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:	todd.stafford
Ship Name:	Celebrity Millennium
Ship Code:	XMN
Is this a revision of a previous report (Y/N)?	Yes

1: SOx Emissions Controls

1.1 Describe the SECA compliance plan.	The compliance plan is to switch all non-regulatory MGO operated combustion sources over to regulatory MGO prior to entering the SECA.
1.1 Completed by:	Todd Stafford (todd.stafford)
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.	1.1 Completed by: Ronald Ladd (ronald.ladd) The XMN uses regulatory MGO, with it's two GE LM2500 Gas Turbines, incinerators and boilers at all times and in all places. The single DG, (DG1) operates on IFO fuel when outside the SECA and on regulatory MGO when inside the SECA. Two hours prior of crossing the ECA the OOW will inform the EWO, with an email, and note this. Seventy minutes before crossing the ECA, the OOW will inform the EWO with an email, and note this. Then the EWO starts the fuel switch procedure this will be entered in the Bridge Logbook, the ECR Logbook and the Environmental Operations Log with the date, time and position. When the fuel shift to regulatory MGO has been completed, the EWO informs the OOW and this will be entered in the Bridge Logbook, the ECR Logbook and the Environmental Operations Log with the date, time and position. The OOW notifies and also sends an email that DG#1 will operate on regulatory MGO until further notice. The XMN has entered the SECA, for the summer season, and therefore has already shifted DG1 to regulatory MGO fuel sources and so shall this remain until such time the SECA is exited.
1.2 Completed by:	Todd Stafford (todd.stafford)

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#1 is the only combustion source that will operated in conjunction with the EGCS.
1.4 Completed by:	Todd Stafford (todd.stafford)
1.5 EGCS units make, number, model, locations, fuel limitations (sulfur %).	The EGCS is a Hybrid CROE Model 2400T - 4S and is capable of reducing 3.5% sulfur fuel emissions to less than 0.1% equivalent sulfur.
1.5 Completed by:	Todd Stafford (todd.stafford)
1.6 Scrubber type (closed, reagent cycle, combination or hybrid open-loop effluent to seawater)?	This is a hybrid "open and closed loop" EGCS and designed for caustic assisted operations.
1.6 Completed by:	Todd Stafford (todd.stafford)
1.7 System status (operational, commissioning, under construction)?	This unit has been installed but has yet to be commissioned. It is not anticipated, that even if commissioned in 2018, that it would be operated in AK waters.
1.7 Completed by:	Todd Stafford (todd.stafford)
1.8 Provide a process description and waste flow/chemicals used (Gaseous emissions, waste effluent, ash, spent reagents, etc.).	The exhaust gas enters the inlet duct of the EGCS's tower bottom and is distributed radially through the inlet distributor. Once it enters this vessel, it is immediately quenched to a diabetic saturation temperature by the scrubbing seawater. The quenched gas flows upward into the tower. Counter current flow of the wash water liquid through the scrubber provides the most efficient mass transfer and intimate gas/liquid contact for high SO2 removal. A chevron mist eliminator, located near the top of the tower, ensures removal of residual droplets before the gas exits the stack. The EGCS can operate in open loop mode in areas where the sea water has sufficient alkalinity and where the wash water can be discharged overboard. The wash water is discharged directly through the EGCS drain piping which includes a loop seal. For areas with restrictive discharge rules and in ports, the system will run in the closed loop mode. The effluent purged from circulation will go to the zero discharge tank. Provisions are included for the addition of sodium hydroxide to the incoming sea water in low alkalinity areas. In open loop, caustic addition is only used if needed to raise the PH the PH of the wash water. In the closed loop configuration caustic is added automatically and only when needed to keep the system in balance. The sodium hydroxide product name onboard the XMN is "Caustic Soda Beads" and manufactured by Axiall, LLC. The MSDS refers to this as Sodium Hydroxide 50% (Blue, 92.50)
1.8 Completed by:	Todd Stafford (todd.stafford)

1.9 What scrubber process parameters are monitored (flow capacities, pH, other)?	Instrumentation is provided for monitoring ph, PAH, turbidity and temperature of the EGCS effluent.
1.9 Completed by:	Todd Stafford (todd.stafford)
1.10 For seawater intake/effluent, please provide port locations (PS/STB Frame number, etc.). Additional notes can include distance below waterline and angles.	A dedicated sea chest and strainer arrangement was installed during the 2016 ship yard sea on the port side, frame 98. The effluent overboard discharge port is found at frame 86 in the Port G/T Rm, Tank Top Lvl.
1.10 Completed by:	Todd Stafford (todd.stafford)

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.	Permanent ballast are tanks 4C and 5C. Sea Water Heeling Tanks are HT S&P. Sea Water Ballast/Gray Water Tanks are 3,4,5 S&P. Dual use. Ballast Tanks are 6 S&P, 7, Deep Tank 2, Forepeak, and Skeg Tanks Permanent Fresh water Ballast Tanks- 4C: 462.1m3. 5C: 260.2m3 Heeling Tanks-fresh Water (closed loop): HTP-338.1m3, HTS-338.1m3 Ballast/Gray Water Tanks: 5s/5P-74.1m3 each 3S/3P-123.9m3 each 4S/4P-277.3m3 each. Ballast Tanks: FPT-709.8m3 DT2-425.3m3 6P/6S-160.5m3 7-297.7m3 SKEG-230.7m3
2.1 Completed by:	Todd Stafford (todd.stafford)
2.2 Are ballast water tanks used for wastewater storage?	Yes. 3,4,5 Port and Starboard are combined use tanks.
2.2 Completed by:	Todd Stafford (todd.stafford)
2.3 Ballast Water system: brief description of the combined piping system if tanks used for both.	The system consists of the tanks enumerated in item #1, and the pumps, eductor, valves and piping. 4.a Are separate tank fill and drain piping installed for each tank? Separate fill and suction piping is installed to each tank. (From 2016 report) Systems tie in together with crossovers. (As indicated in 2016 report and verified by Environmental Officer and shipboard staff, 2017) 4.c With combined systems, how is ballast water contamination avoided? Grey water and ballast systems have crossover valves that would have to be opened for mixing to occur. (As indicated in 2016 report and verified by Environmental Officer and shipboard staff, 2017) Additionally, the ballast pumps cannot pump out the dual use tanks due to a check valve arrangement.
2.3 Completed by:	Todd Stafford (todd.stafford)
2.4 Ballast Water treatment installation? If yes, describe operation/system specifics.	Hyde Guardian HG-250GC, capacity is 250 m3 / hr. The Ballast Water Management Plan has lists

"Type Approval Certificate No IMO Type Approval Certificate No. MCA 0900032/M3 Text from Hyde manual: " Water being pumped into the ballast tanks is directed through a filter system and a powerful ultraviolet (U/V) disinfection unit. The filter removes sediment and larger organisms. The UV light inactivates or damages the DNA of organisms, killing them or making them unable to reproduce. Water being pumped out of the ballast tanks flows through the UV unit once again before being discharged overboard. UV treatment is chemical free and does not contribute to corrosion of ballast tanks or ship's piping." (2016)

2.4 Completed by:	Todd Stafford (todd.stafford)
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.	Vessel will not typically do ballast water exchanges in Alaska.
2.5 Completed by:	Todd Stafford (todd.stafford)

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.)?	1 - Item Type GT 1 1 - Make/Model General Electric M2500 1 - Year 2015 1 - Serial Number/Unique Identifier 565-116 1 - Maximum Rating 25000 KW at max. Speed 3600 2 - Item Type GT 2 2 - Make/Model General ElectricM2500 2 - Year 2012 2 - Serial Number/Unique Identifier 565-101 2 - Maximum Rating 25000 KW at max. Speed3600 3 - Item Type DG 3 - Make/Model Wartsila 16v38B 3 - Year 1999 3 - Serial Number/Unique Identifier PAAE046940 3 - Maximum Rating 11600KW at max. Speed 600 RPM 4 - Item Type Incinerator 1 4 - Make/Model Norsk Inova AS. Type NH 1200 SG-S 4 - Year 1999 4 - Serial Number/Unique Identifier 14079 4 - Maximum Rating 1400 kW 5 - Item Type Incinerator 2 5 - Make/Model Norsk Inova AS Type NH 1200 SG-S 5 - Year 1999 5 - Serial Number/Unique Identifier 14077 5 - Maximum Rating 1400 6 - 6 - Item Type Boiler 1 6 - Make/Model UNEX Type CHB-5000 6 - Year 1999 6 - Serial Number/Unique Identifier SN 6089 6 - Maximum Rating 5000 kg/he at 10 bar 7 - Item Type Boiler 2 7 - Make/Model AALBORG CHB5000 7 - Year 2007 7 - Serial Number/Unique Identifier NR 7195 7 - Maximum Rating 5000 kg/hr at 10 bars 8 - Item Type EDG 8 - Make/Model Almere typeS16RMPTA 8 - Year 1999 8 - Serial Number/Unique Identifier 1560171 8 - Maximum Rating 1313 kW at 1800 rpm 9 - Item Type AUX DG

	9 - Make/Model ALSTON type 18VP 185 9 - Year 1999 9 - Serial Number/Unique Identifier 70154 9 - Maximum Rating 3000 kW at 1800 rpm
3.1 Completed by:	Todd Stafford (todd.stafford)
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 to propulsion combustion sources from 2017.
3.2 Completed by:	Todd Stafford (todd.stafford)
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 2017 combustion source report.
3.3 Completed by:	Todd Stafford (todd.stafford)
3.4 Average Hotel power (kW) in port and underway?	(Chiller A/C) depending on season. Winter time 6,0-6,5 Mega Watts. Summer time 8,0-8,5 MW. Power consumption for Hotel is the same underway or in port.
3.4 Completed by:	Todd Stafford (todd.stafford)
3.5 Average fuel consumption in port and underway?	The fuel consumption for the week of June 8-15 was: 640mt of MGO, 16.7mt of HFO. 516.7mt- underway. 3.08mt/hr 140.03mt- In Port. 0.83mt/hr.
3.5 Completed by:	Todd Stafford (todd.stafford)

4: Food Waste Garbage Handling

4.1 How is food waste handled and disposed of?	Food waste that can be comminuted is presently processed thru one (1) of four (4) operational pulper machines located on deck 1, 3, or 10. The pulped food waste is next processed thru one (1) of three (3) de-watering extractor machines. Once the excess moisture is removed, the remaining food waste is deposited into one (1) of two (2) waste silos. At the base of each silo is a screw type pump that slowly forces the waste either to one of the two ships' incinerators for burning or the waste can be directed thru an overboard valve into the sea once the ship is safely located more than four (4) nautical miles away from land. This vessel has elected not to burn the food waste, but only discharge into the sea when permitted.
4.1 Completed by:	Todd Stafford (todd.stafford)
4.2 Average food waste production per day (kgs/day)?	Average food waste production is approximately .2m3/hr which equates to 4.8m3/day.
4.2 Completed by:	Todd Stafford (todd.stafford)
4.3 Is the food waste de-watered? If yes, provide dewatering volumes and handling information.	Dewatering of food waste is accomplished by passing the semi-liquid pulped food waste thru one(1) of three (3) water extractors whereby pressing of the waste removes the water from the solids and remaining water is recirculated back to the pulpers to process additional food waste.
4.3 Completed by:	Todd Stafford (todd.stafford)
4.4 How are glass bottles, broken crockery, and ceramics handled?	These items are separated immediately as they are created and collected into specific containers to be recycled if possible. Items that are not recycled are still separated for offloads outside of Alaska only.

	Vessel has a current policy of no waste to landfills in North America. Vancouver is capable of receiving and recycling everything.
4.4 Completed by:	Todd Stafford (todd.stafford)
4.5 How is food waste monitored and/or recorded?	The ships' environmental officer maintains the Garbage Record Book. He also develops the food waste discharge at sea plan and requirements for the ships' deck and engineering departments to follow with regards to safe discharge zones while the vessel is at sea offshore. The engineering watch officer is in charge of recording the starts and stops of the processed food waste pumps and the resulting volumes of product discharged.
4.5 Completed by:	Todd Stafford (todd.stafford)

5: Sea Water Intakes

5.1 List all of the seawater intakes (chests); include the locations, frame, side (PS/SB) or compartment.	There are 8 total sea water (chests) intakes. The ones for the RO unit and Fire Pump are small in comparison with the others. (2)Chiller Room: frames 56-59 P/S, 4-5m below waterline. (2)ME/GT's: P/S- frames 74-77. 4-5m below waterline. (1)Scrubber: frames 103-106 PS. 3-4 below waterline. (1)Evaporators Starboard: frames 106-109. 4-5m below waterline. (1)RO unit Port Side, frames 178-180. 4-5m below waterline. Small (1)Fire pump Port Side: frames 150-153. Small
5.1 Completed by:	Todd Stafford (todd.stafford)
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?	Filtration is metal strainers for all units. Differential pressures are monitored and serviced/cleaned accordingly. Frequency is varied.
5.2 Completed by:	Todd Stafford (todd.stafford)
5.3 How is debris and mud from filtration/strainers handled?	Incinerator
5.3 Completed by:	Todd Stafford (todd.stafford)
5.4 Marine Growth Protection Systems in the sea intakes. Description of the control systems and information on checmicals if used.	No chemicals are used within the sea water systems for anti fouling. Aluminum and copper anodes are used to prevent bio fouling within sea chests and pipelines. Cathelco 86/84B units (2) 6 anodes per large sea chest No single document exists that combines all of the separate anti fouling measures. (As indicated in 2016 report and verified by Environmental Officer and shipboard staff, 2017) Description of the antifouling system Anti fouling systems coating is listed as: SigmaGlide 1290 - Red-Brown. ABC 3 - Red ABC 4 - Black. (As indicated in 2016 report

	and verified by Environmental Officer and shipboard staff, 2017)
5.4 Completed by:	Todd Stafford (todd.stafford)
5.5 Hull cleaning in place in Alaska 2018?	No hull cleaning operations are scheduled for XMN in Alaska 2018
5.5 Completed by:	Todd Stafford (todd.stafford)

6: General

6.1 Is vessel crew cooperative on this project?	Yes. Crew are helpful and friendly.
6.1 Completed by:	Todd Stafford (todd.stafford)
6.2 Do you feel the vessel has a clear understanding of compliance requirements?	Yes. Crew appear to have a good understanding of requirements and regulations for their vessel and locations visited.
6.2 Completed by:	Todd Stafford (todd.stafford)
6.3 Are there other remarks/ comments the OR wants to share?	No
6.2 Completed by:	todd.stafford

Z: Signature & Submit

Ocean Rangers contributing to this report:	Todd Stafford (todd.stafford) Ronald Ladd (ronald.ladd)
Ocean Ranger Signature: