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

P.O. Box 330316
Shoreline, WA 98133

Phone: (425) 213-4230

| Inspection Date | Permit Number | County | Receiving Waters | Ecology Inspector |
|---|---|---|---|---|
| May 15, 2024 | NA | King | Marine Waters | Evan Dobrowski |
| **Entry Time 9:00AM** | **Photos Taken** | **Samples Taken** | **Inspection Announced** | **Discharges to:** ☒ Surface Water |
| **Exit Time 11:30AM** | ☒ Yes ☐ No | ☐ Yes ☒ No | ☒ Yes ☐ No | ☐ Ground Water ☐ Dewater ☐ POTW |

**Name and Location of Site Inspected:**
QUAMTUM OF THE SEAS, Royal Caribbean Cruises Ltd.
Pier 91
Seattle, Washington

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

**Additional Participants/Inspectors:**
Jen Baptist, Ecology

**Responsible Official(s):** ***Name/Title/Address/Phone/e-mail***
John Hanley, Manager, Environmental Regulatory Compliance & Sustainability
Royal Caribbean Cruises Ltd.
1050 Caribbean Way, Miami, FL 33132
e: jhanley@rccl.com

**Other Facility Data:**
Notification made to John Hanley on April 29, 2024
Flag - Bahamas
IMO # 9549463

## 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:<br>Last Calibration:<br>Trigger Level for Early Alarm: Trigger Level for Shutdown:<br>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:<br>Last Calibration:<br>Trigger Level for Early Alarm: Trigger Level for Shutdown:<br>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 found to be in the OCNMS, MOU waters or Washington state waters (MOU related waters). Further review will be done following the end of the season. |
| ☒ | Wastewater Discharges protocol per MOU and managed properly | The discharge protocols are consistent with MOU requirements to not occur in MOU related waters. |
| ☒ | Residual Solids Managed Properly/Disposal Protocol per MOU | Residual solids protocols are consistent with MOU requirements. |
| ☒ | Hazardous Waste Managed Properly | Hazardous protocols are consistent with MOU requirements. |
| ☒ | WA Hazardous Waste Guidelines Followed (Appendix vii) | Hazardous waste protocols are consistent with MOU requirements. |

| | | |
|---|---|---|
| ☒ | Solid Waste Managed Properly (zero garbage discharge) | Solid waste protocols are consistent with MOU requirements. Solid waste discharge records were reviewed and are maintained properly. No discharges or releases of solid wastes were found to be inconsistent with MOU requirements. |
| ☒ | Photo/X-Ray Waste Managed Properly (fluids, cartridges,…) and landed ashore | Photo and x-ray waste protocols are consistent with MOU requirements. There is no Photo or x-ray waste on this vessel due to digital development. |
| ☒ | Dry-Cleaning Wastes and Byproducts (fluids, sludge, filter materials…) Managed Properly (PERC – haz waste – landed ashore) | Dry cleaning protocols are consistent with MOU requirements. There is no dry cleaning on this vessel. |
| ☒ | Unused/Outdated Pharmaceuticals Managed Properly (safely disposed of) | Unused or outdated pharmaceuticals are disposed of either by incineration via red medical bag wastes and witnessed by lead nurse or are brought ashore as hazardous waste when necessary. Expired IV fluids, saline solutions, and injectables are discarded down medical center drains. |
| ☒ | 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. |
| ☒ | 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 management protocols are consistent with MOU requirements. |
| ☒ | Incinerator Ash Managed Properly and minimized volume (haz waste segregation and annual testing) | Incinerator ash management is consistent with MOU requirements. |
| ☒ | Oily Bilge Water Managed Properly (<15 ppm, no visible sheen and underway) | Oily bilge water protocols are consistent with 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) | The vessel employs ballast water treatment in MOU related waters consistent with MOU requirements. |
| ☒ | OCNMS rules and regs followed | The discharge protocols are consistent with MOU requirements and are to not occur in OCNMS waters. |
| **Additional General Questions** | | |
| ☒ | 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. |
| ☒ | How is maintenance performed on the outside of the vessel (paint chipping, painting, etc) | Outside vessel maintenance protocols are consistent with MOU requirements. |
| ☒ | 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. |
| ☒ | How are food waste discharges handled (prevention of erroneous materials)? | Food waste discharge protocols are consistent with MOU requirements. |
| ☒ | Medical sinks/floor drains, chem. stor areas wastes go where (plugged, blackwater, bilge)? | Medical sinks/floor drains are reported as connected to blackwater. |
| ☒ | Where is pool and spa water discharged? Dechlorinated/debrominated and underway? | Pool and spa water protocols are consistent with MOU requirements. |
| ☒ | What type of fuel is used and percent sulfur content? | <0.1% sulfur fuel content or EGCS treated equivalent is used throughout the route. |

**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

Evan Dobrowski, Washington State Department of Ecology (Ecology) Northwest Regional Office, Water Quality Program (NWRO-WQ) conducted the inspection of the Royal Caribbean Cruises Ltd. QUANTUM OF THE SEAS on May 13, 2024. The main contact on board the QUANTUM OF THE SEAS was Liang Hong, Environmental Officer (EO) for the vessel. Jen Baptist, Ecology Water Quality Program also joined us for the inspection. Prior notification of the visit was given on April 29, 2024, 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 QUANTUM OF THE SEAS is not approved to discharge wastewater in MOU waters.

The QUANTUM OF THE SEAS launched in August of 2014 and had its maiden voyage in November of 2014. The cruise ship is 1,141 feet long and 136 feet wide with a 29-foot draft. The passenger capacity is approximately 4180 with about 1,500 crew. There are 16 decks with four engines and two Azipods. The QUANTUM OF THE SEAS is scheduled for 22 port calls in Seattle for weekly cruises to Alaska between May 6, 2024, and September 30, 2024.

Inspection

We arrived and boarded the ship (photos #01 and #02) at 9:00 a.m. and began with introductions and a plan for the day with Liang Hong, EO. We discussed various waste streams and discharge protocols as well as locations of discharges in the Engine Control Room (ECR). In the ECR we viewed records (photo #27, 28, and 29) and screen shots (photos # 10, 26, and 33) to assist with the discussion of the treatment systems. We toured the AWP, food waste system and bilge treatment. We then looked at the EGCS up the tower and then the EGCS bleed-off treatment unit. We finalized with a brief debriefing and disembarked the vessel at 11:30 a.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 start with voyage plans (photo #34, 35, and 36) for each itinerary prior to that route. A matrix is developed for each route upon a detailed review of locations for allowed discharges, holding ability of the various wastestreams, and other requirements. The voyage plan for the Seattle/Alaska route details no discharges in MOU related waters. Discharges are stopped at about 13 miles prior to MOU related waters. This vessel stops in Victoria prior to Seattle. Discharges are resumed 13 miles out of MOU related waters or per Canadian requirements. Maps (photo #35 and 36) show the area of stopped discharge prior to entering the OCNMS and Strait of Juan de Fuca.

If a discharge is to occur, the Bridge contacts the ECR staff when nearing a discharge location. Confirmations are made between the Bridge and ECR and discharge ports are opened. All discharges are logged in the NAPA system as well as in the ECR for certain discharge types. Treated sewage and graywater discharges are allowed in Canadian waters and then off again prior to MOU related waters. The vessel is approved for discharge in Alaska. For black water and gray water, the latitude and longitude coordinates are recorded in the *Sewage and Graywater Discharge Record Book* (photo #27, 28, and 29). The date, time and location of both the start and the stop of the discharges are recorded, along with the discharge port, volume, effluent type, flow rate, and speed. The EGCS is off at about 4 nautical miles and put into closed loop per company policy.

Discharge Types

Scanship Advanced Wastewater Treatment System or Advanced Wastewater Purification (AWP):

There is one AWP on the vessel. Black water, which includes toilet waste, and infirmary drains moves by vacuum to one of five Evac collection tanks (photo #04). From the collection tanks, it goes to the screener. Solids are sent to the biowaste tank, then to the incinerator and liquid moves to a tank and is then pumped to the biostep. Gray water consists of sink, shower, galley water, laundry water and potentially pool water and is collected in one of two mixing tanks. From the mixing tanks, the liquid moves to the 5-step biostep for biological treatment (biofilm on rotating plastic pieces – air added with blowers. A defoamer can be used to control foam prior to the biostep.

After the biostep, liquid moves to a dosing unit where a mix of polymers and coagulants are added. Liquid then moves to one of two Dissolved Air Flotation (DAF) (clarification via dissolved air flotation tanks). 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 tanks and to the decanter for drying and incineration. Some solids are sent back to the biostep for biological enhancement. Liquid flow then moves to one of the two polishing filters for ultrafiltration.

Liquid flow then moves to ultraviolet (UV) light disinfection (photo #06). There are two UV units, one on standby. Flow from the UV units is either discharged directly overboard via the discharge port, or is re-circulated to the mixing tanks. Grease from the galleys is collected to prevent it from entering and interfering with the Scanship AWP.

The cruise line uses a maintenance system for work orders and maintenance. Manufacturer recommendations for maintenance of each piece of equipment is included in the system which triggers staff when maintenance is required. Total suspended solids (TSS) (equivalent to turbidity) is monitored continuously at UV disinfection, as is the W/m2 (intensity). If TSS exceeds 30 mg/l, the system automatically stops discharging and recirculates back to the mixing tank. PH is also monitored for adjustments and trigger the chemical additions of coagulant and polymer. There are several monitors throughout the system that are used to access controls as well as in the ECR. Coliform, chlorine, COD, TSS and pH is monitored regularly on board the vessel for system optimization and sampling is done an outside lab as required for Alaska DEC on this route. Random blackwater/graywater discharge records were reviewed during the inspection, and showed no discharges in MOU related waters.

Bilge:

Oily bilge water is treated with one of two Marine floc oily water separators (OWS). This includes pumping oily bilge water to a settling tank, then onto processing in the MarinFloc OWS. From there the clean bilge goes to the Clean Bilge Tank and is then discharged if in an area approved – outside of MOU related waters. A white box (photo #16) is used to only allow discharges at less than 5 ppm oil content maximum. Any treated bilge that does not meet that level is sent by y-valve to the dirty bilge tank and onto the dirty bilge settling tank for re-processing. The discharge protocol is to discharge treated oily bilge at less than 5 ppm outside of MOU related waters, at sea. The EO confirmed that he is not aware of any rerouting of oily bilge and that any staff can report concerns. Reports can be made through the staff/line or through the IMO whistleblower reporting. The OWS were off and recirculating during the inspection and not discharging.

Ballast:

Ballast water is treated on board with a separator system and UV disinfection. Stability is typically managed with the various tanks on the vessel.

Pools:

There are seven pools, and six whirlpools. Pools and whirlpools are empties outside directly overboard if outside of MOU related waters, or if necessary when inside, the water is sent to the graywater mixing tanks.

Food Waste:

Food waste is sent from the galleys to food waste holding tanks. From there, the food waste goes through a pulper – food press . The liquid from the pulper goes to the graywater mixing tanks and the AWP. The food goes to a biowaste dryer and incineration. Any food waste that can't be pulped is incinerated. A grease separator collects grease from the galleys and is combined with used cooking oil for on-shore recycling. Food waste discharges are logged in the NAPA system.

Outside Vessel:

Deck wash is done with NPDES VGP allowed materials (non-toxic, phosphate free, biodegradable cleaners) and processes. Outside vessel maintenance such as paint chipping and painting follows a SOP with the Port of Seattle and Best Management Practices are used when conducting work. It is first cleared with agents and port approval. BMPs include secondary containment for paint and two staff per painting, one to assure paint is contained.

Laundry:

Dry cleaning is not done on board. Laundry water is sent to graywater and discharged outside of MOU related waters.

Hazardous Waste and Incineration:

Hazardous waste is not offloaded in Seattle, only in Victoria on this route. Incinerators (2) are not used in port, only underway.

Medication:

Unused or outdated pharmaceuticals are sent to the incinerator for disposal. Narcotics are sent to the blackwater system in the medical facility for security and keeping the narcotics from leaving the medical facility. Drains from the medical facility go to the blackwater tanks.

Solid Waste:

Solid waste (garbage, recyclables, etc) is collected, sorted, and either reused, recycled, incinerated or off-loaded to shore in Victoria on this route as appropriate.

EGCS:

The vessel has four main engines and two emergency generators. ECA fuel-sulfur compliance is achieved either through the use of marine gas oil at about 0.01 % sulfur content (below the 0.1% sulfur content fuel ECA limit), or with higher sulfur heavy fuel oil (HFO) – typically 1.4-2.7% sulfur, treated by the EGCS to achieve equivalent emissions. The vessel was bunkering fuel (photo #01) during the inspection. It is the RCCL policy to be in closed loop within 4 nautical miles. The vessel uses a Wartsila hybrid EGCS on board which is a wet hybrid open-loop or closed-loop system to minimize the sulfur oxide emissions (SOx). There are two separate systems. In closed-loop, water is pumped from a process water tank up the scrubber. Water is sprayed at the exhaust and is sent down the tower to the process tank. A de-aeration tank is used to settle the exhaust solids. Washwater is then treated by a centrifugal solids separator. A bleed-off treatment unit is used in closed-loop which includes the addition of coagulant, caustic soda, and flocculant/polymer. The vessel has the ability to hold the bleed-off water for about 72 hours, depending on the sulfur content of the fuel and treatment. If the treated bleed-off is above the VGP limits, it recirculates for treatment. In open-loop, sweater is pumped from the seachest up the tower. A continuous monitoring system (CMS) is used to continuously monitor the discharge water, as well as influent for certain parameters. PAH, temperature, turbidity and pH are monitored at the effluent discharge. The bleed-off discharge is typically about 50 cubic meters per day ($m^3$/day), with a capacity of 153 $m^3$/day.

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

Copies to:
John Hanley, Sr. Analyst, Environmental Operations and Compliance, RCCL
Elizabeth Hackley, RCCL
Cameron Harris-Browne, RCCL
Alex Adams, Port of Seattle
Jacob Keith, Port of Seattle
Amy Jankowiak, Ecology
Evan Dobrowski, Ecology
Jen Baptist, Ecology
Central Files: Royal Caribbean Cruises Ltd – QUANTUM OF THE SEAS WQ 6.1

**Section H: Signatures**

| Name and Signature of Inspector: | Agency/Office/Telephone: | Date |
|---|---|---|
| Evan Dobrowski, Compliance Specialist<br>*Evan Dobrowski* | Department of Ecology<br>Northwest Regional Office<br>Compliance Specialist<br>425-213-4230 | July 31, 2024 |

**PHOTO ADDENDUM – QUANTUM OF THE SEAS**
**ROYAL CARIBBEAN CRUISE LINE**
**MAY 13, 2024**


Photo # 1 Image: IMG_1517 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: Vessel with bunkering barge


Photo # 2 Image: IMG_1518 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: Vessel


Photo # 3 Image: IMG_1519 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: Grease trap oil


Photo # 4 Image: IMG_1520 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: wastewater holding tanks

**PHOTO ADDENDUM – QUANTUM OF THE SEAS**
**ROYAL CARIBBEAN CRUISE LINE**
**MAY 13, 2024**


Photo # 5 Image: IMG_1521 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: Hydrotech filtration component


Photo # 6 Image: IMG_1522 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: UV treatment


Photo # 7 Image: IMG_1523 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: Treatment equipment.


Photo # 8 Image: IMG_1524 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: Continuous pH monitor

**PHOTO ADDENDUM – QUANTUM OF THE SEAS**
**ROYAL CARIBBEAN CRUISE LINE**
**MAY 13, 2024**


Photo # 9 Image: IMG_1525 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: Scanship flocculant

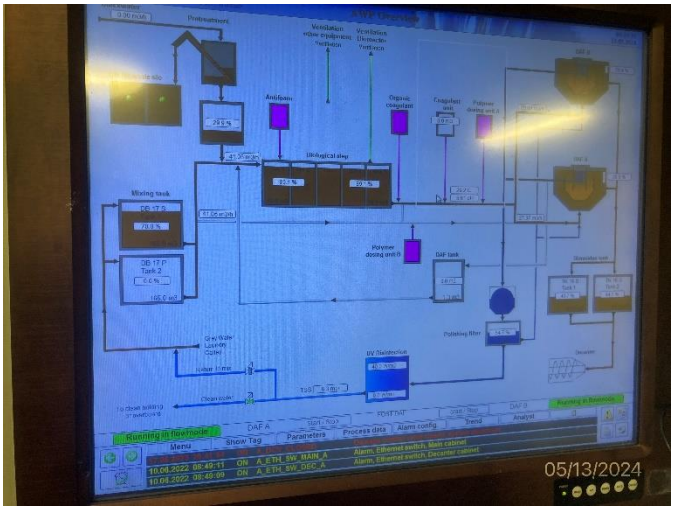


Photo # 10 Image: IMG_1526 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: Treatment system overview


Photo # 11 Image: IMG_1527 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: Discharge valve lockout system


Photo # 12 Image: IMG_1528 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: EGCS filter tank

**PHOTO ADDENDUM – QUANTUM OF THE SEAS**
**ROYAL CARIBBEAN CRUISE LINE**
**MAY 13, 2024**


Photo # 13 Image: IMG_1529 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: EGCS pump controls

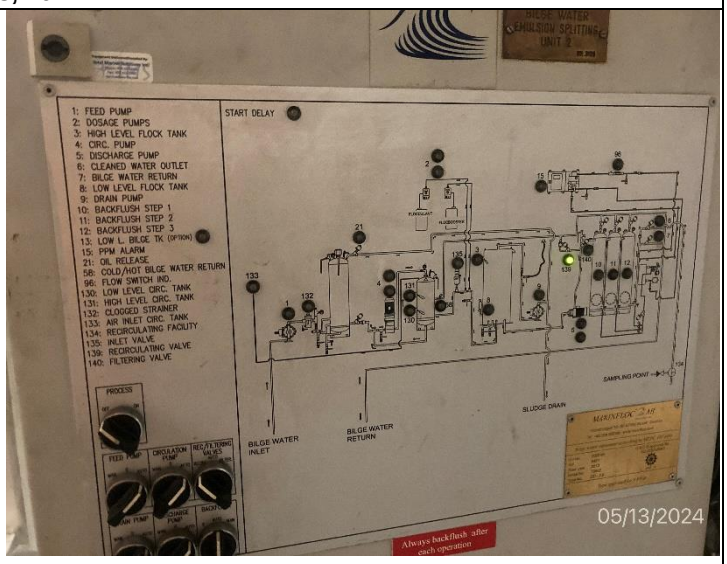


Photo # 14 Image: IMG_1530 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: Marinfloc overview

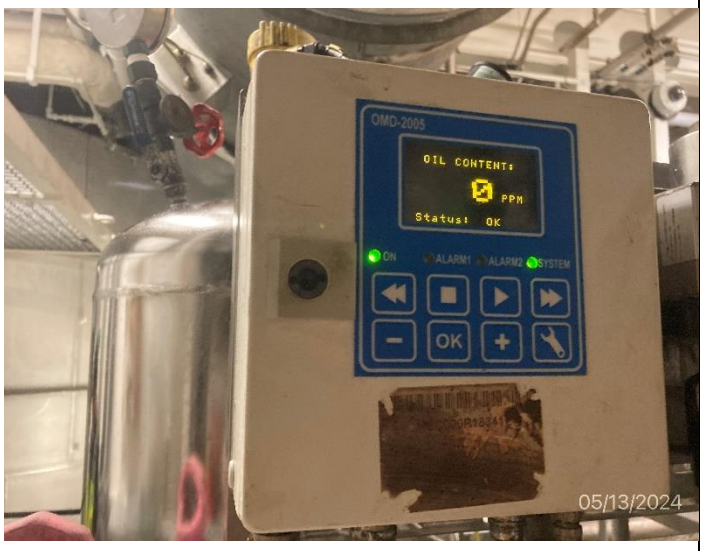


Photo # 15 Image: IMG_1531 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: OWS continuous monitor


Photo # 16 Image: IMG_1532 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: Whitebox

**PHOTO ADDENDUM – QUANTUM OF THE SEAS**
**ROYAL CARIBBEAN CRUISE LINE**
**MAY 13, 2024**


Photo # 17 Image: IMG_1533 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: Bilgewater flocculant


Photo # 18 Image: IMG_1534 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: incinerator ash collection point


Photo # 19 Image: IMG_1535 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: incinerator medical disposal requirements.

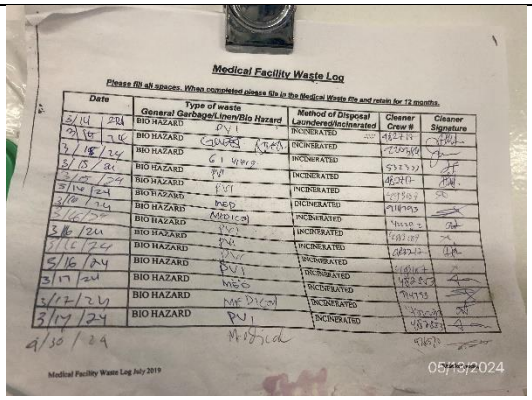


Photo # 20 Image: IMG_1536 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: Medical waste log

**PHOTO ADDENDUM – QUANTUM OF THE SEAS**
**ROYAL CARIBBEAN CRUISE LINE**
**MAY 13, 2024**


Photo # 21 Image: IMG_1537 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: Recycling center


Photo # 22 Image: IMG_1538 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: Recycling bins


Photo # 23 Image: IMG_1539 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: Recycling bins


Photo # 24 Image: IMG_1540 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: Aerosol crusher/evacuator and hazardous waste storage drums

**PHOTO ADDENDUM – QUANTUM OF THE SEAS**
**ROYAL CARIBBEAN CRUISE LINE**
**MAY 13, 2024**


Photo # 25 Image: IMG_1541 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: crushed glass storage

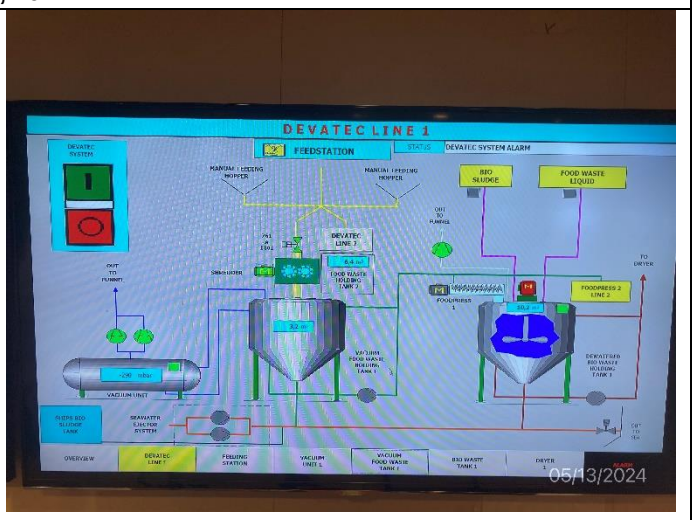


Photo # 26 Image: IMG_1542 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: food waste system overview

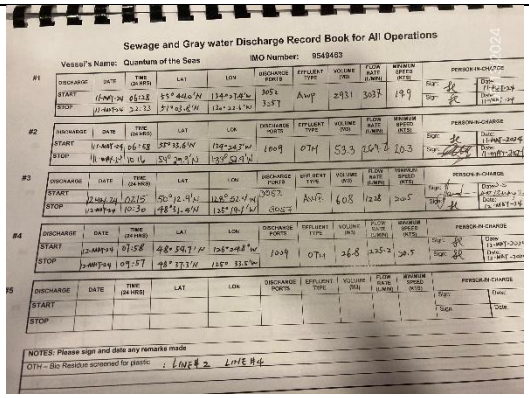


Photo # 27 Image: IMG_1543 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: discharge record book

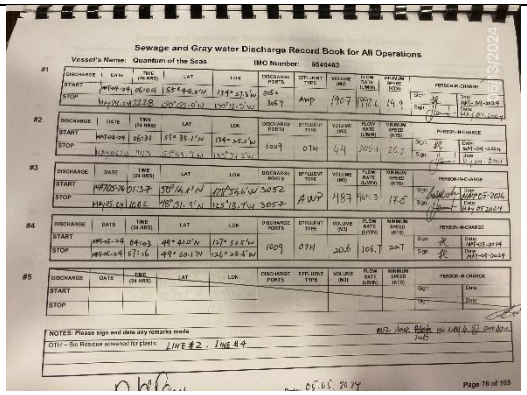


Photo # 28 Image: IMG_1544 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: discharge record book

**PHOTO ADDENDUM – QUANTUM OF THE SEAS**
**ROYAL CARIBBEAN CRUISE LINE**
**MAY 13, 2024**

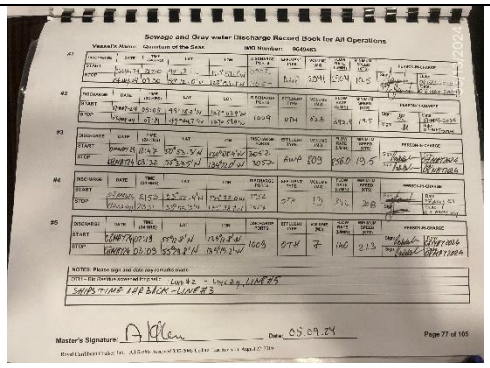


Photo # 29 Image: IMG_1545 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: discharge record book


Photo # 30 Image: IMG_1546 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: biohazard medical waste storage

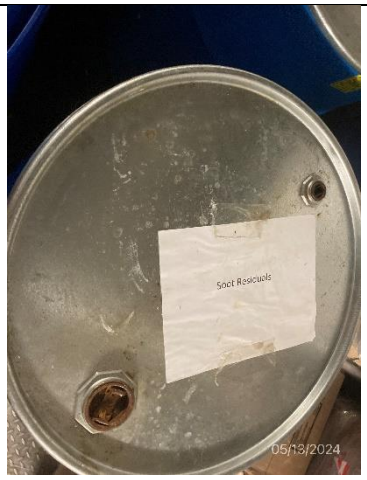


Photo # 31 Image: IMG_1547 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: incinerator ash waste storage


Photo # 32 Image: IMG_1548 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: used battery storage

**PHOTO ADDENDUM – QUANTUM OF THE SEAS**
**ROYAL CARIBBEAN CRUISE LINE**
**MAY 13, 2024**

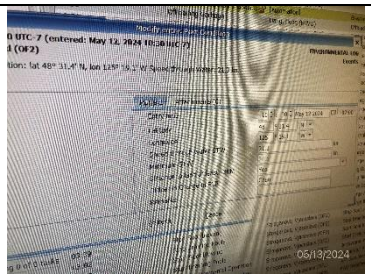

Photo # 33 Image: IMG_1554 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: NAPA log

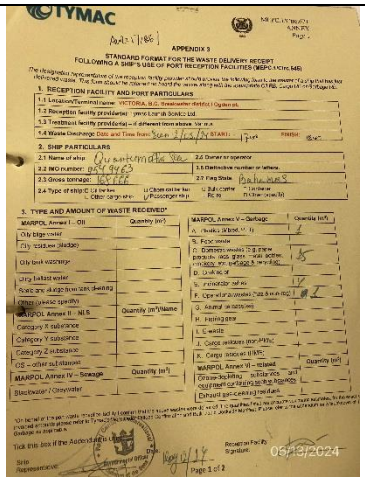


Photo # 34 Image: IMG_1555 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: Waste delivery receipt

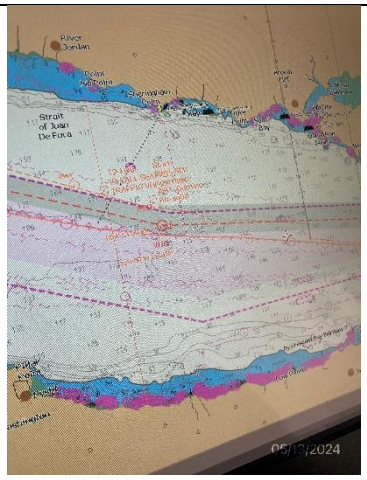


Photo # 35 Image: IMG_1556 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: Route mapping

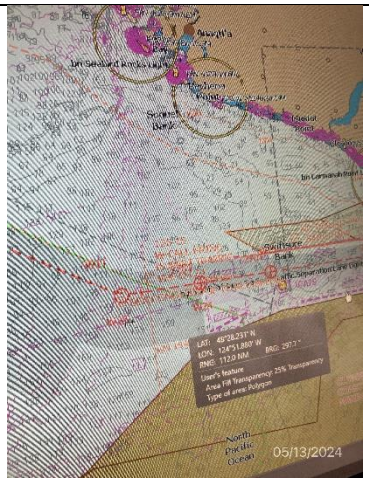


Photo # 36 Image: IMG_1557 Date: 5/13/2024
Taken by: Evan Dobrowski
Description: Route mapping