CROWLEY
People Who Know

Consolidated Additional Observations

This questionnaire combines all standard Additional Observation Questions in one condensed questionnaire.
1. SOx Emissions Controls
2. Ballast Water Project
3. Combustion Source Project
4. Food Waste Project
5. Sea Intake Project

Findings can be reported in the spaces provided for each item; feel free to use additional space for notes and information. Sketches, diagrams, photos of handwritten notes, or copies of schematics are welcome.

Several questions are checks on previous Additional Observations, check these against the previous observations. If a ship is required to have an additional observation project on a section below, skip the section below. For example if a combustion source project is required leave the section in this project blank.

A: General Information

Report Start Date:	May 29, 2018
Ocean Ranger starting report:	richard.ekstrom
Ship Name:	Princess Emerald
Ship Code:	PEM
Is this a revision of a previous report (Y/N)?	Yes

1: SOx Emissions Controls

1.1 Describe the SECA compliance plan.	The Emerald Princess has two engines with commissioned scrubbers, DG 2 and DG 3. Compliance will be achieved by a combination of the use of compliant fuels in DGs and oil fired equipment without an Exhaust Gas Cleaning Systems or use of equipment with Exhaust Gas Cleaning Systems.
1.1 Completed by:	Wesley Whittier (wesley.whittier)
1.2 How does the vessel control SOX emissions in the ECA? Provide description. If the vessel used low sulfur fuels in AK describe the fuel switches and which combustion sources are operated on low fuel sulfur, and when.	While underway in AK waters, vessel using HFO and EGCS for all three of its Wartsila DGs. Prior to arrival in port vessel conducts FO changeover from HFO and EGCS to MGO. Vessel remains on MGO for entire time in port. After departing port, vessel conducts FO changeover from MGO to HFO and EGCS. Prior to entering Special Areas, vessel conducts FO changeover from HFO and EGCS to MGO and remains on MGO for the entire time inside. After departing Special Areas, vessel conducts FO changeover back to HFO and EGCS. All FO changeovers are logged in the Fuel Changeover Record Book in ECR. Vessel also has a matrix showing when and where FO changeover is to be done during voyage.
1.2 Completed by:	Wesley Whittier (wesley.whittier)
1.3 Is the vessel operating or installing an exhaust gas scrubber system in the 2018 Alaska Cruise Season? If yes, complete section 1A. Otherwise skip to section 2.	Yes

1.a: SOx Emissions Controls

1.4 Which combustion sources are coupled with the EGCS system?	Diesel Generators #1 & #2
1.4 Completed by:	Wesley Whittier (wesley.whittier)

1.5 EGCS units make, number, model, locations, fuel limitations (sulfur %).	Make: Ecospray Model: ECO-DeSOx open loop Serial numbers: DG #2 15-027-APC-SC-0100 DG #3 15-027-APC-SC-0200 Location: DG #2 & 3; forward engine casing Fuel sulphur limit: 3.5%
1.5 Completed by:	Wesley Whittier (wesley.whittier)
1.6 Scrubber type (closed, reagent cycle, combination or hybrid open-loop effluent to seawater)?	Open loop (sea-to-sea)
1.6 Completed by:	Wesley Whittier (wesley.whittier)
1.7 System status (operational, commissioning, under construction)?	Operational
1.7 Completed by:	Wesley Whittier (wesley.whittier)
1.8 Provide a process description and waste flow/chemicals used (Gaseous emissions, waste effluent, ash, spent reagents, etc.).	Seawater is drawn from the sea chest through suction strainers by the main SW pump and the dilution pump. The suction strainers have have automatic back-flushing functionality. The main flow of the SW pump supplies SW to the tower nozzle banks where Sox absorption takes place. A demister is installed at the top of the tower to minimize mist/droplets carryover. After the nozzle, exhaust gas direct contact has taken place. The SW + Sox mixture (essentially weak sulfuric acid) drains by gravity and is collected at the bottom of the tower where it enters the discharge line. A level sensor in the collection portion of the lower tower will trigger a shutdown on high level. At this point the effluent stream is analyzed. In order to obtain the desired final effluent pH, the variable frequency drive (VFD) dilution pump output is automatically adjusted. This automatic process is based on the SO2/CO2 ratio as determined by the gas analyzer and engine load. A touchscreen control panel is located next to the VFDs, allowing the operator to set parameters, monitor the process, review the alarm log, etc. No chemical additives are used.
1.8 Completed by:	Wesley Whittier (wesley.whittier)
1.9 What scrubber process parameters are monitored (flow capacities, pH, other)?	Intake water is analyzed by Analyzer Rack One. PAH, turbidity and conductivity are monitored. Final effluent is monitored by Analyzer Rack Three. pH and dissolved oxygen are monitored. Oily discharges or sheens must be monitored visually which is undertaken by the dedicated EGCS Engineer.
1.9 Completed by:	Wesley Whittier (wesley.whittier)
1.10 For seawater intake/effluent, please provide port locations (PS/STB Frame number, etc.). Additional notes can include distance below waterline and angles.	EGCS discharge ports: starboard side; aft; frame 47; compartment 5. Vertically 2.9 and 3.6mm below waterline. Inlet piping and pumps are one deck below.
1.10 Completed by:	Wesley Whittier (wesley.whittier)

2: Ballast Water

2.1 Check the previous Additional Observation Reports (section 1.1) list of tanks used for Ballast Water storage. Including volumes and locations. List any changes.	Clean Ballast tanks: Ballast DB 18. Fr 148-172 206.4m3 Ballast DB 1 Center. 332m3

	Ballast Forepeak 748.6m3 Ballast DB 17. Fr 148-172. 208.8m3 Ballast DB 16 Fr 172-196 190.1m3 Ballast DB 15 Fr 172-196 192.5m3 Ballast DB 14 Fr 196-220 184.9m3 Ballast DB 13 Fr 196-220 86.5m3 The following are designated Galley and Gray Water tanks: W.B or Galley GW 12. Fr 204 - 236 127.0m3 Galley GW 11. Fr 204-236 - 256.3m3 Galley GW 10. Fr 204-236 - 256.3m3 W.B. or GW 9. Fr 204-236 - 127m3 W.B. or GW 8. Fr 236-254 - 166.9m3 W.B. or GW 7. Fr 236-254 - 166.9m3 W.B. or GW 6. Fr 256-272 - 109.4m3 W.B. or GW 5. Fr 256-272 - 109.4m3 W.B. or GW 4. Fr 272-296 - 105.7m3 W.B. or GW 3. Fr 272-296 - 105.7m3
2.1 Completed by:	Richard Ekstrom (richard.ekstrom)
2.2 Are ballast water tanks used for wastewater storage?	Yes. The main ballast lines serves both Ballast tanks and Gray water tanks.
2.2 Completed by:	Richard Ekstrom (richard.ekstrom)
2.3 Ballast Water system: brief description of the combined piping system if tanks used for both.	There is a main ballast line with secondary lines leading to the Ballast and Ballast/Gray Water tanks which is serviced by two ballast pumps. There are independent intake pumps for the Gray Water tanks with suction through a Gray Water manifold.
2.3 Completed by:	Philip Parent (philip.parent)
2.4 Ballast Water treatment installation? If yes, describe operation/system specifics.	Yes. The ballast water treatment system is Hyde Guardian HG 250 with a capacity of 250m3/day. The system consists of a set of six filters which which receive water from the ballast pumps and sea chests. The filters assist in the removal of sediment and marine organisms. After the filters there is a U/V light with 6 lamps. The purpose of the U/V lamps is to kill any remaining marine growth. The water is then discharged to the ballast tanks.
2.4 Completed by:	Richard Ekstrom (richard.ekstrom)
2.5 Ballast Water operations in AK waters (overboard intake/discharge, etc.)? Include the last date of ballast water discharges. Typically in the ballast water logs.	The ship has no plans for ballast operations in Alaska waters, according to EO. The last ballast operation was on June 10, 2018, in Seattle, Wa, where the ship discharged 785m3 of ballast through the Hyde-Guardian treatment system.
2.5 Completed by:	Philip Parent (philip.parent)

3: Combustion Sources

3.1 Are there any changes from the previous Additional Observation projects (Section 2.1) on the propulsion system question on brief description of propulsion and power systems used on board (Diesel direct/reduction gears/PTO's DE, FP, CPP Azipod, etc.)?	Vessel is fitted with 2 propulsion systems: Main Propulsion and Thrusters. Main Propulsion consists of 4 synchroconverters that supply varying frequency supply from main electrical network to 2 synchronous electric motors. The motors are rated at 21 MW, and are directly coupled to the propeller shafts and fixed pitch propellers. The Thruster System is used to assist the Main Propulsion System when maneuvering the vessel at slow speeds, usually when berthing or anchoring.
3.1 Completed by:	Philip Parent (philip.parent)

3.2 Are there any changes from the previous Additional Observation projects (Section 1.1) on the list of the combustion equipment used for Power/Propulsion (make/model/output)?	No changes. The vessel is equipped with 6 Wartsila DGs 4xModel 12V46CR @ 12600kW and 2x8L46CR @ 8400kW. Each main engine drives a generator connected to the main switchboard which feeds the main propulsion transformers, thrusters, and the entire hotel load on the ship. The switchboard supplies power to the vessels two 21MW Propulsion Electric Motors (PEMs) and the power demand determines how many and which DGs are online and used. The switchboard also supplies power to 6 transverse mounted Fincantieri thrusters. The Bow thrusters are rated at 1700kW and the Stern thrusters are rated at 1400kW. The thrusters are used for maneuvering at slow speeds to/from docks or anchoring.
3.2 Completed by:	Philip Parent (philip.parent)
3.3 Are there any changes from the previous Additional Observation projects (section 3) on the incinerators make, model, fuel used, capacity?	No changes. The ship still has one Deerfield Incinerator Model STP W 1600 rated at 1600kW capacity and uses MGO for co-firing.
3.3 Completed by:	Philip Parent (philip.parent)
3.4 Average Hotel power (kW) in port and underway?	Average Hotel Power in Port is 8 to 10 MW Average Hotel Power Underway is 13 MW
3.4 Completed by:	Philip Parent (philip.parent)
3.5 Average fuel consumption in port and underway?	Average Fuel Consumption in Port is 1.3 MT/hr per DG Average Fuel Consumption Underway is 1.5 MT/hr per small DG 1.8 MT/hr per large DG
3.5 Completed by:	Philip Parent (philip.parent)

4: Food Waste Garbage Handling

4.1 How is food waste handled and disposed of?	Large or non-comminuted food waste from food prep, such as big bones, fish skins, etc, put in large totes and offloaded to shoreside facilities in Victoria (for larger, non-comminuted food waste parts). Smaller food waste from galley macerators goes to dewatering units, then to food waste storage tanks for discharge outside 12nm. Food waste GW goes to degreasing units then to Galley GW tanks for discharge overboard outside 4nm.
4.1 Completed by:	Philip Parent (philip.parent)
4.2 Average food waste production per day (kgs/day)?	5m3/day
4.2 Completed by:	Philip Parent (philip.parent)
4.3 Is the food waste de-watered? If yes, provide dewatering volumes and handling information.	The 3m3-4m3/day of dewatered food waste water goes to Degreaser units then to the Galley Gray Water tanks and discharged outside 4nm
4.3 Completed by:	Philip Parent (philip.parent)
4.4 How are glass bottles, broken crockery, and ceramics handled?	Crushed glass, broken crockery, etc, is put in large heavy duty bags and offloaded in Victoria to shoreside facilities for recycling.
4.4 Completed by:	Philip Parent (philip.parent)
4.5 How is food waste monitored and/or recorded?	Garbage Record Book
4.5 Completed by:	Philip Parent (philip.parent)

5: Sea Water Intakes

5.1 List all of the seawater intakes (chests); include the locations, frame, side (PS/SB) or compartment.	There are six Sea Chests that are located Forward 196-220, Aft 64-82,and Middle 108-124
5.1 Completed by:	Philip Parent (philip.parent)
5.2 List filtration systems for each intake. Describe how filter systems are maintained. What is the frequency of cleaning? Is this performed in Alaska?	All Sea Chests have basket strainers that are cleaned per AMOS or if pressure drops in the sea water flow
5.2 Completed by:	Philip Parent (philip.parent)
5.3 How is debris and mud from filtration/strainers handled?	Debris and mud is bagged and offloaded as garbage to shoreside facilities in Victoria. Any biological waste (fish,etc) goes to the food waste system.
5.3 Completed by:	Philip Parent (philip.parent)
5.4 Marine Growth Protection Systems in the sea intakes. Description of the control systems and information on checmicals if used.	The Emerald Princess has six sea chests and uses Marelco ICCP (Impressed Current Catholic Protection) for the sea Chest anti fouling system. No chemicals are used.
5.4 Completed by:	Philip Parent (philip.parent)
5.5 Hull cleaning in place in Alaska 2018?	No plans for Hull cleaning in Alaska. Last cleaning was the rudder which took place outside of Alaska waters in Victoria, BC.
5.5 Completed by:	Philip Parent (philip.parent)

6: General

6.1 Is vessel crew cooperative on this project?	Yes
6.1 Completed by:	Philip Parent (philip.parent)
6.2 Do you feel the vessel has a clear understanding of compliance requirements?	Yes
6.2 Completed by:	Philip Parent (philip.parent)
6.3 Are there other remarks/ comments the OR wants to share?	None
6.2 Completed by:	philip.parent

Z: Signature & Submit

Ocean Rangers contributing to this report:	Philip Parent (philip.parent) Richard Ekstrom (richard.ekstrom) Wesley Whittier (wesley.whittier)
Ocean Ranger Signature: