



# 2018 Wastewater Sampling Results For Small Cruise Ships and Ferries

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Alaska Department of Environmental Conservation  
Commercial Passenger Vessel Environmental Compliance Program

## TABLE OF CONTENTS

1. Summary.....	3
2. Introducton.....	3
3. Methods.....	3
4. Results.....	4
Appendix 1: 2018 Small Cruise Ship Sample data .....	6
Table 1: 2018 Small Cruise Ship and Ferry Summary .....	6
Table 2: Conventional Parameters for Mixed Treated Blackwater and Graywater .....	7
Table 3: Conventional Parameters for Treated Blackwater .....	8
Table 4: Conventional Parameters for Treated Graywater .....	9
Table 5: Full Suite Metal Sample Results .....	10
Appendix 2: REFERENCES .....	11

## 1. SUMMARY

This is a summary of the results of onboard sampling and laboratory testing of small cruise ship and ferry wastewater effluent in Alaska during 2018. Tables of sample results are included in Appendix 1. Information on the sampling techniques and requirements can be found in the Methods section of this summary. Table 1 lists small cruise ships and ferries with BMPs in Alaska and their discharge status in 2018. Small cruise ships and state ferries have made progress in terms of overall wastewater effluent quality since the beginning of the Commercial Passenger Vessel Environmental Compliance (CPVEC) BMP program.

## 2. INTRODUCTION

Sampling of wastewater effluent was conducted for all small cruise ships and ferries with over 50 overnight passenger berths discharging in Alaska waters. Sampling is needed to:

- Check if treatment systems are operational
- Obtain information on treatment system performance for future discharge permits or Best Management Practices Plans
- Compile information on potential environmental effects

Sample result data for cruise ships and ferries has been collected by the Department of Environmental Conservation since 2000. Reports and summaries for prior years can be found on the cruise program's report webpage.

[http://dec.alaska.gov/water/cruise\\_ships/reports.htm](http://dec.alaska.gov/water/cruise_ships/reports.htm)

## 3. METHODS

Samples are grab wastewater samples taken from a sample port prior to discharge. The grab samples were taken according to requirements in the ship's approved Quality Assurance Project Plan (QAPP). Several vessels used the Cruise Line International Association North West and Canada Quality Assurance Project Plan for Sampling and Analysis of Treated Sewage and Graywater from Commercial Passenger Vessels, and some ships use their own Department approved QAPP. The QAPP specifies minimum requirements for sampling and analysis of wastewater. It includes a list of approved methods, sample collection requirements, and laboratory analysis requirements. Samplers must follow the QAPP and the Vessel Specific

Sampling Plan (VSSP) for each cruise ship when collecting a sample. The cruise ship program reviews results submitted by the cruise ship operators for compliance with the QAPP and VSSPs.

Sampling may occur while underway or while docked. All samples were obtained in Southeast Alaska in 2018, with the majority of samples obtained in or near Juneau.

In the attached tables, there are results which have been highlighted in orange indicating an exceedance of water quality standards or Marine Sanitation Device (MSD) certification standards. Regulations (18 AAC 69.080) allow the department to work with the small cruise ship operators to develop corrective actions to address these exceedances, and develop revisions to the BMPs to improve the working order of the MSD. Dark blue highlights indicate that either no sample data was received or accepted. Results below the method detection limit (MDL) are recorded as zero.

#### **4. RESULTS**

Wastewater sample results are listed in Appendix 1 with tables for conventional parameters, nutrient parameters, and metals. Full results of volatile organic compounds (VOCs) and base neutral acids (BNAs) are available on request.

Sampling requirements were modified in late 2015 to match similar changes in the 2014 large cruise ship general permit pertaining to nutrients and priority parameters. Ships with separate greywater discharges were allowed to sample greywater for conventional parameters every other year starting in 2016.

Small cruise ships and ferries are required to meet standard terms and conditions, or seek alternative terms and conditions with Best Management Practices plans in order to discharge blackwater and graywater in Alaska marine waters. Under standard terms and conditions blackwater, graywater, and other wastewater must contain no more than 200 fecal coliform per 100 milliliters and no more than 150 milligrams per liter of total suspended solids. These are the US Coast Guard performance requirements for approval of Type II Marine Sanitation Devices

(MSD) under test conditions. A MSD is required for discharge of blackwater in US waters. Some small cruise ships and ferries also treat their graywater with their MSD.

The statutes allowing alternative terms and conditions expired at the start of 2016, ships operated under a No Action Assurance memo from the Department allowing operation under existing BMPs. The new law allowing alternative terms and conditions was passed in 2017. Regulations were updated and updates to multiple ship BMPs occurred in 2018.

Small cruise ships and ferries continue to balance bacterial disinfection and chlorine use. Chlorine is used to disinfect bacteria, but it is toxic to marine organisms and high residuals must be avoided. Several vessels have installed equipment to dechlorinate the treated wastewater.

The fecal coliform standard is 200 colonies per 100 ml for approved Type II Marine Sanitation Devices. The Alaska marine water quality standards (AMWQS) is a daily maximum of 43 colonies per 100 ml. This AMWQS is used due to the collection of shellfish for raw consumption. This more stringent AMWQS is used by the Cruise Ship Program as it is assumed that the use of this standard would provide adequate protection to all other uses of all marine waters. Traditionally blackwater has had the highest median fecal coliform results, although very high results have also been found in graywater.

## **Conclusion**

The CPVEC program continues to work with small cruise ships and the state ferries to make progress in terms of overall wastewater effluent quality. Since the beginning of the CPVEC program and implementation of the small cruise ship BMPs there has been an increased improvement in the results. Unfortunately, some ships continue to struggle with meeting the standards for suspended solids, fecal coliform, BOD, and chlorine. The National Geographic Quest is a new ship with a new wastewater treatment systems, the effluent performance will be reviewed prior to the 2018 Alaska cruise season. Operators have continued to make progress in corrective actions taken after high fecal coliform and suspended solids results are reported.

**APPENDIX 1: 2018 SMALL CRUISE SHIP SAMPLE DATA**

Table 1: 2018 Small Cruise Ship and Ferry Summary

**2018 Small<sup>1</sup> Commercial Passenger Vessels Wastewater Treatment**

Vessel Operator	Vessel Name	Passenger Capacity <sup>3</sup>	Crew Capacity	Voyages	Maximum Total Passengers	Blackwater Treatment System Manufacturer	Units	BMP	Discharging in Alaska <sup>2</sup> & Subject to sampling program	
									BW	GW
Alaska Marine Highway	<i>Columbia</i>	625	66	Apr-Oct	N/A	Omnipure 15MX	4	Yes	Yes- Mixed	
Alaska Marine Highway	<i>Kennicott</i>	748	42	Year Rd.	N/A	Orca II 500	3	Yes	Yes-Mixed	
Alaska Marine Highway	<i>Malaspina</i>	500	50	Jan-April	N/A	Omnipure 15MX	3	Yes	Yes-Mixed	
Alaska Marine Highway	<i>Matanuska</i>	498	50	Year Rd.	N/A	Omnipure 15MX	3	Yes	Yes-Mixed	
Alaska Dream Cruises	<i>Admiralty Dream</i>	66	21	18	1188	Omnipure 12M	1	Yes	Yes	Yes
Alaska Dream Cruises	<i>Chichagof Dream</i>	78	27	18	1404	Orca II A-500 MSD	1	Yes	Yes- Mixed	
American Cruise Lines	<i>American Constellation</i>	173	46	13	2249	Marine Fast MSD	1	Yes	Yes- Mixed	
Hapag-Lloyd	<i>Bremen</i>	155	94	1	155	Hamworthy RT 80		N/A	No	No
Lindblad/Nat. Geographic	<i>National Geographic Quest</i>	100	50	18	1800	Gertsen & Olufsen Bioreactor	1	Yes	Yes	
Lindblad/Nat. Geographic	<i>National Geographic Sea Bird</i>	62	28	18	1116	Omnipure 12MX	1	Yes	Yes	Yes
Lindblad/Nat. Geographic	<i>National Geographic Sea Lion</i>	62	28	16	992	Omnipure 12M	1	Yes	Yes	Yes
Silver Expeditions	<i>Silver Explorer</i>	150	130	6	900	AquaMaster Unex Bio 200 E	1	Yes	Yes- Mixed	
Un-Cruise Adventures	<i>Safari Endeavor</i>	86	35	17	1462	Omnipure 12M5508	2	Yes	Yes	Yes
Un-Cruise Adventures	<i>S.S. Legacy</i>	92	34	15	1380	Red Fox RF-2000-FP	1	Yes	Yes	Yes
Un-Cruise Adventures	<i>Wilderness Adventurer</i>	74	23	25	1850	Omnipure 12MX	1	Yes	Yes-Mixed	
Un-Cruise Adventures	<i>Wilderness Discoverer</i>	78	24	15	1170	Omnipure 12MX	1	Yes	Yes-Mixed	
Un-Cruise Adventures	<i>Wilderness Explorer</i>	76	26	23	1748	Red Fox RF-2000-FP	1	Yes	Yes	Yes
Windstar	<i>Star Legend</i>	212	155	11	2332	Rochem Biofiltration 18/27-10	1	Yes	Yes- Mixed	
			<b>Totals</b>	<b>214</b>	<b>19,746</b>					

<sup>1</sup>A small vessel has overnight accommodations for 50 to 249 passengers.

<sup>2</sup>Alaska water extends 3 miles from the coastline and includes the Alexander Archipelago.

<sup>3</sup>Based on lower berths for small cruise ships and capacity for ferries.

Vessels highlighted in gray in the above table registered for no discharge of wastewater in Alaskan waters this year.

Table 2: Conventional Parameters for Mixed Treated Blackwater and Graywater

		Ammonia as N	pH	Temperature	Biochemical O <sub>2</sub> Demand	Chemical Oxygen Demand	Total Suspended Solids	Total Chlorine	Free Chlorine	Fecal Coliform Bacteria	Specific Conductance	Oil & Grease	Total Organic Carbon	Alkalinity (Total)	Hardness (as CaCO <sub>3</sub> )	Nitrogen, Nitrate-Nitrite (as N)	Total Phosphorus	Total Kjeldahl Nitrogen	Total Settleable Solids
Reportable Limit (PQL)		0.1	0.1	0.1	2	10	4	0.1	0.1	2	2	5	1	2		1	0.05	1	0.1
Units		mg/L	s.u.	C	mg/L	mg/L	mg/L	mg/L	mg/L	FC/100ml	umhos/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ml/L
Alaska Marine Water Quality Standards, Secondary Treatment standards, or AS 46.03.463		1	6.5-8.5	n/a	60	n/a	150	0.0075	n/a	200	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Vessel Name	Sample Date																		
Columbia	8/27/18		6.80	17.7	100		65	0	0	27									
Columbia	9/24/18	5.60	6.49	13.8	180	1,000	215	0	0	81	41,200	0		120	4,900				0
Kennicott	8/29/18		8.15	15.9	18		14	2.60	2.14	18									
Kennicott	9/26/18	0.17	7.87	14.8	2.7	840	18	3.3	3.0	0	45,100	0		100	5,100				0
Malaspina	8/26/18	6.77	6.77	19.4	140		130	8.3	0.74	130									
Malaspina	9/23/18	3.6	6.54	18.1	66	800	60.0	3.00	0.44	0	39,300	8.90		99	4,600				0
Matanuska																			
Chichagof Dream	6/13/18	2	6.00	23.9	ND	500	34	1.00	0	44,000	38,000	0		120	4,200				0
American Constellation	6/30/18	60	7.43	19.0	200	900	120	0	0	500	1,710	0		400	100				0
American Constellation	8/18/18	48	7.24	23.7	460	1,100	300	0	0	48,000	2,430	6.7		450	110	0.23	14	75	0
National Geo Quest	6/3/18	3	7.85	20.0	16	54	10	0	0.21	410,000	136	0		54	29				0
National Geo Quest	7/1/18	67	7.51	19.0	470	890	107	0	0	3,700,000	1,080	13.6	197	400	41	0	10.8	150	0.5
National Geo Quest	8/12/18		6.96	20.5			117	0	0	200,000									
National Geo Quest	8/26/18	0.78	6.00	19.0	820	1,300	248	0	0	0	10,800	43.7		130	54				0
Star Legend	6/7/18		7.47	30.1	20	82	0	0	0	10	1,170	0.0	24.7	350	20		4.64	87	0
Star Legend	7/5/18	1.1	7.33	26.8	10	62	0	0	0	8	864	0.0		250	16	0	1.24	44	0
Star Legend	7/18/18	79.0	7.59	27.5				0	0	8				400		0	4.76	84	
Wilderness Adventurer	5/5/18		7.96	18.8	480		493	0	0	19,000,000									
Wilderness Discoverer	6/23/18		8.71	17.6	120		103	8.6	0.51	<100									
	<b>Minimum</b>	<b>0</b>	<b>6</b>	<b>14</b>	<b>3</b>	<b>54</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>136</b>	<b>0</b>	<b>25</b>	<b>54</b>	<b>16</b>	<b>0</b>	<b>1</b>	<b>44</b>	<b>0</b>
	<b>Maximum</b>	<b>79.0</b>	<b>8.7</b>	<b>30.1</b>	<b>820.0</b>	<b>1,300.0</b>	<b>493.0</b>	<b>8.6</b>	<b>3.0</b>	<b>19,000,000</b>	<b>45,100</b>	<b>43.7</b>	<b>197.0</b>	<b>450.0</b>	<b>5,100.0</b>	<b>0</b>	<b>13.8</b>	<b>150.0</b>	<b>0.5</b>
	<b>Median</b>	<b>3.60</b>	<b>7.38</b>	<b>19.00</b>	<b>120.00</b>	<b>840.00</b>	<b>103.00</b>	<b>0.00</b>	<b>0.00</b>	<b>81</b>	<b>2,430</b>	<b>0.00</b>	<b>110.85</b>	<b>190.00</b>	<b>100.00</b>	<b>0.00</b>	<b>5</b>	<b>84.00</b>	<b>0.00</b>
	<b>Average</b>	<b>24.54</b>	<b>NA</b>	<b>20.31</b>	<b>206.85</b>	<b>684.36</b>	<b>119.65</b>	<b>1.49</b>	<b>0.39</b>	<b>1,376,634</b>	<b>16,526</b>	<b>6.63</b>	<b>110.85</b>	<b>239.42</b>	<b>1,742.73</b>	<b>0.06</b>	<b>7</b>	<b>88.00</b>	<b>0.06</b>

Nondetects set to 0

\* Too numerous to count

Exceeds WQS, Alaska, or federal secondary treatment standards. Not a violation under BMP

Not analyzed

Holding time or temperature exceeded on fecal result

Not discharging/in overhaul

**Table 3: Conventional Parameters for Treated Blackwater**

	Ammonia as N	pH	Temperature	Biochemical O <sub>2</sub> Demand	Chemical Oxygen Demand	Total Suspended Solids	Total Chlorine	Free Chlorine	Fecal Coliform Bacteria	Conductivity	Oil & Grease	Total Organic Carbon	Alkalinity (Total)	Hardness (as CaCO <sub>3</sub> )	Nitrogen, Nitrate-Nitrite (as N)	Total Phosphorus	Total Kjeldahl Nitrogen	Total Settleable Solids	
Reportable Limit (PQL)	0.1	0.1	0.1	2	10	4	0.1	0.1	2	2	5	1	2		1	0.05	1	0.1	
Units	mg/L	s.u.	C	mg/L	mg/L	mg/L	mg/L	mg/L	FC/100ml	umhos/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
Alaska Marine Water Quality Standards, Secondary Treatment standards, or AS 46.03.463	1	6.5-8.5	n/a	60	n/a	150	0.0075	n/a	200	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
<b>Vessel Name</b>	<b>Sample Date</b>																		
Admiralty Dream	6/8/18	15	8.17	14.7	46	910	86	7.1	1.9	4,500	39,000	0		150	4,600			4	
Admiralty Dream	6/29/18		8.13	15.3				1.4	1.3										
Safari Endeavour	6/24/18		7.40	15.9	90		113.0	0	0	4,400,000									
Sea Bird	6/3/18	10	7.9	13.3	140	950	50	0.83	0	0	35,200	0		100	4100			4.5	
Sea Lion	6/10/18	13	8.3	19.4	160	1400	90	0.67	0.1	0	40,800	10.5		110	4700			0	
Silver Explorer	5/2/18		8.6	29.8	0		150	0.65		8									
Silver Explorer	8/30/18	150	8.15	26.6	480	1400	268	2.2	1.4	0	29,900	7.3	83.4	700	3000	1	14.6	200	3.5
SS Legacy	5/6/18	28	7	9.2	23	820	20	3.9	2.2	0	40,600	0		110	4900			0	
Wilderness Explorer	5/5/18		7.48	9.7				0	0	6,600,000									
<b>Minimum</b>		<b>7.00</b>	<b>9.2</b>	<b>0</b>	<b>820</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>29,900</b>	<b>0</b>	<b>83</b>	<b>100</b>	<b>3,000</b>	<b>1</b>	<b>15</b>	<b>200</b>	<b>0</b>	
<b>Maximum</b>		<b>8.60</b>	<b>29.8</b>	<b>480</b>	<b>1,400</b>	<b>268</b>	<b>7.1</b>	<b>2.2</b>	<b>6,600,000</b>	<b>40,800</b>	<b>11</b>	<b>83</b>	<b>700</b>	<b>4,900</b>	<b>1</b>	<b>15</b>	<b>200</b>	<b>5</b>	
<b>Median</b>		<b>8.13</b>	<b>15.3</b>	<b>90</b>	<b>950</b>	<b>90.0</b>	<b>0.8</b>	<b>0.7</b>	<b>4</b>	<b>39,000</b>	<b>0</b>	<b>83</b>	<b>110</b>	<b>4,600</b>	<b>1</b>	<b>15</b>	<b>200</b>	<b>4</b>	
<b>Average</b>		<b>NA</b>	<b>17.1</b>	<b>134.14</b>	<b>1096.00</b>	<b>111.00</b>	<b>1.9</b>	<b>0.85875</b>	<b>1,375,563.48</b>	<b>37,100</b>	<b>3.56</b>	<b>83.40</b>	<b>234.00</b>	<b>4,260.00</b>	<b>1.40</b>	<b>14.60</b>	<b>200.00</b>	<b>2.40</b>	

Nondetects set to 0

\* Too numerous to count

Exceeds WQS, Alaska, or federal secondary treatment standards. Not a violation under BMP

Not sampled



Table 4: Conventional Parameters for Treated Graywater

	Ammonia as N	pH	Temperature	Biochemical O <sub>2</sub> Demand	Chemical Oxygen Demand	Total Suspended Solids	Total Chlorine	Free Chlorine	Fecal Coliform Bacteria	Conductivity	Oil & Grease	Total Organic Carbon	Alkalinity (total)	Hardness (as CaO <sub>3</sub> )	Nitrogen, Nitrate-Nitrite (as N)	Total Phosphorus	Total Kjeldahl Nitrogen	Total Settleable Solids
Reportable Limit (PQL)	0.1	0.1	0.1	2	10	4	0.1	0.1	2	2	5	1	2		1	0.05	1	0.1
Units	mg/L	s.u.	C	mg/L	mg/L	mg/L	mg/L	mg/L	FC/100ml	umhos/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ml/L
Alaska Marine Water Quality Standards, Secondary Treatment standards, or AS 46.03.463	1	6.5-8.5	n/a	60	n/a	150	0.0075	n/a	200	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Vessel Name	Sample Date																	
Admiralty Dream																		
Safari Endeavour	6/24/18	1.40	6.33	22.7	400	560	38	0	0	45,000	335	16.1	0	21				0
Sea Bird																		
Sea Lion																		
Silver Discoverer																		
Wilderness Discoverer																		
Wilderness Explorer																		
Star Legend	6/7/2018	0.98	6.45	29.4	670	1,200	119	0	0	73,000	338	0	0	16				0
Star Legend	7/5/2018		7.72	19.4	470		100	0	0	2,300,000								
<b>Minimum</b>	<b>1</b>	<b>6.33</b>	<b>19</b>	<b>400</b>	<b>560</b>	<b>38</b>	<b>0</b>	<b>0</b>	<b>45,000</b>	<b>335</b>	<b>0</b>		<b>0</b>	<b>16</b>				<b>0</b>
<b>Maximum</b>	<b>1.4</b>	<b>7.7</b>	<b>29</b>	<b>670</b>	<b>1,200</b>	<b>119</b>	<b>0</b>	<b>0</b>	<b>2,300,000</b>	<b>338</b>	<b>16</b>		<b>0</b>	<b>21</b>				<b>0</b>
<b>Median</b>	<b>1.19</b>	<b>6.45</b>	<b>22.70</b>	<b>470.00</b>	<b>880.00</b>	<b>100.00</b>	<b>0.00</b>	<b>0.00</b>	<b>73,000.00</b>	<b>336.50</b>	<b>8.05</b>		<b>0.00</b>	<b>18.50</b>				<b>0.00</b>
<b>Average</b>	<b>1</b>	<b>6.83</b>	<b>24</b>	<b>513</b>	<b>880</b>	<b>86</b>	<b>0</b>	<b>0</b>	<b>806,000</b>	<b>337</b>	<b>8</b>		<b>0</b>	<b>19</b>				<b>0</b>

Holding tank  
Holding tank  
Holding tank

Nondetects set to 0

\* Too numerous to count

Exceeds WQS, Alaska, or federal secondary treatment standards. Not a violation under BMP

Not sampled

**Table 5: Full Suite Metal Sample Results**

			Antimony (TR)	Antimony dissolved	Arsenic (TR)	Arsenic dissolved	Beryllium (TR)	Beryllium dissolved	Cadmium (TR)	Cadmium dissolved	Chromium (TR)	Chromium dissolved	Copper (TR)	Copper diss	Lead (TR)	Lead, diss	Mercury (Total)	Nickel (TR)	Nickel, diss	Selenium (TR)	Selenium, dissolved	Silver (TR)	Silver, diss	Thallium (TR)	Thallium, dissolved	Zinc (TR)	Zinc, diss		
Reportable Limit (PQL)			1	1	1	2.5	1	1	1	1	1	1	1	1	1	1	0.2	1	1	1	1	1	1	1	1	1	1		
Units			µg/mg	µg/mg	µg/mg	µg/mg	µg/mg	µg/mg	µg/mg	µg/mg	µg/mg	µg/mg	µg/mg	µg/mg	µg/mg	µg/mg	µg/mg	µg/mg	µg/mg	µg/mg	µg/mg	µg/mg	µg/mg	µg/mg	µg/mg	µg/mg	µg/mg		
Alaska Marine Water Quality Standards (chronic for marine life)			N/A	N/A	N/A	36	N/A	N/A	N/A	8.8	N/A	50 (chromium IV)	N/A	3.1	N/A	8.1	0.94	N/A	8.2	N/A	71	N/A	1.9 (acute)	N/A	N/A	N/A	81		
Vessel Name	Sample Date	Sample Type																											
Columbia	9/24/18	Mixed	0	0	0	0	0	0	0	0	0	0	64	30	0	0	0	0	0	0	0	0	0	0	0	0	160	150	
Kennicott	9/26/18	Mixed	0	0	0	0	0	0	0	0	0	0	34	29	0.0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	
Malaspina	9/23/18	Mixed	0	0	0	0	0	0	0	0	0	0	72	34	0	0.0	0	0	0	0	0	0	0	0	0	0	55	55	
Matanuska																													
Admiralty Dream	6/8/18	BW	0	0	0	0	0	0	0	0	0	0	210	640.0	0.0	0	0	0	0	0	0	0	0	0	0	0	260	650	
Chicagof Dream	6/13/18	Mixed	0	0	0	0	0	0	0	0	0	0	22	0	0	0	0	0	0	0	0	0	0	0	0	0	59	0	
American Constellation	8/18/18	Mixed	1.8	0	5.2	5.5	0	0	0	0	1.8	2	42	27	0	0	0	5.1	5.8	0	0	0	0	0	0	0	200	110	
Safari Endeavor	6/24/18	GW	0	1.5	0	0	0	0	0	0	0	0	79	62	6	3	0	25	12	2.7	0	0	0	0	0	0	210	170	
Sea Bird	6/3/18	BW	0	0	0	0	0	0	0	0	0	0	41	21	24	0	0	35	25	0	0	0	0	0	0	0	1600	1300	
Sea Lion	6/10/18	BW	0	0	0	0	0	0	0	0	0	0	68	0	0	0	0	0	0	0	0	0	0	0	0	0	230	90	
Quest	7/1/18	Mixed	0	1.2	1.9	1.9	0	0	0	0	1.3	1.7	59	160	1.6	3	0	4.9	5.2	0	0	0	0	0	0	0	340	260	
Silver Explorer	8/30/18	BW	0	0	0	0	0	0	0	0	0.0	0	2,600	2,200	0	0	0	42	38	0	0	0	0	0	0	0	1600	1300	
S.S. Legacy	5/6/18	BW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	71	58	
Star Legend	6/7/18	Mixed	0	0	0	0	0	0	0	0	2	1.3	0	0	0	0	0	4.8	5	0	0	0	0	0	0	0	6.1	7	
Wilderness Adventurer																													
Wilderness Discoverer																													
Wilderness Explorer																													
<b>Minimum</b>			<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0.0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0.0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Maximum</b>			<b>2</b>	<b>2</b>	<b>5</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2.0</b>	<b>2,600</b>	<b>2,200</b>	<b>24.00</b>	<b>3</b>	<b>0</b>	<b>42</b>	<b>38.0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1600</b>	<b>1300</b>		
<b>Median</b>			<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0.0</b>	<b>59</b>	<b>29</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0.0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>200</b>	<b>110</b>		

Nondetects set to 0  
**Exceeds WQS. Not a violation under BMP regulations.**  
 Not required to sample  
 Not discharging/in overhaul

## **APPENDIX 2: REFERENCES**

Alaska Department of Environmental Conservation (ADEC) Cruise Ship Program

<http://dec.alaska.gov/water/cruise-ships/>

CLIA Northwest and Canada Quality Assurance Project Plan

<http://dec.alaska.gov/media/5198/2018-clia-qapp.pdf>

Small Cruise Ship Discharge Options

<http://dec.alaska.gov/water/cruise-ships/cruise-smallship/>

Alaska Cruise Ship Laws and Regulations

<http://dec.alaska.gov/water/cruise-ships/laws-regs/>

Sample reports and summaries from other years

<http://dec.alaska.gov/water/cruise-ships/cruise-reports/>