



2015 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 summary of the results of onboard sampling and laboratory testing of large cruise ship treated wastewater effluent in Alaska during 2015. This summary provides information on wastewater treatment sampled results obtained under the requirements of the [2014 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. This report does not include the results of receiving water and ambient water sampling taken in the harbors.

Thirty-two large cruise ships operated in Alaska in 2015, of those eighteen ships were authorized to discharge treated wastewater in Alaska, and seventeen ships discharged treated wastewater and conducted sampling. Table 1 lists large cruise ships in Alaska and their discharge status in 2015. No ships operated under the [2010 General Permit](#) in 2015.

2. INTRODUCTION

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

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

Sample result data for cruise ships has been collected by the Department of Environmental Conservation since 2000. Reports and summaries 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. Sampling may occur while underway or while docked. All samples were obtained in Southeast Alaska in 2015, with the majority of samples obtained in or near Juneau. The samples were taken according to requirements in the [2015 Cruise Line International Association North West and Canada Quality Assurance Project Plan for Sampling and Analysis of Treated Sewage and Graywater from Commercial Passenger Vessels](#) (QAPP). The QAPP specifies minimum requirements for sampling and analysis of wastewater. It includes a list of approved methods, sample collection requirements, and laboratory analysis requirements. Samplers must follow the QAPP and the [Vessel Specific Sampling Plan](#) (VSSP) for each cruise ship when collecting a sample. The number of required samples and what parameters measured

are required to be analyzed are listed in the 2014 General Permit and for the US Coast Guard in the QAPP. The Commercial Passenger Vessel Environmental Compliance (cruise ship) program spot checked results submitted by the cruise ship operators for compliance with the QAPP and checked all results for compliance with 2014 General Permit limits.

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 volatile organic compounds (VOCs) and base neutral acids (BNAs) are available on request. Sample results presented in this report only include data collected while a cruise ship was discharging in Alaska.

In the tables of results those values highlighted in red are exceedances of the 2014 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. Results below the method detection limit (MDL) are recorded as zero. 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).

Table 1: 2015 Large Cruise Ship Summary

2015 Large ¹ Commercial Passenger Vessel Discharge Status and Wastewater Treatment												
Vessel Operator	Vessel Name	Passenger Capacity ²	Voyage ³	Crew Capacity	Wastewater Treatment System	Permitted to discharge in Alaska in 2015 ⁴		Stationary Discharge Permitted?	Skagway Docks discharge permitted?			
						Underway	Stationary		Railroad	Dock	Broadway	
Carnival Cruise Lines	Carnival Legend	2124	17	Unknown	Unknown	N	N	None	No	No	No	
Celebrity Cruises	Celebrity Infinity	2170	14	Unknown	Unknown	N	N	None	No	No	No	
Celebrity Cruises	Celebrity Millennium	2449	17	Unknown	Unknown	N	N	None	No	No	No	
Celebrity Cruises	Celebrity Solstice	2145	20	Unknown	Unknown	N	N	None	No	No	No	
Crystal	Symphony	975	1	Unknown	Unknown	N	N	None	No	No	No	
Disney	Wonder	2524	15	920	Harmicrinity Separator	Y	N	None	No	No	No	
Holland America	Amsterdam	1380	17	Unknown	Unknown	N	N	None	No	No	No	
Holland America	Noordam	1916	20	Unknown	Unknown	N	N	None	No	No	No	
Holland America	Roaldam	1916	20	Unknown	Unknown	N	N	None	No	No	No	
Holland America	Statendam	1280	9	455	Scrub	Y	N	None	No	No	No	
Holland America	Vladimir	1422	20	647	Scrub	Y	Y	Yes	Yes	Yes	Yes	
Holland America	Westerdam	1916	21	Unknown	Unknown	N	N	None	No	No	No	
Holland America	Zeeland	1422	15	647	Scrub	Y	Y	Yes	Yes	Yes	Yes	
Norwegian Cruise Line	Norwegian Jewel	2376	20	1100	Scrubship	Y	Y	Yes	Yes	Yes	Yes	
Norwegian Cruise Line	Norwegian Pearl	2394	20	1100	Scrubship	Y	Y	Yes	Yes	Yes	Yes	
Norwegian Cruise Line	Norwegian Sun	1926	20	950	Scrubship	Y	Y	Yes	Yes	Yes	Yes	
NRK	Azura II	872	1	Unknown	Unknown	N	N	None	No	No	No	
Oceanic	Regatta	771	12	370	Trilon	Y	N	None	No	No	No	
Ponant	Le Azur	264	9	136	Rochem Bio-Fit	Y	Y	Yes	Yes	Yes	Yes	
Ponant	Le Soleal	264	1	Unknown	Unknown	N	N	None	No	No	No	
Ponant	Le Soleil	264	1	Unknown	Unknown	N	N	None	No	No	No	
Princess Cruise Line	Cora Princess	1926	20	900	Harmicrinity Separator	Y	N	None	No	No	No	
Princess Cruise Line	Crown Princess	2030	15	1190	Harmicrinity Separator	Y	Y	Graywater only	Yes	No	No	
Princess Cruise Line	Golden Princess	2636	13	1060	Harmicrinity Separator	Y	Y	Graywater only	Yes	No	No	
Princess Cruise Line	Grand Princess	2636	15	1100	Harmicrinity Separator	Y	Y	Graywater only	No	No	No	
Princess Cruise Line	Pacific Princess	870	16	370	Harmicrinity Separator	Y	Y	Graywater only	Yes	No	No	
Princess Cruise Line	Ruby Princess	2034	20	1201	Harmicrinity Separator	Y	Y	Graywater only	No	No	No	
Princess Cruise Line	Silver Princess	2630	15	1150	Harmicrinity Separator	Y	Y	Graywater only	No	No	No	
Prestige Cruises	Seven Seas Navigator	544	17	250	Scrubship	Y	N	None	No	No	No	
Royal Caribbean Cruises	Jewel of the Seas	2502	17	Unknown	Unknown	N	N	None	No	No	No	
Royal Caribbean Cruises	Radiance of the Seas	2502	16	Unknown	Unknown	N	N	None	No	No	No	
Silver Seas	Silver Shadow	393	19	208	Bio Sphere/Merican	Y	N	None	No	No	No	
		Totals	467									

Vessels highlighted in gray in the above table did not discharge wastewater in Alaskan waters in 2015.
¹ A large vessel has overnight accommodations for 250 or more passengers.
² Capacity is the number of lower berths and is calculated from Registration, Vessel Specific Sampling Plan, or Notice of Intent. Actual number of passengers aboard varies.
³ Alaska water includes the Alexander Archipelago and extends 3 miles from the coastline.
⁴ Discharge allowed unless another ship is discharging at the One Dock.

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

Vessel	Sample Date	E. coli	Chemical O ² Demand	Hexane Extractable Material	Total Organic Carbon	Alkalinity	Hardness	Nitrite/Nitrate as N	Total Phosphorus	Total Kjeldahl Nitrogen	Total Settable Solids
	Detection Limit										
	Units	/100ml	mg/l	mg/l	mg/l	mg/l	mg/L	mg/L	mg/l	mg/l	ml/l
Disney Wonder	6/12/15	0	18	0	13	120	41	0	0.72	15	0
Disney Wonder	8/7/15	0	44	0	15	300	57	0	0.8	79	0
Statendam	6/6/15	0	38	0	11	82	28	0.78	4.5	1.8	0
Statendam	8/15/15	0	35	0	13	200	50	0	7.9	33	0
Volendam	6/5/15	0	21	0	9.1	140	27	0.14	4.1	8.3	0
Volendam	7/17/15	0	25	0	8.6	120	27	1.7	3.8	11	0
Zaandam	6/17/15	0	27	0	12	250	34	0	1.5	71	0
Zaandam	8/6/15	0	24	0	8.6	160	39	0.29	0	41	0
Norwegian Jewel	6/2/15	8.4	43	0	15	130	70	0	0	39	0
Norwegian Jewel	8/4/15	0	57	0	16	68	64	0	0	2.2	0
Norwegian Pearl	6/2/15	6.3	37	0	14	140	78	0	0	44	0
Norwegian Pearl	9/15/15	24.9	63	0	23	78	36	0	2.4	21	0
Norwegian Sun	5/22/15	72.8	59	0	17	120	22	0	0.32	35	0
Norwegian Sun	7/9/15	0	40	0	15	130	26	0	0	44	0
Vessel	Sample Date	E. coli	Chemical O ² Demand	Hexane Extractable Material	Total Organic Carbon	Alkalinity	Hardness	Nitrite/Nitrate as N	Total Phosphorus	Total Kjeldahl Nitrogen	Total Settable Solids
	Detection Limit										
	Units	/100ml	mg/l	mg/l	mg/l	mg/l	mg/L	mg/L	mg/l	mg/l	ml/l
L'Austral	6/20/15	0	36	0	14	200	69	11	6.2	55	0
L'Austral	7/18/15	0	23	0	7.4	190	18	0	4.2	40	0
Coral Princess	5/24/15	0	52	6	16	100	180	0	11	17	0
Coral Princess	8/16/15	0	52	0	17	68	57	9.7	11	15	0
Crown Princess-GW	6/15/15	0	27	0	11	70	15	0	0	0.85	0
Crown Princess-GW	8/3/15	0	50	0	17	74	22	0	0	5.1	0
Crown Princess	6/16/15	0	43	0	15	72	16	0	0	3.1	0
Crown Princess	8/4/15	0	39	0	12	450	42	0	0.8	35	0
Golden Princess- GW	6/4/15	0	22	0	6.1	40	18	1.7	0	0.56	0
Golden Princess- GW	8/4/15	0	95	0	29	46	11	0	0.33	6.6	0
Golden Princess	6/15/15	0	52	0	18	350	12	0	0.67	25	0
Golden Princess	8/5/15	2	160	0	71	350	26	0.27	23	510	0
Grand Princess-GW	5/20/15	0	22	0	6.2	50	38	0.7	0	2.1	0
Grand Princess-GW	8/12/15	0	16	0	7.2	62	170	0.47	0	1.6	0
Grand Princess	5/20/15	0	65	0	7.7	400	73	1.8	5.6	71	0
Grand Princess	8/12/15	0	50	0	13	300	130	0.26	8.7	72	0
Vessel	Sample Date	E. coli	Chemical O ² Demand	Hexane Extractable Material	Total Organic Carbon	Alkalinity	Hardness	Nitrite/Nitrate as N	Total Phosphorus	Total Kjeldahl Nitrogen	Total Settable Solids
	Detection Limit										
	Units	/100ml	mg/l	mg/l	mg/l	mg/l	mg/L	mg/L	mg/l	mg/l	ml/l
Pacific Princess-GW	6/18/15	0	25	0	7.5	30	59	12	4.3	2.3	0
Pacific Princess-GW	8/7/15	0	35	0	11	66	57	29	1.6	6.1	0
Pacific Princess	6/19/15	0	41	0	13	98	58	12	9.5	30	0
Pacific Princess	8/7/15	0	49	0	18	180	64	30	9.4	63	0
Ruby Princess-GW	5/13/15	0	55	0	22	58	10	0	0.25	0.76	0
Ruby Princess-GW	7/22/15	4.1	22	0	6	38	43	0.6	0.27	0.76	0
Ruby Princess	5/14/15	13.4	110	0	22	86	67	40	8.4	44	0
Ruby Princess	7/23/15	0	36	0	9.5	200	45	16	0.33	44	0
Star Princess-GW	6/10/15	0	43	7.1	12	110	20	0	0	11	0
Star Princess-GW	7/22/15	0	92	0	30	78	24	0	0.39	6.7	0
Star Princess	6/10/15	0	56	0	18	200	23	0	0.95	41	0
Star Princess	7/22/15	0	63	0	15	77	18	0	0	3.6	0
Regatta-Port	6/1/15	6	166		35	74	490	170	38	47	0
Regatta-Port	8/6/15	0	41	0	12	88	320	43	1	0	0
Seven Seas Navigator	5/24/15	5.2	70	0	19	170	30	0	0.27	57	0
Seven Seas Navigator	7/18/15	0	85	0	32	150	22	0	0	42	0
	MAX	72.8	166	7.1	71	450	490	170	38	510	0
	MIN	0	16	0	6	30	10	0	0	0	0
	MEDIAN	0	43	0	14.5	105	38.5	0	0.695	19	0
	Parameter not sampled										
	Non-detects set to zero or ND										

Table 5: Full Suite Semi-seasonal Metal Sample Results

Vessel	Date	Antimony (TR)	Antimony dissolved	Arsenic (TR)	Arsenic dissolved	Beryllium (TR)	Beryllium dissolved	Cadmium (TR)	Cadmium dissolved	Chromium (TR)	Chromium diss	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	6/12/15	0	0	0	0	0	0	0	0	0	0	24	3.8	1.6	0	0	18	17	1.3	1.4	0	0	0	0	300	190	
Disney Wonder	8/7/15	3.7	5	1.6	1.2	0	0	0	0	1.2	1.4	3.8	3.4	2.3	2.5	0	17	18	2.2	2.3	0	0	0	0	270	290	
Statendam	6/6/15	0	0	0	1	0	0	0	0	0	0	2.1	2.2	0	0	0	20	19	2.1	2.4	0	0	0	0	33	34	
Statendam	8/15/15	0	0	0	1.7	0	0	0	0	2.7	2.6	2.2	2.3	0	0	0	28	28	3.7	5.8	0	0	0	0	4.9	6	
Volendam	6/5/15	0	0	0	0	0	0	0	0	0	0	3.8	4.8	0	0	0	8.1	9.8	2.3	2.7	0	0	0	0	71	75	
Volendam	7/17/15	0	0	0	0	0	0	0	0	0	0	3.9	3.7	0	0	0	11	11	1.4	0	0	0	0	0	97	100	
Zaandam	6/17/15	0	0	0	0	0	0	0	0	0	0	1.5	1.5	0	0	0	6.1	6.1	2	2	0	0	0	0	34	42	
Zaandam	8/6/15	0	0	1.1	1	0	0	0	0	1	1.1	7.2	5.9	0	0	0	6.8	7.2	2.6	3.3	0	0	0	0	60	61	
Norwegian Jewel	6/2/15	0	0	0	0	0	0	0	0	0	0	1.6	1.3	0	0	0	6.9	7.3	0	0	0	0	0	0	48	49	
Norwegian Jewel	8/4/15	0	0	0	0	0	0	0	0	0	0	7	4.7	0	0	0	5.6	9	0	0	0	0	0	0	71	70	
Norwegian Pearl	6/2/15	0	0	0	0	0	0	0	0	0	0	3.6	3.2	0	0	0	4.7	4.9	1.9	1.5	0	0	0	0	71	71	
Norwegian Pearl	9/15/15	0	0	0	0	0	0	0	0	0	0	2.1	1.5	0	0	0	6.5	6.7	0	0	0	0	0	0	65	67	
Norwegian Sun	5/22/15	0	0	0	0	0	0	0	0	0	0	5.2	3.4	0	0	0	29	29	0	0	0	0	0	0	80	81	
Norwegian Sun	7/9/15	0	0	0	0	0	0	0	0	0	0	3.7	3.7	0	0	0	9.1	9.2	0	0	0	0	0	0	52	64	
Ponant	6/20/15	1	1.4	1.5	1.3	0	0	0	0	1.2	1.2	17	15	0	0	0	7.8	7.7	2.3	2.1	0	0	0	0	220	220	
Ponant	7/18/15	0	0	0	0	0	0	0	0	1.1	0	7.5	3.7	0	0	0	5.3	5	1.2	0	0	0	0	0	73	57	
Coral Princess	5/24/15	0	0	2.8	3.4	0	0	0	0	0	0	9.4	8.2	0	0	0	8.9	9.2	6.2	8.1	0	0	0	0	49	52	
Coral Princess	8/16/15	0	1.5	0	0	0	0	0	0	1.7	1.5	18	17	0	0	0	11	10	1.5	1.9	0	0	0	0	65	66	
Crown Princess-GW	6/15/15	0	0	0	0	0	0	0	0	0	0	2.7	2.3	0	0	0	9.7	9.7	0	0	0	0	0	0	16	18	
Crown Princess-GW	8/3/15	0	1.3	0	0	0	0	0	0	0	0	3.8	1.9	0	0	0	11	12	2.4	2.6	0	0	0	0	44	41	
Crown Princess	6/16/15	0	0	0	0	0	0	0	0	0	0	2.6	2.4	0	0	0	12	12	0	0	0	0	0	0	20	24	
Crown Princess	8/4/15	0	0	0	0	0	0	0	0	0	0	2.5	3.9	0	0	0	13	14	3.1	3	0	0	0	0	47	46	
Golden Princess- GW	6/4/15	0	0	0	0	0	0	0	0	0	0	9.5	8.6	0	0	0	4.9	4.9	0	0	0	0	0	0	90	97	
Golden Princess- GW	8/4/15	0	0	0	0	0	0	0	0	0	0	1.4	1.4	0	0	0	11	12	0	0	0	0	0	0	31	31	
Golden Princess	6/15/15	0	0	0	0	0	0	0	0	0	0	7.2	10	0	0	0	5.6	6	0	0	0	0	0	0	87	98	
Golden Princess	8/5/15	0	0	1.7	1.3	0	0	0	0	1.1	1.2	8.2	7.8	0	0	0	9.3	9.5	2	0	0	0	0	0	57	53	
Grand Princess-GW	5/20/15	0	0	0	0	0	0	0	0	1.7	1.7	1.4	1.3	0	0	0	11	11	1.7	0	0	0	0	0	15	17	
Grand Princess-GW	8/12/15	0	0	1.2	0	0	0	0	0	1.2	0	3.8	0	0	0	0	11	12	5.5	6.2	0	0	0	0	28	27	
Grand Princess	5/20/15	0	0	0	1.7	0	0	0	0	1.9	1.8	2.3	6	0	0	0	12	12	1.4	2.6	0	0	0	0	23	59	
Grand Princess	8/12/15	0	0	1.1	0	0	0	0	0	2.5	0	3.2	0	0	0	0	14	14	3.7	5.2	0	0	0	0	35	35	
Pacific Princess-GW	6/18/15	0	0	0	0	0	0	0	0	0	0	45	46	0	0	0	16	17	1.7	1.8	0	0	0	0	87	90	
Pacific Princess-GW	8/7/15	0	0	0	0	0	0	0	0	0	0	17	17	0	0	0	23	23	1.9	1.8	0	0	0	0	130	140	
Pacific Princess	6/19/15	0	0	0	0	0	0	0	0	0	0	27	25	0	0	0	15	14	1.2	1.2	0	0	0	0	73	70	
Pacific Princess	8/7/15	0	0	1.1	0	0	0	0	0	0	0	14	9.2	0	0	0	17	17	2	2.3	0	0	0	0	81	81	
Ruby Princess-GW	5/13/15	0	0	0	0	0	0	0	0	0	0	9	8	0	0	0	7.9	7.5	0	0	0	0	0	0	74	85	
Ruby Princess-GW	7/22/15	0	0	0	1.1	0	0	0	0	1.6	1.5	8.9	9	0	0	0	7	7.3	2.7	3.8	0	0	0	0	110	110	
Ruby Princess	5/14/15	0	0	1.6	0	0	0	0	0	1.3	0	20	13	0	1.1	0	8.3	7.9	2.3	1.2	0	0	0	0	120	100	
Ruby Princess	7/23/15	0	1.1	1.1	1.2	0	0	0	0	1.6	1.5	12	12	0	0	0	7.2	7.1	3.2	3.9	0	0	0	0	97	110	
Star Princess-GW	6/10/15	0	0	0	0	0	0	0	0	0	0	3.2	2.9	0	0	0	14	14	0	0	0	0	0	0	68	69	
Star Princess-GW	7/22/15	0	0	0	0	0	0	0	0	1.7	1.8	2	1.8	0	0	0	15	15	0	0	0	0	0	0	20	21	
Star Princess	6/10/15	0	0	0	1.1	0	0	0	0	0	0	3.3	2.6	0	0	0	14	14	2.1	2.7	0	0	0	0	71	52	
Star Princess	7/22/15	0	0	0	0	0	0	0	0	1.5	1.4	1.7	1.7	0	0	0	15	15	0	0	0	0	0	0	20	22	
Regatta-Port	6/1/15	0	0	9.4	7.1	0	0	0	0	0	0	94	76	0	0	0	15	15	18	17	0	0	0	0	140	130	
Regatta-Port	8/6/15	0	0	6.4	6.3	0	0	0	0	0	0	26	18	0	0	0	21	20	16	18	0	0	0	0	52	44	
Seven Seas Navigator	5/24/15	0	0	1.2	1.2	0	0	0	0	0	0	1.6	6.9	4.2	0	4.5	0	8.2	8.5	0	1.1	0	0	0	0	74	78
Seven Seas Navigator	7/18/15	0	0	1.9	1.8	0	0	0	0	0	0	5	2.5	0	0	0	7.6	7.8	0	0	0	0	0	0	34	33	
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/2015_CLIA-NWC_QAPP.pdf

2014 Large Cruise Ship General Permit

http://dec.alaska.gov/water/cruise_ships/gp/2014gp.html

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 and summaries from prior years

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