Alaska DEC 2008

Small Passenger Vessel

Wastewater Sampling Results

January 2010

Introduction

In 2001, Alaska Statute (AS) 46.03.460-46.03.490 established the Commercial Passenger Vessel Environmental Compliance Program (CPVEC), which is administered by the Alaska Department of Environmental Conservation (DEC). The CPVEC program applies to large[1] and small[2] commercial passenger vessels. The law requires small vessels to sample their wastewater discharges twice per season.

Small cruise ships are required to meet standard terms and conditions, or seek alternative terms and conditions in order to discharge blackwater[3] and graywater[4] in Alaska marine waters. Under standard terms and conditions blackwater, Graywater, and other wastewater must contain no more than 200 fecal coliform per 100 milliliters and no more than 150 milligrams per liter of total suspended solids.

Alaska's original CPVEC law in 2001 established the standard terms and conditions and the alternative terms and conditions. Changes to Alaska's CPVEC law in 2004 (AS 46.03.462 (e)) established additional alternative terms and conditions allowing a Best Management Practices plan (BMP). As part of the 2004 law, the interim protective measures previously allowed under AS 46.03.463(b) and (c) are now the same as the alternative terms and conditions permitted under AS 46.03.462. The Best Management Practices regulations, 18 AC 69.046, became effective on May 18, 2006. For more information about best management practices please see the cruise ship web site at the following address:
http://www.dec.state.ak.us/water/cruise_ships/small_vessel_dischargeoptions.htm

Eighteen small ships registered with the CPVEC program in 2008, including five state ferries that operate in Alaska year-round. A list of registered small vessels can be found on page 10 of this report. All registered small vessels that discharged into Alaskan waters obtained approved Best Management Practices plans and operated under these plans. One small cruise ship, the Bremen did not discharge into Alaskan waters and was not sampled. Table 1 (Parts 1 & 2) summarizes the 2008 small ship sampling results using the median[5] results for each pollutant. Data from the 17 ships were combined and results show that small-ship effluent generally had difficulty meeting water quality standards at the end of pipe for fecal coliform, ammonia, chlorine, copper, and biological oxygen demand (BOD). Because of the results seen in prior year's samples, the BMPs minimize the discharge of wastewater while in port or in sensitive locations like herring spawning areas. This should maximize dilution of the wastewater, and minimize discharge in locations near shore.

[1] A large vessel has >250 overnight passengers as defined in AS 46.03.490(13)
[2] A small vessel has 50-249 overnight passengers as defined in AS 46.03.490(7)
[3] Wastewater from toilets as defined in AS 46.03.490(12).
[4] As defined in AS 46.03.490(6). Wastewater from galley, dishwasher, bath and laundry.
[5] 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 1. Summary 2008 Small Vessels Median Sampling Results –Part 1 (17 vessels)

	Ammonia as N	pH	Biochemical O_2 Demand	Chemical Oxygen Demand	Total Suspended Solids	Total Chlorine, Residual	Fecal Coliform Bacteria by MPN
Alaska Water Quality Standards	**2.9** *	**6.5-8.5**	**60**	**n/a**	**150****	**0.0075**	**200 *****
Units	**mg/L**	**s.u.**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
Graywater (14 samples)	0.98	7	209	390	46	0.1	33
Blackwater (21 samples)	28	6.54	134	620	142	0.6	156
Mixed Blackwater & Graywater (14 Samples)	8.6	7.29	95.5	790	88	4.2	1,290

* Ammonia standards are based on temperature, pH and salinity. This standard is from Table IX in the *Alaska Water Quality Criteria Manual for Toxics and Other Deleterious Organic and Inorganic Substances.*

** Federal Marine Sanitation Device requirements are 150 mg/L.

** *The standard in receiving water for consumption of raw shellfish is 14 fecal coliform bacteria per 100 ml.

Table 1. Summary 2008 Small Vessels Median Sampling Results – Part 2 (16 vessels)

	Arsenic, dissolved	Copper, dissolved	Lead, dissolved	Nickel, dissolved	Selenium, dissolved	Zinc, dissolved
Alaska Water Quality Standards	36	3.1	8.1	8.2	71	81
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Median (16 samples)	18.4	34.7	0.1	8	0	52

Wastewater results for individual ships

Tables 2 through 5 show the 2008 twice-per-season sampling results for each of the 17 ships that reported. Samples were analyzed for conventional and priority pollutants as listed in the Quality Assurance/Quality Control Plan (QAQCP). Results highlighted in yellow are outside the standard terms and conditions or appropriate water quality standard. Small cruise ships operating under Best Management Practice plans do not need to meet standard terms and conditions, so no enforcement action was required. DEC does look for progress on wastewater sample results, and requires improvements prior to issuing extensions to the Best Management Practices plans. When there was a non-detect for a parameter, the result was listed as zero.

Bacteria

Small ships continue to try to balance bacterial disinfection and chlorine use. Chlorine is used to disinfect bacteria, but it is toxic to marine organisms and high residuals must be avoided. The median total residual chlorine result for mixed black and graywater is 560 times the Alaska's marine water quality standard (WQS). The maximum total residual

chlorine results for small-ship graywater and blackwater were 0.8 mg/L and 38 mg/L, respectively. The maximum total residual chlorine for mixed graywater and blackwater was 11.6 mg/L—more than 1500 times WQS. The fecal coliform standard is 200 colonies per 100 ml to meet WQS for secondary-contact recreation. The most stringent WQS is 14 colonies per 100 ml to collect shellfish for raw consumption, and is the standard used to protect all uses of all waters. Blackwater has the highest median fecal coliform results. At 14,000 colonies per 100 ml, the median is 1000 times the WQS for raw consumption of shellfish. The maximum fecal coliform result for any sample was from the Spirit of 98. At 131,000,000 colonies per 100 ml, this is over 9 million times WQS for raw shellfish consumption.

Other Pollutants

One of the two samples for each ship was analyzed for 167 "priority pollutants" 13 total metals, 12 dissolved metals; 72 volatile organic compounds (VOCs); 70 bases, neutral, acids (BNAs). These paraemeters are listed in the QAQCP. Some small ships have separate graywater and blackwater discharges. The department allowed these ships to sample priority pollutants on only one of their wastewater discharges per season.

Most of the priority pollutants were not detected in small ship discharges. Table 5 includes only priority pollutants with medians that have exceeded the practical quantitation limit (PQL) or a pollutant with a maximum value 10 times the PQL. Alaska uses dissolved metal concentration (a subset of total recoverable metals) for its water quality standards, but Table 5 also includes the total recoverable metals results for informational purposes. The pollutants not listed here are considered not detected and the analysis of those pollutants is unnecessary.

Currently there are no AMWQS for 3&4-methylphenol, bromoform, chloroform, benzoic acid and phenol. However, there are Alaska Marine Water Quality Standards (AMWQS) for dissolved arsenic, chromium, copper, lead, selenium, nickel and zinc.

All small cruise ships met the AMWQS for dissolved chromium and lead. All but one small ship that was sampled exceeded the AMWQS for copper. One ship exceeded the AMWQS for selenium, two for arsenic, six for nickel, and seven for zinc.

Conclusion

The wastewater sample results in this report were taken at the point of discharge with no mixing zone. A mixing zone is an area of water surrounding the point of discharge where the wastewater can be diluted by the receiving water. Most permitted wastewater facilities receive a mixing zone. The wastewater volumes on a small commercial vessel are also relatively small (3,000 to 20,000 gallons per day including graywater from sinks and showers), and most small vessels lack the space to store wastewater for more than a few hours. DEC has addressed the difficulty in meeting water quality standards in the Best Management Practices plans (BMPs) by minimizing discharge in sensitive areas and near shore. The BMPs are renewed every three years, and DEC reviews the renewal applications for progress on wastewater sample results.

Small commercial passenger vessels and state ferries have made progress in terms of overall effluent quality. For example the medians for fecal coliform in 2005 and 2006 included median results over 1 million. Improvements have also been seen in metals. DEC believes further improvements can be made by small cruise ships and ferries, especially with regard to chlorine, fecal coliform, and biological oxygen demand (BOD).

Table 2. 2008 Small Ship Graywater Sampling (not including priority pollutants)

		Ammonia as N	pH	Biochemical O_2 Demand	Chemical Oxygen Demand	Total Suspended Solids	Total Chlorine	Free Chlorine	Fecal Coliform Bacteria by MPN	Conductivity	Hexane-Extractable Matreials	Total Organic Carbon	Alkalinity	Total Nitrate & Nitrite	Total Phosphorus	Total Kjeldahl Nitrogen	Total Settleable Solids
Reportable Limit (PQL)		0.1	0.1	2	10	4	0.1	0.1	2	2	5	1	2	1	0.05	1	0.1
Units		mg/L	s.u.	mg/L	mg/L	mg/L	mg/L	mg/L	MPN/100ml	umhos/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ml/L
Alaska Marine Water Quality Standards		2.9	6.5-8.5	60	n/a	150	0.0075	n/a	200	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Vessel Name	Sample Date																
Spirit of Alaska	5/20/08	0.79	6	89.9	340	26	0.3	0.2	0	300	0	67	70	0	0.8	2.57	0
Spirit of Columbia	6/16/08	0.96	7	388	690	131	0	0	8500	743	0	157	37.1	8.61	1.6	8.61	0.1
Spirit of Discovery	5/17/08	0.57	*	186	410	76	*	*	0	71	7.2	58	71	0	8.3	3.21	0
Spirit of Endeavor	5/22/08	1.9	8	236	370	61	0.1	0	0	71	7.6	96	280	215	2.1	12	10
Spirit of Endeavor	7/31/08	3.7	7	229	370	124	0.1	0	10400	14000	21	62	210	0	1.6	8.59	0.28
Spirit of Glacier	5/20/08	3.1	8.52	162	210	42	0.8	1	16000	74	0	0	150	0	1.4	5.57	0
Spirit of 98	5/22/08	0.64	*	600	208	27.3	*	*	20000	184	11	38	110	0	3	6.17	0.67
Spirit of 98	9/4/08	0	6	221	130	20	0	0	9.48	167	0	7.7	85	0.155	0.09	0	0.56
Spirit of Yorktown	6/7/08	5	*	150	200	24	*	*	3480	210	0	50	70	0	1.1	8.39	0
Clipper Odyssey	8/1/08	2.1	6.25	460	670	80	0	0	560000	890	44	120	80	0	5.9	17	0
Sea Bird	6/8/08	1	7.22	196	930	50	0.18	0	0	1440	70	350	41	0.23	3.7	10	0
Sea Bird	8/3/08	0.74	6.07	388.9	1200	24	0.17	0	0	1370	45	500	0	0.25	22.5	7.1	0
Sea Lion	6/7/08	1.6	6.77	187	740	84	0	0	56	294	27	500	31	0	3.1	24	4.5
Sea Lion	8/2/08	0.18	7.7	73.9	1000	5.2	0	0	2	507	5.6	1700	0	0	0	0	0
	Minimum	**0.00**	**6.00**	**74**	**130**	**5.2**	**0.0**	**0.0**	**0**	**71**	**0.0**	**0.0**	**0.0**	**0.00**	**0.00**	**0.00**	**0.00**
	Maximum	**5.00**	**8.52**	**600**	**1,200**	**131.0**	**0.8**	**1.0**	**560,000**	**14,000**	**70.0**	**1,700.0**	**280.0**	**215.00**	**22.50**	**24.00**	**10.00**
	Median	**0.98**	**7.00**	**209**	**390**	**46.0**	**0.1**	**0.0**	**33**	**297**	**7.4**	**81.5**	**70.5**	**0.00**	**1.85**	**7.75**	**0.00**

* Missing sample, results not analyzed. This issue was addressed in BMP renewal in 2009. Information is now copied in the field to updated chain of custody forms.

Table 3. 2008 Small Ship Blackwater Sampling (not including priority pollutants)

		Ammonia as N	pH	Biochemical O_2 Demand	Chemical Oxygen Demand	Total Suspended Solids	Total Chlorine	Fecal Coliform Bacteria by MPN	Conductivity	Free Chlorine	Hexane-Extractable Matreials	Total Organic Carbon	Alkalinity	Total Nitrate & Nitrite	Total Phosphorus	Total Kjeldahl Nitrogen	Total Settleable Solids
Reportable Limit (PQL)		0.1	0.1	2	10	4	0.1	2	2	0.1	5	1	2	1	0.05	1	0.1
Units		mg/L	s.u.	mg/L	mg/L	mg/L	mg/L	MPN/100ml	umhos/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ml/L
Alaska Marine Water Quality		2.9	6.5-8.5	60	n/a	150	0.0075	200	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Vessel Name	Sample Date																
Spirit of Alaska	5/20/08	8.8	6	63	190	114	2.3	80.6	86	0.8	0	18	130	693	2.3	14.5	1.5
Spirit of Alaska	8/12/08	16	7	104	330	176	1.1	23,600	14000	0.4	0	28	140	0.161	4.5	36	6.7
Spirit of Columbia	6/16/08	10	7	91.9	360	130	1.5	0	20500	0.5	0	50.2	128	0	4	24.6	2.63
Spirit of Columbia	8/11/08	28	*	164	859	360	*	0	20800	*	0	126	209	0.589	23	76.9	4
Spirit of Discovery	5/17/08	64	*	33.3	380	250	*	0	83	*	0	20	450	578	9.4	70.2	7
Spirit of Discovery	8/30/08	86	6.5	134	440	150	4.48	909	28200	1	12	44	520	0	12	101	2.1
Spirit of Endeavor	5/22/08	31	6	171	640	164	0.6	19,100	83	0.4	0	122	190	624	9.8	128	0
Spirit of Endeavor	7/17/08	45	*	165	620	330	*	0	92	*	0	43	240	0.83	16	119	6
Spirit of Endeavor	7/31/08	27	6.5	166	410	116	0.2	1,900	1900	0.1	0	100	190	0.457	11	66.5	0.11
Spirit of Glacier Bay	5/20/08	0.44	6.9	3.16	140	64	1	14.2	87	0.8	0	0	99	0	1.1	4.41	0
Spirit of Glacier Bay	6/10/08	N/A	7.54	52.5	N/A	101	15.8	0	N/A	11.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Spirit of Glacier Bay	6/22/08	N/A	8.71	15.3	N/A	22	38	8	N/A	34	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Spirit of 98	5/22/08	110	*	104	494	142	*	131,000,000	38.4	*	0	37	497	N/A	11	124	0
Spirit of 98	7/24/08	63	6.5	177	780	160	0.1	100,000	36000	0.1	15	58	510	0.269	16	72.6	14
Spirit of Yorktown	6/7/08	86	*	329	700	230	*	1,270,000	89	*	0	114	460	0	20	111	7
Spirit of Yorktown	8/30/08	540	*	1680	4300	1440	*	4,890,000	27300	*	24	740	2400	0	70	595	25
Clipper Odyssey	8/1/08	780	7.54	412	1700	160	0	3,800,000	8640	0	0	290	2000	0.29	17	1200	3.5
Sea Bird	6/8/08	0.99	4.29	210	840	50	0	30	29800	0.19	0	290	0	0	0.61	6.4	0
Sea Bird	8/3/08	0.12	4.71	335.2	1500	39	0.2	156	24400	0.16	0	580	0	0	0	0.75	0
Sea Lion	6/7/08	0.12	6.54	0	510	63	0	80,000	29100	0	0	2.7	81	0	0.21	1.7	0
Sea Lion	8/2/08	5.1	7	47.5	870	79	0	0	24300	0	0	460	110	0	1.4	14	0
	Minimum	**0.12**	**4.29**	**0**	**140**	**22**	**0**	**0**	**38.4**	**0**	**0**	**0**	**0**	**0**	**0**	**0.75**	**0**
	Maximum	**780**	**8.71**	**1680**	**4300**	**1440**	**38**	**131000000**	**36000**	**34**	**24**	**740**	**2400**	**693**	**70**	**1200**	**25**
	Median	**28**	**6.54**	**134**	**620**	**142**	**0.6**	**156**	**14000**	**0.4**	**0**	**58**	**190**	**0.0805**	**9.8**	**70.2**	**2.1**

* Missing sample or data. This issue was addressed in 2009. Samples in green were extra samples taken for BMP purposes.

Table 4. 2008 Small Ship Sampling Blackwater and Graywater Mixed Results (not including priority pollutants)

		Ammonia as N	pH	Biochemical O_2 Demand	Chemical Oxygen Demand	Total Suspended Solids	Total Chlorine	Free Chlorine	Fecal Coliform Bacteria by MPN	Conductivity	Hexane-Extractable Matreials	Total Organic Carbon	Alkalinity	Total Nitrate & Nitrite	Total Phosphorus	Total Kjeldahl Nitrogen	Total Settleable Solids
Reportable Limit (PQL)		0.1	0.1	2	10	4	0.1	0.1	2	2	5	1	2	1	0.05	1	0.1
Units		mg/L	s.u.	mg/L	mg/L	mg/L	mg/L	mg/L	MPN/100ml	umhos/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ml/L
Alaska Marine Water Quality		2.9	6.5-8.5	60	n/a	150	0.0075	n/a	200	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Vessel Name	Sample Date																
Columbia	6/9/08	34	7.43	156	780	170	5.4	1.2	180	25400	26	150	200	0	7.2	72	2
Columbia	8/25/08	15	7.17	67.7	950	120	0.8	4.0	4	26,700	8.4	34	150	0	3.3	30	2
Kennicott	5/27/08	0.48	7.99	13.7	1,600	21	1.4	1.4	8	39,400	0	1.1	100	0	0	1.3	0
Kennicott	6/24/08	0	8.15	4.8	650	32	5.2	6.7	10	29,400	0	1	82	0.11	0	0	0
Malaspina	5/20/08	17	6.54	222	1,400	78	11.6	3.4	8,000	30,100	12	120	140	0.11	5.9	38	0
Malaspina	7/15/08	24	6.78	329.4	1,200	160	4.2	0.8	30,000	14,300	31	100	180	0.14	11	77	0
Matanuska	6/8/08	10	7.14	80	530	80	1.0	1.0	8,000	27,200	14	45	120	0.13	3	28	2
Matanuska	8/14/08	7.1	6.90	62.1	510	76	8.8	7.1	0	24,700	7.8	35	94	0	2.1	16	0
Taku	4/25/08	5.2	8.10	135	2,900	190	6.2	4.4	2,400	37,000	18	65	120	0.2	2.5	21	9
Taku	6/10/08	3.4	8.07	111	800	160	6.4	4.2	21	31,300	26	33	100	0.18	2.4	24	3.5
Spirit of Glacier Bay	6/10/08	N/A	7.64	65.5	N/A	70	3.0	1.0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Spirit of Glacier Bay	6/22/08	N/A	7.41	52	N/A	88	0.0	0.0	5,000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Spirit of Oceanus	7/8/08	21	6.90	203	370	88	*	*	2,000,000	16,800	0	73.1	200	0	4.3	29	1
Empress of the North[1]	6/28/08	6.8	6.99	165	480	160	0.0	*	428,000	17,200	46	79	234	0	7.1	6.8	6.5
Minimum		0.0	6.54	4.80	370	21	0.00	0.00	0	14,300.0	0.0	1.0	82.0	0.00	0.00	0.00	0.00
Maximum		34.0	8.15	329.40	2,900	190	11.60	7.10	2,000,000	39,400.0	46.0	150.0	234.0	0.20	11.00	77.00	9.00
Median		8.6	7.29	95.50	790	88	4.20	2.40	1,290	26,950.0	13.0	55.0	130.00	0.06	3.15	26.00	1.50

1- One sample from port discharge, ship unexpectedly exited Alaska waters prior to starboard samples.

* Results not available. Issue was addressed in 2009. Samples in green were additional samples taken for BMP application process.

Table 5. 2008 Small Ship Sampling Priority Pollutants

			3&4-Methylphenol	bromoform	chloroform	Benzoic Acid	Phenol	Arsenic, total	Arsenic, dissolved	Chromium, total	Chromium, dissolved
Reportable Limit (PQL)			5	2	2	130	5	2.5	2.5	2.5	2.5
Units			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Alaska Marine Water Quality Standards			N/A	N/A	N/A	N/A	N/A	N/A	36	N/A	50
Vessel Name	Sample Date	Sample									
Columbia	8/25/08	Mixed	0	37	2.4	210	0	49	29	0	1.3
Kennicott	6/24/08	Mixed	0	34	0	0	0	38	1.4	2.7	0
Malaspina	7/15/08	Mixed	0.26	0.0014	0.008	0.59	0	23	22	0	3.1
Matanuska	8/14/08	Mixed	0	72	1.8	150	0	24	13	3.5	2.8
Taku	6/10/08	Mixed	0	210	1.8	0	0	38	28	0	0
Clipper Odyssey	8/1/08	BW	48	0	1	18	50	17	15	6.8	7.7
Clipper Odyssey	8/1/08	GW	18	0	20	60	8	1.9	2.3	3.1	0
Spirit of 98	9/4/08	BW	160	0	26	1200	19	44.2	45.1	5.97	4.45
Spirit of Alaska	8/12/08	GW	0	0	130	180	0	0	0	12.6	9.2
Spirit of Columbia	8/11/08	GW	0	0	4.3	820	0	0	*	12.7	*
Spirit of Discovery	8/30/08	GW	0	9.4	28	0	0	0	0	0	0
Spirit of Endeavor	7/17/08	GW	17	0	38	0	2.9	0	0	6.7	5.83
Spirit of Glacier Bay		Vessel had unplanned departure from Alaskan waters prior to scheduled sample									
Spirit of Oceanus	7/8/08	Mixed	Sampled but lab did not test because of quality assurance issues (high temperature)								
Spirit of Yorktown	8/30/08	BW	31	0	11	54	15	0	0	0	0
Empress of the North	6/28/08	Port	50	0	4.7	0	23	19.8	31.5	11.2	48.9
Sea Bird	8/3/08	GW	0	0	790	74	0	0.82	4.6	4.5	3.7
Sea Lion	8/2/08	BW	0	4.6	0	34	0.99	31	39	1.4	0
MIN			**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
MAX			**160.00**	**210.00**	**790.00**	**1200.00**	**50.00**	**49.00**	**45.10**	**12.70**	**48.90**
MEDIAN			**0.00**	**0.00**	**4.50**	**44.00**	**0.00**	**18.40**	**13.00**	**3.30**	**2.80**

* Results not available. Issue was addressed in 2009 in updated field forms and chain of custody forms.

Table 5. 2008 Small Ship Sampling Priority Pollutants (continued)

			Copper, total	Copper, dissolved	Lead, total	Lead, dissolved	Mercury	Nickel, total	Nickel, dissolved	Selenium, total	Selenium, dissolved	Silver, total	Thallium, total	Zinc, total	Zinc, dissolved
Reportable Limit (PQL)			1	1	1	1	1	1	1	2.5	2.5	1	1	2.5	2.5
Units			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Alaska Marine Water Quality Standards			N/A	3.1	N/A	8.1	0.94	N/A	8.2	N/A	71	N/A	N/A	N/A	81
Vessel Name	Sample Date	Sample													
Columbia	8/25/08	Mixed	170	130	3.7	1.4	0.037	8	11	14	13	0.038	0	120	100
Kennicott	6/24/08	Mixed	64	1.7	0	4.2	0	12	7.1	0	0	0	0	63	24
Malaspina	7/15/08	Mixed	200	100	3.1	0	0	20	20	8.8	2.4	0	0	190	110
Matanuska	8/14/08	Mixed	200	160	1.5	1	0	17	17	0	0	0.032	0.027	59	92
Taku	6/10/08	Mixed	92	54	25	0	0	13	5	0	0	0	0	100	26
Clipper Odyssey	8/1/08	BW	77	11	6.9	0.73	0.21	940	520	2.8	1.3	0.1	0	240	52
Clipper Odyssey	8/1/08	GW	55	8.5	1.6	0.1	0	4.5	3.8	0	0.27	0.14	0	83	39
Spirit of 98	9/4/08	BW	15.9	9.88	2.51	0	0	12.2	12	0	0	9.55	0	634	100
Spirit of Alaska	8/12/08	GW	117	22.2	3.8	0	0	6.24	8.36	0	0	0	0	518	82.9
Spirit of Columbia	8/11/08	GW	418	*	39	*	0	20.6	*	5.86	*	0	0	1130	*
Spirit of Discovery	8/30/08	GW	69.6	34.7	2.41	0	0	3.36	2.54	0	0	0	0	112	23.8
Spirit of Endeavor	7/17/08	GW	166	35.8	2.64	1.93	0	4.39	3.58	5.51	0	0	0.637	378	121
Spirit of Glacier Bay			Vessel had unplanned departure from Alaskan waters prior to scheduled sample												
Spirit of Oceanus	7/8/08	Mixed	Sampled but lab did not test beasue of quality assurance issues												
Spirit of Yorktown	8/30/08	BW	142	32.2	1.38	0	0	3.65	2.61	0	0	0	0	181	27.6
Empress of the North	6/28/08	Port	119	4.33	6.7	0	0	9.03	47.2	8.78	138	1.07	0	897	7.51
Sea Bird	8/3/08	GW	120	100	2.4	1.8	0.038	4.3	3.8	0.5	0.93	0.2	0	220	220
Sea Lion	8/2/08	BW	35	35	3.3	4.8	0.033	9.3	8	0	0	0.026	0.21	19	16
MIN			**15.90**	**1.70**	**0.00**	**0.00**	**0.00**	**3.36**	**2.54**	**0.00**	**0.00**	**0.00**	**0.00**	**19.00**	**7.51**
MAX			**418.00**	**160.00**	**39.00**	**4.80**	**0.21**	**940.0**	**520.00**	**14.00**	**138.00**	**9.55**	**0.64**	**1130.0**	**220.00**
MEDIAN			**118.00**	**34.70**	**2.87**	**0.10**	**0.00**	**9.17**	**8.00**	**0.00**	**0.00**	**0.01**	**0.00**	**185.50**	**52.00**

2008 Small[1] Commercial Passenger Vessels Wastewater Treatment

	Vessel Operator	Vessel Name	Passenger Capacity (lower berth)	Crew Capacity	Voyages	Maximum Total Passengers	Blackwater Treatment System Manufacturer	Discharging in Alaska[2] & Subject to sampling program	
								BW	GW
1	Alaska Marine Highway System	*Columbia*	157	66	Year Rd.	N/A	Omnipure	Yes	Yes
2	Alaska Marine Highway System	*Kennicott*	162	42	Year Rd.	N/A	Orca	Yes	Yes
3	Alaska Marine Highway System	*Malaspina*	138	50	Year Rd.	N/A	Omnipure	Yes	Yes
4	Alaska Marine Highway System	*Matanuska*	136	50	Year Rd.	N/A	Omnipure	Yes	Yes
5	Alaska Marine Highway System	*Taku*	55	42	Year Rd.	N/A	Effluent Technology	Yes	Yes
6	Majestic America	*Empress of the North*[3]	235	85	13	3055	Orca	Yes	Yes
7	Cruise West	*Spirit of 98*	96	26	18	1728	Red Fox	Yes	Yes
8	Cruise West	*Spirit of Alaska*	78	21	15	1170	Omnipure	Yes	Yes
9	Cruise West	*Spirit of Columbia*	78	21	31	2418	Omnipure	Yes	Yes
10	Cruise West	*Spirit of Discovery*	84	21	17	1428	Red Fox	Yes	Yes
11	Cruise West	*Spirit of Endeavour*	102	28	18	1836	Omnipure	Yes	Yes
12	Cruise West	*Spirit of Glacier Bay*[3]	102	37	15	1530	Orca II A-500 MSD	Yes	Yes
13	Cruise West	*Spirit of Oceanus*	114	64	10	1140	Hamworthy	Yes	Yes
14	Cruise West	*Spirit of Yorktown*	138	37	16	2208	Omnipure 12MX824-27	Yes	Yes
15	Hapag-Lloyd	*Bremen*	164	100	2	328	Unknown	No	No
16	National Geographic	*Sea Bird*	70	28	19	1330	Omnipure 12M	Yes	Yes
17	National Geographic	*Sea Lion*	68	28	19	1292	Omnipure 12M	Yes	Yes
18	ISP	*Clipper Odyssey*	128	76	5	640	Consillium Neptumatic	Yes	Yes
				Totals	198	20103			

[1]A small vessel has overnight accommodations for 50-249 passengers. A large vessel has overnight accommodations for 250 or more passengers.

[2]Alaska water extends 3 miles from the coastline and includes the Alexander Archipelago. Vessels discharging in Alaska water must sample their wastewater twice per season.

[3] Vessel with cancelled sailings for 2008.

Not Discharging in AK waters