



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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Inspection Date August 28, 2021	Permit Number NA	County King	Receiving Waters Marine Waters	Ecology Inspector Evan Dobrowski & Amy Jankowiak
Entry Time: 09:08	Photos Taken <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Samples Taken <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Inspection Announced <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Discharges to: <input checked="" type="checkbox"/> Surface Water <input type="checkbox"/> Ground Water <input type="checkbox"/> Dewater <input type="checkbox"/> POTW
Exit Time: 11:58				

Name and Location of Site Inspected: NORWEGIAN Encore, Norwegian Cruise Line Pier 66 Seattle, Washington	Additional Participants/Inspectors:
On-Site Representative(s): Name/Title/Phone/e-mail Spiros Zervopoulos, Environmental Officer	
Responsible Official(s): Name/Title/Address/Phone/e-mail Sarah Ferguson-Brown, Director, Environmental Operations Norwegian Cruise Line Holdings, Ltd. 7665 Corporate Center Drive Miami, FL 33126 305-436-4349; sbrown@nclcorp.com	Other Facility Data: Notification made to Sarah Brown on August 27, 2021 Flag – Bahamas IMO #9751511

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: NOT APPLICABLE Trigger Level for Early Alarm: NOT APPLICABLE Trigger Level for Shutdown: NOT APPLICABLE 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:	

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

<input checked="" type="checkbox"/>	Dry-Cleaning Wastes and Byproducts (fluids, sludge, filter materials...) Managed Properly (PERC – haz waste – landed ashore)	Dry cleaning protocols are consistent with MOU requirements.
<input checked="" type="checkbox"/>	Unused/Outdated Pharmaceuticals Managed Properly (safely disposed of)	Unused or outdated pharmaceuticals management protocols are consistent with MOU requirements.
<input checked="" type="checkbox"/>	Fluorescent and Mercury Vapor Lamp Bulbs Managed Properly (prevent release of mercury)	Fluorescent and mercury vapor lamp bulbs protocols for management are consistent with 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 management protocols are consistent with MOU requirements.
<input checked="" type="checkbox"/>	Incinerator Ash Managed Properly and minimized volume (haz waste segregation and annual testing)	Incinerator ash management is consistent with MOU requirements.
<input checked="" type="checkbox"/>	Oily Bilge Water Managed Properly (<15 ppm, no visible sheen and underway)	Oily bilge water protocols are consistent with 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)	The vessel employs ballast water exchange outside 200 nm and treatment.
<input checked="" type="checkbox"/>	OCNMS rules and regs followed	The discharge protocols are consistent with MOU requirements and are not to occur in OCNMS waters.

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 protocols are consistent with MOU requirements.
<input checked="" type="checkbox"/>	How is maintenance performed on the outside of the vessel (paint chipping, painting, etc)	Outside vessel maintenance protocols are consistent with MOU requirements.
<input checked="" type="checkbox"/>	Sculleries and Galleys – type of detergents and degreasers used (phosphate free and non-toxic)?	Restaurants and galleys use detergents and degreasers that are non-toxic and phosphate free.
<input checked="" type="checkbox"/>	How are food waste discharges handled (prevention of erroneous materials)?	Food waste discharge protocols are consistent with MOU requirements and records reviewed show no discharges in MOU related waters.
<input checked="" type="checkbox"/>	Medical sinks/floor drains, chem. stor areas wastes go where (plugged, blackwater, bilge)?	Medical sinks/floor drains are reported as connected to Blackwater.
<input checked="" type="checkbox"/>	Where is pool and spa water discharged? Dechlorinated/debrominated and underway?	Pool and spa water protocols are consistent with MOU requirements.
<input checked="" type="checkbox"/>	What type of fuel is used and percent sulfur content?	<0.1% sulfur fuel content used when in MOU waters or EGCS treated equivalent is used throughout the route.

Other:

Section F: Sampling Results

Parameter	Results
Biochemical Oxygen Demand 5-Day (BOD ₅)	NOT APPLICABLE
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 Norwegian Cruise Line's NORWEGIAN ENCORE on August 28, 2021. Evan Dobrowski, Ecology NWRO-WQ, assisted in conducting the inspection. The main contact on board the NORWEGIAN ENCORE was Spiros Zervopoulos, Environmental Officer (EO) for the vessel. Prior notification of the visit was given on August 27, 2021 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 NORWEGIAN ENCORE is not approved to discharge wastewater in MOU waters.

The NORWEGIAN ENCORE launched in 2019, and is 1,094 feet long with about a 28-foot draft. The passenger capacity is approximately 4,000 with a crew capacity of about 1,700. The vessel has five engines, two azipods and 3 thrusters for propulsion. The NORWEGIAN Encore is scheduled for 12 port calls in Seattle for weekly, week long cruises to Alaska between August 7, 2021 and October 23, 2021.

Inspection

We arrived at the cruise terminal at Pier 66 and began by following COVID protocols. After receiving instructions, we boarded the ship at 9:08 a.m. and began with introductions and a plan for the day with Spiros Zervopoulos, EO. We started in the Engine Control Room (ECR) and discussed various waste streams and discharge protocols and locations of discharges with Spiros Zervopoulos and Angelo Iannello (Chief Engineer) along with additional staff. We viewed records and discussed systems and protocols. We then viewed the Exhaust Gas Cleaning System (EGCS), bilge treatment, and the Scanship advanced wastewater treatment system (AWTS) for blackwater and graywater treatment. We then toured the food waste, laundry, garbage room material sorting, and hazardous waste areas. The inspection was then finalized with a brief debriefing and we disembarked the vessel at 11:58 p.m.

Discharge Types and Protocols in MOU waters, Washington State waters or the Olympic Coast National Marine Sanctuary (OCNMS) (MOU related waters):

The discharge protocols are established at the start of the Seattle-Alaska season with voyage planning, meetings and trainings. A passage Plan is created for each stretch of the voyage (example: Ketchikan to Seattle August 26, 2021-August 28, 2021, as attached) The Passage Plan includes each discharge type, the location of allowed discharges for that type, the planned estimated start and stop of each discharge type as well as remarks on local requirements. The Passage Plan for the current voyage depicts no discharges of any type listed (sewage or graywater, biosludge, food waste, treated bilge water, incinerator operations, Exhaust Gas Cleaning System, ballast water, additional operations such as ash scattering or soot blowing) within MOU related waters. In addition, there are regular departure meetings to go over the near-term plan, including Bridge staff and the EO. As the vessel travels into the Strait of Juan de Fuca from Alaska (photo #02), all discharge valves to water are shut off 12 miles outside the OCNMS. The vessel does not use the Canadian exemptions and holds all water discharges throughout the voyage into and out of Seattle to the sea. Discharges are allowed again after exiting the Strait and more than 12 miles out to sea.

When in an area of allowed discharge, the protocol starts with the Bridge staff notifying the ECR staff that they are in an area of allowed discharge. A one-hour notice is provided to ECR staff when coming within 12 miles for discharges to stop. All discharges are recorded both on paper logbooks as well as in their electronic NAPA system. Comparisons of the two data points are completed.

For black water and gray water, the latitude and longitude coordinates are recorded in the *Sewage and Graywater Discharge Record Book* (Sewage/Graywater Log), which is both manually on paper, and entered into NAPA, and was reviewed for recent discharges. The date, time and location of both the start and the stop of the discharges are recorded, along with the volume, discharge type, flow rate, and speed. The recent Sewage/Graywater Logs were reviewed and all discharges appeared to be outside of the MOU related waters. Their graphic of discharge ports in the logbook was nicely detailed.

Discharge Types

Blackwater and Graywater Scanship system (photo #04):

Black water moves by vacuum to the bio waste silos (photo #14). From the silos, it goes to the drum screens which provide pre-screening. Blackwater liquid goes to the drum screens then enters the biosteps (bioreactor). Graywater is collected in mixing tanks and then mixes with blackwater at the biosteps. Solids from the pre-screen sent to the bioresidue tank. Gray water consists of sink, shower, galley water and laundry water. Biological treatment (biofilm on rotating plastic pieces with air added) occurs in the Biostep bioreactor.

After the biostep, polymers and coagulants are added. Liquid then moves to the Dissolved Air Flotation (DAF) tanks for clarification. 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 bioresidue tank which is discharged outside of MOU related waters and more than 12 miles. Liquid flow then moves to the polishing filters (photos #15 and #16) for ultrafiltration.

Flow then moves to ultraviolet (UV) light disinfection (photo #11). There are two large UV units, which one can be in standby for cleaning. The UV system is alarmed for bulb failure and intensity. Flow from the UV units either is discharged directly overboard via the discharge port (if in an area of allowed discharge) or is re-circulated to the mixing tanks.

Total suspended solids (TSS) (equivalent to turbidity) is monitored continuously at UV disinfection. At the time of the inspection, the TSS was 3.7 mg/l. If TSS exceeds 30 mg/l, the system automatically stops discharging and holds. PH is also monitored for adjustments. There are several monitors throughout the system that are used to access controls as well as in the ECR. The vessel conducts its own laboratory monitoring for process control, splits samples with a land-based lab for comparability. The vessel is approved to discharge continuously in Alaska, which has additional monitoring requirements.

Bilge:

Oily bilge water is collected to the dirty bilge-settling tank and is first treated with a Marinfloc oily water separator system (OWS) (photo #07) which includes a centrifugal separator. The oily bilge is treated to less than 15 parts per million (ppm) oil content. Prior to discharge, the clean bilge is sent through "white box" (photo #10) which can't be bypassed and doesn't allow discharges of greater than 15 ppm. The treated oily bilge water is then discharged outside of MOU related waters at a maximum of 15 ppm, but typically 3-7 ppm, and outside of MOU related waters. The Chief Engineer has the one key to the white box, and discharges of clean bilge and offloads of oily sludge are recorded in the Oil record Book. No bypasses or re-routing around the OWS or white box has been known to occur.

Ballast and Pools:

Ballast water is treated on board as necessary with a filter and UV treatment system with exchanges done at greater than 200 nautical miles.. There are four main pools and 10 Jacuzzis. They are all fresh water and all discharges are done outside 12 miles after de-chlorination and pH balancing (outside MOU related waters).

Food Waste:

Food waste is sorted at the source (photo #26) in galleys with a screen prior to the pulper (photo #27). Food is pulped to less than 25 nm and discharged outside of MOU related waters. The pulper is equipped with a magnet to collect any metal silverware or other metal materials that may accidentally make it down the drain. Galleys use Ecolab phosphate free and non-toxic detergents and degreasers. Food waste discharges are logged in the NAPA system and Garbage Record Book.

Outside Vessel:

Deck wash is done with NPDES VGP allowed materials (non-toxic, phosphate free, biodegradable cleaners) and processes and in international waters. Outside vessel maintenance such as paint chipping and painting would only be done at port with Port of Seattle permission following best management practices. Outside vessel maintenance has not been occurring at the Port of Seattle by this vessel this season.

Laundry:

Dry cleaning is done on board with a wet eco-friendly system (DF 2000) with minimal, less toxic waste (photo #28) than the old dry cleaning systems. Laundry water is sent to the Scanship treatment system and discharged outside of MOU related waters.

Medication:

Unused or outdated medications are sent back to manufacturer/pharmacy or discharged outside of 12 miles and MOU related waters and narcotics are destroyed when outside 12 miles (outside MOU related waters). Red bag waste in the medical facility is incinerated or offloaded as hazardous waste. Sharps are sent to the hazardous waste locker for off-loading as bio-hazardous waste. Drains from the medical facility go to the blackwater tanks.

Solid and Hazardous Waste:

Photo waste (photo #24) goes through a silver recovery unit with offloads when silver is less than 5 ppm. Tests are logged and kept. X-rays are done digitally without any waste. Fluorescent bulbs are crushed on board with a mercury vapor removal system (bulb crusher) (photo #23) or offloaded. Filters are offloaded as hazardous waste. Hazardous waste materials are stored separately and offloaded. Solid waste (garbage, recyclables (photo #20), etc) is collected, sorted (photo #19), and either reused, recycled, incinerated (photo #20) or off-loaded to shore as appropriate. Waste minimization efforts are done by tracking, material usage analysis, and minimizing materials such as single-use plastics. The vessel is limiting plastic with biodegradable bottles and reusable water bottles for passengers. Solid and hazardous waste is offloaded in Seattle during this route this season using Clean Harbors and Waste Management. Hazardous waste offload records were reviewed. The incinerator is used primarily for cardboard that can't be recycled and some soft plastics. Incinerator ash is offloaded after testing as non-hazardous waste.

EGCS:

ECA fuel-sulfur compliance is achieved either through the use of 0.1% sulfur content fuel when in MOU waters, or with higher sulfur heavy fuel oil (HFO) treated by the EGCS to achieve equivalent emissions. Marine gas oil (MGO) is typically used when the EGCS is not in use. The vessel is also equipped for shore power, though shore power is not available at Pier 66 in Seattle. The vessel's protocol is to not discharge EGCS washwater in MOU related waters and hasn't discharged at all this season on the Seattle/Alaska route. The vessel was bunkering fuel (photo #03) during the inspection. During the inspection one of the five engines was on EGCS with HFO in closed mode, with all water from the EGCS being held and not discharged. The vessel uses a Yara Marine hybrid EGCS. The hybrid system can operate in both open and closed loop. The closed loop includes bleed-off water which can be held in MOU related waters. Water is sent up the stack and spray nozzles clean the exhaust and send the water back down to a process tank and onto filtration (photo #05) before any discharge. In the open-loop mode, the volume of water is too high for filtration for all of the water (700-800 cubic meters/hour). Filtered soot is collected and offloaded as hazardous waste. In closed-mode, the water is recirculated back through the system until bleeding off is necessary. Monitoring is done of both the air exhaust as well as the discharge water. A continuous emissions monitoring system (CEMS) (photo #06) measures pH, turbidity, PAH, and temperature. The monitors depicted a pH of 5.2 at the time of the inspection in closed loop without discharge.

Conclusions and Recommendations

The protocols for discharges are clear. Records were orderly and appeared consistent with the MOU. The treatment systems appear to be operating well.

Attachments:

- Photographs
- Passage Plan

Copies to:

- Spiros Zervopoulos, EO, Norwegian Encore
 - Mark Toy, Health
 - Donna Spalding, CLIA-NWC
 - Alex Adams, Port of Seattle
 - Amy Jankowiak, Ecology
 - Evan Dobrowski, Ecology
- Central Files: Norwegian Cruise Line – NORWEGIAN Encore; WQ 6.1

Section H: Signatures

<u>Name and Signature of Inspector:</u>	<u>Agency/Office/Telephone:</u>	<u>Date</u>
Amy Jankowiak, Compliance & Technical Assistance Unit Supervisor	Department of Ecology Northwest Regional Office Water Quality Program 206-594-0165	August 30, 2021
Evan Dobrowski, Stormwater & Maritime Compliance Specialist	Department of Ecology Northwest Regional Office Water Quality Program 206-594-0175	August 30, 2021

**PHOTO ADDENDUM – NORWEGIAN ENCORE
NORWEGIAN CRUISE LINE
AUGUST, 28, 2021**



Photo # 1 Image: IMG_0195 Date: 8/28/2021
Taken by: Evan Dobrowski
Description: EGCS soot bag

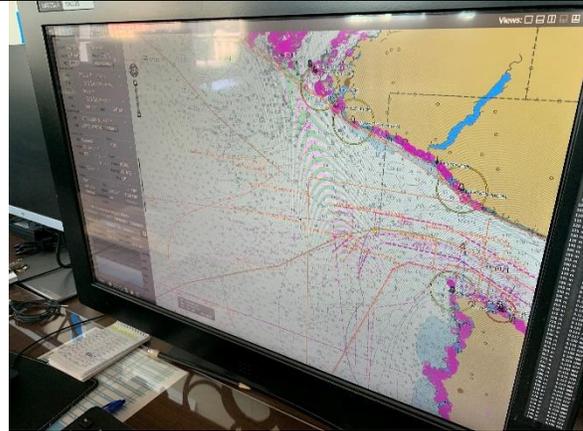


Photo # 2 Image: IMG_0093 Date: 8/28/2021
Taken by: Amy Jankowiak
Description: Bridge – Navigation map



Photo # 3 Image: IMG_0094
Date: 8/28/2021
Taken by: Amy Jankowiak
Description: Bridge – View of bunkering Fuel

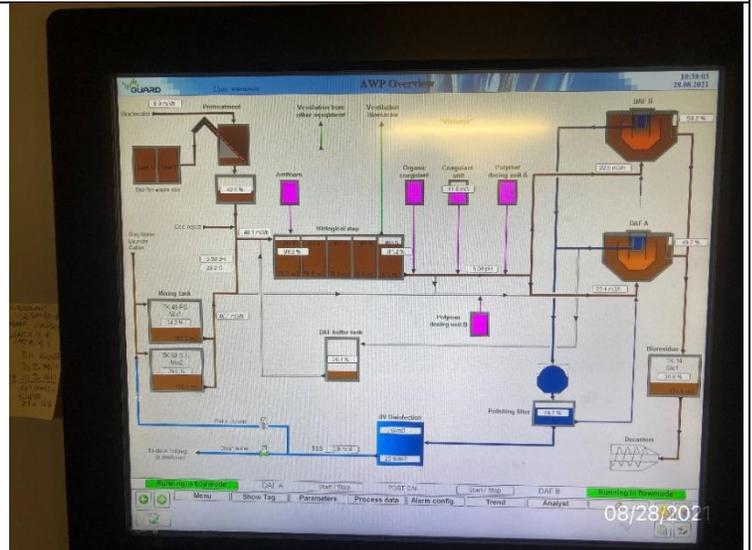


Photo # 4 Image: IMG_0205 Date: 8/28/2021
Taken by: Evan Dobrowski
Description: Scanship Schematic

PHOTO ADDENDUM – NORWEGIAN ENCORE
NORWEGIAN CRUISE LINE
AUGUST, 28, 2021



Photo # 5 Image: IMG_0194 Date: 8/28/2021
 Taken by: Evan Dobrowski
 Description: EGCS – soot filters

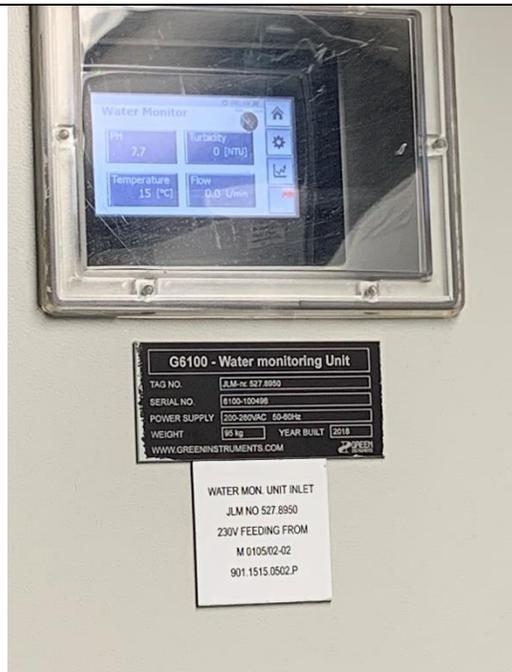


Photo # 6 Image: IMG_0057 Date: 8/28/2021
 Taken by: Amy Jankowiak
 Description: EGCS – Continuous Emissions Monitoring System (CEMS)



Photo # 7 Image: IMG_0188 Date: 8/28/2021
 Taken by: Evan Dobrowski
 Description: Bilge – Marin Floc oily water separator (OWS)



Photo # 8 Image: IMG_0049 Date: 8/28/2021
 Taken by: Amy Jankowiak
 Description: Bilge – ~~MarinFloc~~ Marin Floc system

PHOTO ADDENDUM – NORWEGIAN ENCORE
NORWEGIAN CRUISE LINE
AUGUST, 28, 2021



Photo # 9 Image: IMG_0206 Date: 8/28/2021
Taken by: Evan Dobrowski
Description: Scanship – Bioreactor top of tank



Photo # 10 Image: IMG_0193 Date: 8/28/2021
Taken by: Evan Dobrowski
Description: Bilge – White Box



Photo # 11 Image: IMG_0202 Date: 8/28/2021
Taken by: Evan Dobrowski
Description: Scanship UV



Photo # 12 Image: IMG_0058 Date: 8/28/2021
Taken by: Amy Jankowiak
Description: EGCS Seawater piping

PHOTO ADDENDUM – NORWEGIAN ENCORE
NORWEGIAN CRUISE LINE
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Photo # 13 Image: IMG_0060 Date: 8/28/2021
Taken by: Amy Jankowiak
Description: Engine Room



Photo # 14 Image: IMG_0066 Date: 8/28/2021
Taken by: Amy Jankowiak
Description: Scanship Biostep silos (cylindrical)



Photo # 15 Image: IMG_0071 Date: 8/28/2021
Taken by: Amy Jankowiak
Description: Scanship polishing filters



Photo # 16 Image: IMG_0209 Date: 8/28/2021
Taken by: Evan Dobrowski
Description: Scanship polishing filters - inside

PHOTO ADDENDUM – NORWEGIAN ENCORE
NORWEGIAN CRUISE LINE
AUGUST, 28, 2021



Photo # 17 Image: IMG_0072 Date: 8/28/2021
Taken by: Amy Jankowiak
Description: Medical Waste



Photo # 18 Image: IMG_0074 Date: 8/28/2021
Taken by: Amy Jankowiak
Description: USDA & other waste storage



Photo # 19 Image: IMG_0077 Date: 8/28/2021
Taken by: Amy Jankowiak
Description: Garbage Room (GR)



Photo # 20 Image: IMG_0078 Date: 8/28/2021
Taken by: Amy Jankowiak
Description: GR – compactors

PHOTO ADDENDUM – NORWEGIAN ENCORE
NORWEGIAN CRUISE LINE
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Photo # 21 Image: IMG_0080 Date: 8/28/2021
Taken by: Amy Jankowiak
Description: GR – Glass Crusher



Photo # 22 Image: IMG_0085 Date: 8/28/2021
Taken by: Amy Jankowiak
Description: GR – Aerosol Puncture System



Photo # 23 Image: IMG_0082 Date: 8/28/2021
Taken by: Amy Jankowiak
Description: GR – Hazardous Waste Stor – Bulb Crusher



Photo # 24 Image: IMG_0076 Date: 8/28/2021
Taken by: Amy Jankowiak
Description: GR – Hazardous Waste Stor – Photo Waste

PHOTO ADDENDUM – NORWEGIAN ENCORE
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Photo # 25 Image: IMG_0063 Date: 8/28/2021
Taken by: Amy Jankowiak
Description: Food Waste Collection tank



Photo # 26 Image: IMG_0046 Date: 8/28/2021
Taken by: Amy Jankowiak
Description: Galley – Pulper screen



Photo # 27 Image: IMG_0045 Date: 8/28/2021
Taken by: Amy Jankowiak
Description: Galley - Pulper



Photo # 28 Image: IMG_0088 Date: 8/28/2021
Taken by: Amy Jankowiak
Description: Laundry – Chem storage