Commercial Passenger Vessel Environmental Compliance (CPVEC) Program – 2016 Season Report

Figure 1: Skagway, AK harbor, early morning - June, 2016 (photo: ADEC staff)

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INTRODUCTION

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

NOTE: Tables referenced in the text can be found in the Tables and Acronyms section at the end of the report.

AIR QUALITY PROGRAM SUMMARY

Objective 1: Maintain an effective compliance program that ensures the prevention of air pollution and the protection of public health related to commercial passenger vessels.

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

Implementation. The regulation is applied to cruise ship air quality. The CPVEC program uses EPA Reference Method 9 readings to provide data for determining compliance with marine vessel visible emission standards. This method has been approved by the 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 of commercial passenger vessels. .

Results. Statistically, the 2016 opacity readings were an improvement over 2015 results; however, they were still above the average opacity of earlier years. A detailed summary of opacity results is available in Table 1.

Products

Readings:	388 Method 9 readings performed
Compliance:	28 alleged violations are currently outstanding and pending resolution
Enforcement:	2 alleged violations of 18 AAC 50.070 were settled or closed

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. Typical operation of EGCSs occur while underway.

Enforcement. On March 25, 2015 the Department issued notices of noncompliance for alleged violations of visible emissions (opacity) exceedances between 2010 and 2014. Negotiations on the remaining 28 alleged violations continued through 2016 with settlement expected before the beginning of the 2017 season.

Compliance. Compliance with opacity requirements is determined through use of Method 9 observations. Method 9 observations are made by Department staff, the US Forest Service (USFS) through a Memorandum of Understanding (MOU) while vessels are underway in Tracy Arm, Alaska; or by contracted opacity readers. Shannon & Wilson, Inc. was contracted to conduct opacity readings in 2016.

The Program's goal is to monitor the opacity of ships in as many ports in Alaska as possible with available resources. The Port of Juneau receives more cruise ship traffic than any other port in Alaska, with Skagway and Ketchikan having slightly less traffic. With CPVEC staff and the opacity contractor duty stations in Juneau, the majority of readings occur in Juneau. Department staff and the contractor travel to other ports during the season to conduct readings; however, due to travel costs and limited staff resources, proportional monitoring in other ports is not currently feasible. Table 2 summarizes the locations and numbers of the 2016 opacity readings.

The Department responds to public complaints regarding cruise ship pollution. Although public complaints, photographs, or other evidence of emissions exceedances are difficult to corroborate within our regulatory

framework, 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.

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 developed through 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.

In addition to regular activities during the season, 2016 saw the implementation of a new contract for Ocean Ranger management. The new contract is expected to bring incremental improvements and cost savings to the Program. Crowley Maritime Corporation was the contractor in 2016.

Results. In 2016 Ocean Rangers completed 1,525 Daily Reports, which is a decrease from 2015 primarily due to changes in vessel scheduling with larger vessels transiting Alaskan Waters for fewer days in 2016 than 2015. The net effect is that passenger counts increased and coverage rate for Ocean Rangers increased 2.7% from 2015 to 2016.

Products

Daily Reports:	1,525 Daily Reports completed
Coverage Rate:	Ocean Rangers were aboard ships 70.5 % of the time ships were in Alaskan waters

Objective 2: Improve compliance with requirements for protecting 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 number of compliance issues identified aboard cruise ships by the Ocean Rangers.

Authority. AS 46.03.426(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 176 alleged noncompliance incidents. This is an increase from 160 incidents in 2015 and can be attributed to the tracking of 43 access restriction incidents which is covered in more detail under the Additional Observations Section. A detailed breakdown of all alleged noncompliant incidents are available in Table 3.

In addition to the above compliance categories in Table 3, the following additional categories of observations or concerns were noted during the 2016 season:

- Fleet wide exhaust gas cleaning system installation or operation
- Fleet wide combustion source inventory for assessing potential air emissions impacts was a repeat category from 2015 as Ocean Rangers experienced widespread access restrictions to the information as well as physical locations within the vessels. This reduced their abilities to collect this information
- General Ocean Ranger access restrictions and their impediment to Ocean Ranger job duties as agents of the State

- Fleet wide ballast water management
- Fleet wide electronic 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 Cruise Ship 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 Cruise Ship Program and other relevant parties as needed

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. Alaskan Ocean Ranger hires increased 2% from 2015 hire numbers.

Products

Alaskan Ocean Rangers:	5 of 22, or 23% of deployed Ocean Rangers were Alaskan residents in 2016

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

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

Products

2014 GP Authorizations:	6 new General Permit Authorizations granted in 2016, 24 active Authorizations in place.

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 of and compliance with wastewater discharges in the State of Alaska.

Results. The number of exceedances of permit standards for large vessel effluent samples decreased in 2016. Comparing 2016 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	209 effluent samples were collected for monitoring analysis
Enforcement	22 alleged violations of permit standards were settled or closed
Compliance	20 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
- Fecal coliform levels found in average effluent results of small vessels
- Toxic pollutant and dissolved metal levels found in average effluent results of small vessels

Cruise ship operators reported 22 exceedances of 2014 General Permit daily maximum or minimum limits out of 226 samples taken in 2016. There were 10 exceedances of monthly limits. Biochemical Oxygen Demand had the highest number of monthly limit exceedances with 7, with 6 additional daily limit exceedances for Biochemical Oxygen Demand. There were four exceedances of fecal coliform daily limits, one exceedance for ammonia, one for chlorine, two for Total Suspended Solids monthly averages, and one exceedance for geometric mean for fecal coliform results.

Enforcement. The Department issued 11 notices of violation in 2016 for 20 alleged violations of wastewater effluent limits. Two additional notices of violation were issued for unauthorized discharges of wastewater,

and one additional notice of violation was issued for general permit sampling terms and conditions. Settlements for these notices have not been completed at the time of the 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 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. The CPVEC Program intends to follow up on a two year improvement effort in these categories in 2017.

OCEAN RANGER, ADDITIONAL OBSERVATIONS SUMMARY

Authority. AS 46.03.426(a) authorizes Ocean Rangers to ensure that passengers, crew, and residents at ports are protected from improper sanitation, health, and safety practices; AS 46.03.465(h), AS 46.03.482, and AS 46.03.488 cover additional portions of pollution streams from commercial passenger vessels. Ocean Rangers observe these additional pollution sources.

2016 Project Objectives:

1. Fleet wide exhaust gas cleaning system installation or operation
2. Fleet wide combustion source inventory
3. Fleet wide ballast water management
4. Fleet wide electronic record keeping practices

Objective 1: Fleet wide 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 the environment of Alaska.

Results. The CPVEC Program monitors pollution from large commercial passenger vessels, or cruise ships. The 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).

Exhaust gas cleaning systems, or EGCSs, are designed to eliminate SO_X from the exhaust entering ambient air. Through the process, SO_X derivatives and various other pollutants are often then deposited into the ambient water through waste effluent generated by the scrubbing process.

Through information requests and observations conducted through the Ocean Ranger Program, the CPVEC Program has summarized installation status and operational use of EGCSs during the 2016 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. Rather than burn more expensive, cleaner fuels, nineteen (19) of twenty-three (23) vessels surveyed in 2016 have been confirmed instead to install technological controls to reduce SO_X emissions generated from burning cheaper, heavier marine fuels, illustrated in Table 5. Three of those four vessels where technological controls have not been continued may be in the process of installing these controls. One vessel, the Disney Wonder, has opted to burn low sulfur fuel only.

These systems, while capable of removing SO_X emissions from the air, often generate a new pollutant waste stream into the ambient water. EGCS 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.

Of the thirty (30) large cruise ships registered with the Program in 2016, twenty-three (23) were investigated by Ocean Rangers; seven (7) vessels had itineraries that did not allow sufficient time to complete any EGCS observations – six (6) of which confirmed low sulfur fuel use without any EGCS installation. Of the twenty-three (23) vessels surveyed, fourteen (14) refused Ocean Rangers access to information regarding EGCS installation status or operation. These fourteen (14) vessels belong to the Holland America Group (HAG) management structure covering HAL and PCL. Instead, HAG officials provided unverified, limited, and generic details on EGCS use.

Based on observations made by Ocean Rangers in the 2016, 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. EGCS's have the ability to remove sulfur from exhaust gases formed in the combustion of higher sulfur fuels; however, this requires proper operation and monitoring to ensure compliance.
2. **Oily Discharge.** In the operation of an EGCS, wash water is often discharged into ambient water. This discharge stream is required to be monitored for PAH content by the EPA VGP. Alaska Law prohibits sheens or oily discharge. Ocean Rangers observed sheens from EGCS wash water discharges in Alaskan ports during the 2016 season.
3. **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 EGCS discharges may be in compliance with EPA VGP limits, but out of compliance with Alaskan Water Quality Standards.
4. **Other Discharges.** EGCS discharged wash water can be hotter than ambient water temperatures or discolored. Alaskan Water Quality Standards for color or temperature of discharges do not require monitoring. 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 going forward.

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

Objective 2: Fleet wide 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 as Ocean Rangers experienced widespread access restrictions in collecting this information. 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. Access restrictions persisted on some vessels and an incomplete inventory still persists.

Objective 3: Fleet wide 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. Nineteen additional observation projects were completed for thirty 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 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. This project led to the discovery that one of the cruise ships had tanks that could be used for storage of wastewater or ballast water storage and that they were not included in the ship's Vessel Specific Sampling Plan.

Objective 4: Fleet wide electronic record keeping practices

Results. Ocean Rangers completed a project to gather information on the recordkeeping systems used onboard to track wastewater and wastewater discharges. The purpose of the project was for the Department

to understand how this information is tracked and recorded onboard large cruise ships. This project was completed on 20 large cruise ships in 2016.

Cruise ships have several different methods and systems for wastewater recordkeeping, even different methods among ships within the same cruise line. Federal and state regulations are in place for recordkeeping and reporting of discharges, but there are no regulations for recordkeeping of internal transfers or on the production and treatment of wastewater onboard. In recent years several ships have moved to automate this recordkeeping using electronic systems.

This project assisted the Department in understanding how wastewater data was collected, used, and reported onboard large cruise ships.

TABLES AND FIGURES

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
CCL:	Carnival Cruise Lines
CEL:	Celebrity Cruises
CFR:	Code of Federal Regulations
CPVEC:	Commercial Passenger Vessel Environmental Compliance (Program)
DIS:	Disney Cruise Line
DOW:	Division of Water (ADEC)
ECA:	Emissions Control Area
EGCS:	Exhaust Gas Cleaning System
EPA:	United States Environmental Protection Agency
EU:	Emission Unit
HAL:	Holland America Line
HAG:	Holland America Group (HAL & PCL)
IMO:	International Maritime Organization
LCPV:	Large Commercial Passenger Vessel
MOU:	Memorandum of Understanding
NCL:	Norwegian Cruise Line
PAH:	Polycyclic aromatic hydrocarbon
PCL:	Princess Cruises
RCI:	Royal Caribbean International
SIC:	SilverSea Cruises
SO_X:	Sulfur oxides
TSS:	Total Suspended Solids
US:	United States
USFS:	US Forest Service
UW:	Underway
VGP:	US EPA Vessel General Permit

Table 1: Opacity Data Summary

Year	2012	2013	2014	2015	2016
Number of Readings	150	340	382	343	388
Readings Below 20% Standard	99%	90%	78%	80%	83%
Average Opacity	8%	10%	14%	14%	13%
75th Percentile Opacity	10%	10%	18%	18%	15%
90th Percentile Opacity	15%	20%	35%	30%	30%

Table 2: Opacity Reading Count by Port (2016)

Port	Number of Readings
Haines, AK	1
Hoonah, AK	2
Juneau, AK	259
Ketchikan, AK	70
Sitka, AK	8
Skagway, AK	48

Table 3: Ocean Ranger Alleged Noncompliant Incidents Reported (2016)

Alleged Noncompliant Condition	Number of Incidents Reported
Oil Pollution	27
Safety	34
Sanitation	8
Wastewater	30
Other Waste	10
Air Pollution	12
EPA VGP Items	12
Access	43
Total	**176**

Table 5: 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
CEL	Infinity	1:3	DG1	GT1	GT2				Open Loop	MGO/IFO	MGO/IFO
CEL	Millennium	1:3	DG1	GT1	GT2				Open Loop	MGO	
CEL	Solstice	2:4	DG1	DG2	DG3	DG4			Open Loop	MGO	IFO
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	Maasdam	UNK	UNK						UNK	UNK	UNK
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	Volendam	3:5	DG1	DG2	DG3	DG4	DG5		Open Loop	MGO	MGO
HAL	Westerdam	3:5	DG1	DG2	DG3	DG4	DG5	GT1	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			Open Loop	MGO	MGO
NCL	Norwegian Jewel	UNK:5	DG1	DG2	DG3	DG4	DG5		Open Loop	MGO	MGO
NCL	Norwegian Sun	5:5	DG1	DG2	DG3	DG4	DG5		Open Loop	MGO	MGO
PCL	Coral Princess	3:4	DG1	DG2	DG3	GT1			Open Loop	MGO	HFO
PCL	Crown Princess	2:6	DG1	DG2	DG3	DG4	DG5	DG6	Open Loop	MGO/HFO	MGO/HFO
PCL	Grand Princess	1:UNK	DG1	UNK					UNK	UNK	UNK
PCL	Island Princess	1:4	DG1	DG2	DG3	GT1			Open Loop	MGO/HFO	Unknown
PCL	Ruby Princess	2:6	DG1	DG2	DG3	DG4	DG5	DG6	Open Loop	MGO/HFO	MGO/HFO
PCL	Star Princess	2:6	DG1	DG2	DG3	DG4	DG5	DG6	Open Loop	MGO	HFO
PCL	Sun Princess	UNK	UNK						UNK	MGO	MGO
RCI	Radiance of the Seas	1:3	DG1	GT1	GT2				Open Loop	MGO	