Commercial Passenger Vessel Environmental Compliance (CPVEC) Program – 2017 Seasonal Report

Figure 1: Skagway, AK harbor, 2017 (photo: ADEC staff)

TABLE OF CONTENTS

INTRODUCTION

This report is prepared annually by the Alaska Department of Environmental Conservations (ADEC, or the Department) Division of Water Commercial Passenger Vessel Environmental Compliance Program (CPVEC or the Program). The intent of this report is to provide information on the Program's monitoring and compliance efforts with cruise ship pollution and the status of the Ocean Ranger program.

AIR QUALITY PROGRAM SUMMARY

Objective: Maintain an effective environmental compliance program that engages in the direct monitoring of the opacity of air emissions from commercial passenger vessels to ensure the prevention of air pollution and the protection of public health.

Authority. AS 46.03.488. 18 AAC 50.070 establishes marine vessel visible emission standards.

Implementation. The regulation is applied to visible emissions, excluding water vapor, of marine vessels within three miles of the Alaska coastline. The CPVEC program uses EPA Reference Method 9 readings to provide the source of data for determining compliance with marine vessel visible emission standards. This method has been approved by the US Environmental Protection Agency (EPA) as part of the Federally Enforceable Air Quality Control State Implementation Plan under 40 CFR §52.70(28)(i). The CPVEC program monitors environmental compliance, as well as the direct and indirect environmental impacts of commercial passenger vessels.

Results. Summaries of opacity results are available in Tables 1 to 5.

Products

Readings:	552 Method 9 readings performed
Compliance:	2 alleged violations, 2 Letters of Warning issued
Enforcement:	28 alleged violations of 18 AAC 50.070 from 2010 to 2014 were settled or closed in 2017. Two alleged violations for 2017 were settled.

In addition to monitoring for opacity and initiating enforcement actions for noncompliance, the Program is actively monitoring and studying the following significant points of interest that could result in direct or indirect environmental impacts as required under AS 46.03.488:

- Fuels: Wide use of Marine Gas Oil distillate fuels for compliance with emissions control area regulations for sulfur, particularly while in port.
- EGCSs: Commissioning and operation of exhaust gas control systems (EGCSs) on select vessels with additional wastewater discharge into marine waters of the state.

Enforcement. Two notices of noncompliance were issued for two alleged violations of visible emissions (opacity) exceedances in 2017. Two letters of warning were issued to cruise ship operators in 2017 regarding opacity readings. The Department issued notices of noncompliance for alleged violations of visible emissions (opacity) exceedances between 2010 and 2014 in 2015, final settlements were completed in 2017. All of the issued notices have been resolved through settlements or Compliance Orders by Consent with cruise ship operators. No notices of noncompliance were issued in 2015 or 2016.

Compliance and Monitoring. Compliance with opacity requirements is determined through use of EPA Reference Method 9 observations. Observations are made by trained staff and contracted opacity readers. The current contractor for opacity readings is FLAT LAKE Engineering LLC, based in Ketchikan, AK with additional staff in Juneau, AK and Anchorage, AK. The US Forest Service (USFS) submits observations made while vessels are in Tracy Arm.

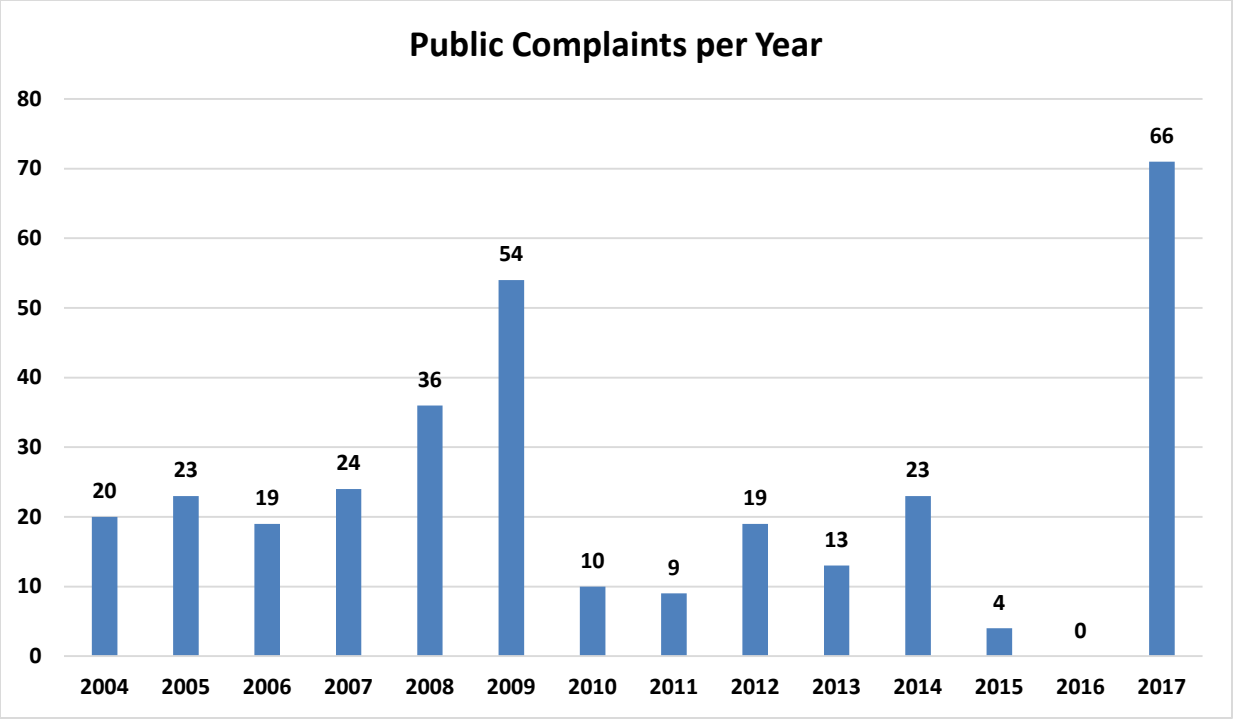
The Program goal in monitoring opacity is to conduct consistent opacity readings primarily within Alaska's three busiest cruise ship ports: Juneau, Ketchikan, and Skagway. Both staff and the contractor will travel to other ports during the season to conduct readings and reasonable efforts will be made to conduct opacity readings of small cruise ships and state ferries. Summary data for reading counts are found on Tables 1 to 5.

Public Complaints. The Department responds to public complaints regarding cruise ship pollution. Although complaints, photographs, or other evidence of emissions exceedances are sometimes not provided

according to Reference Method 9 requirements, the Program will often follow up complaints with an opacity reading by Department staff or the contractor. In any case of a complaint, vessel operators or owners are notified as soon as possible so that mitigating steps may be taken. The number of public complaints responded to by staff each year can be found in Figure 1.

In prior years, many complaints did not mention a particular vessel, but were concerning the overall air quality in Juneau when cruise ships were present. There has been a dramatic increase in complaints during the 2017 season and more complainants are identifying vessels by their name. Furthermore, complaints show a weekly trend with certain vessels, reporting excess smoke and a blue haze settling over downtown Juneau. In 2017, ADEC noticed an increase in complaints from communities outside of Juneau. These communities include Ketchikan, Skagway, and Hoonah.

Figure 2



OCEAN RANGER PROGRAM SUMMARY

Objective 1: Ensure that Ocean Rangers are on board as many ships as possible to verify compliance.

Authority. AS 46.03.476 establishes the Ocean Ranger Program. The statute requires that all large commercial passenger vessels (LCPV) entering the marine waters of the state have an Ocean Ranger on board to act as an independent observer for the purpose of monitoring compliance with State and federal requirements.

Implementation. Ocean Rangers inspect enforceable conditions of State and federal requirements in an observer role only. Reports from Ocean Rangers are made from checklists and visual inspection of all areas onboard a cruise ship in Alaskan waters during voyages and while in port. Reportable days are when a ship is in Alaskan water for at least three hours in a day. The contract for Ocean Rangers is with Crowley Maritime Corporation.

Results. In 2017 Ocean Rangers completed 1581 Daily Reports, which is increase of 56 from 2016 primarily due to increased program funding for the contract. Coverage rate for Ocean Rangers decreased 3.9% from 2016 to 2017. The increase was due to more ships and more voyages, even while the number of report days increased. Ocean Rangers submitted 113 additional information project reports, 28 once a season reports, and 38 oil spill or sheen reports.

Products

Daily Reports:	1581 Daily Reports completed
Coverage Rate:	Ocean Rangers were aboard ships 66.6 % of the time ships were in Alaskan waters

Objective 2: Improve compliance to protect public health and the environment through actions taken to correct compliance concerns reported by Ocean Rangers. Actions can be taken by ADEC or the appropriate referral agency. Reduce the annual infractions identified aboard cruise ships by the Ocean Rangers.

Authority. AS 46.03.476(a) authorizes Ocean Rangers to ensure that passengers, crew, and residents at ports are protected from improper sanitation, health, and safety practices.

Results. Ocean Rangers reported 184 alleged noncompliance incidents. This is an increase from 176 incidents in 2016 and can be attributed to the widespread use of exhaust gas cleaning systems in Alaska and the associated appearance of sheen like surfaces in discharges along with discoloration and foam. A detailed breakdown of all alleged noncompliant incidents are available in Table .

In addition to the above compliance categories in Table , the following additional observations or concerns were noted during the 2017 season:

- Fleet wide exhaust gas cleaning system installation and operation
- Air emissions observations noted upsets, blue smoke and steam, some may have been due to operations with new exhaust gas cleaning systems.
- Ocean Ranger access restrictions and their impediment to Ocean Ranger job duties as agents of the State
- Record keeping practices

Compliance. When Ocean Rangers reported potentially noncompliant incidents, in all cases, the CPVEC Program immediately reported the condition to the cruise ship owner or operator. Standard procedure requires Ocean Rangers to inform a cruise ship's crew of potentially noncompliant conditions. In the case of

an actual noncompliant condition, CPVEC staff worked with the owner or operator to stop or correct the condition.

The CPVEC Program also provides notification to other responsible state and federal agencies regarding potentially noncompliant conditions that fell outside of the jurisdiction of the Program. CPVEC staff reported alleged noncompliant conditions to:

- Safety: U.S. Coast Guard Sector Juneau
- Health and Sanitation: U.S. Centers for Disease Control and Prevention, and the appropriate State of Alaska and local health agencies
- Vessel General Permit (VGP). U.S. Environmental Protection Agency (EPA)
- Oil Pollution Reporting: Because of the time-critical nature of oil pollution cases, Ocean Rangers submitted Oil Reports directly to ADEC's Division of Spill Prevention and Response and copied the Program and other relevant parties as needed
- Other Federal Agencies with jurisdiction such as National Park Service and Forest Service

Objective 3: Maximize the number of qualified Alaskans hired as Ocean Rangers.

Authority. AS 39.25.150(5) authorizes preferential hiring for local applicants when appropriate.

Results. The number of Alaskan Ocean Ranger hires were the same as 2016.

Products

Alaskan Ocean Rangers:	5 of 24, or 21% of deployed Ocean Rangers were Alaskan residents in 2017

WATER QUALITY PROGRAM SUMMARY

Objective 1: All regulated commercial passenger vessels operating in marine waters of the state shall have current, timely, and active permits, authorizations, or plans approved by the Department, as required by state law, which ensure protection of human health and water quality and are based on sound science, technology, and economics.

Authority. AS 46.03.462 require compliance with terms and conditions of discharge permits or standards established for the protection of ambient water quality for commercial passenger vessels.

Results. The CPVEC program receives notices of intent to discharge under the general permit for qualifying vessels. All authorizations were granted before vessel discharges in state waters.

Products

2014 GP Authorizations:	3 new General Permit Authorizations granted in 2017, 27 active Authorizations in place.
Best Management Practices (BMP) Approvals	The BMP law expired in 2015 and was not replaced until late in 2017. The operation of small cruise ship and ferries in 2016 and 2017 occurred under a No Action Assurance Memo by the Department to allow discharges.

Objective 2: Commercial passenger vessels comply with all terms and conditions required by state and federal law and water quality standards are maintained.

Authority. AS 46.03.100 require the permitting and compliance of wastewater discharge permits in the State of Alaska.

Results. The number of exceedances of permit standards for large vessel effluent samples decreased by 16 in 2017. Comparing 2017 sampling results with years prior to 2015 is difficult as the permit limits and sampling frequency for some parameters changed significantly with the new general permit.

Products

Sample Events	211 effluent samples were collected for monitoring analysis
Enforcement	16 alleged violations of permit standards were included in notices of violation or closed
Compliance	14 alleged violations are imminently expecting settlement

In addition to effluent sample monitoring, the Program is actively monitoring and studying the following significant points of interest that could result in direct or indirect environmental impacts:

- Small vessel Marine Sanitation Devices (MSD) performance and capability
- Small vessel chlorine use in waste water treatment
- Concerns with fecal coliform levels found in average effluent results of small vessels
- Concerns with discharges of untreated or partially treated wastewater

Cruise ship operators reported 9 exceedances of 2014 General Permit daily maximum or minimum limits out of 211 samples taken in 2017. There were 7 exceedances of monthly limits. Biochemical Oxygen Demand had the highest number of monthly limit exceedances with four, there were 5 additional daily limit exceedances for Biochemical Oxygen Demand. There were one exceedance of fecal coliform daily limits, two exceedances for ammonia, one for chlorine, two for Total Suspended Solids monthly averages, and one exceedance for geometric mean for fecal coliform results. Table 7 lists 2017 exceedances of general permit daily limits by pollutant type.

Enforcement. The Department issued 7 notices of violation in 2017 for 14 alleged violations of wastewater effluent limits. Two additional notices of violation was issued for unauthorized discharges of wastewater. Settlements for these notices have not been completed at the time of this report.

Compliance. The Department monitored wastewater discharges from large vessels for Biological Oxygen Demand (BOD), fecal coliform, pH, and chlorine, ammonia, and dissolved copper at frequencies established in the general permit. Data results for large vessels are available from the CPVEC Program on request.

The overall effluent quality from small commercial passenger vessels and state ferries has improved since the implementation of the BMP plans. Additional work is still needed on some ships to meet the standards for suspended solids, fecal coliform, BOD, and chlorine. Operations in 2017 occurred under a No Action Assurance agreement, and operators were notified and required to take corrective actions if sample results were outside of the range of previous sample results. The CPVEC Program intends to follow up on a two year improvement effort in these categories in 2018.

OCEAN RANGER, ADDITIONAL OBSERVATIONS SUMMARY

Authority. AS 46.03.476(a) authorizes Ocean Rangers to ensure that passengers, crew, and residents at ports are protected from improper sanitation, health, and safety practices. AS 46.03.476 (b) authorizes Ocean Rangers to monitor and record information on engineering, sanitation, and health related operations of the vessel.

2017 Project Objectives:

1. Exhaust gas cleaning system (EGCS) installation or operation
2. Combustion source inventory
3. Ballast water management
4. Food waste disposal practices

Objective 1: Exhaust gas cleaning system installation or operation

Authority. AS 46.03.465(h), AS 46.03.482, and AS 46.03.488, the CPVEC Program continues study on EGCSs and their potential effect on environment of Alaska.

Results. The CPVEC Program monitors pollution from large commercial passenger vessels, or cruise ships. The US EPA and the International Maritime Organization (IMO) establish rules and regulations regarding fuel use and sulfur oxides (SO_X) emissions inside US and other designated waters; these regions are known as Emission Control Areas (ECAs). State of Alaska waters east of the Kodiak area are part of the North American ECA.

Exhaust gas cleaning systems, or EGCSs, while designed to reduce SO_X from the exhaust entering ambient air, can deposit these and various other pollutants into the ambient water through waste effluent generated by the scrubbing process. Some of these wastes may be held or offloaded in port. Scrubber wash water is typically regulated by the IMO and the US EPA for pH, PAH, and turbidity with other potential pollutants potentially affecting Alaska water quality standards.

Through information requests and daily observations conducted through the Ocean Ranger Program, the CPVEC Program has summarized installation status and operational use of EGCSs during the 2017 cruise ship season.

Since January 1, 2015 cruise ships operating within an ECA have been required to comply with more stringent limits on SO_X emissions. In 2017 34 registered vessels used the following strategies to comply with the SECA (low sulfur emissions) requirement:

- Use of Low Sulfur Fuels (distillate fuel / marine gasoil (MGO)) only: In 2017 14 vessels used MGO fuel to comply with ECA rules. Of the 14 vessels, 10 vessels used MGO for "structural" operations, and 4 vessel used MGO because their exhaust gas cleaning systems were not completed;
- The use of higher sulfur fuels (including residual fuel / heavy fuel oil) in combination with EGCS Systems (scrubbers): In 2017 20 vessels used HFO in combination with exhaust gas cleaning systems to remove the sulfur from the exhaust.

Of the total 34 registered vessel, 27 vessels were part of specific EGCS observations by Ocean Rangers. 7 vessels had itineraries that did not allow sufficient time to complete in-depth observations. Several ships were in the process of installing or commissioning EGCS systems. CPVEC and Ocean Rangers inspected several systems of each type in operation (closed loop as well as open loop systems that use seawater).

Based on observations made by Ocean Rangers in the 2017, the program has identified the following areas of concern:

1. **Sulfur Emissions.** While the Program does not have jurisdiction over compliance concerns with ECA limits, we continue to monitor for vessel compliance methods to meet these requirements. EGCSs have the ability to remove much of the sulfur from exhaust gases formed in the combustion of higher sulfur fuels; however, this requires proper operation and monitoring to ensure compliance.
2. **Visible (Opacity) Emissions:** The Program observed that some EGCS system at times emit heavy steam plumes, these can be mixed with other visible emissions. Some steam plumes may to an untrained observer be misinterpreted as smoke. CPVEC received multiple public complaints regarding low hanging smoke. There were instances when the observed visible emissions outside of the steam plume exceeded the opacity standards.
3. **Sheens and discoloration.** In the operation of an "open loop" EGCS, wash water is discharged into ambient water. This discharge stream is required to be monitored for PAH content by the EPA VGP. Alaska prohibits sheens or oily discharge. Ocean Rangers observed potential sheens from EGCS wash water discharges in Alaskan ports during the 2017 season. Observations were also made of discoloration, foam, and potential solids of unknown source. Most observations occurred while ships were docked. CPVEC staff learned about EGCS discharge filtration systems added to some systems, although some of these units had short filter life or were not continually used.
4. **Acidic Discharge.** EGCS discharged wash water is acidic. Alaskan Water Quality Standards and EPA VGP limit pH. The EPA VGP requires monitoring of EGCS discharged wash water for pH. Some ships reported non-compliant discharges to EPA in 2016 and 2017. One major cruise ship operator started a pH mixing zone sampling project after Ocean Rangers left for the season.
5. **Other Discharges.** EGCS discharged wash water can be hotter than ambient water temperatures or discolored. Some EGCS discharges may be discolored, it is expected that high temperature discharge water from an EGCS will have minimal lasting impacts, however the program will continue to monitor these impacts.

The CPVEC Program will continue to monitor EGCS use and discharges in Alaskan Waters.

Objective 2: Combustion source inventory

Results. In an attempt to assess the current fleet of combustion sources operating aboard cruise ships in Alaskan Waters, Ocean Rangers attempted to complete an additional observation questionnaire first initiated in 2015. The purpose of this project was to help assess potential air emissions impacts from cruise ships. Data collected from this effort is still preliminary and subject to verification.

Objective 3: Ballast water management

Results. Ocean Rangers were tasked with completing a project on selected ships to look at ballast water handling and operations while in Alaskan waters. This was a follow up on previous projects regarding ballast water. Twenty three additional observation projects were completed for thirty four large cruise ships. While most large cruise ships do not discharge ballast water in Alaska, the CPVEC program has interest in ballast water due to the fact many ballast water systems share tanks and equipment with wastewater treatment systems. Ballast water operations are also of interest as they are covered under the EPA Vessel General Permit, and the potential for invasive species introductions.

All vessels that were part of this project in 2017 and prior years had ballast water management plans. Most ships used stored water (wastewater and freshwater) and fuel onboard as ballast and made adjustments to trim by internal transfers of these fluids.

Objective 4: 4. Food waste disposal practices

Results. Ocean Rangers completed a project to gather information on the onboard handling and disposal of food wastes. This project was completed on twenty eight of thirty four large cruise ships in 2017.
This project assisted the Department in understanding how food waste is handled onboard large cruise ships, and how liquid wastes relate to other wastewaters. Ocean Rangers identified some instances when plastics were found mixed in the food waste, but all ships took immediate corrective actions.

Abbreviations and Acronyms

AAC:	Alaska Administrative Code
ADEC:	Alaska Department of Environmental Conservation
AK:	Alaska
AS:	Alaska Statute
AMHS:	Alaska Marine Highway System
BMP:	Best Management Practice
BOD:	Biological Oxygen Demand
CFR:	Code of Federal Regulations
CPVEC:	Commercial Passenger Vessel Environmental Compliance (Program)
ECA:	Emissions Control Area
EGCS:	Exhaust Gas Cleaning System
EPA:	United States Environmental Protection Agency
EU:	Emission Unit
IMO:	International Maritime Organization
LCPV:	Large Commercial Passenger Vessel
MOU:	Memorandum of Understanding
PAH:	Polycyclic aromatic hydrocarbon
SO_X:	Sulfur oxides
TSS:	Total Suspended Solids
US:	United States
USFS:	US Forest Service
UW:	Underway
VGP:	US EPA Vessel General Permit

TABLES

Table 1: 2017 Contractor Opacity Readings

Location	# of Readings
Juneau	224
Ketchikan	227
Skagway	28
Haines	2
Hoonah	0
Sitka	8
Wrangell	0
Whittier	0
Seward	0
Total Opacity Readings	**489**

Table 2: 2017 ADEC Staff Opacity Readings

Location	# of Readings
Juneau	26
Ketchikan	17
Skagway	12
Haines	2
Hoonah	3
Sitka	0
Wrangell	3
Whittier	0
Seward	0
Total Opacity Readings	**63**

Table 3: Opacity Readings Per Year Summary

Year	2013	2014	2015	2016	2017
Number of Readings	340	382	343	388	552

Table 4: Opacity Violations Issued

Vessel	Date	Port	Status
M/S Norwegian Jewel	6/12/2017	Ketchikan	Settled
Island Princess	7/7/2017	Ketchikan	Settled

-Pending indicates a case is currently under negotiation
-Settled indicates an enforcement settlement has been reached
-Resolved indicates a case has been closed without formal enforcement

Table 5: Opacity Reading Count by Port (2017)

Port	Number of Readings
Haines, AK	4
Hoonah, AK	3
Juneau, AK	250
Ketchikan, AK	244
Sitka, AK	8
Skagway, AK	40
Wrangell, AK	3

Table 6: Ocean Ranger Alleged Noncompliant Incidents Reported (2017)

Alleged Noncompliant Condition	Number of Incidents Reported
Oil Pollution	57
Safety	13
Sanitation	7

Wastewater	23
Other Waste	12
Air Pollution	27
EPA VGP Items	17
Access	28
Total	**184**

Table 7: 2017 Wastewater Exceedances of GP Daily Limits (211 samples)

Criteria	Number of Exceedances	Total Samples
Fecal Coliform	2	194
pH	0	211
TSS	2	199
BOD	9	199
Chlorine	1	211
Ammonia	2	123
Copper	0	115
Nickel	NA	44
Zinc	NA	44

Table 8: Vessel Emissions Unit and EGCS Details

Line	Vessel	EGCS:EU	EU Inventory EGCS EU						EGCS	Port Fuel	UW Fuel
CCL	Carnival Legend	3:6	DG1	DG2	DG3	DG4	DG5	DG6	Open Loop	MGO	MGO
CCL	Carnival Miracle	UNK	UNK						UNKOWN	UNK	UNK
CEL	Infinity	1:3	DG1	GT1	GT2				Closed Loop Hybrid	HFO	MGO
CEL	Millennium	1:3	DG1	GT1	GT2				Closed Loop Hybrid	MGO	MGO
CEL	Solstice	2:4	DG1	DG2	DG3	DG4			Not operated at time of report	MGO	MGO
DIS	Disney Wonder	0:5	DG1	DG2	DG3	DG4	DG5		None	MGO	MGO
HAL	Amsterdam	3:5	DG1	DG2	DG3	DG4	DG5		Open Loop	MGO	MGO
HAL	Eurodam		DG1	DG2	DG3	DG4	DG5	DG6	Open Loop	MGO or HFO	MGO or HFO
HAL	Nieuw Amsterdam	3:6	DG1	DG2	DG3	DG4	DG5	DG6	Open Loop	MGO	HFO
HAL	Noordam	3:5	DG1	DG2	DG3	DG4	GT1		Open Loop	MGO/HFO	HFO
HAL	Oosterdam		DG1	DG2	DG3	DG4	DG5		Open Loop	HFO	HFO
HAL	Volendam	3:5	DG1	DG2	DG3	DG4	DG5		Open Loop	MGO	HFO
HAL	Zaandam	3:5	DG1	DG2	DG3	DG4	DG5		Open Loop	MGO	HFO
NCL	Norwegian Pearl	4:4	DG1	DG2	DG3	DG4			Closed Loop	HFO	HFO
NCL	Norwegian Jewel	5:5	DG1	DG2	DG3	DG4	DG5		Closed Loop	HFO	HFO
NCL	Norwegian Sun	5:5	DG1	DG2	DG3	DG4	DG5		Not completed	MGO	MGO
Oceania	Regatta	0:4							None	MGO	MGO
PCL	Coral Princess	3:4	DG1	DG2	DG3	GT1			Open Loop	MGO	HFO
PCL	Golden Princess	UNK	DG1	DG2	DG3	DG4	DG5	DG6	UNK	MGO	MGO
PCL	Grand Princess	4:6	DG1	DG2	DG3	DG4	DG5	DG6	Open Loop	HFO	HFO

PCL	Emerald Princess	2: not confir med		DG2	DG3				Open Loop	HFO	HFO
PCL	Island Princess	1:4	DG1	DG2	DG3	GT1			Open Loop	HFO	HFO
PCL	Ruby Princess	2:6	DG1	DG2	DG3	DG4	DG5	DG6	Open Loop	MGO	HFO
PCL	Star Princess	2:6	DG1	DG2	DG3	DG4	DG5	DG6	Open Loop	MGO	HFO
RCI	Explorer of the Seas	4:6	DG1	DG2	DG3	DG4	DG5	DG6	Closed Loop	MGO	MGO
RCI	Radiance of the Seas	1:3	DG1	GT1	GT2				Open Loop	HFO	MGO
Seven	Seven Seas Mariner	0:4	DG1	DG2	DG3	DG4			None	MGO	MGO
SIC	Silver Shadow	0:5	DG1	DG2	DG3	DG4	DG5		None	MGO	MGO