



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 August 31, 2012	Permit Number NA	County King	Receiving Waters Marine Waters	Ecology Inspector Amy Jankowiak
Entry Time 9:02 am	Photos Taken	Samples Taken	Inspection Announced	Discharges to: <input checked="" type="checkbox"/> Surface Water
Exit Time 11:09 am	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Ground Water <input type="checkbox"/> Dewater <input type="checkbox"/> POTW

Name and Location of Site Inspected: RHAPSODY OF THE SEAS, Royal Caribbean Cruise Line Pier 91 Seattle, Washington	Additional Participants/Inspectors:
On-Site Representative(s): <i>Name/Title/Phone/e-mail</i> Anderson England, Environmental Officer RH EnvironmentalOfficer@rccl.com	
Responsible Official(s): <i>Name/Title/Address/Phone/e-mail</i> 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: Notification made to Rich Pruitt on August 13, 2012

Section A: Areas Evaluated

<input checked="" type="checkbox"/> Black/Gray Wastewater System	<input checked="" type="checkbox"/> Residual Solids	<input checked="" type="checkbox"/> Records/Reports	<input checked="" type="checkbox"/> Hazardous Waste/ Solid Waste	<input checked="" type="checkbox"/> Sampling/Monitoring
<input checked="" type="checkbox"/> Discharge Locations	<input checked="" type="checkbox"/> Operation & Maintenance	<input checked="" type="checkbox"/> Sludge Handling/ Disposal	<input checked="" type="checkbox"/> Oily Bilge Water	<input checked="" type="checkbox"/> Other

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

<input type="checkbox"/> Schematics Match Black/Gray Wastewater System	
<input type="checkbox"/> Operations as Described in Submitted Documentation	
<input type="checkbox"/> Daily 24-hour Continuous Monitoring for Turbidity or Equivalent Monitoring	
<input type="checkbox"/> Turbidimeter or Equivalent Monitoring Equipment Functioning Properly	
<input type="checkbox"/> 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: Recorded Turbidity/Equivalent Levels Above Triggers:	
<input type="checkbox"/> Daily 24-hour Continuous Monitoring for Disinfection Effectiveness	
<input type="checkbox"/> Disinfection Effectiveness Monitoring Equipment Functioning Properly	
Disinfection Effectiveness Monitoring:	
<input type="checkbox"/> Auto Shut Down or Operational Controls to Insure System Shut Down if Disinfection System Upset Occurs	
<input type="checkbox"/> Disinfection System Operated and Maintained Properly	
Disinfection System:	

NOT APPLICABLE

	cartridges,...) and landed ashore	
<input checked="" type="checkbox"/>	Dry-Cleaning Wastes and Byproducts (fluids, sludge, filter materials...) Managed Properly (PERC – haz waste – landed ashore)	Dry cleaning waste products appears to be managed per MOU requirements.
<input checked="" type="checkbox"/>	Unused/Outdated Pharmaceuticals Managed Properly (safely disposed of)	Unused or outdated pharmaceuticals appear to be managed per MOU requirements.
<input checked="" type="checkbox"/>	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.
<input checked="" type="checkbox"/>	Waste Reduction/Reuse/Recycling Opportunities Maximized (glass, cardboard, aluminum & steel cans)	Waste reduction/reuse/recycling opportunities appear to be maximized per MOU requirements.
<input checked="" type="checkbox"/>	Batteries Managed Properly (recycled, reclaimed, disposed of properly)	Batteries appear to be managed per MOU requirements.
<input checked="" type="checkbox"/>	Incinerator Ash Managed Properly and minimized volume (haz waste segregation and annual testing)	Incinerator ash appears to be managed per MOU requirements.
<input checked="" type="checkbox"/>	Oily Bilge Water Managed Properly (<15 ppm, no visible sheen and underway)	Oily bilge water appears to be managed per MOU requirements.
<input checked="" type="checkbox"/>	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 exchanges are reported to not occur on this route.
<input checked="" type="checkbox"/>	OCNMS rules and regs followed	The discharge protocol appears to be consistent with MOU requirements to not occur in the OCNMS.

Additional General Questions

<input checked="" type="checkbox"/>	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.
<input checked="" type="checkbox"/>	How is maintenance performed on the outside of the vessel (paint chipping, painting, etc)	Outside vessel maintenance appears to be handled per MOU requirements.
<input checked="" type="checkbox"/>	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.
<input checked="" type="checkbox"/>	How are food waste discharges handled (prevention of erroneous materials)?	Food waste appears to be handled per MOU requirements.
<input checked="" type="checkbox"/>	Medical sinks/floor drains, chem. stor areas wastes go where (plugged, blackwater, bilge)?	Medical sinks/floor drains appear to be handled per MOU requirements.
<input checked="" type="checkbox"/>	Where is pool and spa water discharged? Dechlorinated/debrominated and underway?	Pool and spa water appears to be handled per MOU requirements.
<input checked="" type="checkbox"/>	What type of fuel is used and percent sulfur content?	An average of <1% sulfur content is used throughout the route with <0.1 alongside.

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 Royal Caribbean Cruise Line (RCCL) RHAPSODY OF THE SEAS on August 31, 2012. The main contact on board the RHAPSODY OF THE SEAS was Anderson England, Environmental Officer for the RHAPSODY OF THE SEAS. Prior notification of the visit was given on August 13, 2012 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 is not approved to discharge wastewater in MOU waters.

The RHAPSODY OF THE SEAS' maiden voyage was in 1997, and is 915 feet long with a width of 105.6 feet. The passenger and crew capacity is about 3381.

The RHAPSODY OF THE SEAS is scheduled for 17 port calls in Seattle and conducts one week cruises to Alaska turning around on Fridays between May 18, 2012 and September 7, 2012.

Inspection

I arrived and boarded the ship (photo #41) at about 9:02 am and began with introductions and a plan for the day with Anderson England, the Environmental Officer. We discussed various waste streams and discharge protocols. We reviewed the various discharge and environmental records. We then toured the Navaldis advanced wastewater treatment system (AWTS) and the oily water separator. We then viewed the garbage and recycling areas, the food waste systems, hazardous waste storage and the photo waste areas. The inspection was then finalized with a debriefing and I disembarked the vessel at about 11:09 am.

Discharge Types and Protocols:

All discharges occur outside of 13 nautical miles (they add a one mile buffer beyond their normal policy). A pre-season plan is put into place and if a discharge is to occur, staff on the Bridge communicate with the Engine Control Room (ECR) staff to verify that they are in an area where discharges are allowed. Discharge locations are recorded in the ECR and electronically. The discharge ports have padlocks on them and the keys are kept in the control room under the Watchkeeper's eye (photo #01). For black water and gray water, the latitude and longitude coordinates are recorded in the *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. All wastewater discharge records that were reviewed appeared to be in compliance with the MOU and did not occur in MOU waters, Washington State waters or the Olympic Coast National Marine Sanctuary (OCNMS) (MOU related waters).

If a violation of the MOU were to occur, vessel staff would notify the Captain and make phone notifications per the MOU. Notification numbers were posted.

The coarse screenings are collected and incinerated or drummed and sent ashore and the bioresidue collected is sent first through the Solids Reduction System of the NAVALIS system and it is then sent to the traditional marine sanitation device for further treatment before discharge or drumming and sending ashore. Any solids discharged are done outside of MOU related waters.

Oily bilge water is treated with a Marin Floc oily water separator (photos #18 and #19) with a company standard of less than 5 ppm oil content. The white box (photo #20) is used to only allow discharges at less than 15 ppm maximum. The Chief Engineer is the only one with the keys to the white box. Discharges of treated oily bilge take place outside of MOU related waters.

Ballast water exchanges do not occur on this route.

Pools use salt water and discharge overboard outside of MOU related waters. Water is dechlorinated prior to discharge. Spa water is sent to the graywater tanks when emptied.

Food waste is collected in various locations (photo #23), is sorted and then sent through a pulper. Pulped food waste and galley water is discharged outside of MOU related waters and at a size of less than 3 mm. Records reviewed were consistent with this protocol. No food chutes are used. Sorting at the source scoop by scoop is done by training workers. Food waste such as pineapple heads, coffee, watermelon rinds and shrimp are either incinerated or composted in Victoria (photo #34) per a new program. Galleys use Ecolab phosphate free and non-toxic detergents and degreasers. Used cooking oil is recycled in Seattle.

Decks are kept clean and are swept regularly. Decks drain to the scuppers and most go directly overboard. Some

scuppers drain to the graywater tanks. Paint chipping and painting is done in port occasionally. If painting and chipping occurs, a drop cloth is used on the pier and a two man drop cloth is hand held in a raft. The paint bucket is kept on the pier to prevent spillage in the water when possible. The Staff Captain or First Officer oversea any painting and chipping. Hull cleaning is done when checked and cleared with the harbormaster. Outside vessel washing occurs with freshwater or with phosphate free/non toxic cleaners when allowed by the port.

Some laundry water is sent to the graywater tanks and some is discharged directly overboard as graywater outside of MOU related waters. Dry cleaning uses a hydrocarbon system (Exxon Mobil, non PERC). The liquid residual goes to the oily water separator system and the dry materials I drummed and offloaded about twice per year.

X-rays are done digitally and therefore do not have a waste product. Photo waste (photos #38, #39, and #40) goes through a silver recovery system, and is treated to less than 5 ppm and is then offloaded. Fluorescent bulbs go to a bulb crusher with a mercury vapor removal system (photo #36). The filters are offloaded as hazardous waste and bulbs are tested for mercury traces. Hazardous waste materials include items such as oily rags, used cartridges and filters, paints, batteries (offloaded as regulated then recycled), sludge oil, aerosols (punctured) (photos #29 and #36), incinerator ash, and sharps. Hazardous waste (photo #35) is typically offloaded in Seattle about every two weeks by PSC. Hazardous waste logs were reviewed and appear to be consistent with MOU requirements.

Unused or outdated pharmaceuticals are either incinerated or off-loaded back to the vendor when feasible. Narcotics are incinerated with witness. Drains in the medical facility go to the blackwater tanks. Sharps, including acupuncture needles are off-loaded as bio-hazardous waste (photo #22).

Solid waste (garbage, recyclables, etc) is collected sorted (photos #24 and #26) and either reused, recycled, incinerated or offloaded to shore as appropriate. The garbage record book was reviewed and showed consistency with requirements.

Glass (photo #27), aluminum (photo #31), tin, scrap metal (photo #33), china, wood pallets, some plastics (photo #28), some paper and cardboard (photo #30), some electronics, batteries and used cooking oil (photo #33) and other items are recycled. Reduction, reuse and recycling progress is tracked and minimization improvements are constant. Approximately 60% is recycled, reused, or reduced now with a goal of 100% by 2014.

Incinerator ash is offloaded to Burlington Environmental and tested every six months to ensure non-metals status. Recent results have passed for non-metals.

An average of less than 1% sulfur content fuel is used throughout the route with <0.1% alongside.

Freshwater is bunkered in Skagway and Juneau and occasionally in Seattle.

Air conditioning condensate is re-used as technical water.

Black water and Gray water System:

Blackwater, which includes toilet waste and infirmery drains and graywater which includes sink and shower water, some laundry water and spa water is sent to various collection tanks (photo #07). The system was previously set up to treat blackwater and graywater separately, and some of the labeling on equipment specifies "GW" or "BW", when the equipment actually takes the combined blackwater and graywater streams. The combined black water and graywater is sent to a shaker screen (photos #06 and #08) to screen out solids. Screened solids are sent to the Sludge Reduction Tank (SRT) in the old Hamaan traditional marine sanitation device for further treatment. The liquid from the shaker screens are sent to the Aerated Equalization Tank (AET) (photo #12) where the biological activity takes place. Bioresidue from the AET is also sent to the SRT. From there, liquid goes through a pre-filter mesh (photo #05) and then to ultrafiltration with tubular ceramic membranes (photo #14). The membranes are inside-out filters where liquid enters through the center and then is filtered outwards through the ceramic. The filters are backwashed (photo #17) automatically, daily, and are chemically cleaned periodically. From the membranes, liquid goes to an ultraviolet (UV) light disinfection unit (photos #15 and #16) and is then sent to holding tanks prior to discharge (photo #21). Liquid from the membranes used to go to an ozone system (photo #10) which is not longer needed or used.

Solids from the SRT (photo #09) are sent through the Hamaan unit which consists of aeration, baffles, and chlorination. Solids are then discharged outside of MOU related waters.

Effluent is continuously monitored for turbidity and pH. An electronic system, AMOS, is used to plan and track maintenance for the system. Two engineers are dedicated to the operations of the AWTS. Sampling is done on the vessel for process control with an on-board sampling laboratory (photos #02, #03, and #04) which analyzes TSS, COD, pH, total chlorine, and fecal coliform. The AWTS can be monitored from the ECR or from various parts of the system

(photo #13).

Upon boarding the vessel, it was reported that more than 200 passengers had gastro-intestinal illnesses during the past few days. All reporting and health precautions were taken. The vessel was undergoing a deep cleaning by all staff on hand and the boarding of more passengers was being delayed to allow for thorough cleaning. Contaminated waste from passenger rooms with sick passengers was bagged separately (photo #25) and handled carefully to prevent contamination. The cleaner "Oxiver" (photo #32) was being used for sanitation.

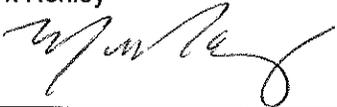
Conclusions and Recommendations

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.

Attachments:
Photographs

Copies to:
Rich Pruitt, RCCL
Anderson England, Environmental Officer, RCCL
Mark Toy, Health
Greg Wirtz, NWCCA
Stephanie Jones Stebbins, Port of Seattle
Kevin Fitzpatrick, Ecology
Mark Henley, Ecology
Amy Jankowiak, Ecology
Central Files: Royal Caribbean Cruise Line – RHAPSODY OF THE SEAS; WQ 6.1

Section H: Signatures

<u>Name and Signature of Inspector:</u>	<u>Agency/Office/Telephone:</u>	<u>Date</u>
Amy Jankowiak 	Department of Ecology Northwest Regional Office Water Quality Program Municipal Compliance Specialist 425-649-7195	9/20/12
Mark Henley 	Department of Ecology Northwest Regional Office Water Quality Section Manager 425-649-7103	9/26/12

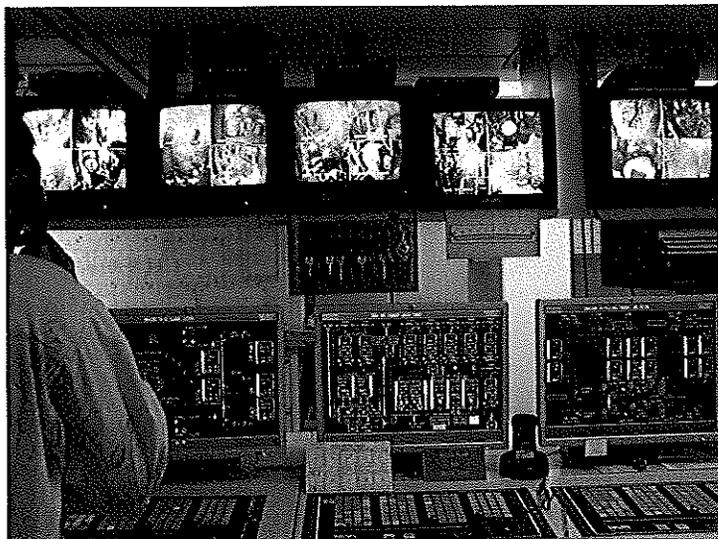


PHOTO #:01 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310001
DESCRIPTION: ENGINE CONTROL ROOM PORT KEYS



PHOTO #:02 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310003
DESCRIPTION: AWTS LAB INCUBATOR



PHOTO #:03 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310004
DESCRIPTION: AWTS LAB BOD INCUBATOR

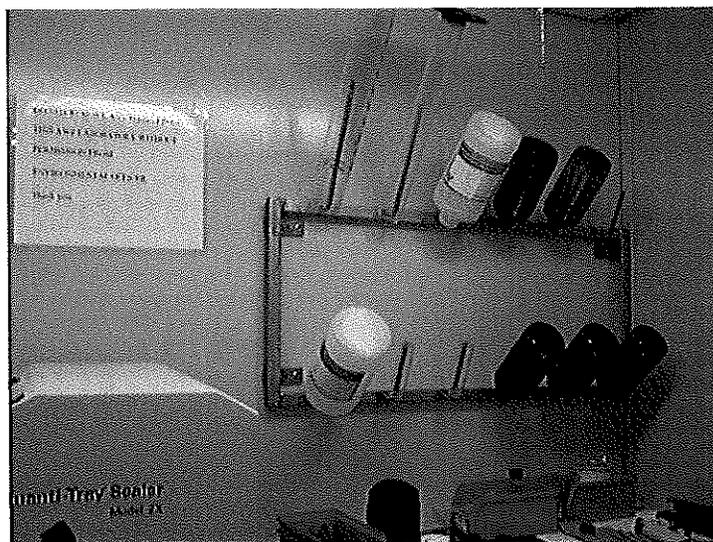


PHOTO #:04 AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310005
DESCRIPTION: AWTS LAB

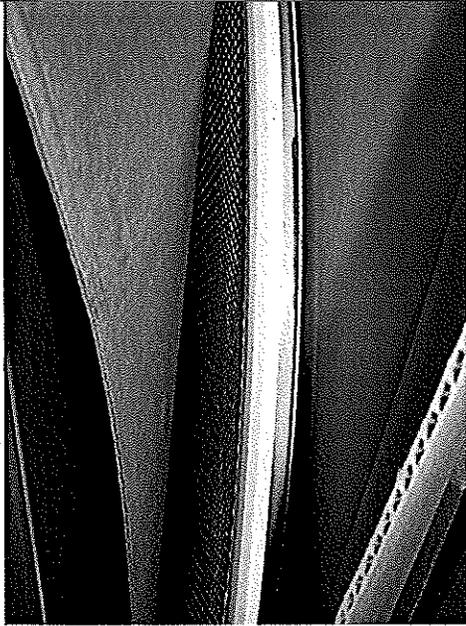


PHOTO #:05 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.:P8310007
DESCRIPTION: AWTS MBR SPARE FILTER SCREEN



PHOTO #:06 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310008
DESCRIPTION: AWTS SHAKER SCREEN

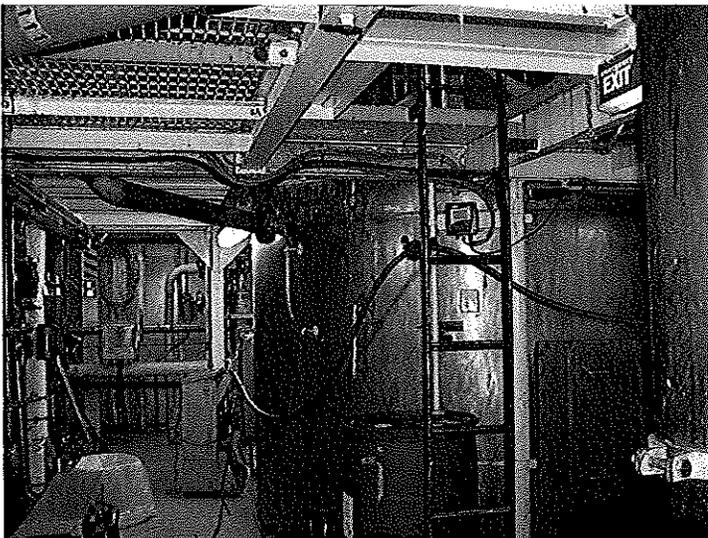


PHOTO #:07 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310010
DESCRIPTION: AWTS HOLDING TANK

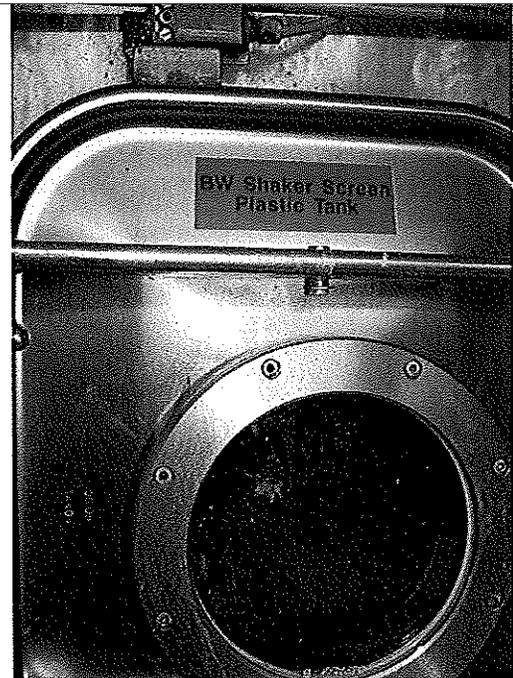


PHOTO #:08 AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310014
DESCRIPTION: AWTS – BLACK WATER SHAKER SCREEN PLASTIC TANK

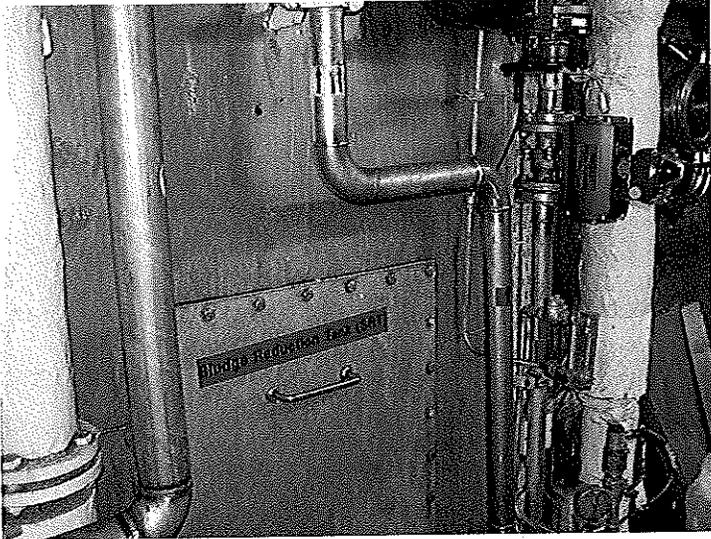


PHOTO #:09 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.:P8310015
DESCRIPTION: AWTS SLUDGE TANK

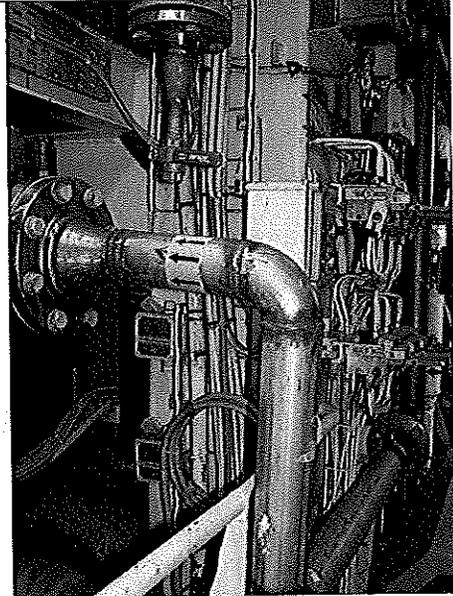


PHOTO #:10 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310016
DESCRIPTION: AWTS OZONE METERS

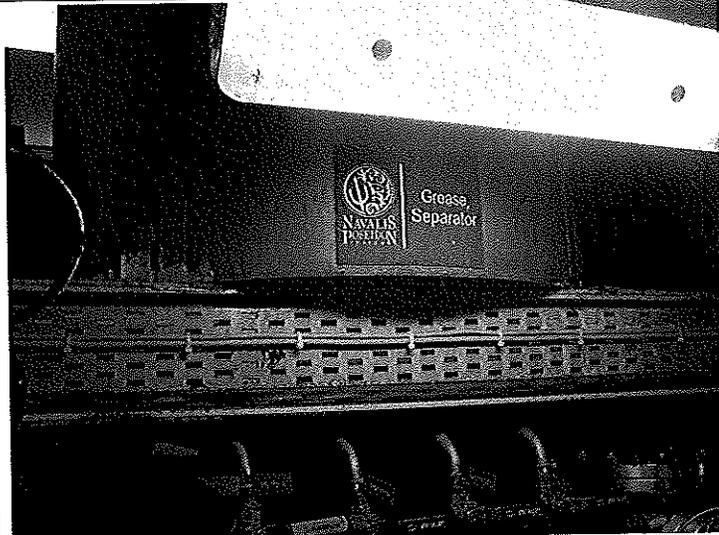


PHOTO #:11 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310018
DESCRIPTION: AWTS GREASE SEPARATOR

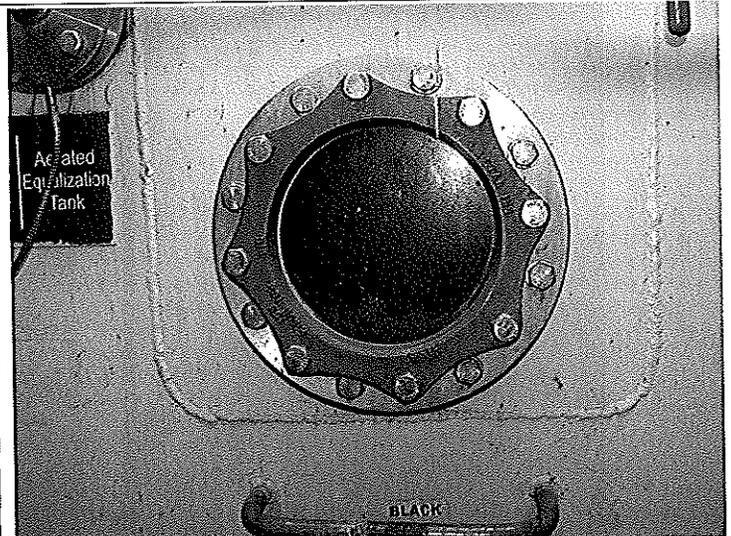


PHOTO #:12 AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310020
DESCRIPTION: AWTS AERATED EQUALIZATION TANK



PHOTO #:13 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.:P8310021
DESCRIPTION: AWTS CONTROL PANEL

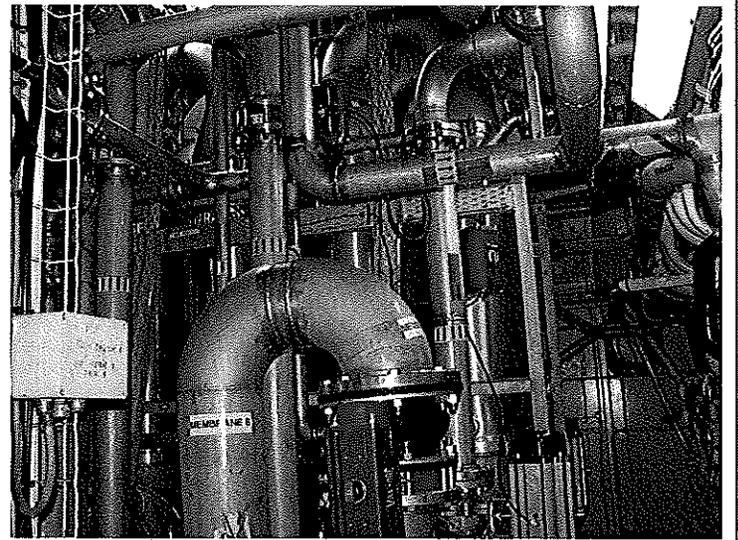


PHOTO #:14 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310023
DESCRIPTION: AWTS MEMBRANES

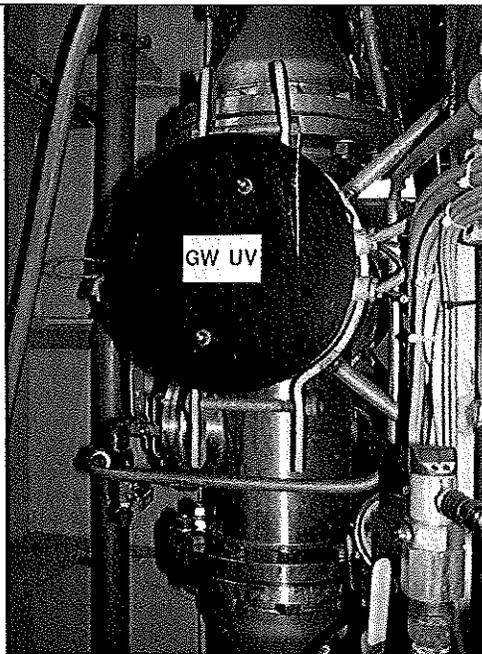


PHOTO #:15 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310024
DESCRIPTION: AWTS UV UNIT

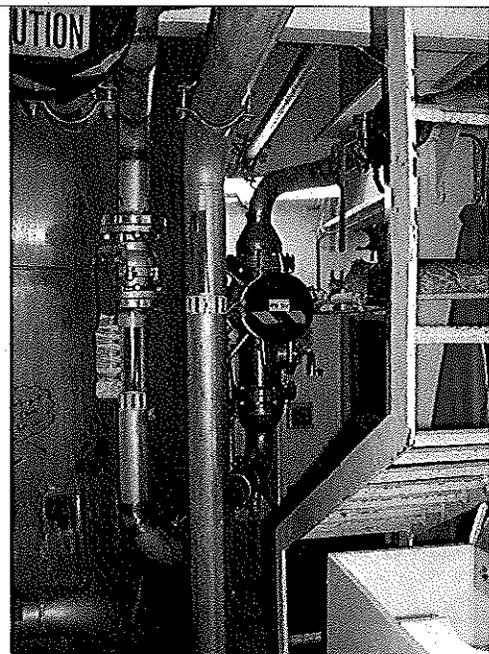


PHOTO #:16 AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310025
DESCRIPTION: AWTS UV UNIT

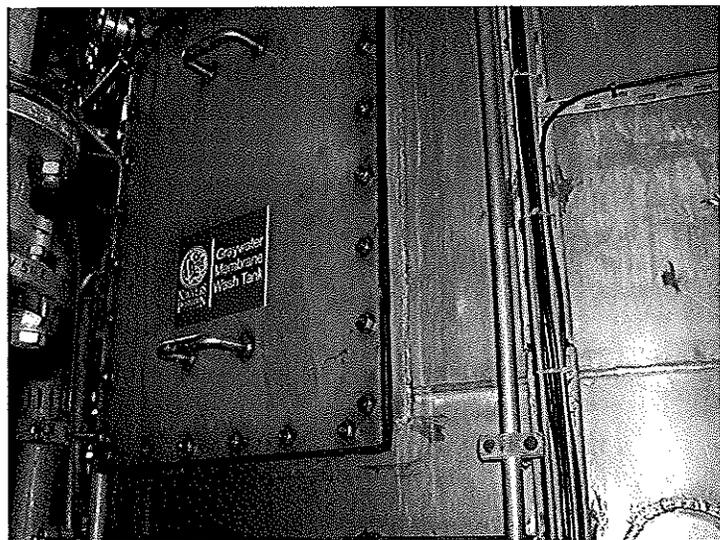


PHOTO #:17 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310026
DESCRIPTION: AWTS MEMBRANE WASH TANK

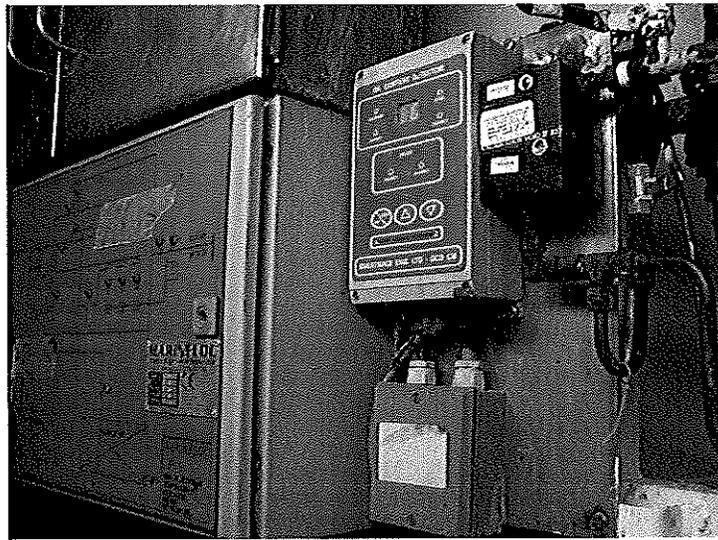


PHOTO #:18 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310027
DESCRIPTION: OILY WATER SEPARATOR

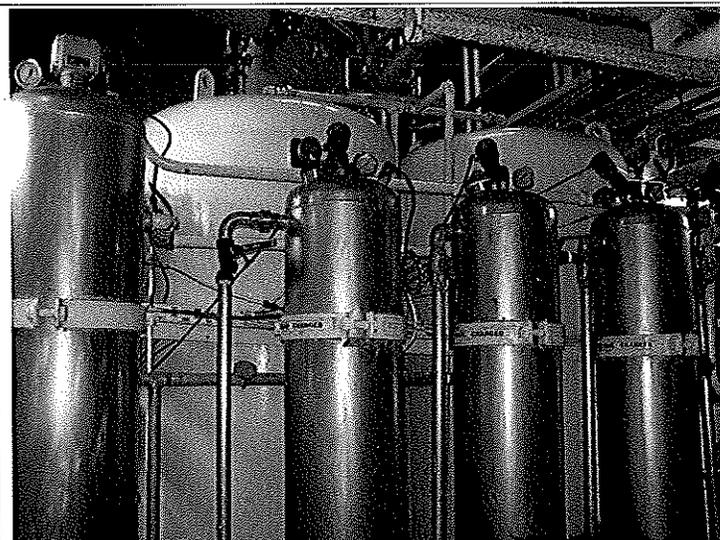


PHOTO #:19 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310029
DESCRIPTION: OILY WATER SEPARATOR

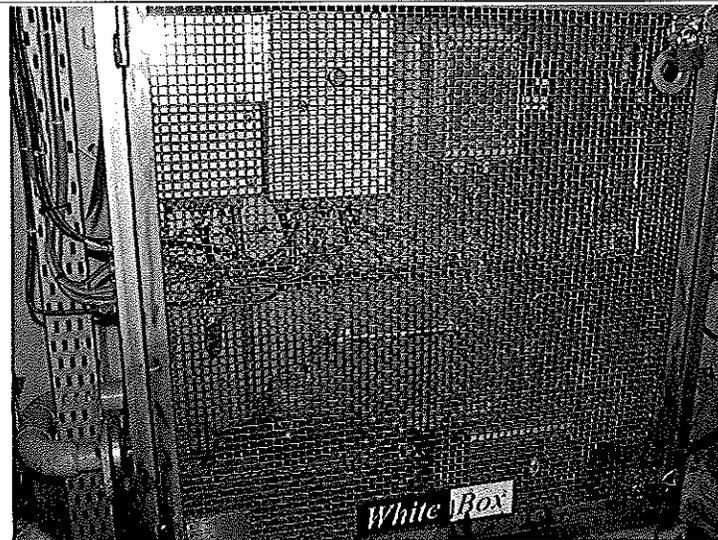


PHOTO #:20 AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310030
DESCRIPTION: OWS WHITE BOX

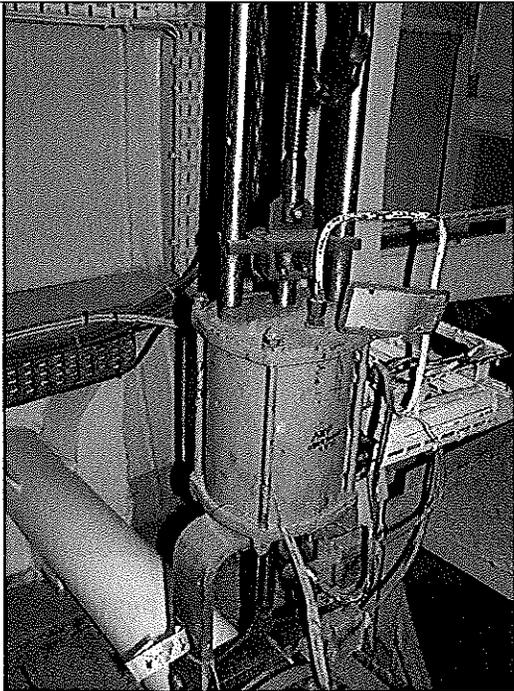


PHOTO #21 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310032
DESCRIPTION: AWTS DISCHARGE PORT



PHOTO #22 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310033
DESCRIPTION: BIOHAZARDOUS WASTE AND INCINERATOR

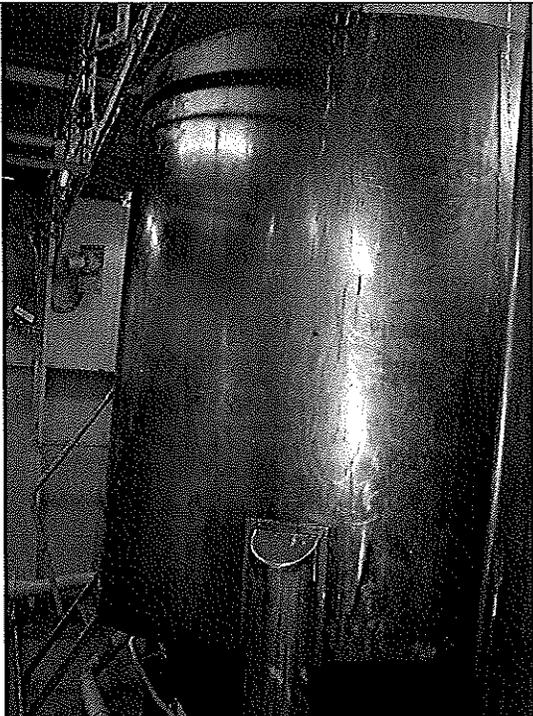


PHOTO #23 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310034
DESCRIPTION: FOOD WASTE TANK



PHOTO #24 AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310035
DESCRIPTION: GARBAGE - PRE SORT

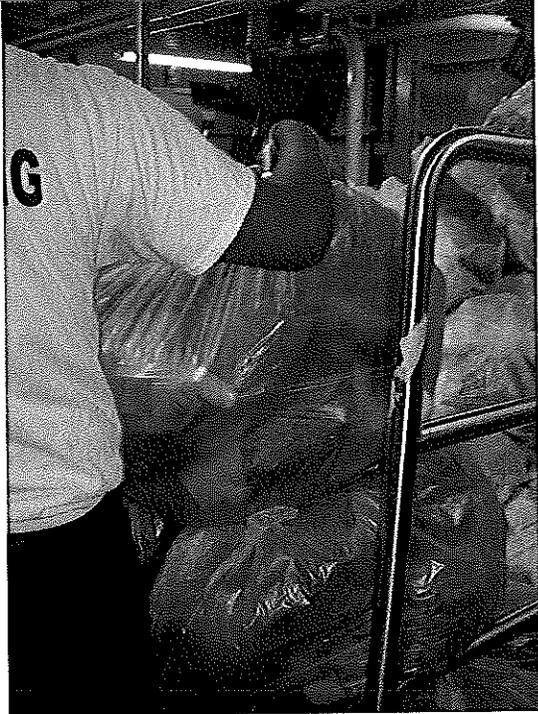


PHOTO #:25 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.:P8310036
DESCRIPTION: VIRUS CONTAMINATED GARBAGE

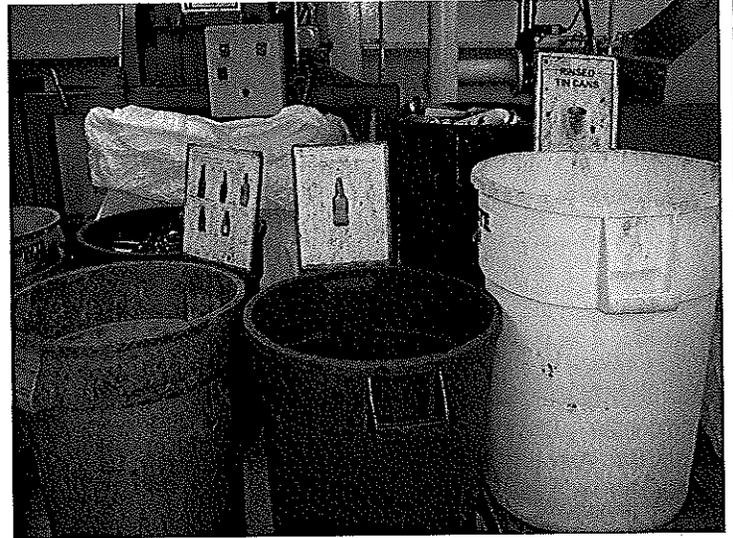


PHOTO #:26 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310037
DESCRIPTION: RECYCLING SORTING

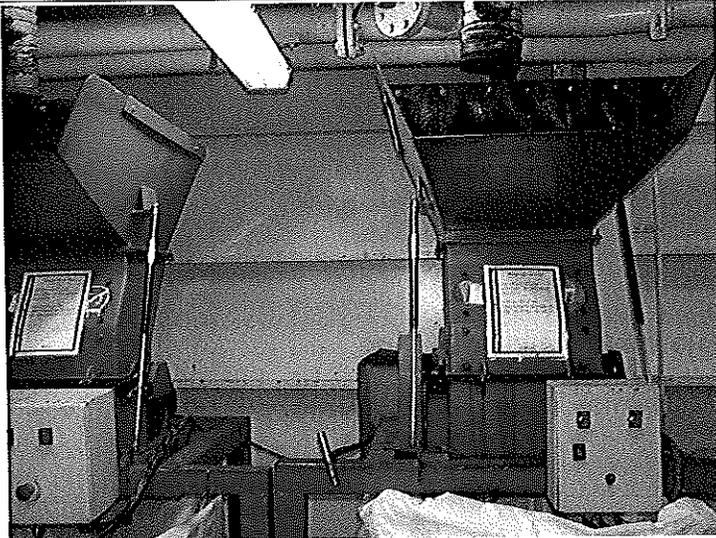


PHOTO #:27 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310038
DESCRIPTION: GLASS CRUSHERS



PHOTO #:28 AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310039
DESCRIPTION: PLASTIC SHREDDING

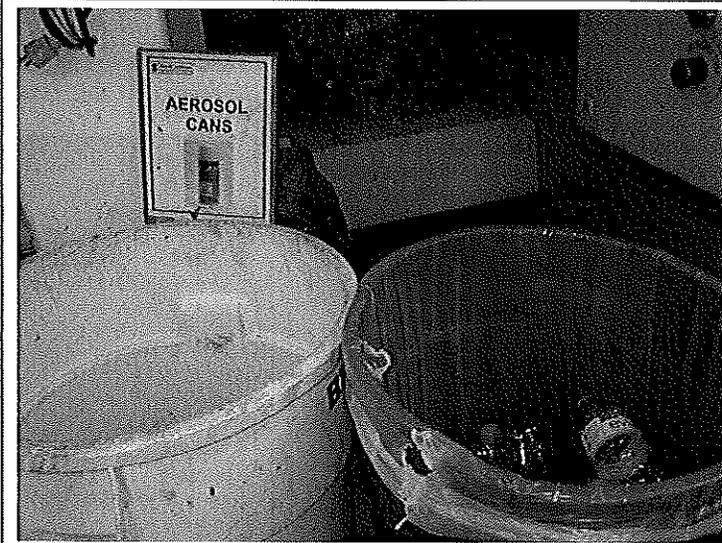


PHOTO #:29 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.:P8310040
DESCRIPTION: AEROSOLS AND PLASTIC SORTING



PHOTO #:30 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310041
DESCRIPTION: CARDBOARD COMPACTOR

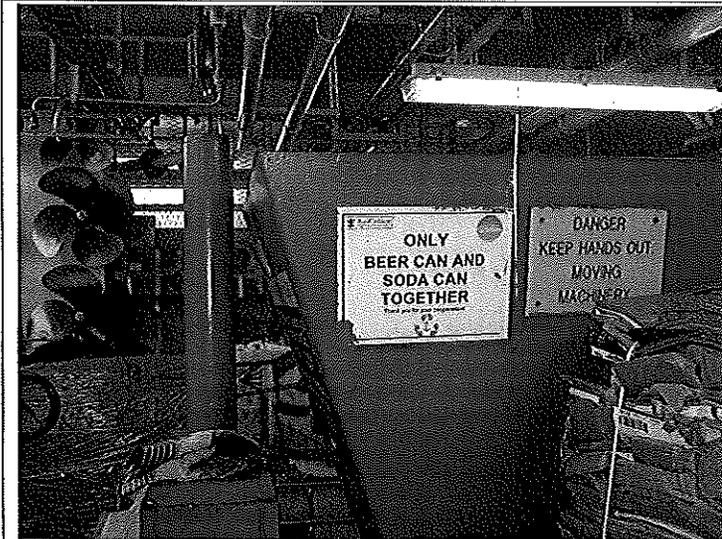


PHOTO #:31 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310042
DESCRIPTION: CAN COMPACTOR



PHOTO #:32 AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310043
DESCRIPTION: OXIVER – FOR CLEANING



PHOTO #33 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310044
DESCRIPTION: SCRAP METAL COLLECTION AND USED COOKING OIL



PHOTO #34 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310045
DESCRIPTION: FOOD WASTE FOR CANADIAN COMPOSTING

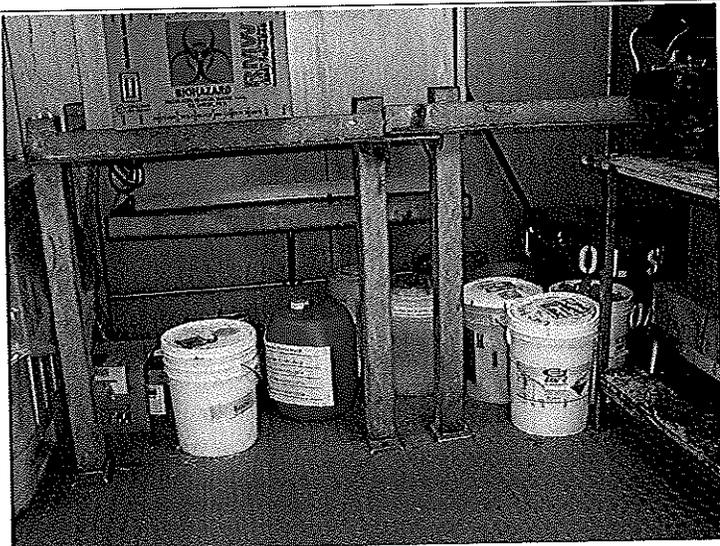


PHOTO #35 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310047
DESCRIPTION: HAZARDOUS WASTE

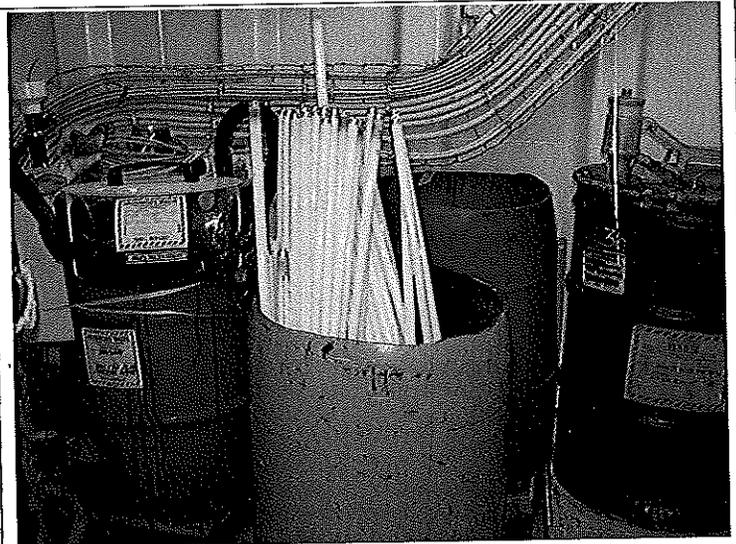


PHOTO #36 AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310048
DESCRIPTION: BULB CRUSHER AND AEROSOL PUNCTURER

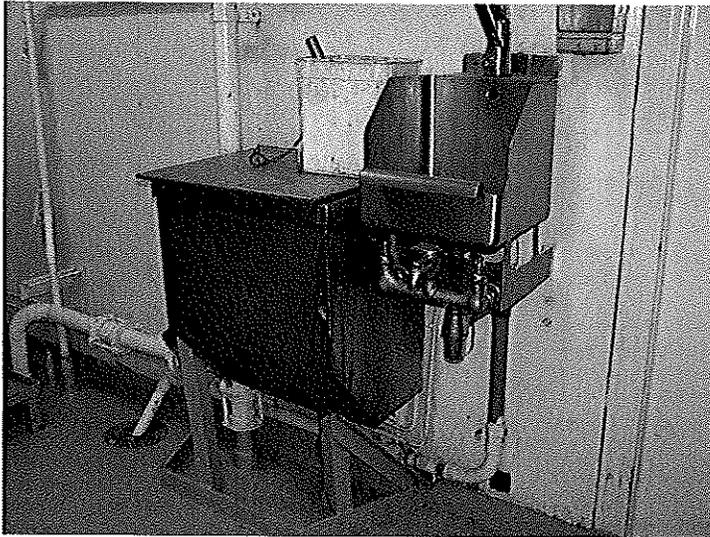


PHOTO #:37 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.:P8310049
DESCRIPTION: OILY BILGE COLLECTOR

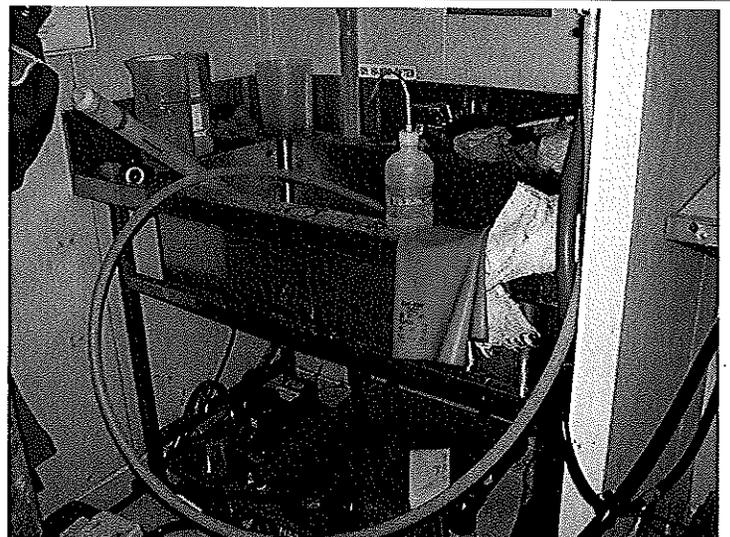


PHOTO #:38 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310050
DESCRIPTION: PHOTO WASTE SINK AREA

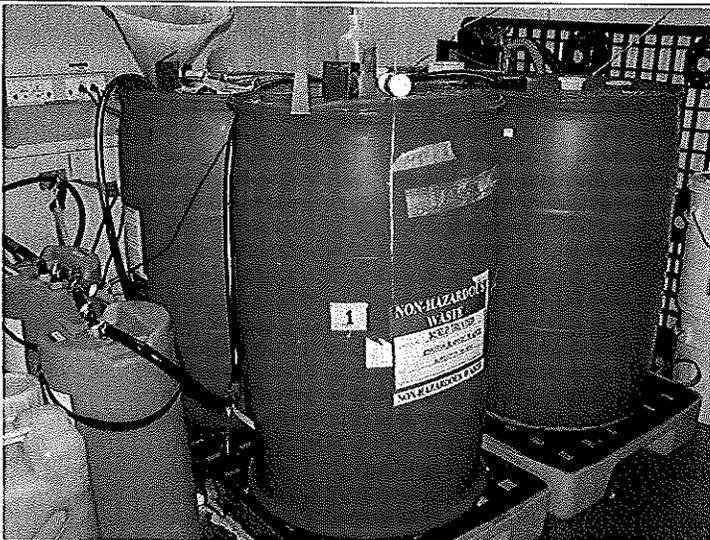


PHOTO #:39 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310051
DESCRIPTION: PHOTO WASTE SILVER RECOVERY

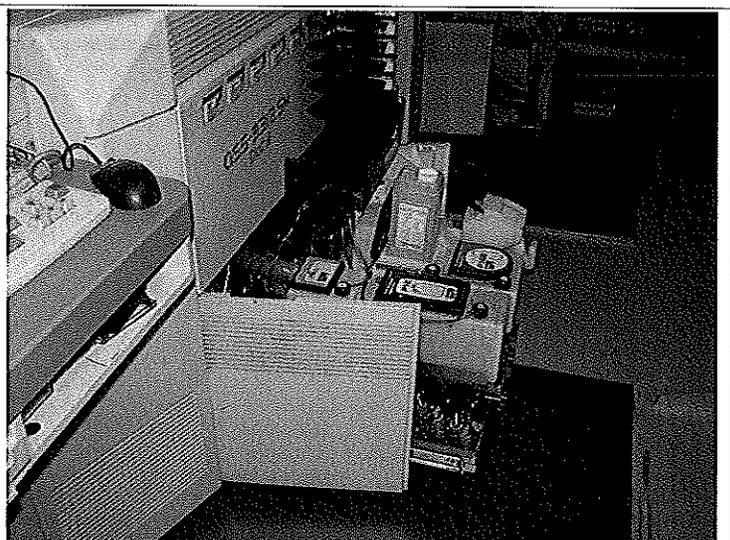


PHOTO #:40 AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.: P8310052
DESCRIPTION: PHOTO WASTE CARTRIDGES

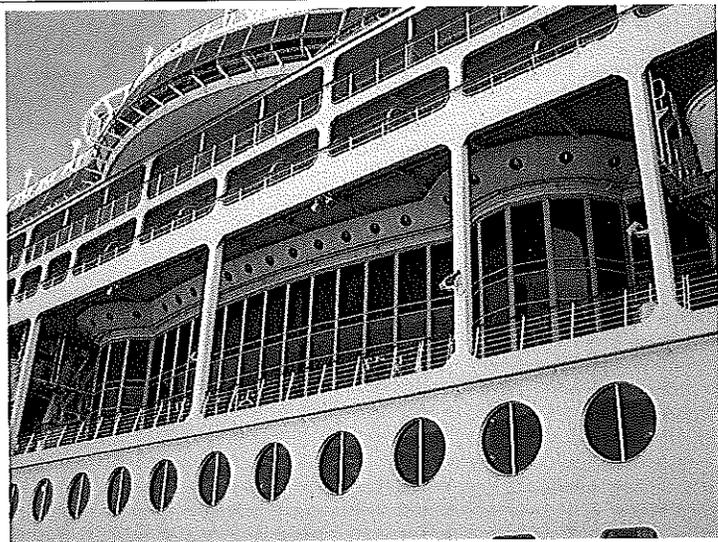


PHOTO #:41 DATE: AUGUST 31, 2012
TAKEN BY: AMY JANKOWIAK FILE No.:P8310053
DESCRIPTION: VESSEL

