

2004 Large Ship Wastewater Continued Compliance Samples for Continuous Discharge Certification by the United States Coast Guard

U.S. Congress enacted Title XIV – Certain Alaskan Cruise Ship Operations on December 21, 2000. Under this federal legislation, large¹ cruise ships may discharge blackwater² and graywater³ in Alaska while underway.⁴ The state law sets standards and sampling requirements for the underway discharge of blackwater in Alaska that are identical to the blackwater standards in the federal law (Table 1). Because of the high fecal coliform counts detected in graywater during 2000, the state law also set graywater standards (Table 1). During an underway discharge, blackwater effluent 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 Ships that discharge blackwater in Alaska while underway must take at least two blackwater samples per cruise ship season.

The federal law also allows continuous discharge of blackwater and graywater that meet more stringent standards also listed in 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) and the Alaska Department of Environmental Conservation (ADEC) five sample results taken within 30 consecutive days that meets the more stringent requirements. The USCG and ADEC evaluate the data submitted. If the conditions are met, the USCG issues a continuous discharge approval letter. A ship approved by the U.S. Coast Guard to discharge continuously must sample their wastewater twice per month to maintain this approval.

Table 1. Comparison of Federal and Alaska standards

Law	State	Federal
# Overnight Passengers	50+	500+
Discharge Limits	At Least 1 mile from shore @ min. 6 knots	
	Blackwater & Graywater	Blackwater only
Fecal Coliform/100 ml	Geometric Mean of 200	200
Total Suspended Solids (mg/l)	150	150
Discharge Limits	Continuous Discharge (at anchor)	
	Blackwater & Graywater	Blackwater & Graywater
Fecal Coliform/100 ml		Geometric Mean of 20
Chlorine (mg/l)	Refers to Federal Law	10
Total Suspended Solids (mg/l)		30

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 contains calculated medians⁶ from the continued compliance sampling results of the medians of each of the advanced treatment systems.

Table 2. Comparison of Advanced Treatment System Medians⁷

Number of Samples = 154	pH	BOD5	TSS	Fecal Coliform	Total Chlorine Residual	Free Chlorine Residual
Treatment (number of samples)		mg/L	mg/L	MPN/100	mg/L	mg/L
Scanship (22)	6.65	5.70	3.4	0	0	0
Rochem (19)	7.30	6.97	0.0	0	0	0
Hamworthy (70)	7.56	3.59	0.0	0	0	0
Zenon (43)	7.71	1.00	0.0	0	0	0

The following tables include all the 2004 continuous compliance sampling results. Continuous discharge sample results highlighted in yellow indicate that the parameter exceeded the continuous discharge limits. Ships that had an exceedance stopped discharging continuously when they received the sampling results and submitted corrective actions with additional sampling results to the USCG and ADEC that showed the problem corrected. For more specific information refer to **Compliance and Enforcement Report**.

¹ 500+ 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. EPA recently began the process of evaluating whether the current federal standards are consistent with Alaska Water Quality Standards.

⁶ 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.

⁷ Since 2000, ADEC has collected substantial amounts of wastewater sampling data on cruise ships and ferries subject to the Commercial Passenger Vessel Environmental Compliance Program. In order to characterize the central tendency of the large quantity of data, the median was used. 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 continuous discharge sample results

Vessel ID	Sample Date	Sample Name	pH	BOD	TSS	Fecal Coliform Bacteria	Chlorine, Residual	Chlorine, Free
				mg/L	mg/L	MPN/100ml	mg/L	mg/L
Norwegian Spirit	7/17/04	Continued Compliance	6.30	6.0	2.0	0	0.10	0.00
Norwegian Spirit	8/3/04	Continued Compliance	7.00	5.4	3.4	0	0.00	0.00
Norwegian Spirit	8/14/04	Spirit Effluent	6.30	9.0	10.0	0	0.00	Missing
Norwegian Spirit	8/24/04	Effluent Spirit	7.00	16.0	3.4	0	0.00	0.00
Norwegian Spirit	9/7/04	Effluent-Spirit	6.50	0.0	8.4	0	0.00	Missing
Norwegian Spirit	9/18/04	Scanship Effluent	6.00	5.0	2.0	2	0.10	Missing
Norwegian Spirit	9/20/04	Effluent-Spirit	6.00	2.2	5.8	1	0.00	Missing
Norwegian Star	6/8/04	Effluent Star	6.84	2.9	2.6	0	0.00	Missing
Norwegian Star	6/20/04	Monthly Sampling (Laucks)	6.40	8.0	6.0	0	0.10	Missing
Norwegian Star	7/6/04	Effluent-Star	6.80	3.6	2.7	0	0.20	Missing
Norwegian Star	7/18/04	CC Time was estimated	6.40	15.0	20.0	30	0.10	0.00
Norwegian Star	8/3/04	Continued Compliance	7.00	2.0	0.8	0	0.00	0.00
Norwegian Star	8/29/04	Star Effluent	6.30	5.0	9.0	20	0.10	Missing
Norwegian Star	9/7/04		7.00	0.0	2.5	0	0.00	0.00
Norwegian Star	9/21/04	Scanship effluent	6.10	6.0	1.0	1	0.00	Missing
Norwegian Sun	6/27/04	Effluent Sun	6.80	18.0	6.0	33	0.00	Missing
Norwegian Sun	7/7/04	Effluent-Sun	6.00	2.1	3.4	0	0.00	Missing
Norwegian Sun	7/21/04	Continued Compliance	7.00	6.7	3.6	0	0.00	0.00
Norwegian Sun	8/4/04	Continued Compliance	7.00	8.9	7.5	9	0.00	0.00
Norwegian Sun	8/18/04	Effluent Sun	7.00	7.2	3.1	0	0.00	0.00
Norwegian Sun	9/8/04		7.00	7.3	3.8	0	0.00	0.00
Norwegian Sun	9/22/04	Effluent - Sun	6.00	2.0	3.0	1	0.20	Missing
		Minimum	6.00	0.0	0.8	0	0.00	0.00
		Median	6.65	5.7	3.4	0	0.00	0.00
		Maximum	7.00	18.0	20.0	33	0.20	0.00

Table 3. Rochem system's continuous discharge sample results

Vessel ID	Sample Date	Sample Name	pH	BOD	TSS	Fecal Coliform Bacteria	Chlorine, Residual	Chlorine, Free
				mg/L	mg/L	MPN/100ml	mg/L	mg/L
Oosterdam	6/7/04	Oosterdam TWW OB	7.72	8.45	0.0	0	0.00	0.00
Oosterdam	6/14/04	Oosterdam TWW (CC)	7.56	13.70	5.5	0	0.00	0.00
Oosterdam	7/12/04	Continued Compliance	6.85	23.60	0.0	30	0.00	0.00
Oosterdam	7/12/04	Continued Compliance TWW	7.72	4.78	0.0	0	0.00	0.00
Oosterdam	7/19/04	TWW Oosterdam	7.00	14.20	0.0	0	0.05	0.05
Oosterdam	8/2/04	BW Continued Compliance	8.55	13.80	0.0	0	0.00	0.00
Oosterdam	8/2/04	GW Continued Compliance	7.97	11.20	0.0	0	0.00	0.00
Oosterdam	8/23/04	TWW Overboard	7.71	12.10	0.0	0	0.00	0.00
Oosterdam	9/13/04	TWW OB	6.76	19.20	2.0	142	0.05	0.05
Oosterdam	9/20/04	Oosterdam CC	7.30	18.40	2.0	1	0.05	0.05
Mercury	5/13/04	Mercury CC	7.16	6.97	2.0	1	0.05	0.05
Mercury	5/21/04	Mercury TWW OB	6.78	3.44	0.0	0	0.00	0.00
Mercury	6/6/04	Mercury TWW OB	6.89	4.78	0.0	0	0.00	0.00
Mercury	7/11/04	Continued Compliance	7.21	3.49	0.0	0	0.00	0.00
Mercury	7/25/04	Continued Compliance	7.68	3.94	0.0	0	0.00	0.00
Mercury	8/8/04	TWW CC	7.09	3.46	0.0	0	0.00	0.00
Mercury	8/22/04	Continued Compliance	7.36	0.00	0.0	0	0.00	0.00
Mercury	9/5/04	TWW Overboard	7.30	5.95	0.0	0	0.00	0.00
Mercury	9/18/04	Mercury CC	7.54	2.88	2.0	1	0.05	0.05
		Minimum	6.76	0.00	0.0	0	0.00	0.00
		Median	7.30	6.97	0.0	0	0.00	0.00
		Maximum	8.55	23.60	5.5	142	0.05	0.05

Table 4. Hamworthy system's continuous discharge sample results

Vessel ID	Sample Date	Sample Name	pH	BOD	TSS	Fecal Coliform Bacteria	Chlorine, Residual	Chlorine, Free
				mg/L	mg/L	MPN/100ml	mg/L	mg/L
Coral Princess	5/19/04	Coral Princess Unann.	7.63	14.7	0.0	0	0	0
Coral Princess	5/25/04	Cont. Comp	6.90	0.0	0.0	0	0	0
Coral Princess	6/2/04	Cont. Comp	7.07	0.0	0.0	11	0	0
Coral Princess	6/8/04	Coral Princess CC	7.44	9.7	0.0	0	1	0.7
Coral Princess	7/6/04	Continued Compliance	7.46	0.0	0.0	0	0	0
Coral Princess	7/14/04	TWW CC	7.69	2.4	0.0	0	0	0
Coral Princess	8/3/04	Continued Compliance	7.54	2.9	0.0	0	0	0
Coral Princess	8/11/04	Continued Compliance	7.57	25.0	0.0	0	0	0
Coral Princess	9/8/04	TWW Overboard	8.12	0.0	0.0	0	0	0
Coral Princess	9/9/04	Coral Princess	7.40	6.0	2.0	1	0.05	0.05
Dawn Princess	5/21/04	TWW Cont. Compliance	7.18	0.0	0.0	0	0	0
Dawn Princess	5/27/04	OB Discharge	7.43	0.0	0.0	0	0	0
Dawn Princess	6/4/04	TWW	7.47	2.6	0.0	0	0.1	0
Dawn Princess	6/10/04	Dawn Princess CC	7.20	0.0	0.0	0	0	0
Dawn Princess	7/2/04	Continued Compliance	6.91	3.7	0.0	0	0	0
Dawn Princess	7/8/04	TWW CC	6.79	0.0	0.0	0	0	0
Dawn Princess	8/5/04	TWW CC	6.79	0.0	0.0	0	0	0
Dawn Princess	8/13/04	Continued Compliance	6.60	19.7	0.0	0	0	0
Dawn Princess	9/2/04	TWW Overboard Discharge	6.33	2.0	0.0	2	0	0
Dawn Princess	9/10/04	TWW Overboard Discharge	7.17	3.5	2.0	1	0.05	0.05
Diamond Princess	5/22/04	TWW	7.40	15.0	0.0	0	0	0
Diamond Princess	5/31/04	TWW Cont. Compliance	8.00	3.9	4.0	0	0	0
Diamond Princess	6/7/04	TWW Overboard	7.98	3.9	41.1	0	0	0
Diamond Princess	6/14/04	Diamond Princess CC	7.62	9.0	0.0	0	0	0
Diamond Princess	7/12/04	TWW Diamond CC	8.07	8.2	0.0	40	0	0
Diamond Princess	7/19/04	Continued Compliance	7.62	0.0	0.0	4	0	0
Diamond Princess	7/26/04	Continued Compliance	7.98	3.4	0.0	8	0	0
Diamond Princess	8/2/04	Continued Compliance	7.86	3.1	0.0	0	0	0
Diamond Princess	8/9/04	TWW CC	8.04	0.0	0.0	0	0	0
Diamond Princess	9/13/04	TWW Overboard	7.85	2.1	2.0	4	0.05	0.05
Diamond Princess	9/16/04	Diamond Princess TWW	7.90	6.4	28.0	54	0.05	0.05
Island Princess	5/18/04	TWW Overboard	7.96	0.0	0.0	0	0.2	0.25
Island Princess	5/26/04	TWW	7.52	0.0	0.0	0	0	0
Island Princess	6/1/04	TWW Overboard Discharge	7.52	0.0	0.0	0	0	0
Island Princess	6/15/04	Island Princess CC	8.02	3.3	0.0	0	0	0
Island Princess	7/7/04	Continued Compliance	7.61	6.2	0.0	0	0	0
Island Princess	7/13/04	TWW CC	7.77	0.0	0.0	0	0	0
Island Princess	8/4/04	Continued Compliance	7.86	6.4	0.0	4	0	0
Island Princess	8/10/04	Continued Compliance	7.96	10.7	4.3	0	0	0
Island Princess	9/1/04	TWW Overboard CC	7.93	0.0	0.0	0	0	0
Island Princess	9/7/04	TWW Overboard	7.95	2.2	0.0	0	0	0
Regal Princess	5/20/04	Cont. Comp	6.87	17.6	0.0	0	0	0
Regal Princess	5/29/04	TWW Cont. Compliance	7.81	0.0	0.0	0	0	0
Regal Princess	6/11/04	Regal Princess CC	7.49	21.5	5.1	0	0	0
Regal Princess	6/30/04	TWW	7.49	11.4	17.7	0	0	0
Regal Princess	7/9/04	TWW CC	7.08	135.0	0.0	0	0	0
Regal Princess	7/31/04	Continued Compliance	7.49	4.0	0.0	0	0	0
Regal Princess	8/8/04	Continued Compliance	6.95	3.3	0.0	0	0	0
Regal Princess	8/20/04	Continued Compliance	6.92	5.0	0.0	0	0	0
Sapphire Princes	6/23/04	TWW	7.74	9.4	0.0	0	0	0
Sapphire Princes	6/30/04	Cont. Compliance	7.36	5.5	0.0	0	0	0
Sapphire Princes	7/14/04	TWW CC	7.34	20.0	0.0	4	0	0
Sapphire Princes	7/28/04	Continued Compliance	7.74	6.8	0.0	2	0	0
Sapphire Princes	8/18/04	Continued Compliance	7.02	29.5	0.0	0	0	0
Sapphire Princes	8/4/04	Sapphire TWW	7.45	3.3	2.0	1	0.05	0.05
Sapphire Princes	9/1/04	TWW Overboard CC	7.64	20.8	0.0	0	0	0
Sapphire Princes	9/8/04	TWW Overboard	6.74	0.0	0.0	2	0	0
Seven Seas Mariner	7/31/04	Continued Compliance	7.97	5.8	0.0	90	0	0
Seven Seas Mariner	8/7/04	Continued Compliance	7.85	8.8	0.0	8	0	0
Sun Princess	5/20/04	Cont.Compliance	7.60	0.0	0.0	0	0.25	0.4
Sun Princess	5/28/04	OB Discharge	7.95	0.0	0.0	5	0	0
Sun Princess	6/11/04	Sun Princess CC	7.61	6.2	0.0	50	0	0
Sun Princess	6/25/04	TWW Cont. Compliance	7.50	10.8	0.0	17	0	0
Sun Princess	7/9/04	TWW CC	7.79	319.0	0.0	60	0	0
Sun Princess	7/15/04	TWW CC	8.00	13.4	0.0	330	0	0
Sun Princess	7/22/04	Continued Compliance	7.61	2.4	0.0	17	0	0
Sun Princess	7/23/04	Continued Compliance	7.56	4.8	0.0	6	0	0
Sun Princess	7/29/04	Continued Compliance	7.59	3.5	0.0	14	0	0
Sun Princess	8/6/04	TWW CC	7.83	0.0	0.0	10	0	0
Sun Princess	9/3/04	TWW	7.91	9.6	0.0	6	0	0
Minimum			6.33	0.0	0.0	0	0	0
Median			7.60	3.6	0.0	0	0	0
Maximum			8.12	319.0	41.1	330	1	0.7

Table 5. Zenon system's continuous discharge sample results

Vessel ID	Sample Date	Sample Name	pH	BOD mg/L	TSS mg/L	Fecal Coliform Bacteria MPN/100ml	Chlorine, Residual mg/L	Chlorine, Free mg/L
Ryndam	5/3/04	Ryndam Post Uv	7.38	1.0	0.50	1.00	0.13	Missing
Ryndam	5/18/04	TWW OB	7.98	0.0	0.00	0.00	0.00	0.00
Ryndam	6/1/04	TWW OB	7.69	0.0	0.00	0.00	0.00	0.00
Ryndam	6/15/04	Ryndam C.C. (TWW)	8.12	0.0	0.00	0.00	0.00	0.00
Ryndam	7/6/04	CC	8.13	0.0	0.00	0.00	0.00	0.00
Ryndam	7/13/04	TWW Unannounced	7.77	6.0	0.00	0.00	0.00	0.00
Ryndam	8/3/04	TWW Ryndam C.C.	7.98	2.6	0.00	0.00	0.00	0.00
Ryndam	8/17/04	TWW	8.24	0.0	0.00	0.00	0.00	0.00
Ryndam	9/7/04	TWW Overboard	8.23	2.7	0.00	0.00	0.00	0.00
Ryndam	9/14/04	CC	7.90	2.7	2.00	1.00	0.05	0.05
Statendam	8/12/04	TWW Statendam CC	7.96	9.5	2.00	1.00	0.05	0.00
Statendam	8/18/04	TWW OB	7.59	35.7	2.00	1.00	0.05	0.05
Statendam	9/1/04	TWW Overboard CC	8.19	19.6	0.00	3.33	0.00	0.00
Statendam	9/14/04	TWW OB	8.01	6.3	2.00	1.00	0.05	0.05
Veendam	5/1/04	UV Effluent	7.54	3.7	1.60	1.00	0.05	Missing
Veendam	5/19/04	Veendam CC TWW	7.91	0.0	0.00	0.00	0.00	Missing
Veendam	6/2/04	Veendam CC	7.47	0.0	0.00	0.00	0.00	0.00
Veendam	6/16/04	Veendam CC	7.96	4.4	0.00	0.00	0.00	0.00
Veendam	7/8/04	CC	7.16	6.4	0.00	0.00	0.00	0.00
Veendam	7/22/04	CC	7.51	3.0	0.00	0.00	0.00	0.00
Veendam	8/19/04	CC	8.04	7.2	0.00	0.00	0.00	0.00
Veendam	8/25/04	TWW Overboard CC	7.38	11.7	0.00	0.00	0.00	0.00
Veendam	9/2/04	TWW Overboard	7.89	0.0	0.00	0.00	0.00	0.00
Veendam	9/16/04	TWW Overboard	7.14	1.0	2.00	1.00	0.05	0.05
Volendam	5/14/04	Volendam TWW OB	7.47	2.0	0.00	0.00	0.00	0.00
Volendam	5/21/04	Volendam TWW CC	7.64	2.3	0.00	0.00	0.00	0.00
Volendam	6/2/04	Volendam TWW OB	7.55	0.0	0.00	0.00	0.00	0.00
Volendam	6/11/04	Volendam TWW	7.44	0.0	0.00	0.00	0.00	0.00
Volendam	7/2/04	Volendam CC	7.99	3.5	0.00	0.00	0.00	0.00
Volendam	7/9/04	CC	7.14	0.0	0.00	0.00	0.00	0.00
Volendam	8/6/04	TWW CC	7.56	0.0	0.00	0.00	0.00	0.00
Volendam	8/13/04	Continued Comp	7.71	0.0	0.00	0.00	0.00	0.00
Volendam	9/3/04	TWW Overboard	7.38	0.0	0.00	0.00	0.00	0.00
Volendam	9/10/04	TWW Overboard CC	7.50	2.3	2.00	1.00	0.05	0.05
Zaandam	5/17/04	Zaandam TWW	7.74	0.0	0.00	0.00	0.00	0.00
Zaandam	6/7/04	Zaandam CC	7.71	0.0	0.00	0.00	0.00	0.00
Zaandam	6/14/04	Zaandam TWW (CC)	7.56	0.0	0.00	0.00	0.00	0.00
Zaandam	7/12/04	CC	7.80	2.4	0.00	0.00	0.00	0.00
Zaandam	7/19/04	CC	7.64	0.0	0.00	0.00	0.00	0.00
Zaandam	8/2/04	CC	8.03	4.1	0.00	0.00	0.00	0.00
Zaandam	8/9/04	TWW CC	8.35	0.0	0.00	0.00	0.00	0.00
Zaandam	9/13/04	TWW OB	7.46	5.8	2.00	1.00	0.74	3.10
Zaandam	9/20/04	TWW OB	7.55	1.0	2.00	1.00	0.05	0.05
Minimum			7.14	0.0	0.00	0.00	0.00	0.00
Median			7.71	1.0	0.00	0.00	0.00	0.00
Maximum			8.35	35.7	2.00	3.33	0.74	3.10