Alaska DEC 2010

Small Commercial Passenger Vessel and Ferry

Wastewater Sampling Results

January 2011

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. These are the US Coast Guard performance requirements for approval of Type II Marine Sanitation Devices (MSD) under test conditions. A MSD is required for discharge of blackwater in US waters. Some small cruise ships and ferries also treat their graywater with their MSD.

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). These BMP 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

Thirteen small ships registered with the CPVEC program in 2010, including five state ferries that operate in Alaska year-round. A list of registered small cruise vessels can be found in Appendix 1. 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 Hanseatic, did not discharge into Alaskan waters and was not sampled. Tables 1 and 2 summarize the 2010 small ship sampling results using the median[5] results for each pollutant. Data from the 12 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, chlorine, copper, and biological oxygen demand (BOD). Because of results seen in previous 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 2010 Small Vessels Median Sampling Results –Part 1 (12 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	**1** *	**6.5-8.5**	**60**	**n/a**	**150****	**0.0075**	**200 *****
Units	**mg/L**	**s.u.**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**fc/100 ml**
Graywater (14 samples)	0.62	7.31	215	390	32	0.0	4364
Blackwater (14 samples)	30	7.8	172	960	138	0.3	24
Mixed Blackwater & Graywater (10 Samples)	7.15	7.16	84	700	62	3.7	125

* 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 for TSS and 200 fc/100 ml for fecal coliform.

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

Table 2. Summary 2010 Small Vessels Median Sampling Results – Part 2 (12 vessels)

	Arsenic, dissolved	Chromium, dissolved	Copper, dissolved	Lead, dissolved	Nickel, dissolved	Selenium, dissolved	Zinc, dissolved
Alaska Water Quality Standards	36	N/A	3.1	8.1	8.2	71	81
Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Median (13 samples)	7.5	0.92	72	0	9.2	14	89

Wastewater results for individual ships

Tables 3 through 7 show the 2010 twice-per-season sampling results for each of the 12 ships that reported. Samples were analyzed for conventional and priority pollutants as listed in the Quality Assurance Project Plan (QAPP). 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 and chlorine

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 490 times the Alaska's marine water quality standard (AMWQS). The maximum total residual chlorine results for small-ship graywater and blackwater were 0.6 mg/L and 8.8 mg/L, respectively. The maximum total residual chlorine for mixed graywater and blackwater was 12.6 mg/L, over 1,600 times AMWQS. The fecal coliform standard is

200 colonies per 100 ml for approved Type II Marine Sanitation Devices. The most stringent AMWQS is 14 colonies per 100 ml to collect shellfish for raw consumption, and is the standard used to protect all uses of all waters. Traditionally blackwater has had the highest median fecal coliform results. In 2010 the highest median was from graywater with 4,364 colonies per 100 ml. This is 313 times the AMWQS for raw consumption of shellfish. The maximum fecal coliform result for any sample was from the Clipper Odyssey. With a greywater result of 1,318,180 colonies per 100 ml, this is over 94,000 times AMWQS 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 7 includes only a selection of the priority results. Full priority results are available on request to DEC.

Alaska uses dissolved metal concentration (a subset of total recoverable metals) for its water quality standards, but Table 6 also includes the total recoverable metals results for informational purposes. There are Alaska Marine Water Quality Standards (AMWQS) for dissolved arsenic, cadmium, chromium, copper, lead, selenium, nickel and zinc.All small cruise ships met the AMWQS for dissolved cadmium, chromium, mercury, and silver. All sampled vessels exceeded the AMWQS for copper. Four ships exceeded the AMWQS for selenium, three for arsenic, six for nickel, one for lead, and six 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. For marine vessels it would be difficult to establish a mixing zone as they are mobile dischargers. DEC has addressed this issue in the Best Management Practices plans (BMPs) to minimize 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. The law that authorizes BMPs is set to expire at the end of 2015. At that time the small commercial passenger vessels will be required to meet Alaska Marine Water Quality Standards (AMWQS) at the point of discharge or obtain a DEC permit to discharge.

Small commercial passenger vessels and state ferries have made progress in terms of overall effluent quality since the beginning of the CPVEC BMP program. Unfortunately there was a reduction in overall effluent quality when comparing 2009 with 2010 with regard to fecal coliform, TSS, and BOD. The increase in the fecal coliform for the mixed samples were likely due to short term issues from modifications made to AMHS ferries to improve performance of their wastewater systems. DEC believes further improvements can be made by small cruise ships and ferries, especially with regard to chlorine, fecal coliform, TSS, and biological oxygen demand (BOD).There will be a reduction in the number of small cruise ships in Alaska in 2011. Cruise West declared bankruptcy at the end of the 2010 cruise season. Cruise West was the largest operator of small cruise ships in Alaska.

Table 3. 2010 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	Conductivity	Oil & Grease	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	FC/100ml	umhos/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ml/L
Alaska Marine Water Quality Standards or MSD Limits		1	6.5-8.5	60	n/a	150	0.0075	n/a	43	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Vessel Name	Sample Date																
Clipper Odyssey	7/9/10	430.00	8.79	450	1,500	400	0	0	550,000	5,760	0	115	1,400	0.38	47.0	590	19.0
Clipper Odyssey	7/20/10	47.00	7.11	700	1,100	260	0	0	1,318,180	2,680	67.0	158	170	0	7.4	77	0
Spirit of Columbia	6/8/10	0.82	6.0	325	1,000	172	0	0	27,000	4,440	36.0	82	62	20	2.7	20	0
Spirit of Columbia	9/1/10	0.23	6.0	160	370	68	0	0	10,909	100	0	66	21	0	1.1	10	0
Spirit of Discovery	5/24/10	0.42	8.0	42	28	15	0.6	0.4	0	204	6	5	51	0.29	0.25	1.4	0
Spirit of Discovery	6/17/10	0.16	7.5	43	510	42	0	0	0	247	0	21	65	0.20	0.38	8.1	0.75
Spirit of Endeavor	5/19/10	1.90	7.0	270	410	20	0.60	4.00	0	757	31.0	110	130	0.13	1.00	9.3	0.6
Spirit of Endeavor	6/23/10	1.40	9.0	282	330	30	0	0.20	8,727	751	48.0	36	120	0.20	1.30	8.4	0
Spirit of Yorktown	6/20/10	3.50	6.80	50.0	150	31	0	0	85,586	570	19	36	49.0	0	0.56	7.80	0
Spirit of Yorktown	8/1/10	4.30	7.62	132.0	230	28	0	0	50,000	196	28	37.7	62.0	0.11	0.71	8.50	0
Sea Bird	6/20/10	0.12	6.74	78.0	350	0	0	0	0	293	8.4	170	33.0	0	0.32	3.70	0
Sea Bird	8/15/10	0.32	6.01	1,700	3,200	45	0	0	0	539	20.0	27	0	0	0.50	3.90	0
Sea Lion	6/19/10	0.31	7.64	440	1,100	33	0.11	0	0	823	24.0	840	180	0	0.62	1.20	0
Sea Lion	8/14/10	0.29	8.03	113.0	330	14	0	0	0	348	16.0	49	76.0	0	0.50	4.50	1.5
	Minimum	**0**	**6.00**	**42**	**28**	**0.0**	**0.0**	**0.0**	**0**	**100**	**0.0**	**5.3**	**0.0**	**0.00**	**0.25**	**1.20**	**0.00**
	Maximum	**430**	**9.00**	**1,700**	**3,200**	**400.0**	**0.6**	**4.0**	**1,318,180**	**5,760**	**67.0**	**840.0**	**1,400.0**	**20.00**	**47.00**	**590.00**	**19.00**
	Median	**0.62**	**7.31**	**215**	**390**	**32.0**	**0.0**	**0.0**	**4,364**	**555**	**19.5**	**57.5**	**63.5**	**0.06**	**0.67**	**8.25**	**0.00**

Non-detects recorded as zero.

Table 4. 2010 Small Ship Blackwater 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	Conductivity	Oil & Grease	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	FC/100ml	umhos/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ml/L
Alaska Marine Water Quality Standards or MSD Limits		1	6.5-8.5	60	n/a	150	0.0075	n/a	43	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Vessel Name	Sample Date																
Clipper Odyssey	7/9/10	450	8.86	480	1,500	1,400	0.2	0	390,000	7,220	7.1	105.0	1,800	0.14	62.0	410	73
Clipper Odyssey	7/20/10	400	8.73	610	2,600	890	8.7	3.4	0	632	5.9	370.0	1,900	0.12	54.0	730	120
Spirit of Columbia	6/8/10	30	7.0	152.0	920	164	0.8	1.5	18	40,900	7.6	67.0	190	0.42	9.80	100	0
Spirit of Columbia	9/1/10	0.14	6.0	15.0	570	30	0.8	1.5	4	34,000	0	6.6	90	0.12	1.10	2.50	0
Spirit of Discovery	5/24/10	84	7.6	188	860	13	1.4	0.2	0	31300	6	65	52	0.3	9.4	37	5
Spirit of Discovery	6/17/10	69	6.8	190	1100.00	196	0	0	954,545	36900	18	37	460	0.49	12.0	56	5.5
Spirit of Endeavor	5/19/10	24	7.0	155	1,000	182	0.5	0.8	118	40,200	6.1	94	200	0.93	10.0	95	1.4
Spirit of Endeavor	6/23/10	30	6.0	300	1,200	112	0.4	0.5	30	39,900	8.5	96	240	0.75	12.0	68.00	2.5
Spirit of Yorktown	6/20/10	540	8.4	2,100	2,900	493	0	0	1,027,273	41,300	24.0	480	2000	0	40.0	330	5
Spirit of Yorktown	8/1/10	440	8.0	1,100	3,000	1,470	0.1	0	1,000,000	24,800	17.0	37.1	1,600	0	33.0	610	18
Sea Bird	6/20/10	1.30	6.91	11.0	490	32	0.15	0.14	207	29,400	0	29	76	0	0.82	8.40	0
Sea Bird	8/15/10	0.15	8.59	2.7	530	15	0	0	4	31,700	0	7.7	78	0	0	0	0
Sea Lion	6/19/10	3.30	8.21	25.0	540	43	0	0	0	32,700	0	44	91	0.24	1.50	10.00	2
Sea Lion	8/14/10	7.60	8.58	127.0	600	74	8.8	0.22	0	25,800	5.2	79.8	130	0.38	3.10	32.00	1.5
Minimum		**0.14**	**6.00**	**3**	**490**	**13.0**	**0**	**0**	**0**	**632**	**0.0**	**6.6**	**52.0**	**0**	**0.00**	**0.00**	**0.00**
Maximum		**540**	**8.86**	**2,100**	**3,000**	**1,470**	**8.8**	**3.4**	**1,027,273**	**41,300**	**24.0**	**480.0**	**2,000**	**0.93**	**62.00**	**730.00**	**120.00**
Median		**30.00**	**7.80**	**172**	**960**	**138.0**	**0.3**	**0.2**	**24**	**32,200**	**6.1**	**66.0**	**195.0**	**0.19**	**9.90**	**62.00**	**2.10**

Non-detects recorded as zero.

Table 5. 2010 Small Ship Sampling Mixed 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	Conductivity	Oil & Grease	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	FC/100ml	umhos/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ml/L
Alaska Marine Water Quality Standards or MSD Limits		1	6.5-8.5	60	n/a	150	0.0075	n/a	43	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Vessel Name	Sample Date																
Columbia	7/12/10	19.0	7.02	91.0	720	43	0	0	37,000	30,300	5.1	42.4	180	0	4.0	23	0
Columbia	8/23/10	5.5	6.59	75.0	150	32	12.6	6.4	20	28,400	9.7	25.0	99	0	4.1	19	0
Kennicott	5/11/10	0	8.25	0	810	19	5.4	3.9	0	42,400	0	5.2	110	0	0	0	0
Kennicott	6/8/10	2.40	8.01	71.0	500	52	2.6	2.6	100	39,400	0	1.8	96	0	0.61	5	0
Malaspina	6/29/10	21.0	5.98	184.0	560	72	0	0	150	21,000	16.0	65.7	53	0.13	4.70	34	0
Malaspina	7/26/10	21.0	6.27	254.0	1,300	132	0	0	718	23,400	24.0	81.3	100	0.12	5.60	36	3
Matanuska	5/23/10	8.8	6.51	116.0	980	42	9.0	2.4	2,500	30,800	12.0	44.0	100	0.19	2.70	22.0	0
Matanuska	6/20/10	27.0	7.29	160.0	850	272	0	0	800,000	25,200	38.0	75.0	240	0	6.80	51.0	6
Taku	5/11/10	4.20	8.53	76	680	80.0	4.8	5.3	40	34,500	17.0	29.0	110.0	0.18	1.80	9.9	0
Taku	6/15/10	2.70	8.20	60	150	118.0	5.7	5.2	20	34,600	12.0	9.2	98.0	0.13	1.60	6.7	2.20
Minimum		**0.00**	**5.98**	**0**	**150**	**19.0**	**0.0**	**0.0**	**0**	**21,000**	**0.0**	**1.8**	**53.0**	**0.00**	**0.00**	**0.00**	**0.00**
Maximum		**27.00**	**8.53**	**254**	**1,300**	**272.0**	**12.6**	**6.4**	**800,000**	**42,400**	**38.0**	**81.3**	**240**	**0.19**	**6.80**	**51.00**	**5.70**
Median		**7.15**	**7.16**	**84**	**700**	**62.0**	**3.7**	**2.5**	**125**	**30,550**	**12.0**	**35.7**	**100**	**0.06**	**3.35**	**20.50**	**0.00**

Non-detects recorded as zero.

Table 6. 2010 Small Ship Sampling Metal Results

Parameter			Antimony (TR)	Antimony, (Dissolved)	Arsenic (TR)	Arsenic, dissolved	Beryllium (TR)	Beryllium Dissoved	Cadmium (TR)	Cadmium Dissolved	Chromium (TR)	Chromium dissolved	Copper (TR)	Copper, dissolved
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Water Quality Standards						36				8.8				3.1
Vessel Name	Sample Date	Sample Type												
Columbia	8/23/10	Mixed	0	0	33	20	0	0	0	0	0	0	94	80
Kennicott	5/11/10	Mixed	0	0	75	51	0	0	0	0	0	0	56	66
Malaspina	7/26/10	Mixed	0	0	41	29	0	0	0	0	0	2.8	150	72
Matanuska	6/20/10	Mixed	0	0	49	56	0	0	0	0	3.5	0.92	800	26
Taku	5/11/10	Mixed	0	0	62	48	0	0	0	0	0	0	110	72
Clipper Odyssey	7/20/10	BW	0	0	6.2	7.5	0	0	0	0	6.6	5.7	280	190
Clipper Odyssey	7/20/10	GW	0	0	4.5	5.2	0	0	0	0	0	0	85	16
Spirit of Columbia	9/1/10	GW	0	0	4.5	0	0	0	0	0	3	0	130	22
Spirit of Discovery	6/17/10	GW	0	0	0	0	0	0	0	0	0	8.9	260	110
Spirit of Endeavor	6/23/10	GW	0	0	2	0	0	0	0	0	5	3	57	42
Spirit of Yorktown	8/1/10	GW	0	0	0	2	0	0	0	0	3.2	2.7	95	34
Sea Bird	8/15/10	GW	0	0	0	2.6	0	0	0	0	14	12	180	140
Sea Lion	8/14/10	BW	1.4	1.5	42	42	0	0	0	0	3.7	0	96	83
MIN			**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**56.00**	**16.00**
MAX			**1.40**	**1.50**	**75.00**	**56.00**	**0.00**	**0.00**	**0.00**	**0.00**	**14.00**	**12.00**	**800.00**	**190.00**
MEDIAN			**0.00**	**0.00**	**6.20**	**7.50**	**0.00**	**0.00**	**0.00**	**0.00**	**3.00**	**0.92**	**110.00**	**72.00**

Non-detects set to zero.

Table 6 (continued) 2010 Small Ship Sampling Metal Results

Parameter			Lead (TR)	Lead, dissolved	Mercury (Total)	Nickel (TR)	Nickel, dissolved	Selenium (TR)	Selenium, dissolved	Silver (TR)	Silver, Dissolved	Thallium (TR)	Thallium, dissolved	Zinc (TR)	Zinc, dissolved
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Water Quality Standards				8.1	0.94		8.2		71		1.9				81
Vessel Name	Sample Date	Sample Type													
Columbia	8/23/10	Mixed	0	0	0	8.1	7.6	120	55	0	0	0	0	58	60
Kennicott	5/11/10	Mixed	0	0	0	15	19	270	170	0	0	0	0	65	41
Malaspina	7/26/10	Mixed	1.4	0	0	33	34	140	100	0	0	0	0	110	89
Matanuska	6/20/10	Mixed	5.6	0	0	30	37	160	180	0	0	0	0	180	21
Taku	5/11/10	Mixed	3.6	0	0	16	19	220	160	0	0	0	0	58	22
Clipper Odyssey	7/20/10	BW	8.8	1.3	0.43	19	18	14	14	0	0	0	3.2	670	190
Clipper Odyssey	7/20/10	GW	2.3	0	0	7.8	9.2	14	13	0	0	0	2.6	130	92
Spirit of Columbia	9/1/10	GW	6.8	1.5	0	7	4.2	12	0	0	0	0	0	600	220
Spirit of Discovery	6/17/10	GW	11	1.2	0	0	0	0	0	0	0	0	0	1800	130
Spirit of Endeavor	6/23/10	GW	3.7	1.7	0	3.8	2.9	1.8	1.4	0	0	0	0	280	110
Spirit of Yorktown	8/1/10	GW	3.8	0	0	0	1.3	0	0	0	0	0	2.7	140	46
Sea Bird	8/15/10	GW	13	12	0	4.2	4.9	0	0	0	0	0	0	570	610
Sea Lion	8/14/10	BW	3.9	0	0	8.8	9.6	130	110	0	0	0	2.1	84	29
MIN			**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**58.00**	**21.00**
MAX			**13.00**	**12.00**	**0.43**	**33.00**	**37.00**	**270.00**	**180.00**	**0.00**	**0.00**	**0.00**	**3.20**	**1800.00**	**610.00**
MEDIAN			**3.80**	**0.00**	**0.00**	**8.10**	**9.20**	**14.00**	**14.00**	**0.00**	**0.00**	**0.00**	**0.00**	**140.00**	**89.00**

Non-detects set to zero.

Table 7 2010 Small Ship Selected Priority Results

Parameter			3/4-Methyl phenol	Acetone	Bromoform	Benzyl Alcohol	Chloroform	Bromodichloromethane	Dibromochloromethane	Benzoic Acid	Phenol	Bis(2-ethylhexyl) phthalate
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	
Water Quality Standards												
Vessel Name	Sample Date	Sample Type										
Columbia	8/23/10	Mixed	0	0	93	0	0	5.4	26	120	0	3.9
Kennicott	5/11/10	Mixed	0	0	32	0	0	0	0	0	0	0
Malaspina	7/26/10	Mixed	0	0	100	0	0	6.2	32	280	0	0
Matanuska	6/20/10	Mixed	170	0	0	0	0	0	0	210	0	0
Taku	5/11/10	Mixed	0	0	190	0	0	0	0	49	0	9
Clipper Odyssey	7/20/10	BW	0	61	0	0	22	0	0	0	32	0
Clipper Odyssey	7/20/10	GW	19	54	7.9	0	6	0	0	73	0	30
Spirit of Columbia	9/1/10	GW	0	0	0	0	23	0	0	0	0	0
Spirit of Discovery	6/17/10	GW	17	0	0	0	8	0	0	0	0	13
Spirit of Endeavor	6/23/10	GW	16	0	0	27	68	0	0	0	0	46
Spirit of Yorktown	8/1/10	GW	0	0	0	90	18	0	0	0	0	0
Sea Bird	8/15/10	GW	0	73	0	87	140	0	0	52	0	9.6
Sea Lion	8/14/10	BW	0	0	140	310	0	18	52	54	0	63
MIN			**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
MAX			**170**	**73**	**190**	**310**	**140**	**18**	**52**	**280**	**32**	**63.00**
MEDIAN			**0.00**	**0.00**	**0.00**	**0.00**	**6.00**	**0.00**	**0.00**	**49.00**	**0.00**	**3.90**

Non-detects set to zero.

Appendix 1

Alaska Department of Environmental Conservation 3/18/2010

2010 Small[1] Commercial Passenger Vessels Wastewater Treatment

Vessel Operator	Vessel Name	Passenger Capacity	Crew Capacity	Voyages	Maximum Total Passengers	Blackwater Treatment System Manufacturer	Discharging in Alaska[2] & Subject to sampling program	
							BW	GW
Alaska Marine Highway System	*Columbia*	625	66	Year Rd.	N/A	Omnipure	Yes	Yes
Alaska Marine Highway System	*Kennicott*	748	42	Year Rd.	N/A	Orca	Yes	Yes
Alaska Marine Highway System	*Malaspina*	500	50	Year Rd.	N/A	Omnipure	Yes	Yes
Alaska Marine Highway System	*Matanuska*	498	50	Year Rd.	N/A	Omnipure	Yes	Yes
Alaska Marine Highway System	*Taku*	370	42	Year Rd.	N/A	Effluent Technology	Yes	Yes
Cruise West	*Spirit of Columbia*	80	21	21	1680	Omnipure	Yes	Yes
Cruise West	*Spirit of Discovery*	95	19	19	1805	Red Fox	Yes	Yes
Cruise West	*Spirit of Endeavour*	109	28	17	1853	Omnipure	Yes	Yes
Cruise West	*Spirit of Yorktown*	138	37	14	1932	Omnipure 12MX824-27	Yes	Yes
Hapag-Lloyd	*Hanseatic*	188	120	1	188	Unknown	No	No
National Geographic	*Sea Bird*	66	28	17	1122	Omnipure 12M	Yes	Yes
National Geographic	*Sea Lion*	66	28	19	1254	Omnipure 12M	Yes	Yes
ISP	*Clipper Odyssey*	132	76	3	396	Consillium Neptumatic	Yes	Yes
			Totals	111	10,230			

[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.

Not Discharging in AK waters