



2013 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 2013. 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.

The number of large cruise ships operated in Alaska in 2013 was 28, of those 17 ships were permitted to discharge treated wastewater in Alaska, and 16 ships discharged treated wastewater and conducted sampling. Table 1 lists large cruise ships in Alaska and their discharge status in 2013.

In 2013, large cruise ships reported 48 exceedances of 2010 General Permit limits out of 199 samples taken for multiple parameters. This compares to 22 exceedances reported in 2012. The Star Princess had 28 of the 48 total exceedances in 2013.

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

Information on sampling requirements is in the 2010 General Permit.

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 2013 [North West and Canada Cruise](#)

[Association 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 2013, 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.

Table 1: 2013 Large Cruise Ship Summary

2013 Large ¹ Commercial Passenger Vessel Discharge Status									
Vessel Operator	Vessel Name	Passenger Capacity	Voyages	Blackwater (BW) Treatment System Manufacturer	ADEC Permitted to discharge in Alaska in 2013 ²		Alaska DEC Approval Discharge Type	Number of Samples	
					BW	GW			
1	Carnival Cruise Lines	<i>Carnival Miracle</i>	2124	20		No	No	No	N/A
2	Celebrity Cruises	<i>Century</i>	1812	20		No	No	No	N/A
3	Celebrity Cruises	<i>Millennium</i>	2449	15		No	No	No	N/A
4	Celebrity Cruises	<i>Solstice</i>	2852	17		No	No	No	N/A
5	Crystal Cruises	<i>Symphony</i>	975	1		No	No	No	N/A
6	Disney	<i>Wonder</i>	2834	16	Hamworthy Bioreactor	Yes	Yes	Underway	8
7	Holland America	<i>Amsterdam</i>	1380	17		No	No	No	N/A
8	Holland America	<i>Oosterdam</i>	1916	21		No	No	No	N/A
9	Holland America	<i>Statendam</i>	1260	21	Zenon	Yes	Yes	Continuous	11
10	Holland America	<i>Volendam</i>	1432	22	Zenon	Yes	Yes	Continuous	11
11	Holland America	<i>Westerdam</i>	1916	20		No	No	No	N/A
12	Holland America	<i>Zaandam</i>	1432	19	Zenon	Yes	Yes	Continuous	12
13	Holland America	<i>Zuiderdam</i>	1916	20		No	No	No	N/A
14	Norwegian Cruise Lines	<i>Norwegian Jewel</i>	2376	18	Scanship	Yes	Yes	Underway	10
15	Norwegian Cruise Lines	<i>Norwegian Pearl</i>	2394	20	Scanship	Yes	Yes	Underway	10
16	Norwegian Cruise Lines	<i>Norwegian Sun</i>	1936	18	Scanship	Yes	Yes	Underway	11
17	Oceania	<i>Regatta</i>	777	13	Triton	Yes	Yes	Continuous	4
18	Princess Cruise Line	<i>Coral Princess</i>	1974	18	Hamworthy Bioreactor	Yes	Yes	Underway	9
19	Princess Cruise Line	<i>Diamond Princess</i>	2678	20	Hamworthy Bioreactor	Yes	Yes	Underway	10
20	Princess Cruise Line	<i>Golden Princess</i>	2598	18	Hamworthy Bioreactor	Yes	Yes	Continuous (GW)/ Underway (BW and GW)	21
21	Princess Cruise Line	<i>Grand Princess</i>	2606	13	Hamworthy Bioreactor	Yes	Yes	Continuous (GW)/ Underway (BW and GW)	20
22	Princess Cruise Line	<i>Island Princess</i>	1974	19	Hamworthy Bioreactor	Yes	Yes	Underway	11
23	Princess Cruise Line	<i>Sapphire Princess</i>	2678	19	Hamworthy Bioreactor	Yes	Yes	Continuous (GW)/ Underway (BW and GW)	20
24	Princess Cruise Line	<i>Star Princess</i>	2598	19	Hamworthy Bioreactor	Yes	Yes	Continuous (GW)/ Underway (BW and GW)	23
25	Prestige Cruises	<i>Seven Seas Navigator</i>	544	15	Scanship	Yes	Yes	Underway	8
26	Royal Caribbean Cruises	<i>Radiance of the Seas</i>	2502	17		No	No	No	N/A
27	Royal Caribbean Cruises	<i>Rhapsody of the Seas</i>	2435	15		No	No	No	N/A
28	Silver Seas	<i>Silver Shadow</i>	382	16	Bio Epure/Marisan	Yes	Yes	Continuous	0
		Totals	487					Totals	199

Vessels highlighted in Gray in the above table are not registered to or chose not to discharge wastewater in Alaskan waters during the 2013 season.

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

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

In 2013, cruise ships reported 48 exceedances of 2010 General Permit limits out of 199 samples taken. Fecal coliform had the highest number of exceedances with ten including monthly geometric mean exceedances. There were seven exceedances of pH limits. For dissolved metals there were five exceedances of copper, ten of nickel, and three for zinc. The remaining exceedances were for ammonia (five), biochemical oxygen demand (five including monthly average exceedances), and residual chlorine (three). There were no exceedances of total suspended solids limits.

Table 2: 2013 Exceedances of GP Limits (199 samples)

Fecal	pH	TSS	BOD	Chlorine	Ammonia	Copper	Nickel	Zinc
10	7	0	5	3	5	5	10	3

In 2013, exceedances of the limits established before Ballot Measure 2 (BOD, fecal coliform, pH) were again greater than the number of exceedances of ammonia and dissolved metals. The number of exceedances in 2013 increased compared with 2012 and 2011 due to the 28 exceedances measured in samples from the Star Princess. The cruise ship program monitored

the results of the Star Princess and inspected the AWTIS system onboard while repairs were underway.

The cruise ship program will increase the frequency of sample quality assurance spot checks in 2014. Further work is planned in checking vessel specific sampling plans and discharge logs to determine if samples are representative of typical discharges. The program also intends to rapidly respond to any sampling quality assurance issues that arise in 2014.

APPENDIX 1: 2013 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											Explanation of color codes						
Company	Vessel	Treatment System	Wastewater Type	Sample Date	Type	mg/L	ug/L	ug/L	ug/L	S.U.	col. per 100 ml	mg/L	mg/L	mg/L	Residual Chlorine	Exceedance of General Permit Limits	Exceedance of Alaska WQS	Exceedance of monthly average	Discharging only treated graywater	Parameter not tested	Not Discharging in Alaska Waters
						Ammonia	Copper	Nickel	Zinc	pH	Fecal Coliform	TSS	BOD	Chlorine							
Disney	Wonder	Hamworthy	Mixed	5/31/2013	GP	21	4.7	25	190	7.1	0	0	0	2.2							
Disney	Wonder	Hamworthy	Mixed	6/7/2013	PP	27	5.6	18	160	7.02	0	0	0	0							
Disney	Wonder	Hamworthy	Mixed	6/14/2013	GP	37	2.9	14	210	7.03	0	0	0	0							
Disney	Wonder	Hamworthy	Mixed	7/12/2013	PP	17	8.4	18	290	7.18	0	0	0	0							
Disney	Wonder	Hamworthy	Mixed	7/19/2013	GP	15	11	19	230	7.02	0	0	0	0							
Disney	Wonder	Hamworthy	Mixed	8/2/2013	GP	20	2.4	14	160	6.8	0	0	0	0							
Disney	Wonder	Hamworthy	Mixed	8/23/2013	GP	11	15	17	230	7.12	0	0	0	0							
Disney	Wonder	Hamworthy	Mixed	9/6/2013	GP	13	5.2	19	220	6.92	0	0	0	0							
Holland America	Statendam	Zenon	Mixed	5/8/2013	GP	0.99	2.9	23	75	7.03	0	0	0	0							
Holland America	Statendam	Zenon	Mixed	5/23/2013	PP	15	2.4	18	39	7.13	0	0	0	0							
Holland America	Statendam	Zenon	Mixed	6/13/2013	GP	8	2.1	21	12	6.96	0	0	0	0							
Holland America	Statendam	Zenon	Mixed	6/19/2013	GP	5	1.9	23	15	6.62	0	0	0	0							
Holland America	Statendam	Zenon	Mixed	7/11/2013	GP	5	2.3	30	12	7.12	0	0	0	0							
Holland America	Statendam	Zenon	Mixed	7/17/2013	GP	3.7	1.2	23	10	6.56	0	0	0	0							
Holland America	Statendam	Zenon	Mixed	7/25/2013	GP					7.25											
Holland America	Statendam	Zenon	Mixed	8/8/2013	PP	3.7	2.6	21	13	7.36	0	0	0	0							
Holland America	Statendam	Zenon	Mixed	8/22/2013	GP	0.31	1.4	14	30	6.84	0	0	0	0							
Holland America	Statendam	Zenon	Mixed	9/5/2013	GP	6	0	19	24	6.92	0	0	0	0							
Holland America	Statendam	Zenon	Mixed	9/24/2013	GP	5.3	1.3	16	5.5	7.32	0	0	0	0							
Holland America	Volendam	Zenon	Mixed	5/3/2013	GP	25	5.1	8.7	8.4	7.59	0	0	0	0							
Holland America	Volendam	Zenon	Mixed	5/10/2013	PP	1.2	12	10	69	7.48	0	0	0	0							
Holland America	Volendam	Zenon	Mixed	6/7/2013	GP	49	3.9	8.3	7.6	7.53	0	0	0	0							
Holland America	Volendam	Zenon	Mixed	6/14/2013	GP	6.9	5.9	1.60	1.59	6.92	0	0	0	0							
Holland America	Volendam	Zenon	Mixed	7/19/2013	GP	8.1	4.1	10	96	7.29	0	0	0	0							
Holland America	Volendam	Zenon	Mixed	7/26/2013	GP	6.9	6.3	9	83	7.32	0	0	0	0							
Holland America	Volendam	Zenon	Mixed	8/2/2013	PP	14	6.4	9.5	78	7.44	0	0	0	0							
Holland America	Volendam	Zenon	Mixed	8/9/2013	GP	10	5.1	11	140	7.82	0	0	0	0							
Holland America	Volendam	Zenon	Mixed	9/6/2013	GP	8.3	4.3	9	120	7.24	0	0	0	0							
Holland America	Volendam	Zenon	Mixed	9/13/2013	GP	11	5.2	11	82	7.52	0	0	0	0							
Holland America	Volendam	Zenon	Mixed	9/13/2013	USCG					7.51											
Holland America	Zaandam	Zenon	Mixed	5/7/2013	PP	9	8.9	16	99	6.86	0	0	0	0							
Holland America	Zaandam	Zenon	Mixed	5/23/2013	GP	17	3.3	9.1	69	6.95	0	0	0	0							
Holland America	Zaandam	Zenon	Mixed	6/6/2013	GP	13	3.2	9.2	100	6.93	0	0	0	0							
Holland America	Zaandam	Zenon	Mixed	6/7/2013	USCG					7.23											
Holland America	Zaandam	Zenon	Mixed	6/20/2013	GP	7.7	4.6	11	200	7.09	0	0	0	0							
Holland America	Zaandam	Zenon	Mixed	7/10/2013	GP	4.3	2.8	9	120	7.09	0	0	0	0							
Holland America	Zaandam	Zenon	Mixed	7/18/2013	GP	4.3	10	3.6	150	7.15	0	0	0	0							
Holland America	Zaandam	Zenon	Mixed	7/24/2013	GP	16	3.1	8.3	74	7.25	0	0	0	0							
Holland America	Zaandam	Zenon	Mixed	8/7/2013	USCG					7.21											
Holland America	Zaandam	Zenon	Mixed	8/15/2013	GP	3.7	10	11	98	6.92	0	0	0	0							
Holland America	Zaandam	Zenon	Mixed	9/4/2013	GP	9.9	2.9	7.8	93	7.08	0	0	0	0							
Holland America	Zaandam	Zenon	Mixed	9/12/2013	GP	5.2	3.9	9.8	100	6.92	0	0	0	0							
Norwegian	Jewel	Scanship	Mixed	5/21/2013	GP	28	2.3	6.4	130	6.72	2	5	5	5							
Norwegian	Jewel	Scanship	Mixed	5/22/2013	PP	33	2.6	5.8	81	6.84	0	0	0	0							
Norwegian	Jewel	Scanship	Mixed	6/5/2013	GP	30	3	8.7	66	6.65	0	0	0	3.5							
Norwegian	Jewel	Scanship	Mixed	6/12/2013	GP	18	2.4	5.5	47	6.22	2	0	0	2.8							
Norwegian	Jewel	Scanship	Mixed	7/10/2013	GP	16	1.8	5.8	89	6.68	6	0	0	4.9							
Norwegian	Jewel	Scanship	Mixed	7/17/2013	GP	42	2.1	5.8	83	6.92	0	5	3	7							
Norwegian	Jewel	Scanship	Mixed	8/7/2013	PP	26	3.1	5.8	88	6.85	0	4	4	5.5							
Norwegian	Jewel	Scanship	Mixed	8/21/2013	GP	40	1.6	5	34	6.83	2	0	0	7.2							
Norwegian	Jewel	Scanship	Mixed	9/4/2013	GP	34	2	5.6	79	6.78	0	0	0	5.3							
Norwegian	Jewel	Scanship	Mixed	9/11/2013	GP	28	2.1	7.2	100	6.65	0	20	6	0							
Norwegian	Pearl	Scanship	Mixed	5/15/2013	GP	21	7.1	4.6	81	6.73	2	4	7.6	0							
Norwegian	Pearl	Scanship	Mixed	5/22/2013	PP	20	14	5.5	78	6.56	10	0	10	0							
Norwegian	Pearl	Scanship	Mixed	6/5/2013	GP	22	3.8	5.5	72	6.8	0	0	5	14							
Norwegian	Pearl	Scanship	Mixed	6/12/2013	GP	22	4.9	5.6	54	6.76	4	0	16	0.2							
Norwegian	Pearl	Scanship	Mixed	7/10/2013	GP	39	4.7	5.4	62	6.92	40	18	25	0.11							
Norwegian	Pearl	Scanship	Mixed	7/17/2013	GP	29	2	5.1	71	6.72	0	0	3.6	0							
Norwegian	Pearl	Scanship	Mixed	8/7/2013	PP	2.9	2.6	5	61	6.84			0.8	0							
Norwegian	Pearl	Scanship	Mixed	8/21/2013	GP	21	2.8	4.5	73	6.59	0	0	7.6	0							
Norwegian	Pearl	Scanship	Mixed	9/4/2013	GP	20	2.8	5.5	98	6.51	2	4	7.5	0							
Norwegian	Pearl	Scanship	Mixed	9/11/2013	GP	23	2.9	4.8	130	6.87	0	17	7	0							
Norwegian	Sun	Scanship	Mixed	5/16/2013	PP	24	6.7	11	48	6.89	0	0	10	0							
Norwegian	Sun	Scanship	Mixed	5/24/2013	GP	16	11	9.5	58	6.94	9	0	21	0							
Norwegian	Sun	Scanship	Mixed	6/7/2013	GP	24	8	9.5	49	6.96	0	0	18	0							
Norwegian	Sun	Scanship	Mixed	6/21/2013	GP	23	7.9	9.3	66	6.7	0	4	16	0							
Norwegian	Sun	Scanship	Mixed	7/12/2013	GP	27	12	14	53	6.57	0	0	8.9	0							
Norwegian	Sun	Scanship	Mixed	7/19/2013	PP	23	3.5	11	53	6.72	0	0	27	0.11							
Norwegian	Sun	Scanship	Mixed	8/2/2013	GP	24	9.5	12	63	6.73	0	0	0	0							
Norwegian	Sun	Scanship	Mixed	8/16/2013	GP	35	5.5	8	67	6.8	0	0	14	0							
Norwegian	Sun	Scanship	Mixed	9/6/2013	GP	24	5.8	14	74	6.64	0	0	5	15							
Norwegian	Sun	Scanship	Mixed	9/12/2013	GP	19	5.4	10	65	6.72	0	0	8	6							
Norwegian	Sun	Scanship	Mixed	9/13/2013	GP	22	6.9	11	48	6.87	0	0	10	0							
Princess	Coral	Hamworthy	Mixed acc. Gray	5/26/2013	GP	11	18	8.4	57	6.96	0	0	7	0							
Princess	Coral	Hamworthy	Mixed acc. Gray	6/9/2013	GP	28	7	6.6	39	6.86	0	0	7.7	0							
Princess	Coral	Hamworthy	Mixed acc. Gray	6/16/2013	PP	41	6.3	6.6	39	7.06	0	0	3.8	0							
Princess	Coral	Hamworthy	Mixed acc. Gray	7/7/2013	GP	43	10	6.3	34	7.21	0	0	0	0							
Princess	Coral	Hamworthy	Mixed acc. Gray	7/14/2013	GP	32	6.1	8.5	51	7.06	0	0	0	0							
Princess	Coral	Hamworthy	Mixed acc. Gray	8/4/2013	PP	7.6	13	7.3	59	6.79	0	0	0	0							
Princess	Coral	Hamworthy	Mixed acc. Gray	8/11/2013	GP	12	16	8.1	71	7.04	0	0	0	0							
Princess	Coral	Hamworthy	Mixed acc. Gray	9/1/2013	GP	24	5.2	10	47	7.06	0	0	2.2	0							
Princess	Coral	Hamworthy	Mixed acc. Gray	9/8/2013	GP	23	3.8	8.7	30	6.92	0	0	2.3	0							
Princess	Diamond	Hamworthy	Mixed acc. Gray	5/22/2013	GP	19	13	12	120	7.78	4	0	3.6	0							
Princess	Diamond	Hamworthy	Mixed acc. Gray	5/28/2013	GP	76	16	13													

SemiMonthly General Permit Sample Results

Non-detects set to zero

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	

Company	Vessel	Treatment System	Wastewater Type	Sample Date	Type	mg/L				ug/L			S.U.	col. per 100 ml			mg/L	mg/L	mg/L	Residual
						Ammonia	Copper	Nickel	Zinc	pH	Fecal Coliform	TSS		BOD	Chlorine					
Princess	Grand	Hamworthy	Mixed acc. Gray	5/14/2013	GP	110	15	13	95	8.1	0	0	3.6	0	0	0	0	0	0	
Princess	Grand	Hamworthy	Mixed acc. Gray	5/15/2013	PP	42	10	10	120	8.1	0	0	5	0	0	0	0	0	0	
Princess	Grand	Hamworthy	Mixed acc. Gray	6/23/2013	GP	9.9	11	9.3	240	7.31	2	0	0	0	0	0	0	0	0	
Princess	Grand	Hamworthy	Mixed acc. Gray	7/13/2013	GP	5.6	9.3	10	150	7.02	0	0	0	0	0	0	0	0	0	
Princess	Grand	Hamworthy	Mixed acc. Gray	7/24/2013	PP	17	17	9.9	160	7.13	0	0	0	0	0	0	0	0	0	
Princess	Grand	Hamworthy	Mixed acc. Gray	7/24/2013	PP	16	120	12	150	7.39	0	0	0	0	0	0	0	0	0	
Princess	Grand	Hamworthy	Mixed acc. Gray	8/2/2013	GP	14	40	12	200	6.81	0	0	8	0	0	0	0	0	0	
Princess	Grand	Hamworthy	Mixed acc. Gray	8/14/2013	GP	13	13	13	120	7.02	0	0	0	0	0	0	0	0	0	
Princess	Grand	Hamworthy	Mixed acc. Gray	9/1/2013	GP	15	22	12	160	7.1	0	0	4.1	0	0	0	0	0	0	
Princess	Grand	Hamworthy	Mixed acc. Gray	9/11/2013	GP	14	16	9.8	97	7.18	0	0	2.5	0	0	0	0	0	0	
Princess	Grand	Hamworthy	Graywater	5/13/2013	GP	9.1	6.6	16	190	7.49	2	0	9.1	0	0	0	0	0	0	
Princess	Grand	Hamworthy	Graywater	5/14/2013	PP	5.7	2.9	12	250	7.35	0	0	4	0	0	0	0	0	0	
Princess	Grand	Hamworthy	Graywater	6/13/2013	GP	2.3	4.9	11	280	7.21	0	0	0	0	0	0	0	0	0	
Princess	Grand	Hamworthy	Graywater	6/22/2013	GP	0.29	5.7	9	150	7.34	0	0	0	0	0	0	0	0	0	
Princess	Grand	Hamworthy	Graywater	7/12/2013	GP	0.27	6.5	10	130	7.58	0	0	7.6	0	0	0	0	0	0	
Princess	Grand	Hamworthy	Graywater	7/24/2013	PP	15	96	10	120	7.44	0	0	2.1	0	0	0	0	0	0	
Princess	Grand	Hamworthy	Graywater	8/1/2013	GP	2.1	11	15	310	7.24	0	0	0	0	0	0	0	0	0	
Princess	Grand	Hamworthy	Graywater	8/14/2013	GP	0	7.8	9.9	81	7.46	0	0	0	0	0	0	0	0	0	
Princess	Grand	Hamworthy	Graywater	9/10/2013	GP	1.6	3.6	12	78	7.53	0	0	2.9	0	0	0	0	0	0	
Princess	Grand	Hamworthy	Graywater	9/11/2013	GP	0	3.6	14	170	7.21	0	0	8	0	0	0	0	0	0	
Princess	Island	Hamworthy	Mixed acc. Gray	5/17/2013	GP	16	9.2	13	99	7.14	0	0	0	0	0	0	0	0	0	
Princess	Island	Hamworthy	Mixed acc. Gray	5/24/2013	GP	16	16	6.6	96	7.1	0	0	0	0	0	0	0	0	0	
Princess	Island	Hamworthy	Mixed acc. Gray	6/14/2013	PP	100	4.3	6.6	7.4	7.2	0	0	80	0	0	0	0	0	0	
Princess	Island	Hamworthy	Mixed acc. Gray	6/21/2013	GP	35	36	7.9	100	6.76	0	0	0	0	0	0	0	0	0	
Princess	Island	Hamworthy	Mixed acc. Gray	7/12/2013	PP	22	20	5.2	100	7.21	0	0	0	0	0	0	0	0	0	
Princess	Island	Hamworthy	Mixed acc. Gray	7/19/2013	GP	35	26	5.2	86	7.52	0	0	2.5	0	0	0	0	0	0	
Princess	Island	Hamworthy	Mixed acc. Gray	8/9/2013	GP	35	38	7.9	110	7.35	0	0	0	0	0	0	0	0	0	
Princess	Island	Hamworthy	Mixed acc. Gray	8/16/2013	GP	14	24	5.5	89	7.17	0	0	2.3	0	0	0	0	0	0	
Princess	Island	Hamworthy	Mixed acc. Gray	9/6/2013	GP	83	5.5	8.3	23	7.49	0	0	2.9	0	0	0	0	0	0	
Princess	Island	Hamworthy	Mixed acc. Gray	9/13/2013	GP	96	7.5	5.6	12	7.5	0	0	8.8	0	0	0	0	0	0	
Princess	Island	Hamworthy	Mixed acc. Gray	9/19/2013	GP	99	7.41	180	7.41	180	0	0	0	0	0	0	0	0	0	
Princess	Sapphire	Hamworthy	Mixed acc. Gray	5/22/2013	GP	54	4.6	15	110	7.88	0	0	15	0	0	0	0	0	0	
Princess	Sapphire	Hamworthy	Mixed acc. Gray	5/29/2013	GP	91	6.8	14	180	7.95	0	0	16	0	0	0	0	0	0	
Princess	Sapphire	Hamworthy	Mixed acc. Gray	6/4/2013	PP	1.9	7.2	13	120	7.23	0	0	0	0	0	0	0	0	0	
Princess	Sapphire	Hamworthy	Mixed acc. Gray	6/19/2013	GP	90	7.2	12	87	8.12	0	0	40	0	0	0	0	0	0	
Princess	Sapphire	Hamworthy	Mixed acc. Gray	7/2/2013	PP	45	7.2	14	340	7.78	0	0	18	0	0	0	0	0	0	
Princess	Sapphire	Hamworthy	Mixed acc. Gray	7/16/2013	GP	46	5.8	9.4	70	7.67	0	0	19	0	0	0	0	0	0	
Princess	Sapphire	Hamworthy	Mixed acc. Gray	8/7/2013	GP	47	11	11	200	8	34	0	35	0	0	0	0	0	0	
Princess	Sapphire	Hamworthy	Mixed acc. Gray	8/13/2013	GP	33	14	13	140	7.85	0	0	7.4	0	0	0	0	0	0	
Princess	Sapphire	Hamworthy	Mixed acc. Gray	9/10/2013	GP	29	20	9.9	85	7.52	0	0	16	0	0	0	0	0	0	
Princess	Sapphire	Hamworthy	Mixed acc. Gray	9/18/2013	GP	27	11	13	120	7.25	0	0	5.4	0	0	0	0	0	0	
Princess	Sapphire	Hamworthy	Graywater	5/21/2013	GP	0.54	5.1	15	130	7.22	0	0	0	0	0	0	0	0	0	
Princess	Sapphire	Hamworthy	Graywater	5/29/2013	GP	0.59	8.7	15	210	6.94	0	0	0	0	0	0	0	0	0	
Princess	Sapphire	Hamworthy	Graywater	6/4/2013	PP	1.9	7.2	13	120	7.23	0	0	0	0	0	0	0	0	0	
Princess	Sapphire	Hamworthy	Graywater	6/18/2013	GP	0.39	7.9	11	120	7.12	0	0	0	0	0	0	0	0	0	
Princess	Sapphire	Hamworthy	Graywater	7/2/2013	PP	1.3	13	19	470	6.76	0	0	2.4	0	0	0	0	0	0	
Princess	Sapphire	Hamworthy	Graywater	7/16/2013	GP	0.31	7.4	13	120	7.01	0	0	0	0	0	0	0	0	0	
Princess	Sapphire	Hamworthy	Graywater	8/7/2013	GP	0.34	11	11	180	7.2	0	0	2.8	0	0	0	0	0	0	
Princess	Sapphire	Hamworthy	Graywater	8/13/2013	GP	0.93	15	15	140	6.91	0	0	0	0	0	0	0	0	0	
Princess	Sapphire	Hamworthy	Graywater	9/10/2013	GP	5.7	12	12	110	6.92	0	0	0	0	0	0	0	0	0	
Princess	Sapphire	Hamworthy	Graywater	9/18/2013	GP	0.13	11	13	110	6.73	0	0	0	0	0	0	0	0	0	0
Princess	Star	Hamworthy	Mixed acc. Gray	5/14/2013	GP	0.8	4.4	26	33	6.45	73	0	9.1	0	0	0	0	0	0	
Princess	Star	Hamworthy	Mixed acc. Gray	5/21/2013	GP	0.56	200	90	99	8.09	410	0	0	0	0	0	0	0	0	
Princess	Star	Hamworthy	Mixed acc. Gray	5/28/2013	GP	0.72	100	260	52	6.72	360	0	12	0	0	0	0	0	0	
Princess	Star	Hamworthy	Mixed acc. Gray	6/11/2013	PP	200	10	86	10	8.33	0	0	0	0	0	0	0	0	0	
Princess	Star	Hamworthy	Mixed acc. Gray	6/25/2013	GP	3.8	10	100	31	6.67	0	0	43	0	0	0	0	0	0	
Princess	Star	Hamworthy	Mixed acc. Gray	7/2/2013	GP	100	31	11	18	7.94	0	0	45	0	0	0	0	0	0	
Princess	Star	Hamworthy	Mixed acc. Gray	7/9/2013	PP	4.2	2.2	25	28	6.76	0	0	30	0	0	0	0	0	0	
Princess	Star	Hamworthy	Mixed acc. Gray	7/23/2013	GP	19	2.9	5.4	15	6.68	0	0	9	0	0	0	0	0	0	
Princess	Star	Hamworthy	Mixed acc. Gray	8/13/2013	GP	1.9	2.9	5.4	15	6.68	0	0	21	0	0	0	0	0	0	
Princess	Star	Hamworthy	Mixed acc. Gray	8/20/2013	GP	3.2	7.1	48	11	6.94	0	0	13	0	0	0	0	0	0	
Princess	Star	Hamworthy	Mixed acc. Gray	9/3/2013	GP	0.73	53	87	98	7.17	0	0	14	0	0	0	0	0	0	
Princess	Star	Hamworthy	Mixed acc. Gray	9/9/2013	GP	0.52	13	31	59	6.68	0	0	10	0	0	0	0	0	0	
Princess	Star	Hamworthy	Graywater	5/13/2013	GP	0.38	5.7	70	19	6.45	200	0	9.2	0	0	0	0	0	0	
Princess	Star	Hamworthy	Graywater	5/20/2013	GP	2.9	80	400	120	6.69	5	0	2.8	0	0	0	0	0	0	
Princess	Star	Hamworthy	Graywater	6/10/2013	PP	0.58	4.6	68	10	6.5	0	0	15	0	0	0	0	0	0	
Princess	Star	Hamworthy	Graywater	6/24/2013	GP	0.81	16	72	17	6.56	0	0	26	0	0	0	0	0	0	
Princess	Star	Hamworthy	Graywater	7/1/2013	GP	1.5	23	70	13	6.35	0	0	60	0	0	0	0	0	0	
Princess	Star	Hamworthy	Graywater	7/8/2013	GP	0.34	12	62	27	6.65	0	0	12	0	0	0	0	0	0	
Princess	Star	Hamworthy	Graywater	7/22/2013	GP	0.7	71	120	21	6.56	0	0	32	0	0	0	0	0	0	
Princess	Star	Hamworthy	Graywater	8/12/2013	GP	0.7	71	120	21	6.56	0	0	ND	0	0	0	0	0	0	
Princess	Star	Hamworthy	Graywater	8/19/2013	GP	4.7	3.5	30	17	6.92	0	0	34	0	0	0	0	0	0	
Princess	Star	Hamworthy	Graywater	9/2/2013	GP	0.3	47	76	82	7.03	0	0	15	0	0	0	0	0	0	
Princess	Star	Hamworthy	Graywater	9/9/2013	GP	0.23	12	38	50	6.59	0	0	7.2	0	0	0	0	0	0	
Oceania	Regatta	Triton	Mixed-Port	8/1/2013	PP	9.9	17	5.7	14	7.6	0	0	9.3	0	0	0	0	0	0	
Oceania	Regatta	Triton	Mixed-Starboard	8/15/2013	PP	0.25	19	6.8	18	7.05	0	0	16	0	0	0	0	0	0	
Oceania	Regatta	Triton	Mixed-Starboard	8/15/2013	PP	9.1	34	7.2	24	6.78	0	0	16	0	0	0	0	0	0	
Oceania	Regatta	Triton	Mixed-Starboard	8/15/2013	PP	0.97	19	7.6	20	7.32	0	0	18	0	0	0	0	0	0	
Seven Seas	Navigator	Scanship	Mixed	5/15/2013	GP	0.12	12	13	84	6.5	0	0	28	7.7	0	0	0	0	0	
Seven Seas	Navigator	Scanship	Mixed	5/25/2013	GP	34	13													

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

Vessel	Sample Date	Chemical O ² Demand	Free Chlorine	Residual Chlorine	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	0.10	0.10	2.00	5.00	1.00	5.00	5.00	0.50		0.50	0.05	1.00	0.10
	Units	mg/l	mg/l	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	6/7/13	37	ND	ND	1324	ND	11	190	96	ND	ND		4.1	18	ND
Disney Wonder	7/12/13	36	ND	ND	1196	ND	13	150	77	ND	ND		4.5	24	ND
Statendam	5/23/13	37	ND	ND	605	ND	13	120	25	ND	0.69		0.87	19	ND
Statendam	8/8/13	39	ND	ND	1010	5.6	14	210	71	ND	1.6		0.69	59	ND
Volendam	5/10/13	36	ND	ND	1140	ND	13	310	24	5.79	0.26		3.5	ND	ND
Volendam	8/2/13	33	ND	ND	697	ND	8.9	180	20	0.37	ND		2.9	18	ND
Zaandam	5/7/13	23	ND	ND	660	ND	7.9	120	34	4.8	ND		2.7	5.6	ND
Zaandam	8/21/13	26	ND	ND	459	ND	10	120	20	1.2	ND		2.8	20	ND
Norwegian Jewel	5/22/13	58	ND	ND	784	ND	15	140	32	ND	ND		ND	32	ND
Norwegian Jewel	8/7/13	53	ND	ND	705	ND	18	130	23	ND	ND		ND	39	ND
Norwegian Pearl	5/22/13	63	ND	ND	688	ND	18	110	53	ND	ND		0.34	23	ND
Norwegian Pearl	8/7/13	54	ND	ND	736	ND	16	42	240	ND	ND		ND	4.6	ND
Norwegian Sun	5/16/13	42	ND	ND	710	ND	14	120	36	ND	ND		0.57	27	ND
Norwegian Sun	7/19/13	73	ND	ND	727	ND	19	110	41	ND	ND		0.61	25	ND
Coral Princess	6/16/13	63	ND	ND	1304	ND	23	420	88	ND	ND		13	36	ND
Coral Princess	8/4/13	53	ND	ND	1060	ND	14	70	89	ND	1.4		89	12	ND
Diamond Princess	6/11/13	74	ND	ND	912	ND	21	120	41	28	1.7		13	44	ND
Diamond Princess	7/9/13	52	ND	ND	790	ND	19	140	35	3.2	1.8		8.8	44	ND
Golden Princess- GW	6/5/13	23	ND	ND	1662	ND	5.4	42	190	ND	ND		ND	3.6	ND
Golden Princess- GW	8/14/13	29	ND	ND	171	ND	6.3	46	4.8	ND	ND		ND	1.5	ND
Golden Princess	6/6/13	40	ND	ND	4360	ND	6.2	52	440	ND	ND		0.23	3.3	ND
Golden Princess	8/15/13	26	ND	ND	470	ND	46	46	35	ND	ND		ND	1.3	ND
Grand Princess-GW	5/14/13	31	ND	ND	481	ND	12	78	31	ND	ND		0.43	8.3	ND
Grand Princess-GW	7/24/13	52	ND	ND	659	ND	5.3	80	33	0.8		14	5.2	17	ND
Grand Princess	5/15/13	59	ND	ND	1351	ND	12	190	110	ND	1.8		2.2	41	ND
Grand Princess	7/24/13	55	ND	ND	757	ND	5.5	64	40	1.1		15	7.4	16	ND
Island Princess	6/14/13	170	ND	ND	2090	ND	25	470	120			ND	12	130	ND
Island Princess	7/12/13	59	ND	ND	1430	ND	20	120	110	0.74	5.7		11	28	ND
Sapphire Princess- GW	6/4/13	16	ND	ND	319	ND	3.8	68	23	0.14	0.31		ND	2.4	ND
Sapphire Princess- GW	7/2/13	19	ND	ND	575	ND	11	42	47	0.73	0.32		ND	2.7	ND
Sapphire Princess	6/4/13	42	ND	ND	729	ND	9.8	200	22	0.2	ND		0.25	43	ND
Sapphire Princess	7/2/13	48	ND	ND	693	ND	16	200	28	0.19	0.21		4.4	46	ND
Star Princess-GW	6/10/13	34	ND	ND	139	ND	9.6	38	13	ND	ND		0.3	3	ND
Star Princess-GW	7/8/13	56	ND	ND	200	ND	16	60	9.3	ND	ND		ND	1.5	ND
Star Princess	6/11/13	190	ND	ND	3430	ND	59	240	110	ND	ND		26	330	ND
Star Princess	7/9/13	64	ND	ND	210	ND	22	60	6.9	ND	ND		0.43	6.5	ND
Regatta-Port	8/1/13	66	ND	ND	2340	ND	13	30	29	86	ND		17	ND	ND
Regatta-Port	8/15/13	46	ND	ND	1140	ND	10	200	35	36	ND		9.4	ND	ND
Regatta- Starboard	8/1/13	72	ND	ND	2410	ND	13	46	86	66	ND		14	5.6	ND
Regatta- Starboard	8/15/13	47	ND	ND	900	ND	10	180	35	24	0.18		9.5	0.55	ND
Seven Seas Navigator	6/9/13	61	ND	ND	765	ND	16	88	ND	ND	ND		2.8	15	ND
Seven Seas Navigator	8/11/13	88	ND	ND	760	ND	18	64	42	ND	ND		0.54	11	ND
	MAX	190	ND	ND	4360	5.6	59	470	440	86	5.7	15	89	330	ND
	MIN	16	ND	ND	139	ND	3.8	30	ND	ND	ND	ND	ND	ND	ND
	MEDIAN	50	ND	ND	758.5	ND	13	120	35	1.2	1.045	14.5	3.5	18	ND
	Parameter not sampled														
	ND= Non-detect														

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	6/7/13	0	0	2.6	0	0	0	0	0	2.3	1.5	6.2	5.6	1	0	0	18	18	6.7	6.8	0	0	0	0	170	160
Disney Wonder	7/12/13	0	0	2.6	2.7	0	0	0	0	1.2	1.5	9	8.4	2.2	2.3	0	18	18	8.5	8.1	0	0	0	0	300	290
Statendam	5/23/13	0	0	0	0	0	0	0	0	2.1	0	2.5	2.4	0	0	0	18	18	5.1	5.3	0	0	0	0	33	39
Statendam	8/8/13	0	1.2	2	2	0	0	0	0	0	1.6	3	2.6	0	0	0	21	21	6.6	6.8	0	0	0	0	12	13
Volendam	5/10/13	0	0	2.3	2.6	0	0	0	0	0	1.4	12	12	0	0	0	9.8	10	5.8	7.5	0	0	0	0	66	69
Volendam	8/2/13	0	0	0	0	0	0	0	0	1.8	1.8	6.4	6.4	0	0	0	9.3	9.5	1.8	2.3	0	0	0	0	110	78
Zaandam	5/7/13	0	0	0	0	0	0	0	0	0	0	9.2	8.9	0	0	0	16	16	1.7	1.9	0	0	0	0	98	99
Zaandam	8/21/13	0	0	0	0	0	0	0	0	0	0	4.4	4.5	0	0	0	7.8	7.8	5.6	4.5	0	0	0	0	89	100
Norwegian Jewel	5/22/13	0	0	0	0	0	0	0	0	1.3	0	2.9	2.6	0	0	0	5.3	5.8	0	1	0	0	0	0	76	81
Norwegian Jewel	8/7/13	0	1	1.5	1.1	0	0	0	0	0	0	8.3	3.1	0	0	0	6	5.8	2	0	0	0	0	0	100	88
Norwegian Pearl	5/22/13	0	0	0	4.2	0	0	0	0	1.4	0	21	14	0	0	0	4.9	5.5	1.1	1.7	0	0	0	0	95	78
Norwegian Pearl	8/7/13	0	0	4.1	0	0	0	0	0	0	0	9.5	3.6	0	0	0	4	5	15	1.1	0	0	0	0	41	61
Norwegian Sun	5/16/13	0	1.3	0	0	0	0	0	0	0	0	10	6.7	0	0	0	11	11	0	0	0	0	0	0	51	48
Norwegian Sun	7/19/13	0	1.4	0	1.1	0	0	0	0	0	0	4.2	3.5	0	0	0	11	11	0	0	0	0	0	0	55	53
Norwegian Sun	9/12/13	0	0	0	0	0	0	0	0	0	0	5.4	6.2	0	0	0	10	10	0	1.6	0	0	0	0	65	65
Coral Princess	6/16/13	0	0	2.4	2.5	0	0	0	0	1.3	1.3	6.8	6.3	0	0	0	6.9	6.6	4.8	4.6	0	0	0	0	37	39
Coral Princess	8/14/13	0	1.1	1.5	1.4	0	0	0	0	1.1	1.1	14	13	0	0	0	7.3	7.3	3.6	3.6	0	0	0	0	59	59
Diamond Princess	6/11/13	0	0	2.2	1.7	0	0	0	0	1.6	1.5	18	20	0	0	0	11	11	4.1	3.3	0	0	0	0	210	230
Diamond Princess	7/9/13	1.1	1.9	1.8	2	0	0	0	0	0	0	37	9.7	1.4	0	0	12	12	2.8	2.9	0	0	0	0	120	130
Golden Princess- GW	6/5/13	0	0	4.4	3.1	0	0	0	0	1.7	1.1	10	8.8	0	0	0	7.1	7.4	15	16	0	0	0	0	110	110
Golden Princess- GW	8/14/13	0	0	0	0	0	0	0	0	1.5	0	5.8	6	0	0	0	7.5	7	0	0	0	0	0	0	140	140
Golden Princess	6/16/13	0	1.2	7.7	6.9	0	0	0	0	1.8	1.2	19	15	0	0	0	8.8	8.7	28	30	0	0	0	0	170	170
Golden Princess	8/15/13	0	1.3	0	0	0	0	0	0	1.6	1.1	5.8	5.7	0	0	0	11	10	3.4	2.5	0	0	0	0	160	150
Grand Princess-GW	5/14/13	0	0	0	0	0	0	0	0	1.7	1.7	2.7	2.9	0	0	0	11	12	2.1	1.1	0	0	0	0	250	250
Grand Princess-GW	7/24/13	0	1.6	0	0	0	0	0	0	1.4	1.2	100	96	0	0	0	11	10	1	1.4	0	0	0	0	120	120
Grand Princess	5/15/13	0	0	1.4	0	0	0	0	0	1.2	1.2	11	10	0	0	0	10	10	6.7	4.6	0	0	0	0	120	120
Grand Princess	7/24/13	0	1.4	0	1.1	0	0	0	0	1.2	1.2	120	120	0	0	0	11	12	1.5	2.2	0	0	0	0	150	150
Island Princess	6/14/13	0	0	4	4	0	0	0	0	1.7	1.7	4.8	4.3	0	0	0	6.8	6.6	12	12	0	0	0	0	4.3	7.4
Island Princess	7/12/13	0	0	6.3	5.6	0	0	0	0	0	0	21	20	0	0	0	5.3	5.2	20	18	0	0	0	0	100	100
Sapphire Princess- GW	6/4/13	0	0	0	0	0	0	0	0	0	0	7.4	7.2	0	0	0	13	13	2	2.6	0	0	0	0	120	120
Sapphire Princess-GW	7/2/13	0	0	1.3	1.7	0	0	0	0	1.6	1.3	12	13	1.3	1.3	0	20	19	5.6	6.1	0	0	0	0	460	470
Sapphire Princess	6/4/13	0	0	1.5	1.5	0	0	0	0	1.1	0	7.8	7.3	0	0	0	13	13	2.8	3.4	0	0	0	0	100	100
Sapphire Princess	7/2/13	0	0	1.5	1.6	0	0	0	0	1.4	1.1	8.5	7.2	0	0	0	15	14	5	4.7	0	0	0	0	350	340
Star Princess-GW	6/10/13	0	0	0	0	0	0	0	0	0	1.1	6.2	4.6	0	0	0	6.7	6.8	0	0	0	0	0	0	7.8	10
Star Princess-GW	7/8/13	0	0	0	0	0	0	0	0	0	0	76	12	0	0	0	63	62	0	0	0	0	0	0	28	27
Star Princess	6/11/13	0	0	3.2	4	0	0	0	0	1.8	1.7	260	10	0	0	0	15	8.6	3.9	7	0	0	0	0	7.9	10
Star Princess	7/9/13	0	0	0	0	0	0	0	0	0	0	66	2.2	0	0	0	26	25	0	1.6	0	0	0	0	25	28
Regatta-Port	8/1/13	0	0	5	4.3	0	0	0	0	1.1	1.5	18	17	0	0	0	5.7	5.7	10	7.6	0	0	0	0	13	14
Regatta-Port	8/15/13	0	0	2.8	2.8	0	0	0	0	1.4	1.1	23	19	0	0	0	8.1	6.8	1.3	1.4	0	0	0	0	24	18
Regatta- Starboard	8/1/13	0	1.3	5.1	4.4	0	0	0	0	3.2	1.3	98	34	8.4	0	0	9.1	7.2	11	9.9	7.1	0	0	0	37	24
Regatta- Starboard	8/15/13	0	0	3.1	2.6	0	0	0	0	1.5	1.1	21	17	0	0	0	7.2	7.6	1.2	1.4	0	0	0	0	18	20
Seven Seas Navigator	6/9/13	0	0	1.4	1.3	0	0	0	0	2.1	1	7.9	5.6	0	0	0	10	10	2.5	1.6	0	0	0	0	35	33
Seven Seas Navigator	8/1/13	0	0	1.4	1.2	0	0	0	0	2.5	1.6	29	13	0	0	0	13	12	2.5	2.6	0	0	0	0	46	38

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/NWCCA_2013_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