

Juneau Air Quality and Cruise ship Emissions Monitoring

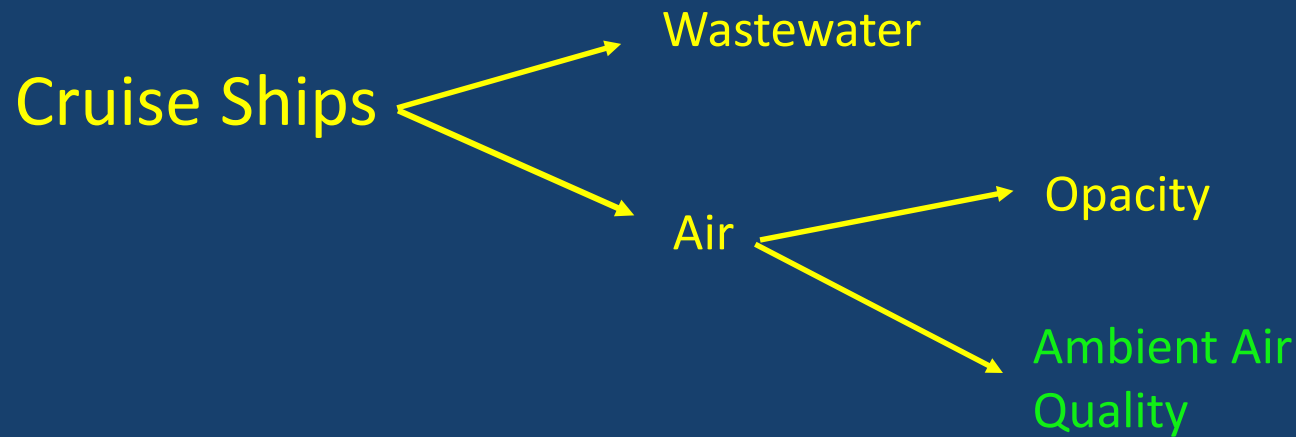


DEPARTMENT OF ENVIRONMENTAL CONSERVATION

DIVISION OF AIR QUALITY and DIVISION OF WATER QUALITY

January 29, 2019

Who at DEC Monitors Cruise Ships?



- ❖ Yellow – Division of Water Quality; Cruise Ships – Ed White
- ❖ Green – Division of Air Quality; Air Monitoring- Barbara Trost

2018 Concerns and Questions

Public complaints and questions

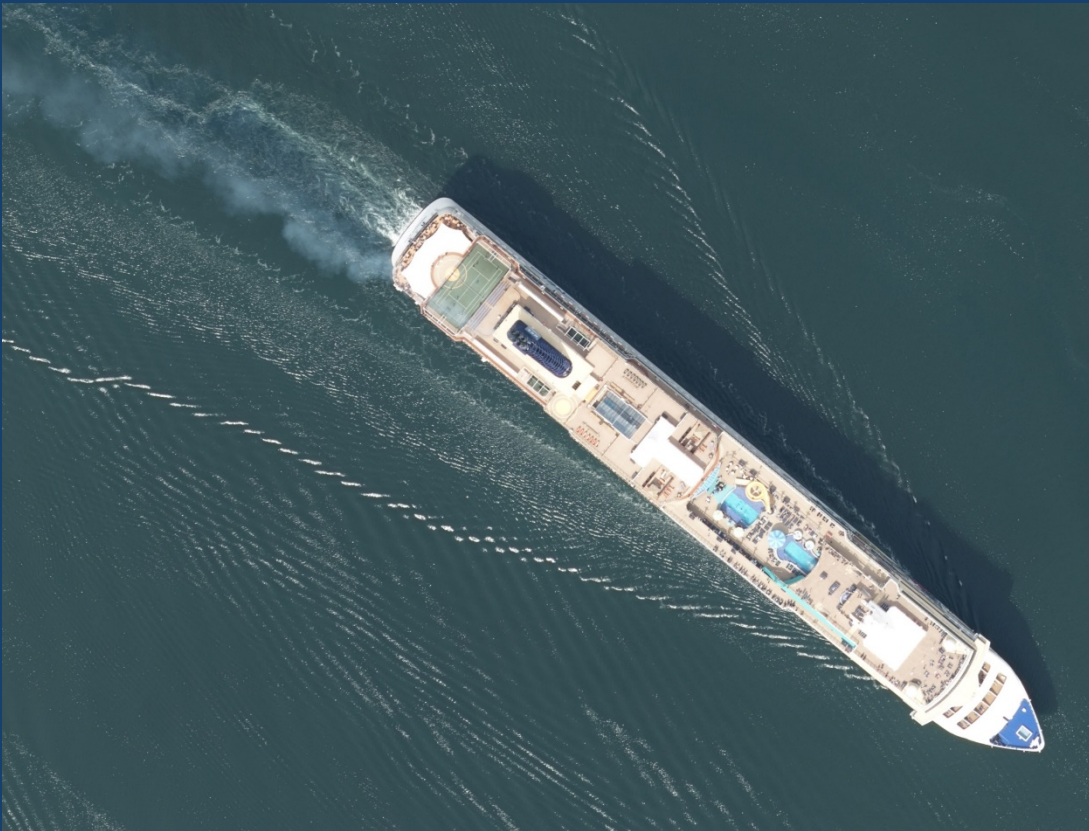
- Large increase in 2017 and 2018
- Complaints from outside Juneau
- Types of complaints
- Increase in ship traffic and size of ships
- Changes in ship operations



Public concerns and questions



Opacity



- All ships must comply with State's Opacity limits
- State of Alaska has been monitoring vessel air emissions since 1970s

Ambient Air Quality



- In 2000 an [Ambient Air Quality study](#) was conducted in Juneau due to concern about cruise ship opacity.
 - No exceedances of air quality standards were found in the 2000 study

Information



DEC Cruise Ship website
[https://dec.alaska.gov/water/
cruise-ships/](https://dec.alaska.gov/water/cruise-ships/)

Cruise Ship Industry Impact on Air Quality



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2019 Ambient Air Quality Screening Level Study

Objectives:

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



2019 Ambient Air Quality Saturation Study

Saturation study:

study floods a small area with a large number of low-cost non-regulatory sensors for a short period of time, typically to answer a defined set of questions

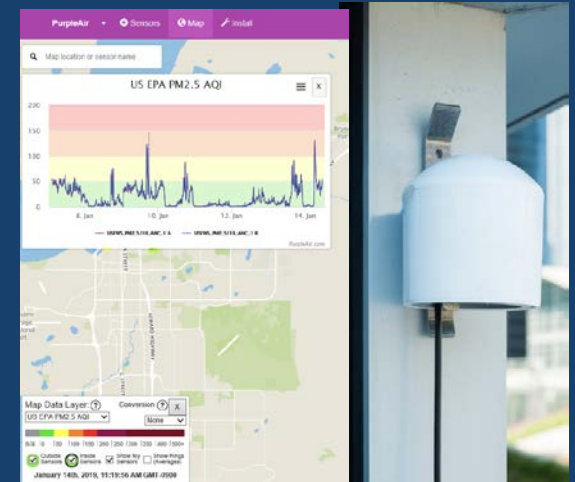
- 20 non-regulatory PM_{2.5} sensors set up in a grid in downtown area
- 10 non-regulatory passive SO₂ samplers at selected sites on days with many cruise ships in port
- Site selections yet to be made: city and state buildings; volunteers
- Results of screening level study and available funding will determine future actions.



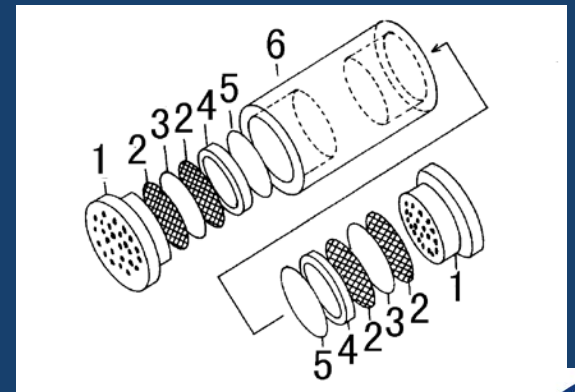
Saturation Study Equipment



- ❖ $PM_{2.5}$ → Purple Air
- ❖ Continuous
- ❖ Non-regulatory
- ❖ Posts real-time data on website
- ❖ 20 sites –
 - ❖ Mar-May 2019 pre season
 - ❖ Jun –Oct 2019 maximum impact



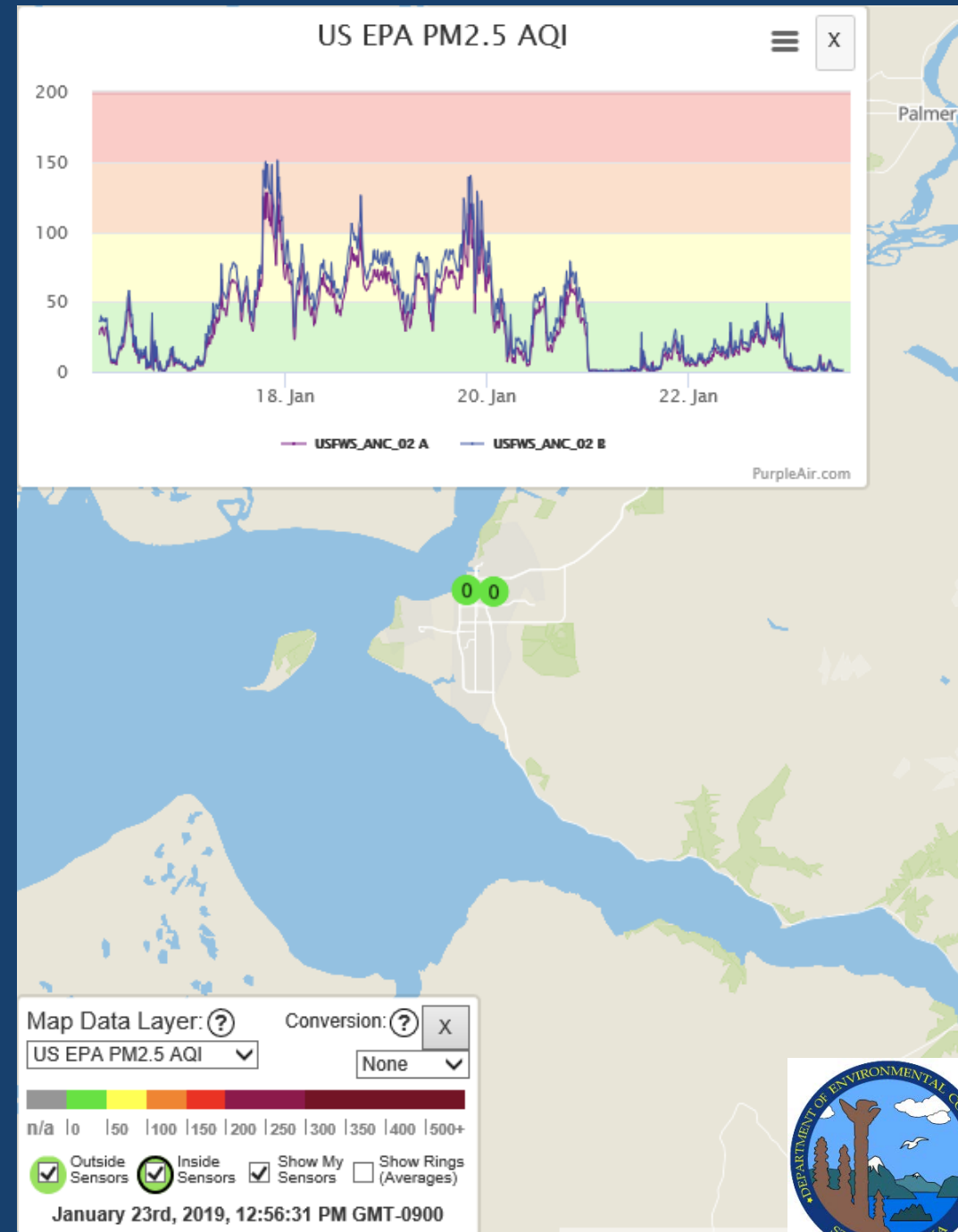
- ❖ SO_2 → Ogawa Passive Sampler
- ❖ Integrated (12-24 hours)
- ❖ Non-regulatory
- ❖ Detection limit (24 hours) ~3.8 ppb (depends on lab analysis)
- ❖ 10 sites; 2 per week for 4 weeks



Access to data

Purple Air PM_{2.5}

- Wireless communication & SD cards
- DEC will develop website for the study
- May look something like this
- Still in planning phase



Preliminary monitoring plan

Background Monitoring

- Before the start of the cruise ship season on April 28, 2019
- Purple Air:
 - grid pattern covering downtown Juneau
 - Power cost ~ \$1/ month
 - Operating entire study period
- Passive SO₂ sampler :
 - 3 days chosen to have similar weather conditions to expected 'worst' days

Plume identification monitoring

- Passive Ogawa SO₂ monitoring
 - Located at a subset of Purple Air sites
 - Targeted sampling at days with large number of cruise ships in port (example 6 cruise ships in port on 5/28/19)
 - No power required



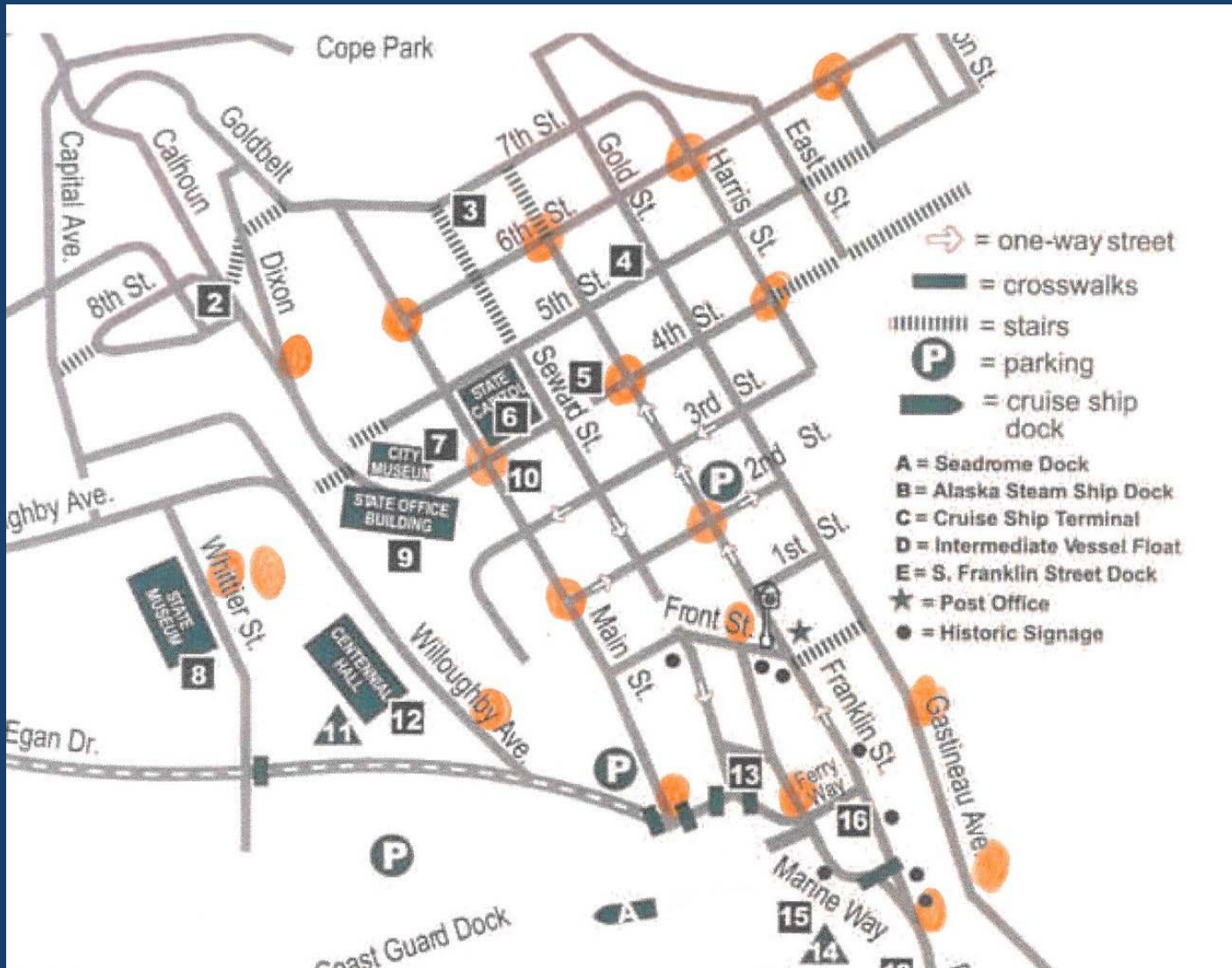
Passive Ogawa SO₂ monitoring

Targeted at days with large number of cruise ships in port (example 6 cruise ships in port on 5/28/19)

Table 5 Draft Cruise Schedule 2019				* choose days based on favorable winds
Date	Day	#	SO2*	
4/27	Sat	0	Y	pre-cruise monitoring
4/28	Sun	1		plume ID monitoring
4/29	Mon	1		plume ID monitoring
4/30	Tue	0	Y	plume ID monitoring
5/1	Wed	1		plume ID monitoring
5/2	Thu	1		plume ID monitoring
5/3	Fri	1		plume ID monitoring
5/26	Sun	4		plume ID monitoring
5/27	Mon	4		plume ID monitoring
5/28	Tue	6	Y	plume ID monitoring
5/29	Wed	5		plume ID monitoring
5/30	Thu	6	Y	plume ID monitoring
5/31	Fri	3		PA moved (m
6/1	Sat	3		max impact m



Example Sensor Grid



● PM_{2.5} sensor locations (Purple Air)

SO₂ samplers will be collocated with some of the Purple Air sensors



Help us help you...

Add information to the laminated map with sticky flags



Are you willing to host a monitor?

.... please leave your name, phone number, email and address & location proposed on the green signup sheet

Contact us!

Barbara Trost

AMQA Program Manager

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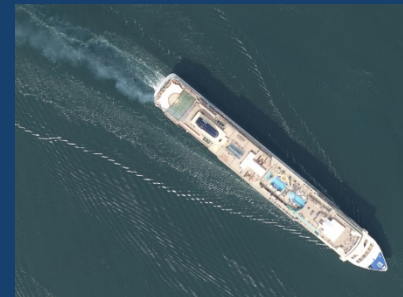
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Commercial Passenger Vessel Environmental Compliance Program "Cruise Ship Program"

January 29, 2019

Large Cruise Ships (>250 passengers)

Small Cruise Ships (50 to 249 passengers)

Alaska State Ferries

Background Information

- 18 AAC 50.070 – Marine Vessel Visible Emission Standards
- Exemptions are granted for initial startup & maneuvering
- EPA Reference Method 9

Opacity Limits

18 AAC 50.070. Marine vessel visible emission standards

1)(A) *While vessel is at berth or anchor (over 20% for up to three minutes)*

(1)(B) *While vessel is at berth during initial startup of the vessel preparing to cast off or weigh anchor (over 20% for up to six minutes)*

(2) *During the hour immediately after weighing anchor or casting off (up to 40% for an hour or up to 100% for nine minutes)*

(3) *During the hour before completion of maneuvering to anchor or making fast to shore (up to 40% for an hour or up to 100% for nine minutes)*

(4) *Vessel underway and not covered under 1-3 above (over 20% for up to three minutes)*

Opacity Monitoring of Cruise Ships & State Ferries



Opacity Monitoring Program

- ADEC staff
- ADEC Contractor
 - Minimum of 225 reading per cruise ship season
- US Forest Service Rangers

- Address Public Complaints
 - Conduct a Method 9
 - Contact the cruise line
- Self-monitor (Continuous Emissions Monitoring)
- Self-report under 18 AAC 50.240

Opacity Monitoring in 2018

Opacity Readings Per Year Summary

Year	2014	2015	2016	2017	2018
Number of Readings	382	343	388	552	480

DEC and Contractor Opacity Reading Count by Port (2018)

Port	Number of Readings
Anchorage	2
Haines	2
Hoonah	2
Juneau	233
Ketchikan	196
Seward	3
Sitka	16
Skagway	26
Wrangell, AK	3



Opacity Enforcement in 2018

Opacity Enforcement Action Per Year Summary

Year	2010- 2014	2015	2016	2017	2018
Violations	49	0	0	2	9
Settlement totals	\$533,125	\$0	\$0	\$75,000	TBD

Opacity Violations Issued (2018)

Vessel	Date	Port	Status
HAL Nieuw Amsterdam	6/19/18	Skagway	Pending
HAL Westerdam	6/20/18	Haines	Pending
NCL Norwegian Jewel	7/11/18	Ketchikan	Settled
PCL Emerald Princess	7/31/18	Ketchikan	Pending
PCL Golden Princess	7/31/18	Juneau	Pending
HAL Eurodam	8/2/18	Ketchikan	Pending
RCL Radiance of the Seas	8/8/18	Ketchikan	Pending
RCL Radiance of the Seas	8/17/18	Seward	Pending
HAL Amsterdam	8/24/18	Ketchikan	Pending



Questions?



Contact us!

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