

2021 Air Compliance Annual Report On Cruise Ships & State Ferries

AIR QUALITY COMPLIANCE PROGRAM



Un-Cruise Wilderness Adventurer and Royal Caribbean Cruises Serenade of the Seas docked in Juneau July 23, 2021



Alaska Department of Environmental Conservation

TABLE OF CONTENTS

INTRODUCTION..... 3
AIR QUALITY SUMMARY..... 4
TABLES 8

Abbreviations and Acronyms

AAC:	Alaska Administrative Code
ADEC:	Alaska Department of Environmental Conservation
AS:	Alaska Statute
CFR:	Code of Federal Regulations
DG:	Diesel Generator
ECA:	Emissions Control Area
EGCS:	Exhaust Gas Cleaning System
EPA:	United States Environmental Protection Agency
EU:	Emission Unit
GT:	Gas Turbine
HFO:	Heavy Fuel Oil
IMO:	International Maritime Organization
LCPV:	Large Commercial Passenger Vessel
MGO:	Marine gas oil, a distillate fuel
MOU:	Memorandum of Understanding
PM:	Particulate Matter
SO _x :	Sulfur oxides
USFS:	United States Forest Service
UW:	Underway

INTRODUCTION

This report is prepared annually by the Alaska Department of Environmental Conservation (ADEC) Division of Air Quality, Compliance Program (AQ Program). The intent of this report is to provide information on the air quality monitoring and compliance efforts with cruise ship and state ferries air pollution.



Royal Caribbean Cruises Serenade of the Seas docked in Ketchikan August 28, 2021

AIR QUALITY SUMMARY

Objective: To protect the Alaskan environment by ensuring that air emissions from marine vessels in the state do not create unhealthy air. This is accomplished through the direct monitoring of the opacity of air emissions from cruise ships and state ferries.

The goal in monitoring opacity is to conduct consistent opacity readings primarily within Alaska's three busiest cruise ship ports: Juneau, Ketchikan, and Skagway. Both ADEC staff and the contractor will travel to other ports during the season to conduct readings. While the primary focus is to monitor large cruise ships, reasonable efforts are made by ADEC staff and the contractor to conduct opacity readings on small cruise ships and state ferries.

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

Implementation. The regulation applies to visible emissions, excluding water vapor, of marine vessels within three miles of the Alaska coastline. The AQ compliance program uses EPA Reference Method 9 (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 AQ compliance program monitors environmental compliance, as well as the direct and indirect environmental effects of cruise ships and state ferries.

2021 Results. Summaries of opacity results are available in Tables 1 to 3. Summaries of formal enforcement actions are available in Tables 5 to 8.

Compliance:	533 Method 9 readings performed
Enforcement:	3 Issued, 8 Pending

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. The US Forest Service (USFS) signed on to a Memorandum of Understanding (MOU) with ADEC Division of Water to monitor air emissions and wastewater discharges from marine vessels. The latest MOU was executed May 21, 2018 and is effective through April 30, 2023. In 2019 and in 2021, the USFS and ADEC coordinated together in order to perform Method 9 observations while vessels were underway in Tracy Arm and Endicott Arm. USFS provided the watercraft and operator while ADEC provided the certified opacity reader.

Enforcement.

1. Norwegian Cruise Line Holding Ltd. (NCL) Compliance Order by Consent (COBC) – Effective December 11, 2015. **CLOSED February 7, 2020.** NCL is the operator of the marine vessels *Norwegian Jewel*, *Norwegian Pearl*, and *Norwegian Sun*. **Details:** NCL entered into a COBC settlement agreement December 2015 based on seventeen (17) counts of noncompliance by exceeding the visible emission standards while operating in Alaskan waters spanning the 2012-2014 seasons. The COBC requires NCL to fully and timely comply with and/or complete remedial measures and corrective actions as required by the Order. **Stipulated Penalties:** For each vessel owned, operated, or chartered by NCL, a penalty of \$37,500 for each non-compliance event under 18 AAC 50.070 that occurs while this Order is effective and that is listed in an ADEC Notice of Violation (NOV).

2018 Action: NOV issued September 7, 2018 on the Norwegian Jewel for July 11, 2018 non-compliance in Ketchikan. Demand Letter of Stipulated Penalties issued October 5, 2018. Stipulated penalties of \$37,500 paid by NCL.

2019 Action: NOV issued June 7, 2019 on the Norwegian Joy for a May 21, 2019 non-compliance event in Juneau. Demand Letter of Stipulated Penalties issued December 11, 2019. Stipulated penalties of \$37,500 paid by NCL

2020 Action: NCL requested termination of COBC pursuant with Paragraph 53, subparagraph 53.4 on February 6, 2020. ADEC issued a COBC Closure Letter on February 7, 2020. NCL has fulfilled all actions required by the COBC.

2. Royal Caribbean Cruises Ltd. (Respondent) Compliance Order by Consent (COBC) – Effective February 3, 2017. **CLOSED December 15, 2021.** The Respondent is the owner of the cruise line brands Royal Caribbean International (RCL), operator of the marine vessels *Radiance of the Seas* and *Rhapsody of the Seas* and Celebrity Cruises (Celebrity), operator of the marine vessels *Celebrity Century* and *Celebrity Millennium*. **Details:** The Respondent entered into a COBC settlement Agreement February 2017 based on eight (8) counts of noncompliance by exceeding the visible emission standards while operating in Alaskan waters spanning the 2010, 2013, and 2014 seasons. The COBC requires the Respondent to fully and timely perform, comply with and/or complete remedial measures and corrective actions as required by the Order. **Stipulated Penalties:** For each vessel owned, operated, or chartered, a penalty of \$37,500 for each non-complaint event under 18 AAC 50.070 that occurs while the Order is effective and that is listed in an ADEC Notice of Violation.

2018 Action: Two (2) NOVs issued September 7, 2018 on the Radiance of the Seas for August 8, 2018 non-compliance in Ketchikan and on the Radiance of the Seas for August 17, 2018 non-compliance in Seward. Demand Letter for Stipulated Penalties issued October 5, 2018. Settlement pending. **2019 Update:** Settlement pending. **2020 Update:** Settlement resolved.

2020 Action: One (1) NOV issued July 24, 2020 on the Ovation of the Seas for August 18, 2019 non-compliance in Juneau. The NOV required corrective actions and remedial measures be performed by RCL.

2021 Action: RCL requested termination of COBC pursuant with Paragraph 52 on October 28, 2021. ADEC issued a COBC Closure Letter on December 15, 2021. RCL has fulfilled all actions required by the COBC.

3. Holland American Line (HAL) Settlement Agreement signed May 22, 2017. HAL signed a Settlement Agreement for years 2009-2014 alleged visible air emission violations. The State of Alaska collected a total civil assessment of \$180,000.

2018 Action: Four (4) NOVs issued September 7, 2018 on the Nieuw Amsterdam for June 19, 2018 non-compliance in Skagway, on the Westerdam for June 20, 2018 non-compliance in Haines, on the Eurodam for August 2, 2018 non-compliance in Ketchikan, and on the Amsterdam for August 24, 2018 non-compliance in Ketchikan. Settlement Agreement to HAL “Year 2018 Visible Air Emissions” issued October 17, 2018.

2019 Update: Settlement pending.

2020 Action: Holland American Line (HAL) Settlement Agreement signed October 13, 2020. HAL signed a Settlement Agreement for the 2018 alleged visible air emission violations. The State of Alaska collected a total civil assessment of \$112,500.

4. Princess Cruise Line, Ltd. (PCL) Settlement Agreement signed May 22, 2017. PCL signed a Settlement Agreement for years 2009-2014 alleged visible air emission violations. The State of Alaska collected the total assessment of \$110,125.

2018 Action: Two (2) NOVs issued September 7, 2018 on the Emerald Princess for July 31, 2018 non-compliance in Ketchikan and on the Golden Princess for July 31, 2018 non-compliance in Juneau. Settlement Agreement to PCL “Year 2018 Visible Air Emissions” issued October 17, 2018.

2019 Update: Settlement pending.

2019 Action: NOV issued July 15, 2019 on the Royal Princess for a May 29, 2019 non-compliance event in Skagway.

2020 Action: Princess Cruise Line, Ltd. (PCL) Settlement Agreement signed October 13, 2020. PCL signed a Settlement Agreement for the 2018 alleged visible air emission violations. The State of Alaska collected the total assessment of \$75,000.00.

2020 Action: Princess Cruise Line, Ltd. (PCL) Settlement Agreement signed October 13, 2020. PCL signed a Settlement Agreement for the 2019 alleged visible air emission violations. The State of Alaska suspends the total assessed amount of \$37,500.00 provided that the M/S Royal Princess fully and timely complies with all Alaska air-quality laws and regulations during the entirety of the vessel’s next season operating in Alaska.

5. **2019 Action:** NOV issued July 15, 2019 on the Oceania Regatta for an August 21, 2019 non-compliance event in Sitka.

2020 Update: Settlement Pending.

2021 Action: Norwegian Cruise Line Holdings (NCLH) Settlement Agreement signed January 20, 2021. NCLH signed a Settlement Agreement for the 2019 alleged visible air emission violation. The State of Alaska suspends the total assessed amount of \$18,750.00 provided that the M/S Oceania Regatta fully and timely complies with all Alaska air-quality laws and regulations during the entirety of the vessel’s next season operating in Alaska.

6. **2019 Action:** NOV issued October 15, 2019 on the AMHS Kennicott for an August 21, 2019 non-compliance event in Juneau.

2020 Update: Settlement Pending.

2021 Action: NOV issued January 27, 2021 on the AMHS for four (4) counts of alleged non-compliance. These events occurred July 8, 2020, August 5, 2020, and August 19, 2020 in Juneau and October 7, 2020 in Whittier.

2021 Update: Settlement Pending.

7. **2019 Action:** NOV issued September 9, 2019 on the Carnival Legend for a June 29, 2019 non-compliance event in Juneau.

2020 Action: Carnival Cruise Line (Carnival) Settlement Agreement signed October 13, 2020. Carnival signed a Settlement Agreement for the 2019 alleged visible air emission violations. The State of Alaska suspends the total assessed amount of \$37,500.00 provided that the M/S Carnival Legend fully and timely complies with all Alaska air-quality laws and regulations during the entirety of the vessel’s next season operating in Alaska.

8. **2019 Action:** NOV issued October 22, 2019 on the SilverSeas Silver Muse for a September 8, 2019 non-compliance event in Juneau.

2020 Update: Settlement Pending.

2021 Action: Silversea Cruises Ltd. (SCL) Settlement Agreement signed February 22, 2021. SCL signed a Settlement Agreement for the 2019 alleged visible air emission violation. The State of Alaska suspends the amount of \$18,750.00 provided that the M/S Silver Muse fully and timely complies with all Alaska air-quality laws and regulations during the entirety of the vessel’s next season operating in Alaska. The State of Alaska collected the non-suspended amount of \$18,750.00.

Public Complaints. The Department responds to public complaints regarding cruise ship pollution. Important information to provide the Department is the date and time, name of the vessel, location, and the duration of the emissions exceedance. The Department will investigate the complaint and will notify the vessel operators or owners as soon as possible so that mitigating steps can be taken. Depending on availability, the Department will often follow up complaints with an opacity reading by Department staff or the contractor. The number of public complaints received by the Department each year is available in Figure 1 below.

The Department received two public complaints during the 2021 cruise ship season.

Complaint No. 1:

7/26/21 JNU @1322 – Celebrity Cruises Celebrity Millennium - Cruise ship has been smoking for 20 minutes after docking. Photo and videos provided.

Action Taken: An email was sent to the operator 7/27/21.

- Operator Response: The Celebrity Millennium was made fast to shore at approx. 1340. The vessel was maneuvering with one gas turbine (GT) and one diesel generator (DG). Both engines were on Marine Gas Oil (MGO). No use of Exhaust Gas Cleaning Systems. The Heat Recovery Steam Generator (HRSG) was online. Once safely alongside, only the GT remained on during her stay. The “white” plume is steam from the HRSG unit. During normal operations, this unit will vent excess steam from the system.

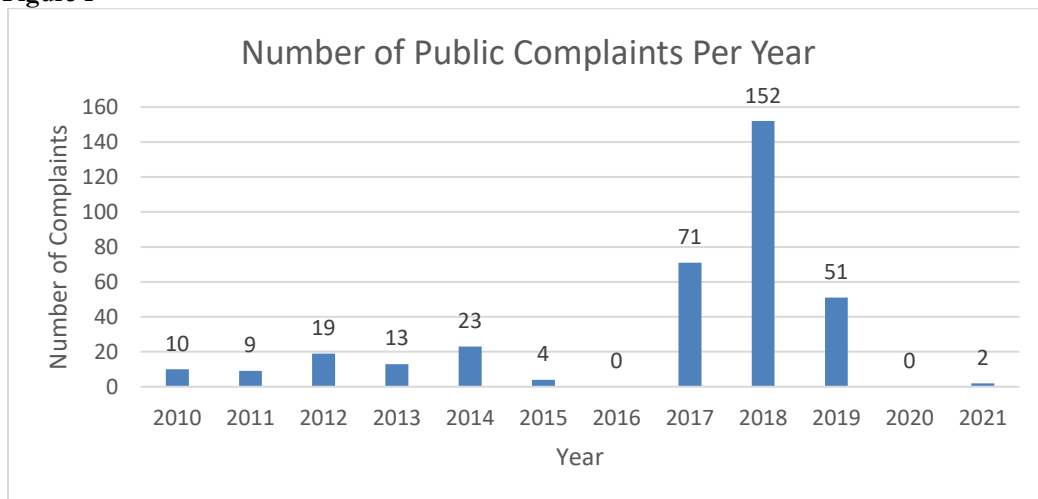
SnowCloud Webcam footage confirms presence of steam. No further action.

Complaint No. 2:

8/28/21 JNU @0915-0945 - A thick plume of smoke was emitting from what possibly was a large boat behind the Seadrome Bldg. Really thick & black which was also pumping through the ventilation system at 400 Willoughby Ave. Choking out our workforce, causing nausea, and headaches thought out the building. Notably this plume of smoke seemed to blanket most of the channel Juneau - Douglas channel. No photos provided.

Action Taken: Investigated site. Viewed SnowCloud Webcam footage. Could not determine source of smoke. No further action.

Figure 1



Ambient Air Monitoring. The Air Monitoring & Quality Assurance Program implemented a ambient air monitoring saturation study during the 2019 cruise ship season in downtown Juneau. A saturation study is a type of investigation that uses multiple samplers in a small geographic area over a limited amount of time. By using a tightly spaced grid of *Purple Air* low-cost particulate monitors (PM_{2.5}) and several *Ogawa* passive sulfur dioxide monitors (SO₂), the goals of the saturation study were:

- to address ambient air quality complaints centered on the cruise ship industry emissions;
- to determine which areas of downtown Juneau are most affected (maximum impact locations); and
- to assess if the scale in terms of frequency, duration, spatial variability and severity of these impacts has the potential to significantly affect public health and/or violate Clean Air Act air quality standards.

Key Points from the 2019 Study:

- Based on the particulate matter measurements from the PA monitors, the air quality in Juneau during the study period can be considered as “Good” using the EPA Air Quality Index (AQI) classifications, with only a few days during wildfire smoke events considered as “Moderate” to “Unhealthy for Sensitive Groups”.
- While there is strong evidence cruise ships had short term impacts on air quality in downtown Juneau, there is no evidence to suggest the cruise ship industry air quality impacts in Juneau during the 2019 cruise ship season would have led to 24-hour PM_{2.5} violations of the NAAQS.
- During the six-month study, emissions events from cruise ships were typically brief and only lasted one or two hours. The monitors detected short term emissions plumes from cruise ships in the form of widespread elevated PM_{2.5} concentrations affecting multiple sites simultaneously. Slash burning, outdoor food vendors, and residential activities also had noticeable short-term impacts on air quality.
- Early in the 2019 cruise season, cruise line companies worked together to reduce their impact on local air quality. Two of the strategies used for reducing emissions were reducing idle times in the harbor and switching to a low sulfur marine fuel while in port. While it is difficult to compare Juneau’s 2019 cruise ship related air quality impacts to previous year’s impacts as no monitoring data exists for 2018, the 2019 season had fewer complaints than the previous two years.
- The data collected did not identify a single maximum impact site but indicated that various parts of the downtown Juneau were impacted simultaneously by emission plumes, depending on weather conditions.

The study report can be found at the following link: [Cruise Ship Impacts - Southeast Alaska Air Quality Monitoring Project](#).

Based on the study findings, the Air Monitoring Program installed three new monitoring sites in the Juneau downtown area **using low-cost sensor technology, specifically AQmesh sensor pods** (<https://www.aqmesh.com/>). ADEC selected AQMesh sensor pods because the pods have a large suite of available sensors. The pods used in the State of Alaska network are configured to measure particulate matter (PM₁, PM_{2.5}, PM₄ and PM₁₀), NO, NO₂, CO, and SO₂. The pods also measure humidity, temperature, and atmospheric pressure. Measurements are taken in 15-minute intervals for all parameters and then transmitted via cellular network. Currently two sites are operational and are reporting real time data to the ADEC website (<https://dec.alaska.gov/air/air-monitoring/aqmesh-community-based-monitoring>). The third site will be reinstalled in the spring 2022.

TABLES

Table 1: 2021 Contractor Opacity Readings

Location	Readings
Juneau	81
Ketchikan	422
Skagway	0
Haines	0
Hoonah	0
Sitka	0
Seward	0
Whittier	10
Total Opacity Readings	513

Table 2: 2021 ADEC Staff Opacity Readings

Location	Readings
Juneau	9
Ketchikan	0
Skagway	1
Haines	0
Hoonah	0
Sitka	2
Whittier	5
Endicott Arm	3
Total Opacity Readings	20

Table 3: Opacity Reading Count by Port (2021)

Port	Readings
Juneau, AK	90
Ketchikan, AK	422
Skagway, AK	1
Haines, AK	0
Hoonah, AK	0
Sitka, AK	2
Whittier, AK	15
Endicott Arm	3

Table 4: Opacity Readings Per Year Summary

Year	2014	2015	2016	2017	2018	2019	2020	2021
Number of Readings	382	343	388	552	480	447	12	533

Table 5: Opacity Violations Issued (2018)

Vessel	Date	Port	Status
HAL Nieuw Amsterdam	6/19/2018	Skagway	Settled
HAL Westerdam	6/20/2018	Haines	Settled
NCL Norwegian Jewel	7/11/2018	Ketchikan	Settled
PCL Emerald Princess	7/31/2018	Ketchikan	Settled
PCL Golden Princess	7/31/2018	Juneau	Settled
HAL Eurodam	8/2/2018	Ketchikan	Settled
RCL Radiance of the Seas	8/8/2018	Ketchikan	Resolved
RCL Radiance of the Seas	8/17/2018	Seward	Resolved
HAL Amsterdam	8/24/2018	Ketchikan	Resolved

Table 6: Opacity Notice of Violations Issued (2019)

Vessel	Date	Port	Status
PCL Norwegian Joy	5/21/2019	Juneau	Settled
Oceania Regatta	6/1/2019	Sitka	Settled
PCL Royal Princess	5/29/2019	Skagway	Settled
Carnival Legend	6/29/2019	Juneau	Settled
RCL Ovation of the Seas	8/18/2019	Juneau	Settled
AMHS Kennicott	8/21/2019	Juneau	Pending
Silver Seas Silver Muse	9/8/2019	Juneau	Settled

Table 7: Opacity Notice of Violations Issued (2020)

Vessel	Date	Port	Status
AMHS Kennicott	7/8/2020	Juneau	Pending
AMHS Kennicott	8/5/2020	Juneau	Pending
AMHS Kennicott	8/19/2020	Juneau	Pending
AMHS Kennicott	10/7/2020	Whittier	Pending

Table 7: Opacity Notice of Violations Issued (2021)

Vessel	Date	Port	Status
RCL Ovation of the Seas	8/22/2021	Juneau	Pending
RCL Ovation of the Seas	10/4/2021	Juneau	Pending
RCL Ovation of the Seas	10/10/2021	Ketchikan	Pending

- 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 8: Violations Per Year Summary

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Violations	7	4	2	5	25	0	0	2	9	7	4	3



Alaska Marine Highway System M/V Matanuska docked in Ketchikan June 7, 2021