



2014 Wastewater Sampling Results For Large Cruise Ships

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Alaska Department of
Environmental Conservation
Commercial Passenger Vessel Environmental Compliance Program



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1. SUMMARY

This is a report of the results of sampling and laboratory testing of large cruise ship treated wastewater effluent in Alaska during 2014. This report is produced to provide information on wastewater treatment sampled results obtained under the requirements of the [2010 Large Commercial Passenger Vessel Wastewater Discharge General Permit](#) (General Permit). 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 report.

Twenty-eight large cruise ships operated in Alaska in 2014, of those seventeen ships were permitted to discharge treated wastewater in Alaska, and sixteen ships discharged treated wastewater and conducted sampling. Table 1 lists large cruise ships in Alaska and their discharge status in 2014. No ships operated under the [2014 General Permit](#) in 2014.

In 2014, large cruise ships reported thirty-five exceedances of 2010 General Permit limits out of 211 samples taken for multiple parameters. This compares to 48 exceedances reported in 2013. The Star Princess had 28 of the 48 total exceedances in 2013, and three in 2014.

2. INTRODUCTION

Sampling of cruise ship effluent is a requirement under the General Permit for all large cruise ships discharging in Alaska waters. Sampling is needed to:

- Check for compliance of permit effluent limits
- Obtain information on treatment system performance for future discharge permits
- Compile information on potential environmental effects

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

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 2014 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](#) (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 number of required samples and what parameters measured are required to be analyzed are listed in the 2010 General Permit and for the US Coast Guard in the QAPP.

The cruise ship program spot checked several results submitted by the cruise ship operators for compliance with the QAPP and checked all results for compliance with 2010 General Permit limits.

Sampling may occur while underway or when docked. All samples were obtained in Southeast Alaska in 2014, with the majority of samples obtained in or near Juneau. Sample results presented in this report only include data collected while a cruise ship was discharging in Alaska. Samples were all scheduled with the exception of US Coast Guard random unannounced sample events marked as “USCG” in the results. Full sample suites of all QAPP listed parameters are identified as “PP” for priority pollutants, and all other samples are identified as “GP” (General Permit).

In the tables of results those values highlighted in red are exceedances of the 2010 Wastewater Discharge General Permit limits. Orange highlighted results were below a daily maximum, but were an exceedance of a monthly average limit. Dark blue highlights indicate that either no sample data was received or accepted. Ammonia and dissolved metal results below the method detection limit (MDL) are recorded as zero while other parameters are listed as non-detects (ND).

4. RESULTS

Wastewater sample results are listed in Appendix 1 with tables for parameters with General Permit limits, conventional and nutrient results with no limits, and metals. Full results of VOCs and BNAs are available on request.

2014 Large¹ Commercial Passenger Vessel Discharge Status

Vessel Operator	Vessel Name	Passenger Capacity	Voyages	Crew Capacity	Wastewater Treatment System	Permitted to discharge in Alaska in 2014 ²		Alaska DEC Approval Discharge Type
						BW	GW	
Carnival Cruise Lines	<i>Carnival Miracle</i>	2124	21	Unknown	Unknown	No	No	NA
Celebrity Cruises	<i>Celebrity Century</i>	1812	16	Unknown	Unknown	No	No	NA
Celebrity Cruises	<i>Celebrity Millennium</i>	2449	16	Unknown	Unknown	No	No	NA
Celebrity Cruises	<i>Celebrity Solstice</i>	3148	19	Unknown	Unknown	No	No	NA
Disney	<i>Wonder</i>	2834	15	920	Hamworthy Bioreactor	Yes	Yes	Underway
Du Pontant	<i>L'Austral</i>	264	1	Unknown	Unknown	No	No	NA
Holland America	<i>Amsterdam</i>	1380	14	Unknown	Unknown	No	No	NA
Holland America	<i>Oosterdam</i>	1916	20	Unknown	Unknown	No	No	NA
Holland America	<i>Statendam</i>	1260	19	588	Zenon	Yes	Yes	Continuous
Holland America	<i>Volendam</i>	1432	22	647	Zenon	Yes	Yes	Continuous
Holland America	<i>Westerdam</i>	1916	21	Unknown	Unknown	No	No	NA
Holland America	<i>Zaandam</i>	1432	20	647	Zenon	Yes	Yes	Continuous
Holland America	<i>Zuiderdam</i>	1916	20	Unknown	Unknown	No	No	NA
Norwegian Cruise Lines	<i>Norwegian Jewel</i>	2376	18	1100	Scanship	Yes	Yes	Underway
Norwegian Cruise Lines	<i>Norwegian Pearl</i>	2394	20	1100	Scanship	Yes	Yes	Underway
Norwegian Cruise Lines	<i>Norwegian Sun</i>	1936	19	950	Scanship	Yes	Yes	Underway
Oceania	<i>Regatta</i>	777	11	373	Triton	Yes	Yes	Continuous
Princess Cruise Line	<i>Coral Princess</i>	1986	18	900	Hamworthy Bioreactor	Yes	Yes	Underway
Princess Cruise Line	<i>Crown Princess</i>	3080	18	1190	Hamworthy Bioreactor	Yes	Yes	Continuous
Princess Cruise Line	<i>Golden Princess</i>	2636	20	1060	Hamworthy Bioreactor	Yes	Yes	Continuous
Princess Cruise Line	<i>Grand Princess</i>	2606	18	1100	Hamworthy Bioreactor	Yes	Yes	Continuous
Princess Cruise Line	<i>Island Princess</i>	1974	18	900	Hamworthy Bioreactor	Yes	Yes	Underway
Princess Cruise Line	<i>Pacific Princess</i>	670	18	373	Hamworthy Bioreactor	Yes	Yes	Continuous
Princess Cruise Line	<i>Star Princess</i>	2600	13	1150	Hamworthy Bioreactor	Yes	Yes	Continuous
Prestige Cruises	<i>Seven Seas Navigator</i>	544	15	350	Scanship	Yes	Yes	Underway
Royal Caribbean Cruises	<i>Radiance of the Seas</i>	2502	18	Unknown	Unknown	No	No	NA
Royal Caribbean Cruises	<i>Rhapsody of the Seas</i>	2435	16	Unknown	Unknown	No	No	NA
Silver Seas	<i>Silver Shadow</i>	382	18	305	Bio Epure/Marisan	Yes	Yes	Continuous
		Totals	482					

Vessels highlighted in gray in the above table did not discharge wastewater in Alaskan waters in 2014.

¹A large vessel has overnight accommodations for 250 or more passengers.

²Alaska water includes the Alexander Archipelago and extends 3 miles from the coastline.

Table 1: 2014 Large Cruise Ship Summary

In 2014, cruise ships reported 35 exceedances of 2010 General Permit limits out of 211 samples taken. pH had the highest number of exceedances with seventeen. There were three exceedances of fecal coliform limits. For dissolved metals there was one exceedance of copper, one of nickel, and three exceedances for zinc. The remaining exceedances were for ammonia (seven), biochemical oxygen demand (two including monthly average exceedances), and residual chlorine (one). There were no exceedances of total suspended solids limits.

Table 2: 2014 Exceedances of GP Limits (211 samples)

Fecal	pH	TSS	BOD	Chlorine	Ammonia	Copper	Nickel	Zinc
3	17	0	2	1	7	1	1	3

In 2014, exceedances of the limits established before Ballot Measure 2 (BOD, fecal coliform, pH, and chlorine) were again greater than the number of exceedances of ammonia and

dissolved metals. The number of exceedances in 2014 decreased compared with 2013 due to the 28 exceedances measured in 2013 samples from the Star Princess.

The cruise ship program sampling frequency and limits changed in 2015 with all ships transitioning to the 2014 Large Commercial Passenger Vessel General Permit. Further work occurred in 2015 in checking vessel specific sampling plans and discharge logs to determine if samples are representative of typical discharges.

APPENDIX 1: 2014 LARGE CRUISE SHIP WASTEWATER SAMPLE DATA

Table 3: Semi-monthly parameters and general permit limits

SemiMonthly General Permit Sample Results															Non-detects set to zero				
Company	Vessel	Treatment System	Wastewater Type	Sample Date	Type	mg/L	ug/L	ug/L	ug/L	U.S.U.	col. per 100 ml	mg/L	mg/L	mg/L	Total Residual Chlorine				
						Ammonia	Copper	Nickel	Zinc	pH	Fecal Coliform	TSS	BOD	Chlorine					
Disney	Wonder	Hamworthy	Mixed	5/30/2014	GP	36	6.1	18	180	7.15	0	0	0	2.3	0				
Princess	Crown	Hamworthy	Graywater	9/8/2014	GP	0	3.7	7.6	110	7.03	0	0	0	0	0				

Explanation of color codes:

- Exceedance General Permit Limits
- Exceedance of Alaska WQS
- Exceedance of monthly average
- Discharging only treated graywater
- Parameter not tested
- Not Discharging in Alaska Waters

Results from Discharge monitoring reports and attached sample results, all sample results taken while discharging and in Alaska

Sample types: PP - Twice a year with priority pollutants
GP - General Permit Twice Monthly Sample
USCC - Samples taken under USCC random unannounced sampling program

Zenon

Ammonia			
Stationary (mg/L)	WQS (mg/L)	Stationary (ug/L)	WQS (ug/L)
28	1	50	3.1

Dissolved Nickel

Stationary (ug/L)	WQS (ug/L)	Dissolved Zinc	WQS (ug/L)
40	8.2	188	81

pH

Minimum	Maximum	Biological oxygen demand (BOD)	Monthly Average
6.5	8.5	60 mg/L	30 mg/L

Fecal Coliform

Maximum	Monthly Average
43 / 100 ml	14 / 100 ml

Total Suspended Solids (TSS)

Maximum	Total Residual Chlorine
150 mg/L	0.0075 mg/L

Table 4: Semi-seasonal nutrients and other conventional parameters with no General Permit Limits

Vessel	Sample Date	Chemical O ² Demand	Specific Conductance	Hexane Extractable Material	Total Organic Carbon	Alkalinity	Hardness	Nitrate as N	Nitrite as N	Nitrate/Nitrite	Total Phosphorus	Total Kjeldahl Nitrogen	Total Settable Solids
	Detection Limit	5.00	2.00	5.00	1.00	5.00	5.00	0.50		0.50	0.05	1.00	0.10
	Units	mg/l	umhos/cm	mg/l	mg/l	mg/L	mg/L	mg/L	mg/L	mg/L	mg/l	mg/l	ml/l
Disney Wonder	6/6/14	33	1040	0	5.9	150	59	0	0		3.1	24	0
Disney Wonder	8/8/14	45	2370	0	8.5	200	180	0	0		3.6	48	0
Statendam													
Volendam	5/9/14	31	618	0	6.7	130	21	2	0		3.4	25	0
Volendam	7/18/14	29	559	0	8.6	140	22	0	0		1.9	13	0
Zaandam	5/11/14	27	627	0	7.5	130	19	2.1	0.15		0	30	0
Zaandam	7/20/14	28	535	0	9.2	120	21	0.48	0		0	21	0
Norwegian Jewel	5/27/14	62	828	0	19	180	95.4	0.19	0		0	39	0
Norwegian Jewel	8/6/14	57	968	0	17	180	63	0	0		0	47	0
Norwegian Pearl	5/21/14	360	13800	0	10	110	42.8	0	0		0.26	16	0
Norwegian Pearl	8/6/14	63	752	0	3.3	94	1100	0	0		0.29	29	0
Norwegian Sun	6/6/14	54	660	0	9.1	100	33	0	0		0.38	37	0
Norwegian Sun	8/85/14	46	677	0	14	110	21	0	0		0	34	0
Vessel	Sample Date	Chemical O ² Demand	Specific Conductance	Hexane Extractable Material	Total Organic Carbon	Alkalinity	Hardness	Nitrate as N	Nitrite as N	Nitrate/Nitrite	Total Phosphorus	Total Kjeldahl Nitrogen	Total Settable Solids
	Detection Limit	5.00	2.00	5.00	1.00	5.00	5.00	0.50		0.50	0.05	1.00	0.10
	Units	mg/l	umhos/cm	mg/l	mg/l	mg/L	mg/L	mg/L	mg/L	mg/L	mg/l	mg/l	ml/l
Coral Princess	6/3/14	50	732	0	10	100	46	0	0.39		8.3	19	0
Coral Princess	8/13/14	63	2930	0	21	250	220	0	0		11	56	0
Crown Princess-GW	6/4/14	86	300	0	8.7	86	27	0	0		0.21	1.5	0
Crown Princess-GW	8/13/14	21	391	0	9.5	74	2.4	0	0		0	0.65	0
Crown Princess	6/4/14	420	1030	0	6.8	200	25	0.27	0		3.3	42	0
Crown Princess	8/13/14	50	1000	0	12	69	26.5	0	9.1		0	1.3	0
Golden Princess- GW	6/2/14	77	340	0	6.2	40	30	0	0		0	0.52	0
Golden Princess- GW	8/4/14	20	252	0	7.3	48	16	0	0		0.35	0.56	0
Golden Princess	6/3/14	20	214	0	2.7	31	13	1.1	0		0.21	0	0
Golden Princess	8/5/14	29	308	0	15	57	14	0	0		0.34	0.6	0
Grand Princess-GW	5/28/14	26	2330	0	6.1	68	175	0	0		0	0.73	0
Grand Princess-GW	8/6/14	26	851	0	8.6	84	55	0	0		0	1	0
Grand Princess	5/28/14	72	3850	0	18	100	2260				32	13	74
Grand Princess	8/7/14	59	900	0	15	96	51	0.23	13		8.4	20	0
Vessel	Sample Date	Chemical O ² Demand	Specific Conductance	Hexane Extractable Material	Total Organic Carbon	Alkalinity	Hardness	Nitrate as N	Nitrite as N	Nitrate/Nitrite	Total Phosphorus	Total Kjeldahl Nitrogen	Total Settable Solids
	Detection Limit	5.00	2.00	5.00	1.00	5.00	5.00	0.50		0.50	0.05	1.00	0.10
	Units	mg/l	umhos/cm	mg/l	mg/l	mg/L	mg/L	mg/L	mg/L	mg/L	mg/l	mg/l	ml/l
Island Princess	6/15/14	74	1210	0	17	200	72	0.23	0.78		11	54	0
Island Princess	8/10/14	60	1398	0	15	200	85	0	2		9.7	52	0
Pacific Princess-GW	6/5/14	28	1200	0	3.9	37	82	5.2	6.6		3.7	11	0
Pacific Princess-GW	8/7/14	29	256	0	7.5	64	16	0	0.26		0.82	6.6	0
Pacific Princess	6/6/14	38	953	0	7	150	51	3.4	2.1		6.9	33	0
Pacific Princess	8/8/14	54	868	0	14	98	37	0.14			28	9.3	30
Star Princess-GW	5/28/14	44	243	0	10	66	7.68	0	0		0	4.4	0
Star Princess-GW	9/3/15	38	203	0	12	52	4420	0	0		0	2.6	0
Star Princess	5/28/14	52	566	0	10	160	22	0.11	0		1.6	22	0
Star Princess	9/4/14	62	195	0	11	50	6.01	0	0		0	2.9	0
Regatta-Port	6/20/14	120	3640	0	13	0	280	65	0		9.5	10	0
Regatta-Port	8/5/14	34	2360	0	6.4	140	160	25	0		7.8	0	0
Regatta- Starboard	6/20/14	160	3910	21	11	0	270	59	0		11	23	0
Regatta- Starboard	8/5/14	33	3050	0	4.9	140	240	11	0		6.6	0	0
Seven Seas Navigator	5/24/14	34	572	0	9.3	70	22.5	0	0.16		0	7.5	0
Seven Seas Navigator	7/13/14	44	545	0	11	65	21	0	0		0.39	4.5	0
	MAX	420	13800	21	21	250	4420	65	13	32	13	74	0
	MIN	20	195	ND	2.7	0	2.4	0	0	0	0	0	0
	MEDIAN	45.5	790	ND	9.4	99	39.9	0	0	14	0.385	17.5	0
	Parameter not sampled												
	Non-detects set to zero												

Table 5: Full Suite Semi-seasonal Metal Sample Results

		Semi seasonal Metal Samples																									
Vessel	Date	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	
Disney Wonder	6/8/14	0	1.4	0	0	0	0	0	0	9.4	1.3	2.9	2.7	0	0	0	29	25	1.2	1.2	0	0	0	0	190	170	
Disney Wonder	8/8/14	0	0	1.6	1.3	0	0	0	0	1.1	1.2	5	4.6	0	0	0	18	19	4.7	4.2	0	0	0	0	130	130	
Statendam																											
Volendam	5/9/14	0	0	1.2	1.3	0	0	0	0	0	1.3	11	9.9	0	0	0	7.3	8.3	2.4	4.2	0	0	0	0	100	110	
Volendam	7/18/14	0	0	0	0	0	0	0	0	1.1	0	4	3.9	0	0	0	9.5	9.1	0	0	0	0	0	0	95	97	
Zaandam	5/11/14	0	0	1.1	0	0	0	0	0	0	0	4.5	5	0	0	0	10	11	1.8	2	0	0	0	0	85	89	
Zaandam	7/20/14	0	0	0	0	0	0	0	0	0	1.1	5.3	5.5	0	0	0	7.5	7.5	1.4	1.3	0	0	0	0	110	110	
Norwegian Jewel	5/27/14	0	0	0	8.9	0	0	0	0	0	0	4.4	30	0	0	0	6.3	4.8	0	1.5	0	0	0	0	87	37	
Norwegian Jewel	8/6/14	0	0	0	0	0	0	0	0	0	0	2.4	2.1	0	0	0	4.8	4.6	0	0	0	0	0	0	37	38	
Norwegian Pearl	5/21/14	0	0	0	2.9	0	0	0	0	0	0	8.8	12	0	0	0	5.6	5.8	0	0	0	0	0	0	98	93	
Norwegian Pearl	8/6/14	0	0	9.8	8.9	0	0	0	0	0	0	27	24	0	0	0	2.6	2.5	31	27	0	0	0	0	18	21	
Norwegian Sun	6/6/14	0	0	0	0	0	0	0	0	0	0	8.3	5.7	0	0	0	9.8	9.2	0	0	0	0	0	0	28	28	
Norwegian Sun	8/8/14	1.2	1.4	0	0	0	0	0	0	0	0	9.5	5.9	0	0	0	17	17	0	0	0	0	0	0	19	21	
Coral Princess	6/3/14	0	0	0	0	0	0	0	0	0	0	20	13	0	0	0	9.9	9.7	1.1	1.1	0	0	0	0	62	56	
Coral Princess	8/13/14	0	0	4.3	4.3	0	0	0	0	0	0	6.4	5.5	0	0	0	7.1	6.5	11	11	0	0	0	0	32	27	
Crown Princess-GW	6/4/14	0	0	0	0	0	0	0	0	1.4	1.3	7.4	6.8	0	0	0	22	22	0	0	0	0	0	0	72	70	
Crown Princess-GW	8/13/14	0	0	0	0	0	0	0	0	0	0	8.1	8.6	0	0	0	12	12	0	0	0	0	0	0	68	69	
Crown Princess	6/4/14	0	0	0	0	0	0	0	0	0	1.1	5.3	4.7	0	0	0	21	20	0	0	0	0	0	0	73	69	
Crown Princess	8/13/14	0	0	0	0	0	0	0	0	1.3	0	25	22	1	0	0	12	11	0	0	0	0	0	0	78	77	
Golden Princess- GW	6/2/14	0	0	0	0	0	0	0	0	0	0	5.3	5.5	0	0	0	5.4	5.5	0	0	0	0	0	0	130	140	
Golden Princess- GW	8/4/14	0	0	0	0	0	0	0	0	0	0	2.9	2.7	0	0	0	8	7.8	0	0	0	0	0	0	120	120	
Golden Princess	6/3/14	0	0	0	0	0	0	0	0	0	0	9.9	10	0	0	0	3.4	3.5	0	0	0	0	0	0	84	88	
Golden Princess	8/5/14	0	0	0	0	0	0	0	0	0	0	5.7	5.2	0	0	0	6.8	6.5	0	0	0	0	0	0	110	110	
Grand Princess-GW	5/28/14	0	0	0	0	0	0	0	0	1.6	1.6	4.7	4.3	0	0	0	14	13	0	0	0	0	0	0	89	71	
Grand Princess-GW	8/6/14	0	0	0	0	0	0	0	0	0	0	1.8	1.9	0	0	0	6.3	6.4	1.4	1.5	0	0	0	0	23	25	
Grand Princess	5/28/14	0	0	2	1.8	0	0	0	0	1.6	1.6	17	15	0	0	0	12	12	0	0	0	0	0	0	85	90	
Grand Princess	8/7/14	0	0	0	0	0	0	0	0	1.3	1.8	5.3	5.4	0	0	0	7.7	7.5	1.4	1.3	0	0	0	0	69	71	
Island Princess	6/15/14	0	0	1.5	1.5	0	0	0	0	0	0	16	15	0	0	0	5.7	5.7	3.4	3.1	0	0	0	0	67	64	
Island Princess	8/10/14	0	0	1.2	1.5	0	0	0	0	0	0	12	13	0	0	0	4.7	4.8	3.3	3.4	0	0	0	0	45	47	
Pacific Princess-GW	6/5/14	0	0	0	0	0	0	0	0	1	0	7.8	7.5	0	0	0	20	19	1.6	1.7	0	0	0	0	68	67	
Pacific Princess-GW	8/7/14	0	1.1	0	0	0	0	0	0	0	0	1.3	1.3	0	0	0	17	17	0	0	0	0	0	0	22	24	
Pacific Princess	6/6/14	0	0	0	0	0	0	0	0	0	0	10	11	0	0	0	15	16	1.2	1	0	0	0	0	73	77	
Pacific Princess	8/8/14	0	0	0	0	0	0	0	0	0	1.1	17	18	0	0	0	19	19	1.2	1.1	0	0	0	0	51	55	
Star Princess-GW	5/28/14	0	0	0	0	0	0	0	0	0	1	2.5	2.4	0	0	0	4.9	5.1	0	0	0	0	0	0	33	33	
Star Princess-GW	9/3/15	0	1.1	0	0	0	0	0	0	0	0	5	3.6	0	0	0	5.2	5	0	0	0	0	0	0	38	29	
Star Princess	5/28/14	0	0	0	0	0	0	0	0	0	0	7.4	5.7	0	0	0	6.3	6.7	0	0	0	0	0	0	60	51	
Star Princess	9/4/14	0	0	0	0	0	0	0	0	0	0	2.7	2.3	0	0	0	7.7	8.1	0	0	0	0	0	0	66	66	
Regatta-Port	6/20/14	0	0	4.6	3.3	0	0	0	0	4.3	4.5	100	70	0	0	0	19	22	11	9.3	0	0	0	0	170	180	
Regatta-Port	8/5/14	0	0	2.9	3	0	0	0	0	0	0	18	15	0	0	0	5.1	5.2	4.2	4.3	0	0	0	0	32	27	
Regatta- Starboard	6/20/14	0	0	5.2	4.6	0	0	0	0	1.6	0	230	35	0	0	0	27	29	13	11	1.4	0	0	0	510	320	
Regatta- Starboard	8/5/14	0	0	3.5	3.2	0	0	0	0	0	0	62	25	1.8	0	0	4.7	4.7	6.8	6.6	0	0	0	0	26	22	
Seven Seas Navigator	5/24/14	0	0	0	0	0	0	0	0	0	0	3.1	2.5	0	0	0	6.8	6.7	0	0	0	0	0	0	48	47	
Seven Seas Navigator	7/13/14	0	0	0	1.1	0	0	0	0	1.2	1	7.1	6	0	0	0	8.1	8	0	0	0	0	0	0	41	42	
All results in micrograms/L (ug/L)																											
Non detects recorded as zero																											

APPENDIX 2: REFERENCES

Alaska Department of Environmental Conservation (ADEC) Cruise Ship Program

http://www.dec.state.ak.us/water/cruise_ships/index.htm

Quality Assurance Project Plan

http://dec.alaska.gov/water/cruise_ships/pdfs/2014_CLIA_NWC_QAPP.pdf

2010 Large Cruise Ship General Permit

http://www.dec.state.ak.us/water/cruise_ships/gp/10gp.html

Alaska Cruise Ship Laws and Regulations

http://www.dec.state.ak.us/water/cruise_ships/Law_and_Regs/index.htm

Sample reports from prior years

http://www.dec.state.ak.us/water/cruise_ships/reports.htm