

2007 Large Ship Wastewater Continued Compliance Samples for Continuous Discharge Certification by the United States Coast Guard

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U.S. Congress enacted Title XIV – Certain Alaskan Cruise Ship Operations on December 21, 2000. Under this federal legislation, large¹ cruise ships may discharge treated sewage (blackwater)² and graywater³ in Alaska while underway⁴ if the discharge meets the standards found in Table 1.

The federal law also allows continuous discharge of blackwater and graywater that meet more stringent standards (Table 1). Ship owner/operators have installed advanced wastewater treatment systems on their vessels to meet the more stringent standards. A ship owner/operator must submit to the U.S. Coast Guard (USCG) five sample results from representative samples taken on different days within 30 consecutive days that meets the more stringent requirements. If the conditions are met, the USCG issues a continuous discharge letter, which allows ships to discharge continuously including times when the ship is at anchor. A ship approved by the U.S. Coast Guard to discharge continuously must sample their wastewater twice per month to maintain this approval.

In 2001, a new state law sets standards and sampling requirements for the underway discharge of blackwater in Alaska that were identical to the blackwater standards in the federal law (Table 1). During an underway discharge, blackwater effluent under the federal standards must contain no more than 200 fecal coliform per 100 ml and no more than 150 mg/l total suspended solids. There are currently no federal effluent standards for underway graywater discharges.⁵ Because of the high fecal coliform counts detected in graywater during 2000, the state law also set graywater standards (Table 1). Ships that discharge blackwater in Alaska while underway must take at least two blackwater samples per cruise ship season to fulfill federal requirements. Alaska state law requires ships that discharge in Alaska to take two samples of both blackwater and graywater.

In 2006 Alaska voters passed Ballot Measure 2⁶. This new law required large cruise ships that discharge wastewater in Alaska to obtain a general permit that set limits at Alaska Water Quality standards at the point of discharge. In 2007, large cruise ships operated under a Compliance Order by Consent (COBC) that allowed ships to discharge under existing federal and state legislation until an Alaska General Permit was released. The large cruise ship General Permit was issued March 25, 2008.

¹ 500+ overnight passengers, the state defines large as 250+ overnight passengers

² wastewater from toilets

³ wastewater from galley, sinks and showers and laundry

⁴ Traveling at least 6 knots while at least 1 nautical mile from shore.

⁵ The Administrator of the EPA may promulgate different wastewater effluent standards in the future.

⁶ http://www.dec.state.ak.us/water/cruise_ships/Law_and_Regs/index.htm

Table 1. Summary Comparison of 2007 Federal and Alaska standards

		Law	
		State	Federal ⁷
Underway	# of Overnight Passengers	250+	500+
		Blackwater and Graywater	“Blackwater” Only
	Fecal Coliform bacteria (FC/100ml)	Geometric Mean of 200*	200
	Total Suspended Solids (mg/L)	150	150
Continuous Discharge		Blackwater and Graywater	“Blackwater” Only
	Fecal coliform bacteria (FC/100ml)	Refers to federal law*	Geometric mean of 20
	Total Suspended Solids (mg/L)		30 (30 day average)
	Total Residual Chlorine		10 ug/L (0.010 mg/L)

* Prior to Cruise Ship GP issued in 2008.

The ADEC’s *Assessment of Cruise Ship and Ferry Wastewater Impacts in Alaska* (January 2004), located on the State website at http://www.state.ak.us/dec/water/cruise_ships/assessreport04.htm, Section 6 contains detailed information on the advanced systems that treat wastewater discharged into Alaska water. There are four main systems installed on large cruise ships operating in Alaska waters. Table 2 compares the calculated medians⁸ from the continued compliance sampling results of each advanced wastewater treatment system.

Table 2. Comparison of Advanced Treatment System Medians

Number of Samples =	pH	BOD ⁷	TSS	Fecal Coliform	Total Chlorine Residual	Free Chlorine Residual
Treatment (number of samples)		mg/L	mg/L	FC/100 ml	mg/L	mg/L
Scanship (43)	6.88	6.73	5	0	0	0
Rochem (27)	7.33	5.58	0	0	0	0
Hamworthy (90)	7.71	2.48	0	0	0	0
Zenon (43)	7.54	0	0	0	0	0

The following tables include all the 2007 continuous compliance sampling results. Continuous discharge sample results highlighted in yellow indicate that the parameter exceeded the continuous discharge limits and the ship was discharging in Alaska waters. Not all vessels that submitted continuous compliance sample results discharged in Alaska waters. Some samples were taken outside of Alaska.

⁷ Full federal regulations can be found under [33 CFR 159.309](#) and [40 CFR 133.102](#).

⁸ The median is the middle of a distribution: half the scores are above the median and half are below the median. The median is less sensitive to extreme scores than an average and is thus a better measure for skewed distributions.

Table 3. Scanship System's 2007 Continuous Discharge Sample Results

VESSEL	Sample Date	pH	Biochemical Oxygen Demand	Total Suspended Solids	Fecal Coliform Bacteria	Chlorine, Residual	Chlorine, Free
	Units	SU	mg/L	mg/L	FC/100 ml	mg/L	mg/L
Norwegian Pearl	5/13/07	6.3	12	7	0	0	0
Norwegian Pearl	5/29/07	6.56	16.1	0	0	0	0
Norwegian Pearl	6/3/07	8	7	44	7	0	0
Norwegian Pearl	6/19/07	7.04	18	5	0	0	0
Norwegian Pearl	7/8/07	6.4	9	5	0	0	0
Norwegian Pearl	8/5/07	6.4	14	40	0	0	0
Norwegian Pearl	8/21/07	7.67	5.98	4	0	0	0
Norwegian Pearl	9/2/07	6.6	5	0	0	0	0
Norwegian Pearl	9/11/07	7.56	2.09	8	0	0	0
Norwegian Star	5/5/07	6.4	11	6	4	0	0
Norwegian Star	5/15/07	6.97	7.97	0	0	0	0
Norwegian Star	5/29/07	6.56	16.1	0	0	0	0
Norwegian Star	6/2/07	6.7	22	5	2	0	0
Norwegian Star	6/19/07	6.88	3.08	0	0	0	0
Norwegian Star	7/7/07	6.9	6	5	0	0	0
Norwegian Star	7/10/07	6.63	5.94	6	0	0	0
Norwegian Star	8/4/07	6.5	11	5	0	0	0
Norwegian Star	8/21/07	7.29	4.3	0	0	0	0
Norwegian Star	9/1/07	6.2	4	0	0	0	0
Norwegian Star	9/11/07	7.34	18	9	0	0	0
Norwegian Sun	5/16/07	6.93	6.37	4	0	0	0
Norwegian Sun	5/23/07	7.5	7.79	0	0	0	0
Norwegian Sun	6/6/07	7.18	8.65	6	2	0.11	0
Norwegian Sun	6/27/07	7.23	9.61	0	0	0	0
Norwegian Sun	7/18/07	6.94	6.73	4	48	0	0
Norwegian Sun	7/25/07	6.79	10.2	9	0	0.11	0
Norwegian Sun	8/8/07	7.13	11.3	0	0	0	0
Norwegian Sun	8/15/07	7.52	7.28	0	0	0	0
Norwegian Sun	9/5/07	6.98	4.13	0	0	0	0
Norwegian Sun	9/12/07	7.17	6.79	0	0	0	0
Serenade of the Seas*	4/7/07	7.02	24	7	70	0	0
Serenade of the Seas	4/14/07	6.9	3	8	4	0	0
Serenade of the Seas	5/19/07	7.06	0	6	0	0	0
Serenade of the Seas	5/26/07	6.8	0	6	2	0	0
Serenade of the Seas	6/2/07	6.76	0	3	0	0	0
Serenade of the Seas	6/9/07	7.64	0	3	7	0	0
Serenade of the Seas	7/14/07	6.53	0	7	7	0	0
Serenade of the Seas	7/21/07	6.7	0	5	20	0	0
Serenade of the Seas	8/11/07	6.6	0	4	8	0	0
Serenade of the Seas	8/18/07	6.65	0	6	13	0	0
Serenade of the Seas	9/8/07	6.62	0	5	0	0	0
Serenade of the Seas	9/15/07	6.75	0	4	0	0	0
Serenade of the Seas	10/1/07	6.7	13	12	2	0	0
	Minimum	6.20	0.00	0	0	0.00	0.00
	Maximum	8.00	24.00	44	70	0.11	0.00
	Median	6.88	6.73	5	0	0.00	0.00

0= No detection

* Note: Serenade of the Seas did not discharge in Alaska waters in 2007.

Table 4. Rochem System's 2007 Continuous Discharge Sample Results

VESSEL	Sample Date	pH	Biochemical Oxygen Demand	Total Suspended Solids	Fecal Coliform Bacteria	Chlorine, Residual	Chlorine, Free
	Units		mg/L	mg/L	FC/100 ml	mg/L	mg/L
Carnival Spirit	5/11/07	7.28	12.4	0	0	0.0	0.0
Carnival Spirit	5/26/07	7.33	10.3	0	0	0.0	0.0
Carnival Spirit	6/23/07	7.38	11.00	0	0	0.0	0.0
Carnival Spirit	6/30/07	7.14	14.60	0	0	0.0	0.0
Carnival Spirit	7/14/07	7.08	18.10	0	0	0.0	0.0
Carnival Spirit	7/21/2007	7.11	18.7	0	0	0.0	0.0
Carnival Spirit	8/4/08	7.35	4.85	0	0	0.0	0.0
Carnival Spirit	8/18/08	7.94	15.60	0	0	0.0	0.0
Carnival Spirit	9/1/07	7.33	11.20	0	0	0.0	0.0
Carnival Spirit	9/7/07	7.22	6.30	0	0	0.0	0.0
Mercury	5/11/07	7.23	0.00	0	0	0.0	0.0
Mercury *	5/18/07	5.85	0.00	0	0	0.0	0.0
Mercury	6/1/07	7.50	0.00	0	0	0.0	0.0
Mercury	6/8/07	7.54	0.00	0	0	0.0	0.0
Mercury	7/13/07	7.17	0.00	0	0	0.0	0.0
Mercury	7/20/07	7.40	0.00	0	0	0.0	0.0
Mercury *	8/10/07	9.78	0.00	0	0	0.0	0.0
Mercury	8/17/07	6.80	0.00	0	0	0.0	0.0
Mercury	9/7/07	7.05	0.00	0	0	0.0	0.0
Mercury	9/14/07	6.50	0.00	0	0	0.0	0.0
Mercury	10/13/07	7.00	0.00	0	0	0.0	0.0
Noordam	7/8/07	7.40	16.00	0	2	0.0	0.0
Noordam	7/18/07	7.68	0.00	0	0	0.0	0.0
Noordam	8/5/07	7.10	23.00	0	0	0.0	0.0
Noordam	8/15/07	7.88	18.30	0	0	0.0	0.0
Noordam	9/19/08	7.40	2.87	0	0	0.0	0.0
Oosterdam	7/7/07	7.70	12.00	2	0	0.0	0.0
Oosterdam	9/10/07	7.37	20.90	4	0	0.0	0.0
	Minimum	5.85	0.00	0	0	0.0	0.0
	Maximum	9.78	23.00	4	2	0.0	0.0
	Median	7.33	5.58	0	0	0.0	0.0

0= No detection

* Note: Mercury did not discharge in Alaska waters in 2007.

Table 5. Hamworthy System's 2007 Continuous Discharge Sample Results

Vessel	Sample Date	pH	Biochemical Oxygen Demand	Total Suspended Solids	Fecal Coliform Bacteria	Chlorine, Residual	Chlorine, Free
	Units		mg/L	mg/L	FC/100 ml	mg/L	mg/L
Coral Princess	4/18/07	6.93	0	0	0	0	0
Coral Princess	5/21/07	7.35	0	0	0	0	0
Coral Princess	5/31/07	7.67	0	0	0	0	0
Coral Princess	6/7/07	7.03	0	0	0	0.1	0
Coral Princess	6/21/07	7.71	2.96	0	0	0	0
Coral Princess	7/13/07	7.65	7.11	0	0	0	0
Coral Princess	8/10/07	7.7	0	0	0	0	0
Coral Princess	8/24/07	7.7	3.45	0	0	0	0
Coral Princess	9/7/07	7.63	3.56	0	0	0	0
Coral Princess	9/13/07	7.94	10.8	0	0	0.12	0
Dawn Princess	5/15/07	7.62	0	0	0	0	0
Dawn Princess	5/25/07	7.49	7.32	0	24	0	0
Dawn Princess	5/31/07	7.3	0	0	0	0	0
Dawn Princess	6/14/07	7.77	0	0	0	0	0
Dawn Princess	7/5/07	7.55	0	0	0	0	0
Dawn Princess	7/24/07	7.79	0	0	0	0	0
Dawn Princess	8/3/07	7.57	0	0	0	0	0
Dawn Princess	8/14/07	8.07	4.05	0	0	0	0
Dawn Princess	9/2/07	7.79	0	0	0	0	0
Dawn Princess	9/13/07	7.17	4.09	0	2	0	0
Diamond Princess	4/7/07	7.87	8	0	0	0	0
Diamond Princess	5/15/07	7.89	0	0	0	0	0
Diamond Princess	6/6/07	7.91	0	0	0	0	0
Diamond Princess	6/12/07	7.8	2.64	0	0	0	0
Diamond Princess	7/10/07	7.63	0	0	2	0	0
Diamond Princess	7/18/07	7.74	0	0	2	0	0
Diamond Princess	8/7/07	7.94	8.49	0	0	0	0
Diamond Princess	8/15/07	8.17	20.3	0	0	0	0
Diamond Princess	9/4/07	7.98	8.31	2	10	0	0
Diamond Princess	9/12/07	7.95	14.5	0	16	0	0
Golden Princess	4/22/07	6.9	7	0	0	0	0
Golden Princess *	5/7/07	7.48	47.9	18	200	0	0
Golden Princess	5/10/07	7.03	2.48	3	6	0	0
Golden Princess	5/12/07	7.4	4	5	4	0	0
Golden Princess	6/2/07	7.4	10	0	2	0	0
Golden Princess	6/18/07	6.25	5.33	0	0	0	0
Golden Princess	7/2/07	7.74	16.2	6	0	0	0
Golden Princess	7/7/07	6.8	20	7	0	0	0
Golden Princess	8/4/07	6.9	11	0	0	0	0
Golden Princess	8/6/07	7.59	9.39	0	0	0	0
Golden Princess	9/1/07	7.3	18	5	0	0	0
Golden Princess	9/3/07	7.73	0	3	0	0	0
Island Princess	5/16/07	7.58	0	0	0	0	0
Island Princess	5/25/07	7.14	0	0	0	0	0
Island Princess	6/8/07	7.63	0	0	2	0	0
Island Princess	6/22/07	7.76	0	0	0	0.11	0
Island Princess	7/6/07	7.73	0	0	0	0.11	0
Island Princess	7/12/07	7.71	2.95	7	0	0	0
Island Princess	8/9/07	7.3	0	0	0	0	0
Island Princess	8/17/07	7.73	0	0	0	0	0
Island Princess	9/6/07	7.57	0	0	0	0	0
Island Princess	9/14/07	7.01	0	0	0	0	0
Pacific Princess	5/27/07	8.44	11	9	0	0	0
Pacific Princess*	5/30/07	8.49	2	32	0	0.21	0
Pacific Princess	6/9/07	7.95	3.99	0	0	0.12	0
Pacific Princess	6/17/07	7.98	4.63	0	8100	0	0
Pacific Princess	6/24/07	7.78	3.44	0	0	0	0
Pacific Princess	7/1/07	7.87	0	0	0	0.98	0.22
Pacific Princess	8/4/07	7.97	16.3	0	0	0	0
Pacific Princess	8/12/07	7.87	4.73	0	0	0	0
Pacific Princess	9/1/07	7.71	9.74	0	10	0	0
Pacific Princess	9/9/07	7.43	5.1	0	0	0	0

* Note: This vessel was not discharging in Alaska waters at time of sample.

Table 6. Zenon System's 2007 Continuous Discharge Sample Results

Vessel	Sample Date	pH	Biochemical Oxygen Demand	Total Suspended Solids	Fecal Coliform Bacteria	Chlorine, Residual	Chlorine, Free
	Units		mg/L	mg/L	FC/100 ml	mg/L	mg/L
Infinity	5/9/07	7.30	5.00	0	0	0.00	0.00
Infinity	5/10/07	7.40	0.00	0	0	0.00	0.00
Infinity *	6/3/07	7.31	0.00	0	33	0.00	0.00
Infinity	6/17/07	7.38	0.00	0	7	0.00	0.00
Infinity *	6/24/07	7.11	0.00	0	47	0.00	0.00
Infinity	7/1/07	7.40	0.00	0	0	0.00	0.00
Infinity	7/8/07	7.13	0.00	0	0	0.00	0.00
Infinity	7/15/08	7.27	0.00	0	0	0.00	0.00
Infinity	7/22/07	6.98	0.00	0	0	0.00	0.00
Infinity	7/29/07	6.84	0.00	0	0	0.00	0.00
Infinity	8/12/07	6.94	0.00	0	0	0.00	0.00
Infinity	8/19/07	6.93	0.00	0	0	0.00	0.00
Infinity	9/9/07	7.22	0.00	0	0	0.00	0.00
Infinity	9/16/07	7.30	0.00	2	0	0.00	0.00
Infinity *	9/27/07	7.10	5.00	0	0	0.14	0.02
Ryndam	5/8/07	7.35	0.00	0	0	0.0	0.00
Ryndam	5/24/07	6.89	0.00	0	0	0.0	0.00
Ryndam	6/13/07	7.32	0.00	0	0	0.0	0.00
Ryndam	6/27/07	7.84	0.00	0	0	0.0	0.00
Ryndam	7/11/07	7.07	0.00	0	0	4.8	0.42
Ryndam	7/25/07	7.69	0.00	0	0	0.0	0.00
Ryndam	8/8/07	7.87	0.00	0	0	0.0	0.00
Ryndam	8/16/07	8.19	0.00	0	0	0.0	0.00
Ryndam	9/5/07	7.91	0.00	0	0	0.0	0.00
Ryndam	9/13/07	7.54	0.00	0	0	0.0	0.00
Statendam	5/23/07	8.03	6.90	0	0	0.0	0.00
Statendam	5/31/07	7.83	8.93	0	0	0.0	0.00
Statendam	6/6/07	7.79	14.10	0	0	0.0	0.00
Statendam	6/28/07	7.84	12.80	0	0	0.0	0.00
Statendam	7/12/07	6.83	53.30	8	0	0.0	0.00
Statendam	7/26/07	7.75	7.78	0	0	0.0	0.00
Statendam	8/9/07	7.36	10.40	0	0	0.0	0.00
Statendam	8/23/07	7.69	6.17	0	0	0.0	0.00
Statendam	9/6/07	7.62	11.00	5	0	0.0	0.00
Statendam	9/20/07	7.53	7.51	0	0	0.0	0.00
Volendam	6/19/07	8.04	0.00	0	0	0.0	0.00
Volendam	6/26/07	7.82	0.00	0	2	0.0	0.00
Volendam	7/3/07	7.84	2.65	0	0	0.0	0.00
Volendam	7/17/07	7.61	0.00	0	0	0.0	0.00
Volendam	8/7/07	7.99	0.00	0	0	0.0	0.00
Volendam	8/21/07	8.21	0.00	0	0	0.0	0.00
Volendam	9/4/07	7.52	0.00	1	0	0.0	0.00
Volendam	9/11/07	8.10	0.00	7	0	0.0	0.00
Zaandam	5/11/07	7.47	0.00	0	0	0.0	0.00
Zaandam	5/18/07	7.56	0.00	0	0	0.0	0.00
Zaandam	6/8/07	7.54	0.00	0	2	0.0	0.00
Zaandam	6/15/07	7.92	0.00	0	18	0.0	0.00
Zaandam	7/13/07	7.69	0.00	0	0	0.0	0.00
Zaandam	7/20/07	7.33	0.00	0	0	0.0	0.00
Zaandam	8/17/07	8.11	0.00	0	0	0.0	0.00
Zaandam	8/24/07	7.81	9.12	0	0	0.0	0.00
Zaandam	9/7/07	7.95	0.00	0	0	0.0	0.00
	Minimum	6.83	0.00	0	0	0.00	0.00
	Maximum	8.21	53.30	8	47	4.80	0.42
	Median	7.54	0.00	0	0	0.00	0.00

0= No detection

* Note: Infinity was not discharging in Alaska waters in 2007.