



ALASKA
Department of
Environmental
Conservation

Technology Data

Treatment System Type: Hamworthy Used by Princess, Seven Seas

	Ammonia	Copper	Nickel	Zinc
Median	48	13.2	8.5	110.0
Average	53.7	23.3	12.9	126.3
Max	160	160	420	450
Min	0.097	0.25	0.5	18
95th Percentile	114	78.9	22	271
99th Percentile	142.8	133.1	63.4	394.8

Note: Sample data does not include samples where there was a known malfunction in the treatment system. This was only two samples.

2004-2009 Sample data

Ship	Date	Ammonia	Copper	Nickel	Zinc
Coral Princess	5/15/2004	36	27.4	11.1	153.0
Coral Princess	5/19/2004	55.0			
Coral Princess	8/11/2004	33.0	25.40	9.30	78.90
Dawn Princess	5/13/2004	7.5			
Dawn Princess	7/16/2004	16.0	10.50	9.44	121.00
Diamond Princess	5/17/2004	71.0			
Diamond Princess	7/12/2004	3.6	33.60	11.60	233.00
Island Princess	5/26/2004	110.0			
Island Princess	7/27/2004	63.0	0.25	11.20	73.80
Regal Princess	5/20/2004	24.0			
Regal Princess	7/18/2004	60.0	76.30	9.44	187.00
Sapphire Princes	6/30/2004	100.0			
Sapphire Princes	8/4/2004	23.7	14.90	8.51	411.00
Sapphire Princes	8/25/2004	61.7	20.00	10.40	370.00
Seven Seas Mariner	6/27/2004	18.0			
Seven Seas Mariner	8/29/2004	7.4	10.40	0.50	55.70
Sun Princess	5/20/2004	0.1			
Sun Princess	9/9/2004	28.0	1.96	4.83	22.00
Sapphire Princes	5/25/2005	51.0			
Sapphire Princes	7/20/2005	95.8	1.25	3.58	26.60
Seven Seas Mariner	6/6/2005	92.7			
Seven Seas Mariner	7/25/2005	0.1	2.76	3.42	84.50
Sun Princess	5/26/2005	74.0			
Sun Princess	8/12/2005	66.0	10.20	6.50	91.90
Regal Princess	6/3/2005	49.0			
Regal Princess	9/10/2005	30.0	128.00	9.33	54.40
Coral Princess	5/25/2005	25.0			
Coral Princess	7/12/2005	32.0	23.60	8.21	171.00
Dawn Princess	5/27/2005	74.0			
Dawn Princess	7/28/2005	23.0	11.20	5.09	89.20
Diamond Princess	5/23/2005	41.0			
Diamond Princess	7/18/2005	79.0	31.10	10.50	106.00
Diamond Princess	8/15/2005	64.0			
Island Princess	5/24/2005	34.0			
Island Princess	7/13/2005	14.0	20.30	5.53	141.00
Coral Princess	6/8/2006	110.0			
Coral Princess	6/22/2006	89.0	17.70	4.05	80.10
Coral Princess	8/21/2006	150.0	7.64	9.40	46.70
Dawn Princess	5/29/2006	59.0			
Dawn Princess	6/26/2006	26.0	22.70	4.30	252.00
Diamond Princess	5/24/2006	36.0			
Diamond Princess	6/21/2006	44.0	10.70	15.50	89.80
Diamond Princess	8/2/2006	61.0			
Island Princess	5/26/2006	22.0			
Island Princess	6/23/2006	22.0	19.20	7.93	98.30
Regal Princess	6/9/2006	59.0			
Regal Princess	7/20/2006	60.0	66.70	15.40	137.00
Sapphire Princess	5/31/2006	54.0			
Sapphire Princess	8/29/2006	66.0	160.00	15.70	67.20
Sun Princess	5/24/2006	42.0			
Sun Princess	6/21/2006	23.0	11.20	7.77	176.00
Sun Princess	7/12/2006	69.0	11.00	8.50	305.00
Sun Princess	8/2/2006	51.0			
Seven Seas Mariner	6/12/2006	22.0			
Seven Seas Mariner	8/7/2006	0.1	4.61	3.87	86.70
Coral Princess	6/7/2007	33.0			

Note: Non-detects listed as 1/2 the Method Detection Limit (MDL) for statistical purposes.

Ship	Date	Ammonia	Copper	Nickel	Zinc
Coral Princess	6/15/2007	73.0	38.40		84.40
Coral Princess	7/27/2007	46.0	17.40	8.44	75.10
Dawn Princess	5/25/2007	59.0	2.38		80.70
Dawn Princess	6/5/2007	44.0	1.93	2.92	44.70
Dawn Princess	7/13/2007	76.0			
Diamond Princess	5/23/2007	35.0			
Diamond Princess	6/6/2007	44.0	15.10		130.00
Diamond Princess	7/31/2007	41.0	8.20	8.36	78.90
Golden Princess	5/21/2007	27.0	13.30		109.00
Golden Princess	6/4/2007	24.0	18.40	8.41	142.00
Golden Princess	7/31/2007	34.0			
Island Princess	5/25/2009	28.0	25.00		103.00
Island Princess	5/31/2007	48.0	26.50	6.68	143.00
Island Princess	8/27/2007	72.0			
Pacific Princess	6/17/2007	59.0	11.90		86.60
Pacific Princess	7/7/2007	44.0			
Pacific Princess	8/18/2007	48.0	41.00	15.00	60.00
Sapphire Princess	5/30/2007	66.0	34.90	15.00	84.50
Sapphire Princess	7/31/2007	56.0			
Sapphire Princess	8/14/2007	54.0	46.60	7.60	62.50
Sun Princess	5/16/2007	2.8	7.94		73.40
Sun Princess	5/30/2007	75.0			
Sun Princess	8/22/2007	100.0	6.60		33.00
Seven Seas Mariner	6/11/2007	14.0	5.07	4.70	76.70
Seven Seas Mariner	7/22/2007	21.0	3.57	5.86	75.70
Coral Princess	5/15/2008	23	17.2	17.5	208
Coral Princess	5/23/2008	74	17	9.5	170
Coral Princess	5/29/2008	100	19.1	7.62	132
Coral Princess	6/12/2008	59	31.4	10.5	151
Coral Princess	6/20/2008	33	88.1	12	125
Coral Princess	7/10/2008	20	25.8	9.28	159
Coral Princess	7/18/2008	25	18	7.82	98.8
Coral Princess	7/28/2008	58	31	7.2	98
Coral Princess	8/1/2008	24	20.3	8.1	173
Coral Princess	8/7/2008	68	19	6.7	140
Coral Princess	9/4/2008	42	24	7.7	150
Coral Princess	9/12/2008	51	30	9.2	140
Dawn Princess	5/11/2008	26	5.58	8.15	94.2
Dawn Princess	5/23/2008	23	6.48	4.56	134
Dawn Princess	5/31/2008	33	5.5	3.3	150
Dawn Princess	6/12/2008	15	7.25	3.88	232
Dawn Princess	6/20/2008	26	5.09	3.12	222
Dawn Princess	6/30/2008	28	6	3	120
Dawn Princess	7/10/2008	5.4	8.52	4.7	114
Dawn Princess	7/20/2008	23	5.11	3.66	121
Dawn Princess	8/21/2008	53	7.2	3.6	260
Dawn Princess	8/29/2008	15	7.4	4.5	150
Dawn Princess	9/18/2008	44	8.4	4.4	220
Dawn Princess	9/8/2008	25	12	4.4	140
Diamond Princess	6/10/2008	110	7.81	18.5	106
Diamond Princess	6/18/2008	100	8.6	15	84
Diamond Princess	7/8/2008	89	35.3	13	59.8
Diamond Princess	7/16/2008	73	17.5	28.4	97.5
Diamond Princess	8/5/2008	67	14.2	8.9	112
Diamond Princess	8/27/2008	70	11	11	130
Diamond Princess	9/2/2008	78	6.4	12	110
Diamond Princess	9/10/2008	120	5.5	12	50
Golden Princess	5/12/2008	21	9.26	6.92	179
Golden Princess	5/15/2008	29	8.3	6	180
Golden Princess	5/19/2008	27	11.3	7.3	225
Golden Princess	6/9/2008	36	10.2	6.33	203
Golden Princess	6/16/2008	51	10.7	4.89	106
Golden Princess	6/30/2008	42	5.1	5.3	93
Golden Princess	7/7/2008	22	14.5	7.36	156
Golden Princess	7/21/2008	21	6.72	6.47	269
Golden Princess	8/11/2008	33	17	6.8	150
Golden Princess	8/18/2008	38	41	9.4	350
Golden Princess	9/1/2008	63	11	5.7	130
Golden Princess	9/8/2008	46	35	6.9	210
Island Princess	5/22/2008	22	23.2	14.5	92.5

Ship	Date	Ammonia	Copper	Nickel	Zinc
Island Princess	5/30/2008	24	37.2	9.51	135
Island Princess	6/5/2008	70	40.8	9.14	228
Island Princess	6/13/2008	64	22.5	8.68	87.4
Island Princess	6/19/2008	38	22	9.3	360
Island Princess	7/11/2008	12	40	9	120
Island Princess	7/17/2008	26	29.5	8.36	164
Island Princess	8/8/2008	87	5.4	7.9	38
Island Princess	8/14/2008	83	5.4	6.8	39
Island Princess	8/22/2008	76	5.6	7.9	73
Island Princess	9/5/2008	75	5.2	6.2	77
Island Princess	9/11/2008	98	7	7.2	18
Sapphire Princess	5/20/2008	52	14	12.7	53.1
Sapphire Princess	5/28/2008	92	23.2	15.7	67.1
Sapphire Princess	6/11/2008	7.8	51	24	60
Sapphire Princess	6/17/2008	85	13.9	14.2	47.4
Sapphire Princess	6/25/2008	50	22.9	27	89.9
Sapphire Princess	7/1/2008	37	8.78	9.32	53.3
Sapphire Princess	7/9/2008	40	28.1	43.2	112
Sapphire Princess	7/29/2008	100	5.6	13	92
Sapphire Princess	8/6/2008	100	13.2	18.4	64.3
Sapphire Princess	8/12/2008	71	9.4	13	45
Sapphire Princess	9/3/2008	130	10	20	59
Sapphire Princess	9/9/2008	110	8.2	13	45
Star Princess	5/7/2008	35	140	21	410
Star Princess	5/14/2008	21	135	15.7	110
Star Princess	5/28/2008	34	100	12	130
Star Princess	6/18/2008	27	59.2	13.6	123
Star Princess	6/25/2008	32	55.5	15.7	119
Star Princess	7/16/2008	42	30.1	18.4	113
Star Princess	7/17/2008	30	19	8.5	87
Star Princess	8/13/2008	64	100	19	81
Star Princess	8/20/2008	65	78	20	100
Star Princess	9/3/2008	56	35	9.3	120
Star Princess	9/10/2008	71	60	11	49
Sun Princess	8/15/2008	100	14.0	9.1	150.0
Seven Seas Mariner	5/23/2008	42	23.3	7.26	357
Seven Seas Mariner	5/25/2008	19	4.62	5.75	227
Seven Seas Mariner	6/14/2008	29	2.56	5.94	97.3
Seven Seas Mariner	6/13/2008	33	9.7	4.5	45
Seven Seas Mariner	7/18/2008	40	5.87	4.46	35.9
Seven Seas Mariner	7/19/2008	13	2.76	4.24	29.9
Seven Seas Mariner	8/15/2008	11	3.2	4.5	29
Seven Seas Mariner	8/16/2008	9.9	4.7	3.8	47
Seven Seas Mariner	9/13/2008	4.7	11	4.6	63
Seven Seas Mariner	9/14/2008	11	12	3.9	74
Coral Princess	5/21/2009	91	35.00	9.10	190.00
Coral Princess	5/29/2009	67	26.00	7.90	100.00
Coral Princess	6/4/2009	74	20.00	7.90	180.00
Coral Princess	6/12/2009	75	25.00	8.70	110.00
Coral Princess	6/18/2009	64	11.00	6.90	170.00
Coral Princess	7/2/2009	59	8.40	21.00	88.00
Coral Princess	7/16/2009	65	11.00	9.20	150.00
Coral Princess	7/20/2009	67	8.30	7.50	56.00
Coral Princess	8/13/2009	68	9.50	20.00	190.00
Coral Princess	8/27/2009	31	13.00	8.50	150.00
Coral Princess	9/10/2009	67	16.00	6.70	130.00
Coral Princess	9/18/2009	51	11.00	8.00	140.00
Diamond Princess	5/20/2009	69	9.70	10.00	100.00
Diamond Princess	5/26/2009	79	10.00	9.50	100.00
Diamond Princess	6/3/2009	82	5.00	13.00	81.00
Diamond Princess	6/13/2009	68	6.10	9.60	79.00
Diamond Princess	6/17/2009	100	6.70	12.00	120.00
Diamond Princess	7/1/2009		8.60	11.00	150.00
Diamond Princess	7/15/2009	74	4.10	14.00	160.00
Diamond Princess	7/29/2009	92	7.20	14.00	170.00
Diamond Princess	8/12/2009	86	21.00	15.00	240.00
Diamond Princess	8/31/2009	45	11.00	11.00	150.00
Diamond Princess	9/9/2009	55	11.00	19.00	200.00
Diamond Princess	9/15/2009	41	8.90	16.00	240.00
Golden Princess	5/11/2009	43	14.00	7.90	250.00

Ship	Date	Ammonia	Copper	Nickel	Zinc
Golden Princess	5/18/2009	35	23.00	6.80	290.00
Golden Princess	6/1/2009	17	13.00	7.50	250.00
Golden Princess	6/8/2009	59	37.00	7.70	200.00
Golden Princess	6/15/2009	27	15.00	11.00	220.00
Golden Princess	7/6/2009	17	10.00	7.70	130.00
Golden Princess	7/13/2009	70	15.00	11.00	190.00
Golden Princess	7/20/2009	40	12.00	6.60	130.00
Golden Princess	8/3/2009	35	39.00	12.00	450.00
Golden Princess	8/10/2009	23	51.00	10.00	300.00
Golden Princess	9/7/2009	28	18.00	6.20	280.00
Golden Princess	9/14/2009	37	35.00	12.00	330.00
Island Princess	5/14/2009	130	13.00	6.50	140.00
Island Princess	5/27/2009	120	5.20	8.60	88.00
Island Princess	5/28/2009	160	10.00	8.20	88.00
Island Princess	6/11/2009	130	5.50	9.90	87.00
Island Princess	6/25/2009	110	8.00	7.10	130.00
Island Princess	7/9/2009	85	5.20	6.00	130.00
Island Princess	7/22/2009	80	6.10	5.80	160.00
Island Princess	8/20/2009	120	12.00	7.00	140.00
Island Princess	8/14/2009	120	14.00	9.80	200.00
Island Princess	9/3/2009	100	7.90	6.90	190.00
Island Princess	9/11/2009	97	4.00	9.00	50.00
Pacific Princess	5/16/2009	40	54.00	19.00	110.00
Pacific Princess	5/25/2009	26	66.00	19.00	130.00
Pacific Princess	6/8/2009	35	36.00	16.00	84.00
Pacific Princess	6/22/2009	31	33.00	21.00	100.00
Pacific Princess	7/6/2009	41	110.00	25.00	150.00
Pacific Princess	7/20/2009	45	100.00	23.00	72.00
Pacific Princess	8/3/2009	51	76.00	17.00	87.00
Pacific Princess	8/31/2009	10	6.20	14.00	120.00
Pacific Princess	9/5/2009	47	28.00	18.00	150.00
Pacific Princess	9/14/2009	41	12.00	13.00	160.00
Sapphire Princess	5/19/2009	99	7.50	10.00	30.00
Sapphire Princess	5/27/2009	120	42.00	14.00	94.00
Sapphire Princess	6/2/2009	100	130.00	420.00	67.00
Sapphire Princess	6/16/2009	93	46.00	70.00	43.00
Sapphire Princess	6/30/2009	89	130.00	170.00	110.00
Sapphire Princess	7/13/2009	81	56.00	30.00	66.00
Sapphire Princess	7/14/2009	140	21.00	17.00	63.00
Sapphire Princess	7/28/2009	99	60.00	20.00	96.00
Sapphire Princess	8/11/2009	86	44.00	16.00	76.00
Sapphire Princess	8/25/2009	78	41.00	17.00	100.00
Sapphire Princess	9/8/2009	63	47.00	26.00	270.00
Sapphire Princess	9/16/2009	100	87.00	48.00	170.00
Sea Princess	5/27/2009	99	63.00	12.00	48.00
Sea Princess	5/28/2009	46	58.00	12.00	50.00
Sea Princess	6/7/2009	45	16.00	7.10	50.00
Sea Princess	6/17/2009	130	14.00	7.70	77.00
Sea Princess	6/27/2009	76	12.00	7.80	69.00
Sea Princess	7/8/2009	59	9.40	7.70	50.00
Sea Princess	7/17/2009	62	17.00	7.90	62.00
Sea Princess	7/27/2009	85	12.00	8.30	41.00
Sea Princess	8/16/2009	150	12.00	7.00	64.00
Sea Princess	8/26/2009	81	20.00	9.50	81.00
Sea Princess	9/5/2009	41	5.80	6.70	84.00
Sea Princess	9/4/2009	120	12.00	7.90	83.00
Star Princess	5/13/2009	48	11.00	9.20	140.00
Star Princess	5/19/2009	35	12.00	5.90	93.00
Star Princess	5/20/2009	27	17.00	9.60	160.00
Star Princess	6/3/2009	49	15.00	9.80	150.00
Star Princess	6/10/2009	72	15.00	8.50	150.00
Star Princess	7/8/2009	39	9.00	6.90	140.00
Star Princess	7/15/2009	76	12.00	7.20	150.00
Star Princess	7/29/2009	47	14.00	6.00	120.00
Star Princess	8/5/2009	46	17.00	8.10	150.00
Star Princess	8/19/2009	49	15.00	6.50	140.00
Star Princess	9/2/2009	34	15.00	6.20	160.00
Star Princess	9/9/2009	64	26.00	6.60	170.00
Seven Seas Mariner	5/29/2009	16	2.70	8.50	23.00
Seven Seas Mariner	5/30/2009	29	5.50	9.40	50.00

Ship	Date	Ammonia	Copper	Nickel	Zinc
Seven Seas Mariner	6/19/2009	8.3	2.50	5.00	56.00
Seven Seas Mariner	6/20/2009	1.8	2.80	4.60	62.00
Seven Seas Mariner	7/17/2009	7.8	4.40	3.80	41.00
Seven Seas Mariner	7/18/2009	3.4	2.20	4.10	61.00
Seven Seas Mariner	8/7/2009	6.7	6.70	4.00	59.00
Seven Seas Mariner	8/8/2009	0.23	6.00	3.30	50.00
Seven Seas Mariner	9/4/2009	7.4	10.00	5.70	96.00
Seven Seas Mariner	9/5/2009	6.9	6.60	6.10	110.00

Treatment System Type: Scanship Used by Norwegian, Serenade

	Ammonia	Copper	Nickel	Zinc
Median	28.0	4.31	8.38	70.50
Average	29.4	6.6	9.7	78.0
Max	71	43	39.2	312
Min	0.31	0.25	3.11	0.5
95th Percentile	50.15	19.235	18.1	159.05
99th Percentile	67.66	25.96	28.42	266.66

2004-2009 Sample data

Ship	Date	Ammonia	Copper	Nickel	Zinc
Norwegian Spirit	6/8/2004	3.6			
Norwegian Spirit	7/27/2004	11.0	2.78	9.28	47.20
Norwegian Spirit	8/10/2004	12.0	0.25	8.16	55.70
Norwegian Star	6/29/2004	43.0			
Norwegian Star	8/10/2004	68.0	3.58	3.11	122.00
Norwegian Sun	6/2/2004	20.0			
Norwegian Sun	8/18/2004	51.0	1.76	7.09	105.00
Serenade of the Seas	6/2/2005	32.0	6.20	11.80	184.00
Serenade of the Seas	6/23/2005	19.0			
Serenade of the Seas	8/18/2005	21.0	3.83	19.00	312.00
Norwegian Dream	6/26/2005	41.0			
Norwegian Dream	7/24/2005	13.0	11.30	39.20	97.00
Norwegian Spirit	5/24/2005	18.0			
Norwegian Spirit	7/26/2005	16.0	4.11	5.37	66.90
Norwegian Star	6/14/2005	46.0			
Norwegian Star	7/19/2005	50.0	5.75	7.09	169.00
Norwegian Sun	6/1/2005	28.0			
Norwegian Sun	8/17/2005	36.0	4.21	6.36	117.00
Norwegian Wind	6/22/2006	36.0			
Norwegian Wind	7/26/2006	0.3			
Norwegian Wind	8/23/2006	30.0	8.06	16.10	22.20
Norwegian Star	5/23/2006	44.0			
Norwegian Star	8/8/2006	51.0	2.84	7.27	67.10
Norwegian Sun	5/23/2006	25.0			
Norwegian Sun	7/11/2006	36.0	2.37	5.39	39.00
Serenade of the Seas	6/15/2006	14.0			
Serenade of the Seas	8/3/2006	27.0	3.97	14.60	233.00
Norwegian Sun	5/16/2007	34.0	2.93	8.83	90.30
Norwegian Sun	5/23/2007	26.0	2.72		125.00
Norwegian Sun	8/2/2007	46.0			
Norwegian Pearl	5/29/2007	14.0	0.99		92.20
Norwegian Pearl	6/5/2007	20.0			
Norwegian Pearl	7/17/2007	38.0	11.20	3.29	49.00
Norwegian Star	5/15/2007	22.0	2.12		77.70
Norwegian Star	6/5/2007	17.0			
Norwegian Star	7/17/2007	27.0	1.72	7.97	47.80
Norwegian Pearl	5/6/2008	49	18	6.1	98
Norwegian Pearl	5/13/2008	18	9.2	6.91	94.4
Norwegian Pearl	6/3/2008	27	5.7	4	67
Norwegian Pearl	6/17/2008	38	19.3	9.43	50.3
Norwegian Pearl	6/24/2008	23	4.84	5.74	105
Norwegian Pearl	7/15/2008	26	9.43	6.06	54.7
Norwegian Pearl	7/22/2008	25	3.53	3.47	67.1
Norwegian Pearl	8/12/2008	34	6.9	5.1	110
Norwegian Pearl	8/19/2008	41	12	4.9	110
Norwegian Pearl	9/2/2008	27	8.5	3.8	73
Norwegian Pearl	9/9/2008	36	8.8	5	62
Norwegian Star	5/6/2008	40	6	13	74
Norwegian Star	5/13/2008	32	2.27	8.09	79.4
Norwegian Star	6/3/2008	6.6	1.5	8.9	26
Norwegian Star	6/17/2008	19	2.52	6.89	58.4

Note: Non-detects listed as 1/2 the Method Detection Limit (MDL) for statistical purposes.

Scanship

Ship	Date	Ammonia	Copper	Nickel	Zinc
Norwegian Star	6/24/2008	22	1.99	8.73	111
Norwegian Star	7/15/2008	29	1.38	9.6	63.6
Norwegian Star	7/29/2008	43	2.15	8.38	69.9
Norwegian Star	8/12/2008	20	3.7	13	100
Norwegian Star	8/19/2008	26	2.3	13	110
Norwegian Star	8/26/2008	20	4.6	11	94
Norwegian Star	9/2/2008	11	2.2	11	160
Norwegian Star	9/9/2008	17	12	14	140
Norwegian Sun	5/14/2008	71	5.49	7.37	30.9
Norwegian Sun	5/21/2008	32	4.91	6.03	27.4
Norwegian Sun	5/28/2008	36	3.4	6.8	36
Norwegian Sun	6/4/2008	24	2.81	7.81	19.2
Norwegian Sun	6/11/2008	10	4.03	6.72	15.5
Norwegian Sun	7/2/2008	17	5	5.74	26.3
Norwegian Sun	7/9/2008	12	4.53	6.11	36.8
Norwegian Sun	7/17/2008	32	5.1	4.4	3.9
Norwegian Sun	8/6/2008	22	5.14	4.79	30.6
Norwegian Sun	8/13/2008	29	11	7.2	44
Norwegian Sun	9/3/2008	16	3.4	4.3	38
Norwegian Sun	9/10/2008	28	3.1	5.6	34
Norwegian Pearl	5/12/2009	9.6	15.00	5.40	110.00
Norwegian Pearl	5/19/2009	41	20.00	6.20	71.00
Norwegian Pearl	5/26/2009	45	9.30	5.00	77.00
Norwegian Pearl	6/2/2009	45	11.00	5.20	110.00
Norwegian Pearl	6/9/2009	50	12.00	4.90	93.00
Norwegian Pearl	7/7/2009	56	26.00	8.50	52.00
Norwegian Pearl	7/14/2009	35	14.00	5.20	77.00
Norwegian Pearl	7/28/2009	38	43.00	12.00	31.00
Norwegian Pearl	8/4/2009	41	18.00	6.10	87.00
Norwegian Pearl	8/18/2009	42	13.00	5.70	66.00
Norwegian Pearl	9/1/2009	48	22.00	6.20	86.00
Norwegian Pearl	9/8/2009	43	22.00	6.20	100.00
Norwegian Star	4/29/2009	33	3.40	14.00	91.00
Norwegian Star	5/5/2009	26	5.60	12.00	82.00
Norwegian Star	5/12/2009	28	6.00	7.10	35.00
Norwegian Star	5/18/2009	2.3	5.50	6.90	47.00
Norwegian Star	6/9/2009	66	4.20	8.70	51.00
Norwegian Star	6/16/2009	11	3.40	8.30	44.00
Norwegian Star	7/7/2009	28	4.20	11.00	82.00
Norwegian Star	7/14/2009	28	2.50	14.00	70.00
Norwegian Star	7/28/2009	32	7.10	13.00	58.00
Norwegian Star	8/4/2009	20	5.40	18.00	95.00
Norwegian Star	8/11/2009	21	3.80	14.00	86.00
Norwegian Star	9/1/2009	21	4.10	13.00	73.00
Norwegian Star	9/8/2009	25	3.50	18.00	90.00
Norwegian Sun	5/6/2009	42	4.70	14.00	17.00
Norwegian Sun	5/19/2009	45	2.20	8.80	0.50
Norwegian Sun	5/20/2009	43	4.00	11.00	30.00
Norwegian Sun	6/3/2009	44	3.00	6.70	30.00
Norwegian Sun	6/10/2009	36	2.80	8.20	40.00
Norwegian Sun	7/8/2009	36	3.70	12.00	34.00
Norwegian Sun	7/22/2009	30	4.70	10.00	68.00
Norwegian Sun	8/5/2009	41	3.20	11.00	44.00
Norwegian Sun	8/12/2009	38	3.00	11.00	49.00
Norwegian Sun	8/19/2009	44	4.40	9.80	23.00
Norwegian Sun	9/2/2009	29	8.60	13.00	62.00
Norwegian Sun	9/9/2009	30	8.40	13.00	69.00
Serenade of the Seas	5/21/2009	28	2.98	9.61	102.00
Serenade of the Seas	5/28/2009	17	3.93	17.20	141.00
Serenade of the Seas	6/4/2009	23	3.79	10.60	94.50
Serenade of the Seas	6/25/2009	16	3.02	12.00	94.00
Serenade of the Seas	7/2/2009	23	3.84	12.50	133.00
Serenade of the Seas	7/23/2009	16	4.96	22.10	135.00
Serenade of the Seas	8/6/2009	23	3.70	12.40	267.00

Ship	Date	Ammonia	Copper	Nickel	Zinc
Serenade of the Seas	8/20/2009	14	5.02	9.13	60.30
Serenade of the Seas	9/17/2009	15	8.15	28.20	77.80
Serenade of the Seas	9/24/2009	10	4.71	21.10	81.40

Treatment System Type: Rochem Used by Carnival Spirit, Mercury, Westerdam, Oosterdam

	Ammonia	Copper	Nickel	Zinc
Median	0.1	0.66	0.50	6.93
Average	1.4	1.2	1.3	17.7
Max	13	11.7	10.6	135
Min	0.1	0.25	0.201	2.73
95th Percentile	7.036	1.844	6.151	58.31
99th Percentile	11.796	9.5352	9.7332	118.28

Note: Sample data does not include samples where there was a detection of fecal coliform or Total Suspended Solids (TSS). This indicates the reverse osmosis membranes were not properly maintained.

Note: only contains data from vessels that discharged in Alaskan waters in 2004-2009

2004-2009 Sample data

Ship	Date	Ammonia	Copper	Nickel	Zinc
Oosterdam	6/7/2004	13.0			
Oosterdam	8/23/2004	8.7	0.25	10.60	59.00
Mercury	5/21/2004	3.9			
Mercury	7/18/2004	3.0	1.65	1.57	4.82
Mercury	9/5/2004	4.5	1.23	1.02	135.00
Carnival Spirit	6/4/2005	0.4			
Carnival Spirit	7/16/2005	0.2	0.25	0.38	2.73
Mercury	6/5/2005	0.6			
Mercury	7/24/2005	0.1	0.80	0.50	6.85
Carnival Spirit	6/3/2006	0.2			
Carnival Spirit	7/1/2006	0.2	1.14	0.71	10.60
Mercury	7/9/2006	1.7			
Mercury	8/13/2006	0.9	1.86	6.66	52.10
Carnival Spirit	7/19/2008	0.1	0.25	0.50	3.99
Carnival Spirit	7/26/2008	0.1	0.25	0.50	9.29
Carnival Spirit	8/2/2008	0.42	0.86	0.50	6.93
Carnival Spirit	8/16/2008	0.48	0.39	0.50	5.10
Carnival Spirit	9/12/2008	0.1	0.70	0.50	5.36
Carnival Spirit	9/19/2008	0.1	1.18	0.50	9.96
Carnival Spirit	5/8/2009	0.1	1.70	0.26	11.20
Carnival Spirit	5/30/2009	0.1	0.65	0.50	3.42
Carnival Spirit	6/20/2009	0.1	0.66	0.50	9.86
Carnival Spirit	6/27/2009	0.1	0.97	0.50	11.80
Carnival Spirit	7/11/2009	0.1	0.25	0.49	32.40
Carnival Spirit	7/25/2009	0.1	0.34	0.22	5.80
Carnival Spirit	8/8/2009	0.1	0.38	1.41	3.82
Carnival Spirit	8/15/2009	0.1	11.70	0.50	10.00
Carnival Spirit	9/4/2009	0.1	0.55	0.20	2.93
Carnival Spirit	9/11/2009	0.1	0.26	0.26	4.33

Note: Non-detects listed as 1/2 the Method Detection Limit (MDL) for statistical purposes.

Treatment System Type: Zenon, Used by Holland America

	Ammonia	Copper	Nickel	Zinc
Median	13.0	6.08	12.40	60.00
Average	16.3	8.2	14.7	61.7
Max	57	52	133	196
Min	0.051	0.25	3.6	0.5
95th Percentile	38.3	21.975	22.08	140
99th Percentile	50.65	49.928	40.476	188.2

2004-2009 Sample data

Ship	Date	Ammonia	Copper	Nickel	Zinc
Ryndam	5/18/2004	0.5			
Ryndam	7/13/2004	17.0	4.43	133.00	20.00
Statendam	8/12/2004	12.0	13.00	39.90	9.77
Statendam	9/9/2004	10.0			
Veendam	5/19/2004	15.0			
Veendam	6/6/2004	11.0	4.19	18.50	140.00
Veendam	7/14/2004	20.0	5.44	22.10	196.00
Volendam	5/21/2004	13.0			
Volendam	7/16/2004	20.0	4.90	15.30	170.00
Zaandam	5/24/2004	10.0			
Zaandam	8/9/2004	20.0	4.71	5.34	140.00
Ryndam	6/1/2005	26.0			
Ryndam	7/27/2005	16.0	4.41	18.50	34.40
Statendam	9/6/2005	57.0			
Statendam	9/11/2005	37.0	51.80	23.90	11.70
Veendam	5/19/2005	1.8			
Veendam	6/30/2005	0.1			
Veendam	7/28/2005		3.95	19.10	50.50
Volendam	5/20/2005	13.0			
Volendam	6/24/2005	10.0	12.40	11.10	48.20
Zaandam	6/27/2005	24.0			
Zaandam	8/8/2005	20.0	6.25	11.70	57.10
Ryndam	6/1/2006	2.9			
Ryndam	7/27/2006	3.4	7.73	40.50	14.70
Statendam	5/30/2006	24.0			
Statendam	8/9/2006	35.0	2.60	21.00	14.50
Veendam	5/25/2006	16.0			
Veendam	8/3/2006	14.0	3.72	11.40	24.90
Volendam	5/19/2006	8.7			
Volendam	7/26/2006	10.0	9.04	11.40	54.30
Zaandam	5/14/2006	22.0			
Zaandam	8/9/2006	14.0	7.22	15.90	28.10
Ryndam	5/16/2007	6.8	17.20		92.10
Ryndam	5/24/2007	0.1	1.30	14.00	54.00
Ryndam	8/31/2007	13.0	6.42		4.60
Statendam	5/23/2007	19.0	0.29		4.96
Statendam	6/14/2007	26.0	6.00	18.00	14.00
Statendam	8/2/2007	32.0			
Volendam	7/10/2007	34.0	7.52	10.70	40.40
Volendam	7/31/2007	23.0			
Volendam	8/21/2007	10.0	4.78		60.70
Zaandam	5/11/2007	1.3	16.80		70.90
Zaandam	6/1/2007	19.0			
Zaandam	7/27/2007	20.0	5.17	9.47	35.80
Zaandam	9/21/2007	0.5	5.00	12.00	31.00
Ryndam	5/26/2008	2	31.00	19.00	110.00

Note: Non-detects listed as 1/2 the Method Detection Limit (MDL) for statistical purposes.

Ship	Date	Ammonia	Copper	Nickel	Zinc
Ryndam	5/9/2008	0.44	18.20	17.00	63.70
Ryndam	5/16/2008	1.4	22.20	14.30	75.10
Ryndam	6/13/2008	1.3	16.20	14.10	75.00
Ryndam	6/20/2008	0.1	21.70	11.70	80.70
Ryndam	7/11/2008	0.1	26.60	14.00	84.40
Ryndam	7/18/2008	0.63	12.80	11.10	81.40
Ryndam	8/22/2008	16	6.90	11.00	69.00
Ryndam	8/15/2008	10	16.00	11.00	64.00
Ryndam	8/1/2008	0.93	20.30	13.90	80.60
Ryndam	9/5/2008	6.2	12.00	11.00	72.00
Ryndam	9/12/2008	3.9	8.50	10.00	15.00
Statendam	6/23/2008	13	0.25	13.00	1.70
Statendam	6/30/2008	4.8	0.25	6.01	3.10
Statendam	7/14/2008	24	0.25	14.30	4.75
Statendam	7/28/2008	16	1.12	13.90	5.96
Statendam	8/11/2008	10	0.25	17.00	2.20
Statendam	8/18/2008	11	1.50	15.00	5.30
Statendam	9/1/2008	27	3.20	14.00	7.00
Statendam	9/8/2008	10	2.60	17.00	4.80
Veendam	5/11/2008	24	9.53	12.40	69.20
Veendam	5/27/2008	16	7.15	14.00	101.00
Veendam	5/21/2008	8.2	8.00	12.00	63.00
Veendam	6/3/2008	6	8.56	13.60	110.00
Veendam	6/17/2008	7.5	8.70	10.00	140.00
Veendam	7/22/2008	6.2	4.10	10.00	71.00
Veendam	7/1/2008	8.2	8.00	12.40	76.40
Veendam	7/15/2008	15	5.21	8.84	77.30
Veendam	7/8/2008	12	7.67	13.30	108.00
Veendam	8/5/2008	11	3.44	10.50	97.10
Veendam	8/19/2008	12	6.40	17.00	63.00
Veendam	9/2/2008	11	4.10	12.00	57.00
Veendam	9/16/2008	8.8	6.20	12.00	71.00
Volendam	7/2/2008	2.4	16.70	14.80	95.50
Volendam	7/10/2008	11	4.90	10.00	60.00
Volendam	8/7/2008	36	6.60	20.00	44.00
Volendam	8/21/2008	46	4.70	11.00	46.00
Volendam	8/27/2008	24	5.70	10.00	37.00
Volendam	9/4/2008	28	4.70	11.00	31.00
Volendam	9/10/2008	23	3.90	9.10	0.50
Zaandam	5/22/2008	12	6.93	9.40	103.00
Zaandam	5/14/2008	2.4	52.00	11.80	99.50
Zaandam	6/11/2008	2.2	5.10	6.70	97.00
Zaandam	6/5/2008	18	6.16	12.40	108.00
Zaandam	6/19/2008	11	3.49	11.30	30.50
Zaandam	7/17/2008	12	8.28	12.00	59.70
Zaandam	7/9/2008	5.9	7.81	10.10	51.50
Zaandam	8/14/2008	19	6.40	10.00	60.00
Zaandam	8/15/2008	24	6.20	8.60	68.00
Zaandam	8/28/2008	11	6.60	8.40	58.00
Zaandam	9/3/2008	1.7	11.00	9.80	61.00
Zaandam	9/11/2008	6.4	3.80	6.00	3.20
Ryndam	6/9/2009	6	6.40	16.00	100.00
Ryndam	6/16/2009	13	13.00	15.00	110.00
Ryndam	6/23/2009	30	4.60	14.00	190.00
Ryndam	7/7/2009	34	3.80	14.00	100.00
Ryndam	7/21/2009	30	3.60	17.00	150.00
Ryndam	8/25/2009	45	6.90	15.00	160.00
Ryndam	8/30/2009	32	7.30	12.00	82.00
Ryndam	9/1/2009	36	5.40	13.00	110.00
Ryndam	9/8/2009	28	3.30	12.00	100.00

Ship	Date	Ammonia	Copper	Nickel	Zinc
Ryndam	9/15/2009	31	4.30	11.00	68.00
Statendam	6/3/2009	47	2.80	18.00	0.50
Statendam	6/4/2009	36	2.00	18.00	22.00
Statendam	6/18/2009	21	7.70	3.60	31.00
Statendam	7/2/2009	29	9.40	15.00	32.00
Statendam	7/16/2009	27	1.60	14.00	24.00
Statendam	8/13/2009	45	9.50	16.00	29.00
Statendam	8/19/2009	26	15.00	15.00	5.60
Statendam	8/27/2009	19	24.00	22.00	32.00
Statendam	9/10/2009	37	2.10	18.00	30.00
Statendam	9/16/2009	52	2.80	18.00	26.00
Volendam	5/18/09	18	5.4	23.0	110.0
Zaandam	5/10/2009	19	8.10	9.90	88.00
Zaandam	5/17/2009	12	9.80	9.10	55.00
Zaandam	5/27/2009	1.7	3.30	9.00	55.00
Zaandam	6/7/2009	6.3	5.90	6.80	46.00
Zaandam	6/14/2009	15	5.80	6.70	78.00
Zaandam	7/12/2009	2.9	5.00	9.10	110.00
Zaandam	7/22/2009	3.5	4.80	11.00	30.00
Zaandam	8/2/2009	39	8.00	12.00	85.00
Zaandam	8/16/2009	20	4.10	17.00	63.00
Zaandam	9/6/2009	14	3.90	15.00	76.00
Zaandam	9/13/2009	8	4.50	9.40	46.00

Treatment System Type: Marisan Used by Silver Shadow

	Ammonia	Copper	Nickel	Zinc
Median	0.3	52.0	13.9	21.0
Average	1.8	48.6	13.4	25.6
Max	23.0	172.0	24.1	125.0
Min	0.1	3.8	5.7	0.5
95th Percentile	7.2	97.0	23.1	61.4
99th Percentile	19.7	157.0	23.9	112.3

2004-2009 Sample data

Ship	Date	Ammonia	Copper	Nickel	Zinc
Silver Shadow	7/8/2004	23.0	30.90	24.10	42.40
Silver Shadow	8/19/2004	0.2	172.00	13.80	125.00
Silver Shadow	9/5/2004	7.5			
Silver Shadow	6/16/2006	0.1	9.03	14.80	34.90
Silver Shadow	7/21/2006	0.1			
Silver Shadow	6/15/2008	0.65	6.21	17.8	0.5
Silver Shadow	6/26/2008	0.1	4.04	10.8	0.5
Silver Shadow	7/18/2008	0.41	4.03	5.71	4.42
Silver Shadow	7/28/2008	0.45	6.84	7.25	3.61
Silver Shadow	8/4/2008	0.1	3.81	7.19	0.5
Silver Shadow	8/7/2008	0.6	54	10	58
Silver Shadow	8/23/2008	0.18	42	7.4	8.4
Silver Shadow	9/9/2008	0.16	93	12	30
Silver Shadow	9/10/2008	0.17	73	10	6.4
Silver Shadow	6/1/2009	1.2	51.00	15.00	27.00
Silver Shadow	6/9/2009	2.3	58.00	17.00	16.00
Silver Shadow	6/11/2009	0.23	53.00	15.00	25.00
Silver Shadow	7/2/2009	0.54	67.00	23.00	38.00
Silver Shadow	7/13/2009	0.28	64.00	13.00	31.00
Silver Shadow	7/24/2009	0.1	72.00	16.00	18.00
Silver Shadow	8/5/2009	0.46	59.00	15.00	24.00
Silver Shadow	8/21/2009	0.32	50.00	14.00	18.00

Note: Non-detects listed as 1/2 the Method Detection Limit (MDL) for statistical purposes.

Treatment System Type: Hamann Used by Summit, Infinity, Radiance, Rhapsody

*Note only three samples

	Ammonia	Copper	Nickel	Zinc
Median	56.6	3.4	11.4	170.5
Average	74.2	3.4	11.4	170.5
Max	130.0	3.8	21.8	199.0
Min	36.0	3.1	1.0	142.0
95th Percentile	122.7	3.8	20.8	196.2
99th Percentile	128.5	3.8	21.6	198.4

2004-2009

Sample data

Ship	Date	Ammonia	Copper	Nickel	Zinc
Summit	6/28/2004	56.6	3.80	1.03	142.00
Infinity	6/22/2006	36.0			
Infinity	7/27/2006	130.0	3.07	21.80	199.00

Treatment system Type: Hydroxyl Used by Millennium, Vision of the Seas

*Note only one sample

	Ammonia	Copper	Nickel	Zinc
Median	4.6	2.3	15.8	65.3
Average	4.6	2.3	15.8	65.3
Max	4.6	2.3	15.8	65.3
Min	4.6	2.3	15.8	65.3
95th Percentile	4.6	2.3	15.8	65.3
99th Percentile	4.6	2.3	15.8	65.3

2004-2009

Sample data

Ship and Date	Ammonia	Copper	Nickel	Zinc
Millenium 7/28/2008	4.6	2.30	15.80	65.30