# 2016 Wastewater Sampling Results For Large Cruise Ships

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Alaska Department of

Environmental Conservation

Commercial Passenger Vessel Environmental Compliance Program

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# 1. SUMMARY

This is a report of the results of onboard sampling and laboratory testing of large cruise ship treated wastewater effluent in Alaska during 2016. This report is produced to provide information on wastewater treatment sampled results obtained under the requirements of the 2014 Large Commercial Passenger Vessel Wastewater Discharge General Permit (General Permit). Tables of sample results are included in Appendix 1. Information on the sampling techniques and requirements can be found in the Methods section of this report.

Thirty large cruise ships operated in Alaska in 2016, of those twenty ships were authorized to discharge treated wastewater in Alaska, and eighteen ships discharged treated wastewater and conducted sampling. Table 1 lists large cruise ships in Alaska and their discharge status in 2016.

# 2. INTRODUCTON

Sampling of cruise ship effluent is a requirement under the General Permit for all large cruise ships discharging in Alaska waters. Sampling is needed to:

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

Sample result data for cruise ships has been collected by the Department of Environmental Conservation since 2000. Reports for prior years can be found on the cruise program's report webpage.

# 3. METHODS

Samples are grab wastewater samples taken from a sample port prior to discharge. The number of required samples and what parameters measured are required to be analyzed are listed in the 2014 General Permit and for the US Coast Guard in the QAPP. Sampling may occur while underway or when docked. All samples were obtained in Southeast Alaska in 2016, with the majority of samples obtained in or near Juneau. Sample results presented in this report only include data collected while a cruise ship was discharging in Alaska.

The samples were taken according to requirements in the 2016 Cruise Line International Association North West and Canada 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, and laboratory analysis requirements. Samplers must follow the QAPP and the Vessel Specific Sampling Plan (VSSP) for each cruise ship when collecting a sample. The 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.

# 4. RESULTS

Wastewater sample results are listed in Appendix 1 with tables for parameters with General Permit limits, conventional and nutrient results with no limits, and metals. Full results of VOCs and BNAs are available on request. This report does not include the results of receiving water and ambient water sampling taken in the harbors.

In the tables of results those values highlighted in red are exceedances of the 2014 Wastewater Discharge General Permit limits. Orange highlighted results were below a daily maximum, but were an exceedance of a monthly average limit. Dark blue highlights indicate that either no sample analysis was required or no data was received. Results below the method detection limit (MDL) are recorded as zero. Full sample suites of all QAPP listed parameters are identified as "PP" for priority pollutants, and all other samples are identified as "GP" (General Permit).

**Table 1: 2016 Large Cruise Ship Summary**

2016 Large[1] Commercial Passenger Vessel Discharge Status and Wastewater Treatment — Rev3

| | Vessel Operator | Vessel Name | Passenger Capacity[2] | Voyages | Total Passengers[4] | Crew Capacity | Wastewater Treatment System | Permitted to discharge in Alaska in 2016[3] | | Skagway Docks discharge permitted? | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Underway | Stationary | Railroad | Ore | Broadway |
| 1 | Carnival Cruise Lines | *Carnival Legend* | 2124 | 17 | 36,108 | Unknown | Triton Type MSTP9 | No | No | No | No | No |
| 2 | Celebrity Cruises | *Celebrity Infinity* | 2170 | 17 | 36,890 | Unknown | Zenon Zeeweed | No | No | No | No | No |
| 3 | Celebrity Cruises | *Celebrity Millennium* | 2449 | 16 | 39,184 | Unknown | Hydroxyl CB-100 MSD | No | No | No | No | No |
| 4 | Celebrity Cruises | *Celebrity Solstice* | 3148 | 18 | 56,664 | Unknown | Kruger WABAG MSD | No | No | No | No | No |
| 5 | Crystal | *Crystal Serenity* | 1050 | 9 | 9,450 | Unknown | Unknown | No | No | No | No | No |
| 6 | Disney | *Disney Wonder* | 2834 | 13 | 36,842 | 920 | Hamworthy MBR AWTS | Yes | No | No | No | No |
| 7 | Holland America | *Amsterdam* | 1380 | 18 | 24,840 | Unknown | Hamworthy MSD | No | No | No | No | No |
| 8 | Holland America | *Maasdam* | 1258 | 9 | 11,322 | 580 | Zenon AWTS | Yes | Yes | Yes | Yes | Yes |
| 9 | Holland America | *Nieuw Amsterdam* | 2106 | 22 | 46,332 | 929 | Hamworthy Bioreactor | Yes | No | No | No | No |
| 10 | Holland America | *Noordam* | 1916 | 21 | 40,236 | Unknown | Rochem UF MSD | No | No | No | No | No |
| 11 | Holland America | *Volendam* | 1432 | 23 | 32,936 | 647 | Zenon AWTS | Yes | Yes | Yes | Yes | Yes |
| 12 | Holland America | *Westerdam* | 1916 | 21 | 40,236 | Unknown | Rochem UF MSD | No | No | No | No | No |
| 13 | Holland America | *Zaandam* | 1432 | 19 | 27,208 | 647 | Zenon AWTS | Yes | Yes | Yes | Yes | Yes |
| 14 | Norwegian Cruise Line | *Norwegian Jewel* | 2376 | 20 | 47,520 | 1100 | Scanship Type II AWTS | Yes | Yes | Yes | Yes | Yes |
| 15 | Norwegian Cruise Line | *Norwegian Pearl* | 2394 | 20 | 47,880 | 1100 | Scanship Type II AWTS | Yes | Yes | Yes | Yes | Yes |
| 16 | Norwegian Cruise Line | *Norwegian Sun* | 1936 | 20 | 38,720 | 950 | Scanship Type II AWTS | Yes | Yes | Yes | Yes | Yes |
| 17 | Oceania | *Regatta* | 777 | 12 | 9,324 | 373 | Triton Water MBR AWTS | Yes | No | No | No | No |
| 18 | Ponant | *L'Austral* | 264 | 1 | 264 | 136 | Rochem Bio-filt AWTS | Yes | Yes | Yes | Yes | Yes[5] |
| 19 | Ponant | *Le Soleal* | 264 | 9 | 2,376 | 136 | Rochem Bio-filt AWTS | Yes | Yes | Yes | Yes | Yes[5] |
| 20 | Princess Cruise Line | *Coral Princess* | 1986 | 18 | 35,748 | 900 | Hamworthy MBR AWTS | Yes | No | No | No | No |
| 21 | Princess Cruise Line | *Crown Princess* | 3080 | 19 | 58,520 | 1190 | Hamworthy MBR AWTS | Yes | Yes - Graywater only | Yes | No | No |
| 22 | Princess Cruise Line | *Grand Princess* | 2606 | 13 | 33,878 | 1100 | Hamworthy MBR 16 AWTS | Yes | Yes - Graywater only | No | No | No |
| 23 | Princess Cruise Line | *Island Princess* | 1974 | 18 | 35,532 | 900 | Hamworthy MBR AWTS | Yes | No | No | No | No |
| 24 | Princess Cruise Line | *Ruby Princess* | 3084 | 19 | 58,596 | 1201 | Hamworthy MBR 16 AWTS | Yes | Yes - Graywater only | No | No | No |
| 25 | Princess Cruise Line | *Star Princess* | 2600 | 19 | 49,400 | 1150 | Hamworthy MBR AWTS | Yes | Yes - Graywater only | No | No | No |
| 26 | Princess Cruise Line | *Sun Princess* | 2022 | 1 | 2,022 | 924 | Hamworthy MBR AWTS | Yes | No | No | No | No |
| 27 | Prestige Cruises | *Seven Seas Mariner* | 769 | 16 | 12,304 | 431 | Hamworthy MBR 240C AWTS | Yes | No | No | No | No |
| 28 | Royal Caribbean Cruises | *Explorer of the Seas* | 4000 | 17 | 68,000 | Unknown | Unknown | No | No | No | No | No |
| 29 | Royal Caribbean Cruises | *Radiance of the Seas* | 2502 | 17 | 42,534 | Unknown | Hamann MSD | No | No | No | No | No |
| 30 | Silver Seas | *Silver Shadow* | 382 | 19 | 7,258 | 305 | Bio Epure/Marisan | Yes | No | No | No | No |
| | | | **Totals** | **481** | **988,124** | | | | | | | |

Vessels highlighted in gray in the above table did not discharge wastewater in Alaskan waters in 2016.

[1] A large vessel has overnight accommodations for 250 or more passengers.

[2] Capacity is the number of lower berths and is calculated from Registration, Vessel Specific Sampling Plan, or Notice of Intent. Actual number of passenger aboard varies.

[3] Alaska water includes the Alexander Archipelago and extends 3 miles from the coastline. Only vessels that discharge into Alaska waters are required to sample wastewater.

[4] Assumes full capacity on every voyage

[5] Discharge at Broadway Dock allowed unless another ship is discharging at the Ore Dock

MBR is a Membrane Bioreactor

# APPENDIX 1: 2016 LARGE CRUISE SHIP WASTEWATER SAMPLE DATA

## Table 3: Semi-monthly parameters and general permit limits

SemiMonthly General Permit Sample Results

Non-detects set to zero

| Company | Vessel | Treatment System | Wastewater Type | Sample taken while | Sample Date | Type | mg/L Ammonia | ug/L Copper | ug/L Nickel | ug/L Zinc | S.U. pH | C Temp | m3/hr Flow rate | col. per 100 ml Fecal Coliform | mg/L TSS | mg/L BOD | mg/L Hardness | umhos/cm Specific Conductance | mg/L Free Chlorine | mg/L TR Chlorine |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Disney CL | Disney Wonder | Hamworthy | Mixed | Underway | 5/27/2016 | GP | | | | | 7.57 | 29.4 | 0.3 | 0 | 0 | 0 | | | 0 | 0 |
| Disney CL | Disney Wonder | Hamworthy | Mixed | Underway | 6/3/2016 | GP | | | | | 7.37 | 31.5 | 0.3 | 0 | 0 | 0 | | | 0 | 0 |
| Disney CL | Disney Wonder | Hamworthy | Mixed | Underway | 6/17/2016 | PP | 41 | 1.1 | 15 | 220 | 6.94 | 29 | 13.9 | 0 | 0 | 0 | 63 | 976 | 0 | 0 |
| Disney CL | Disney Wonder | Hamworthy | Mixed | Underway | 7/8/2016 | GP | | | | | 7.13 | 32.6 | 10 | 0 | 0 | 0 | | | 0 | 0 |
| Disney CL | Disney Wonder | Hamworthy | Mixed | Underway | 7/22/2016 | GP | | | | | 7.27 | 32.1 | NR | 0 | 0 | 0 | | | 0 | 0 |
| Disney CL | Disney Wonder | Hamworthy | Mixed | Underway | 8/5/2016 | PP | 46 | 1.7 | 17 | 250 | 7.43 | 31.2 | 10 | 0 | 0 | 0 | 40 | 1090 | 0 | 0 |
| Disney CL | Disney Wonder | Hamworthy | Mixed | Underway | 8/12/2016 | GP | | | | | 7.35 | 31.1 | 36 | 0 | 0 | 0 | | | 0 | 0 |
| Holland America | Maasdam | Zenon | Mixed | Stationary | 5/27/2016 | GP | 47 | 2.6 | | | 7.22 | 24.9 | 15.4 | 0 | 0 | 0 | 36 | 987 | 0 | 0 |
| Holland America | Maasdam | Zenon | Mixed | Stationary | 6/10/2016 | PP | 41 | 3.1 | 21 | 56 | 7.33 | 27.1 | 16 | 0 | 0 | 0 | 27 | 760 | 0 | 0 |
| Holland America | Maasdam | Zenon | Mixed | Stationary | 6/24/2016 | GP | 65 | 4.1 | | | 7.38 | 27.9 | 27 | 0 | 0 | 0 | 30 | 1130 | 0 | 0 |
| Holland America | Maasdam | Zenon | Mixed | Stationary | 7/8/2016 | GP | 56 | 4.3 | | | 7.39 | 28.4 | 16 | 0 | 0 | 0 | 35 | 1150 | 0 | 0 |
| Holland America | Maasdam | Zenon | Mixed | Stationary | 7/22/2016 | PP | 54 | 3.1 | 22 | 200 | 7.36 | 27.6 | 8 | 0 | 0 | 0 | 34 | 1140 | 0 | 0 |
| Holland America | Maasdam | Zenon | Mixed | Stationary | 8/5/2016 | GP | 54 | 9.7 | | | 7.31 | 28.9 | 15 | 0 | 0 | 0 | 29 | 1020 | 0 | 0 |
| Holland America | Maasdam | Zenon | Mixed | Stationary | 8/19/2016 | GP | 58 | 4.7 | | | 7.13 | 27.9 | 16 | 0 | 0 | 0 | 33 | 1090 | 0 | 0 |
| Holland America | Maasdam | Zenon | Mixed | Stationary | 9/2/2016 | GP | 42 | 2.9 | | | 7.21 | 27.1 | 15.7 | 0 | 0 | 0 | 30 | 883 | 0 | 0 |
| Holland America | Maasdam | Zenon | Mixed | Stationary | 9/16/2016 | GP | 39 | 1.8 | | | 7.07 | 27.1 | 16 | 0 | 0 | 0 | 31 | 889 | 0 | 0 |
| Holland America | Nieuw Amsterdam | Hamworthy | Mixed | Underway | 5/10/2016 | GP | | | | | 7.87 | 29.8 | 12.5 | 0 | 0 | 5.4 | | | 0 | 0 |
| Holland America | Nieuw Amsterdam | Hamworthy | Mixed | Underway | 5/17/2016 | PP | 140 | 3 | 15 | 58 | 7.67 | 29.2 | 12.5 | 0 | 0 | 14 | 5.1 | 1580 | 0 | 0 |
| Holland America | Nieuw Amsterdam | Hamworthy | Mixed | Underway | 6/14/2016 | GP | | | | | 7.82 | 28.6 | 12.5 | 2 | 0 | 2.7 | | | 0 | 0 |
| Holland America | Nieuw Amsterdam | Hamworthy | Mixed | Underway | 6/21/2016 | GP | | | | | 7.66 | 28.1 | 12.5 | | 0 | 11 | | | 0 | 0 |
| Holland America | Nieuw Amsterdam | Hamworthy | Mixed | Underway | 6/28/2016 | GP | | | | | 7.62 | 30.7 | 12.5 | 0 | | | | | 0 | 0 |
| Holland America | Nieuw Amsterdam | Hamworthy | Mixed | Underway | 7/12/2016 | PP | 32 | 0 | 6.6 | 9 | 7.55 | 30.4 | 12.5 | 0 | 0 | 5.1 | 1500 | 1080 | 0 | 0 |
| Holland America | Nieuw Amsterdam | Hamworthy | Mixed | Underway | 7/19/2016 | GP | | | | | 7.57 | 31.8 | 12 | 2 | 0 | 7.9 | | | 0 | 0 |
| Holland America | Nieuw Amsterdam | Hamworthy | Mixed | Underway | 8/2/2016 | GP | 120 | | | | 7.75 | 18.6 | 3 | 0 | 0 | 0 | | | 0 | 0 |
| Holland America | Nieuw Amsterdam | Hamworthy | Mixed | Underway | 8/9/2016 | GP | | | | | 7.83 | 18.4 | 4 | 0 | 0 | 2.6 | | | 0 | 0 |
| Holland America | Nieuw Amsterdam | Hamworthy | Mixed | Underway | 9/6/2016 | GP | | | | | 7.52 | 30.6 | 4 | | 7.6 | 0 | | | 0 | 0 |
| Holland America | Nieuw Amsterdam | Hamworthy | Mixed | Underway | 9/20/2016 | GP | | | | | 7.55 | 26 | 11.52 | | 0 | 19 | | | 0 | 0 |
| Holland America | Nieuw Amsterdam | Hamworthy | Mixed | Underway | 9/27/2016 | GP | | | | | 7.54 | 30.9 | 11.52 | 0 | | | | | 0 | 0 |
| Holland America | Volendam | Zenon | Mixed | Stationary | 5/6/2016 | GP | 62 | 2.8 | | | 7.46 | 25.1 | 10 | 0 | 0 | 2.8 | 40 | 1060 | 0 | 0 |
| Holland America | Volendam | Zenon | Mixed | Stationary | 5/13/2016 | PP | 53 | 1.9 | 13 | 66 | 7.3 | 27.9 | 9.8 | 0 | 0 | 0 | 27 | 967 | 0 | 0 |
| Holland America | Volendam | Zenon | Mixed | Stationary | 6/10/2016 | GP | 37 | 4.1 | | | 7.45 | 27.6 | 24.5 | 5 | 0 | 2.1 | 28 | 777 | 0 | 0 |
| Holland America | Volendam | Zenon | Mixed | Stationary | 6/17/2016 | USCG | | | | | 7.17 | 28.2 | 24.5 | 0 | 0 | 4.5 | | | 0 | 0 |
| Holland America | Volendam | Zenon | Mixed | Stationary | 6/24/2016 | GP | 42 | 1.5 | | | 7.28 | 28.1 | 30 | 0 | 0 | 0 | 35 | 748 | 0 | 0 |
| Holland America | Volendam | Zenon | Mixed | Stationary | 7/8/2016 | GP | 48 | 1.8 | | | 7.4 | 29.7 | 30 | 7 | 0 | 0 | 27 | 796 | 0 | 0 |
| Holland America | Volendam | Zenon | Mixed | Stationary | 7/22/2016 | GP | 52 | 4.1 | | | 7.46 | 29.1 | 21.8 | 0 | 0 | 0 | 32 | 884 | 0 | 0 |
| Holland America | Volendam | Zenon | Mixed | Stationary | 8/5/2016 | PP | 79 | 4.2 | 13 | 90 | 7.48 | 28 | 30 | 0 | 0 | 0 | 36 | 1140 | 0 | 0 |
| Holland America | Volendam | Zenon | Mixed | Stationary | 8/19/2016 | GP | 52 | 4.4 | | | 7.41 | 29 | 12.8 | 0 | 0 | 0 | 42 | 872 | 0 | 0 |
| Holland America | Volendam | Zenon | Mixed | Stationary | 9/2/2016 | GP | 47 | 3.3 | | | 7.32 | 28.4 | 21.7 | 0 | 0 | 2.2 | 39 | 814 | 0 | 0 |
| Holland America | Volendam | Zenon | Mixed | Stationary | 9/16/2016 | GP | 52 | 2.4 | | | 7.53 | 27 | 16.5 | 0 | 0 | 0 | 39 | 887 | 0 | 0 |
| Holland America | Volendam | Zenon | Mixed | Stationary | 10/1/2016 | GP | 50 | 6.9 | | | 7.61 | 27.1 | 22 | 0 | 0 | 0 | 33 | 948 | 0 | 0 |
| Holland America | Zaandam | Zenon | Mixed | Stationary | 5/17/2016 | GP | 48 | 5.3 | | | 7.31 | 24.4 | 22 | 2 | 0 | 0 | 39 | 1210 | 0 | 0 |
| Holland America | Zaandam | Zenon | Mixed | Stationary | 5/25/2016 | GP | 56 | 2.7 | | | 7.38 | 26.1 | 19 | 0 | 0 | 31 | 30 | 1040 | 0 | 0 |
| Holland America | Zaandam | Zenon | Mixed | Stationary | 6/2/2016 | PP | 17 | 2.1 | 10 | 66 | 7.2 | 27.9 | 14.0 | 0 | 0 | 0 | 51 | 830 | 0 | 0 |
| Holland America | Zaandam | Zenon | Mixed | Stationary | 6/22/2016 | GP | 40 | 1.6 | | | 7.38 | 28 | 30 | 0 | 0 | 0 | 34 | 1020 | 0 | 0 |
| Holland America | Zaandam | Zenon | Mixed | Stationary | 7/6/2016 | GP | 44 | 8.6 | | | 7.18 | 28.1 | 12.3 | 0 | 0 | 0 | 38 | 918 | 0 | 0 |
| Holland America | Zaandam | Zenon | Mixed | Stationary | 7/20/2016 | GP | 45 | 1.5 | | | 7.44 | 27.6 | 23.9 | 0 | 0 | 0 | 29 | 969 | 0 | 0 |
| Holland America | Zaandam | Zenon | Mixed | Stationary | 8/3/2016 | GP | 51 | 1.4 | | | 7.33 | 27.8 | 27.4 | 0 | 0 | 0 | 32 | 945 | 0 | 0 |
| Holland America | Zaandam | Zenon | Mixed | Stationary | 8/11/2016 | PP | 37 | 0 | 9.5 | 42 | 7.24 | 27.3 | 23 | 0 | 0 | 0 | 53 | 927 | 0 | 0 |
| Holland America | Zaandam | Zenon | Mixed | Stationary | 9/8/2016 | GP | 33 | 1.1 | | | 7.2 | 27.1 | 11 | 0 | 0 | 0 | 51 | 891 | 0 | 0 |
| Holland America | Zaandam | Zenon | Mixed | Stationary | 9/14/2016 | GP | 45 | 3.3 | | | 7.45 | 26 | 24.5 | 0 | 0 | 0 | 33 | 990 | 0 | 0 |
| Holland America | Zaandam | Zenon | Mixed | Stationary | 9/22/2016 | GP | | | | | 7.46 | 26.5 | 24 | | 0 | 0 | 33 | 990 | 0 | 0 |
| Norwegian CL | Norwegian Jewel | Scanship | Mixed | Stationary | 5/10/2016 | GP | 25 | 2 | | | 6.34 | 27.8 | 24 | 0 | 0 | 2.7 | 73 | 762 | 0 | 0 |
| Norwegian CL | Norwegian Jewel | Scanship | Mixed | Stationary | 5/24/2016 | GP | 42 | 1.6 | | | 6.55 | 28.7 | 33 | 0 | 0 | 3 | 75 | 937 | 0 | 0 |
| Norwegian CL | Norwegian Jewel | Scanship | Mixed | Stationary | 6/7/2016 | PP | 31 | 1.2 | 5.4 | 37 | 6.6 | 29.2 | 25 | 0 | 0 | 3.1 | 64 | 799 | 0 | 0 |
| Norwegian CL | Norwegian Jewel | Scanship | Mixed | Stationary | 6/21/2016 | GP | 35 | 0.98 | | | 6.59 | 30.1 | 8 | 0 | 4 | 6.8 | 74 | 1040 | 0 | 0 |
| Norwegian CL | Norwegian Jewel | Scanship | Mixed | Stationary | 6/29/2016 | USCG | | | | | 6.18 | 30.7 | NR | 7 | 0 | 3 | | | 0 | 0 |
| Norwegian CL | Norwegian Jewel | Scanship | Mixed | Stationary | 7/12/2016 | GP | 27 | 2.3 | | | 6.59 | 29.9 | 29.5 | 12 | 44 | 13 | 83 | 853 | 0 | 0 |
| Norwegian CL | Norwegian Jewel | Scanship | Mixed | Stationary | 7/19/2016 | GP | 22 | 0 | | | 6.96 | 31 | 36.2 | 0 | 0 | 3.1 | 73 | 761 | 0 | 0 |
| Norwegian CL | Norwegian Jewel | Scanship | Mixed | Stationary | 8/2/2016 | PP | 37 | 2 | 7.3 | 41 | 6.63 | 31.5 | 37.9 | 0 | 0 | 5.2 | 70 | 890 | 0 | 0 |
| Norwegian CL | Norwegian Jewel | Scanship | Mixed | Stationary | 8/16/2016 | GP | 27 | 1.7 | | | 6.47 | 30.6 | 31.8 | 0 | 4 | 2.7 | 74 | 874 | 0 | 0 |
| Norwegian CL | Norwegian Jewel | Scanship | Mixed | Stationary | 9/6/2016 | GP | 48 | 0.79 | | | 6.76 | 29.4 | 30.1 | 2 | 4.8 | 3.2 | 78 | 988 | 0 | 0 |
| Norwegian CL | Norwegian Jewel | Scanship | Mixed | Stationary | 9/13/2016 | GP | 30 | 1.9 | | | 6.75 | 27.2 | 33.2 | 0 | 5.6 | 4.1 | 74 | 809 | 0 | 0 |
| Norwegian CL | Norwegian Pearl | Scanship | Mixed | Stationary | 5/7/2016 | GP | 46 | 3 | | | 7.04 | 24.5 | 32 | 2 | 6.4 | 9.1 | 67 | 1170 | 0 | 0 |
| Norwegian CL | Norwegian Pearl | Scanship | Mixed | Stationary | 5/17/2016 | PP | 49 | 1.8 | 4.8 | 52 | 6.86 | 25.1 | 32 | 0 | 6 | 7.1 | 36 | 862 | 0 | 0 |
| Norwegian CL | Norwegian Pearl | Scanship | Mixed | Stationary | 6/14/2016 | GP | 61 | 0.9 | | | 7.2 | 25.7 | 30 | 2 | 0 | 4.1 | 78 | 19900 | 0 | 0 |
| Norwegian CL | Norwegian Pearl | Scanship | Mixed | Stationary | 6/21/2016 | GP | 67 | 1 | | | 6.77 | 19.6 | 26 | 0 | 5.5 | 15 | 23 | 1090 | 0 | 0 |
| Norwegian CL | Norwegian Pearl | Scanship | Mixed | Stationary | 6/29/2016 | USCG | | | | | 6.36 | 29.7 | NR | 7 | 4 | 6.5 | | | 0 | 0 |
| Norwegian CL | Norwegian Pearl | Scanship | Mixed | Stationary | 7/5/2016 | GP | 49 | 1.6 | | | 6.86 | 26.8 | 30 | 0 | 6 | 6.1 | 27 | 843 | 0 | 0 |
| Norwegian CL | Norwegian Pearl | Scanship | Mixed | Stationary | 7/19/2016 | GP | 41 | 1.6 | | | 6.59 | 29.3 | 29.4 | 0 | 7.6 | 6.7 | 24 | 815 | 0 | 0 |
| Norwegian CL | Norwegian Pearl | Scanship | Mixed | Stationary | 8/9/2016 | PP | 56 | 1.5 | 4.8 | 55 | 6.9 | 27.9 | 36 | 0 | 7 | 6.2 | 21 | 984 | 0 | 0 |
| Norwegian CL | Norwegian Pearl | Scanship | Mixed | Stationary | 8/23/2016 | GP | 60 | 1.3 | | | 6.65 | 29.8 | 17.2 | 28 | 5.6 | 3.4 | 33 | 1450 | 0 | 0 |
| Norwegian CL | Norwegian Pearl | Scanship | Mixed | Stationary | 9/6/2016 | GP | 52 | 0.87 | | | 6.93 | 27.9 | 30 | 2 | 4.8 | 6.9 | 88 | 1420 | 0 | 0 |
| Norwegian CL | Norwegian Pearl | Scanship | Mixed | Stationary | 9/13/2016 | GP | 57 | 1.2 | | | 6.83 | 28.7 | 32 | 0 | 7.2 | 8.9 | 34 | 1080 | 0 | 0 |
| Norwegian CL | Norwegian Sun | Scanship | Mixed | Stationary | 5/18/2016 | GP | 64 | 3.6 | | | 6.96 | 28 | 50 | 0 | 4 | 45 | 54 | 1440 | 0 | 0 |
| Norwegian CL | Norwegian Sun | Scanship | Mixed | Stationary | 5/26/2016 | GP | 43 | 7.3 | | | 6.52 | 27.8 | 20.5 | 2 | 23 | 31 | 34 | 1130 | 0 | 0 |
| Norwegian CL | Norwegian Sun | Scanship | Mixed | Stationary | No discharge for most of June | | | | | | | | | | | | | | | |
| Norwegian CL | Norwegian Sun | Scanship | Mixed | Stationary | 6/24/2016 | GP | 52 | 5.1 | | | 6.52 | 30.1 | 20.5 | 0 | 12 | 10 | 88 | 1420 | 0 | 0.1 |
| Norwegian CL | Norwegian Sun | Scanship | Mixed | Stationary | No discharge for July,August, and September | | | | | | | | | | | | | | | |
| Ponant | Le Soleal | Rochem | Mixed | Stationary | 6/10/2016 | GP | 10 | 7.4 | | | 6.97 | 22 | 1.2 | 840 | 48 | 130 | 2700 | 2260 | 0 | 0 |
| Ponant | Le Soleal | Rochem | Mixed | Stationary | 6/25/2016 | PP | 13 | 2 | 7.9 | 120 | 6.94 | 25.5 | 1.3 | 0 | 0 | 0 | 23 | 815 | 0 | 0 |
| Ponant | Le Soleal | Rochem | Mixed | Stationary | 7/7/2016 | GP | 22 | 15 | | | 6.73 | 27.6 | 0.9 | 0 | 0 | 3.2 | 36 | 861 | 0 | 0 |
| Ponant | Le Soleal | Rochem | Mixed | Stationary | 7/9/2016 | PP | 27 | 17 | 20 | 1300 | 6.35 | 28.3 | NR | 0 | 0 | 0 | 36 | 884 | 0 | 0 |
| Ponant | Le Soleal | Rochem | Mixed | Stationary | 8/26/2016 | GP | 0.5 | 2.1 | | | 6.9 | 26.2 | 1.2 | 0 | 0 | 0 | 44 | 409 | 0 | 0 |
| Ponant | Le Soleal | Rochem | Mixed | Stationary | 8/27/2016 | GP | 2.4 | 2.6 | | | 6.04 | 28.1 | 1.1 | 0 | 0 | 0 | 29 | 440 | 0 | 0 |
| Princess CL | Coral Princess | Hamworthy | Mixed | Underway | 5/17/2016 | GP | | | | | 7.28 | 38.7 | NR | 0 | 0 | 2.2 | | | 0 | 0 |
| Princess CL | Coral Princess | Hamworthy | Mixed | Underway | 5/25/2016 | GP | | | | | 7.35 | 36.2 | 14.4 | 0 | 0 | 3.3 | | | 0 | 0 |
| Princess CL | Coral Princess | Hamworthy | Mixed | Underway | 6/8/2016 | PP | 65 | 8.5 | 13 | 49 | 7.35 | 37.4 | 15.8 | 0 | 0 | 4 | 80 | 1590 | 0 | 0 |
| Princess CL | Coral Princess | Hamworthy | Mixed | Underway | 6/22/2016 | GP | | | | | 7.21 | 36.5 | NR | 0 | 0 | 13 | | | 0 | 0 |
| Princess CL | Coral Princess | Hamworthy | Mixed | Underway | 7/13/2016 | GP | | | | | 7.4 | 39.9 | 14.2 | 0 | 0 | 61 | | | 0 | 0 |
| Princess CL | Coral Princess | Hamworthy | Mixed | Underway | 7/20/2016 | GP | | | | | 7.35 | 38.2 | 7.2 | 0 | 0 | 34 | | | 0 | 0 |
| Princess CL | Coral Princess | Hamworthy | Mixed | Underway | 8/3/2016 | PP | 79 | 2.3 | 7.7 | 22 | 7.27 | 38.2 | 10.7 | 0 | 0 | 2.4 | 610 | 7190 | 0 | 0 |
| Princess CL | Coral Princess | Hamworthy | Mixed | Underway | 8/17/2016 | GP | | | | | 7.31 | 36.6 | 7.1 | 0 | 0 | 0 | | | 0 | 0 |
| Princess CL | Coral Princess | Hamworthy | Mixed | Underway | 9/7/2016 | GP | | | | | 7.63 | 38.3 | 8.3 | 0 | 0 | 2.9 | | | 0 | 0 |
| Princess CL | Coral Princess | Hamworthy | Mixed | Underway | 9/14/2016 | GP | | | | | 7.71 | 39.7 | 4.9 | 0 | 0 | 4 | | | 0 | 0 |
| Princess CL | Crown Princess | Hamworthy | Mixed | Underway | 5/17/2016 | GP | | | | | 7.89 | 18.7 | 8.0 | 0 | 0 | 15 | | | 0 | 0 |
| Princess CL | Crown Princess | Hamworthy | Mixed | Underway | 5/24/2016 | PP | 120 | 5.5 | 10 | 38 | 7.47 | 18.1 | 5.6 | 0 | 0 | 30 | 30 | 1060 | 0 | 0 |
| Princess CL | Crown Princess | Hamworthy | Mixed | Underway | 6/7/2016 | GP | | | | | 7.1 | 18.8 | 6 | 0 | 0 | 33 | | | 0 | 0 |
| Princess CL | Crown Princess | Hamworthy | Mixed | Underway | 6/21/2016 | GP | | | | | 7.56 | 22.1 | 5.8 | | 0 | 22 | | | 0 | 0 |
| Princess CL | Crown Princess | Hamworthy | Mixed | Underway | 6/28/2016 | GP | | | | | 8.03 | 21.5 | 6.5 | 28 | | | | | 0 | 0 |
| Princess CL | Crown Princess | Hamworthy | Mixed | Underway | 7/12/2016 | GP | | | | | 7.63 | 32.3 | 48 | 0 | 0 | 24 | | | 0 | 0 |
| Princess CL | Crown Princess | Hamworthy | Mixed | Underway | 7/19/2016 | GP | | | | | 8 | 31.8 | 18 | 0 | 0 | 16 | | | 0 | 0 |
| Princess CL | Crown Princess | Hamworthy | Mixed | Underway | 8/2/2016 | PP | 140 | 4.3 | 11 | 51 | 8.22 | 29.3 | 25 | 0 | 0 | 15 | 42 | 2160 | 0 | 0 |
| Princess CL | Crown Princess | Hamworthy | Mixed | Underway | 8/16/2016 | GP | | | | | 7.67 | 30.5 | 27 | 330 | 0 | 9.3 | | | 0 | 0 |
| Princess CL | Crown Princess | Hamworthy | Mixed | Underway | 8/22/2016 | GP | | | | | 8.21 | 31.4 | 17 | 0 | | | | | 0 | 0 |
| Princess CL | Crown Princess | Hamworthy | Mixed | Underway | 9/6/2016 | GP | | | | | 8.09 | 31.3 | NR | | 0 | 6.7 | | | 0 | 0 |
| Princess CL | Crown Princess | Hamworthy | Mixed | Underway | 9/13/2016 | GP | | | | | 8.13 | 31 | 2.7 | 0 | 0 | 9.5 | | | 0 | 0 |
| Princess CL | Crown Princess | Hamworthy | Graywater | Stationary | 5/16/2016 | GP | 1.1 | 0.89 | | | 6.65 | 25.8 | 15.12 | 0 | 0 | 29 | 3.3 | 380 | 0 | 0 |
| Princess CL | Crown Princess | Hamworthy | Graywater | Stationary | 5/23/2016 | PP | 2.6 | 0 | 11 | 6.4 | 6.62 | 21.2 | 12.06 | 0 | 0 | 32 | 15 | 327 | 0 | 0 |
| Princess CL | Crown Princess | Hamworthy | Graywater | Stationary | 5/30/2016 | GP | | | | | 7.77 | 20.8 | 8.4 | | 0 | 17 | | | 0 | 0 |
| Princess CL | Crown Princess | Hamworthy | Graywater | Stationary | 6/6/2016 | GP | 3.9 | 0.54 | | | 6.67 | 19.2 | 25.92 | 0 | 0 | 20 | 35 | 487 | 0 | 0 |
| Princess CL | Crown Princess | Hamworthy | Graywater | Stationary | 6/20/2016 | GP | 0 | 1.1 | | | 6.64 | 28.8 | 13.98 | 0 | 0 | 11 | 17 | 345 | 0 | 0 |
| Princess CL | Crown Princess | Hamworthy | Graywater | Stationary | 7/11/2016 | GP | 0 | 0.77 | | | 6.65 | 28.8 | 14 | 0 | 0 | 20 | 25 | 433 | 0 | 0 |
| Princess CL | Crown Princess | Hamworthy | Graywater | Stationary | 7/18/2016 | GP | 1.4 | 1.2 | | | 6.7 | 29.2 | 26 | 0 | 0 | 16 | 31 | 444 | 0 | 0 |
| Princess CL | Crown Princess | Hamworthy | Graywater | Stationary | 8/1/2016 | GP | 0 | 2 | | | 6.68 | 29.1 | 11 | 0 | 0 | 16 | 74 | 977 | 0 | 0 |
| Princess CL | Crown Princess | Hamworthy | Graywater | Stationary | 8/15/2016 | PP | 0 | 1.9 | 15 | 21 | 6.64 | 27.3 | 25 | 0 | 0 | 10 | 14 | 293 | 0 | 0 |
| Princess CL | Crown Princess | Hamworthy | Graywater | Stationary | 9/5/2016 | GP | 0.96 | 2.2 | | | 7.19 | 29.4 | 12 | 0 | 0 | 13 | 79 | 1070 | 0 | 0 |
| Princess CL | Crown Princess | Hamworthy | Graywater | Stationary | 9/12/2016 | GP | 0 | 1.8 | | | 7.11 | 29.4 | 12 | 0 | 0 | 10 | 13 | 312 | 0 | 0 |

*Explanation of color codes*

- Exceedance General Permit Limits
- Exceedance of Alaska WQS
- Exceedance of monthly
- Treated graywater
- Parameter not tested

**Results from Discharge monitoring reports and attached sample results, all sample results taken while discharging and in**

Sample types: PP- Twice a year priority pollutants; GP- General Permit Twice Monthly; USCG- USCG random unannounced

**Limits**

| Ammonia | | |
|---|---|---|
| Underway | Under 6 kts | WQS |
| 160 mg/L | 78 mg/L | 1 mg/L |

| pH | |
|---|---|
| Minimum | Maximum |
| 6.0 | 9.0 |

| Fecal Coliform | |
|---|---|
| Maximum | Monthly Geo Mean |
| 40/ 100 ml | 14/ 100 ml |

| Total Suspended Solids (TSS) | |
|---|---|
| Maximum | Monthly Average |
| 150 mg/L | 30 mg/L |

| Dissolved Copper | |
|---|---|
| Under 6 kts | WQS |
| 77 (µg/ L) | 3.1 (µg/ L) |

| TR Chlorine |
|---|
| Maximum |
| 0.0075 mg/L |

| BOD | |
|---|---|
| Maximum | Monthly Average |
| 60 mg/L | 30 mg/L |

## SemiMonthly General Permit Sample Results

**Non-detects set to zero**

| Company | Vessel | Treatment System | Waste-water Type | Sample taken while | Sample Date | Type | Ammonia mg/L | Copper ug/L | Nickel ug/L | Zinc ug/L | pH S.U. | Temp C | Flow rate m3/hr | Fecal Coliform col. per 100 ml | TSS mg/L | BOD mg/L | Hardness mg/L | Specific Conductance umhos/cm | Free Chlorine mg/L | TR Chlorine mg/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Princess CL | Grand Princess | Hamworthy | Mixed | Underway | 5/15/2016 | GP | | | | | 8.01 | 30.8 | 14.0 | 0 | 0 | 6.1 | | | 0 | 0 |
| Princess CL | Grand Princess | Hamworthy | Mixed | Underway | 5/26/2016 | GP | | | | | 7.86 | 28.5 | 22 | 7 | 0 | 2.9 | | | 0 | 0 |
| Princess CL | Grand Princess | Hamworthy | Mixed | Underway | 6/4/2016 | PP | 79 | 3.3 | 12 | 53 | 7.91 | 28.5 | 14 | 0 | 0 | 2.6 | 170 | 2300 | 0 | 0 |
| Princess CL | Grand Princess | Hamworthy | Mixed | Underway | 6/14/2016 | GP | | | | | 7.47 | 28.4 | 24.1 | 0 | 0 | 0 | | | 0 | 0 |
| Princess CL | Grand Princess | Hamworthy | Mixed | Underway | 7/14/2016 | GP | | | | | 7.85 | 31.1 | 15 | 0 | 0 | 4.8 | | | 0 | 0 |
| Princess CL | Grand Princess | Hamworthy | Mixed | Underway | 7/25/2016 | GP | | | | | 8.14 | 32.1 | 11 | 0 | 0 | 0 | | | 0 | 0 |
| Princess CL | Grand Princess | Hamworthy | Mixed | Underway | 8/13/2016 | GP | | | | | 7.85 | 33 | 11.4 | 0 | 0 | 3.3 | | | 0 | 0 |
| Princess CL | Grand Princess | Hamworthy | Mixed | Underway | 8/23/2016 | PP | 56 | 1.2 | 12 | 19 | 7.68 | 30.5 | 12 | 0 | 0 | 2.8 | 130 | 1900 | 0 | 0 |
| Princess CL | Grand Princess | Hamworthy | Mixed | Underway | 9/2/2016 | GP | | | | | 7.75 | 31 | 9 | 550 | 0 | 5.6 | | | 0 | 0 |
| Princess CL | Grand Princess | Hamworthy | Mixed | Underway | 9/11/2016 | GP | | | | | 7.6 | 29.7 | NR | 0 | | | | | 0 | 0 |
| Princess CL | Grand Princess | Hamworthy | Mixed | Underway | 9/13/2016 | GP | | | | | 7.91 | 28.1 | 18 | 0 | 0 | 4.3 | | | 0 | 0 |
| Princess CL | Grand Princess | Hamworthy | Graywater | Stationary | 5/14/2016 | GP | 0 | 3.6 | | | 7.3 | 26.9 | 11.7 | 0 | 0 | 4.4 | 760 | 7860 | 0 | 0 |
| Princess CL | Grand Princess | Hamworthy | Graywater | Stationary | 5/25/2016 | GP | 0 | 3.8 | | | 7.23 | 28 | 11 | 0 | 0 | 2 | 130 | 1788 | 0 | 0 |
| Princess CL | Grand Princess | Hamworthy | Graywater | Stationary | 6/3/2016 | PP | 1.8 | 2.4 | 14 | 70 | 7.46 | 27.9 | 13.92 | 0 | 0 | 0 | 250 | 3200 | 0 | 0 |
| Princess CL | Grand Princess | Hamworthy | Graywater | Stationary | 6/14/2016 | GP | 0 | 3.7 | | | 6.87 | 28.1 | 13.3 | 0 | 0 | 0 | 480 | 5000 | 0 | 0 |
| Princess CL | Grand Princess | Hamworthy | Graywater | Stationary | 7/14/2016 | GP | 0 | 2.1 | | | 7.3 | 29.6 | 16 | 0 | 0 | 0 | 410 | 4280 | 0 | 0 |
| Princess CL | Grand Princess | Hamworthy | Graywater | Stationary | 7/24/2016 | GP | 0 | 0.84 | | | 7.08 | 30.4 | 18 | 0 | 0 | 0 | 110 | 1310 | 0 | 0 |
| Princess CL | Grand Princess | Hamworthy | Graywater | Stationary | 8/3/2016 | PP | 0 | 1.6 | 13 | 33 | 7.38 | 28.7 | 7.2 | 0 | 0 | 3.3 | 240 | 2730 | 0 | 0 |
| Princess CL | Grand Princess | Hamworthy | Graywater | Stationary | 8/23/2016 | GP | 0 | | | | 7.16 | 29 | 12 | 0 | 0 | 0 | | 842 | 0 | 0 |
| Princess CL | Grand Princess | Hamworthy | Graywater | Stationary | 9/1/2016 | GP | 0 | 1.4 | | | 7.24 | 29.6 | 14 | 50 | 0 | 0 | 720 | 6880 | 0 | 0 |
| Princess CL | Grand Princess | Hamworthy | Graywater | Stationary | 9/11/2016 | GP | 2.1 | 0.93 | | | 7.18 | 28.2 | 18 | 0 | 0 | 0 | 320 | 3580 | 0 | 0 |
| Princess CL | Island Princess | Hamworthy | Mixed | Underway | 5/15/2016 | GP | | | | | 7.59 | 37.6 | 14.4 | 0 | 0 | 16 | | | 0 | 0 |
| Princess CL | Island Princess | Hamworthy | Mixed | Underway | 5/22/2016 | GP | | | | | 7.62 | 34.5 | 15 | 0 | 0 | 13 | | | 0 | 0 |
| Princess CL | Island Princess | Hamworthy | Mixed | Underway | 6/5/2016 | PP | 120 | 1.4 | 5.8 | 7.3 | 7.56 | 35.9 | 15 | 3 | 0 | 40 | 59 | 1490 | 0 | 0 |
| Princess CL | Island Princess | Hamworthy | Mixed | Underway | 6/19/2016 | GP | | | | | 7.64 | 39.5 | 7.2 | 0 | 0 | 43 | | | 0 | 0 |
| Princess CL | Island Princess | Hamworthy | Mixed | Underway | 6/26/2016 | GP | | | | | 7.64 | 36.2 | 13.2 | 0 | 0 | 7.2 | | | 0 | 0 |
| Princess CL | Island Princess | Hamworthy | Mixed | Underway | 7/10/2016 | GP | | | | | 7.21 | 37 | 13.2 | 0 | 0 | 0 | | | 0 | 0 |
| Princess CL | Island Princess | Hamworthy | Mixed | Underway | 7/24/2016 | GP | | | | | 7.19 | 37.8 | 13.2 | 0 | 0 | 0 | | | 0 | 0 |
| Princess CL | Island Princess | Hamworthy | Mixed | Underway | 8/7/2016 | GP | | | | | 7.11 | 36.8 | 13.2 | 0 | 0 | 2.5 | | | 0 | 0 |
| Princess CL | Island Princess | Hamworthy | Mixed | Underway | 8/14/2016 | PP | 32 | 1.4 | 4.6 | 31 | 7.1 | 37.8 | 13.2 | 0 | 0 | 5 | 52 | 819 | 0 | 0 |
| Princess CL | Island Princess | Hamworthy | Mixed | Underway | 9/4/2016 | GP | | | | | 7.3 | 37.5 | 14.4 | 0 | 0 | 2.9 | | | 0 | 0 |
| Princess CL | Island Princess | Hamworthy | Mixed | Underway | 9/11/2016 | GP | | | | | 7.49 | 36.9 | 14.4 | 0 | 0 | 2.8 | | | 0 | 0 |
| Princess CL | Ruby Princess | Hamworthy | Mixed | Underway | 5/12/2016 | GP | | | | | 8.11 | 28.9 | 13.8 | 0 | 0 | 3.7 | | | 0 | 0 |
| Princess CL | Ruby Princess | Hamworthy | Mixed | Underway | 5/19/2016 | GP | | | | | 8.2 | 28.7 | 15.7 | 0 | 0 | 5.9 | | | 0 | 0 |
| Princess CL | Ruby Princess | Hamworthy | Mixed | Underway | 6/2/2016 | PP | 130 | 13 | 8.1 | 65 | 7.48 | 25.2 | 43.2 | 0 | 0 | 57 | 37 | 1490 | 0 | 0 |
| Princess CL | Ruby Princess | Hamworthy | Mixed | Underway | 6/16/2016 | GP | | | | | 7.81 | 31.4 | 135.7 | 0 | 0 | 0 | | | 0 | 0 |
| Princess CL | Ruby Princess | Hamworthy | Mixed | Underway | 6/22/2016 | GP | | | | | 8.29 | 30.5 | 22.3 | | 0 | 2.2 | | | 0 | 0 |
| Princess CL | Ruby Princess | Hamworthy | Mixed | Underway | 7/7/2016 | GP | | | | | 7.61 | 31.8 | 10.5 | 0 | 0 | 0 | | | 0 | 0 |
| Princess CL | Ruby Princess | Hamworthy | Mixed | Underway | 7/21/2016 | GP | | | | | 7.77 | 30.9 | 16.4 | 0 | 0 | 81 | | | 0 | 0 |
| Princess CL | Ruby Princess | Hamworthy | Mixed | Underway | 8/11/2016 | PP | 160 | 23 | 9 | 110 | 7.99 | 28.9 | NR | | 0 | 9.6 | 52 | 1920 | 0 | 0 |
| Princess CL | Ruby Princess | Hamworthy | Mixed | Underway | 8/25/2016 | GP | | | | | 7.73 | 29.9 | 15.3 | | 0 | 76 | | | 0 | 0 |
| Princess CL | Ruby Princess | Hamworthy | Mixed | Underway | 8/31/2016 | GP | 95 | | | | 7.87 | 31.9 | 12.4 | 0 | 0 | 3.5 | | | 0 | 0 |
| Princess CL | Ruby Princess | Hamworthy | Mixed | Underway | 9/8/2016 | GP | | | | | 7.69 | 28.6 | 12.2 | 0 | 0 | 9.2 | | | 0 | 0 |
| Princess CL | Ruby Princess | Hamworthy | Mixed | Underway | 9/15/2016 | GP | | | | | 7.94 | 27.9 | 16.7 | | 0 | 0 | | | 0 | 0 |
| Princess CL | Ruby Princess | Hamworthy | Graywater | Stationary | 5/11/2016 | GP | 2.8 | 16 | | | 6.98 | 29.7 | 86.4 | 0 | 0 | 3.5 | 23 | 341 | 0 | 0 |
| Princess CL | Ruby Princess | Hamworthy | Graywater | Stationary | 5/18/2016 | GP | 0 | 16 | | | 6.56 | 30.5 | 13.0 | 0 | 0 | 7.9 | 15 | 273 | 0 | 0 |
| Princess CL | Ruby Princess | Hamworthy | Graywater | Stationary | 6/1/2016 | PP | 4.6 | 21 | 7.9 | 120 | 7.05 | 28.1 | 1.4 | 0 | 0 | 0 | 29 | 455 | 0 | 0 |
| Princess CL | Ruby Princess | Hamworthy | Graywater | Stationary | 6/15/2016 | GP | 0 | 11 | | | 6.97 | 31.2 | 86.4 | 0 | 0 | 0 | 84 | 971 | 0 | 0 |
| Princess CL | Ruby Princess | Hamworthy | Graywater | Stationary | 7/6/2016 | GP | 32 | 17 | | | 7.47 | 31.7 | 1080 | 0 | 0 | 0 | 50 | 709 | 0 | 0 |
| Princess CL | Ruby Princess | Hamworthy | Graywater | Stationary | 7/20/2016 | GP | 0.59 | 12 | | | 7.35 | 32 | 6.5 | 0 | 0 | 3.2 | 52 | 570 | 0 | 0 |
| Princess CL | Ruby Princess | Hamworthy | Graywater | Stationary | 8/10/2016 | PP | 3.4 | 14 | 11 | 150 | 6.95 | 29.9 | 15.7 | 0 | 0 | 0 | 58 | 799 | 0 | 0 |
| Princess CL | Ruby Princess | Hamworthy | Graywater | Stationary | 8/24/116 | GP | 0 | 12 | | | 6.73 | 30 | NR | 0 | 0 | 0 | 110 | 1310 | 0 | 0 |
| Princess CL | Ruby Princess | Hamworthy | Graywater | Stationary | 9/7/2016 | GP | 2.8 | 9.2 | | | 6.07 | 30 | 15.2 | 0 | 0 | 0 | 19 | 306 | 0 | 0 |
| Princess CL | Ruby Princess | Hamworthy | Graywater | Stationary | 9/14/2016 | GP | 0 | 8.3 | | | 6.97 | 31.1 | 198 | 0 | 0 | 0 | 29 | 397 | 0 | 0 |
| Princess CL | Star Princess | Hamworthy | Mixed | Underway | 5/24/2016 | GP | | | | | 7.42 | 32.9 | 27.8 | 7 | 0 | 15 | | | 0 | 0 |
| Princess CL | Star Princess | Hamworthy | Mixed | Underway | 5/25/2016 | GP | | | | | 7.45 | 32.9 | 39.7 | 17 | 0 | 58 | | | 0 | 0 |
| Princess CL | Star Princess | Hamworthy | Mixed | Underway | 6/7/2016 | PP | 150 | 0 | 8.3 | 7 | 7.95 | 29.9 | 27.1 | 0 | 4.8 | 120 | 54 | 1390 | 0 | 0 |
| Princess CL | Star Princess | Hamworthy | Mixed | Underway | 6/15/2016 | GP | | | | | 6.67 | 29.6 | 29.3 | 0 | 0 | 18 | | | 0 | 0 |
| Princess CL | Star Princess | Hamworthy | Mixed | Underway | 7/13/2016 | GP | | | | | 8.11 | 35.1 | 8.3 | 0 | 0 | 120 | | | 0 | 0 |
| Princess CL | Star Princess | Hamworthy | Mixed | Underway | 7/27/2016 | GP | | | | | 8.24 | 34.2 | 30 | 0 | 0 | 60 | | | 0 | 0 |
| Princess CL | Star Princess | Hamworthy | Mixed | Underway | 8/10/2016 | PP | 60 | 1.1 | 9.9 | 15 | 6.83 | 36.3 | 21.6 | 0 | 0 | 7.4 | 28 | 369 | 0 | 0 |
| Princess CL | Star Princess | Hamworthy | Mixed | Underway | 8/17/2016 | GP | | | | | 8.19 | 36 | 25.9 | 5 | 0 | 19 | | | 0 | 0 |
| Princess CL | Star Princess | Hamworthy | Mixed | Underway | 9/7/2016 | GP | | | | | 8.08 | 32.3 | 26.6 | 3 | 0 | 11 | | | 0 | 0 |
| Princess CL | Star Princess | Hamworthy | Mixed | Underway | 9/14/2016 | GP | | | | | 7.93 | 31.7 | 33.7 | 5 | 0 | 7.9 | | | 0 | 0 |
| Princess CL | Star Princess | Hamworthy | Graywater | Stationary | 5/18/2016 | PP | 3.7 | 1.7 | 13 | 31 | 6.93 | 30 | 28.1 | 0 | 0 | 15 | 30 | 490 | 0 | 0 |
| Princess CL | Star Princess | Hamworthy | Graywater | Stationary | 5/24/2016 | GP | 1.2 | 1.2 | | | 6.67 | 31.3 | 19.7 | 5 | 0 | 17 | 12 | 225 | 0 | 0 |
| Princess CL | Star Princess | Hamworthy | Graywater | Stationary | 6/1/2016 | GP | 1.9 | 2.1 | | | 7.07 | 29.7 | 18 | 0 | 0 | 27 | 35 | 304 | 0 | 0 |
| Princess CL | Star Princess | Hamworthy | Graywater | Stationary | 6/7/2016 | GP | 4.1 | 1.1 | | | 6.84 | 32.3 | 20.0 | 0 | 0 | 30 | 16 | 236 | 0 | 0 |
| Princess CL | Star Princess | Hamworthy | Graywater | Stationary | 7/13/2016 | GP | 0 | 1.6 | | | 6.72 | 32.6 | 19.4 | 0 | 0 | 7.8 | 86 | 986 | 0 | 0 |
| Princess CL | Star Princess | Hamworthy | Graywater | Stationary | 7/27/2016 | GP | 1.9 | 1.3 | | | 6.96 | 33 | 19.6 | 0 | 0 | 7.8 | 24 | 294 | 0 | 0 |
| Princess CL | Star Princess | Hamworthy | Graywater | Stationary | 8/10/2016 | GP | 4.1 | 1.4 | | | 6.87 | 35.2 | 16.6 | 0 | 0 | 8.4 | 48 | 682 | 0 | 0 |
| Princess CL | Star Princess | Hamworthy | Graywater | Stationary | 8/16/2016 | PP | 0.67 | 1.3 | 7.5 | 15 | 6.64 | 32.8 | 21.4 | 0 | 0 | 5.7 | 12 | 199 | 0 | 0 |
| Princess CL | Star Princess | Hamworthy | Graywater | Stationary | 8/24/2016 | USCG | | | | | 6.66 | 31.2 | 17.2 | 2 | 0 | 6.7 | | | 0 | 0 |
| Princess CL | Star Princess | Hamworthy | Graywater | Stationary | 9/7/2016 | GP | 1.6 | 0.86 | | | 6.42 | 32.1 | 20.0 | 0 | 0 | 7.2 | 13 | 247 | 0 | 0 |
| Princess CL | Star Princess | Hamworthy | Graywater | Stationary | 9/13/2016 | GP | 2.7 | 1.1 | | | 6.76 | 32.6 | 19.5 | 0 | 0 | 4.3 | 21 | 202 | 0 | 0 |
| Oceania Cruises | Regatta | Triton | Mixed- Port | Underway | 5/23/2016 | PP | 0 | 65 | 12 | 160 | 8.22 | 19.4 | 3.9 | 0 | 41 | 12 | 24 | 1330 | 0 | 0 |
| Oceania Cruises | Regatta | Triton | Mixed-Port | Underway | 5/26/2016 | GP | | | | | 8.44 | 18.9 | 4.0 | 0 | 53 | 15 | | | 0 | 0 |
| Oceania Cruises | Regatta | Triton | Mixed-Port | Underway | ND- June, July | | | | | | | | | | | | | | | |
| Oceania Cruises | Regatta | Triton | Mixed-Port | Underway | 8/24/2016 | GP | | | | | 7.59 | 24.7 | 4.9 | 0 | 5.6 | 9.2 | | | 0 | 0 |
| Oceania Cruises | Regatta | Triton | Mixed- Start | Underway | 5/23/2016 | PP | 0 | 31 | 13 | 110 | 7.01 | 21.4 | NR | 0 | 11 | 3.6 | 47 | 1340 | 0 | 0 |
| Oceania Cruises | Regatta | Triton | Mixed- Start | Underway | 5/26/2016 | GP | | | | | 7.83 | 20.4 | 4.0 | 0 | 19 | 5.8 | | | 0 | 0 |
| Oceania Cruises | Regatta | Triton | Mixed- Start | Underway | 6/4/2016 | GP | | | | | 7.39 | 22.1 | 0.8 | 0 | 14 | 2.9 | | | 0 | 0 |
| Oceania Cruises | Regatta | Triton | Mixed- Start | Underway | 6/20/2016 | GP | | | | | 7.52 | 22.9 | 1.2 | 0 | 17 | 4.1 | | | 0 | 0 |
| Oceania Cruises | Regatta | Triton | Mixed- Start | Underway | 7/19/2016 | PP | 0 | 17 | 7.5 | 42 | 8.06 | 24.6 | 2 | 0 | 23 | 5.1 | 59 | 1530 | 0 | 0 |
| Oceania Cruises | Regatta | Triton | Mixed- Start | Underway | 7/29/2016 | GP | | | | | 7.66 | 22.9 | 1.9 | 0 | 60 | 12 | | | 0 | 0 |
| Oceania Cruises | Regatta | Triton | Mixed-Port | Underway | 8/15/2016 | GP | | | | | 7.3 | 23.3 | 1.9 | | 72 | 14 | | | 0 | 0 |
| Oceania Cruises | Regatta | Triton | Mixed-Port | Underway | 8/24/2016 | GP | | | | | 7.52 | 22 | 4.9 | 0 | 15 | 3.4 | | | 0 | 0 |
| Seven Seas | Seven Seas Mariner | Scanship | Mixed | Underway | 5/22/2016 | PP | 65 | 11 | 8.4 | 79 | 7.75 | 31.4 | 0.4 | 0 | 0 | 0 | 39 | 1240 | 0 | 0 |
| Seven Seas | Seven Seas Mariner | Scanship | Mixed | Underway | 5/28/2016 | GP | | | | | 6.48 | 32.2 | 9 | | 0 | 0 | | | 0 | 0 |
| Seven Seas | Seven Seas Mariner | Scanship | Mixed | Underway | 6/5/2016 | GP | | | | | 6.53 | 33.8 | 9 | 0 | 0 | 0 | | | 0 | 0 |
| Seven Seas | Seven Seas Mariner | Scanship | Mixed | Underway | 6/19/2016 | GP | | | | | 7.3 | 34.7 | 9 | 0 | 0 | 0 | | | 0 | 0 |
| Seven Seas | Seven Seas Mariner | Scanship | Mixed | Underway | 7/10/2016 | GP | | | | | 7.07 | 35.6 | 9 | 0 | 0 | 0 | | | 0 | 0 |
| Seven Seas | Seven Seas Mariner | Scanship | Mixed | Underway | 7/27/2016 | GP | | | | | 6.79 | 36.6 | 9 | 0 | 0 | 4 | | | 0 | 0 |
| Seven Seas | Seven Seas Mariner | Scanship | Mixed | Underway | 8/7/2016 | GP | | | | | 6.73 | 44.1 | 9 | 0 | 0 | 0 | | | 0 | 0 |
| Seven Seas | Seven Seas Mariner | Scanship | Mixed | Underway | 8/14/2016 | PP | 3.6 | 4.8 | 8.6 | 44 | 7.06 | 38.7 | 9 | 0 | 0 | 0 | 54 | 869 | 0 | 0 |
| | | | | | **Average** | | 35.72 | 4.83 | 10.9 | 97.8 | 7.29 | 29.55 | | 9.97 | 2.71 | 10.11 | 108.05 | 1362.85 | 0.000 | 0.000 |
| | | | | | **Max** | | 160 | 65 | 22 | 1300 | 8 | 44 | | 840 | 72 | 130 | 2700 | 19900 | 0 | 0 |
| | | | | | **Min** | | 0 | 0 | 4.6 | 6.4 | 6.04 | 18.10 | | 0.00 | 0.00 | 0.00 | 3.30 | 199.00 | 0.0 | 0.0 |
| | | | | | **Median** | | 36.00 | 2.10 | 10.0 | 52.0 | 7.31 | 29.40 | | 0.00 | 0.00 | 3.55 | 37.50 | 948.00 | 0.0 | 0.0 |
| | | | | | **Count of samples** | | 122 | 119 | 41 | 41 | 209 | 209 | 209 | 196 | 204 | 204 | 120 | 121 | 209 | 209 |

*Explanation of color codes*

- Exceedance General Permit Limits
- Exceedance of Alaska WQS
- Exceedance of monthly
- Treated graywater
- Parameter not tested

**Results from Discharge monitoring reports and attached sample results, all sample results taken while discharging and in**

Sample types: PP- Twice a year priority pollutants; GP- General Permit Twice Monthly; USCG- USCG random unannounced

**Limits**

| | | |
|---|---|---|
| **Ammonia** | | |
| Underway | Under 6 kts | WQS |
| 160 mg/L | 78 mg/L | 1 mg/L |
| **pH** | | |
| Minimum | Maximum | |
| 6.0 | 9.0 | |
| **Fecal Coliform** | | |
| Maximum | Monthly Geo Mean | |
| 40/ 100 ml | 14/ 100 ml | |
| **Total Suspended Solids (TSS)** | | |
| Maximum | Monthly Average | |
| 150 mg/L | 30 mg/L | |
| **Dissolved Copper** | | |
| Under 6 kts | WQS | |
| 77 (µg/ L) | 3.1 (µg/ L) | |
| **TR Chlorine** | | |
| Maximum | | |
| 0.0075 mg/L | | |
| **BOD** | | |
| Maximum | Monthly Average | |
| 60 mg/L | 30 mg/L | |

## Table 4: Semi-seasonal nutrients and other conventional parameters with no General Permit Limits

| Vessel | Sample Date | E. coli | Chemical $O^2$ Demand | Hexane Extractable Material | Total Organic Carbon | Alkalinity (Total) | Hardness | Nitrite/Nitrate as N | Total Phosphorus | Total Kjeldahl Nitrogen | Total Settable Solids |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Detection Limit** | 1 | 5.00 | 5.00 | 1.00 | 5.00 | 5.00 | 0.50 | 0.05 | 1.00 | 0.10 |
| | **Units** | /100ml | mg/l | mg/l | mg/l | mg/l | mg/L | mg/L | mg/l | mg/l | ml/l |
| Disney Wonder | 6/17/16 | 0 | 40 | 0 | 8.7 | 250 | 63 | 0 | 4.85 | 52 | 0 |
| Disney Wonder | 8/5/16 | 0 | 42 | 0 | 8.5 | 250 | 40 | 0 | 1.9 | 33 | 0 |
| Maasdam | 6/10/16 | 0 | 50 | 0 | 0 | 250 | 27 | 0 | 0 | 44 | 0 |
| Maasdam | 7/22/16 | 0 | 44 | 0 | 13 | 300 | 34 | 0 | 0 | 60 | 0 |
| Nieuw Amsterdam | 5/17/16 | 0 | 80 | 0 | 12 | 500 | 5.1 | 0 | 14 | 110 | 0 |
| Nieuw Amsterdam | 7/12/16 | | 260 | 0 | 4.6 | | 1500 | 0 | 0 | 28 | 0 |
| Nieuw Amsterdam | 7/19/16 | 0 | | | | | | | | | |
| Nieuw Amsterdam | 8/2/16 | | | | | 450 | | 0 | 8.52 | 110 | |
| Volendam | 5/13/16 | 0 | 53 | 0 | 13 | 300 | 27 | 0.3 | 0.6 | 53 | 0 |
| Volendam | 8/5/16 | 0 | 45 | 0 | 16 | 400 | 36 | 0 | 2 | 70 | 0 |
| Volendam | 10/1/16 | 0 | | | | | 33 | 0 | 5.4 | 51 | |
| Zaandam | 6/2/16 | 0 | 37 | 0 | 13 | 160 | 51 | 0.16 | 0.253 | 19 | 0 |
| Zaandam | 8/11/16 | 0 | 27 | 0 | 11 | 250 | 53 | 0.23 | 0 | 36 | 0 |
| Le Soleal | 6/25/16 | 0 | 29 | 0 | 0 | 78 | 23 | 0 | 1.84 | 12 | 0 |
| Le Soleal | 7/9/16 | 0 | 32 | 0 | 6.9 | 35 | 36 | 0 | 1.75 | 24 | 0 |

| Vessel | Sample Date | E. coli | Chemical $O^2$ Demand | Hexane Extractable Material | Total Organic Carbon | Alkalinity (total) | Hardness | Nitrite/Nitrate as N | Total Phosphorus | Total Kjeldahl Nitrogen | Total Settable Solids |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Detection Limit** | | 5.00 | 5.00 | 1.00 | 5.00 | 5.00 | 0.50 | 0.05 | 1.00 | 0.10 |
| | **Units** | /100ml | mg/l | mg/l | mg/l | mg/l | mg/L | mg/L | mg/l | mg/l | ml/l |
| Norwegian Jewel | 6/7/16 | 0 | 40 | 0 | 14 | 130 | 64 | 0.13 | 0 | 32 | 0 |
| Norwegian Jewel | 8/2/16 | 0 | 63 | 0 | 17 | 170 | 70 | 0.19 | 0 | 35 | 0 |
| Norwegian Pearl | 5/17/16 | 1 | 76 | 0 | 23 | 200 | 36 | 0 | 0 | 42 | 0 |
| Norwegian Pearl | 8/9/16 | 2 | 54 | 0 | 22 | 200 | 21 | 0 | 0 | 60 | 0 |
| Norwegian Sun | | | | | | | | | | | |
| Coral Princess | 6/8/16 | 0 | 97 | 0 | 27 | 250 | 80 | 2.2 | 14 | 73 | 0 |
| Coral Princess | 8/3/16 | 1 | 240 | 0 | 24 | 450 | 610 | 0 | 2.21 | 74 | 0 |
| Crown Princess-GW | 5/23/16 | 0 | 93 | 0 | 27 | 70 | 15 | 0 | 0 | 3.7 | 0 |
| Crown Princess-GW | 8/15/16 | 0 | 42 | 0 | 8.8 | 72 | 14 | 0 | 0.215 | 1.2 | 0 |
| Crown Princess | 5/24/16 | 0 | 130 | 0 | 38 | 500 | 30 | 0 | 3.87 | 92 | 0 |
| Crown Princess | 8/2/16 | 0 | 110 | 0 | 25 | 500 | 42 | 0.27 | 16.5 | 170 | 0 |
| Grand Princess-GW | 6/3/16 | 0 | 24 | 0 | 3.4 | 50 | 250 | 0 | 0 | 2.4 | 0 |
| Grand Princess-GW | 8/3/16 | 4.1 | 81 | 0 | 15 | 70 | 240 | 0 | 0 | 0.78 | 0 |
| Grand Princess | 6/4/16 | 18 | 53 | 0 | 16 | 300 | 170 | 3.8 | 5.11 | 39 | 0 |
| Grand Princess | 8/23/16 | 2 | 86 | 0 | 15 | 140 | 130 | 3.4 | 3.22 | 38 | 0 |

| Vessel | Sample Date | E. coli | Chemical $O^2$ Demand | Hexane Extractable Material | Total Organic Carbon | Alkalinity (Total) | Hardness | Nitrite/Nitrate as N | Total Phosphorus | Total Kjeldahl Nitrogen | Total Settable Solids |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Detection Limit** | | 5.00 | 5.00 | 1.00 | 5.00 | 5.00 | 0.50 | 0.05 | 1.00 | 0.10 |
| | **Units** | /100ml | mg/l | mg/l | mg/l | mg/l | mg/L | mg/L | mg/l | mg/l | ml/l |
| Island Princess | 6/5/16 | 6.3 | 120 | 0 | 40 | 450 | 59 | 0 | 9.98 | 120 | 0 |
| Island Princess | 8/14/16 | 0 | 50 | 0 | 18 | 250 | 52 | 0 | 8.83 | 31 | 0 |
| Ruby Princess-GW | 6/1/16 | 0 | 17 | 0 | 7.1 | 64 | 29 | 0 | 0.353 | 6 | 0 |
| Ruby Princess-GW | 8/10/16 | 0 | 0 | 0 | 5.7 | 55 | 58 | 4.8 | 0.416 | 3 | 0 |
| Ruby Princess | 6/2/16 | 0 | 150 | 0 | 48 | 450 | 37 | 0 | 9.38 | 110 | 0 |
| Ruby Princess | 8/11/16 | | 66 | 0 | 27 | 600 | 52 | 4.3 | 12.8 | 140 | 0 |
| Ruby Princess | 8/31/16 | 0 | | | | 450 | | 2.5 | 0.734 | 120 | |
| Star Princess-GW | 5/18/16 | 0 | 50 | 0 | 16 | 60 | 30 | 0 | 0.7 | 4.6 | 0 |
| Star Princess-GW | 8/16/16 | 0 | 26 | 0 | 6.3 | 50 | 12 | 0 | 0 | 1.2 | 0 |
| Star Princess | 6/7/16 | 0 | 320 | 0 | 110 | 450 | 54 | 0.39 | 8.23 | 86 | 0 |
| Star Princess | 8/10/16 | 0 | 59 | 0 | 8.2 | 300 | 28 | 0 | 0 | 3.4 | 0 |
| Regatta-Port | 5/23/16 | 1 | 82 | 0 | 13 | 170 | 24 | 62 | 3.3 | 0 | 0 |
| Regatta-Port | | | | | | | | | | | |
| Regatta-Starboard | 5/23/16 | 0 | 52 | 0 | 13 | 60 | 47 | 93 | 10 | 0 | 0 |
| Regatta-Starboard | 7/19/16 | 0 | 55 | 0 | 10 | 250 | 59 | 68 | 10.3 | 0 | 0 |
| Seven Seas Mariner | 5/22/16 | 0 | 83 | 0 | 23 | 300 | 39 | 4.4 | 9.72 | 12 | 0 |
| Seven Seas Mariner | 8/14/16 | 0 | 59 | 0 | 22 | 150 | 54 | 1.5 | 2.66 | 4 | 0 |
| | **MAX** | 18 | 320 | 0 | 110 | 600 | 1500 | 93 | 16.5 | 170 | 0 |
| | **MIN** | 0 | 0 | 0 | 0 | 35 | 5.1 | 0 | 0 | 0 | 0 |
| | **MEDIAN** | 0 | 54 | 0 | 13 | 250 | 39.5 | 0 | 1.95 | 37 | 0 |

Parameter not sampled
Not discharging

**Non-detects set to zero or ND**

## Table 5: Full Suite Semi-seasonal Metal Sample Results

| | | Semi seasonal Metal Samples | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vessel | Date | Antimony (TR) | Antimony dissolved | Arsenic (TR) | Arsenic dissolved | Beryllium (TR) | Beryllium dissolved | Cadmium (TR) | Cadmium dissolved | Chromium (TR) | Chromium diss | Copper (TR) | Copper diss | Lead (TR) | Lead, diss | Mercury (Total) | Nickel (TR) | Nickel, diss | Selenium (TR) | Selenium, dissolved | Silver (TR) | Silver, diss | Thallium (TR) | Thallium, dissolved | Zinc (TR) | Zinc, diss |
| Disney Wonder | 6/17/16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.4 | 0 | 1.2 | 1.1 | 1 | 0 | 0 | 16 | 15 | 1.2 | 0 | 0 | 0 | 0 | 0 | 220 | 220 |
| Disney Wonder | 8/5/16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.2 | 1.4 | 1.8 | 1.7 | 0 | 1.4 | 0 | 17 | 17 | 1 | 1 | 0 | 0 | 0 | 0 | 240 | 250 |
| Maasdam | 6/10/16 | 0 | 0 | 1.1 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 3.1 | 3.1 | 0 | 0 | 0 | 22 | 21 | 3 | 2.4 | 0 | 0 | 0 | 0 | 57 | 56 |
| Maasdam | 7/22/16 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 2.2 | 1.8 | 3.1 | 3.1 | 0 | 0 | 0 | 22 | 22 | 4.6 | 6.5 | 0 | 0 | 0 | 0 | 66 | 200 |
| Nieuw Amsterdam | 5/17/16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.3 | 1.5 | 4.7 | 3 | 0 | 0 | 0 | 16 | 15 | 1.8 | 1.3 | 0 | 0 | 0 | 0 | 59 | 58 |
| Nieuw Amsterdam | 7/12/16 | 0 | 0 | 19 | 20 | 0 | 0 | 0 | 0 | 1.1 | 0 | 3.2 | 0 | 0 | 0 | 0 | 6 | 6.6 | 59 | 94 | 0 | 0 | 0 | 0 | 9.8 | 9 |
| Volendam | 5/13/16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.4 | 2 | 1.9 | 0 | 0 | 0 | 13 | 13 | 1.9 | 0 | 0 | 0 | 0 | 0 | 65 | 66 |
| Volendam | 8/5/16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.2 | 4.5 | 4.2 | 0 | 0 | 0 | 12 | 13 | 1.7 | 1.4 | 0 | 0 | 0 | 0 | 86 | 90 |
| Zaandam | 6/2/16 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1.6 | 1.8 | 2 | 2.1 | 0 | 0 | 0 | 11 | 10 | 2.4 | 2.1 | 0 | 0 | 0 | 0 | 63 | 66 |
| Zaandam | 8/11/16 | 0 | 0 | 1.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.2 | 0 | 0 | 0 | 0 | 10 | 9.5 | 3.3 | 2.1 | 0 | 0 | 0 | 0 | 43 | 42 |
| Norwegian Jewel | 6/7/16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 1.4 | 1.2 | 0 | 0 | 0 | 5 | 5.4 | 0 | 0 | 0 | 0 | 0 | 0 | 33 | 37 |
| Norwegian Jewel | 8/2/16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.8 | 2 | 0 | 0 | 0 | 7.5 | 7.3 | 0 | 0 | 0 | 0 | 0 | 0 | 37 | 41 |
| Norwegian Pearl | 5/17/16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1.3 | 2.8 | 1.8 | 0 | 0 | 0 | 4.8 | 4.8 | 0 | 0 | 0 | 0 | 0 | 0 | 53 | 52 |
| Norwegian Pearl | 8/9/16 | 0 | 0 | 0 | 1.1 | 0 | 0 | 0 | 0 | 0 | 0 | 2.8 | 1.5 | 0 | 0 | 0 | 5.1 | 4.8 | 0 | 0 | 0 | 0 | 0 | 0 | 55 | 55 |
| Norwegian Sun | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Le Soleal | 6/25/16 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1.9 | 0 | 2.1 | 2 | 0 | 0 | 0 | 7.9 | 7.9 | 1.3 | 1.1 | 0 | 0 | 0 | 0 | 110 | 120 |
| Le Soleal | 7/9/16 | 0 | 0 | 0 | 1.2 | 0 | 0 | 0 | 0 | 0 | 2.6 | 16 | 17 | 0 | 0 | 0 | 19 | 20 | 1.4 | 1.6 | 0 | 0 | 0 | 0 | 1200 | 1300 |
| Coral Princess | 6/8/16 | 0 | 0 | 1.5 | 0 | 0 | 0 | 0 | 0 | 1.5 | 2.8 | 8.7 | 8.5 | 0 | 0 | 0 | 14 | 13 | 2.8 | 2.5 | 0 | 0 | 0 | 0 | 48 | 49 |
| Coral Princess | 8/3/16 | 0 | 0 | 11 | 8.9 | 0 | 0 | 0 | 0 | 1 | 1.2 | 3.5 | 2.3 | 0 | 0 | 0 | 7.6 | 7.7 | 37 | 33 | 0 | 0 | 0 | 0 | 24 | 22 |
| Crown Princess-GW | 5/23/16 | 4.6 | 4.1 | 0 | 0 | 0 | 0 | 0 | 0 | 1.4 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 11 | 0 | 1.2 | 0 | 0 | 0 | 0 | 8.7 | 6.4 |
| Crown Princess-GW | 8/15/16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.2 | 1 | 1.2 | 1.9 | 0 | 0 | 0 | 15 | 15 | 0 | 1 | 0 | 0 | 0 | 0 | 20 | 21 |
| Crown Princess | 5/24/16 | 1.8 | 2.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 5.3 | 5.5 | 0 | 0 | 0 | 9.4 | 10 | 1.4 | 1.9 | 0 | 0 | 0 | 0 | 40 | 38 |
| Crown Princess | 8/2/16 | 0 | 0 | 1.5 | 1.9 | 0 | 0 | 0 | 0 | 1.2 | 1.1 | 2.9 | 4.3 | 0 | 0 | 0 | 11 | 11 | 2.2 | 2.2 | 0 | 0 | 0 | 0 | 41 | 51 |
| Grand Princess-GW | 6/3/16 | 0 | 0 | 0 | 2.8 | 0 | 0 | 0 | 0 | 1.9 | 2.2 | 5.2 | 2.4 | 0 | 0 | 0.38 | 16 | 14 | 11 | 11 | 0 | 0 | 0 | 0 | 66 | 70 |
| Grand Princess-GW | 8/3/16 | 0 | 0 | 3.6 | 3 | 0 | 0 | 0 | 0 | 1.9 | 2.2 | 1.5 | 1.6 | 0 | 0 | 0 | 13 | 13 | 13 | 11 | 0 | 0 | 0 | 0 | 33 | 33 |
| Grand Princess | 6/4/16 | 0 | 0 | 2.1 | 0 | 0 | 0 | 0 | 0 | 2.5 | 2.1 | 3.3 | 3.3 | 0 | 0 | 0.35 | 12 | 12 | 7.1 | 7.2 | 0 | 0 | 0 | 0 | 51 | 53 |
| Grand Princess | 8/23/16 | 0 | 0 | 1.9 | 2 | 0 | 0 | 0 | 0 | 1.4 | 1.6 | 1.2 | 1.2 | 0 | 0 | 0 | 12 | 12 | 4.4 | 5.1 | 0 | 0 | 0 | 0 | 20 | 19 |
| Island Princess | 6/5/16 | 0 | 0 | 0 | 1.3 | 0 | 0 | 0 | 0 | 1.3 | 1.3 | 0 | 1.4 | 0 | 0 | 0 | 6 | 5.8 | 0 | 2.1 | 0 | 0 | 0 | 0 | 8.8 | 7.3 |
| Island Princess | 8/14/16 | 0 | 0 | 2 | 1.5 | 0 | 0 | 0 | 0 | 0 | 0 | 1.6 | 1.4 | 0 | 0 | 0 | 4.7 | 4.6 | 2.6 | 1.7 | 0 | 0 | 0 | 0 | 34 | 31 |
| Ruby Princess-GW | 6/1/16 | 0 | 0.9 | 0 | 0 | 0 | 0 | 0 | 0 | 8.8 | 1.4 | 210 | 21 | 11 | 0.75 | 0 | 13 | 7.9 | 1.3 | 1.2 | 0 | 0 | 0 | 0.048 | 440 | 120 |
| Ruby Princess-GW | 8/10/16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 27 | 14 | 1.6 | 0 | 0 | 12 | 11 | 2.4 | 1.9 | 0 | 0 | 0 | 0 | 200 | 150 |
| Ruby Princess | 6/2/16 | 0 | 0 | 1.2 | 0 | 0 | 0 | 0 | 0 | 2.2 | 2.1 | 15 | 13 | 0 | 0 | 0 | 8.4 | 8.1 | 2 | 0 | 0 | 0 | 0 | 0 | 62 | 65 |
| Ruby Princess | 8/11/16 | 0 | 0 | 1.9 | 1.9 | 0 | 0 | 0 | 0 | 0 | 0 | 22 | 23 | 0 | 0 | 0 | 9.2 | 9 | 2 | 2 | 0 | 0 | 0 | 0 | 110 | 110 |
| Star Princess-GW | 5/18/16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.5 | 3.2 | 1.7 | 0 | 0 | 0 | 11 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 36 | 31 |
| Star Princess-GW | 8/16/16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.4 | 1.3 | 0 | 0 | 0 | 7.8 | 7.5 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 15 |
| Star Princess | 6/7/16 | 0 | 0 | 0 | 1.2 | 0 | 0 | 0 | 0 | 1.1 | 1.8 | 0 | 0 | 0 | 0 | 0 | 8.4 | 8.3 | 0 | 2.1 | 0 | 0 | 0 | 0 | 4.1 | 7 |
| Star Princess | 8/10/16 | 3.7 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.3 | 1.1 | 0 | 0 | 0 | 10 | 9.9 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 15 |
| Regatta-Port | 5/23/16 | 0 | 0 | 1.4 | 0 | 0 | 0 | 0 | 0 | 3.4 | 4.4 | 75 | 65 | 0 | 0 | 0 | 13 | 12 | 1.4 | 1.7 | 0 | 0 | 0 | 0 | 190 | 160 |
| Regatta-Starboard | 5/23/16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.7 | 2.9 | 87 | 31 | 1.3 | 0 | 0 | 16 | 13 | 1.3 | 1.3 | 0 | 0 | 0 | 0 | 140 | 110 |
| Regatta-Starboard | 7/19/16 | 0 | 0 | 1.6 | 2.2 | 0 | 0 | 0 | 0 | 1.3 | 1.1 | 33 | 17 | 0 | 0 | 0 | 7.8 | 7.5 | 1.5 | 1.9 | 0 | 0 | 0 | 0 | 58 | 42 |
| Seven Seas Mariner | 5/22/16 | 0 | 0 | 2.4 | 2.2 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 11 | 0 | 0 | 0 | 7.9 | 8.4 | 1.1 | 1.2 | 0 | 0 | 0 | 0 | 82 | 79 |
| Seven Seas Mariner | 8/14/16 | | 0 | 4.1 | 2.8 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 4.8 | 0 | 0 | 0 | 9.1 | 8.6 | 1.2 | 1.1 | 0 | 0 | 0 | 0 | 94 | 44 |
| | MAX | 4.6 | 4.1 | 19 | 20 | 0 | 0 | 0 | 0 | 8.8 | 4.4 | 210 | 65 | 11 | 1.4 | 0.38 | 22 | 22 | 59 | 94 | 0 | 0 | 0 | 0.048 | 1200 | 1300 |

**All results in micrograms/L (ug/L)**

**Non detects recorded as zero**

## APPENDIX 2: REFRENCES

Alaska Department of Environmental Conservation (ADEC) Cruise Ship Program
http://www.dec.state.ak.us/water/cruise_ships/index.htm

2014 Large Cruise Ship General Permit
http://dec.alaska.gov/water/cruise_ships/gp/2014gp.html

Quality Assurance Project Plan
http://dec.alaska.gov/water/cruise_ships/pdfs/2016_CLIA-NWC_QAPP.pdf

Alaska Cruise Ship Laws and Regulations
http://www.dec.state.ak.us/water/cruise_ships/Law_and_Regs/index.htm

Sample reports from prior years
http://www.dec.state.ak.us/water/cruise_ships/reports.htm