

2022 Large Commercial Passenger Vessel Wastewater Report

COMMERCIAL PASSENGER VESSEL ENVIRONMENTAL
COMPLIANCE (CPVEC) PROGRAM



January 2023



Cover photo: Norwegian Cruise Lines Bliss Vessel docked at the STO dock in Sitka, Alaska. August 15th, 2022

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INTRODUCTION

This report summarizes 2022 onboard sampling and effluent sample testing results for large commercial passenger vessel (CPV)¹ treated wastewater effluent in Alaska waters².

This year 41 large CPVs registered with the Alaska Department of Environmental Conservation (ADEC) to operate in Alaska in 2022, with 25 of those vessels authorized to discharge treated wastewater in Alaska waters.

Sampling of wastewater effluent is a requirement under the General Permit (GP) for all large CPVs discharging in Alaska waters. Effluent sampling requirements are contained within the [GP](#). Sampling is a requirement to:

- Check for compliance of permit effluent limits;
- Obtain information on treatment system performance for future discharge permits; and
- Compile information on potential environmental effects.

The tables and appendices in this report go into greater detail about how these large vessels performed in terms of their effluent sample results during the 2022 season, and what trends ADEC will be focusing on in the future to ensure maximum compliance from these vessels, cruise lines, and industry.

Sample result data for cruise ships has been collected by the ADEC since 2000. For comparison purposes, this report will reference the previous sampling results noted in the [2019 Large Cruise Ship Wastewater Report](#) because 2019 is the most comparable in terms of number of cruise ships in Alaska and samples taken. Years 2020 and 2021 were affected by the COVID-19 pandemic, making their results significantly different from the 2022 season. Reports for prior years can be found on the cruise program's report webpage: <https://dec.alaska.gov/water/cruise-ships/cruise-reports/>

¹ Large CPVs have overnight accommodations (lower berths) for greater than or equal to 250 passengers.

² Alaska water extends 3 miles from the coastline and includes the Alexander Archipelago.

METHODS

Commercial passenger ships produce two types of wastewater: blackwater and graywater. Blackwater is wastewater from ship's toilets and medical facilities. Graywater is wastewater from accommodations (showers/sinks), galley areas, and laundry. Any combination of blackwater and graywater will be referred to as mixed wastewater in this report, but technically it is considered blackwater.

Samples are grab wastewater samples taken from a sample port prior to discharge. The number of required samples and what parameters are required to be analyzed are listed in the 2014 General Permit, and are taken from the US Coast Guard in the Quality Assurance Project Plan (QAPP) and 33 Code of Federal Regulations 159 – Marine Sanitation Devices. Sampling may occur while underway or while the cruise ship is docked. Most 2022 samples were obtained in Southeast Alaska; either while docked in Juneau or in-route to Juneau and processed by Admiralty Environmental. Sample results presented in this report only include data collected while a cruise ship was actively discharging to Alaska waters.

The samples were taken according to requirements in the [2022 Cruise Line International Association Alaska Quality Assurance Project Plan for Sampling and Analysis of Treated Sewage and Graywater from Commercial Passenger Vessels \(QAPP\)](#). The QAPP specifies minimum requirements for sampling and analysis of wastewater. It includes a list of approved methods, sample collection requirements, sample custody and laboratory analysis requirements. Samplers must follow the QAPP and the approved Vessel Specific Sampling Plan (VSSP) for each cruise ship when collecting a sample. The Commercial Passenger Vessel Environmental Compliance (Cruise Ship) program spot checked results submitted by the cruise ship operators for compliance with the QAPP and checked all results for compliance with 2014 General Permit limits.

RESULTS

Table 1 provides passenger counts and voyage numbers for each large vessel that entered Alaskan waters this season. Table 2 and 3 provide summary data for effluent parameters measured. Table 4 and 5 provides occurrence data for dissolved metals sampled. Appendix A provides information regarding the discharge status of the large vessels. 2022 wastewater sampling results are listed in both Appendix B and Appendix C, separated by the type of parameter – GP or priority. The number of samples received (n) are noted in each table. Non-detect (ND) values are entered as zeros in the results table, but the parameter may still be present in the sample, just not at a detectable level. In the tables of results red highlighted cells indicate exceedances of the 2014 Wastewater Discharge General Permit limits.

Unlike the GP parameters that are required to be sampled twice per month, sampling for priority parameters [volatile organic compounds (VOCs) and base neutral acids (BNAs)], and nutrients are not required with every sample. Priority/nutrients sampling results are provided in Appendix C of this report.

Whole effluent toxicity effluent testing and receiving water testing was conducted in 2022 but is not summarized in this report. This data can be provided upon request.

Table 1. 2022 Large Cruise Ship Voyages and Passenger Counts

Vessel Operator	Vessel Name	Passenger Capacity [1]	Planned Voyages	Completed Voyages	2022 Passenger capacity [2]
Carnival Cruise Lines	Carnival Miracle	2124	11	11	23,364
Carnival Cruise Lines	Carnival Spirit	2124	19	19	40,356
Carnival Cruise Lines	Carnival Splendor	3012	17	17	51,204
Celebrity Cruises	Celebrity Eclipse	2852	18	17	48,484
Celebrity Cruises	Celebrity Millennium	2158	19	19	41,002
Celebrity Cruises	Celebrity Solstice	2852	19	19	54,188
Cunard	Queen Elizabeth	2077	5	5	10,385
Disney	Disney Wonder	2834	18	18	51,012
Holland America	Eurodam	2104	23	23	48,392
Holland America	Koningsdam	2650	23	23	60,950
Holland America	Nieuw Amsterdam	2106	21	21	44,226
Holland America	Noordam	1972	19	19	37,468
Holland America	Westerdam	1964	15	15	29,460
Holland America	Zuiderdam	1964	22	22	43,208
Hurtigruten	Roald Amundsen	530	8	8	4,240
Norwegian Cruise Line	Norwegian Bliss	4004	26	26	104,104
Norwegian Cruise Line	Norwegian Encore	3998	24	24	95,952
Norwegian Cruise Line	Norwegian Jewel	2376	25	25	59,400
Norwegian Cruise Line	Norwegian Spirit	2050	13	13	26,650
Norwegian Cruise Line	Norwegian Sun	1936	24	21	40,656
Oceania	Regatta	777	13	12	9,324
Ponant	L' Austral	264	2	2	528
Ponant	Le Boreal	264	2	2	528
Ponant	Le Commandant Charcot	270	1	1	270
Princess Cruise Line	Crown Princess	3090	20	20	61,800
Princess Cruise Line	Discovery Princess	3660	21	21	76,860
Princess Cruise Line	Grand Princess	2606	19	19	49,514
Princess Cruise Line	Majestic Princess	3560	19	19	67,640
Princess Cruise Line	Royal Princess	3560	20	20	71,200
Princess Cruise Line	Ruby Princess	3084	14	14	43,176
Regent Seven Seas Cruises	Seven Seas Mariner	769	20	18	13,842
Royal Caribbean Cruises	Ovation of the Seas	4182	20	20	83,640
Royal Caribbean Cruises	Quantum of the Seas	4188	22	22	92,136
Royal Caribbean Cruises	Radiance of the Seas	2142	21	21	44,982
Royal Caribbean Cruises	Serenade of the Seas	2146	21	21	45,066
Seabourn	Seabourn Odyssey	458	16	16	7,328
Silver Seas	Silver Muse	596	18	18	10,728
Silver Seas	Silver Shadow	388	18	13	5,044
Silver Seas	Silver Wind	274	2	2	548
Viking	Viking Orion	930	15	15	13,950
Windstar Cruises	Star Breeze	318	11	11	3,498
			684	672	1,616,303

[1] Based on the number of lower berths. Actual number of passengers aboard varies.

[2] Assumes full passenger capacity on every voyage.

Vessels highlighted in gray did not discharge to AK waters.

Deviations in Number of Voyages occurred in 2022.

Final Voyage Count Not Confirmed by Operator.

Table 2. 2022 Large Cruise Ship Summary Data, Mixed Wastewater Effluent

2022 Mixed Wastewater Effluent (n=240)							
	Count (n)	Average	Median	Min	Max	Std Dev	Std Error
Overboard WW Flow rate (m ³ /hr)	238	20	16	1	126	16	1
Temperature (C)	239	27.9	28.4	16.8	39.8	3.6	0.2
pH (SU)	240	7.22	7.26	5.10	8.28	0.45	0.03
Free Chlorine (mg/L)	240	0	0	0	8	0	0
Total Residual Chlorine (mg/L)	240	0	0	0	10	1	0
Fecal Coliform (FC/100mL)	236	7	0	0	690	55	4
Biological Oxygen Demand, BOD (mg/L)	236	6	3	0	120	13	1
Total Suspended Solids, TSS (mg/L)	235	2	0	0	21	4	0
Ammonia (as N) (mg/L)	116	22	21	0	83	19	2
Copper, Dissolved (ppb)	115	17	5	0	980	92	9
Specific Conductance (µmhos/cm)	130	1652	984	430	32100	3182	279
Hardness (mg/L)	116	126	58	0	2000	295	27
Alkalinity (Total)	49	162	140	0	450	113	16
Chemical Oxygen Demand, COD (mg/L)	48	64	58	27	216	37	5
Total Organic Carbon, TOC	48	13.9	13.6	0.0	37.9	6.1	0.9
Total Kjeldahl Nitrogen (mg/L)	53	37	32	0	120	33	5
Nitrogen, Nitrate-Nitrite (as N) (mg/L)	53	8	1	0	74	14	2
Total Phosphorus (as P) (µg/L)	52	4	1	0	21	5	1
E.coli (MPN/ 100mL)	52	5	0	0	180	26	4
Settleable Solids & Oil & Grease (n=48) were below lab detection levels for all samples.							
2013DB-0004 General Permit Compliance Items							

Analysis of Table 2 Results

Table 2 shows the average, median, minimum, maximum, standard deviation, and standard error for all mixed wastewater effluent samples that were taken from large vessels during the 2022 season.

When compared to results in 2019, there were relatively similar results for average flow rate (19.7 m³/hr in 2019, 20.0 m³/hr in 2022), temperature (29.9°C in 2019, 27.9°C in 2022), pH (7.25 in 2019, 7.22 in 2022), free and total residual chlorine (all 0), BOD (5 mg/L in 2019, 6 mg/L in 2022), TSS (2 mg/L in both 2019 and 2022). There was a decrease in the average amount of ammonia (34 mg/L in 2019, 22 mg/L in 2022), and fecal coliform (16 FC/100 mL in 2019, 7 FC/100mL in 2022), but an increase in average dissolved copper (10 ppb in 2019, 17 ppb in 2022). This increase in dissolved copper was largely due to the Seabourn Odyssey vessel who had a 980 ppb result in May of 2022, along with another exceedance of 97 ppb in July of 2022, therefore making the average effluent result much higher than years past. The Seabourn Odyssey received Notices of Violation for these

copper exceedances, and this is an effluent measure that ADEC will be monitoring closely in seasons to come.

Table 3. 2022 Large Cruise Ship Summary Data, Graywater Effluent

2022 Greywater Effluent (n=60)							
	Count (n)	Average	Median	Min	Max	Std Dev	Std Error
Overboard WW Flow rate (m ³ /hr)	59	18	9	3	188	28	4
Temperature (C)	60	27.3	27.4	20.0	35.9	2.3	0.3
pH (SU)	60	7.13	7.09	5.81	8.43	0.52	0.07
Free Chlorine (mg/L)	60	0	0	0	0	0	0
Total Residual Chlorine (mg/L)	60	0	0	0	0	0	0
Fecal Coliform (FC/100mL)	60	0	0	0	3	0	0
Biological Oxygen Demand (BOD, mg/L)	60	6	0	0	200	26	3
Total Suspended Solids, TSS (mg/L)	60	0	0	0	6	1	0
Ammonia (as N) (mg/L)	56	3	1	0	62	9	1
Copper, Dissolved (ppb)	57	10	4	0	91	17	2
Specific Conductance (µmhos/cm)	60	499	391	218	2350	359	46
Hardness (mg/L)	57	40	26	5	210	36	5
Alkalinity (Total)	12	30	27	0	81	28	8
Chemical Oxygen Demand, COD (mg/L)	12	16	17	0	39	14	4
Total Organic Carbon, TOC	12	4.0	3.2	1.8	10.4	2.3	0.7
Total Kjeldahl Nitrogen (mg/L)	12	1	0	0	6	2	1
Nitrogen, Nitrate-Nitrite (as N) (mg/L)	12	4	5	0	11	4	1
Total Phosphorus (as P) (µg/L)	12	0	0	0	2	1	0
Settleable Solids, Oil & Grease, and E.Coli (n=12) were below lab detection levels for all samples.							
2013DB-0004 General Permit Compliance Items							

Analysis of Table 3 Results

There are similar comparisons in Table 3 for graywater effluent as there are in Table 2. When compared to results in 2019, there were similar results for pH (6.98 in 2019, 7.13 in 2022), free and total residual chlorine (all 0), fecal coliform (both 0 FC/100 mL), BOD (5 mg/L in 2019, 6 mg/L in 2022), TSS (both 0 mg/L), but differences in average flow rate (13.0 m³/hr in 2019, 18.0 m³/hr in 2022), and temperature (30.3°C in 2019, 27.3°C in 2022). There was a decrease in the average amount of ammonia (5 mg/L in 2019, 3 mg/L in 2022), but again an increase in average dissolved copper (5 ppb in 2019, 10 ppb in 2022).

Table 4. 2022 Other Dissolved Metals – Mixed Wastewater

Priority samples (twice per season) are analyzed for 12 metals. Dissolved copper has limits in the GP and is sampled more frequently than other metals; sample size is noted in the table.

2022 Dissolved Metals, Mixed (n=48)			
	Detected	% of Samples	Range (ppb)
Antimony	1	2%	1.8
Arsenic	13	27%	1.0-4.2
Beryllium	Below Detection		
Cadmium	Below Detection		
Chromium	17	35%	1.0-20
Lead	4	8%	1.2-2.2
Nickel	46	96%	3.2-31
Selenium	Below Detection		
Silver	Below Detection		
Thallium	Below Detection		
Zinc	47	98%	17-2700
Copper (n=115)	102	89%	1.1-980

Analysis of Table 4 Results

Copper, zinc, and nickel stand out in these sample results as occurring at much higher rates than any other dissolved metal. All three show up in nearly 90% of samples and have extremely large ranges within those sample events.

Table 5. 2022 Other Dissolved Metals - Graywater

Priority samples (twice per season) are analyzed for 12 metals. Copper has limits in the GP and is sampled more frequently than other metals; sample size is noted in the table.

2022 Dissolved Metals, Greywater (n=12)			
	Detected	% of Samples	Range (ppb)
Antimony	1	8%	2.4
Arsenic	Below Detection		
Beryllium	Below Detection		
Cadmium	Below Detection		
Chromium	4	33%	1.2-1.6
Lead	Below Detection		
Nickel	12	100%	11-31
Selenium	1	8%	1.7
Silver	Below Detection		
Thallium	Below Detection		
Zinc	12	100%	18-830
Copper (n=57)	47	82%	1.0-91

Analysis of Table 5 Results

There is a similar trend with copper, zinc, and nickel in the graywater effluent samples; zinc and nickel show up in 100% of the samples taken, copper shows up in 82% of samples taken, and they all have extremely large ranges within those sample events.

SUMMARY

ADEC has compiled this data to be usable in the future seasons to track progress of these vessels and ensure maintenance of their wastewater treatment systems. Since this was the first full season back in Alaskan waters after COVID-19, ADEC expects the cruise industry to keep growing in Alaska in seasons to come, and this data will become imperative to inform a performance benchmark.

The inclusion of Table 4 and Table 5 for the 2022 season was to intentionally highlight the frequent and high levels of dissolved metals ADEC is observing in cruise ship effluent samples. Dissolved metals are not treated by the wastewater treatment systems on these large vessels, so it is possible that high levels of copper, zinc, and nickel are indicative of a degrading wastewater treatment system leaching metals into the effluent from evaporators and piping. Since many of these vessels were either laid up or processing very little waste during the 2020 and 2021 season due to COVID-19, it is possible

that these systems now need increased maintenance or repair to reduce the levels of dissolved metals coming into the wastewater.

If there are any questions or concerns regarding this report, please contact the Cruise Ship Program Manager, Kaitlyn Raffier, at Kaitlyn.raffier@alaska.gov or 907-465-5138.

ONLINE RESOURCES

Alaska Department of Environmental Conservation (ADEC) Cruise Ship Program

<http://dec.alaska.gov/water/cruise-ships/>

2014 Large Cruise Ship General Permit

<http://dec.alaska.gov/water/cruise-ships/cruise-general-permit/>

Quality Assurance Project Plan

<https://dec.alaska.gov/media/25446/clia-alaska-qapp-mar2022-finalweb.pdf>

Alaska Cruise Ship Laws and Regulations

<http://dec.alaska.gov/water/cruise-ships/laws-regs/>

Sample reports from prior years

<http://dec.alaska.gov/water/cruise-ships/cruise-reports/>

APPENDIX A: 2022 LARGE CPV – DISCHARGE TABLE

Large CPV Vessel discharge status, wastewater treatment system and permit number presented. [1 Page]

APPENDIX B: 2022 LARGE CPV SAMPLE RESULTS – GP PARAMETERS

Large CPV effluent results for the 2022 Season, Both Mixed and GW are presented. This dataset lists parameters monitored in accordance with the 2014 General Permit. Exceedances are highlighted pink in the table. [6 Pages]

APPENDIX C: 2022 LARGE CPV SAMPLE RESULTS – PRIORITY PARAMETERS

Large CPV effluent results for the 2022 Season, Both Mixed and GW are presented. This dataset lists less frequently monitored parameters associated with Priority Sampling. Operators are required to sample for Priority parameters twice per season. The dataset does contain a few conventional sampling events when additional parameters were samples. [2 Pages]

APPENDIX A: 2022 LARGE CPV – DISCHARGE TABLE

	Vessel Operator	Vessel Name	Wastewater Treatment System [1]	GP Authorization	Permitted to Discharged to Alaska waters in 2022			Vessel Discharged to AK Waters.	
					Underway	Stationary	Skagway*		
1	Carnival Cruise Lines	Carnival Miracle	ND		No Authorization	No	No	No	None Reported
2	Carnival Cruise Lines	Carnival Spirit	ND		No Authorization	No	No	No	None Reported
3	Carnival Cruise Lines	Carnival Splendor	ND		No Authorization	No	No	No	None Reported
4	Celebrity Cruises	Celebrity Eclipse	ND	Kruger/WABAG	No Authorization	No	No	No	None Reported
5	Celebrity Cruises	Celebrity Millennium	ND	Hydroxyl	No Authorization	No	No	No	None Reported
6	Celebrity Cruises	Celebrity Solstice	ND	Kruger/WABAG	No Authorization	No	No	No	None Reported
7	Cunard	Queen Elizabeth		Hamworthy MBR 320 (x2) UV	2013DB-0004-0035	Yes	No	No	Yes
8	Disney	Disney Wonder		Hamworthy (x2)	2013DB-0004-0001	Yes	No	No	Yes
9	Holland America	Eurodam		Hamworthy MBR 360N Mk.3 (x2)	2013DB-0004-0025	Yes	No	No	Yes
10	Holland America	Koningsdam		Hamworthy MBR 16 Mk.3 (x2)	2013DB-0004-0040	Yes	No	No	Yes
11	Holland America	Nieuw Amsterdam		Hamworthy MBR 360N Mk.3 (x2)	2013DB-0004-0023	Yes	No	No	Yes
12	Holland America	Noordam	ND	Rochem	No Authorization	No	No	No	None Reported
13	Holland America	Westerdam	ND	Rochem	No Authorization	No	No	No	None Reported
14	Holland America	Zuiderdam	ND		No Authorization	No	No	No	None Reported
15	Hurtigruten	Roald Amundsen	ND		No Authorization	No	No	No	None Reported
16	Norwegian Cruise Line	Norwegian Bliss		Scanship AWP 25 (x1)	2013DB-0004-0028	Yes	Yes	No	Yes
17	Norwegian Cruise Line	Norwegian Encore		Scanship AWP 60 (x1)	2013DB-0004-0036	Yes	Yes	Yes	Yes
18	Norwegian Cruise Line	Norwegian Jewel		Scanship , Mussell FA45 (x1)	2013DB-0004-0015	Yes	Yes	Yes	Yes
19	Norwegian Cruise Line	Norwegian Spirit		Scanship AWP R 106 (x1)	2013DB-0004-0043	Yes	Yes	Yes	Yes
20	Norwegian Cruise Line	Norwegian Sun		Scanship , Mussell FA40 (x1)	2013DB-0004-0017	Yes	Yes	Yes	Yes
21	Oceania	Regatta		Triton (2 units)	2013DB-0004-0011	Yes	Yes	Yes	Yes
22	Ponant	L' Austral	ND	Rochem	No Authorization	No	No	No	None Reported
23	Ponant	Le Boreal	ND		No Authorization	No	No	No	None Reported
24	Ponant	Le Commandant Charcot	ND		No Authorization	No	No	No	None Reported
25	Princess Cruise Line	Crown Princess		Hamworthy (x3)	2013DB-0004-0006	Yes	Yes	No	Yes
26	Princess Cruise Line	Discovery Princess		Hamworthy MBR 24 (x2)	2013DB-0004-0041	Yes	Yes	No	Yes
27	Princess Cruise Line	Grand Princess		Hamworthy (x2)	2013DB-0004-0008	Yes	Yes	No	Yes
28	Princess Cruise Line	Majestic Princess		Hamworthy MBR 24 (x2)	2013DB-0004-0042	Yes	Yes	No	Yes
29	Princess Cruise Line	Royal Princess		Hamworthy MBR 24 (x2)	2013DB-0004-0034	Yes	Yes	No	Yes
30	Princess Cruise Line	Ruby Princess		Hamworthy (x3)	2013DB-0004-0005	Yes	Yes	No	Yes
31	Regent Seven Seas Cruises	Seven Seas Mariner		Hamworthy MBR 240C (x2)	2013DB-0004-0019	Yes	Yes	Yes	Yes
32	Royal Caribbean Cruises	Ovation of the Seas		Scanship AWP 60 (x1)	2013DB-0004-0032	Yes	No	No	Yes
33	Royal Caribbean Cruises	Quantum of the Seas		Scanship AWP 60 (x1)	2013DB-0004-0037	Yes	No	No	Yes
34	Royal Caribbean Cruises	Radiance of the Seas	ND	Hamann	No Authorization	No	No	No	None Reported
35	Royal Caribbean Cruises	Serenade of the Seas	ND		No Authorization	No	No	No	None Reported
36	Seabourn	Seabourn Odyssey		Hamworthy MBR 140 Mk.2 (x2)	2013DB-0004-0039	Yes	Yes	No	Yes
37	Silver Seas	Silver Muse	ND	Scanship AWP 25 (x1)	2013DB-0004-0029	Yes	No	No	No
38	Silver Seas	Silver Shadow	ND	Marisan 250 TPD (x1)	No Authorization	No	No	No	None Reported
39	Silver Seas	Silver Wind	ND		No Authorization	No	No	No	None Reported
40	Viking	Viking Orion		Scanship AWP 25 (x1)	2013DB-0004-0030	Yes	Yes	No	Yes
41	Windstar Cruises	Star Breeze		EVAC 145K (x1)	2013DB-0004-0038	Yes	Yes	No	Yes

[1] Marine Sanitation Device: Model (# of units). Nondischarging vessels are not required to provide treatment system information.

*Skagway: Discharges have a 15m mixing zone when vessel is at the adjacent dock: Applies to Broadway Dock and Ore Dock.

2022 Large CPV Wastewater Report - Appendix B

Vessel [1]	Sample Date	SampleNo	Sample Type [2]	Wastewater Type	Discharge Status	Temp (°C)	Flow rate (m3/hr)	pH (S.U.)	Free Cl (mg/L)	TR Cl (mg/L)	Fecal Coliform (FC/100mL)	BOD (mg/L)	TSS (mg/L)	Ammonia (mg/L)	Copper, Dissolved (ppb)	Hardness (mg/L)	Spec. Conductance (umhos/cm)
Crown_UW	8/9/2022	AE 29843 R	PP	Mixed	Underway	28.3	29.5	7.89	0	0	0	82	0	67	2	34	1,660
Crown_UW	6/14/2022	AE 29193	CC	Mixed	Underway	26.6	7.8	7.92	0	0	42	8.4	0				
Crown_UW	7/12/2022	AE 29532	CC	Mixed	Underway	26.1	48.2	7.70	0	0	44	3	0				
Crown_UW	5/24/2022	AE 29022	PP	Mixed	Underway	25.0	45.2	7.90	0	0	0	13	0	68	0	71	1,687
Crown_UW	5/17/2022	AE 28911	CC	Mixed	Underway	16.8	28.9	8.00	0	0	2	29	0				
Crown_UW	6/28/2022	AE 29412	CC	Mixed	Underway	30.1	42.0	8.25	0	0	2	5.2	0				
Crown_UW	7/26/2022	AE 29729	CC	Mixed	Underway	30.6	31.8	7.58	0	0		4.5	0				
Crown_UW	8/30/2022	AE 30126 R1	CC	Mixed	Underway	27.9	48.1	7.20	0	0	0	0	0				
Crown_UW	9/6/2022	AE 30267	CC	Mixed	Underway	28.0	78.0	7.87	0	0	0	0	0				
Crown_UW	9/13/2022	AE 30299	CC	Mixed	Underway	27.9	58.4	7.95	0	0	0	0	0				
Discovery_UW	8/18/2022	AE 30020 R	PP	Mixed	Underway	26.7	18.3	7.06	0	0	0	0	0	42	0	120	958
Discovery_UW	6/9/2022	AE 29217	PP	Mixed	Underway	25.2	17.4	7.54	0	0	0	2.3	0	36	0	27	1,180
Discovery_UW	5/12/2022	AE 28737	CC	Mixed	Underway	26.7	10.8	7.87	0	0	0	3.5	0				
Discovery_UW	5/19/2022	AE 28925	CC	Mixed	Underway	27.2	50.0	7.14	0	0	0	0	0				
Discovery_UW	6/16/2022	AE 29294	CC	Mixed	Underway	29.5	18.7	7.29	0	0	0	0	0				
Discovery_UW	7/7/2022	AE 29509	CC	Mixed	Underway	29.6	17.6	7.99	0	0	0	2	0				
Discovery_UW	7/21/2022	AE 29708	CC	Mixed	Underway	28.8	13.0	7.57	0	0		0					
Discovery_UW	7/28/2022	AE 29805	CC	Mixed	Underway	28.4	16.4	7.35	0	0	0						
Discovery_UW	8/4/2022	AE 29899	CC	Mixed	Underway	27.3	16.5	7.70	0	0		0	0				
Discovery_UW	9/7/2022	AE 30271	CC	Mixed	Underway	29.3	21.4	7.66	0	0	0	0	0				
Discovery_UW	9/14/2022	AE 30305	CC	Mixed	Underway	27.6	18.5	7.78	0	0	0	0	0				
Disney Wonder	6/10/2022	AE 29176	PP	Mixed	Underway	28.7	21.7	7.23	0	0	0	0	0	64	13	79	1,570
Disney Wonder	8/19/2022	AE 30030 R	PP	Mixed	Underway	28.1		6.99	0	0	0	0	0	4	25	38	557
Disney Wonder	5/20/2022	AE 28932	CC	Mixed	Underway	29.8	22.2	7.82	0	0	0	0	0				
Disney Wonder	5/27/2022	AE 29045	CC	Mixed	Underway	26.8	27.2	7.16	0	0	0	0	0				
Disney Wonder	6/24/2022	AE 29405	CC	Mixed	Underway	30.0	22.2	7.31	0	0	0	0	0				
Disney Wonder	7/15/2022	AE 29569	CC	Mixed	Underway	30.4	26.5	7.00	0	0	0	2.8	0				
Disney Wonder	7/29/2022	AE 29751	CC	Mixed	Underway	29.6	23.2	7.03	0	0	0	0	0				
Disney Wonder	8/12/2022	AE 30000 R	CC	Mixed	Underway	31.9	19.2	7.21	0	0	0	0	0				
Disney Wonder	9/9/2022	AE 30288	CC	Mixed	Underway	28.3	21.9	7.25	0	0	0	0	0				
Disney Wonder	9/16/2022	AE 30365	CC	Mixed	Underway	30.3	22.3	6.85	0	0	0	0	0				
Eurodam	7/20/2022	AE 29704	CC	Mixed	Underway	28.5	16.0	7.60	0	0	0	62	0				
Eurodam	5/18/2022	AE 28918	PP	Mixed	Underway	25.4	22.5	7.50	0	0	6	3.3	0	83	6.2	36	1,161
Eurodam	8/10/2022	AE 29847	PP	Mixed	Underway	27.7	18.7	7.55	0	0	0	0	7.2	55	2.2	58	32,100
Eurodam	5/11/2022	AE 28734	CC	Mixed	Underway	26.1	10.3	7.45	0	0	3	0	0				
Eurodam	6/22/2022	AE 29322	CC	Mixed	Underway	17.4	12.9	7.60	0	0	0	4.2	10				
Eurodam	6/29/2022	AE 29417	CC	Mixed	Underway	18.5	6.1	7.77	0	0	2	0	0				
Eurodam	7/13/2022	AE 29548	CC	Mixed	Underway	27.6	8.0	7.42	0	0	0	20	4				
Eurodam	8/24/2022	AE 30053	CC	Mixed	Underway	31.0	4.7	7.29	0	0	0	5.9	0				
Eurodam	9/7/2022	AE30272	CC	Mixed	Underway	31.4	9.8	7.48	0	0	0	18	0				
Eurodam	9/21/2022	AE 30383	CC	Mixed	Underway	29.2	126.0	7.28	0	0	10	6.7	0				
Eurodam	10/4/2022	AE 30395	CC	Mixed	Underway	28.8	1.0	7.85	0	0	0	16	0				
Grand_UW	7/31/2022	AE 29811	CC	Mixed	Underway	28.3	3.3	8.00	7.7	10	0						
Grand_UW	8/7/2022	AE 29837 R	PP	Mixed	Underway	28.3	5.7	7.86	0	0	5	2.3	0	39		46	1,020
Grand_UW	6/12/2022	AE 29183	PP	Mixed	Underway	26.2	7.1	7.36	0	0	2	3.5	0	21	1.3	58	959
Grand_UW	5/15/2022	AE 28906	CC	Mixed	Underway	25.9	7.3	7.25	0	0	2	9.2	0				
Grand_UW	5/29/2022	AE 29050	CC	Mixed	Underway	28.7	6.6	7.20	0	0	5	6.7	0				
Grand_UW	6/19/2022	AE 29310	CC	Mixed	Underway	29.6	9.2	7.52	0	0	0	2.2	0				
Grand_UW	7/9/2022	AE 29524	CC	Mixed	Underway	28.4	8.2	7.44	0	0	10	3.6	0				
Grand_UW	7/23/2022	AE 29714	CC	Mixed	Underway	28.9	3.5	8.21	0	0	38	0	0				
Grand_UW	8/21/2022	AE 30037	CC	Mixed	Underway	30.3	3.5	7.19	0	0	0	0	0				
Grand_UW	9/4/2022	AE 30182	CC	Mixed	Underway	27.4	5.9	6.97	0	0	0	0	0				
Grand_UW	9/18/2022	AE 30371	CC	Mixed	Underway	28.1	5.4	7.38	0	0	0	5.9	0				

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Vessel [1]	Sample Date	SampleNo	Sample Type [2]	Wastewater Type	Discharge Status	Temp (°C)	Flow rate (m3/hr)	pH (S.U.)	Free Cl (mg/L)	TR Cl (mg/L)	Fecal Coliform (FC/100mL)	BOD (mg/L)	TSS (mg/L)	Ammonia (mg/L)	Copper, Dissolved (ppb)	Hardness (mg/L)	Spec. Conductance (umhos/cm)
Koningsdam	7/12/2022	AE 29533	PP	Mixed	Underway	25.9	11.4	7.47	0	0	60	0	0	44	1.1	36	1,130
Koningsdam	5/17/2022	AE 28914	PP	Mixed	Underway	24.9	12.0	7.54	0	0	0	0	0	61	3.4	58	1,297
Koningsdam	5/10/2022	AE 28733	CC	Mixed	Underway	24.3	12.3	7.53	0	0	0	0	0				
Koningsdam	6/14/2022	AE 29194	CC	Mixed	Underway	27.0	4.6	7.27	0	0	2	6.7	0				
Koningsdam	6/21/2022	AE 29314	CC	Mixed	Underway	26.6	29.3	7.44	0	0	0	0	0				
Koningsdam	7/26/2022	AE 29730	CC	Mixed	Underway	27.0	10.6	7.59	0	0	5	11	0				
Koningsdam	8/16/2022	AE 30009	CC	Mixed	Underway	28.5	10.6	7.52	0	0	0	6.1	0				
Koningsdam	8/23/2022	AE 30047	CC	Mixed	Underway	27.7	13.2	7.53	0	0	3	3	0				
Koningsdam	9/6/2022	AE 30269	CC	Mixed	Underway	27.0	16.5	7.69	0	0	2	5.4	0				
Koningsdam	9/27/2022	AE 30391	CC	Mixed	Underway	28.1	9.2	7.59	0	0	0	7.7	0				
Koningsdam	10/4/2022	AE 30396	CC	Mixed	Underway	27.9	10.4	7.64	0	0	0	6.5	0				
Majestic UW	7/13/2022	AE 29555	PP	Mixed	Underway	28.7	14.7	7.65	0	0	0	61	0	50	4.6	48	1,410
Majestic UW	7/27/2022	AE 29738	CC	Mixed	Underway		2.0	6.56	0	0.1	0	3.4	0				
Majestic UW	6/8/2022	AE 29165	PP	Mixed	Underway	28.5	15.1	7.23	0	0	0	0	0	13	5.9	37	856
Majestic UW	5/18/2022	AE 28919	CC	Mixed	Underway	25.8	15.4	6.36	0	0	0	2.2	0				
Majestic UW	5/25/2022	AE 29030	CC	Mixed	Underway	27.0	16.4	7.54	0	0	0	3.7	0				
Majestic UW	6/21/2022	AE 29320	CC	Mixed	Underway	27.5	13.4	7.43	0	0	0	21	0				
Majestic UW	8/17/2022	AE 30099	CC	Mixed	Underway	25.7	13.3	6.98	0	0	0	0	0				
Majestic UW	8/24/2022	AE 30055	CC	Mixed	Underway	27.3	9.2	6.82	0	0	0	0	0				
Majestic UW	9/7/2022	AE 30273 R	CC	Mixed	Underway	23.4	5.2	7.34	0	0	0	0	0				
Majestic UW	9/13/2022	AE 30302	CC	Mixed	Underway	29.2	20.0	7.11	0	0	0	18	0				
Nieuw Amsterdam	5/12/2022	AE 28738	PP	Mixed	Underway	29.2	15.0	6.87	0	0	0	0	0	34	4.1	30	767
Nieuw Amsterdam	7/20/2022	AE 29707	PP	Mixed	Underway	32.0	8.7	7.67	0	0	0	5.9	0	62	1.4	49	837
Nieuw Amsterdam	5/4/2022	AE 28729	CC	Mixed	Underway	17.8	6.6	6.81	0	0	0	0	0				
Nieuw Amsterdam	6/9/2022	AE 29170	CC	Mixed	Underway	30.9	9.6	7.45	0	0	0	0	0				
Nieuw Amsterdam	6/30/2022	AE 29427	CC	Mixed	Underway	30.6	15.4	7.42	0	0	0	5.3	0				
Nieuw Amsterdam	7/14/2022	AE 29562	CC	Mixed	Underway	31.0	10.9	6.97	0	0	0	8.3	0				
Nieuw Amsterdam	8/25/2022	AE 30062	CC	Mixed	Underway	32.3	9.2	7.58	0	0	0	0	0				
Nieuw Amsterdam	8/31/2022	AE 30167	CC	Mixed	Underway	31.0	11.2	6.87	0	0	0	3.4	0				
Nieuw Amsterdam	9/8/2022	AE 30283	CC	Mixed	Underway	29.5	13.8	7.74	0	0	0	17	0				
Nieuw Amsterdam	9/28/2022	AE 30393	CC	Mixed	Underway	29.4	15.5	7.60	0	0		6.3	0				
Norwegian Bliss	5/10/2022	AE 28735	PP	Mixed	Stationary	28.5	28.0	7.28	0	0	0	4	17	0	9.9	59	579
Norwegian Bliss	8/2/2022	AE 29821 R	PP	Mixed	Stationary	32.3	39.8	7.45	0	0	0	3.5	4.8	0.28	4.6	0	630
Norwegian Bliss	5/2/2022	AE 28728	CC	Mixed	Stationary	24.6	31.6	7.13	0	0	0	2.5	13	0	7.2	62	686
Norwegian Bliss	6/7/2022	AE 29167	CC	Mixed	Stationary	31.0	38.5	7.33	0	0	0	3.6	0	0.21	5.2	100	1,078
Norwegian Bliss	6/21/2022	AE 29326	CC	Mixed	Stationary	29.5	39.6	7.29	0	0	0	2.9	0	0.16	4.2	89	941
Norwegian Bliss	7/5/2022	AE 29506	CC	Mixed	Stationary	32.3	35.4	7.22	0	0	0	2.5	0	0.2	4.2	54	582
Norwegian Bliss	7/19/2022	AE 29706	CC	Mixed	Stationary	30.7	56.8	7.13	0	0	0	3.2	4.8	0.17	4.7	62	588
Norwegian Bliss	8/16/2022	AE 30016	CC	Mixed	Stationary	31.5	32.2	7.35	0	0	2	3.1	0	0.19	6.1	0	652
Norwegian Bliss	9/13/2022	AE 30307	CC	Mixed	Stationary	30.4	39.5	7.16	0	0	0	5.7	4.8	0	4.87	58	679
Norwegian Bliss	9/26/2022	AE 30392	CC	Mixed	Stationary	29.3	48.0	6.99	0	0	0	2.6	6	0.88	4.4	66	645
Norwegian Bliss	10/10/2022	AE 30404	CC	Mixed	Stationary	28.8	46.0	6.95	0	0	0	2.3	4.8	2	4.8	72	694
Norwegian Bliss	10/17/2022	AE 30407	CC	Mixed	Stationary	29.5	61.1	7.07	0	0	0	2.3	0	1.5	3.4	85	736
Norwegian Encore	6/7/2022	AE 29168	PP	Mixed	Stationary	30.7	44.1	7.19	0	0	0	4.7	9.6	21	3.2	45	722
Norwegian Encore	8/16/2022	AE 30017	PP	Mixed	Stationary	28.5	45.0	6.38	0	0	0	0	0	17	3.7	0	707
Norwegian Encore	5/17/2022	AE 28920	CC	Mixed	Stationary	26.7	2.7	7.00	0	0	0	0	0	7	5.4	38	628
Norwegian Encore	5/24/2022	AE 29034	CC	Mixed	Stationary	26.5	34.9	7.08	0	0	0	0	0	9.0	4.8	47	694
Norwegian Encore	6/14/2022	AE 29288	CC	Mixed	Stationary	30.4	56.4	6.82	0	0	0	2.8	0	25	3.3	45	781
Norwegian Encore	7/5/2022	AE 29551	CC	Mixed	Stationary	30.4	40.0	7.15	0	0	7	2.6	0	25	1.7	40	741
Norwegian Encore	7/26/2022	AE 29735	CC	Mixed	Stationary	29.5	49.7	6.96	0	0	0	0	0	16	2.9	45	738
Norwegian Encore	8/9/2022	AE 29848	CC	Mixed	Stationary	31.2	40.0	6.41	0	0	0	0	0	19	2.6	40	716
Norwegian Encore	9/6/2022	AE 30274	CC	Mixed	Stationary	28.7	30.8	6.69	0	0	0	0	0	15	4.72	48	642
Norwegian Encore	9/20/2022	AE 30384	CC	Mixed	Stationary	28.8	47.0	7.08	0	0	0	3.2	0	20	2.9	51	682

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Vessel [1]	Sample Date	SampleNo	Sample Type [2]	Wastewater Type	Discharge Status	Temp (°C)	Flow rate (m3/hr)	pH (S.U.)	Free Cl (mg/L)	TR Cl (mg/L)	Fecal Coliform (FC/100mL)	BOD (mg/L)	TSS (mg/L)	Ammonia (mg/L)	Copper, Dissolved (ppb)	Hardness (mg/L)	Spec. Conductance (umhos/cm)
Norwegian Encore	10/4/2022	AE 30398	CC	Mixed	Stationary	28.3	44.0	7.03	0	0	0	3.1	4.4	20	2.9	45	632
Norwegian Encore	10/11/2022	AE 30405	CC	Mixed	Stationary	28.9	47.0	7.00	0	0	0	2.6	4.4	6.4	2.5	57	528
Norwegian Jewel	10/12/2022	AE 30406	CC	Mixed	Stationary	26.0	33.0	7.05	0	0	690	0	0	35	0	76	986
Norwegian Jewel	5/19/2022	AE 28933	PP	Mixed	Stationary	26.6	27.0	7.16	0	0	0	4.3	14	27	5.4	1600	1,767
Norwegian Jewel	7/14/2022	AE 29565	PP	Mixed	Stationary	28.4	27.0	6.94	0	0	0	4.8	6.8	37	0	240	2,730
Norwegian Jewel	4/28/2022	AE 28776	CC	Mixed	Underway	27.2	28.0	7.14	0	0	0	4.4	5.6				
Norwegian Jewel	5/26/2022	AE 29044	CC	Mixed	Stationary	27.9	28.0	7.18	0	0	0	3.6	9.2	20	6.6	85	981
Norwegian Jewel	6/9/2022	AE 29177	CC	Mixed	Stationary	29.2	28.2	6.97	0	0	0	5.5	15	27	4.5	73	1,060
Norwegian Jewel	6/16/2022	AE 29303	CC	Mixed	Stationary	28.7	26.0	7.17	0	0	0	4	6	32	0	93	1,320
Norwegian Jewel	7/28/2022	AE 29750	CC	Mixed	Stationary	29.9	26.0	7.12	0	0	2	9.1	21	33	3.2	73	1,110
Norwegian Jewel	8/11/2022	AE 29997	CC	Mixed	Stationary	29.5	28.0	6.77	0	0	0	3.3	6.8	33	3.2	150	1,820
Norwegian Jewel	8/18/2022	AE 30028	CC	Mixed	Stationary	29.0	25.0	6.75	0	0	0	3.2	7.6	33	3.8	83	1,172
Norwegian Jewel	8/25/2022	AE 30221	CC	Mixed	Stationary	29.6	26.0	6.87	0	0	0	3.2	17				
Norwegian Jewel	9/8/2022	AE 30289	CC	Mixed	Stationary	28.7	27.0	7.00	0	0	0	4.4	0	41	2.13	110	1,360
Norwegian Jewel	9/22/2022	AE 30389	CC	Mixed	Stationary	27.7	26.0	6.98	0	0	0	2.4	0	23	2.2	75	891
Norwegian Jewel	10/5/2022	AE 30400	CC	Mixed	Stationary	28.8	25.0	7.26	0	0	0	4.8	13	50	7.7	76	1,090
Norwegian Spirit	10/6/2022	AE 30401	CC	Mixed	Stationary	24.4	22.0	6.50	0	0	2	64	5.2	30	0	52	1,060
Norwegian Spirit	8/20/2022	AE 30041 R	PP	Mixed	Stationary	26.5	22.0	6.71	0	0	0	10	0	28	3.3	26	818
Norwegian Spirit	7/10/2022	AE 29529	PP	Mixed	Stationary	22.8	23.0	6.68	0	0	0	6.7	6.9	2.2	0	2000	7,460
Norwegian Spirit	6/22/2022	AE 29392	CC	Mixed	Stationary	21.6	20.0	6.44	0	0	0	3.9	0	13	3.7	29	711
Norwegian Spirit	6/23/2022	AE 29397	CC	Mixed	Stationary	24.2	21.0	6.15	0	0	0	2.7	4.4	21	9.0	30	808
Norwegian Spirit	7/1/2022	AE 29429	CC	Mixed	Stationary	23.6	24.0	6.70	0	0	0	3.9	4.8	22	5.4	30	681
Norwegian Spirit	8/10/2022	AE 29859	CC	Mixed	Stationary	25.1	22.0	6.56	0	0	0	9.2	0	24	1.1	25	719
Norwegian Spirit	9/18/2022	AE 30377	CC	Mixed	Stationary	25.0	19.0	7.14	0	0	0	13	0	32	0	74	1,390
Norwegian Spirit	9/26/2022	AE 30421	CC	Mixed	Stationary	25.9	31.0	6.81	0	0	17	24	0	31	0	40	1,020
Norwegian Sun	5/23/2022	AE 29025	CC	Mixed	Stationary	26.9	29.0	7.03	0	0	0	9.3	5.6	37	110	230	3,220
Norwegian Sun	8/1/2022	AE 29818	PP	Mixed	Stationary	29.5	23.5	6.70	0	0	0	11	17	34	7.1	27	1,050
Norwegian Sun	6/6/2022	AE 29162	PP	Mixed	Stationary	28.6	24.0	7.07	0	0	0	7.2	4.4	41	13	73	1,648
Norwegian Sun	5/16/2022	AE 28915	CC	Mixed	Stationary	34.7	25.0	6.89	0	0	0	9.4	6.5	46	14	43	1,228
Norwegian Sun	6/27/2022	AE 29416	CC	Mixed	Stationary	28.8	25.0	6.43	0	0	10	4.6	4	29	14	51	1,190
Norwegian Sun	7/18/2022	AE 29582	CC	Mixed	Stationary	27.1	24.0	6.73	0	0	2	6.4	0	31	13	38	1,140
Norwegian Sun	7/25/2022	AE 29734	CC	Mixed	Stationary	28.4	19.0	6.40	0	0	5	3.9	8	29	3.2	170	2,330
Norwegian Sun	8/15/2022	AE 30011	CC	Mixed	Stationary	29.0	22.0	6.65	0	0	2	10	4	36	4.8	21	914
Norwegian Sun	9/12/2022	AE 30303	CC	Mixed	Stationary	25.9	19.0	6.59	0	0	0	3.2	0	37	6.68	28	946
Norwegian Sun	9/17/2022	AE 30376	CC	Mixed	Stationary	27.7	24.0	6.67	0	0	0	5.7	0	41	4.4	33	1,201
Norwegian Sun	10/1/2022	AE 30394	CC	Mixed	Stationary	26.5	27.0	6.57	0	0	0	3.4	5.2	41	3	160	2,490
Norwegian Sun	10/8/2022	AE 30397	CC	Mixed	Stationary	28.3	24.2	6.72	0	0	0	7.2	0	36	1.8	25	1,080
Ovation of the Seas	6/27/2022	AE 29434	CC	Mixed	Underway	30.6	42.6	7.36	0	0	0	98	0				
Ovation of the Seas	6/7/2022	AE 29164	PP	Mixed	Underway	26.6	42.0	7.43	0	0	50	9.7	10	27	14	40	720
Ovation of the Seas	8/2/2022	AE 29817 R	PP	Mixed	Underway	26.2	39.6	7.36	0	0	0	0	4.4	20	8.3	43	717
Ovation of the Seas	5/16/2022	AE 28908	CC	Mixed	Underway	28.3	50.0	7.63	0	0	0	2.7	4				
Ovation of the Seas	5/23/2022	AE 28943	CC	Mixed	Underway	25.6	14.0	8.13	0	0	2	2.4	0				
Ovation of the Seas	7/11/2022	AE 29528	CC	Mixed	Underway	28.6	36.3	7.31	0	0	0	0	0				
Ovation of the Seas	7/19/2022	AE 29583	CC	Mixed	Underway	28.1	35.8	7.31	0	0	0	0	4.8				
Ovation of the Seas	8/16/2022	AE 30014	CC	Mixed	Underway	29.4	35.5	6.74	0	0	0	0	0				
Ovation of the Seas	9/12/2022	AE 30294	CC	Mixed	Underway	26.9	45.0	6.95	0	0	0	0	5.2				
Ovation of the Seas	9/20/2022	AE 30380	CC	Mixed	Underway	30.1	32.0	7.35	0	0	0	9.1	4.8				
Quantum of the Seas	6/3/2022	AE 29077 R	PP	Mixed	Underway	29.9	20.0	6.25	0	0	5	3.8	20	4.2	11	59	798
Quantum of the Seas	6/17/2022	AE 29304	CC	Mixed	Underway	29.4	28.7	6.55	0	0	0	3.6	0			71	
Quantum of the Seas	5/13/2022	AE 28741 R	CC	Mixed	Underway	27.0	31.7	6.69	0	0	0	4.1	15				
Quantum of the Seas	5/27/2022	AE 29046	CC	Mixed	Underway	28.5	12.6	6.57	0	0	0	5.6	17				
Quantum of the Seas	7/8/2022	AE 29519 R	PP	Mixed	Underway	29.9	26.0	6.77	0	0	0	2.6	9.5		7.9		798
Quantum of the Seas	7/15/2022	AE 29570	CC	Mixed	Underway	29.2	45.0	7.30	0	0	0	3.4	9.6				

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Vessel [1]	Sample Date	SampleNo	Sample Type [2]	Wastewater Type	Discharge Status	Temp (°C)	Flow rate (m3/hr)	pH (S.U.)	Free Cl (mg/L)	TR Cl (mg/L)	Fecal Coliform (FC/100mL)	BOD (mg/L)	TSS (mg/L)	Ammonia (mg/L)	Copper, Dissolved (ppb)	Hardness (mg/L)	Spec. Conductance (umhos/cm)
Quantum of the Seas	8/5/2022	AE 29834	CC	Mixed	Underway	30.2	19.3	6.89	0	0	0	0	4.8				
Quantum of the Seas	8/19/2022	AE 30029	CC	Mixed	Underway	31.6	37.8	6.92	0	0	0	0	7.2				
Quantum of the Seas	9/2/2022	AE 30319	CC	Mixed	Underway	29.7	41.5	7.06	0	0	0	0	6.4				
Quantum of the Seas	9/16/2022	AE 30367	CC	Mixed	Underway	30.2	34.7	6.77	0	0	0	0	6.4				
Queen Elizabeth	7/16/2022	AE 29571	PP	Mixed	Underway	29.4	10.2	7.26	0	0	0	2.8	0	20	13	66	1,400
Queen Elizabeth	6/18/2022	AE 29300	PP	Mixed	Underway	29.5	13.0	7.73	0	0	12	4.1	0	69	20	140	2,410
Queen Elizabeth	6/10/2022	AE 29255	CC	Mixed	Underway	27.7	14.6	7.40	0	0	0	4.4	0				
Queen Elizabeth	7/15/2022	AE 29561	CC	Mixed	Underway	30.8	9.4	7.39	0	0	0	2.8	0				
Regatta Port	6/6/2022	AE 29160	PP	Mixed	Stationary	20.3	3.3	6.66	0	0	50	5.4	0	30	6.3	210	2,390
Regatta Port	8/15/2022	AE 30102 R	PP	Mixed	Stationary	25.4	2.0	7.59	0	0	0	18	0	34	9.5	90	1,650
Regatta Port	5/22/2022	AE 28941	CC	Mixed	Stationary	22.7	3.6	8.28	0	0	0	3.4	0	38	18	1900	16,600
Regatta Port	5/28/2022	AE 29055	CC	Mixed	Stationary	20.4	2.0	7.04	0	0	0	7.5	5.6	36	11	180	2,220
Regatta Port	6/20/2022	AE 29316	CC	Mixed	Stationary	20.7	3.3	7.52	0	0	0	6.3	0				2,860
Regatta Port	7/11/2022	AE 29530	CC	Mixed	Stationary	23.0	6.0	6.94	0	0	0	6.4	0				1,440
Regatta Port	8/4/2022	AE 29829	CC	Mixed	Stationary	22.3	5.0	7.90	0	0	0	5.7	0				1,440
Regatta Stbd	6/6/2022	AE 29161	PP	Mixed	Stationary	23.5	3.3	6.30	0	0	0	4.1	0	0.16	13	170	2,142
Regatta Stbd	7/27/2022	AE 29747 R	PP	Mixed	Stationary	21.8	3.0	7.30	0	0	0	7.1	0	2.7	3.4	47	750
Regatta Stbd	5/22/2022	AE 28942	CC	Mixed	Stationary	20.0	3.6	6.07	0	0	0	2.4	0	0.16	63	550	5,090
Regatta Stbd	5/28/2022	AE 29056	CC	Mixed	Stationary	22.4	2.0	7.27	0	0	0	6.2	0	0	21	110	1,880
Regatta Stbd	6/20/2022	AE 29317	CC	Mixed	Stationary	22.7	3.4	7.15	0	0	0	0	0				2,010
Regatta Stbd	7/11/2022	AE 29531	CC	Mixed	Stationary	24.1	6.0	6.97	0	0	0	14	0				727
Regatta Stbd	8/4/2022	AE 29830	CC	Mixed	Stationary	24.1	5.0	7.94	0	0	0	7	0				1,220
Regatta Stbd	8/15/2022	AE 30103 R2	CC	Mixed	Stationary	27.3	3.0	7.38	0	0	0	7.8	0				1,480
Royal UW	5/18/2022	AE 28921	PP	Mixed	Underway	22.6	7.8	5.10	0	0	0	3.2	0	45	12	51	1,248
Royal UW	7/6/2022	AE 29512	PP	Mixed	Underway	28.5	4.7	7.48	0	0	0	3.3	0	29	1.2	39	836
Royal UW	5/5/2022	AE 28731 R	CC	Mixed	Underway	25.0	2.3	7.13	0	0	0	9.9	0				
Royal UW	6/15/2022	AE 29284	CC	Mixed	Underway	28.0	9.0	6.95	0	0	0	4.2	0				
Royal UW	6/29/2022	AE 29419	CC	Mixed	Underway	25.1	2.7	6.57	0	0	0	5.9	0				
Royal UW	7/13/2022	AE 29549 R	CC	Mixed	Underway	30.6	14.7	7.28	0	0	0	8.9	0				
Royal UW	8/3/2022	AE 29823	CC	Mixed	Underway	29.5	12.0	7.33	0	0	0	5.3	0				
Royal UW	8/31/2022	AE 30166	CC	Mixed	Underway	29.2	12.5	7.59	0	0	0	5.4	0				
Royal UW	9/14/2022	AE 30309	CC	Mixed	Underway	28.9	7.6	7.51	0	0	0	6.3	0				
Royal UW	9/20/2022	AE 30381	CC	Mixed	Underway	29.3	8.4	7.58	0	0	2	5.7	0				
Ruby UW	6/13/2022	AE 29256	PP	Mixed	Underway	26.6	22.4	7.04	0	0	88	2.8	0	13		270	3,160
Ruby UW	6/24/2022	AE 29398	CC	Mixed	Underway	30.8	18.8	7.36	0	0	480	8.4	0				
Ruby UW	8/3/2022	AE 29819 R	PP	Mixed	Underway	31.8		8.15	0	0	0	11	0	57	24	31	1,050
Ruby UW	5/14/2022	AE 28901	CC	Mixed	Underway	28.1	24.0	7.45	0	0	13	0	0				
Ruby UW	5/25/2022	AE 29028	CC	Mixed	Underway	26.5	16.4	7.82	0	0	7	2.1	0				
Ruby UW	6/23/2022	AE 29396	CC	Mixed	Underway	29.8	16.8	7.69	0	0	32						
Ruby UW	7/14/2022	AE 29556	CC	Mixed	Underway	31.0	22.3	7.87	0	0	0	11	0				
Ruby UW	8/12/2022	AE 29995	CC	Mixed	Underway	30.1	17.8	7.42	0	0	0	8.6	0				
Ruby UW	8/22/2022	AE 30043	CC	Mixed	Underway	30.3	17.4	8.01	0	0	2	9.2	0				
Ruby UW	9/1/2022	AE 30173	CC	Mixed	Underway	30.6	12.8	8.21	0	0	0	4.9	0				
Seabourn Odyssey	5/30/2022	AE 29064	CC	Mixed	Stationary	27.3	6.5	7.76	0	0	0	2.5	0	27	980	60	1,382
Seabourn Odyssey	7/31/2022	AE 29878	CC	Mixed	Stationary	35.2	4.5	7.53	0	0	0	3.8	0		97		798
Seabourn Odyssey	6/17/2022	AE 29306	PP	Mixed	Stationary	32.1	5.0	7.55	0	0	0	0	0	21	23	640	7,020
Seabourn Odyssey	8/5/2022	AE 29835 R	PP	Mixed	Stationary	28.7	4.8	7.55	0	0	0	0	0	5.5	19	14	636
Seabourn Odyssey	6/3/2022	AE 29079	CC	Mixed	Stationary	30.5	51.0	7.63	0	0	0	0	0				1,224
Seabourn Odyssey	7/8/2022	AE 29521	CC	Mixed	Stationary	33.3	5.5	7.73	0	0	0	0	0				1,020
Seabourn Odyssey	7/22/2022	AE 29712	CC	Mixed	Stationary	31.4	4.5	7.05	0	0	0	4.6	0				871
Seabourn Odyssey	8/19/2022	AE 30032	CC	Mixed	Stationary	34.1	5.3	7.44	0	0	0	2.5	0				587
Seabourn Odyssey	9/1/2022	AE 30177	CC	Mixed	Stationary	31.1	5.1	7.03	0	0	0	2.1	0				501
Seabourn Odyssey	9/10/2022	AE 30293	CC	Mixed	Stationary	26.4	4.5	7.45	0	0	0	2.3	0				1,110

2022 Large CPV Wastewater Report - Appendix B

Vessel [1]	Sample Date	SampleNo	Sample Type [2]	Wastewater Type	Discharge Status	Temp (°C)	Flow rate (m3/hr)	pH (S.U.)	Free Cl (mg/L)	TR Cl (mg/L)	Fecal Coliform (FC/100mL)	BOD (mg/L)	TSS (mg/L)	Ammonia (mg/L)	Copper, Dissolved (ppb)	Hardness (mg/L)	Spec. Conductance (umhos/cm)
Seven Seas Mariner	7/8/2022	AE 29525	PP	Mixed	Stationary	38.1	9.0	6.94	0	0	0	0	0	0.27	6.3	240	2,660
Seven Seas Mariner	6/4/2022	AE 29083	PP	Mixed	Stationary	37.3	9.0	7.29	0	0	0	0	0	0.36	7.9	260	2,870
Seven Seas Mariner	5/12/2022	AE 28742	CC	Mixed	Stationary	34.3	9.0	6.27	0	0	0	0	0	0.69	33	110	2,000
Seven Seas Mariner	5/28/2022	AE 29057	CC	Mixed	Stationary	35.5	9.0	7.39	0	0	0	0	0	2.5	22	240	3,270
Seven Seas Mariner	6/24/2022	AE 29407	CC	Mixed	Stationary	36.7	9.0	7.55	0	0	0	0	0	1	16	210	2,550
Seven Seas Mariner	7/2/2022	AE 29502	CC	Mixed	Stationary	39.8	9.0	7.27	0	0	0	0	0	0.25	6.3	200	2,340
Seven Seas Mariner	7/30/2022	AE 29754	CC	Mixed	Stationary	35.0	9.0	7.70	0	0	0			0.23			
Seven Seas Mariner	8/13/2022	AE 300006	CC	Mixed	Stationary	32.4	9.0	7.40	0	0	0	0	0	0.8	21	24	430
Seven Seas Mariner	8/19/2022	AE 30035	CC	Mixed	Stationary	35.5	9.0	7.37	0	0	0	3.3	0	0.72	9.2	22	499
Seven Seas Mariner	9/3/2022	AE 30186	CC	Mixed	Stationary	36.5	9.0	7.67	0	0	0	0	0	4.3	16.4	18	484
Seven Seas Mariner	9/24/2022	AE 30496	CC	Mixed	Stationary	35.9	9.0	7.03	0	0	0	2.7	0	1.1	20	13	554
Star Breeze	5/24/2022	AE 29027	CC	Mixed	Underway	18.5	3.6	7.33	0	0	0	120	0				
Star Breeze	6/5/2022	AE 29084	PP	Mixed	Underway	20.3	51.6	6.87	0	0	0	3.2	0	15	9.1	18	780
Star Breeze	8/12/2022	AE 29999	PP	Mixed	Underway	21.4	4.8	7.21	0	0	0	5.1	0	7.9	12	12	611
Star Breeze	6/15/2022	AE 29293	CC	Mixed	Underway	20.6	4.3	7.08	0	0	0	0	0				
Star Breeze	7/7/2022	AE 29516	CC	Mixed	Underway	22.9	4.1	6.65	0	0	0	0	0				
Star Breeze	7/18/2022	AE 29579	CC	Mixed	Underway	24.6	3.6	7.00	0	0	0	2.6	0				
Star Breeze	8/24/2022	AE 30056	CC	Mixed	Underway	23.1	5.4	7.28	0	0	3	2.1	0				
Viking Orion	5/19/2022	AE 28935	PP	Mixed	Stationary	24.6	12.0	6.50	0	0	0	9.2	17	4.3	6.2	60	730
Viking Orion	8/7/2022	AE 29842	PP	Mixed	Stationary	27.4	11.5	7.17	0	0	0	0	0	0.17	0	60	962
Viking Orion	5/27/2022	AE 29049	CC	Mixed	Stationary	23.9	12.0	6.89	0	0	0	2.6	4.4	0.75	4.8	33	710
Viking Orion	6/9/2022	AE 29178	CC	Mixed	Stationary	22.7	12.0	6.66	0	0	7	2.5	4.8	7.9	1.6	65	899
Viking Orion	6/28/2022	AE 29420	CC	Mixed	Stationary	27.0	11.0	6.95	0	0	0	0	0	13	0	62	881
Viking Orion	7/17/2022	AE 29577	CC	Mixed	Stationary	25.1	11.0	6.87	0	0	2	0	0	4.3	1.3	88	675
Viking Orion	7/26/2022	AE 29736	CC	Mixed	Stationary	24.3	11.5	6.90	0	0	0	2.6	8	3.4	0	34	805
Viking Orion	8/17/2022	AE 30024	CC	Mixed	Stationary	25.8	12.0	7.35	0	0	0	0	4	0	1.9	29	711
Viking Orion	9/3/2022	AE 30187	CC	Mixed	Stationary	24.5	11.0	6.89	0	0	0	0	0	15	2.08	39	972
Viking Orion	9/15/2022	AE 30366	CC	Mixed	Stationary	23.4	10.0	6.84	0	0	0	0	0	13	1.6	75	989
Greywater Effluent																	
Crown IP	8/8/2022	AE 29845 R	PP	GW	Stationary	26.1	15.6	7.09	0	0	0	9.8	0	4.2	1.8	28	562
Crown IP	5/23/2022	AE 29024	PP	GW	Stationary	24.0	187.7	7.18	0	0	3	0	0		0	82	1,073
Crown IP	5/16/2022	AE 28912	CC	GW	Stationary	35.9	53.1	6.89	0	0	0	0	0	4.7	1.7	17	407
Crown IP	6/13/2022	AE 29197	CC	GW	Stationary	24.5		7.08	0	0	2	2.2	0	4	5.1	20	474
Crown IP	6/27/2022	AE 29414	CC	GW	Stationary	27.3	41.0	7.07	0	0	0	9.9	0	7.1	6.7	52	854
Crown IP	7/11/2022	AE 29547	CC	GW	Stationary	26.7	15.4	7.07	0	0	0	0	0	4.6	3.6	54	820
Crown IP	7/25/2022	AE 29732	CC	GW	Stationary	28.0	15.1	6.62	0	0	0	0	0	3	13	14	390
Crown IP	8/29/2022	AE 30123	CC	GW	Stationary	26.0	4.0	7.17	0	0	0	0	0	6.7	4.83	6.5	308
Crown IP	9/5/2022	AE 30268	CC	GW	Stationary	25.6	42.0	8.35	0	0	0	0	0	5.6	9.76	4.5	268
Crown IP	9/12/2022	AE 30300	CC	GW	Stationary	27.0	41.8	7.23	0	0	0	0	0	8.6	11.4	19	475
Discovery IP	6/1/2022	AE 29071	PP	GW	Stationary	28.1	7.8	7.02	0	0	0	0	0	0	1	20	282
Discovery IP	8/17/2022	AE 30026 R	PP	GW	Stationary	27.3	9.6	7.59	0	0	0	0	0	0	0	110	519
Discovery IP	5/11/2022	AE 28736	CC	GW	Stationary	28.3	8.4	7.27	0	0	0	0	0	0	0	19	252
Discovery IP	5/18/2022	AE 28926	CC	GW	Stationary	27.7	50.0	6.99	0	0	0	0	0	0	0	19	270
Discovery IP	6/15/2022	AE 29298	CC	GW	Stationary	29.7	10.0	6.75	0	0	0	0	0				261
Discovery IP	7/6/2022	AE 29511	CC	GW	Stationary	29.4	5.1	7.47	0	0	0	0	0				461
Discovery IP	7/20/2022	AE 29709	CC	GW	Stationary	30.0	7.5	7.12	0	0	0	0	0	0	1.5	85	406
Discovery IP	8/10/2022	AE 29860	CC	GW	Stationary	30.3	9.9	7.40	0	0	0	0	0				470
Discovery IP	9/7/2022	AE 30280	CC	GW	Stationary	27.7	9.0	7.73	0	0	0	0	0	0	0	130	506
Discovery IP	9/14/2022	AE 30360	CC	GW	Stationary	26.5	88.4	7.31	0	0	0	0	0	0	0	110	513
Grand IP	8/6/2022	AE 29840 R	PP	GW	Stationary	28.4	2.8	7.48	0	0	0	5.6	0	0.29	0	46	686
Grand IP	6/11/2022	AE 29184	PP	GW	Stationary	25.5	4.3	7.76	0	0	0	0	0	2.8	0	31	582
Grand IP	5/14/2022	AE 28907	CC	GW	Stationary	25.2	6.3	7.75	0	0	0	7.1	0	18	7.7	88	1,310
Grand IP	5/28/2022	AE 29053	CC	GW	Stationary	26.5	4.6	7.75	0	0	0	4	0	0	3.1	49	1,087

2022 Large CPV Wastewater Report - Appendix B

Vessel [1]	Sample Date	SampleNo	Sample Type [2]	Wastewater Type	Discharge Status	Temp (°C)	Flow rate (m3/hr)	pH (S.U.)	Free Cl (mg/L)	TR Cl (mg/L)	Fecal Coliform (FC/100mL)	BOD (mg/L)	TSS (mg/L)	Ammonia (mg/L)	Copper, Dissolved (ppb)	Hardness (mg/L)	Spec. Conductance (umhos/cm)
Grand IP	6/19/2022	AE 29313	CC	GW	Stationary	27.3	6.1	7.79	0	0	0	0	0	1.9	1.4	34	505
Grand IP	7/9/2022	AE 29527	CC	GW	Stationary	28.8	4.1	7.70	0	0	0	2.1	0	0.12	1.3	34	470
Grand IP	7/23/2022	AE 29724	CC	GW	Stationary	26.3	6.3	8.43	0	0	0	2	0	1.5	1.1	100	1,230
Grand IP	8/20/2022	AE 30040	CC	GW	Stationary	21.7	2.6	7.68	0	0	0	2.5	0	0	4.5	66	919
Grand IP	9/3/2022	AE 30188	CC	GW	Stationary	26.3	4.1	7.56	0	0	0	0	0	0	2.83	18	434
Grand IP	9/17/2022	AE 30372	CC	GW	Stationary	26.5	2.7	7.62	0	0	0	0	0	0	0	20	459
Majestic IP	6/7/2022	AE 29166	PP	GW	Stationary	28.2	9.2	7.16	0	0	0	2	0	0.13	0	16	232
Majestic IP	7/13/2022	AE 29559	PP	GW	Stationary	26.2	9.0	7.21	0	0	0	20	0	2.1	1.8	19	320
Majestic IP	5/18/2022	AE 28929	CC	GW	Stationary	22.0	15.4	6.91	0	0	0	2.2	0	0.6	16	15	313
Majestic IP	5/24/2022	AE 29032	CC	GW	Stationary	25.4	10.0	7.04	0	0	0	3.7	0	0.42	1.6	16	273
Majestic IP	6/21/2022	AE 29327	CC	GW	Stationary	25.7	70.0	7.41	0	0	0	0	0	0.25	1.5	29	240
Majestic IP	7/27/2022	AE 29742	CC	GW	Stationary	27.5	7.7	6.96	0	0	0	0	0	1.2	1.8	21	262
Majestic IP	8/10/2022	AE 29861	CC	GW	Stationary	24.7	5.3	7.25	0	0	0	0	0	0.16	1.7	29	290
Majestic IP	8/24/2022	AE 30060	CC	GW	Stationary	27.8	6.4	6.92	0	0	0	0	0	0.14	3.35	21	279
Majestic IP	9/7/2022	AE 30281	CC	GW	Stationary	27.0	7.5	6.86	0	0	0	0	0	0	2.56	28	376
Majestic IP	9/13/2022	AE 30306	CC	GW	Stationary	28.3	5.7	6.19	0	0	0	0	0	0	6.42	20	259
Royal IP	8/3/2022	AE 29826	CC	GW	Stationary	20.0	13.8	8.16	0	0	0	200	5.6	62	7	41	870
Royal IP	9/20/2022	AE 30386	CC	GW	Stationary	29.2	8.6	5.81	0	0	0	0	0	0.99	19	23	252
Royal IP	7/6/2022	AE 29508	PP	GW	Stationary	24.9	3.8	7.18	0	0	0	5.5	0	4.8	44	26	377
Royal IP	5/17/2022	AE 28922	PP	GW	Stationary	26.9	15.7	7.04	0	0	0	2.7	0	0	4.7	19	238
Royal IP	5/4/2022	AE 28730	CC	GW	Stationary	26.9	7.4	7.05	0	0	0	30	0	3.5	6.3	26	392
Royal IP	6/14/2022	AE 29289	CC	GW	Stationary	25.7	14.3	6.58	0	0	0	4.2	0	0.55	7.3	29	278
Royal IP	6/28/2022	AE 29421	CC	GW	Stationary	29.2	9.2	6.40	0	0	0	4.6	0	0.79	18	33	321
Royal IP	7/12/2022	AE 29552	CC	GW	Stationary	28.6	6.5	6.61	0	0	0	0	0	1.3	23	21	282
Royal IP	8/31/2022	AE 30169	CC	GW	Stationary	27.5	6.9	6.87	0	0	0	2.3	0	0.58	1.03	23	322
Royal IP	9/14/2022	AE 30362	CC	GW	Stationary	28.0	5.8	6.91	0	0	0	0	0	1.2	3.4	26	236
Ruby IP	5/25/2022	AE 29041	CC	GW	Stationary	26.3	14.4	5.99	0	0	0	4.1	0	0.34	91	30	302
Ruby IP	8/3/2022	AE 29827 R	PP	GW	Stationary	28.0	12.5	6.43	0	0	0	2.5	0	0.76	20	21	870
Ruby IP	6/2/2022	AE 29075	PP	GW	Stationary	30.2	9.9	6.87	0	0	0	0	0	0.22	41	36	396
Ruby IP	5/13/2022	AE 28902	CC	GW	Stationary	29.0	9.4	6.62	0	0	0	3.6	0	0	23	23	225
Ruby IP	6/23/2022	AE 29401	CC	GW	Stationary	28.0	12.6	6.88	0	0	0	3.5	0	0	19	210	2,350
Ruby IP	7/14/2022	AE 29564	CC	GW	Stationary	28.5	16.7	6.37	0	0	0	7.8	0	1.1	20	77	800
Ruby IP	7/23/2022	AE 29725	CC	GW	Stationary	30.0	17.6	7.09	0	0	0	0	0	0.64	11	23	326
Ruby IP	8/21/2022	AE 30044	CC	GW	Stationary	29.4	14.4	7.61	0	0	0	0	0	0.81	21	22	312
Ruby IP	9/1/2022	AE 30176	CC	GW	Stationary	29.0	17.6	6.66	0	0	0	0	0	0.93	64.1	17	218
Ruby IP	9/11/2022	AE 30297	CC	GW	Stationary	28.7	19.5	6.63	0	0	0	2.4	0	0.85	28.7	43	459

[1] UW: Underway (>6 knots). IP: In-port, Stationary (<6 knots).

[2] CC: Continued Compliance, GP Sample (Twice per month). PP: Priority Pollutant (Twice per season).

Parameter Results exceed General Permit 2004 limits

Vessel [1]	Sample Date	SampleNo	Sample Type [2]	Effluent Type	Discharge Status	Spec. Conductance (umhos/cm)	Hardness (mg/L)	Nickel, Dissolved (ppb)	Zinc,, Dissolved (ppb)	Alkalinity (Total)	COD (mg/L)	Total Organic Carbon	Total Kjeldahl Nitrogen (mg/L)	Nitrogen, NO2-NO3 (mg/L)	Total Phosphorus (µg/L)	Settleable Solids (mg/L)	Oil & Grease (mg/L)	E.coli (MPN/100mL)
Norwegian Bliss	5/10/2022	AE 28735	PP	Mixed	Stationary	579	59	6.3	120	80	47	14.1	2.3	12	0.474	0	0	0
Norwegian Bliss	8/2/2022	AE 29821 R	PP	Mixed	Stationary	630	0	5.7	62	120	43	6.3	0	9.5	0	0	0	1
Norwegian Bliss	10/10/2022	AE 30404	CC	Mixed	Stationary	694	72						0	22	0			1
Crown UW	8/9/2022	AE 29843 R	PP	Mixed	Underway	1660	34	15	89	450	190	37.9	110	0	10.2	0	0	0
Crown UW	5/24/2022	AE 29022	PP	Mixed	Underway	1687	71	16	52	400	94	20.8	100	0	7.67	0	0	0
Discovery UW	8/18/2022	AE 30020 R	PP	Mixed	Underway	958	120	27	110	250	43	10.7	43	6.1	4.62	0	0	0
Discovery UW	6/9/2022	AE 29217	PP	Mixed	Underway	1180	27	26	160	250	60	9.1	46	8.9	4.21	0	0	0
Disney Wonder	6/10/2022	AE 29176	PP	Mixed	Underway	1570	79	28	170	300	49	13.6	70	0	7.13	0	0	0
Disney Wonder	8/19/2022	AE 30030 R	PP	Mixed	Underway	557	38	20	270	90	38	8.7	6.5	6	5.55	0	0	0
Norwegian Encore	6/7/2022	AE 29168	PP	Mixed	Stationary	722	45	8.5	56	140	43	14.3	28	5.8	0.346	0	0	0
Norwegian Encore	8/16/2022	AE 30017	PP	Mixed	Stationary	707	0	4.4	86	86	34	9.7	16	13	0	0	0	0
Norwegian Encore	10/4/2022	AE 30398	CC	Mixed	Stationary	632	45						26	5.8	0			0
Eurodam	5/18/2022	AE 28918	PP	Mixed	Underway	1161	36	12	51	250	70	18.7	94	15	6.5	0	0	3
Eurodam	8/10/2022	AE 29847	PP	Mixed	Underway	32100	58	20	120	250	57	14.0	81	1.4	3.47	0	0	0
Grand UW	8/7/2022	AE 29837 R	PP	Mixed	Underway	1020	46	15	85	300	49	12.6	71	0	9.73	0	0	0
Grand UW	6/12/2022	AE 29183	PP	Mixed	Underway	959	58	13	28	77	42	9.9	21	14	5.4	0	0	0
Norwegian Jewel	5/19/2022	AE 28933	PP	Mixed	Stationary	1767	1600	5.2	76	160	78	20.8	33	1.4	0.502	0	0	0
Norwegian Jewel	7/14/2022	AE 29565	PP	Mixed	Stationary	2730	240	8	82	180	98	14.8	40	0	0	0	0	1
Norwegian Jewel	10/5/2022	AE 30400	CC	Mixed	Stationary	1090	76						58	0	0.741			0
Koningsdam	7/12/2022	AE 29533	PP	Mixed	Underway	1130	36	14	27	350	55	16.1	78	0	8.01	0	0	0
Koningsdam	5/17/2022	AE 28914	PP	Mixed	Underway	1297	58	21	42	250	66	12.8	63	0	9.8	0	0	0
Majestic UW	7/13/2022	AE 29555	PP	Mixed	Underway	1410	48	14	130	400	61	18.6	72	1.6	14.6	0	0	0
Majestic UW	6/8/2022	AE 29165	PP	Mixed	Underway	856	37	17	190	93	32	11.3	18	0.92	9.91	0	0	0
Nieuw Amsterdam	5/12/2022	AE 28738	PP	Mixed	Underway	767	30	14	110	24	40	11.4	36	0	9.29	0	0	1
Nieuw Amsterdam	7/20/2022	AE 29707	PP	Mixed	Underway	837	49	10	31	120	28	9.5	120	0.41	1.29	0	0	0
Ovation of the Seas	6/7/2022	AE 29164	PP	Mixed	Underway	720	40	3.2	86	180	64	22.1	32	1.1	5.42	0	0	6
Ovation of the Seas	8/2/2022	AE 29817 R	PP	Mixed	Underway	717	43	3.8	90	150	48	10.3	21	4.9	0.922	0	0	1
Quantum of the Seas	6/3/2022	AE 29077 R	PP	Mixed	Underway	798	59	3.2	63	0	46	14.2	7.7	22	1	0	0	2
Quantum of the Seas	6/17/2022	AE 29304	CC	Mixed	Underway		71	3.2	56	44		12.5	6.7				0	
Quantum of the Seas	7/8/2022	AE 29519 R	PP	Mixed	Underway	798					39			22		0		0
Queen Elizabeth	7/16/2022	AE 29571	PP	Mixed	Underway	1400	66	10	76	120	90	24.1	18	10	15.7	0	0	0
Queen Elizabeth	6/18/2022	AE 29300	PP	Mixed	Underway	2410	140	11	85	300	110	21.1	84	0	14	0	0	11
Regatta Port	6/6/2022	AE 29160	PP	Mixed	Stationary	2390	210	19	17	23	61	9.8	34	37	0.393	0	0	50
Regatta Port	8/15/2022	AE 30102 R	PP	Mixed	Stationary	1650	90	18	39	300	94	17.7	39	0	1.21	0	0	0
Regatta Stbd	6/6/2022	AE 29161	PP	Mixed	Stationary	2142	170	17	40	0	44	10.0	0	57	1.39	0	0	0
Regatta Stbd	7/27/2022	AE 29747 R	PP	Mixed	Stationary	750	47	13	28	58	27	4.7	0	18	0.438	0	0	0
Royal UW	5/18/2022	AE 28921	PP	Mixed	Underway	1248	51	31	2700	0	59	19.1	54	74	21.3	0	0	0
Royal UW	7/6/2022	AE 29512	PP	Mixed	Underway	836	39	8.6	130	190	37	13.6	84	0	9.98	0	0	0
Ruby UW	6/13/2022	AE 29256	PP	Mixed	Underway	3160	270	8.7	95	110	77	11.4	0	0	5.63	0	0	180
Ruby UW	8/3/2022	AE 29819 R	PP	Mixed	Underway	1050	31	14	160	350	57	15.5	85	4.8	8.67	0	0	0
Seabourn Odyssey	6/17/2022	AE 29306	PP	Mixed	Stationary	7020	640	0	130	150	140	11.5	23	1.2	3.16	0	0	0
Seabourn Odyssey	8/5/2022	AE 29835 R	PP	Mixed	Stationary	636	14	5.4	84	150	28	8.7	5.4	0	0.752	0	0	1
Seven Seas Mariner	7/8/2022	AE 29525	PP	Mixed	Stationary	2660	240	5.7	50	89	61	10.7	0	0	0	0	0	
Seven Seas Mariner	6/4/2022	AE 29083	PP	Mixed	Stationary	2870	260	5.7	64	110	31	9.0	1.5	0	1.77	0	0	0
Seven Seas Mariner	7/30/2022	AE 29754	CC	Mixed	Stationary					160			0.96	0	1.46			0
Norwegian Spirit	8/20/2022	AE 30041 R	PP	Mixed	Stationary	818	26	15	150	140	73	20.8	33	0	0	0	0	0
Norwegian Spirit	7/10/2022	AE 29529	PP	Mixed	Stationary	7460	2000	0	0	69	216	0.0	2.5	0	0	0	0	4
Star Breeze	6/5/2022	AE 29084	PP	Mixed	Underway	780	18	12	340	160	59	20.2	19	0	0	0	0	0
Star Breeze	8/12/2022	AE 29999	PP	Mixed	Underway	611	12	12	200	110	62	15.0	11	0	0.286	0	0	0
Norwegian Sun	8/1/2022	AE 29818	PP	Mixed	Stationary	1050	27	20	130	140	75	16.5	36	0	0	0	0	0
Norwegian Sun	6/6/2022	AE 29162	PP	Mixed	Stationary	1648	73	12	140	150	66	15.2	52	0.26	0	0	0	0
Norwegian Sun	10/1/2022	AE 30394	CC	Mixed	Stationary	2490	160						50	0	0			2
Viking Orion	5/19/2022	AE 28935	PP	Mixed	Stationary	730	60	15	95	25	66	14.4	8.6	15	7.63	0	0	0
Viking Orion	8/7/2022	AE 29842	PP	Mixed	Stationary	962	60	15	55	58	30	5.4	0	9.9	0	0	0	1
Greywater																		
Crown IP	8/8/2022	AE 29845 R	PP	GW	Stationary	562	28	14	27	68	39	10.4	4.6	0.36	0	0	0	0
Crown IP	5/23/2022	AE 29024	PP	GW	Stationary	1073	82	24	96	52	31	6.0	0.95	0	0	0	0	0
Discovery IP	6/1/2022	AE 29071	PP	GW	Stationary	282	20	26	440	0	0	3.6	1.1	6.5	0.418	0	0	0
Discovery IP	8/17/2022	AE 30026 R	PP	GW	Stationary	519	110	31	180	81	0	2.8	0	3.2	0	0	0	0
Grand IP	8/6/2022	AE 29840 R	PP	GW	Stationary	686	46	12	26	34	22	3.0	0	1.3	0	0	0	0
Grand IP	6/11/2022	AE 29184	PP	GW	Stationary	582	31	11	18	48	17	1.8	0.2	0	0	0	0	0

Vessel [1]	Sample Date	SampleNo	Sample Type [2]	Effluent Type	Discharge Status	Spec. Conductance (umhos/cm)	Hardness (mg/L)	Nickel, Dissolved (ppb)	Zinc,, Dissolved (ppb)	Alkalinity (Total)	COD (mg/L)	Total Organic Carbon	Total Kjeldahl Nitrogen (mg/L)	Nitrogen, NO2-NO3 (mg/L)	Total Phosphorus (µg/L)	Settleable Solids (mg/L)	Oil & Grease (mg/L)	E.coli (MPN/ 100mL)
Majestic IP	6/7/2022	AE 29166	PP	GW	Stationary	232	16	19	260	23	29	4.6	0	3.6	0	0	0	0
Majestic IP	7/13/2022	AE 29559	PP	GW	Stationary	320	19	17	320	30	0	3.3	2.6	5.6	0.514	0	0	0
Royal IP	7/6/2022	AE 29508	PP	GW	Stationary	377	26	21	830	24	27	4.5	6.4	11	1.96	0	0	0
Royal IP	5/17/2022	AE 28922	PP	GW	Stationary	238	19	11	420	0	17	3.1	0	6.4	0.268	0	0	0
Ruby IP	8/3/2022	AE 29827 R	PP	GW	Stationary	870	21	12	220	0	15	2.8	0	8.2	0.823	0	0	0
Ruby IP	6/2/2022	AE 29075	PP	GW	Stationary	396	36	17	430	0	0	2.6	0.74	7	0	0	0	0

[1] UW: Underway (>6 knots). IP: In-port, Stationary (<6 knots).

[2] CC: Continued Compliance, GP Sample (Twice per month). PP: Priority Pollutant (Twice per season).