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:	Jun 29, 2018
Ocean Ranger starting report:	james.ham
Ship Name:	Carnival Legend
Ship Code:	CLE
Is this a revision of a previous report (Y/N)?	Yes

1: SOx Emissions Controls

1.1 Describe the SECA compliance plan.	Compliance will be achieved by a combination of the use of compliant fuels in DGs and oil fired equipment without an EGCS, and the operation of EGCS or use of compliant fuels on oil fired equipment with EGES installed.
1.1 Completed by:	James Ham (james.ham)
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.	DG # 1,2,3, run on MGO (o.ooo74% Sulfur) at all times. DG 4,3,6,connected to Exhaust Gas Scrubber System, run on (1.76 % Sulfur. Fuel changeover on MGO to all Engines before arriving to Ports.
1.2 Completed by:	James Ham (james.ham)
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?	DG #4,5,6
1.4 Completed by:	James Ham (james.ham)
1.5 EGCS units make, number, model, locations, fuel limitations (sulfur %).	GEOSPRAY Technologies Sorol Italy / Type : Eco Desox Serial # : Tower 4 13-02B-APCW-0010 Tower 5 13-02B-APCW-0022 Tower 6 13-02B-APCW-0023 Location: Incinerator Room / Fuel Limitation <2,0%
1.5 Completed by:	James Ham (james.ham)
1.6 Scrubber type (closed, reagent cycle, combination or hybrid open-loop effluent to seawater)?	Open Loop
1.6 Completed by:	James Ham (james.ham)
1.7 System status (operational, commissioning, under construction)?	Operational
1.7 Completed by:	James Ham (james.ham)
1.8 Provide a process description and waste flow/chemicals used (Gaseous emissions, waste effluent, ash, spent reagents, etc.).	The EcoSpray EGC fitted to the vessel is a wet open loop system that utilizes seawater

	to reduce the SOx in exhaust gases from the DGs. The system pumps seawater from a sea chest to a DeSOx Tower where the SOx is removed by mixing the seawater with exhaust gases. The removal of the SOx also lowers the pH of the seawater and the water must then be diluted with additional seawater to buffer (increase) the pH before it is discharged back into the sea.The major components of the EGC are as follows: 1. SW Pumps: pumps the wash-water from the sea chest to the DeSOx Towers. 2. SW Filters: removes particulate matter from the wash water to prevent clogging of the spray nozzles in the DeSOx Towers; The filters also have an automatic back flush function which returns filtered material to the sea. 3. DeSOx Towers: sprays the wash water into the exhaust stream to remove the SOx and then separates the wash water from the exhaust gases; The water is drained from the base of the Tower, and the gases exit at the top via a Demister section, and continue to the funnel. 4. Static Mixers: mixes the wash water and dilution water to buffer (increase) the pH. 5. Dilution Pumps: pumps the dilution water to the Static Mixers. 6. Catalytic Dry Filters: utilizes an oxidation process to reduce the particulate matter and hydrocarbons in the exhaust gases. 7. Wash-Water Filters: removes particulate matter from the wash-water discharged from the DeSOx Towers. *NOTE*- vessel has future plans to replace the three motors on the Dilution Pumps with three larger motors, in hopes that a greater volume of dilution will aid in the vessel meeting AK pH requirements. The three new motors are onboard, but it is not sure when they will be installed.
1.8 Completed by:	James Ham (james.ham)
1.9 What scrubber process parameters are monitored (flow capacities, pH, other)?	pH, turbidity, and PAH.
1.9 Completed by:	James Ham (james.ham)
1.10 For seawater intake/effluent, please provide port locations (PS/STB Frame number, etc.). Additional notes can include distance below waterline and angles.	Dilution Pumps intake (designated onboard as Dilution Sea Chest), Port side Frame #108, about 5-6 meters below waterline. Seawater intake (designated onboard as Seawater Sea Chest), Port side Frame #112, about 5-6 meters below waterline.Three effluent overboard discharges, Port side Frames #95-#97, about 3-4 meters below waterline.
1.10 Completed by:	James Ham (james.ham)

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.	Ballast system consists o f: - Five Ballast water tanks located in double bottom . Twelv e ballast/gray water tanks located in double bottom . - One ballast water tank located in tank top. Ballast Water: Ballast Water Tanks Capacity (m3) BW 1 357.8

	BW2 101.7 BW9 146.0 Bw10 119.9 Bw11 411.2 Bw12 789.5 Total: 1926.1
2.1 Completed by:	James Ham (james.ham)
2.2 Are ballast water tanks used for wastewater storage?	All ballast tanks are potentially used for Gray water holding.
2.2 Completed by:	James Ham (james.ham)
2.3 Ballast Water system: brief description of the combined piping system if tanks used for both.	. System is divided into three independent systems, as follows: - Ballast water system Ballast stripping system - Healing system Total ballast water capacity is 4533 m3, so divided: - Ballast water 1926 m3 - Ballast/ grey water 2100 m3 - Permanent ballast water 507 m3 - Ballast/ grey water 2100 m3 Ballast can be pumped from any ballast tank to sea and vice versa , or from one ballast tank to another to a limited ex tent. Flooding directly from sea bypassing the pumps can also fill the tanks. System is manually remote controlled through the MAS from ECR , and all tanks have remote level indication. Tanks are connected to main line with branches; each tank has its own shut off valve at the branch line . - One ballast pump (7321/001) takes suction from sea chest S1 and S2. -One ballast pump (7321/002) takes suction from sea chest S5 and S6. Ballast pumps are equipped with an automatic vacuum priming systems. - One general service pump for ejector driving water (5211/024) and it takes suction from sea chest S1 and S2. -Two ballast stripping Ejectors. -Thirty-five automatic control valves. No ballast water pipes are passed through fuel oil tanks.
2.3 Completed by:	James Ham (james.ham)
2.4 Ballast Water treatment installation? If yes, describe operation/system specifics.	NO Advanced Ballast Water Treatment System installed. Other information same as 2017.
2.4 Completed by:	James Ham (james.ham)
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.	No Ballast water operation in Alaska waters . Last exchanged was in May 2018.
2.5 Completed by:	James Ham (james.ham)

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.)?	No changes from previous reporting
3.1 Completed by:	James Ham (james.ham)
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 from previous reporting
3.2 Completed by:	James Ham (james.ham)
3.3 Are there any changes from the previous Additional Observation projects (section 3) on the incinerators make, model, fuel used, capacity?	No changes from previous reporting
3.3 Completed by:	James Ham (james.ham)
3.4 Average Hotel power (kW) in port and underway?	6200 kWh. -2016 value. 1122.56MW/hr per SEA to SEA voyage.

2nd Engineer and EO's unable to locate underway and docked separation of usage.

3.4 Completed by: James Ham (james.ham)

4: Food Waste Garbage Handling

4.1 How is food waste handled and disposed of?

Wet food waste onboard is sent from 12 areas (sculleries, galleys, food prep areas, etc.) via a vacuum collection and conveying system. Food waste such as meat fat, bones, shells, fruit/vegetable husks and rinds, etc. are not put into this system, but are instead segregated, collected, and offloaded outside AK waters, usually in VIC. The wet food waste is sent from these 12 origination points onboard to two of the three Food Waste Separator units found onboard (two are in operation, with one in "standby" mode). Each of these Food Waste Separator units has shredders and de-watering units as part of their systems. From the Food Waste Separator units, the food waste is sent to two Wet Waste Holding Tanks, while the water from the de-watering systems is sent to two Degrease Collection Tanks.The two Wet Waste Holding Tanks are discharged overboard once vessel is outside 12 nautical miles. The water from de-watering is also discharged outside 12 nautical miles, and is considered part of Galley GW.

4.1 Completed by: James Ham (james.ham)

4.2 Average food waste production per day (kgs/day)?

Total average wet food waste that is generated per day is about 3.1 cubic meters. This number is based on an 8 day voyage where a total of 24.8 cubic meters of wet food waste was discharged overboard outside 12 nautical miles, during the 8 day voyage. The volume of food waste landed ashore in VIC weekly(bones, shells, etc.) was about 4 cardboard totes, or 4,475 pounds.

4.2 Completed by: James Ham (james.ham)

4.3 Is the food waste de-watered? If yes, provide dewatering volumes and handling information.

6,0 m3 / per day of food waste / weekly Basis USDA Waste 16,000 lbs.

4.3 Completed by: James Ham (james.ham)

4.4 How are glass bottles, broken crockery, and ceramics handled?

USDA Mixed Glass , Broken, China, crockery, Ceramics are offloaded as USDA Waste in Victoria BC.

4.4 Completed by: James Ham (james.ham)

4.5 How is food waste monitored and/or recorded?

Volumes of wet food waste discharged overboard outside 12 nautical miles, as well as the food waste that is collected and offloaded in VIC (bones, shells, etc.), are logged in NAPA, Garbage Record Book, and in the EPMD (Environmental Performance Monitoring Data), which documents every action done by the vessel each voyage, i.e. discharges food waste overboard, offloads food waste in VIC, bunkers potable water, etc. Also, vendor receipts are kept onboard showing volumes of food waste (bones, shells, etc.) offloaded in VIC.

4.5 Completed by: James Ham (james.ham)

5: Sea Water Intakes

5.1 List all of the seawater intakes (chests); include the locations, frame, side (PS/SB) or compartment.	List of sea chests: 1 x Incinerator Room (port) 1 x Aft Engine Room (STBD) 1 x Forward Engine Room (port) 1 x Forward Engine Room (STBD) 1 x Compressor Room (port) 1 x Compressor Room (STBD)
5.1 Completed by:	Chris Schneider (chris.schneider)
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?	Basket filters which are cleaned as needed based on differential pressure of filters.
5.2 Completed by:	Chris Schneider (chris.schneider)
5.3 How is debris and mud from filtration/strainers handled?	It is stored in drums and offloaded.
5.3 Completed by:	Chris Schneider (chris.schneider)
5.4 Marine Growth Protection Systems in the sea intakes. Description of the control systems and information on checmicals if used.	Sacrificial Anodes are used which were replaced in the shipyard in May of 2018.
5.4 Completed by:	Chris Schneider (chris.schneider)
5.5 Hull cleaning in place in Alaska 2018?	No hull cleaning is planned in Alaska this season.
5.5 Completed by:	Chris Schneider (chris.schneider)

6: General

6.1 Is vessel crew cooperative on this project?	Crew was very helpful
6.1 Completed by:	James Ham (james.ham)
6.2 Do you feel the vessel has a clear understanding of compliance requirements?	EO is new and still learning systems
6.2 Completed by:	James Ham (james.ham)

Z: Signature & Submit

Ocean Rangers contributing to this report:	James Ham (james.ham) Chris Schneider (chris.schneider)
Ocean Ranger Signature: