

Alaska DEC

Large Cruise Ship 2008

Wastewater Sampling Results

Issued December 2009

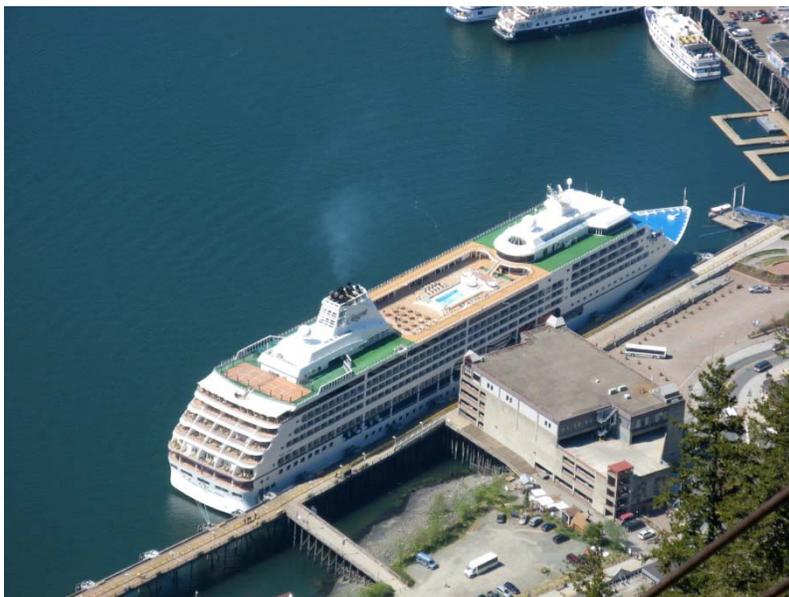


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1. EXECUTIVE SUMMARY

The Alaska Department of Environmental Conservation (DEC) issued a Cruise Ship General Permit authorizing discharge of treated wastewater into Alaskan waters on March 25, 2008. The permit was issued as a result of [Ballot Measure 2](#) (Cruise Ship Measure) that Alaskan voters passed in 2006. Prior to this ballot initiative cruise ships were required to meet effluent limits that were established in state law. The new law required that Alaska Water Quality Standards be met at the point of discharge (i.e. no mixing zone). The resulting permit also required additional reporting and sampling requirements, and contained new limits for several wastewater parameters. It contained less stringent interim (2008 and 2009) limits for ammonia, copper, nickel, and zinc to allow ship owners and operators time to improve effluent quality before being required to meet the strict long-term (Alaska Water Quality) limits.

In 2008, there were 48 exceedances of interim limits. The highest number of exceedances was for ammonia (21). DEC used enforcement discretion and did not issue Notices of Violation (NOV) for three of these exceedances due to their short duration, or being within the laboratory margin of error. The remaining 45 exceedances resulted in the issuance of 20 NOVs. Princess Cruise Line had the largest number of vessels discharging in 2008 (8 total) and received 15 NOVs. Four other companies received NOVs (Holland America received 2; Regent, Norwegian Cruise Line, and Silversea each received 1). See Table 1 for discharge status, exceedances, and treatment system manufacturer information.

Table 1: 2008 Large Cruise Ship General Permit Exceedances

2008 Large¹ Commercial Passenger Vessel General Permit Exceedances List

	Vessel Operator	Vessel Name	Voyages	Blackwater (BW) Treatment System Manufacturer	Permitted to discharge in Alaska ³		Discharge in AK waters 2008	Exceed- ances of Interim Limits	NOVs Issued ⁸
					BW	GW			
1	Carnival Cruise Lines	<i>Carnival Spirit</i> ⁷	18	Triton/Rochem	Yes	Yes ⁴	Yes	1	0
2	Celebrity Cruises	<i>Infinity</i>	21	Zenon	Yes	Yes	No	N/A	N/A
3	Celebrity Cruises	<i>Mercury</i>	20	Biopure/Rochem	No	No	No	N/A	N/A
4	Celebrity Cruises	<i>Millennium</i> ⁶	19	Hydroxyl Cleansea	Yes	Yes	Yes	1	0
5	Holland America	<i>Amsterdam</i>	18	Unknown	No	No	No	N/A	N/A
6	Holland America	<i>Oosterdam</i>	21	Rochem Bio-filtration	Yes	No ⁵	No	N/A	N/A
7	Holland America	<i>Ryndam</i>	20	Zenon	Yes	Yes	Yes	0	0
8	Holland America	<i>Statendam</i>	20	Zenon	Yes	Yes	Yes	0	0
9	Holland America	<i>Veendam</i>	21	Zenon	Yes	Yes	Yes	0	0
10	Holland America	<i>Volendam</i>	18	Zenon	Yes	Yes	Yes	0	0
11	Holland America	<i>Westerdam</i>	20	Rochem Bio-filtration	Yes	No ⁵	Yes	10	2
12	Holland America	<i>Zaandam</i>	19	Zenon	Yes	Yes	Yes	0	0
13	International Shipping Partners	<i>Clipper Pacific</i>	1	Hamman	No	No	No	N/A	N/A
14	Mitsui OSK	<i>Nippon Maru</i>	1	Orca II	No	No	No	N/A	N/A
15	Norwegian Cruise Lines	<i>Norwegian Pearl</i>	20	Scanship	Yes	Yes	Yes	1	1
16	Norwegian Cruise Lines	<i>Norwegian Star</i>	21	Scanship	Yes	Yes	Yes	0	0
17	Norwegian Cruise Lines	<i>Norwegian Sun</i>	19	Scanship	Yes	Yes	Yes	0	0
18	Princess Cruise Line	<i>Coral Princess</i>	18	Hamworthy Bioreactor	Yes	Accom Only	Yes	3	1
19	Princess Cruise Line	<i>Dawn Princess</i>	14	Hamworthy Bioreactor	Yes	Accom Only	Yes	2	1
20	Princess Cruise Line	<i>Diamond Princess</i>	20	Hamworthy Bioreactor	Yes	Accom Only	Yes	7	2
21	Princess Cruise Line	<i>Golden Princess</i>	20	Hamworthy Bioreactor	Yes	Accom Only	Yes	2	2
22	Princess Cruise Line	<i>Island Princess</i>	18	Hamworthy Bioreactor	Yes	Accom Only	Yes	4	3
23	Princess Cruise Line	<i>Sapphire Princess</i>	18	Hamworthy Bioreactor	Yes	Accom Only	Yes	6	3
24	Princess Cruise Line	<i>Star Princess</i>	20	Hamworthy Bioreactor	Yes	Accom Only	Yes	7	2
25	Princess Cruise Line	<i>Sun Princess</i>	1	Hamworthy Bioreactor	Yes	Accom Only	Yes	1	1
26	Princess Cruise Line	<i>Tahitian Princess</i>	8	BioPure	No	No	No	N/A	N/A
27	Regent	<i>Seven Seas Mariner</i>	16	Hamworthy Bioreactor	Yes	Yes	Yes	1	1
28	Royal Caribbean Cruises Ltd.	<i>Radiance of the Seas</i>	18	Hamman	Yes	Yes	No	N/A	N/A
29	Royal Caribbean Cruises Ltd.	<i>Serenade of the Seas</i>	20	Scanship	Yes	Yes	No	N/A	N/A
30	Royal Caribbean Cruises Ltd.	<i>Rhapsody of the Seas</i>	17	Hamman	No	No	No	N/A	N/A
31	Silver Seas	<i>Silver Shadow</i>	11	Biopure/Marisan	Yes	Yes	Yes	2	1
							Totals	48	20

In Light Blue- These vessels registered to discharge, but have discharged only to participate in the EPA/DEC study in Skagway or started late in the season.

In Orange- These vessels were permitted by DEC to discharge but have not.

In Grey- These vessels registered to not discharge in Alaska waters during the 2008 season.

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

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

⁴ Galley graywater not discharged

⁵ Some graywater mixed with blackwater

⁶ Discharged to participate in EPA/DEC study in Skagway and also to meet related sampling requirements.

⁷ Began discharging in Alaskan waters on July 18th.

⁸ Some NOVs are for multiple exceedances

2. INTRODUCTION

In August 2006, the Alaska Public passed [Ballot Measure 2](#) (Cruise Ship Measure). This initiative contained provisions pertaining to taxation, gambling, sale of shore-side excursions, and environmental practices of commercial passenger vessels.

The Department of Environmental Conservation (DEC) is responsible for implementing the changes in the environmental statutes. As a result the Department must:

- Issue wastewater discharge permits to large cruise ships (A.S. 46.03.462)

- Place U.S. Coast Guard licensed engineers (Ocean Rangers) onboard all large cruise ships. (This subject was included in a separate [2008 Report](#)).
- Collect hourly vessel positional tracking data and monthly discharge logs

A General Permit (GP) was developed to satisfy the new permitting requirement. A draft version of the General Permit was released for public comment during the spring of 2007. On March 25th, 2008 DEC issued the cruise ship [General Permit](#), number 2007DB0002. The new General Permit requires owners and operators of large cruise ships (those that provide overnight accommodations for over 250 passengers) to obtain a wastewater discharge permit from DEC for the discharge of any treated sewage, graywater, or other wastewater into marine waters of the state. The permit was updated May 1st 2008 to correct a regulation citation and change the sampling and Source Reduction Evaluation deadlines. Further information on the cruise ship General Permit and associated forms and an information sheet can be found at: www.dec.state.ak.us/water/cruise_ships/gp/08gp.html

In 2008, DEC issued authorizations to discharge under the General Permit for 25 of the 31 large cruise ships that had Alaskan voyages. A list of authorized vessels and copies of authorization letters can be found at: http://www.dec.state.ak.us/water/cruise_ships/gp/Auth_08.html

3. GENERAL PERMIT REQUIREMENTS

The 2008 Large Cruise Ship General Permit required that:

- Discharge must comply with Alaska Water Quality Standards (18 AAC 70) at the point of discharge. Less stringent interim limits were established for copper, nickel, zinc and ammonia for the first two years of the permit. (See Appendix 1.)
- Prohibited discharge into Skagway Harbor and potentially in other impaired waterways.
- No discharge of foam, oily wastes, garbage, sludge, or grease into State waters.
- Permittees must submit a signed Notice of Intent to Discharge, that provided treatment, storage, and contact information. Companies must also certify that tributyltin paints are not used. Discharge is prohibited until DEC approves and authorization to discharge.
- Twice a month sampling is required for the following parameters: biological oxygen demand (BOD), fecal coliform bacteria, total residual chlorine, ammonia, some dissolved metals (copper, nickel and zinc), pH, and total suspended solids (TSS). The General Permit specifies limits for all of these parameters. (See Appendix 1.) All samples for the GP must be taken in Alaskan waters while the ship is discharging.

- Twice a season sampling for Volatile Organic Compounds, Base Neutral Acids, and several other parameters.
- Monthly submission of Discharge Monitoring Reports containing sample data.
- If applying for interim limits, an operator must submit a Source Reduction Evaluation (SRE).

4. SAMPLE RESULTS SUMMARY

Wastewater treatment systems used on large cruise ships discharging in Alaskan waters have generally performed well at treating effluent parameters that have been under close observation by ADEC and the US Coast Guard since 2001. This includes fecal coliform bacteria counts (an indicator of potential pathogens), pH, chlorine, biological oxygen demand, and total suspended solids. An exceedance of one of these parameters may indicate improperly working equipment. In most cases, a vessel will discontinue discharging when results indicate an exceedance. Typically equipment will be inspected and cleaned, and samples will be taken outside of Alaskan waters to verify that equipment is functioning properly prior to discharging again in Alaska.

The additional focus in 2008 was on the new limits included in the large cruise ship General Permit, specifically ammonia, copper, nickel, and zinc. Of the 31 large cruise ships that visited Alaska in 2008, 20 large cruise ships discharged into Alaskan waters and were regularly sampled. One of these, the Carnival Spirit, only discharged specific streams of accommodations graywater. The number of exceedances of interim limits and traditional parameters are listed in Table 1 on page four.

For the long-term limits, ammonia and copper were the most difficult parameter to meet in 2008. Only the Silver Shadow met the long-term limits (Alaska Water Quality standards) for ammonia (2.9 mg/ L). This is the smallest of the large cruise ships, and uses a unique ozone-generating wastewater treatment system. All ships had at least one exceedance of the long-term copper limit. The Statendam was close to meeting long-term limit for copper (3.1 micrograms/ L) with only one sample result (3.2 micrograms/ L) above the limit.

Three ships were able to meet the long-term limits for nickel (8.2 micrograms/ L): the Seven Seas Mariner, Dawn Princess, and the Norwegian Sun. The Westerdam and Norwegian Pearl each had only one exceedance of the nickel long-term limit. Zinc long-term limits (81 micrograms/ L) were exceeded on all but three ships: the Statendam, Norwegian Sun, and Silver Shadow.

5. RESULTS BY COMPANY

Explanation of color codes	
	Exceedance of interim limits or Alaska Water Quality Standards if no interim limit
	Exceedance of long-term limits
	Discharging only treated graywater
	No Discharge in Alaska in 2008

Alaska General Permit Limits			
Ammonia		Copper	
interim (mg/ L)	long term (mg/ L)	interim (ug/ L)	long term (ug/ L)
80.4	2.9	66	3.1
Nickel		Zinc	
interim (ug/ L)	long term (ug/ L)	interim (ug/ L)	long term (ug/ L)
180	8.2	230	81
pH		Biological oxygen demand (BOD)	
Minimum	Maximum	Maximum	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)		Total Residual Chlorine	
Maximum	150 mg/ L	Maximum	0.0075 mg/ L

This section lists wastewater sample results for pollutants with effluent limits by company. There are more pollutants for which ships that discharged must take samples but which have no effluent limits under the general permit. For those sample results, please see Appendix 2 Tables 3 and 4.

Carnival Cruise Lines

Carnival operated one ship in Alaska in 2008, the Carnival Spirit. The Spirit did not discharge in May and June. The ship received authorization to discharge with interim limits for nickel and copper.

The Carnival Spirit reported a high pH number on the July 26th sample result. The pH was immediately retested and found to be within the range of the GP limits. No NOV was issued. Carnival Spirit met the long-term limits for ammonia and metals. This ship only discharged accommodation graywater. The graywater was treated through a Rochem wastewater treatment system.

2008 Semimonthly General Permit Sample Results for Carnival Cruise Lines

Company	Vessel	Sample Date	mg/L	ug/L	ug/L	ug/L	S.U.	col. per 100 ml	mg/L	mg/L	mg/L
			<u>Amm</u> <u>onia</u>	<u>Copp</u> <u>er</u>	<u>Nickel</u>	<u>Zinc</u>	<u>pH</u>	<u>Fecal</u> <u>Coliorm</u>	<u>TSS</u>	<u>BOD</u>	<u>Total</u> <u>Residual</u> <u>Chlorine</u>
Carnival	Spirit	May, June	No Discharge								
Carnival	Spirit	7/19/2008	ND	ND	ND	3.99	7.16	ND	ND	4.9	ND
Carnival	Spirit	7/26/2008	ND	ND	ND	9.29	9.2	ND	ND	3.79	ND
Carnival	Spirit	8/2/2008	0.42	0.86	ND	6.93	6.63	4.92	ND	4.68	ND
Carnival	Spirit	8/15/2008	ND	0.85	ND	7.76	7.07	ND	ND	6.13	ND
Carnival	Spirit	8/16/2008	0.48	0.39	ND	5.1	7.2	ND	ND	6.71	ND
Carnival	Spirit	9/12/2008	ND	0.7	ND	5.36	7.3	ND	ND	5.02	ND
Carnival	Spirit	9/19/2008	ND	1.18	ND	9.96	7.5	ND	ND	10.3	ND

Celebrity Cruises

Royal Caribbean International (RCI), owner of Celebrity, submitted Notices of Intent to Discharge for the Celebrity Infinity and the Celebrity Millennium. However, the Infinity did not discharge in Alaskan waters in 2008. The Millennium only discharged to participate in the EPA/ DEC Bold study in Skagway under a Compliance by Order of Consent (COBC).

2008 Semimonthly General Permit Sample Results – Celebrity

Company	Vessel	Sample Date	mg/L	ug/L	ug/L	ug/L	S.U.	col. per 100 ml	mg/L	mg/L	mg/L
			<u>Ammo</u> <u>nia</u>	<u>Copp</u> <u>er</u>	<u>Nickel</u>	<u>Zinc</u>	<u>pH</u>	<u>Fecal</u> <u>Coliorm</u>	<u>TSS</u>	<u>BOD</u>	<u>Total</u> <u>Residual</u> <u>Chlorine</u>
Celebrity	Millennium	May, June	No Discharge								
Celebrity	Millennium	7/28/2008	4.6	2.3	15.8	65.3	7.5	210	ND	3.7	0.1
Celebrity	Millennium	August, Sept	No Discharge								

The Millennium showed a higher than permitted level of fecal coliform bacteria and chlorine on the July 28th sample. No NOV was issued due to the discharge being part of the Bold discharge study. The Millennium used a Hydroxyl Cleansea wastewater treatment system.

Holland America Line (HAL)

Holland America operated 8 cruise ships in Alaska in 2008. It submitted Notices of Intent to discharge for seven of those vessels on April 24th 2008. The Oosterdam, Ryndam, Statendam, Veendam, Volendam, Westerdam, and Zaandam received authorizations to discharge on April 29th 2008. One vessel, the Oosterdam was authorized to, but never discharged in Alaskan waters in 2008. The Oosterdam and Westerdam used Rochem treatment systems, all others used Zenon treatment systems.

2008 Semimonthly General Permit Sample Results Westerdam											
Company	Vessel	Sample Date	mg/L	ug/L	ug/L	ug/L	S.U.	col. per 100 ml	mg/L	mg/L	mg/L
			Ammonia	Copper	Nickel	Zinc	pH	Fecal Coliform	TSS	BOD	Total Residual Chlorine
Holland America	Westerdam	5/14/2008	36	ND	5.97	124	7.4	ND	ND	20.9	ND
Holland America	Westerdam	5/28/2008	130	6.47	4.69	47.2	7.6	2	ND	47.9	ND
Holland America	Westerdam	6/4/2008	100	1	3.8	23	7.6	2	ND	13.2	ND
Holland America	Westerdam	6/11/2008	130	4.45	8.85	501	7.7	2	ND	16.5	ND
Holland America	Westerdam	7/9/2008	No Discharge								
Holland America	Westerdam	7/16/2008	69	1.31	5.29	36.5	7.2	ND	ND	41.3	ND
Holland America	Westerdam	8/6/2008	57	ND	4.21	39.5	7.5	2	ND	4.3	ND
Holland America	Westerdam	8/7/2008	67	2.6	6.3	62	7.5	ND	1	2.8	ND
Holland America	Westerdam	8/13/2008	63	3.8	4.8	44	7.3	ND	ND	2.8	ND
Holland America	Westerdam	9/3/2008	130	5.6	6.9	44	7.6	ND	ND	ND	ND
Holland America	Westerdam	9/17/2008	110	2.9	8.1	12	7.3	ND	ND	126	ND

The Westerdam received 2 Notices of Violation for 10 exceedances of the General permit limits. Seven exceedances are shown above in red. There were also exceedances of the monthly average for Biological Oxygen Demand (BOD). Of the ten exceedances, there was only one exceedance for metal limits (zinc-501 ug/L on June 11th 2008). All other exceedances were for ammonia and BOD.

2008 Semimonthly General Permit Sample Results Holland America

Company	Vessel	Sample Date	mg/L	ug/L	ug/L	ug/L	S.U.	col. per 100 ml	mg/L	mg/L	mg/L
			Ammonia	Copper	Nickel	Zinc	pH	Fecal Coliorm	TSS	BOD	Total Residual Chlorine
Holland America	Ryndam	5/9/2008	0.44	18.2	17	63.7	7.4	ND	ND	ND	ND
Holland America	Ryndam	5/16/2008	1.4	22.2	14.3	75.1	7.2	ND	ND	ND	ND
Holland America	Ryndam	5/26/2008	2	31	19	110	6.9	ND	ND	ND	ND
Holland America	Ryndam	6/13/2008	1.3	16.2	14.1	75	7.2	ND	ND	ND	ND
Holland America	Ryndam	6/20/2008	ND	21.7	11.7	80.7	7	ND	ND	ND	ND
Holland America	Ryndam	7/11/2008	ND	26.6	14	84.4	6.9	ND	ND	2.9	ND
Holland America	Ryndam	7/18/2008	0.63	12.8	11.1	81.4	7.2	ND	ND	ND	ND
Holland America	Ryndam	8/1/2008	0.93	20.3	13.9	80.6	7.1	ND	ND	ND	ND
Holland America	Ryndam	8/15/2008	10	16	11	64	7.1	ND	ND	3.8	ND
Holland America	Ryndam	8/22/2008	16	6.9	11	69	7.4	ND	2	ND	ND
Holland America	Ryndam	9/5/2008	6.2	12	11	72	7.2	ND	ND	ND	ND
Holland America	Ryndam	9/12/2008	3.9	8.5	10	15	7.3	ND	ND	ND	ND
Holland America	Statendam	May	No Discharge								
Holland America	Statendam	6/23/2008	13	ND	13	1.7	7.5	ND	ND	8	ND
Holland America	Statendam	6/30/2008	4.8	ND	6.01	3.1	7.3	ND	ND	5	ND
Holland America	Statendam	7/14/2008	24	ND	14.3	4.75	7.7	ND	ND	17.3	ND
Holland America	Statendam	7/28/2008	16	1.12	13.9	5.96	7.6	ND	ND	12.9	ND
Holland America	Statendam	8/11/2008	10	ND	17	2.2	7	ND	ND	34	ND
Holland America	Statendam	8/18/2008	11	1.5	15	5.3	7.1	28	ND	18.4	ND
Holland America	Statendam	9/1/2008	27	3.2	14	7	7.4	ND	ND	28.9	ND
Holland America	Statendam	9/8/2008	10	2.6	17	4.8	7.5	ND	ND	23.3	ND
Holland America	Veendam	5/11/2008	24	9.53	12.4	69.2	7.5	ND	ND	2.2	ND
Holland America	Veendam	5/21/2008	8.2	8	12	63	7.4	ND	ND	3.15	ND
Holland America	Veendam	5/27/2008	16	7.15	14	101	7.5	ND	ND	ND	ND
Holland America	Veendam	6/3/2008	6	8.56	13.6	110	7.3	ND	ND	ND	0.1*
Holland America	Veendam	6/17/2008	7.5	8.7	10	140	7.4	ND	ND	3.2	ND
Holland America	Veendam	7/1/2008	8.2	8	12.4	76.4	7.3	ND	ND	ND	ND
Holland America	Veendam	7/8/2008	12	7.67	13.3	108	7.3	ND	ND	ND	ND
Holland America	Veendam	7/15/2008	15	5.21	8.84	77.3	7.1	ND	ND	ND	ND
Holland America	Veendam	8/19/2008	12	6.4	17	63	7.3	ND	ND	ND	ND
Holland America	Veendam	9/2/2008	11	4.1	12	57	7.4	ND	ND	ND	ND
Holland America	Veendam	9/16/2008	8.8	6.2	12	71	7.4	ND	ND	ND	ND

* See next paragraph for explanation of result.

2008 Semimonthly General Permit Sample Results Holland America

Company	Vessel	Sample Date	mg/L	ug/L	ug/L	ug/L	S.U.	col. per 100 ml	mg/L	mg/L	mg/L
			Ammonia	Copper	Nickel	Zinc	pH	Fecal Coliorm	TSS	BOD	Total Residual Chlorine

Holland America	Volendam	May									
Holland America	Volendam	June	No Discharge								
Holland America	Volendam	7/2/2008	2.4	16.7	14.8	95.5	7.3	ND	ND	ND	ND
Holland America	Volendam	7/10/2008	11	4.9	10	60	7.3	ND	ND	ND	ND
Holland America	Volendam	8/7/2008	36	6.6	20	44	7.3	ND	ND	ND	ND
Holland America	Volendam	8/21/2008	46	4.7	11	46	7.3	ND	ND	ND	ND
Holland America	Volendam	8/27/2008	24	5.7	10	37	7.2	ND	ND	ND	ND
Holland America	Volendam	9/4/2008	28	4.7	11	31	7.3	ND	ND	4.6	ND
Holland America	Volendam	9/10/2008	23	3.9	9.1	ND	7.3	ND	ND	ND	ND

Holland America	Zaandam	5/14/2008	2.4	52	11.8	99.5	7.3	ND	ND	ND	ND
Holland America	Zaandam	5/22/2008	12	6.93	9.4	103	7.4	ND	ND	ND	ND
Holland America	Zaandam	6/5/2008	18	6.16	12.4	108	7.4	ND	ND	ND	ND
Holland America	Zaandam	6/11/2008	2.2	5.1	6.7	97	7.4	ND	ND	ND	ND
Holland America	Zaandam	6/19/2008	11	3.49	11.3	30.5	7.6	ND	5	15.2	ND
Holland America	Zaandam	7/9/2008	5.9	7.81	10.1	51.5	7.5	ND	ND	2.5	ND
Holland America	Zaandam	7/17/2008	12	8.28	12	59.7	7.4	ND	ND	4.8	ND
Holland America	Zaandam	8/14/2008	19	6.4	10	60	7.4	ND	ND	2.2	ND
Holland America	Zaandam	8/15/2008	24	6.2	8.6	68	7.4	ND	ND	2.9	ND
Holland America	Zaandam	8/28/2008	11	6.6	8.4	58	7.5	ND	ND	2.3	ND
Holland America	Zaandam	9/3/2008	1.7	11	9.8	61	7.1	ND	ND	ND	ND
Holland America	Zaandam	9/11/2008	6.4	3.8	6	3.2	7.5	ND	ND	ND	ND

The samples taken from the Ryndam, Statendam, Veendam, Volendam, and Zaandam were all within the General Permit interim limits. The Veendam had a high chlorine result on June 3rd 2008. The Veendam did not have a chlorine limit under the general permit as they did not use chlorine as part of their treatment system. Therefore, no NOV was issued. The Statendam generally met the long-term limits for copper and zinc. The Ryndam, Veendam, Volendam, and Zaandam all had exceedances of the long-term limits for metals and ammonia.

Norwegian Cruise Line (NCL)

Norwegian Cruise Line operated three cruise ships in Alaska in 2008. All three ships have a Scanship wastewater treatment system and were authorized to discharge wastewater in Alaska.

2008 Semimonthly General Permit Sample Results Norwegian Cruise Lines

Company	Vessel	Sample Date	mg/L	ug/L	ug/L	ug/L	S.U.	col. per	mg/	mg/	mg/L
			Ammo nia	Copp er	Nickel	Zinc	pH	Fecal Coliorm	TSS	BOD	Total Residual Chlorine
Norwegian	Pearl	5/6/2008	49	18	6.1	98	6.6	ND	ND	6.3	ND
Norwegian	Pearl	5/13/2008	18	9.2	6.91	94.4	6.2	ND	5	3.9	ND
Norwegian	Pearl	6/3/2008	27	5.7	4	67	6.7	ND	2.4	2.1	ND
Norwegian	Pearl	6/17/2008	38	19.3	9.43	50.3	6.8	8	7	3.46	ND
Norwegian	Pearl	6/24/2008	23	4.84	5.74	105	6.8	ND	6	13	ND
Norwegian	Pearl	7/15/2008	26	9.43	6.06	54.7	6.8	ND	ND	3.2	ND
Norwegian	Pearl	7/22/2008	25	3.53	3.47	67.1	6.8	ND	6	3.2	ND
Norwegian	Pearl	8/12/2008	34	6.9	5.1	110	6.7	ND	ND	2.9	ND
Norwegian	Pearl	8/19/2008	41	12	4.9	110	6.5	ND	ND	3	ND
Norwegian	Pearl	9/2/2008	27	8.5	3.8	73	6.8	ND	7	ND	ND
Norwegian	Pearl	9/9/2008	36	8.8	5	62	6.8	ND	6	ND	ND
Norwegian	Star	5/6/2008	40	6	13	74	7	ND	ND	15.6	ND
Norwegian	Star	5/13/2008	32	2.27	8.09	79.4	7	ND	ND	5.5	ND
Norwegian	Star	6/3/2008	6.6	1.5	8.9	26	6.7	ND	ND	5.6	ND
Norwegian	Star	6/17/2008	19	2.52	6.89	58.4	6.7	ND	ND	ND	ND
Norwegian	Star	6/24/2008	22	1.99	8.73	111	6.6	ND	8	8	ND
Norwegian	Star	7/15/2008	29	1.38	9.6	63.6	6.8	ND	ND	7	ND
Norwegian	Star	7/29/2008	43	2.15	8.38	69.9	6.8	12	7	4.7	ND
Norwegian	Star	8/12/2008	20	3.7	13	100	6.7	ND	ND	8.5	ND
Norwegian	Star	8/19/2008	26	2.3	13	110	6.7	2	ND	9.1	ND
Norwegian	Star	8/26/2008	20	4.6	11	94	6.8	4	11	12.9	ND
Norwegian	Star	9/2/2008	11	2.2	11	160	6.6	Error	4	8.1	ND
Norwegian	Star	9/9/2008	17	12	14	140	6.5	ND	ND	8.3	ND
Norwegian	Sun	5/14/2008	71	5.49	7.37	30.9	6.6	ND	9	6.1	ND
Norwegian	Sun	5/21/2008	32	4.91	6.03	27.4	6.7	ND	0	4.2	ND
Norwegian	Sun	5/28/2008	36	3.4	6.8	36	6.8	40	4.8	9	ND
Norwegian	Sun	6/4/2008	24	2.81	7.81	19.2	6.8	2	ND	4.6	ND
Norwegian	Sun	6/11/2008	10	4.03	6.72	15.5	6.6	16	6	12	ND
Norwegian	Sun	7/2/2008	17	5	5.74	26.3	6.7	ND	5	5.6	ND
Norwegian	Sun	7/9/2008	12	4.53	6.11	36.8	6.8	2	4	5.8	ND
Norwegian	Sun	7/17/2008	32	5.1	4.4	3.9	6.7	ND	8	7.6	ND
Norwegian	Sun	8/6/2008	22	5.14	4.79	30.6	6.8	ND	ND	14	ND
Norwegian	Sun	8/13/2008	29	11	7.2	44	6.5	ND	ND	10	ND
Norwegian	Sun	9/3/2008	16	3.4	4.3	38	6.5	ND	ND	ND	ND
Norwegian	Sun	9/10/2008	28	3.1	5.6	34	6.5	ND	ND	2.3	ND

The Norwegian Pearl had a pH result on May 13th that was lower than the General Permit limits. Norwegian Sun met long-term limits for nickel and zinc.

Princess Cruises

Princess operated eight ships that visited Alaska regularly in 2008. The Tahitian Princess did not discharge inside of the GP boundaries in 2008. The Sun Princess made only one voyage through Alaskan waters in 2008. Princess submitted Notices of Intent to discharge for the Coral Princess, Dawn Princess, Diamond Princess, Golden Princess, Island Princess, Sapphire Princess, Star Princess, and Sun Princess. All eight vessels were granted authorization to discharge under the general permit. Princess wastewater treatment systems are all manufactured by Hamworthy.

2008 Semimonthly General Permit Sample Results Princess Cruises											
Company	Vessel	Sample Date	mg/L	ug/L	ug/L	ug/L	S.U.	col. per 100 ml	mg/L	mg/L	mg/L
			<u>Ammonia</u>	<u>Copper</u>	<u>Nickel</u>	<u>Zinc</u>	pH	<u>Fecal Coliform</u>	TSS	BOD	Total Residual Chlorine
Princess	Coral	5/15/2008	23	17.2	17.5	208	7	ND	ND	2.1	ND
Princess	Coral	5/23/2008	74	17	9.5	170	7.4	ND	ND	ND	0.19
Princess	Coral	5/29/2008	100	19.1	7.62	132	7.5	ND	ND	3.3	ND
Princess	Coral	6/12/2008	59	31.4	10.5	151	7.3	ND	ND	ND	ND
Princess	Coral	6/20/2008	33	88.1	12	125	6.9	ND	ND	2	0.1
Princess	Coral	7/10/2008	20	25.8	9.28	159	7.3	ND	ND	ND	ND
Princess	Coral	7/18/2008	25	18	7.82	98.8	7.3	ND	ND	ND	ND
Princess	Coral	7/28/2008	58	31	7.2	98	7.2	ND	4	ND	ND
Princess	Coral	8/1/2008	24	20.3	8.1	173	7.2	ND	ND	ND	ND
Princess	Coral	8/7/2008	68	19	6.7	140	7.7	ND	ND	ND	ND
Princess	Coral	9/4/2008	42	24	7.7	150	7.5	ND	ND	ND	ND
Princess	Coral	9/12/2008	51	30	9.2	140	7.4	ND	ND	ND	ND
Princess	Dawn	5/11/2008	26	5.58	8.15	94.2	7.3	ND	ND	ND	ND
Princess	Dawn	5/23/2008	23	6.48	4.56	134	7	ND	ND	3.8	ND
Princess	Dawn	5/31/2008	33	5.5	3.3	150	7	ND	2	ND	ND
Princess	Dawn	6/12/2008	15	7.25	3.88	232	7.1	ND	ND	ND	ND
Princess	Dawn	6/20/2008	26	5.09	3.12	222	7.2	ND	ND	ND	ND
Princess	Dawn	6/30/2008	28	6	3	120	7	ND	ND	ND	ND
Princess	Dawn	7/10/2008	5.4	8.52	4.7	114	6.9	ND	ND	2.4	ND
Princess	Dawn	7/20/2008	23	5.11	3.66	121	7.1	ND	ND	ND	ND
Princess	Dawn	8/21/2008	53	7.2	3.6	260	7.3	ND	ND	2.4	ND
Princess	Dawn	8/29/2008	15	7.4	4.5	150	6.9	ND	ND	ND	ND
Princess	Dawn	9/8/2008	25	12	4.4	140	7.1	ND	ND	ND	ND
Princess	Dawn	9/18/2008	44	8.4	4.4	220	7.4	4	ND	4.1	ND

2008 Semimonthly General Permit Sample Results Princess Cruises											
Company	Vessel	Sample Date	mg/L	ug/L	ug/L	ug/L	S.U.	col. per 100 ml	mg/L	mg/L	mg/L
			<u>Ammo</u> <u>nia</u>	<u>Copp</u> <u>er</u>	<u>Nickel</u>	<u>Zinc</u>	<u>pH</u>	<u>Fecal</u> <u>Coliorm</u>	<u>TSS</u>	<u>BOD</u>	<u>Total</u> <u>Residual</u> <u>Chlorine</u>
Princess	Diamond	5/13/2008	81	6.75	11.8	51.7	7.3	62	ND	11.3	ND
Princess	Diamond	5/26/2008	150	4.6	9.9	48	7.9	ND	ND	3.8	ND
Princess	Diamond	6/10/2008	110	7.81	18.5	106	7.6	ND	ND	ND	ND
Princess	Diamond	6/18/2008	100	8.6	15	84	7.8	ND	ND	3.05	ND
Princess	Diamond	7/8/2008	89	35.3	13	59.8	7.8	ND	ND	3.5	ND
Princess	Diamond	7/16/2008	73	17.5	28.4	97.5	7.5	ND	ND	3.6	ND
Princess	Diamond	8/5/2008	67	14.2	8.9	112	7.6	ND	ND	3.1	ND
Princess	Diamond	8/27/2008	70	11	11	130	7.3	ND	ND	ND	ND
Princess	Diamond	9/2/2008	78	6.4	12	110	7.5	2	ND	3	ND
Princess	Diamond	9/10/2008	120	5.5	12	50	7.8	ND	ND	4.6	ND
Princess	Golden	5/12/2008	21	9.26	6.92	179	8.2	12	ND	ND	ND
Princess	Golden	5/15/2008	29	8.3	6	180	7	ND	ND	ND	ND
Princess	Golden	5/19/2008	27	11.3	7.3	225	7	ND	ND	ND	ND
Princess	Golden	6/9/2008	36	10.2	6.33	203	7.1	ND	ND	3.9	ND
Princess	Golden	6/16/2008	51	10.7	4.89	106	7.4	ND	ND	ND	ND
Princess	Golden	6/30/2008	42	5.1	5.3	93	7.5	2	ND	3.2	ND
Princess	Golden	7/7/2008	22	14.5	7.36	156	7.3	ND	ND	2.3	ND
Princess	Golden	7/21/2008	21	6.72	6.47	269	7.3	4	ND	2.8	ND
Princess	Golden	8/11/2008	33	17	6.8	150	7.2	ND	ND	3.5	ND
Princess	Golden	8/18/2008	38	41	9.4	350	7.4	ND	ND	ND	ND
Princess	Golden	9/1/2008	63	11	5.7	130	7.6	ND	ND	20.2	ND
Princess	Golden	9/8/2008	46	35	6.9	210	7.3	ND	ND	3.3	ND
Princess	Island	5/22/2008	22	23.2	14.5	92.5	7	ND	ND	ND	ND
Princess	Island	5/30/2008	24	37.2	9.51	135	6.7	ND	ND	ND	0.11
Princess	Island	6/5/2008	70	40.8	9.14	228	7.2	ND	ND	ND	ND
Princess	Island	6/13/2008	64	22.5	8.68	87.4	7.1	ND	ND	2.27	ND
Princess	Island	6/19/2008	38	22	9.3	360	7.2	ND	ND	27.4	ND
Princess	Island	7/11/2008	12	40	9	120	6.8	ND	ND	ND	ND
Princess	Island	7/17/2008	26	29.5	8.36	164	6.9	ND	ND	2.9	ND
Princess	Island	8/8/2008	87	5.4	7.9	38	7.5	6	ND	20.7	ND
Princess	Island	8/14/2008	83	5.4	6.8	39	7.4	2	ND	15	ND
Princess	Island	8/22/2008	76	5.6	7.9	73	7.5	2	2	16	ND
Princess	Island	9/5/2008	75	5.2	6.2	77	7.2	ND	ND	ND	ND
Princess	Island	9/11/2008	98	7	7.2	18	7.7	ND	ND	27.9	ND

2008 Semimonthly General Permit Sample Results Princess Cruises											
Company	Vessel	Sample Date	mg/L	ug/L	ug/L	ug/L	S.U.	col. per 100 ml	mg/L	mg/L	mg/L
			Ammonia	Copper	Nickel	Zinc	pH	Fecal Coliform	TSS	BOD	Total Residual Chlorine
Princess	Sapphire	5/20/2008	52	14	12.7	53.1	7.1	ND	ND	21.3	ND
Princess	Sapphire	5/28/2008	92	23.2	15.7	67.1	6.7	ND	ND	2.8	ND
Princess	Sapphire	6/11/2008	7.8	51	24	60	7.7	ND	ND	ND	ND
Princess	Sapphire	6/17/2008	85	13.9	14.2	47.4	7.6	ND	ND	6.28	ND
Princess	Sapphire	6/25/2008	50	22.9	27	89.9	7.6	ND	ND	6.4	ND
Princess	Sapphire	7/1/2008	37	8.78	9.32	53.3	7.6	ND	ND	4.2	ND
Princess	Sapphire	7/9/2008	40	28.1	43.2	112	7.5	ND	ND	2.5	ND
Princess	Sapphire	7/29/2008	100	5.6	13	92	7.7	ND	1	4.8	ND
Princess	Sapphire	8/6/2008	100	13.2	18.4	64.3	7.7	ND	ND	6	ND
Princess	Sapphire	8/12/2008	71	9.4	13	45	7.6	ND	ND	2.9	ND
Princess	Sapphire	9/3/2008	130	10	20	59	7.7	ND	ND	8.1	ND
Princess	Sapphire	9/9/2008	110	8.2	13	45	7.7	ND	ND	4.5	ND
Princess	Star	5/7/2008	35	140	21	410	6.3	2	ND	3.5	ND
Princess	Star	5/14/2008	21	135	15.7	110	7	ND	ND	6.4	ND
Princess	Star	5/28/2008	34	100	12	130	7.1	ND	ND	4	ND
Princess	Star	6/18/2008	27	59.2	13.6	123	6.9	ND	ND	ND	ND
Princess	Star	6/25/2008	32	55.5	15.7	119	6.7	ND	ND	6.8	ND
Princess	Star	7/16/2008	42	30.1	18.4	113	6.6	ND	ND	ND	ND
Princess	Star	7/17/2008	30	19	8.5	87	6.8	ND	ND	3.4	ND
Princess	Star	8/13/2008	64	100	19	81	7.3	ND	ND	4	ND
Princess	Star	8/20/2008	65	78	20	100	7.2	ND	ND	3.7	ND
Princess	Star	9/3/2008	56	35	9.3	120	7.4	ND	ND	ND	ND
Princess	Star	9/10/2008	71	60	11	49	7.4	ND	ND	ND	ND
Princess	Sun	8/15/2008	100	14	9.1	150	7.4	ND	2	3.7	ND

Princess received 15 Notices of Violation in 2008. The majority of the notices were for violating the interim limits for ammonia, copper, and zinc. One NOV incorporated low pH (the Star Princess May 7th sample), and one incorporated a high fecal result (the Diamond Princess on May 13th). The Dawn Princess met the long term limits for nickel on every sample.

Royal Caribbean International (RCI)

Royal Caribbean International submitted Notices of Intent to discharge for the Radiance of the Seas and the Serenade of the Seas. Neither vessel discharged into Alaskan waters in 2008. Royal Caribbean did not submit a Notice of Intent for the Rhapsody of the Seas. This company self-reported an

unpermitted discharge in Alaskan waters in Chatham Strait from the Rhapsody of the Seas in 2008.

Seven Seas Mariner (Regent)

The Seven Seas Mariner, operated by Regent, uses a Hamworthy treatment system. The Seven Seas Mariner was authorized to discharge under the general permit.

2008 Semimonthly General Permit Sample Results Seven Seas Mariner											
Company	Vessel	Sample Date	mg/L	ug/L	ug/L	ug/L	S.U.	col. per 100 ml	mg/L	mg/L	mg/L
			Ammonia	Copper	Nickel	Zinc	pH	Fecal Coliform	TSS	BOD	Total Residual Chlorine
Regent	Seven Seas Mariner	5/23/2008	42	23.3	7.26	357	7.3	ND	ND	2.9	ND
Regent	Seven Seas Mariner	5/25/2008	19	4.62	5.75	227	7.3	ND	ND	3	ND
Regent	Seven Seas Mariner	6/13/2008	33	9.7	4.5	45	7.4	ND	ND	ND	ND
Regent	Seven Seas Mariner	6/14/2008	29	2.56	5.94	97.3	7.3	ND	ND	ND	ND
Regent	Seven Seas Mariner	7/18/2008	40	5.87	4.46	35.9	7.6	ND	ND	ND	ND
Regent	Seven Seas Mariner	7/19/2008	13	2.76	4.24	29.9	7.5	ND	ND	ND	ND
Regent	Seven Seas Mariner	8/15/2008	11	3.2	4.5	29	7.3	ND	ND	3.1	ND
Regent	Seven Seas Mariner	8/16/2008	9.9	4.7	3.8	47	7.3	ND	ND	2.3	ND
Regent	Seven Seas Mariner	9/13/2008	4.7	11	4.6	63	7.1	ND	ND	ND	ND
Regent	Seven Seas Mariner	9/14/2008	11	12	3.9	74	7	ND	ND	ND	ND

The Seven Seas Mariner received a Notice of Violation for the May 23rd sample results based on an exceedance of zinc. From July through September, the Seven Seas Mariner consistently met the long term limits for zinc. The Seven Seas Mariner met the long-term limits on nickel throughout the 2008 season.

Silver Shadow (Silversea)

The Silver Shadow, operated by Silversea, is the smallest of the large cruise ships that discharged into Alaskan waters in 2008. This vessel uses a unique treatment system manufactured by Marisan. The Silver Shadow was authorized to discharge under the general permit.

The Silver Shadow had consistently low results for ammonia and zinc. The Silver Shadow received a Notice of Violation for copper exceedances on the September 9th and September 10th samples.

2008 Semimonthly General Permit Sample Results Silver Shadow											
Company	Vessel	Sample Date	mg/L	ug/L	ug/L	ug/L	S.U.	col. per 100 ml	mg/ L	mg/ L	mg/L
			<u>Ammonia</u>	<u>Copper</u>	<u>Nickel</u>	<u>Zinc</u>	<u>pH</u>	<u>Fecal Coliform</u>	<u>TSS</u>	<u>BOD</u>	<u>Total Residual Chlorine</u>
Silver Seas	Silver Shadow	6/15/2008	0.65	6.21	17.8	0	7.2	ND	49	9.27	ND
Silver Seas	Silver Shadow	6/26/2008	0	4.04	10.8	0	7.1	ND	17	9.6	ND
Silver Seas	Silver Shadow	7/18/2008	0.41	4.03	5.71	4.42	7.4	ND	5	8.4	ND
Silver Seas	Silver Shadow	7/28/2008	0.45	6.84	7.25	3.61	7.4	ND	22	9.9	ND
Silver Seas	Silver Shadow	8/4/2008	0	3.81	7.19	0	7.8	ND	19	11.3	ND
Silver Seas	Silver Shadow	8/7/2008	0.6	54	10	58	6.8	8	99	8.1	ND
Silver Seas	Silver Shadow	8/23/2008	0.18	42	7.4	8.4	7.1	ND	45	10.2	ND
Silver Seas	Silver Shadow	9/9/2008	0.16	93	12	30	7	ND	64	5.9	ND
Silver Seas	Silver Shadow	9/10/2008	0.17	73	10	6.4	7.2	ND	24	5.5	ND

APPENDIX 1. GENERAL PERMIT LIMITS

The 2008 General Permit requires that tested wastewater parameters meet Alaska Water Quality Standards at the point of discharge (no mixing zone) by 2010. These effluent limits are summarized in the table below. ADEC realized that vessels would have difficulty meeting some of these limits (ammonia, copper, nickel, and zinc) and issued a compliance schedule with the General Permit. Under the compliance schedule operators could apply for less stringent interim limits for ammonia, copper, nickel, and zinc for the 2008 and 2009 season. The interim limits are shown in Table 2 in parentheses.

Table 2: Effluent Limits and Discharge Reporting

Effluent Characteristics	Minimum Value ¹	Monthly Average ¹	Daily Maximum ¹	Minimum Frequency	Sample Type
Total Flow (cubic meters per day of effluent)	N/A	Not to exceed design capacity Report	Not to exceed design capacity Report	Daily	Metered or estimated
Biochemical Oxygen Demand (5-day)	N/A	30 mg/ L	60 mg/ L	Twice Monthly	Grab
Fecal Coliform Bacteria	N/A	14 per 100 mL	43 per 100 mL	Twice Monthly	Grab
Total Residual Chlorine	N/A	N/A	0.0075 mg/ L ^{3,4}	Twice Monthly	Field test
Ammonia	N/A	N/A	(80.4 mg/ L ⁵) 2.9 mg/ L ⁶	Twice Seasonally	Grab
Copper	N/A	N/A	(0.066 mg/ L ⁵) 0.0031 mg/ L ⁶	Twice Seasonally	Grab
Nickel	N/A	N/A	(0.18 mg/ L ⁵) 0.0082 mg/ L ⁶	Twice Seasonally	Grab
Zinc	N/A	N/A	(0.23 mg/ L ⁵) 0.081 mg/ L ⁶	Twice Seasonally	Grab
pH	6.5 S.U.	N/A	8.5 S.U.	Twice Monthly	Field test, grab, or continuous
Total Suspended Solids	N/A	N/A	150 mg/ L	Twice Monthly	Grab or Continuous
Conductivity	N/A	N/A	Report	Twice Seasonally	Field test, grab, or continuous
Chemical Oxygen Demand	N/A	N/A	Report	Twice Seasonally	Grab
Nitrate-Nitrogen (N-NO ₃)	N/A	N/A	Report	Twice Seasonally	Grab
Total phosphorus	N/A	N/A	Report	Twice Seasonally	Grab
Total Kjeldahl Nitrogen (TKN)	N/A	N/A	Report	Twice Seasonally	Grab
Total Organic Carbon	N/A	N/A	Report	Twice Seasonally	Grab
Base-Neutral Acid extractables (BNA)	N/A	N/A	Report	Twice Seasonally	Grab
Volatile Organic Compounds (VOCs)	N/A	N/A	Report	Twice Seasonally	Grab

1. Milligrams per liter (mg/ L); milliliter (mL); Standard Units (S.U.)

2. The "monthly average" is the average of all samples taken during the calendar month. If only one sample is collected, the result of that sample is the monthly average.

3. Analytical results below the method detection limit shall be deemed compliant with the effluent limits.

4. Testing and reporting for total residual chlorine is not required if chlorine is not used as disinfectant in the wastewater treatment works process.

5. These interim compliance limits are effective during the 2008 and 2009 cruise ship seasons for vessels with approved compliance schedules that comply with Section 1.9.

6. These limits become effective for all permittees at the beginning of the 2010 cruise ship season.

APPENDIX 2: 2008 LARGE CRUISE SHIP WASTEWATER SAMPLE DATA

Table 3: Semi-monthly parameters

Final		12/08/2008 E White											
2008 SemiMonthly General Permit Sample Results													
Company	Vessel	Sample Date	Type	ND= Non-detect									
				mg/L	ug/L	ug/L	ug/L	S.U.	col. per 100 ml Fecal Coliform	mg/L	mg/L	mg/L	Total Residual
				Ammonia	Copper	Nickel	Zinc	pH		TSS	BOD	Chlorine	
Carnival	Spirit	May, June	ND										
Carnival	Spirit	7/19/2008	CC	ND	ND	ND	3.99	7.2	ND	ND	4.9	ND	
Carnival	Spirit	7/26/2008	UA	ND	ND	ND	9.29	8.2	ND	ND	3.79	ND	
Carnival	Spirit	8/2/2008	UA	0.42	0.86	ND	6.93	6.6	4.92	ND	4.68	ND	
Carnival	Spirit	8/16/2008	CC	0.48	0.39	ND	5.1	7.2	ND	ND	6.71	ND	
Carnival	Spirit	9/12/2008	UA	ND	0.7	ND	5.36	7.3	ND	ND	5.02	ND	
Carnival	Spirit	9/19/2008	CC	ND	1.18	ND	9.96	7.5	ND	ND	10.3	ND	
Celebrity	Infinity	2008	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Celebrity	Millennium	May, June	ND										
Celebrity	Millennium	7/28/2008	CC	4.6	2.3	15.8	65.3	7.5	210	ND	3.7	0.1	
Celebrity	Millennium	August, Sept	ND										
Holland America	Oosterdam	2008	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Holland America	Ryndam	5/9/2008	CC	0.44	18.2	17	63.7	7.4	ND	ND	ND	ND	
Holland America	Ryndam	5/16/2008	CC	1.4	22.2	14.3	75.1	7.2	ND	ND	ND	ND	
Holland America	Ryndam	5/26/2008	UA	2	31	19	110	6.9	ND	ND	ND	ND	
Holland America	Ryndam	6/13/2008	CC	1.3	16.2	14.1	75	7.2	ND	ND	ND	ND	
Holland America	Ryndam	6/20/2008	CC	ND	21.7	11.7	80.7	7	ND	ND	ND	ND	
Holland America	Ryndam	7/11/2008	CC	ND	26.6	14	84.4	6.9	ND	ND	2.9	ND	
Holland America	Ryndam	7/18/2008	CC	0.63	12.8	11.1	81.4	7.2	ND	ND	ND	ND	
Holland America	Ryndam	8/1/2008	CC	0.93	20.3	13.9	80.6	7.1	ND	ND	ND	ND	
Holland America	Ryndam	8/15/2008	CC	10	16	11	64	7.1	ND	ND	3.8	ND	
Holland America	Ryndam	8/22/2008	UA	16	6.9	11	69	7.4	ND	2	ND	ND	
Holland America	Ryndam	9/5/2008	CC	6.2	12	11	72	7.2	ND	ND	ND	ND	
Holland America	Ryndam	9/12/2008	CC	3.9	8.5	10	15	7.3	ND	ND	ND	ND	
Holland America	Statendam	May	ND										
Holland America	Statendam	6/23/2008	UA	13	ND	13	1.7	7.5	ND	ND	8	ND	
Holland America	Statendam	6/30/2008	CC	4.8	ND	6.01	3.1	7.3	ND	ND	5	ND	
Holland America	Statendam	7/14/2008	CC	24	ND	14.3	4.75	7.7	ND	ND	17.3	ND	
Holland America	Statendam	7/28/2008	CC	16	1.12	13.9	5.96	7.6	ND	ND	12.9	ND	
Holland America	Statendam	8/11/2008	CC	10	ND	17	2.2	7	ND	ND	34	ND	
Holland America	Statendam	8/18/2008	UA	11	1.5	15	5.3	7.1	28	ND	18.4	ND	
Holland America	Statendam	9/1/2008	CC	27	3.2	14	7	7.4	ND	ND	28.9	ND	
Holland America	Statendam	9/8/2008	CC	10	2.6	17	4.8	7.5	ND	ND	23.3	ND	
Holland America	Veendam	5/11/2008	CC	24	9.53	12.4	69.2	7.5	ND	ND	2.2	ND	
Holland America	Veendam	5/21/2008	UA	8.2	8	12	63	7.4	ND	ND	3.15	ND	
Holland America	Veendam	5/27/2008	CC	16	7.15	14	101	7.5	ND	ND	ND	ND	
Holland America	Veendam	6/3/2008	CC	6	8.56	13.6	110	7.3	ND	ND	0.1	ND	
Holland America	Veendam	6/17/2008	UA	7.5	8.7	10	140	7.4	ND	ND	3.2	ND	
Holland America	Veendam	7/1/2008	CC	8.2	8	12.4	76.4	7.3	ND	ND	ND	ND	
Holland America	Veendam	7/8/2008	CC	12	7.67	13.3	108	7.3	ND	ND	ND	ND	
Holland America	Veendam	7/15/2008	CC	15	5.21	8.84	77.3	7.1	ND	ND	ND	ND	
Holland America	Veendam	7/22/2008	UA	6.2	4.1	10	71	7.2	ND	1.6	ND	ND	
Holland America	Veendam	8/5/2008	CC	11	3.44	10.5	97.1	7.4	ND	ND	2.7	ND	
Holland America	Veendam	8/19/2008	CC	12	6.4	17	63	7.3	ND	ND	ND	ND	
Holland America	Veendam	9/2/2008	CC	11	4.1	12	57	7.4	ND	ND	ND	ND	
Holland America	Veendam	9/16/2008	CC	8.8	6.2	12	71	7.4	ND	ND	ND	ND	
Holland America	Volendam	May	ND										
Holland America	Volendam	7/2/2008	CC	2.4	16.7	14.8	95.5	7.3	ND	ND	ND	ND	
Holland America	Volendam	7/10/2008	UA	11	4.9	10	60	7.3	ND	ND	ND	ND	
Holland America	Volendam	8/7/2008	CC	36	6.6	20	44	7.3	ND	ND	ND	ND	
Holland America	Volendam	8/21/2008	CC	46	4.7	11	46	7.3	ND	ND	ND	ND	
Holland America	Volendam	8/27/2008	UA	24	5.7	10	37	7.2	ND	ND	ND	ND	
Holland America	Volendam	9/4/2008	CC	28	4.7	11	31	7.3	ND	ND	4.6	ND	
Holland America	Volendam	9/10/2008	CC	23	3.9	9.1	ND	7.3	ND	ND	ND	ND	
Holland America	Westerdam	5/14/2008	CC	36	ND	5.97	124	7.4	ND	ND	20.9	ND	
Holland America	Westerdam	5/28/2008	CC	130	6.47	4.69	47.2	7.6	2	ND	47.9	ND	
Holland America	Westerdam	6/4/2008	UA	100	1	3.8	23	7.6	2	ND	13.2	ND	
Holland America	Westerdam	6/11/2008	CC	130	4.45	8.85	501	7.7	2	ND	16.5	ND	
Holland America	Westerdam	7/9/2008	ND										
Holland America	Westerdam	7/16/2008	CC	69	1.31	5.29	36.5	7.2	ND	ND	41.3	ND	
Holland America	Westerdam	8/6/2008	CC	57	ND	4.21	39.5	7.5	2	ND	4.3	ND	
Holland America	Westerdam	8/7/2008	UA	67	2.6	6.3	62	7.5	ND	1	2.8	ND	
Holland America	Westerdam	8/13/2008	CC	63	3.8	4.8	44	7.3	ND	ND	2.8	ND	
Holland America	Westerdam	9/3/2008	CC	130	5.6	6.9	44	7.6	ND	ND	ND	ND	
Holland America	Westerdam	9/17/2008	CC	110	2.9	8.1	12	7.3	ND	ND	126	ND	
Holland America	Zaandam	5/14/2008	CC	2.4	52	11.8	99.5	7.3	ND	ND	ND	ND	
Holland America	Zaandam	5/22/2008	CC	12	6.93	9.4	103	7.4	ND	ND	ND	ND	
Holland America	Zaandam	6/5/2008	CC	18	6.16	12.4	108	7.4	ND	ND	ND	ND	
Holland America	Zaandam	6/11/2008	UA	2.2	5.1	6.7	97	7.4	ND	ND	ND	ND	
Holland America	Zaandam	6/19/2008	CC	11	3.49	11.3	30.5	7.6	ND	5	15.2	ND	
Holland America	Zaandam	7/9/2008	CC	5.9	7.81	10.1	51.5	7.5	ND	ND	2.5	ND	
Holland America	Zaandam	7/17/2008	CC	12	8.28	12	59.7	7.4	ND	ND	4.8	ND	
Holland America	Zaandam	8/14/2008	CC	19	6.4	10	60	7.4	ND	ND	2.2	ND	
Holland America	Zaandam	8/15/2008	UA	24	6.2	8.6	68	7.4	ND	ND	2.9	ND	
Holland America	Zaandam	8/28/2008	CC	11	6.6	8.4	58	7.5	ND	ND	2.3	ND	
Holland America	Zaandam	9/3/2008	CC	1.7	11	9.8	61	7.1	ND	ND	ND	ND	
Holland America	Zaandam	9/11/2008	CC	6.4	3.8	6	3.2	7.5	ND	ND	ND	ND	

Explanation of color codes	
Red	Exceedance of interim limits or Alaska Water Quality Standards if no interim limits
Yellow	Exceedance of long-term limits
Light Blue	Discharging only treated graywater
Dark Blue	Non Discharger in Alaska in 2008

Results from 2008 Discharge monitoring reports and attached sample results, all sample results taken while discharging and in Alaska

Ammonia	interim (mg/L)	long term (mg/L)	Copper	interim (ug/L)	long term (ug/L)
	80.4	2.9		66	3.1
Nickel	interim (ug/L)	long term (ug/L)	Zinc	interim (ug/L)	long term (ug/L)
	180	8.2		230	81
pH	Minimum	Maximum	Biological oxygen demand (BOD)		
	6.5	8.5	Maximum	Monthly Average	
			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		Maximum		
			0.0075 mg/L		

See text in Section 5. Did not result in violation of the GP.

2008 SemiMonthly General Permit Sample Results											ND= Non-detect		
Company	Vessel	Sample Date	Type	mg/L	ug/L	ug/L	ug/L	S.U.	col. per 100 ml	mg/L	mg/L	mg/L	
				Ammonia	Copper	Nickel	Zinc	pH	Fecal Coliform	TSS	BOD	Chlorine	
												Total Residual	
Norwegian	Pearl	5/6/2008	CC	49	18	6.1	98	6.6	ND	ND	6.3	ND	
Norwegian	Pearl	5/13/2008	CC	18	9.2	6.91	94.4	6.2	ND	5	3.9	ND	
Norwegian	Pearl	6/3/2008	UA	27	5.7	4	67	6.7	ND	2.4	2.1	ND	
Norwegian	Pearl	6/17/2008	CC	38	19.3	9.43	50.3	6.8	8	7	3.46	ND	
Norwegian	Pearl	6/24/2008	CC	23	4.84	5.74	105	6.8	ND	6	13	ND	
Norwegian	Pearl	7/15/2008	CC	26	9.43	6.06	54.7	6.8	ND	ND	3.2	ND	
Norwegian	Pearl	7/22/2008	CC	25	3.53	3.47	67.1	6.8	ND	6	3.2	ND	
Norwegian	Pearl	8/12/2008	CC	34	6.9	5.1	110	6.7	ND	ND	2.9	ND	
Norwegian	Pearl	8/19/2008	CC	41	12	4.9	110	6.5	ND	ND	3	ND	
Norwegian	Pearl	9/2/2008	UA	27	8.5	3.8	73	6.8	ND	7	ND	ND	
Norwegian	Pearl	9/9/2008	CC	36	8.8	5	62	6.8	ND	6	ND	ND	
Norwegian	Star	5/6/2008	CC	40	6	13	74	7	ND	ND	15.6	ND	
Norwegian	Star	5/13/2008	CC	32	2.27	8.09	79.4	7	ND	ND	5.5	ND	
Norwegian	Star	6/3/2008	UA	6.6	1.5	8.9	26	6.7	ND	ND	5.6	ND	
Norwegian	Star	6/17/2008	CC	19	2.52	6.89	58.4	6.7	ND	ND	ND	ND	
Norwegian	Star	6/24/2008	CC	22	1.99	8.73	111	6.6	ND	8	8	ND	
Norwegian	Star	7/15/2008	CC	29	1.38	9.6	63.6	6.8	ND	ND	7	ND	
Norwegian	Star	7/29/2008	CC	43	2.15	8.38	69.9	6.8	12	7	4.7	ND	
Norwegian	Star	8/12/2008	CC	20	3.7	13	100	6.7	ND	ND	8.5	ND	
Norwegian	Star	8/19/2008	CC	26	2.3	13	110	6.7	2	ND	9.1	ND	
Norwegian	Star	8/26/2008	UA	20	4.6	11	94	6.8	4	11	12.9	ND	
Norwegian	Star	9/2/2008	CC	11	2.2	11	160	6.6	Error	4	8.1	ND	
Norwegian	Star	9/9/2008	CC	17	1.2	14	140	6.5	ND	ND	8.3	ND	
Norwegian	Sun	5/14/2008	CC	71	5.49	7.37	30.9	6.6	ND	9	6.1	ND	
Norwegian	Sun	5/21/2008	CC	32	4.91	6.03	27.4	6.7	ND	0	4.2	ND	
Norwegian	Sun	5/28/2008	UA	36	3.4	6.8	36	6.8	40	4.8	9	ND	
Norwegian	Sun	6/4/2008	CC	24	2.81	7.81	19.2	6.8	2	ND	4.6	ND	
Norwegian	Sun	6/11/2008	CC	10	4.03	6.72	15.5	6.6	16	6	12	ND	
Norwegian	Sun	7/2/2008	CC	17	5	5.74	26.3	6.7	ND	5	5.6	ND	
Norwegian	Sun	7/9/2008	CC	12	4.53	6.11	36.8	6.8	2	4	5.8	ND	
Norwegian	Sun	7/17/2008	UA	32	5.1	4.4	3.9	6.7	ND	8	7.6	ND	
Norwegian	Sun	8/6/2008	CC	22	5.14	4.79	30.6	6.8	ND	ND	14	ND	
Norwegian	Sun	8/13/2008	CC	29	11	7.2	44	6.5	ND	ND	10	ND	
Norwegian	Sun	9/3/2008	CC	16	3.4	4.3	38	6.5	ND	ND	ND	ND	
Norwegian	Sun	9/10/2008	CC	28	3.1	5.6	34	6.5	ND	ND	2.3	ND	
Princess	Coral	5/15/2008	CC	23	17.2	17.5	208	7	ND	ND	2.1	ND	
Princess	Coral	5/23/2008	UA	74	17	9.5	170	7.4	ND	ND	ND	0.19	
Princess	Coral	5/29/2008	CC	100	19.1	7.62	132	7.5	ND	ND	3.3	ND	
Princess	Coral	6/12/2008	CC	59	31.4	10.5	151	7.3	ND	ND	ND	ND	
Princess	Coral	6/20/2008	CC	33	88.1	12	125	6.9	ND	ND	2	0.1	
Princess	Coral	7/10/2008	CC	20	25.8	9.28	159	7.3	ND	ND	ND	ND	
Princess	Coral	7/18/2008	CC	25	18	7.82	98.8	7.3	ND	ND	ND	ND	
Princess	Coral	7/28/2008	UA	58	31	7.2	98	7.2	ND	4	ND	ND	
Princess	Coral	8/1/2008	CC	24	20.3	8.1	173	7.2	ND	ND	ND	ND	
Princess	Coral	8/7/2008	CC	68	19	6.7	140	7.7	ND	ND	ND	ND	
Princess	Coral	9/4/2008	CC	42	24	7.7	150	7.5	ND	ND	ND	ND	
Princess	Coral	9/12/2008	CC	51	30	9.2	140	7.4	ND	ND	ND	ND	
Princess	Dawn	5/11/2008	CC	26	5.58	8.15	94.2	7.3	ND	ND	ND	ND	
Princess	Dawn	5/23/2008	CC	23	6.48	4.56	134	7	ND	ND	3.8	ND	
Princess	Dawn	5/31/2008	UA	33	5.5	3.3	150	7	ND	2	ND	ND	
Princess	Dawn	6/12/2008	CC	15	7.25	3.88	232	7.1	ND	ND	ND	ND	
Princess	Dawn	6/20/2008	CC	26	5.09	3.12	222	7.2	ND	ND	ND	ND	
Princess	Dawn	6/30/2008	UA	28	6	3	120	7	ND	ND	ND	ND	
Princess	Dawn	7/10/2008	CC	5.4	8.52	4.7	114	6.9	ND	ND	2.4	ND	
Princess	Dawn	7/20/2008	CC	23	5.11	3.66	121	7.1	ND	ND	ND	ND	
Princess	Dawn	8/21/2008	CC	53	7.2	3.6	260	7.3	ND	ND	2.4	ND	
Princess	Dawn	8/29/2008	CC	15	7.4	4.5	150	6.9	ND	ND	ND	ND	
Princess	Dawn	9/8/2008	CC	25	12	4.4	140	7.1	ND	ND	ND	ND	
Princess	Dawn	9/18/2008	CC	44	8.4	4.4	220	7.4	4	ND	4.1	ND	
Princess	Diamond	5/13/2008	CC	81	6.75	11.8	51.7	7.3	62	ND	11.3	ND	
Princess	Diamond	5/26/2008	UA	150	4.6	9.9	48	7.9	ND	ND	3.8	ND	
Princess	Diamond	6/10/2008	CC	110	7.81	18.5	106	7.6	ND	ND	ND	ND	
Princess	Diamond	6/18/2008	UA	100	8.6	15	84	7.8	ND	ND	3.05	ND	
Princess	Diamond	7/8/2008	CC	89	35.3	13	59.8	7.8	ND	ND	3.5	ND	
Princess	Diamond	7/16/2008	CC	73	17.5	28.4	97.5	7.5	ND	ND	3.6	ND	
Princess	Diamond	8/5/2008	CC	67	14.2	8.9	112	7.6	ND	ND	3.1	ND	
Princess	Diamond	8/27/2008	CC	70	11	11	130	7.3	ND	ND	ND	ND	
Princess	Diamond	9/2/2008	CC	78	6.4	12	110	7.5	2	ND	3	ND	
Princess	Diamond	9/10/2008	CC	120	5.5	12	50	7.8	ND	ND	4.6	ND	
Princess	Golden	5/12/2008	CC	21	9.26	6.92	179	8.2	12	ND	ND	ND	
Princess	Golden	5/15/2008	UA	29	8.3	6	180	7	ND	ND	ND	ND	
Princess	Golden	5/19/2008	CC	27	11.3	7.3	225	7	ND	ND	ND	ND	
Princess	Golden	6/9/2008	CC	36	10.2	6.33	203	7.1	ND	ND	3.9	ND	
Princess	Golden	6/16/2008	CC	51	10.7	4.89	106	7.4	ND	ND	ND	ND	
Princess	Golden	6/30/2008	UA	42	5.1	5.3	93	7.5	2	ND	3.2	ND	
Princess	Golden	7/7/2008	CC	22	14.5	7.36	156	7.3	ND	ND	2.3	ND	
Princess	Golden	7/21/2008	CC	21	6.72	6.47	269	7.3	4	ND	2.8	ND	
Princess	Golden	8/11/2008	CC	33	17	6.8	150	7.2	ND	ND	3.5	ND	
Princess	Golden	8/18/2008	CC	38	41	9.4	350	7.4	ND	ND	ND	ND	
Princess	Golden	9/1/2008	CC	63	11	5.7	130	7.6	ND	ND	20.2	ND	
Princess	Golden	9/8/2008	CC	46	35	6.9	210	7.3	ND	ND	3.3	ND	

Explanation of color codes	
Red	Exceedance of interim limits or Alaska Water Quality Standards if no interim limits
Yellow	Exceedance of long-term limits
Light Blue	Discharging only treated graywater
Dark Blue	Non Discharger in Alaska in 2008

Results from 2008 Discharge monitoring reports and attached sample results, all sample results taken while discharging and in Alaska

Ammonia	interim (mg/L)	long term (mg/L)	Copper	interim (ug/L)	long term (ug/L)
	80.4	2.9		66	3.1
Nickel	interim (ug/L)	long term (ug/L)	Zinc	interim (ug/L)	long term (ug/L)
	180	8.2		230	81
pH	Minimum	Maximum	Biological oxygen demand (BOD)		
	6.5	8.5	Maximum	Monthly Average	
			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		Maximum		
			0.0075 mg/L		

Final		12/08/2008 E White												
2008 SemiMonthly General Permit Sample Results											ND= Non-detect			
Company	Vessel	Sample Date	Type	mg/L	ug/L	ug/L	ug/L	S.U.	col. per 100 ml	mg/L	mg/L	mg/L		
				Ammonia	Copper	Nickel	Zinc	pH	Fecal Coliform	TSS	BOD	Chlorine		
Princess	Island	7/17/2008	CC	26	29.5	8.36	164	6.9	ND	ND	2.9	ND		
Princess	Island	8/8/2008	CC	87	5.4	7.9	38	7.5	6	ND	20.7	ND		
Princess	Island	8/14/2008	CC	83	5.4	6.8	39	7.4	2	ND	15	ND		
Princess	Island	8/22/2008	UA	76	5.6	7.9	73	7.5	2	2	16	ND		
Princess	Island	9/5/2008	CC	75	5.2	6.2	77	7.2	ND	ND	ND	ND		
Princess	Island	9/11/2008	CC	98	7	7.2	18	7.7	ND	ND	27.9	ND		
Princess	Sapphire	5/20/2008	CC	52	14	12.7	53.1	7.1	ND	ND	21.3	ND		
Princess	Sapphire	5/28/2008	CC	92	23.2	15.7	67.1	6.7	ND	ND	2.8	ND		
Princess	Sapphire	6/11/2008	UA	7.8	5.1	24	60	7.7	ND	ND	ND	ND		
Princess	Sapphire	6/17/2008	CC	85	13.9	14.2	47.4	7.6	ND	ND	6.28	ND		
Princess	Sapphire	6/25/2008	CC	50	22.9	27	89.9	7.6	ND	ND	6.4	ND		
Princess	Sapphire	7/1/2008	CC	37	8.78	9.32	53.3	7.6	ND	ND	4.2	ND		
Princess	Sapphire	7/9/2008	CC	40	28.1	43.2	112	7.5	ND	ND	2.5	ND		
Princess	Sapphire	7/29/2008	UA	100	5.6	13	92	7.7	ND	1	4.8	ND		
Princess	Sapphire	8/6/2008	CC	100	13.2	18.4	64.3	7.7	ND	ND	6	ND		
Princess	Sapphire	8/12/2008	CC	71	9.4	13	45	7.6	ND	ND	2.9	ND		
Princess	Sapphire	9/3/2008	CC	130	10	20	59	7.7	ND	ND	8.1	ND		
Princess	Sapphire	9/9/2008	CC	110	8.2	13	45	7.7	ND	ND	4.5	ND		
Princess	Star	5/7/2008	CC	35	140	21	410	6.3	2	ND	3.5	ND		
Princess	Star	5/14/2008	CC	21	135	15.7	110	7	ND	ND	6.4	ND		
Princess	Star	5/28/2008	UA	34	100	12	130	7.1	ND	ND	4	ND		
Princess	Star	6/18/2008	CC	27	59.2	13.6	123	6.9	ND	ND	ND	ND		
Princess	Star	6/25/2008	CC	32	55.5	15.7	119	6.7	ND	ND	6.8	ND		
Princess	Star	7/16/2008	CC	42	30.1	18.4	113	6.6	ND	ND	ND	ND		
Princess	Star	7/17/2008	UA	30	19	8.5	87	6.8	ND	ND	3.4	ND		
Princess	Star	8/13/2008	CC	64	100	19	81	7.3	ND	ND	4	ND		
Princess	Star	8/20/2008	CC	65	78	20	100	7.2	ND	ND	3.7	ND		
Princess	Star	9/3/2008	CC	56	35	9.3	120	7.4	ND	ND	ND	ND		
Princess	Star	9/10/2008	CC	71	60	11	49	7.4	ND	ND	ND	ND		
Princess	Sun	8/15/2008	UA	100	14	9.1	150	7.4	ND	2	3.7	ND		
Royal Caribbean	Radiance		ND	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Royal Caribbean	Serenade		ND	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Regent	Seven Seas Mariner	5/23/2008	CC	42	23.3	7.26	357	7.3	ND	ND	2.9	ND		
Regent	Seven Seas Mariner	5/25/2008	CC	19	4.62	5.75	227	7.3	ND	ND	3	ND		
Regent	Seven Seas Mariner	6/13/2008	UA	33	9.7	4.5	45	7.4	ND	ND	ND	ND		
Regent	Seven Seas Mariner	6/14/2008	CC	29	2.56	5.94	97.3	7.3	ND	ND	ND	ND		
Regent	Seven Seas Mariner	7/18/2008	CC	40	5.87	4.46	35.9	7.6	ND	ND	ND	ND		
Regent	Seven Seas Mariner	7/19/2008	CC	13	2.76	4.24	29.9	7.5	ND	ND	ND	ND		
Regent	Seven Seas Mariner	8/15/2008	CC	11	3.2	4.5	29	7.3	ND	ND	3.1	ND		
Regent	Seven Seas Mariner	8/16/2008	UA	9.9	4.7	3.8	47	7.3	ND	ND	2.3	ND		
Regent	Seven Seas Mariner	9/13/2008	CC	4.7	11	4.6	63	7.1	ND	ND	ND	ND		
Regent	Seven Seas Mariner	9/14/2008	CC	11	12	3.9	74	7	ND	ND	ND	ND		
Silver	Silver Shadow	6/15/2008	CC	0.65	6.21	17.8	0	7.2	ND	49	9.27	ND		
Silver	Silver Shadow	6/26/2008	CC	0	4.04	10.8	0	7.1	ND	17	9.6	ND		
Silver	Silver Shadow	7/18/2008	CC	0.41	4.03	5.71	4.42	7.4	ND	5	8.4	ND		
Silver	Silver Shadow	7/28/2008	CC	0.45	6.84	7.25	3.61	7.4	ND	22	9.9	ND		
Silver	Silver Shadow	8/4/2008	CC	0	3.81	7.19	0	7.8	ND	19	11.3	ND		
Silver	Silver Shadow	8/7/2008	UA	0.6	54	10	58	6.8	8	99	8.1	ND		
Silver	Silver Shadow	8/23/2008	UA	0.18	42	7.4	8.4	7.1	ND	45	10.2	ND		
Silver	Silver Shadow	9/9/2008	CC	0.16	93	12	30	7	ND	64	5.9	ND		
Silver	Silver Shadow	9/10/2008	CC	0.17	73	10	6.4	7.2	ND	24	5.5	ND		

Explanation of color codes	
Exceedance of interim limits or Alaska Water Quality Standards if no interim limits	
Exceedance of long-term limits	
Discharging only treated graywater	
Non Discharger in Alaska in 2008	

Results from 2008 Discharge monitoring reports and attached sample results, all sample results taken while discharging and in Alaska

Ammonia interim (mg/L) 80.4	long term (mg/L) 2.9	Copper interim (ug/L) 66	long term (ug/L) 3.1
Nickel interim (ug/L) 180	long term (ug/L) 8.2	Zinc interim (ug/L) 230	long term (ug/L) 81
pH Minimum 6.5	Maximum 8.5	Biological oxygen demand (BOD) Maximum 60 mg/L Monthly Average 30 mg/L	
Fecal Coliform Maximum 43/ 100 ml		Monthly Average 14/ 100 ml	
Total Suspended Solids (TSS) Maximum 150 mg/L		Total Residual Chlorine Maximum 0.0075 mg/L	

Table 4: Semi-seasonal conventional parameters

Vessel	Sample Date	Chemical O ₂ Demand	Free Chlorine	Residual Chlorine	Conductivity	Hexane Extractable Material	Total Organic Carbon	Alkalinity	Nitrogen, Nitrate-Nitrite (as N)	Total Phosphorus	Total Kjeldahl Nitrogen	Total Settable Solids
	Detection Limit	10.00	0.10	0.10	2.00	5.00	1.00	2.00	1.00	0.05	1.00	
	Units	mg/l	mg/l	mg/l	umhos/cm	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Quality Standards		None	None	0.0075	None	None	None	None	None	None	None	None
Carnival Spirit	8/15/08	15	0	0	56.7	0	3.6	28.4	1.3	0	1.27	0
Carnival Spirit	9/12/08	25	0	0	51	0	3.3	26.4	2.2	0	2.18	0
Celebrity Milenium	7/28/08	78	0	0.1	5190	0	11	124	0	0.54	7.21	0
Ryndam	5/26/08	36	0	0	723	0	9.7	51	44	11	0	0
Ryndam	8/22/08	25	0	0	577	0	8.2	160	0	3.2	21	0
Statendam	6/23/08	62	0	0	912	0	18	240	0	2.4	18	0
Statendam	8/18/08	91	0	0	488	0	26	120	0	0	17	0
Veendam	5/21/08	59	0	0	863	0	24	300	0	6.6	13	0
Veendam	6/17/08	49	0	0	822	0	15	290	0.43	0.31	9.4	0
Veendam	7/22/08	36	0	0	841	0	11	220	0.13	0.22	9.1	0
Volendam	7/22/08	28	0	0	980	0	11	250	4.1	4.6	15	0
Volendam	8/27/08	55	0	0	843	0	15	100	0	6.2	28	0
Westerdam	6/4/08	140	0	0	1610	0	32	550	0	9.5	130	0
Westerdam	8/7/08	53	0	0	1200	0	18	380	0	12	82	0
Zaandam	6/11/08	35	0	0	631	0	10	230	0.55	0.4	29	0
Zaandam	8/15/08	39	0	0	869	0	15	340	0.0655	0.46	31	0
Coral Princess	5/23/08	75	0	0.19	1350	0	23	370	0	12	97	0
Coral Princess	7/28/08	80	0	0	1180	0	20	280	0.92	13	0.92	0
Dawn Princess	5/31/08	72	0	0	728	0	24	160	1.4	12	1.4	0
Dawn Princess	6/30/08	69	0	0	774	0	25	150	1.49	9.5	38	0
Diamond Princess	6/18/08	71	0	0	1330	0	17	460	5.33	11	130	0
Diamond Princess	9/10/08	68	0	0	1500	0	20	530	0	9.2	150	0
Golden Princess	5/15/08	30	0	0	822	0	16	63	24	8.9	35	0
Golden Princess	6/30/08	53	0	0	744	0	13	160	2.36	8.9	52	0
Island Princess	6/19/08	60	0	0	950	0	18	170	14	15	53	0
Island Princess	8/22/08	73	0	0	1270	0	20	360	0	9	110	0
Sapphire Princess	6/11/08	100	0	0	1340	0	14	350	0	11	100	0
Sapphire Princess	7/29/08	73	0	0	1160	0	22	400	0.531	9.5	110	0
Star Princess	5/28/08	91	0	0	3440	0	21	97	23	11	41	0
Star Princess	7/17/08	43	0	0	647	0	14	130	12	9.6	35	0
Sun Princess	8/15/08	160	0	0	1360	0	42	470	1.5	13	130	0
Norwegian Pearl	6/3/08	51	0	0	855	0	14	140	8	0	35	0
Norwegian Pearl	9/2/08	64	0	0	910	0	13	160	1.1	0	38	0
Norwegian Star	6/3/08	32	0	0	591	0	8.6	72	0	0	9.8	0
Norwegian Star	8/26/08	59	0	0	1190	0	12	130	0	0.26	33	0
Norwegian Sun	5/28/08	50	0	0	1110	0	32	120	1.6	0.29	47	0
Norwegian Sun	7/17/08	33	0	0	1160	0	8	130	0.43	0.25	40	0
Seven Seas Mariner	6/13/08	36	0	0	854	0	11	250	0	0.21	44	0
Seven Seas Mariner	8/16/08	33	0	0	653	0	11	190	0	0.39	13	0
Silver Shadow	8/7/08	1200	0	0	30200	0	1	63	0	0	1.5	0
Silver Shadow	8/23/08	540	0	0	21400	0	1.9	55	0	0	0.79	0
MAX		1200	0	0.19	30200	0	42	550	44	15	150	0
MIN		25	0	0	51	0	1	26.4	0	0	0	0
MEDIAN		59	0	0	855	0	14	160	0.531	3.2	28	0

Table 5: Full Suite Semi-seasonal Metal Sample Results

Vessel	Date	Antimony (TR)	Antimony dissolved	Arsenic (TR)	Arsenic dissolved	Cadmium (TR)	Cadmium dissolved	Chromium (TR)	Chromium dissolved	Copper (TR)	Copper diss	Lead (TR)	Lead, diss	Nickel (TR)	Nickel, diss	Selenium (TR)	Selenium, dissolved	Silver (TR)	Silver, diss	Thallium (TR)	Thallium, dissolved	Zinc (TR)	Zinc, diss	
AK Water Standards in ug/L					36		8.8		50		3.1		8.1		8.2		71		1.9				81	
Carnival Spirit	8/15/2008	0	0	0	0	0	0	0	0	1.15	0.847	0.124	0	0	0	1.44	0	0	0	0	0	5.79	7.76	
Carnival Spirit	9/12/2008	0	0	0	0	0	0	0.281	0.355	0.959	0.701	0	0	0.343	0	3.37	1.98	0	0	0	0	3.37	5.36	
Celebrity Millennium	7/28/2008	0	0	4.43	4.14	0	0	6.7	7.08	4.6	2.29	0	0	15.3	15.8	39.2	38.6	0	0	0	0	61.3	65.3	
Ryndam	5/26/2008	0	0	0	1.2	0	0	0	2	28	31	0	0	18	19	0	0	0	0	0	0	110	110	
Ryndam	8/22/2008	0.4	0.38	0.92	2.1	0	0	1.1	6.9	6.9	0.1	0.09	10	11	0.11	0.68	0.01	0	0.15	0	0	75	69	
Statendam	6/23/2008	0	0	1.2	2.3	0	0	0	2.4	0	0	0	0	12	13	0	0	0	0	0	0	0	1.7	
Statendam	8/18/2008	0.033	0.098	0	0	0	0	0	0.87	1.7	1.5	0.045	0.085	15	15	0	0	0	0.002	0.09	0.077	0	5.3	
Veendam	5/21/2008	0.26	0.4	0	1.1	0	0	0	0.94	8.4	8	0.61	0.1	11	12	0.63	0.37	0.027	0.029	0	0.1	59	63	
Veendam	6/17/2008	0	0	0	0	0	0	0	0	8.7	8.7	0	0	9.8	10	0	0	0	0	0	4.7	140	140	
Veendam	7/22/2008	0	0	0	0	0	0	0	0	4.5	4.1	0	0	10	10	0	0	0	0	0	0	0	74	71
Volendam	7/22/2008	0	0	2.5	0	0	0	0	1.2	2.8	4.9	0	0	9.7	10	1.1	0	0	0	0	0	48	60	
Volendam	8/27/2008	0.27	0.29	0.53	0	0	0	0	5.1	7.7	5.7	0	0.31	10	11	0	0.3	0	0	0	0	29	37	
Westerdam	6/4/2008	0	0.067	2.9	1.3	0	0	0	1.4	0.73	1	0	3.5	0	3.8	0.47	0.65	0.029	0.01	0.61	0	5.5	23	
Westerdam	8/7/2008	0.065	0.15	1.2	2	0	0	0	2.4	1.8	2.6	0.15	0.2	4	6.3	0	0	0.001	0	1.4	0.23	37	62	
Zaandam	6/11/2008	0	0	0	1.6	0	0	0	4.2	5.6	5.1	0	0	12	6.7	0	0	0	0	0	0	120	97	
Zaandam	8/15/2008	0.33	0.4	0.62	0	0	0	0.73	1.2	5.6	6.2	0.041	0.083	8.6	8.6	0	0	0.016	0.005	0.16	0.072	55	68	
Coral Princess	5/23/2008	0	0	1.9	2.4	0	0	0	0	17	17	1.9	1.9	8.9	9.5	0	1.1	0	0	0	1.4	160	170	
Coral Princess	7/28/2008	0	0	2.9	3.4	0	0	0	0	26	31	1.1	1.1	6.6	7.2	0	1.7	0	0	0	2.2	90	98	
Dawn Princess	5/31/2008	0.91	0.23	3.1	2.4	0	0	0	1.6	7.1	5.5	0.8	4.6	3.3	3.3	1.6	0	1.3	0	1	0.055	170	150	
Dawn Princess	6/30/2008	0	0	2.4	2.9	0	0	2.6	0	6.2	6	0	0	2.7	3	0	0	0	0	0	0	120	120	
Diamond Princess	6/18/2008	0	0	2.1	1.5	0	0	1.2	3.4	8.6	8.6	0	0	13	15	0	0	0	0	0	1.3	81	84	
Diamond Princess	9/10/2008	0.47	0.27	3.1	2.1	0.035	0	0	1	6	5.5	0.49	0	12	12	0.72	0.55	0.053	0.008	0.73	2.3	56	50	
Golden Princess	5/15/2008	0	0	0	2	0	0	0	0	7	8.3	0	0	0	6	0	1.1	0	0	0	1.9	130	180	
Golden Princess	6/30/2008	0	0	1.9	1.6	0	0	2.3	2.3	5.6	5.1	0	0	6.2	5.3	0	0	0	0	0	0	89	93	
Island Princess	6/19/2008	1.2	1.4	2.7	2.9	0	0	2.2	3.1	21	22	0	1	9	9.3	0	0	0	0	0	4	330	360	
Island Princess	8/22/2008	0.43	0.43	2.2	2.4	0	0	0	1.6	4	5.6	0.32	0.32	7.9	7.9	0.7	0.63	0	0	0	0.12	75	73	
Sapphire Princess	6/11/2008	0	0	1.2	2.4	0	0	0	6.2	85	51	0	0	29	24	0	0	0	0	0	0	65	60	
Sapphire Princess	7/29/2008	0	0	2.2	0	0	0	0	1.8	8.1	5.6	0	0	13	13	1.2	0	0	0	0	2.3	95	92	
Star Princess	5/28/2008	0	0	0	2.8	0	0	0	1.3	96	100	0	0	11	12	0	0	0	0	0	0	140	130	
Star Princess	7/17/2008	0	1.2	2.3	0	0	0	2.5	0	25	19	0	0	8.4	8.5	0	0	0	0	0	0	100	87	
Sun Princess	8/15/2008	0.54	0.6	1.9	1.5	0	0	0.58	1.3	13	14	0.49	0.66	8	9.1	0	0	0.016	0.007	0.8	0.11	92	150	
Norwegian Pearl	6/3/2008	0	0	0	2.7	0	0	0	2	6.2	5.7	0	0	0	4	0	0	0	0	0	0	74	67	
Norwegian Pearl	9/2/2008	0	0	2.3	2.2	0	0	0	4.3	8.7	8.5	0	0	4.3	3.8	0	0	0	0	0	0	67	73	
Norwegian Star	6/3/2008	0	0	0	1.7	0	0	0	0	0	1.5	0	0	8.9	8.9	0	0	0	0	0	3	30	26	
Norwegian Star	8/26/2008	0.35	0.28	2.7	1.8	0	0	0	0.71	3.6	4.6	1	1.6	11	11	0.51	0.15	0.006	0	0	1.7	64	94	
Norwegian Sun	5/28/2008	0	0	0	2.2	0	0	0	1.1	0	3.4	0	0	6.2	6.8	0	0	0	0	0	0	17	17	
Norwegian Sun	7/17/2008	0	1.5	2	2.1	0	0	0	0	6	5.1	0	0	4.5	4.4	0	0	0	0	0	2.4	8	3.9	
Seven Seas Mariner	6/13/2008	0	0	3	3.6	0	0	1.3	0	12	9.7	0	0	4.8	4.5	0	0	0	0	0	0	39	45	
Seven Seas Mariner	8/16/2008	0.23	0.38	2.1	2.1	0	0	0.61	1.4	3.6	4.7	0.09	0.17	3.6	3.8	0	0	0	0.004	0.071	0.051	39	47	
Silver Shadow	8/7/2008	0.22	0.45	34	22	0	0	0	1.4	52	54	0.18	0.31	4.9	10	0	0	0.011	0.021	0.45	0.95	3.3	58	
Silver Shadow	8/23/2008	0.25	0.23	36	15	0	0	0	0.78	46	42	0.13	0.095	4.2	7.4	14	5.9	0	0.007	0	0	3.9	8.4	

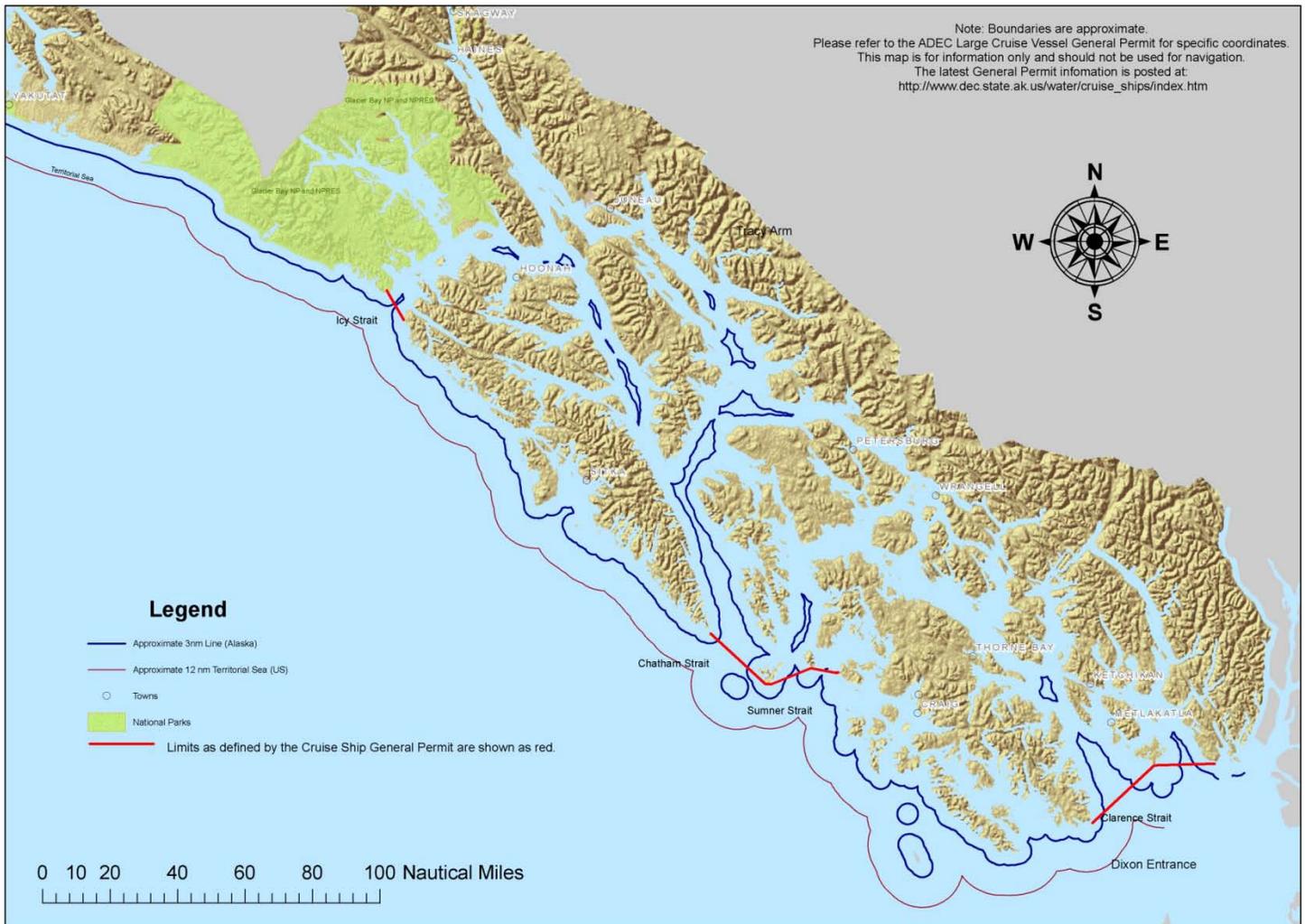
APPENDIX 3: SE ALASKA GP BOUNDARIES MAP

NOTE:

GP BOUNDARIES ARE THE BLUE LINES ON THE OUTER COAST AND THE THICK RED LINES BETWEEN THE ISLANDS OF THE ALEXANDER ARCHIPELAGO. THE "DOUGHNUT HOLES" (AREAS MORE THAN 3 MILES FROM SHORE, BUT INSIDE SE ALASKA) WERE CLOSED PRIOR TO THE ISSUANCE OF THE 2008 GENERAL PERMIT.

THE THIN RED LINES INDICATE THE 12NM BOUNDARY AND ARE USED FOR CERTAIN FEDERAL AND INTERNATIONAL LAWS.

CPVEC General Permit SE Alaska Boundaries



APPENDIX 4: USEFUL WEBSITES

Alaska Department of Environmental Conservation (ADEC) Cruise Ship Home Page

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

General Permit Authorizations by ADEC

http://www.dec.state.ak.us/water/cruise_ships/gp/Auth_08.html

2008 Large Cruise Ship General Permit

http://www.dec.state.ak.us/water/cruise_ships/gp/2008GP_Mod_CPVEC.pdf

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

EPA NPDES Vessel Discharges Page

http://cfpub.epa.gov/npdes/home.cfm?program_id=350