Permit No.: 2007DB0002

Final Large Commercial Passenger Vessel Wastewater Discharge General Permit Information Sheet

May 1, 2008

Alaska Department of Environmental Conservation
Division of Water
Commercial Passenger Vessel Environmental Compliance Program
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The Alaska Department of Environmental Conservation (ADEC), Commercial Passenger Vessel Environmental Compliance (CPVEC) Program originally issued the Large Commercial Passenger Vessel Wastewater Discharge General Permit (the General Permit), number 2007DB0002 for discharges of treated sewage, graywater, and other wastewater effective March 25, 2008. On April 9, 2008, the Alaska Cruise Association requested an informal review of the permit. The ADEC Director of the Division of Water issued her decision on April 24, 2008. She remanded the permit to staff to make the following revisions:

- Permittees now have sixty (60) rather than thirty (30) days from the date of NOI submittal to submit their Source Reduction Evaluation to the Department. A Source Reduction Evaluation is required by General Permit Section 1.9 when permittees are allowed to discharge ammonia, copper, nickel, or zinc at the interim effluent limits listed in Table 1. This decision grants additional time to permittees to complete the Source Reduction Evaluation, while still allowing for subsequent monitoring during the 2008 cruise ship season and evaluation of the status of reduction in the concentrations of the parameters of concern.

- In the original March 25, 2008 version of the permit, the Discharge Monitoring Report (DMR) was due within 21 days of each sampling event. The Director agreed that meeting that timeframe would be challenging and was not necessary to meet the Department's cruise ship specific statutes and regulations regarding reporting. Therefore, the DMR is now due on the 21st day of the following calendar month in which sample(s) were taken.

- On the first page of the permit, the citation to the Alaska Coastal Management Program was listed as 6 AAC 80 in the original March 25, 2008 permit. The citation has been corrected to 11 AAC 112.

- In Section 1.5.2.2 Limitations and Monitoring, a clarification was made regarding the date that the first sampling event was due. The sampling event was originally required within ten (10) days of the first entry into the waters of the state for each cruise ship season. The sampling event is now required within ten (10) days of the first discharge into Alaska waters. The change clarifies the timing of a sample since a vessel may seek coverage under the general permit but choose not to discharge immediately after entry into Alaska waters.

On May 1, 2008, the permit was updated to reflect the changes listed above. From this point forward, the information sheet is identical to the one issued on March 25, 2008 that accompanied the original permit of the same date.

The final General Permit places limits on the types and amounts of pollutants that can be discharged from large commercial passenger vessels and places other conditions on such activity.

This information document includes:

- information on public comments on the draft permit;
- a description of the industry and the types of vessels covered; and
- a description of the final permit conditions and the basis for permit limits.

Public Comment Period

The Department sought public comment on the draft permit from April 10, 2007 through May 10, 2007. In response to a request from members of the cruise ship industry, the comment period was extended to May 24, 2007.

The Department held a combined public information workshop and public hearing at Centennial Hall in Juneau Alaska on April 18, 2007. Interested members of the public provided formal verbal testimony. Substantive comments on the draft permit were received and all written comments and formal verbal testimony were considered by the Department.

Documents are Available for Review

The final General Permit and related documents can be reviewed or obtained by visiting or contacting the Department between 8:00 a.m. and 4:30 p.m., Monday through Friday at the address below. The final permit, information sheet, and other information can also be located on the Departments website http://www.dec.state.ak.us/water/cruise_ships/index.htm

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Appeal Procedures

A person aggrieved by the Department's permit decision may request an adjudicatory hearing in accordance with 18 AAC 15.195 - 18 AAC 15.340 or an informal review by the division director in accordance with 18 AAC 15.185.

Background

In August 2006, Alaskan voters approved a ballot measure that added new requirements to the CPVEC Program. The new statute requires owners/operators of large commercial passenger vessels to obtain a wastewater discharge permit from ADEC for the discharge of any treated sewage, graywater, or other wastewater into marine waters of the state. This General Permit was developed to satisfy this new requirement.

Operation under the General Permit

This section summarizes some of the changes from the draft General Permit to the final General Permit.

Vessel Classification

The draft General Permit included a simple classification system based on discharge location. ADEC received comments that pointed out that this classification system was of no value in terms of effluent limits or other permit requirements. Based upon public comments received, the classification system was removed from the final permit.

Non-Discharging Vessels

The draft General Permit included the requirement that non-discharging vessels submit a Notice of Intent for permit coverage. ADEC received comments that objected to this provision citing the lack of statutory or regulatory authority to require permit coverage for vessels that will not discharge treated sewage, graywater, or other wastewaters into marine waters of the state. The final permit only requires a Notice of Intent for large commercial passenger vessels that discharge sewage, graywater, or other wastewater into the marine waters of the state.

Vessel Tracking

The draft General Permit required that hourly vessel location via Global Positioning System (GPS) technology be available to ADEC on demand (formerly Section 1.8.2). This section was not required because the law (AS 46.03.465) requires that this location information be available to ADEC from all commercial passenger vessels, not just those that discharge. Therefore, the provision was deleted from the final General Permit.

Discharge Exclusion Areas

The draft General Permit proposed to prohibit wastewater discharges in certain areas, including:

1. Legislatively designated special area, (State Game Refuges, Critical Habitat Areas and State Game Sanctuaries).
2. Areas within 100 meters horizontally of mean lower low water tidal datum of the tidally affected portion of waters identified under 11 AAC 195.010(a) as important for the spawning, rearing, or migration of anadromous fish.
3. Within 100 meters of known herring spawning areas from March 1 through June 15 of each calendar year, within waters that are of a depth of 20 meters vertically of mean lower low water tidal datum, and that are identified in the department's set of maps entitled, Herring Spawning Areas in Alaska, dated November 2005 and adopted by reference.
4. Within one (1) nautical mile of any major Steller sea lion haulout or rookery site or within any Steller sea lion "Critical habitat Area" defined in 50 CFR 226.202, whichever is greater, without written permission from the Regional Director of the National Marine Fisheries Services.
5. Any waterbody included in the ADEC Clean Water Act (CWA) Section 305(b) report or effective CWA Section 303(d) list of waters which are "impaired" or "water quality-limited" for any of the authorized pollutant parameters.

Public comments received suggested that additional areas be considered for exclusion, while others expressed opposition to these provisions based upon the lack of statutory or regulatory authority to prohibit discharges within these areas. The final General Permit retains a prohibition against discharging into CWA Section 303(d) impaired waters unless the treated effluent meets the long-term effluent limits found in Table 1 of the General Permit.

Discharge Characterization

During 2000, wastewater samples were taken from 21 large cruise ships visiting Juneau. The only cruise ship wastewater discharge regulated by the Environmental Protection Agency at the time was treated sewage from the marine sanitation devices (MSDs).

Treated sewage (from toilets) and graywater (from showers, sinks, galleys, and laundry) were tested in the same manner as land based sewage treatment plants. Most sample results from MSDs showed that treated sewage exceeded the federal treatment standard and that graywater had elevated fecal coliform levels. Following the initial sampling results, the U.S. Coast Guard focused on how marine sanitation devices were operated and maintained by conducting follow-up inspections.

Some of the findings of the 2000 sampling are summarized below:

- 43% of the samples for fecal coliform were in compliance with the federal marine sanitation device (MSD) standard of 200 fecal coliform per 100 milliliters. Fecal coliform indicates the possible presence of human waste.

- 32% of the samples for total suspended solids were in compliance with the MSD standard.

- Only one of the samples of conventional MSDs was in compliance with both the fecal coliform and total suspended solids standards.

- Five of the six samples of combined gray and blackwater treated by reverse osmosis systems were in compliance with both the fecal coliform and total suspended solids standards.

- 75% of the samples of graywater tested had over five times the fecal coliform standard for MSDs of 200 FC/100ml.

Each ship's discharge was also analyzed for a suite of chemicals, called priority pollutants to evaluate if there was improper disposal of hazardous chemicals into the wastewater disposal systems. Priority pollutants include metals and man-made organic compounds, including those used in industrial products or processes. A few priority pollutants were present at levels above water quality standards.

Unannounced sampling events (twice per season /per vessel) were initiated in 2001. By the end of the 2005 cruise ship season, sample results indicated substantial improvements in effluent discharge quality from properly operated and maintained MSDs. (The 2005 Large Ship Sampling Results (2 samples per season) are available at: http://www.dec.state.ak.us/water/cruise_ships/pdfs/05_unannounced_sample_results.pdf).

The 2005 unannounced sample results are summarized in the Table 1 below.

Table 1. Summary 2005 Large Ship Unannounced Sampling Results, Excluding Priority Pollutants (20 ships, 42 samples)

	Ammonia as N	pH	Biochemical O_2 Demand	Chemical O_2 Demand	Total Suspended Solids	Chlorine, Free	Chlorine, Residual	Fecal Coliform Bacteria by MPN
Alaska Water Quality Standards	**20.0[1]**	**6.5 – 8.5**	**N/A**	**N/A**	**N/A**	**N/A**	**0.0075**	**14[2]**
Units	**mg/l**	**S.U.**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**MPN/100 ml**
Minimum	**0**	**6.38**	**0**	**0**	**0**	**0**	**0**	**0**
Maximum	**95.8**	**9.5**	**160**	**285**	**6.3**	**0**	**0.19**	**20**
Median	**24.5**	**7.47**	**3.45**	**59**	**0**	**0**	**0**	**0**

1 Ammonia standards are based on temperature, pH and salinity. This standard is from Table IX in the *Alaska Water Quality Criteria Manual for Toxics and Other Deleterious Organic and Inorganic Substances* using a ph 7.8, salinity of 20 g/kg and temperature between 10-15 degrees Celsius.

2. Standard used for consumption of raw shellfish.

The cruise ship discharges that are the subject of the final General Permit are treated sewage, graywater, and other wastewater. Collectively, the treated wastewater (prior to discharge) is called effluent. Effluent is defined in the final General Permit as the segment of a treated sewage, graywater, or other wastewater stream that precedes discharge of the wastewater stream to the receiving environment. The volume of treated wastewater discharge varies from vessel to vessel, but ranged from 60,760 gallons per day to 289,270 gallons per day (2006 ADEC data). For purposes of comparison, Table 2 below contrasts cruise ship population and discharge volume with municipal population and discharge volume from two small municipalities in southeast Alaska.

Table 2: Comparison of Cruise Ship Discharge Volume with that of Similarly Populated Southeast Alaska Municipalities

	Cruise Ship A	Cruise Ship B	Municipality A	Municipality B
Total population	3,224	2,760	3,398	2,589
Wastewater production	211,300 gals/day (max load)	158,500 gals/day (max load)	614,000 gals/day (avg Jan-Mar, May 99)	375,000 gals/day (avg May-Aug 97)

(Alaska Cruise Ship Initiative: Part I Final Report (Activities through June 1, 2000))

Cruise ships have been working to improve the performance of their traditional marine sanitation devices (MSD) or replace them with new advanced wastewater treatment technologies. The advanced wastewater treatment technologies are very effective at removing Biological Oxygen

Demand (BOD), Total Suspended Solids (TSS), and fecal coliform without relying on the use of chlorine (Table 3, below).

Table 3: Comparison of Advanced Treatment System Medians

	pH	BOD5	TSS	Total Chlorine Residual	Free Chlorine Residual	Fecal Coliform
Units		mg/L	mg/L	mg/L	mg/L	MPN/100
Reverse Osmosis (21)	7.28	14.9	0.0	0.00	0.00	0
Zenon (24)	7.64	0.0	0.0	0.00	0.00	0
Scanship (18)	6.94	10.9	7.0	0.00	0.00	0
Hamworthy (58)	7.33	2.2	0.0	0.00	0.00	0

("Assessment of Cruise Ship and Ferry Wastewater Impacts in Alaska," ADEC, February 9, 2004)

Data Reliability and Representative Nature

It is crucial that wastewater sample data is reliable and representative. This data will be used to determine compliance with the General Permit. Large vessels that discharged in Alaska from 2001 to 2007 took at least two compliance samples per cruise ship season to satisfy both state and federal cruise ship laws. ADEC, the U.S. Coast Guard, and the Northwest Cruiseship Association have established a Quality Assurance/Quality Control (QAQC) plan that ensures that the sample results are reliable. The final General Permit requires permittees to follow the ADEC-approved QAQC plan.

The QAQC plan includes standard sampling and laboratory quality control elements with additional instructions tailored to a maritime facility. It lists all the pollutants to be tested and the EPA analytical methods to be used. The QAQC plan requirements include duplicate sampling, sampling audits, and a lab technical systems audit. The U.S. Coast Guard cruise ship regulations require third party sampling. The final General Permit is consistent with ADEC regulations and allows permittees to collect samples using a qualified person that may be an employee. However, owners/operators of large cruise ships sample to satisfy the requirements of both the federal and state law and are likely to continue to use a third party sampler for all monitoring required by the final General Permit.

Because each ship is configured differently and follows unique wastewater management practices, the state also requires the owner/operator to submit a vessel specific sampling plan (VSSP). The VSSP plan, approved by ADEC before sampling begins, must demonstrate that the sample will be representative of the wastewater discharged from the particular ship. The General Permit requires onboard sampling locations to be the same as those listed in the current approved VSSP.

Effluent Limitations

When ADEC issues permits for shore-based domestic wastewater treatment plants, it typically authorizes a mixing zone where water quality standards can be legally exceeded, while still protecting aquatic resources. However, the new law requires that all discharges meet applicable standards -- including Alaska Water Quality Standards -- ***at "the point of discharge***," (AS 46.03.462(b)(1)(emphasis added)). ADEC concludes that the effect of the new law is to preclude authorization of a dilution factor or mixing zone in the final General Permit for parameters that have exceeded the Water Quality Standards in the effluent in recent years - ammonia, copper, nickel, and zinc.

Effluent limits in the final General Permit are based upon state Water Quality Standards and, where applicable, a combination of state and federal requirements.

Alaska's Water Quality Standards (18 AAC 70) include three articles: Article 1, statewide standards (18 AAC 70.005 -.050), Article 2, exceptions to state-wide standards (18 AAC 70.200 -.270), and Article 3, general provisions (18 AAC 70.900 -.990). The standards also include the Alaska Water Quality Criteria Manual for Toxic and Deleterious Organic and Inorganic Substances. The Alaska Water Quality Criteria Manual for Toxic and Deleterious Organic and Inorganic Substances has been adopted into 18 AAC 70.020(b). Numeric criterion for certain pollutants in the final General Permit (i.e., fecal coliform) are found in 18 AAC 70.020 (b).

The Alaska Water Quality Standards are found at:
http://www.dec.state.ak.us/water/wqsar/wqs/wqs.htm

Long-term Effluent Limits in the Final General Permit

ADEC included the conventional and priority pollutants that cruise ships have been sampling since 2001 as part of the original state and federal cruise ship law requirements in Table 1 of the final General Permit. ADEC evaluated the large cruise ship wastewater effluent data from 2001 through 2005 and established effluent limits for parameters that had exceeded the Alaska Water Quality Standards. ADEC concluded that other parameters are not likely to exceed the water quality standards.

Lead is no longer included in Table 1 of the final General Permit. The data did not indicate that large cruise ships are likely to exceed the Alaska Water Quality standards for lead. The inclusion of lead in the draft General Permit was a technical error and nickel should have been included instead. Consequently, nickel has been added to Table 1 of the final General Permit.

The final General Permit established the following long-term effluent limits:

BOD (Biological Oxygen Demand)

The Alaska Water Quality Standards do not contain a numeric criterion for BOD. The final General Permit uses the limit established in 40 CFR 133.102 Secondary Standard which has been in effect in the existing cruise ship regulatory program.

Fecal Coliform
The CPVEC program law states that a person may not discharge sewage from a commercial passenger vessel into the marine waters of the state that has a fecal coliform count greater than 200 FC/100 ml. However, because the newer cruise ship law (AS 46.03.462(b)(1)) requires that the Water Quality Standards be met at the "point of discharge", the final General Permit incorporated the most restrictive standard, in this case the State of Alaska marine aquatic life water quality criterion of 14 FC/100 ml for a monthly average and 43 FC/100 ml for a daily maximum.

Total Residual Chlorine
Chlorine is often used to disinfect treated wastewater prior to discharge and as an alternative method of disinfection in case of failure of a primary disinfection system.

Free residual chlorine is described as the portion of the chlorine injected into water that remains as molecular chlorine, hypochlorous acid, or hypochlorite ions after the solution has reached a state of equilibrium. Total residual chlorine includes free chlorine, but also includes chlorine that has combined with ammonia or other nitrogenous compounds. ADEC saltwater criteria for total residual chlorine are 0.013 mg/L (acute criterion) and 0.0075 mg/L (chronic criterion). The acute criterion is based upon a 24-hour average concentration. The chronic criterion is based upon a four-day average concentration.

The effluent limit in the final General Permit for total residual chlorine is 0.0075 mg/L. This numerical limit is below the detection level for EPA-approved analytical methods. Therefore, effluent samples will be considered compliant with the total residual chlorine limit if the maximum daily chlorine concentration is below the method detection limit.

Ammonia
Ammonia is present in two forms in saltwater: un-ionized ammonia (NH_3) and the ammonium ion (NH_4^+). The un-ionized ammonia form has been demonstrated to be the more toxic form of ammonia. Ammonia affects the life cycle as well as survival of some species. Receiving water characteristics affect the proportion of ammonia that exists as un-ionized ammonia.

Ammonia standards are based on temperature, pH and salinity. The proposed effluent limit of 2.9 mg/L in the final General Permit is based upon Table IX in the Alaska Water Quality Criteria Manual for Toxics and Other Deleterious Organic and Inorganic Substances. ADEC derived this value by using a pH of 7.8, a salinity of 20 g/kg, and a temperature range of 10-15 degrees Celsius.

Copper
Alaska has a water quality standard of 0.0031 mg/L dissolved copper in saltwater based on chronic effects to aquatic life and 0.0048 mg/L for acute effects (Table IV in the Alaska Water Quality Criteria Manual for Toxics and Other Deleterious Organic and Inorganic Substances). The chronic criterion is based upon a four-day average. The acute criterion is based upon a 24-hour average. Copper can be toxic in aquatic environments and bio-concentrates in many different organs in fish and mollusks. ADEC selected the effluent limit for copper based upon the more stringent 0.0031 mg/L standard that is set to protect aquatic life from the chronic effects of exposure to copper.

Nickel
Alaska has a water quality standard of 0.0082 mg/L dissolved nickel in saltwater based on chronic effects to aquatic life and 0.074 mg/L for acute effects (Table IV in the Alaska Water Quality Criteria Manual for Toxics and Other Deleterious Organic and Inorganic Substances). The chronic criterion is based upon a four-day average. The acute criterion is based upon a one-hour average. ADEC selected the effluent limit for nickel based upon the more stringent 0.0082 mg/L standard that is set to protect aquatic life from the chronic effects of exposure to nickel.

Zinc
Alaska has a water quality standard of 0.081 mg/L dissolved zinc in saltwater based on chronic effects to aquatic life and 0.090 mg/L for acute effects (Table IV in the Alaska Water Quality Criteria Manual for Toxics and Other Deleterious Organic and Inorganic Substances). The chronic criterion is based upon a four-day average. The acute criterion is based upon a one-hour average. ADEC selected the effluent limit for zinc based upon the more stringent 0.081 mg/L standard that is set to protect aquatic life from the chronic effects of exposure to zinc.

pH
Federal rules (40 CFR 133.102 Secondary Treatment) establish the criterion for pH at a value between 6 and 9. The most stringent state water quality criterion for pH (for aquaculture water supply and aquatic life) states that pH must be no less than 6.5 and no greater than 8.5 standard units, and may not vary more than 0.2 pH units from natural conditions. The final General Permit limits pH to a range of 6.5 to 8.5 standard units.

Total Suspended Solids (TSS)
The Alaska Water Quality Standards do not contain a numeric criterion for TSS. The final General Permit uses the limit established in Alaska's statutes relating to cruise ships at AS 46.03.463(b) which is the same as the federal standard.

Compliance Schedule

Public comment and ADEC analysis indicate that large commercial passenger vessels are not likely to be able to immediately comply with the strict "point of discharge" effluent limits in the General Permit.

One logical outcome under this scenario is that vessels would not seek coverage under the final General Permit and would instead elect to discharge into waters of the United States (outside the marine waters of the state). These vessels might elect not to operate the advanced wastewater treatment systems (AWTS) currently on board since there would have been no regulatory incentive to do so. The AWTS have performed with outstanding environmental results and benefits. The systems' operations likely treat ammonia, copper, nickel, and zinc, to some extent reducing those pollutants' impacts to the receiving waters/environment. As such, the advanced wastewater treatment systems' continued operation is better for the environment and receiving waters everywhere than if the cruise ships hold their wastewaters, fail to maintain and operate the systems, and discharge the wastewaters in raw or untreated form in U.S. or international waters outside Alaska waters.

ADEC did not quantify the impact that vessels choosing to discharge outside of Alaska waters might have on in-port duration and sailing locations. A compliance schedule will allow for orderly, timely, and reasonable development of additional treatment technologies or optimized operations, while also averting economic hardship to Alaska coastal communities and residents that benefit from the presence of the cruise ship industry. Public comments on the draft General Permit echo these concerns and objectives. In addition, ADEC believes that it should encourage the continued use of the AWTSs that industry has installed on a majority of the ships that ply Alaska's waters.

Public comments recognized that deadlines or milestones for coming into compliance with standards for ammonia and several metals - and the consequences for failing to do so - are essential to cruise lines taking effective corrective action in response to exceedances. ADEC agreed and elevated the corrective action process in section 1.11 of the draft General Permit to a compliance schedule in section 1.9 of the final General Permit. This section details the components of the Source Reduction Evaluation that permittees must implement in order to obtain ADEC approval for discharging effluent that meets the interim compliance limits established in Table 1 of the General Permit. The Source Reduction Evaluation must identify the likely source(s) of the pollutant(s) of concern, include a plan to reduce concentrations to authorized levels, and include an implementation schedule, which may not extend beyond the beginning of the 2010 cruise ship season.

ADEC has incorporated a compliance schedule into the final General Permit that will allow the cruise ship industry the 2008 and 2009 seasons to come into compliance with the water quality criteria based limits found in Table 1 of the final permit. The Alaska Water Quality Standards authorize the department to consider and establish a compliance schedule under certain situations under 18 AAC 70.910.

Each of the regulatory requirements for use of a compliance schedule in a permit is addressed below.

Regulatory Requirement: ADEC must determine that more time is required for a facility to come into full compliance with the water quality standards. (See 18 AAC 70.910(a))

Basis/Background for ADEC Determination: The Water Quality Standards for ammonia, copper, nickel, and zinc have not previously been applied to cruise ship effluent at the "point of discharge" (AS 46.03.462(b)(1). While most of the large cruise vessels have now been retrofitted to include advanced wastewater treatment systems (AWTSs), these systems were designed to focus on other pollutants of concern, such as fecal coliform and total suspended solids. No systems have been installed onboard that are designed to treat ammonia and the metals. Such technology will take time to develop, test, and install on large cruise vessels and will not be available at the time the final General Permit is issued. Based upon public comments on the draft General Permit and multiple years of data from large cruise ship wastewater discharges, ADEC determined that compliance with the stringent long-term effluent limits for ammonia, nickel, copper and zinc found in Table 1 of the final General Permit would be unattainable for the majority of the fleet for at least the 2008 cruise ship season.

Regulatory Requirement: ADEC must determine that the compliance schedule is for a requirement with which a facility is not in compliance when a permit or certification is issued. (See 18 AAC 70.910(a)(1)).

Basis/Background for ADEC Determination: Published sampling results from the 2005 cruise ship season (http://www.dec.state.ak.us/water/cruise_ships/reports.htm) document multiple exceedances of the most stringent applicable criterion for ammonia, dissolved copper, dissolved nickel and dissolved zinc. (Tables IV and IX of the Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances). Sampling completed during the 2004 season documented multiple exceedances of the most stringent applicable criterion for copper and zinc.

Table 4, below, summarizes sample analysis for copper, nickel, and zinc in 2005.

Table 4 - 2005 Large Ships Unannounced Sampling Results for Priority Pollutants

Vessel	Sample Date	Copper (dissolved) Sample Results	Copper Exceedance	Zinc (dissolved) Sample Results	Zinc Exceedance?	Nickel (dissolved) Sample Results	Nickel Exceedance?
Alaska Water Quality Standards		3.1 ug/l		81.0 ug/l		8.2 ug/l	
Carnival Spirit	7/16	1.23	N	135	Y	1.02	N
Coral Princess	7/12	23.6	Y	171	Y	8.21	Y
Dawn Princess	7/28	11.2	Y	89.2	Y	5.09	N
Diamond Princess	7/18	31.1	Y	106	Y	10.5	Y
Island Princess	7/13	20.3	Y	141	Y	5.53	N
Mercury	7/24	0.25*	N	2.73	N	0.375*	N
Norwegian Dream	7/24	11.3	Y	97	Y	39.2	Y
Norwegian Spirit	7/26	4.11	Y	66.9	N	5.37	N
Norwegian Star	7/19	5.75	Y	169	Y	7.09	N
Norwegian Sun	8/17	4.21	Y	117	Y	6.36	N
Oosterdam	8/8	1.63	N	172	Y	5.27	N
Regal Princess	9/10	128	Y	54.4	N	9.33	Y
Ryndam	7/27	4.41	Y	34.4	N	18.5	Y
Sapphire Princes	7/20	1.25	N	26.6	N	3.58	N
Serenade of the Seas	8/18	3.83	Y	312	Y	19	Y
Seven Seas Mariner	7/25	2.76	N	84.5	Y	3.42	N
Statendam	9/11	51.8	Y	11.7	N	23.9	Y
Sun Princess	8/18	10.2	Y	91.9	Y	6.5	N
Veendam	7/28	3.95	Y	50.5	N	19.1	Y
Volendam	6/24	12.4	Y	48.2	N	11.1	Y
Zaandam	8/8	6.25	Y	57.1	N	11.7	Y
	No. of Exceedances		**16**		**12**		**10**
	Percent of Samples		**76%**		**57%**		**48%**

* Samples were run at a lower reporting limit (PQL).

The department likewise evaluated the potential impacts on the likelihood of cruise ships being able to discharge in compliance with the ammonia standard. Table 5, below, contrasts 2005 sample results with the long-term effluent limit for ammonia in Table 1 of the final General Permit.

Table 5 - Ammonia as N

	2005 Sample Date	2005 Sample Results	Ammonia Exceedance? Y or N
Table 1 limit (mg/L)			2.9 mg/L
Ryndam	6/1	26	Y
Ryndam	7/27	16	Y
Sapphire Princes	5/25	51	Y
Sapphire Princes	7/20	95.8	Y
Serenade of the Seas	6/23	19	Y
Serenade of the Seas	8/18	21	Y
Seven Seas Mariner	6/6	92.7	Y
Seven Seas Mariner	7/25	0.097	N
Statendam	9/6	57	Y
Statendam	9/11	37	Y
Norwegian Dream	6/26	41	Y
Norwegian Dream	7/24	13	Y
Norwegian Spirit	5/24	18	Y
Norwegian Spirit	7/26	16	Y
Norwegian Star	6/14	46	Y
Norwegian Star	7/19	50	Y
Norwegian Sun	6/1	28	Y
Norwegian Sun	8/17	36	Y
Oosterdam	6/27	21	Y
Oosterdam	8/8	17	Y
Regal Princess	6/3	49	Y
Regal Princess	9/10	30	Y
Carnival Spirit	6/4	0.41	N
Carnival Spirit	7/16	0.24	N
Coral Princess	5/25	25	Y
Coral Princess	7/12	32	Y
Dawn Princess	5/27	74	Y
Dawn Princess	7/28	23	Y
Diamond Princess	5/23	41	Y
Diamond Princess	7/18	79	Y
Island Princess	5/24	34	Y
Island Princess	7/13	14	Y
Mercury	6/5	0.61	N
Mercury	7/24	ND	N
34 sample events		**No. of Exceedances**	**29**
		% Exceedance	**85%**

After evaluating the data in the two above tables, ADEC concluded that the majority of vessels would not be able to immediately comply with the ammonia, copper, nickel, and zinc limits in the permit.

Regulatory Requirement: ADEC must determine that allowing a facility more time to come into full compliance will not harm or threaten public health or the environment. (See 18 AAC 70.910(a)).

Basis/Background for ADEC Determination: ADEC reviewed the host of reports available on cruise ship discharges in Alaska (http://www.dec.state.ak.us/water/cruise_ships/reports.htm), including the "2005 Large Ships Sampling Results (2 samples per season)" report. The report concludes that "[s]ome large ships wastewater discharges have ammonia, dissolved copper, dissolved nickel and dissolved zinc results that exceed Alaska water quality standards. Most of these standards will be met quickly in the receiving water because the effluent is dispersed and should not pose a risk to the environment." The "2004 Large Ship Sampling Results (2 samples per season)" report drew a similar conclusion (http://www.dec.state.ak.us/water/cruise_ships/pdfs/04ls_sampling.pdf). All of the published reports concluded that discharges are unlikely to have any detrimental effects on either water quality or aquatic life once the effects of effluent dilution are considered.

A Science Advisory Panel and ADEC report concluded that for a typical large cruise ship moving at a minimum speed of 6 knots and discharging wastewater at 200m^3/hr the dilution factor on the wastewater effluent is 50,000 ("The Impact of Cruise Ship Wastewater Discharge on Alaska Waters," November 2002, available at: http://www.dec.state.ak.us/water/cruise_ships/pdfs/impactofcruiseship.pdf). When evaluating the cruise ship effluent data in conjunction with this dilution factor, ADEC does not expect effluent discharged from a moving large cruise ship to exceed water quality standards in the receiving waterbody. ADEC also reviewed the published data on dilution from stationary vessels during a worst case scenario (Skagway[1] during a neap[2] tide) ("Assessment of Cruise Ship and Ferry Wastewater Impacts in Alaska Commercial Passenger Vessel Environmental Compliance Program," February 9, 2004, available at: http://www.dec.state.ak.us/water/cruise_ships/assessreport04.htm). Table 6, below, is from Appendix D (Cruise Ship Stationary Discharge Modeling) of this report.

[1] Skagway is located at the end of Lynn Canal and is not affected by open ocean effects.
[2] A tide of minimum range occurring at the first and third quarters of the moon.

Table 6 - Dilution

Ship Name	Max Dilution	Factor Reached @ (m)
Coral Princess	10	1.0
Dawn Princess	24	4.0
Island Princess	8	<1
Pacific Princess	10	15.0
Star Princess	20	4.0
Sun Princess	15	2.5
Carnival Spirit	5	<1
Mercury	18	4.0
Norwegian Sky	14	2.0
Norwegian Sun	30	7.0
Norwegian Wind	24	5.0
Seven Seas Mariner	18	2.0
Maasdam	60	5.0
Ryndam	60	5.0
Statendam	60	4.0
Veendam	60	5.0
Volendam	60	5.0
Zaandam	60	5.0

This table provides modeled information on how rapidly effluent is diluted in the receiving water. The median dilution factor was 22, which was reached 4.5 meters away from the ship.

Interim Compliance Limits in the final General Permit

The final General Permit and compliance schedule include interim compliance limits. ADEC compiled the cruise ship sample data for ammonia, copper, nickel, and zinc for the 2004 through 2007 Alaska cruise ship seasons. The upper 95th percentile limit of this data (shown in Table 7 below) was selected as the interim compliance limit for each parameter.

Table 7 - Ninety-fifth (95th) Percentile of the Cruise Ship Wastewater Effluent Data Collected in Alaska from 2004 through 2007

	Ammonia	Copper	Nickel	Zinc
Alaska Water Quality Standard	2.9 mg/L	0.0031 mg/L	0.0082 mg/L	0.081 mg/L
No. of Exceedances	8	5	5	5
% of Samples that Exceed WQS	5	6	6	6
95 Percentile value based on 2004 - 2007 data	80.4 mg/L	0.066 mg/L	0.18 mg/L	0.23 mg/L

The effluent limits, including the interim limits for ammonia, copper nickel and zinc under the compliance schedule, are included in the final General Permit as Table 1 and shown below in Table 8.

Table 8 (Table 1 of the final General Permit): Effluent Limits and Discharge Reporting

Effluent Characteristics	**Minimum Value[1]**	**Monthly Average[1]**	**Daily Maximum[1]**	**Minimum Frequency**	**Sample Type**
Total Flow (cubic meters per day of effluent)	N/A	Not to exceed design capacity Report	Not to exceed design capacity Report	Daily	Metered or estimated
Biochemical Oxygen Demand (5-day)	N/A	30 mg/L	60 mg/L	Twice Monthly	Grab
Fecal Coliform Bacteria	N/A	14 per 100 mL [2]	43 per 100 mL	Twice Monthly	Grab
Total Residual Chlorine	N/A	N/A	0.0075 mg/L[3, 4]	Twice Monthly	Field test
Ammonia	N/A	N/A	(80.4 mg/L[5]) 2.9 mg/L[6]	Twice Seasonally	Grab
Copper	N/A	N/A	(0.066 mg/L[5]) 0.0031 mg/L[6]	Twice Seasonally	Grab

Effluent Characteristics	**Minimum Value[1]**	**Monthly Average[1]**	**Daily Maximum[1]**	**Minimum Frequency**	**Sample Type**
Nickel	N/A	N/A	(0.18 mg/L[5]) 0.0082 mg/L[6]	Twice Seasonally	
Zinc	N/A	N/A	(0.23 mg/L[5]) 0.081 mg/L[6]	Twice Seasonally	Grab
pH	6.5 S.U.	N/A	8.5 S.U.	Twice Monthly	Field test, grab, or continuous
Total Suspended Solids	N/A	N/A	150 mg/L	Twice Monthly	Grab or Continuous
Conductivity	N/A	N/A	Report	Twice Seasonally	Field test, grab, or continuous
Chemical Oxygen Demand	N/A	N/A	Report	Twice Seasonally	Grab
Nitrate-Nitrogen ($N\text{-}NO_3$)	N/A	N/A	Report	Twice Seasonally	Grab
Total phosphorus	N/A	N/A	Report	Twice Seasonally	Grab
Total Kjeldahl Nitrogen (TKN)	N/A	N/A	Report	Twice Seasonally	Grab
Total Organic Carbon	N/A	N/A	Report	Twice Seasonally	Grab
Base-Neutral Acid extractables (BNA)	N/A	N/A	Report	Twice Seasonally	Grab
Volatile Organic Compounds (VOCs)	N/A	N/A	Report	Twice Seasonally	Grab

Footnotes:

1. Milligrams per liter (mg/L); milliliter (mL); Standard Units (S.U.)
2. The "monthly average" is the average of all samples taken during the calendar month. If only one sample is collected, the result of that sample is the monthly average.
3. Analytical results below the method detection limit shall be deemed compliant with the effluent limits.
4. Testing and reporting for total residual chlorine is not required if chlorine is not used as disinfectant in the wastewater treatment works process.
5. These interim compliance limits are effective during the 2008 and 2009 cruise ship seasons for vessels with approved compliance schedules that comply with Section 1.9.
6. These limits become effective for all permittees at the beginning of the 2010 cruise ship season.

Based upon the ADEC 2004 modeling of dilution of effluent from a stationary large cruise ship, the median dilution factor was 22, which was reached 4.5 meters away from the ship. ADEC applied this median dilution factor to the highest detected result in large cruise ship effluent for copper, nickel, and zinc during the 2007 season; all of the metal concentrations would meet Alaska Water Quality Standards less than 4.5 meters from the ship. The highest 2007 detected result for ammonia would need to be diluted by a factor of 34 in order to meet Alaska Water Quality Standards. Based upon the 2004 modeling results, the Alaska Water Quality Standard would likely be met approximately 7 meters from the ship.

Table 9 – Approximate Distances before Alaska Water Quality Standards are Met in the Receiving Water for Highest 2007 Result

	Ammonia	Copper	Nickel	Zinc
Alaska Water Quality Standard (mg/L)	2.9	0.0031	0.0082	0.081
Highest Detected Value in 2007	100	0.041	0.018	0.143
Required Dilution Factor (2007 value/WQS)	34	13	2	2

Therefore, ADEC has concluded that the short term exceedances under the General Permit using the interim compliance limits, and the compliance schedule will not result in adverse impacts to public health or the environment.

Regulatory Requirement: The compliance schedule must contain a narrative description of how the facility will achieve compliance; include remedial measures specified as a sequence of actions enforceable by the department, and with completion dates leading to compliance for each requirement; and it must require compliance in as brief a time as feasible. (See 18 AAC 70.910(b)(1)-(3)).

Basis/Background for ADEC Determination: Section 1.9 of the final General Permit requires a narrative description of actions the permittee must take to be eligible for the compliance schedule. It requires a source reduction evaluation, implementation plan, schedule, and increased monitoring frequency. The compliance schedule includes an incentive to comply with all of the long-term effluent limits as quickly as possible (by reducing monitoring requirements) and full compliance by all vessels by the 2010 cruise ship season. Section 1.9.13 of the final General Permit indicates that the compliance schedule and the source reduction evaluation/plan are enforceable conditions of the permit.

Regulatory Requirement: If compliance is not achievable in one year, the compliance schedule must require the permittee to submit regular progress reports to the department. The progress report submitted must include the activities and completion dates required in the compliance

schedule and the dates when those activities were achieved, and an explanation of why a completion date was not or cannot be met and a description of corrective measures taken. (See 18 AAC 70.910(b)(4)).

Basis/Background for ADEC Determination: The compliance schedule in the final General Permit requires an annual progress report under section 1.9.12. Progress reports must describe actions to develop and implement the Source Reduction Evaluation and must include the results and dates of the sampling and analysis; any equipment or process changes made to achieve the long-term effluent limits; and an explanation of why any completion date was not or cannot be met and a description of any corrective measures.

Regulatory Requirement: The compliance schedule must include a statement that the compliance schedule does not prevent the department from pursuing an enforcement action for noncompliance with a permit condition not covered by the compliance schedule. (See 18 AAC 70.910(b)(6)).

Basis/Background for ADEC Determination: Section 1.9.14 of the final General Permit addresses this requirement.

Monitoring Requirements

The final General Permit contains monitoring requirements and frequencies for all the effluent limits stated in Table 1. The final General Permit retains the twice seasonal monitoring requirement for those parameters without effluent limits that the CPVEC program previously required. This latter requirement also mirrors the federal monitoring requirements for these parameters.