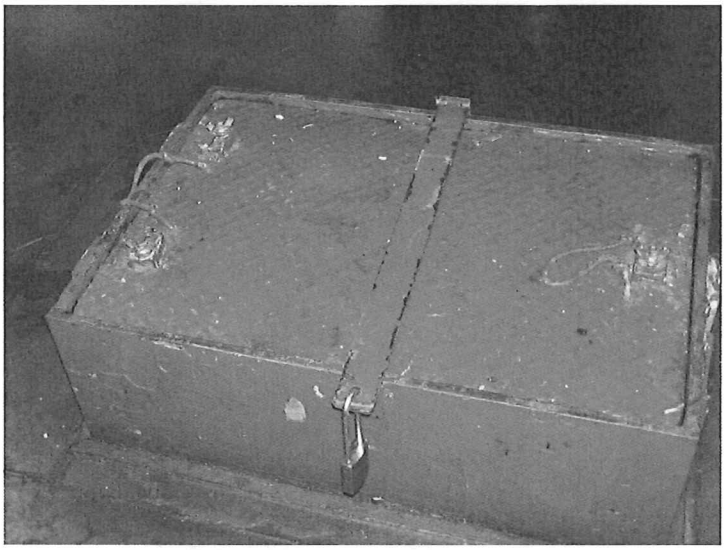

PHOTO #:07 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010021
DESCRIPTION: FOOD WASTE CHUTE (PADLOCKED)

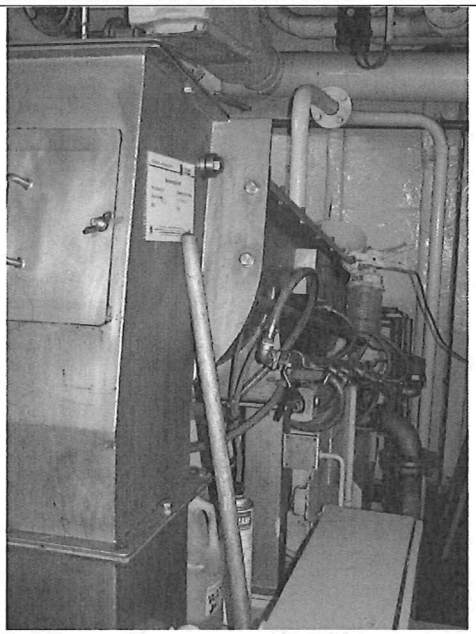

PHOTO #:08 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010022
DESCRIPTION: FOOD WASTE PULPER

PHOTO #:09 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010023
DESCRIPTION: PHOTO WASTE

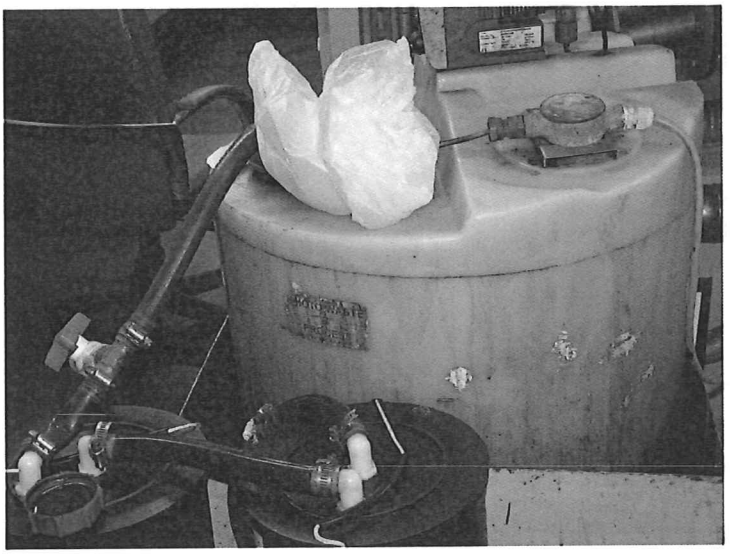

PHOTO #:10 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010024
DESCRIPTION: SILVER RECOVERY SYSTEM FOR PHOTO WASTE

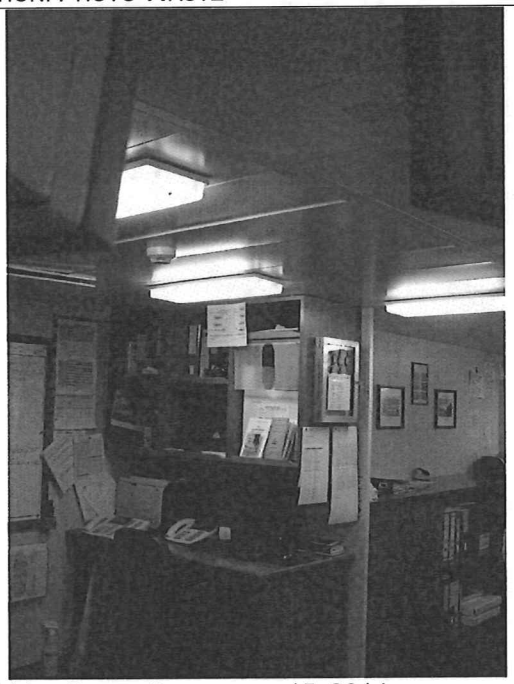

PHOTO #:11 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010025
DESCRIPTION: ENGINE CONTROL ROOM (DISCHARGE PORT KEYS ON CABINET)

PHOTO #:12 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010026
DESCRIPTION: OILY BILGE WATER DISCHARGE PORT FROM OILY WATER SEPARATORS (OWS)

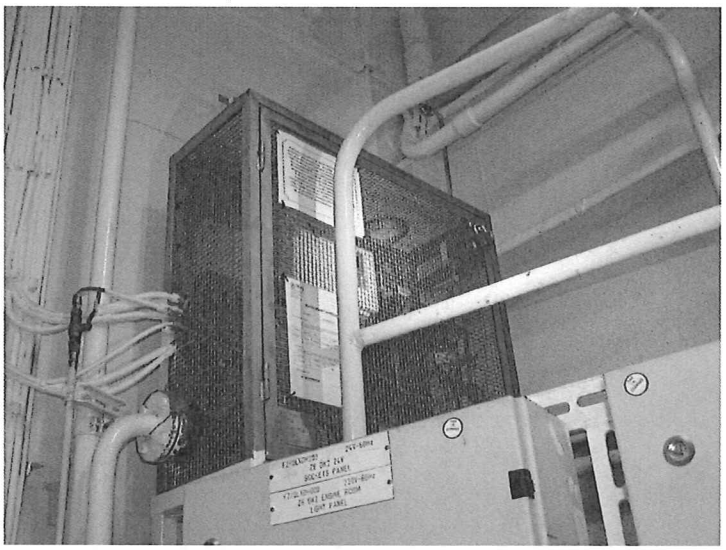

PHOTO #:13 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010027
DESCRIPTION: OWS WHITE BOX

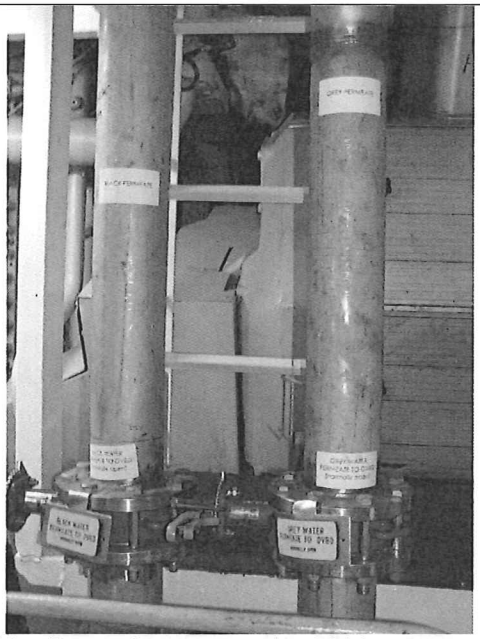

PHOTO #:14 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010029
DESCRIPTION: MBR OVERBOARD VALVING/SAMPLING LOCATION

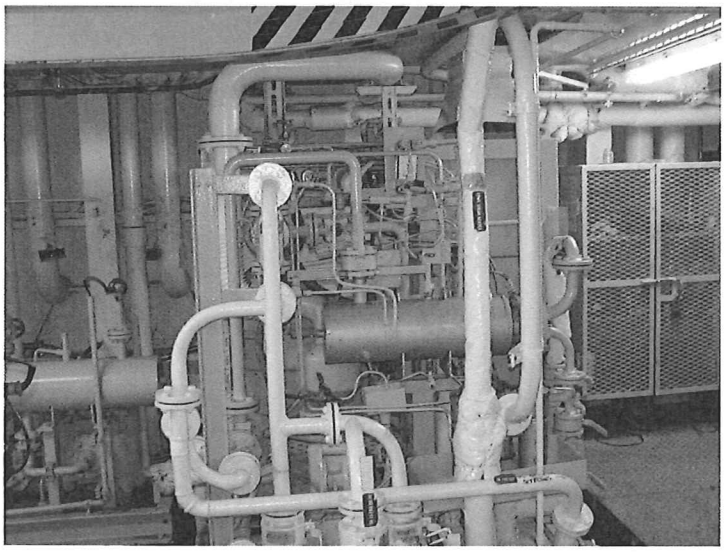

PHOTO #:15 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010030
DESCRIPTION: OWS 1ST STAGE (TO <50PPM OIL CONTENT)

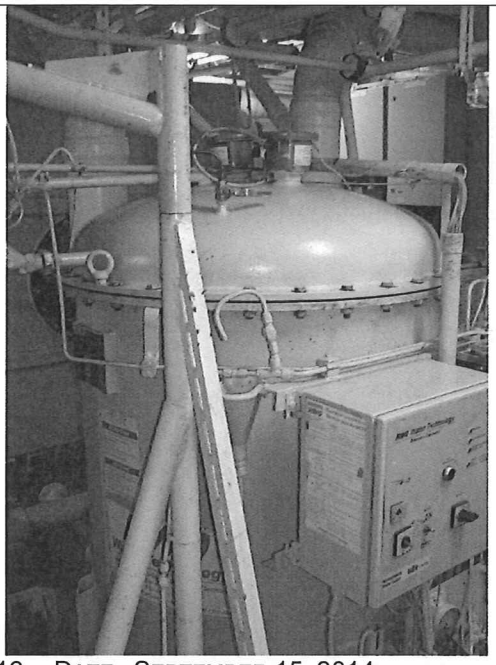

PHOTO #:16 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010031
DESCRIPTION: OWS 2ND STAGE (TO <15PPM OIL CONTENT)

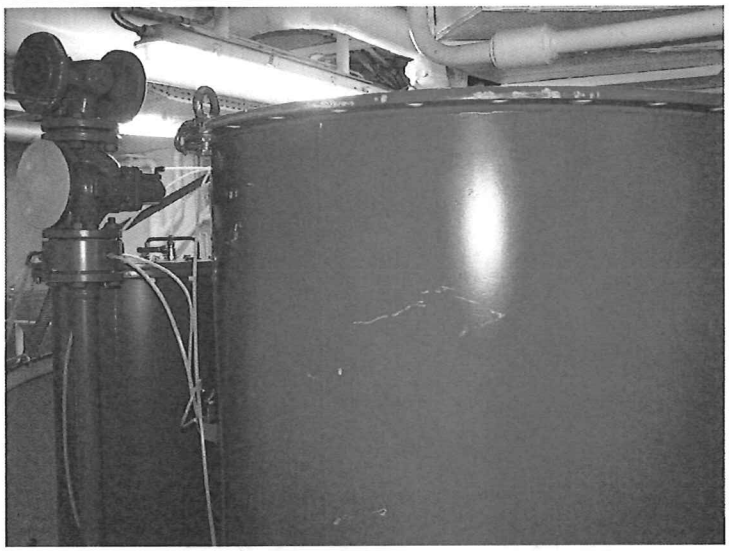

PHOTO #:17 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010032
DESCRIPTION: NEW OWS (TO <5PPM OIL CONTENT) TO BE INSTALLED

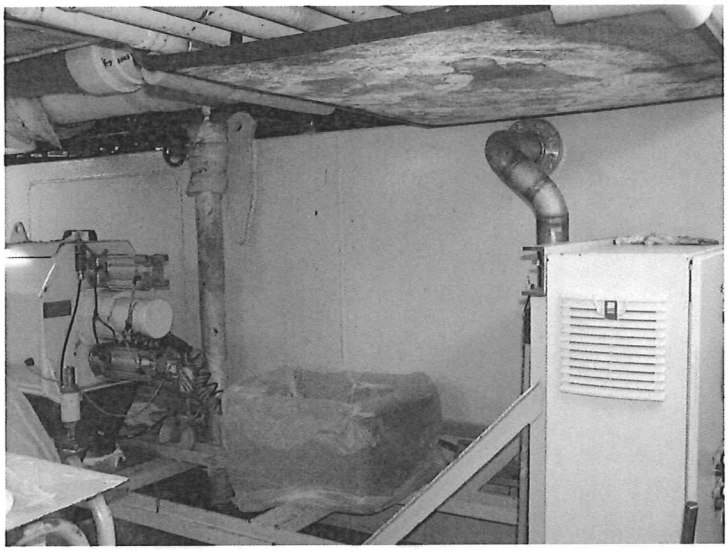

PHOTO #:18 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010033
DESCRIPTION: MBR TANK (BIG BOX)

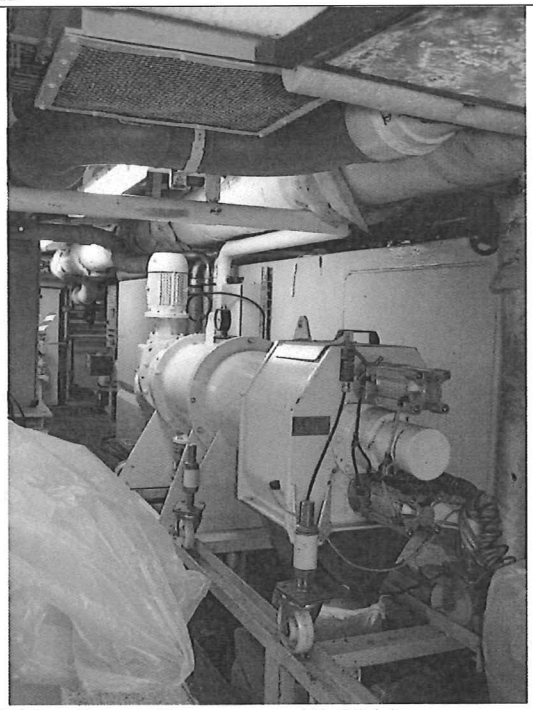

PHOTO #:19 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010034
DESCRIPTION: MBR SCREEN PRESS

PHOTO #:20 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010035
DESCRIPTION: MBR SCREEN PRESS SCREENINGS (BAGGED FOR INCINERATION)

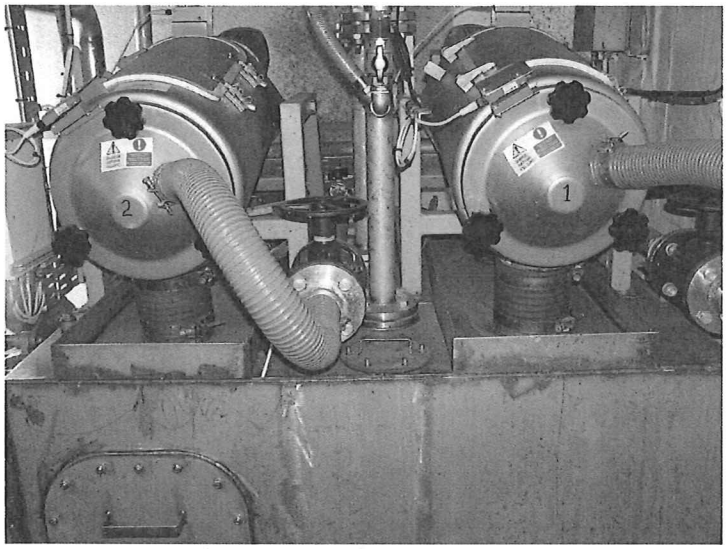

PHOTO #:21 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010036
DESCRIPTION: MBR INTERMEDIATE FILTERS

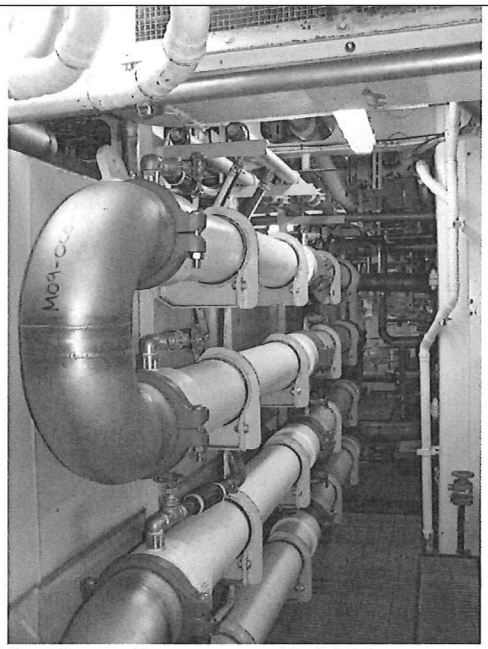

PHOTO #:22 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010037
DESCRIPTION: MBR MEMBRANE FILTERS

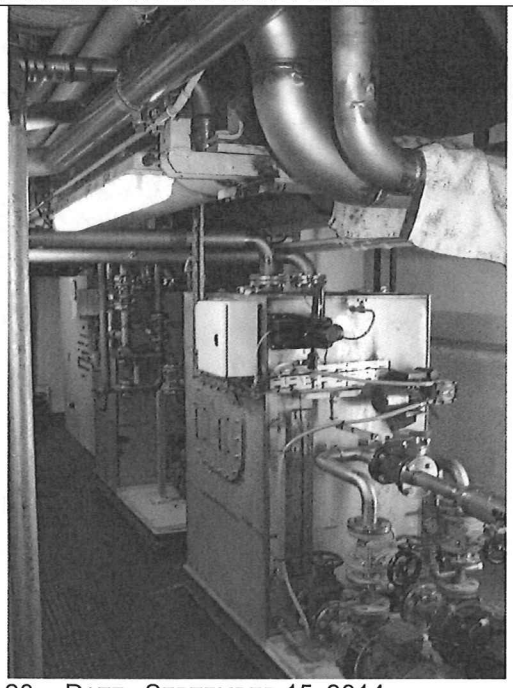

PHOTO #:23 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010038
DESCRIPTION: MBR PERMEATE TANK (STEEL BOX)

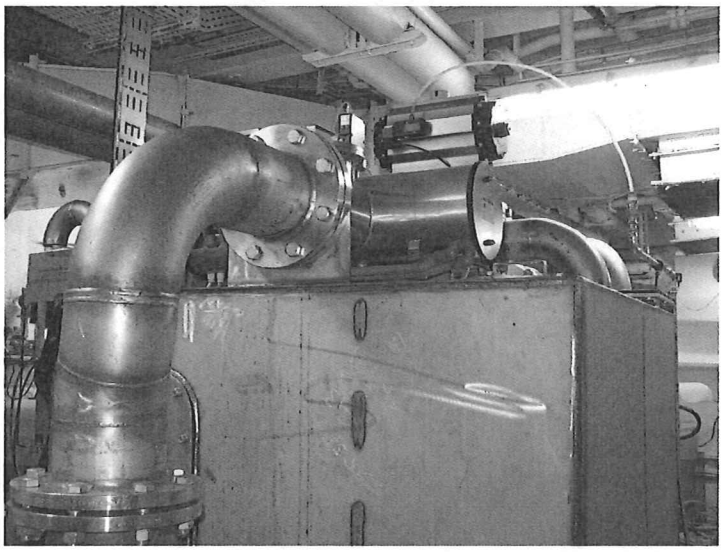

PHOTO #:24 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010041
DESCRIPTION: MBR ULTRAVIOLET (UV) LIGHT DISINFECTION UNIT

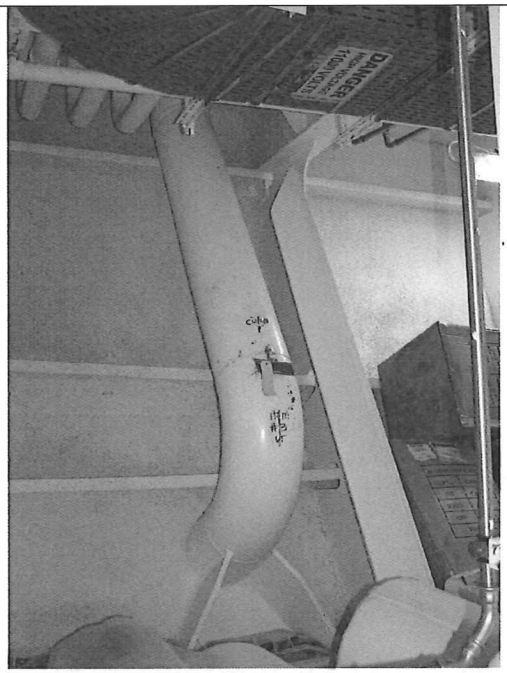

PHOTO #:25 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010043
DESCRIPTION: MBR GW OVERBOARD PIPE (AFTER UV)

PHOTO #:26 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010044
DESCRIPTION: MBR BW OVERBOARD PIPE (AFTER UV) (AND SCUPPERS PIPE)

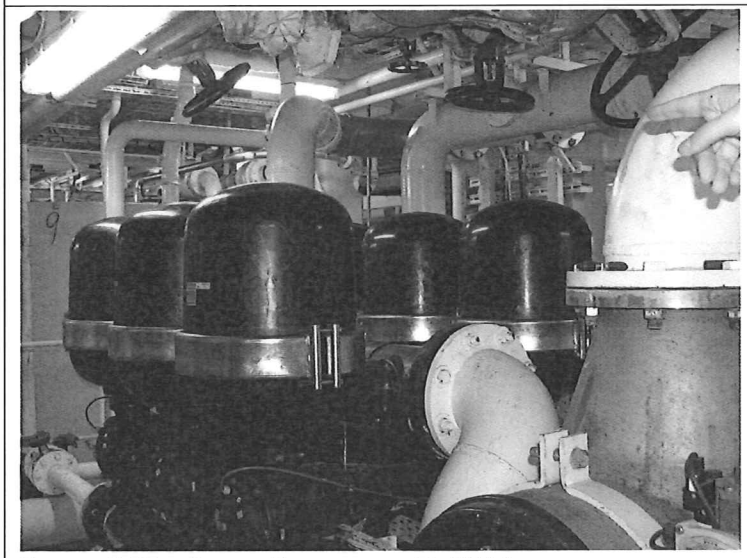

PHOTO #:27 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010039
DESCRIPTION: BALLAST WATER TREATMENT SYSTEM FILTERS

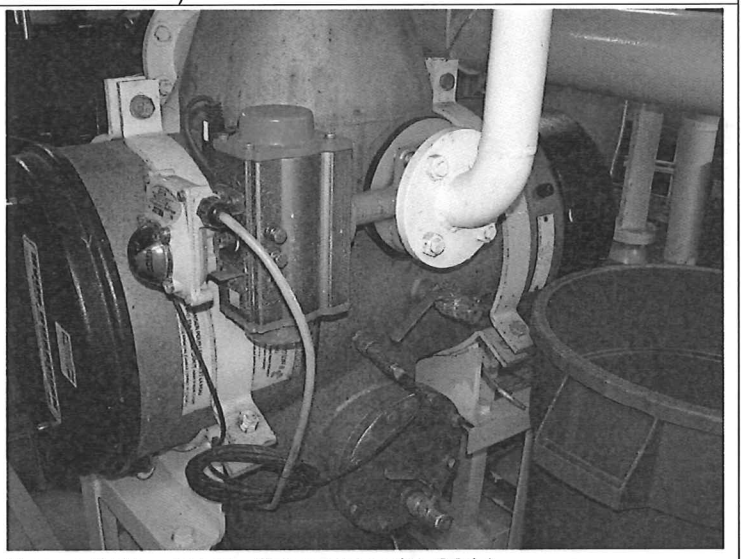

PHOTO #:28 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010040
DESCRIPTION: BALLAST WATER TREATMENT SYSTEM UV

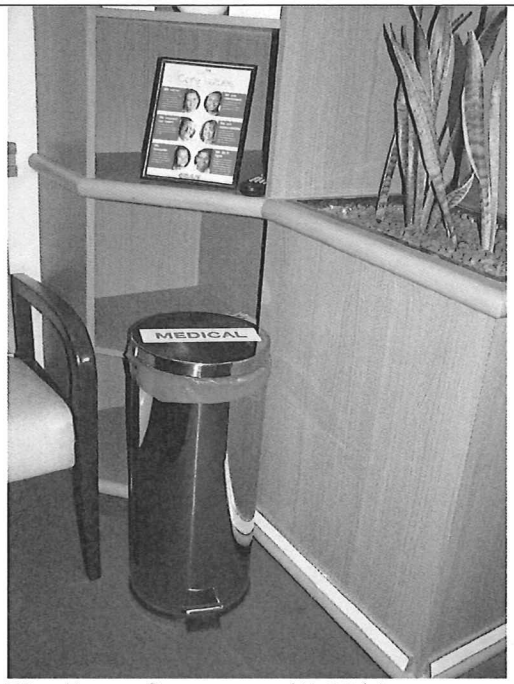

PHOTO #:29 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010046
DESCRIPTION: MEDICAL FACILITY RED-BAGGED WASTE

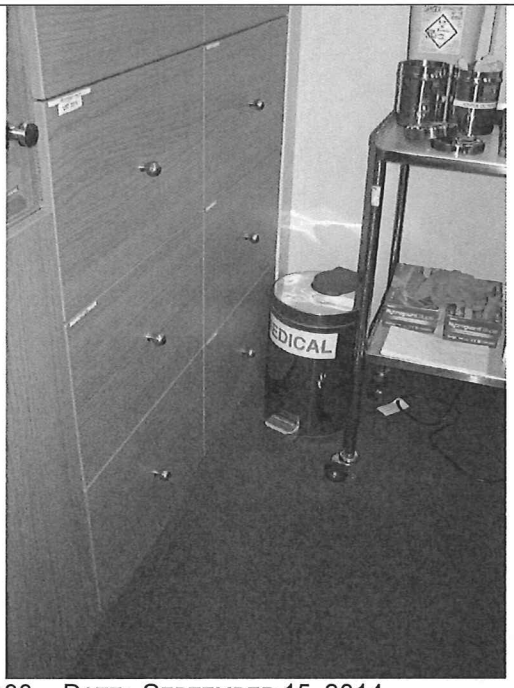

PHOTO #:30 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010047
DESCRIPTION: MEDICAL FACILITY RED-BAGGED WASTE AND SHARPS (YELLOW BOX)

PHOTO #:31 DATE: SEPTEMBER 15, 2014
TAKEN BY: AMY JANKOWIAK FILE NO.: P1010048
DESCRIPTION: MEDICAL FACILITY – SOURCE WASTE SORTING