




2004 ASSESSMENT OF CRUISE SHIP ENVIRONMENTAL EFFECTS IN WASHINGTON

Washington State Department of Ecology

January 24, 2005



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TABLE OF CONTENTS

EXECUTIVE SUMMARY

1. INTRODUCTION

- 1.1 *Assessment Report*
- 1.2 *Cruise Industry Operations in Washington State*
- 1.3 *Memorandum of Understanding Summary*

2. MOU REQUIREMENTS

- 2.1 *Description of Requirements*
- 2.2 *Alaska Requirements, Certification*

3. DOCUMENTATION OF DISCHARGES FROM ADVANCED WASTEWATER TREATMENT SYSTEMS

- 3.1 *Documentation Required*
- 3.2 *Documentation Received*
- 3.3 *Approvals*

4. SAMPLING

- 4.1 *Sampling Required*
- 4.2 *Sampling Data*

5. INSPECTIONS

- 5.1 *Reports*

6. COMPLIANCE

- 6.1 *Compliance with Requirements*

7. CONCLUSIONS

- 7.1 *Overall*
- 7.2 *Recommendations*

2004 Assessment of Cruise Ship Environmental Effects in Washington

TABLES

Table 1.	2004 Cruise Ships Calling to Ports in Washington
Table 2.	Washington Cruise MOU: Key Points
Table 3.	2004 Cruise Ship Vessels and Wastewater Treatment
Table 4.	2004 Approval to Discharge
Table 5.	Sample Results – Cruise Ships Discharging into Washington Waters

FIGURES

Figure 1.	Passenger Volume
Figure 2.	Map of “Waters Subject to this MOU”

APPENDICES

Appendix A	SAMPLE RESULTS
Appendix B	LETTERS OF COMPLIANCE FROM MEMBER LINES
Appendix C	ANNUAL CRUISE MEETING NOTES
Appendix D	2004 MEMORANDUM OF UNDERSTANDING, CRUISE OPERATIONS IN WASHINGTON

EXECUTIVE SUMMARY

In May 2003, the Norwegian Sun cruise ship discharged approximately 16,000 gallons of sludge into the Strait of Juan de Fuca. It launched an investigation that led the Department of Ecology to order the cruise company to not only update the ship's waste-management equipment, but also to improve documentation, training and other systems. But more importantly, the incident prompted a broader effort to address waste discharges from cruise ships in Washington waters.

After reviewing other states' approaches to cruiseship waste, the Department of Ecology (Ecology) determined that a memorandum of understanding (MOU) between the Northwest Cruiseship Association, the Port of Seattle and Ecology was an appropriate course of action due to restrictions in federal law. Specifically, the federal Clean Water Act prohibits the state from regulating discharges from marine sanitation devices.

The three parties negotiated a voluntary agreement that was signed on April 20, 2004, the day before the 2004 cruise season began. The MOU established many provisions that actually exceed federal law to ensure that water quality in Washington's marine waters is protected.

The MOU bans all cruise-ship wastewater discharges (black and gray water), except from vessels with advanced wastewater treatment systems (AWTS). These systems are being installed in cruise ships in the Alaska market in response to requirements by the state of Alaska, and they provide wastewater treatment that meets or exceeds Alaska's requirements under federal law. The MOU allows continuous discharge in Washington waters from these AWTS if stringent requirements are met.

In addition, the MOU provides for other elements:

- Sludge from any type of wastewater treatment system may be discharged only when a ship is more than 12 nautical miles from shore, and it's specifically prohibited from being discharged within a defined portion of the Olympic Coast National Marine Sanctuary.
- The MOU specifies a sampling regimen, and testing and reporting requirements, and it requires advanced notification and documentation from ships planning to discharge via an AWTS.
- Also, cruise ships will comply with Washington's more restrictive hazardous-waste laws and they will not dump garbage into state waters.

The goal of the MOU was to increase protection for Washington's marine waters from cruise-ship waste. On the whole, the MOU led to some improvements of the management of wastes during the 2004 season, demonstrating that voluntary agreements can achieve desired environmental results, but struggled in communicating the requirements of the MOU to all of the cruiseships.

Thanks to the reporting requirements included in the MOU, some areas have been identified for continued improvement in the coming cruise season. For example, the cruise companies struggled in communicating the requirements of the MOU to all of their ships, possibly because the MOU was signed only the day before the 2004 cruise season started. As a result, some ships that probably qualified for continuous discharge or discharge away from berth instead chose to

hold their wastes onboard until they were outside state waters. In addition, two incidents of unauthorized discharges have been identified, thanks to the self-reporting requirements. The Department of Ecology is following up with the companies.

Ecology anticipates that more ships will apply for continuous discharge in Washington for the 2005 season. But some cruise lines have said they will likely continue to hold treated wastewater effluent onboard while within Washington waters.

The cruise-ship MOU has resulted in several benefits to Washington's environment:

- It ensured we had a water-quality strategy in place to address the 2004 cruise season.
- It increased Ecology's understanding of the operational practices of the cruise industry and an increased the cruise industry's understanding of the environmental concerns in Washington.
- It forged a new and valuable partnership between state regulators, the cruise industry and other interested parties.
- The MOU did not lessen the state's authority to enforce Washington's water quality laws.

Admittedly, the MOU also has its limitations: it is a voluntary agreement that cannot be enforced through legal channels; not every cruise ship that travels through Washington's waters is covered by the MOU, either because it does not make a port call while in Washington waters or because it's not a member of the Northwest Cruiseship Association; air quality issues are not covered by the MOU; and lack of dedicated funding hinders Ecology's ability to monitor whether and how the MOU is implemented.

1. INTRODUCTION

1.1 Assessment Report

The purpose of this assessment report is to assess the performance of the cruise industry for environmental impacts for the 2004 cruise season. The goals of this report are:

1. Analyze the overall compliance with the Memorandum of Understanding;
2. Evaluate the performance of the advanced wastewater treatment systems; and
3. Make recommendations in relation to the matters discussed in the report.

This report also presents general background information and detailed appendices of wastewater sampling data, in response to the public interest. Bilge and ballast water issues are a maritime wide concern and are beyond the scope of this report.

1.2 Cruise Industry Operations in Washington State

Cruise ships have operated out of Seattle since 1999 and the cruise business is one of the fastest growing business segments at the Port of Seattle. In recognition of the increased demand for Alaska bound cruises, the Port added two berthing spots at Terminal 30 early in 2004. The original cruise terminal at Pier 66 has two berths. To accommodate the increased number of port calls by cruise ships, the Port has added sailings departing on Thursdays, Fridays, an occasional Monday, in addition to the traditional Saturday and Sunday departures for the upcoming 2005 season.

The economic impacts of the cruise industry to the state are measurable and not inconsequential, as can be seen from the chart below.

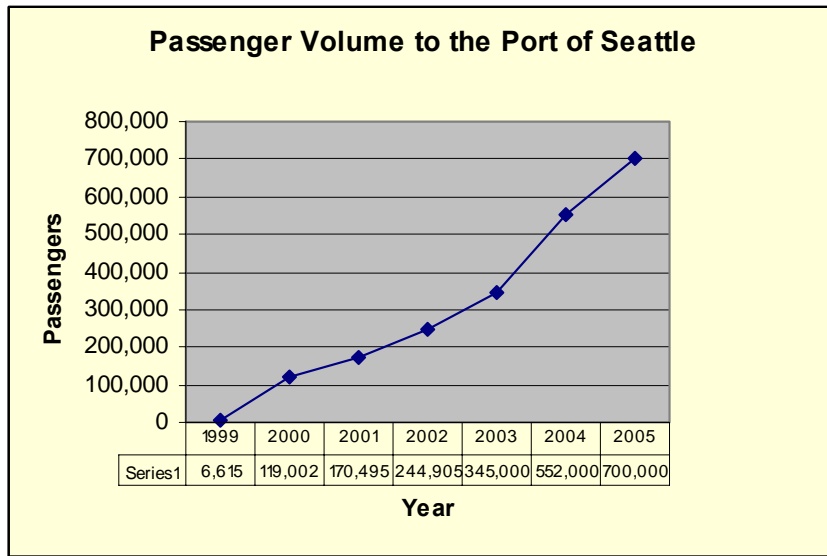
Economic Impacts of Cruise Industry to Regional Economy

Year	Jobs	Payroll	Business Revenue	Local and State Taxes
2003	1,072	\$39 million	\$124 million	\$3.8 million
2004	1,700	\$59 million	\$208 million	\$5.9 million

(From "The Economic Impacts of the 2003 Cruise Season at the Port of Seattle", Port of Seattle, and a Port of Seattle Press Release dated October 29, 2004.)

The figure below shows the increasing number of passengers enjoying Alaska-bound cruises since 1999.

Figure 1: Passenger Volume



Source: Port of Seattle Records and Port of Seattle News Release 10/29/04.
2005 values are projected estimates

Ecology has historically had little information on the environmental impacts of the cruise industry in Washington. This is due to their regulatory status under the Federal Clean Water Act (CWA). Because of the international nature of the cruise industry, cruise ships and their waste water treatment systems are excluded from many of the U.S. environmental laws and regulations that land-based industries are required to meet. The federal Clean Water Act prevents state and local governments from regulating discharges from Marine Sanitation Devices. State governments can petition for "no discharge" zones for their state waters and can thereby prohibit all discharges within those zones. The United States Coast Guard (USCG) certifies marine sanitation devices meet certain operational criteria for performance but does not monitor wastewater effluent quality. Large ships operate under MARPOL (International Convention for the Prevention of Pollution from Ships), an environmental treaty drafted by the International Maritime Organization (IMO). Annex IV of MARPOL addresses the disposal of sewage. Since the U.S. did not sign Annex IV, it is not mandatory that ships follow Annex IV in the United States...ICCL standards...

For the 2004 season, the Northwest Cruiseship Association consisted of the following member lines:

- Carnival Cruise Lines
- Celebrity Cruises
- Crystal Cruises
- Holland America Cruise Line
- Norwegian Cruise Lines
- Princess Cruises
- Radisson Seven Seas
- Royal Caribbean Cruises
- Silver Sea Cruises

In 2004, 93% of port calls were made by NWCA member ships. Table 1 below depicts the member lines, the ships visiting Washington Waters, the number of port calls and the persons on board.

Table 1: 2004 Cruise Ships Calling to Ports in Washington

2004: Cruise Ships visiting Washington Waters ²			
Vessel Operator	Vessel Name	Number of Port Calls ⁵	Total Persons on Board ¹
NWCA MEMBERS			
Celebrity Cruises	<i>Mercury</i>	12	2279
Holland America Cruise Line	<i>Amsterdam</i>	24	2107
Holland America Cruise Line	<i>Oosterdam</i>	21	2624
Holland America Cruise Line	<i>Veendam</i>	1	1854
Holland America Cruise Line	<i>Zaandam</i> ⁴	1	2080
Norwegian Cruise Lines	<i>Norwegian Star</i>	17	4000
Norwegian Cruise Lines	<i>Norwegian Sun</i>	1	3200
Norwegian Cruise Lines	<i>Norwegian Spirit</i>	20	3600
Norwegian Cruise Lines	<i>Norwegian Wind</i> ³	1	2800
Princess Cruises	<i>Diamond Princess</i>	20	3908
Princess Cruises	<i>Sapphire Princess</i>	16	3908
Princess Cruises	<i>Dawn Princess</i>	1	2850
Radisson Seven Seas	<i>Seven Seas Mariner</i>	1	1200
Silver Sea Cruises	<i>Silver Shadow</i>	3	740
NON NWCA MEMBERS			
Cruise West	<i>Spirit of Oceanus</i>	1	114
Mariser Marine	<i>Universe Explorer</i>	3	815
West Steamship	<i>Empress of the North</i> ³	6	320
TOTALS		149	Approx 552,000

¹Numbers come from the Alaska Discharge Status Report. Capacity is calculated from Registration, Vessel Specific Sampling Plan, or Juneau Cruiseship Schedule. Includes both passengers and crew. Actual number of passenger aboard varies dependent upon sales. One exception: Spirit of Oceanus, number from Cruise West = passengers

²Washington waters refers to the "waters subject to this Memorandum of Understanding (MOU)" as defined in the MOU signed April 20, 2004

³2003 information from the Alaska Discharge Status Report

⁴Called in Port Angeles

⁵Numbers come from Port of Seattle 2004 Cruise Ship Sailing Schedule

1.3 Memorandum of Understanding Summary

The Norwegian Sun May 2003 incident prompted meetings between Ecology and the Northwest Cruiseship Association as well as the Port of Seattle and other key stakeholders to work on ways to deal with discharges from cruise ships. After reviewing other state's approaches to cruiseship waste, it was determined that a Memorandum of Understanding between the Northwest Cruiseship Association, Ecology, and the Port of Seattle would be the way to go due to restrictions in Federal law. After months of meetings and many drafts, the Memorandum of Understanding (MOU) was signed April 20, 2004 a day prior to the beginning of the 2004 cruising season. The MOU and related documents are available on Ecology's website at: http://www.ecy.wa.gov/programs/wq/wastewater/cruise_mou/index.html

The MOU bans cruise-ship wastewater discharges (black and gray water), except from vessels with advanced treatment systems (AWTS). AWTS provides treatment that meets or exceeds Alaska's requirements under federal law. The MOU allows continuous discharge in

2004 Assessment of Cruise Ship Environmental Effects in Washington

Washington waters from these AWTS with stringent provisions. Sludge may only be discharged more than 12 miles from shore and not within a defined portion of the Olympic Coast National Marine Sanctuary. The MOU specifies a sampling regime, testing and reporting requirements and requires advanced notification and documentation from ships planning to discharge. The MOU also specifies that the ships will comply with Washington’s more restrictive hazardous waste laws and stipulates that garbage may not be discharged in state waters.

Table 2: WASHINGTON CRUISE MOU: Key Points

ISSUE	STATUS QUO	WASHINGTON MOU
Covered Waters	Applies to State waters (dispute concerning State jurisdiction for so-called “donut holes”).	Applies to State waters, international waters in Straits of Juan de Fuca and incorporates ICCL Provisions which extend applicability for some purposes to 12 miles from shore. [Definition of covered waters resolves dispute concerning State jurisdiction.]
Sludge Disposal	Sludge can be discharged when outside of territorial waters of U.S. and outside of waters of the State of Washington.	Prohibited unless 12 nm from shore and also prohibited within the “Area to Be Avoided” of the Olympic Coast National Marine Sanctuary.
Annual Registration	No requirements.	Notice must be given to Ecology prior to the arrival of any ship that proposes to use an Advanced Treatment System (ATS). Cruise lines will provide detailed information on the ATS in use on each ship if continuous discharge. Not currently required.
Discharge of untreated Blackwater or Graywater	Prohibited if exceed water quality standards.	Prohibited. Gray water is presently unaddressed by federal law.
Discharge of Blackwater or Graywater Treated only by a conventional Marine Sanitation Device (MSD)	Allowed.	Prohibited. This exceeds federal requirements.
Discharge of Blackwater or Graywater Treated by an ATS Approved by the US Coast Guard for Continuous Discharge	No distinction between MSD and ATS.	Permitted in all places. Port of Seattle lease agreements currently prohibit discharge from any treatment system while in Port. (ATS run best when continuous).
Mandatory Blackwater and Graywater Sampling	No requirements.	Effectively incorporates federal sampling by requiring that ATS comply with federal law. One sample required per month to be performed in Washington. Federally required sampling can be used to meet this requirement so long as done in Seattle by Ecology approved lab. In addition, must provide Ecology with copies of all sample results that are being given to Alaska. Currently not required.
Participation by Regulators in Sampling Process	No requirements.	Must provide Ecology with split samples on request. Ecology allowed on ship to observe sampling. Currently not required.
Requirements as to What Must Be Included in ATS	No requirements.	Specific requirements exceed federal law: Ultra-Violet light polishing, various monitoring equipment, storage tanks. Currently not required.
Requirements as to Operation of ATS	No requirements.	Specific requirements exceed federal law: monitoring of effluent and responding to upset conditions. Currently not required.
Vessel Inspections	None by Ecology. USCG...	Minimum of one vessel inspection for purpose of verifying operation of ATS. Currently not required.
Whole Effluent Toxicity Testing	No requirement.	Once every two years. Currently not required.
RCRA Issues	Subject to RCRA requirements of state in which hazardous waste is landed.	Ecology has right to inspect RCRA records. Cruise lines agree to comply with more restrictive State rules when offloading hazardous waste in Washington and to provide Ecology with annual reports of hazardous waste offloaded on Washington.
Non-RCRA Garbage	Subject to solid waste requirements of state or community in which garbage is	May not be discharged in State waters.

	landed. Also subject to provisions of MARPOL ANNEX IV.	
Requirement for Reporting Violations	None specifically.	Included.
Specified Fines and Penalties	No specific requirements. RCW 90.48 and Water Quality Standards apply.	Not included. RCW 90.48 and Water Quality Standards apply.
Effective Date	NA	Upon Signature.

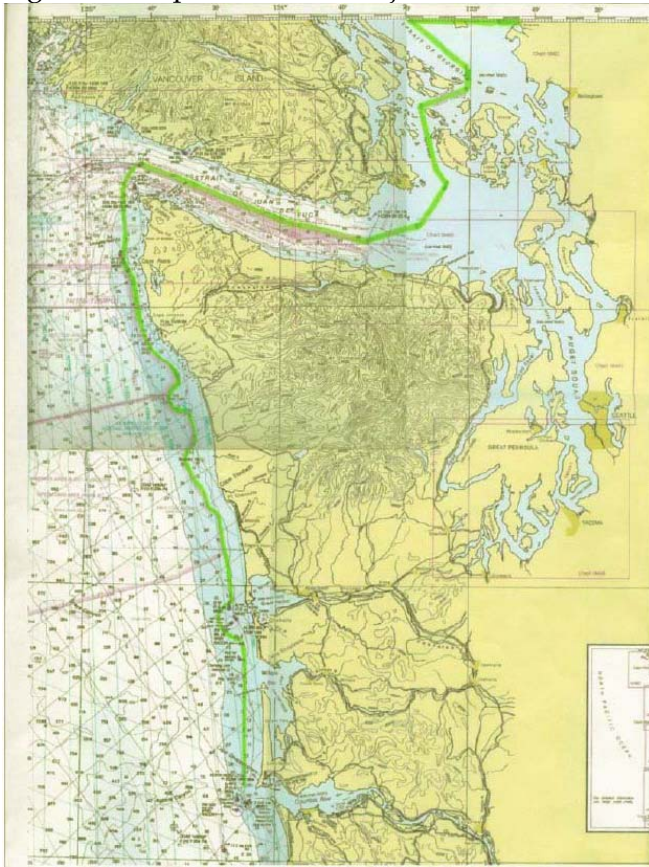
2. MOU REQUIREMENTS

2.1 Description of Requirements

Applicability of MOU:

The MOU applies to cruise ships that are part of the Northwest Cruiseship Association and only to those member ships making a call at a port in Washington. NCWA member ships that do not make a port call in Washington are not subject to the provisions of the MOU while transiting off the Washington coast. All the ships subject to the MOU are engaged in cruise itineraries greater than one-day duration. Considerable care was taken in developing the geographic area in which the terms of the MOU apply. Due to a discrepancy between how the State of Washington and the U.S. Coast Guard define “Washington waters”, areas exist where the shipping industry, as a whole, does not recognize Washington regulatory authority. This was the case in the Norwegian Sun incident. The discharge occurred more than three nautical miles off the shore of Whidbey Island so the discharge was in compliance with federal law. However, the discharge was still within Washington’s definition of “waters of the state” which reaches to the international border with Canada. The cruise industry agreed to recognize Washington’s definition of state waters for the purposes of the MOU. Consequently, the “Waters subject to this MOU” are defined as including the Puget Sound and the Strait of Juan de Fuca south of the international boundary with Canada; and for off the west coast, the belt of seas measured from the line of ordinary low water along that portion of the coast which is in direct contact with the open sea and the line marking the seaward limit of inland waters, and extending seaward a distance of three miles as illustrated in Appendix iii of the MOU. The definition of the “waters subject to this MOU” is inclusive of the marine waters of the state as defined in Washington law. See figure 2 below.

Figure 2: Map of “Waters subject to this MOU”



Wastewater Discharges:

The MOU defines “blackwater” as wastes from toilets, urinals, medical sinks and other similar facilities, and “graywater” as including drainage from dishwasher, shower, laundry, bath, galley drains and washbasin drains.

Advanced wastewater treatment systems (AWTS) are systems that meet the higher standards and testing regime as set out in federal law, Title XIV, Certain Alaska Cruise Ship Operations, Section 1404(c). The AWTS are systems such as the Zenon and Hamworthy membrane biological reactor ultrafiltration system, the Scanship biological reactor and ultrafiltration system and the Rochem reverse osmosis ultrafiltration system. Table 3 identifies the type of treatment in use during the 2004 season by NWCA member ships.

Table 3: 2004 Cruise Ship Vessels and Wastewater Treatment

Vessel Operator	Vessel Name	Blackwater (BW) Treatment System Manufacturer	Graywater (GW) Treatment System Manufacturer	Type of Treatment System
NWCA MEMBERS				
Celebrity Cruises	<i>Mercury</i>	Biopure/Rochem	Mixed with BW	AWTS: Rochem is a reverse osmosis ultrafiltration system.
Holland America Cruise Line	<i>Amsterdam</i>	Unknown	Unknown	Unknown
Holland America Cruise Line	<i>Oosterdam</i>	Rochem	Mixed with BW	AWTS: Rochem is a reverse osmosis ultrafiltration system.
Holland America Cruise Line	<i>Veendam</i>	Zenon	Mixed with BW	AWTS: Zenon is a biological reactor and ultrafiltration system.
Holland America Cruise Line	<i>Zaandam</i>	Zenon	Mixed with BW	AWTS: Zenon is a biological reactor and ultrafiltration system.
Norwegian Cruise Lines	<i>Norwegian Star</i>	Scanship	Mixed with BW	AWTS: Scanship is a biological reactor flocculation/flotation & UV disinfection system.
Norwegian Cruise Lines	<i>Norwegian Sun</i>	Scanship	Mixed with BW	AWTS: Scanship is a biological reactor flocculation/flotation & UV disinfection system.
Norwegian Cruise Lines	<i>Norwegian Spirit</i>	Scanship	Mixed with BW	AWTS: Scanship is a biological reactor flocculation/flotation & UV disinfection system.
Norwegian Cruise Lines	<i>Norwegian Wind</i>	Scanship	Mixed with BW	AWTS: Scanship is a biological reactor flocculation/flotation & UV disinfection system.
Princess Cruises	<i>Diamond Princess</i>	Hamworthy Bioreactor	Mixed with BW (except galley/laundry – no treatment)	AWTS: Hamworthy is a biological reactor and ultrafiltration system.
Princess Cruises	<i>Sapphire Princess</i>	Hamworthy Bioreactor	Mixed with BW (except galley/laundry – no treatment)	AWTS: Hamworthy is a biological reactor and ultrafiltration system.
Princess Cruises	<i>Dawn Princess</i>	Hamworthy Bioreactor	Mixed with BW (except galley/laundry – no treatment)	AWTS: Hamworthy is a biological reactor and ultrafiltration system.
Radisson Seven Seas	<i>Seven Seas Mariner</i>	Hamworthy Bioreactor	Mixed with BW	AWTS: Hamworthy is a biological reactor and ultrafiltration system.
Silver Sea Cruises	<i>Silver Shadow</i>	Biopure/Marisen	Mixed with BW	Unknown
NON NWCA MEMBERS				
Cruise West	<i>Spirit of Oceanus</i>	Unknown	Unknown	Unknown
Mariser Marine	<i>Universe Explorer</i>	Unknown	Unknown	Unknown
West Steamship	<i>Empress of the North</i>	Orca	chlorine	Macerator Chlorinating System

The MOU prohibits discharges of untreated blackwater and untreated graywater within waters subject to the MOU from any type of treatment system. The MOU also prohibits discharges of treated blackwater and treated graywater unless it is from an AWTS which meets the Alaska requirements and under the following conditions:

- The ships are allowed to discharge \geq one nautical mile away from its berth and \geq 6 knots with the submittal of documentation prior to discharge.
- The ships are allowed to discharge within one nautical mile of berth with further documentation and provisions including 24-hour continuous turbidity or equivalent monitoring, emergency shut-down for treatment upsets, and ultraviolet light disinfection immediately prior to discharge.

All ships discharging within waters subject to the MOU must: sample the effluent once per month while in Seattle using a Washington state-certified laboratory, split samples with Ecology upon request, conduct Whole Effluent Toxicity (WET) testing once every two years, provide test results provided to Alaska, notify Ecology prior to sampling, allow Ecology to conduct inspections to verify the operating condition of the AWTS and notify Ecology of any material changes made to the system.

The MOU prohibits the discharge of residual solids from the treatment system (sludge) in waters subject to the MOU, within 12 nautical miles from shore, and within the “Area To Be Avoided” off the Washington Coast of the Olympic Coast National Marine Sanctuary.

Hazardous Waste:

Per the MOU, Washington and the NWCA agreed to a uniform application procedure for the EPA national identification number in accordance with the Resource Conservation and Recovery Act (RCRA). The MOU specifies that Washington has the right to inspect all records upon request in relation to hazardous waste management. NWCA member lines shall provide an annual report regarding the total hazardous waste offloaded in Washington. NWCA agrees to comply with the guidelines for specific waste streams per Washington regulations.

Solid Waste:

The discharge of solid waste (garbage) is prohibited in waters subject to the MOU.

2.2 Alaska Requirements, Certification

The U.S. Congress enacted Title XIV – Certain Alaskan Cruise Ship Operations in December 2000. The law creates wastewater standards for vessels. The regulations to implement the law (AS 46.03.460 – AS 46.03.490 and 18 AAC 69) became effective in July 2001 and November, 2002 and are enforced by the United States Coast Guard. Under the legislation, large cruise ships may discharge blackwater and graywater in Alaska while underway and law allows continuous discharge of blackwater and graywater that meet more stringent standards through a certification process. A ship approved by the U.S. Coast Guard to discharge continuously must sample their wastewater twice per month.

All of the cruise ships subject to the Washington Cruise MOU are also subject to the Alaska requirements.

3. DOCUMENTATION OF DISCHARGES FROM ADVANCED WASTEWATER TREATMENT SYSTEMS

3.1 Documentation Required

Documentation is required for discharges from an AWTS occurring one nautical mile or more away from a ship’s berth. The ship must be moving at a speed at or greater than 6 knots. The documentation must identify the type of treatment system in use on the ship, include schematic diagrams of the system and document that the system is certified by the United States Coast Guard.

When the discharge occurs within one nautical mile of berth, cruise ship operator is required to submit the above documentation. In addition, vessel specific information on how the ship’s system meets the provision for 24-hour continuous turbidity or equivalent monitoring, documentation of system design that demonstrates emergency shut-down capacity, documentation that all treated effluent will receive final polishing with ultraviolet light

immediately prior to discharge, copies of water quality test results for the preceding six months and a vessel specific plan that identifies storage capacities and notification procedures.

3.2 Documentation Received

Documentation was received for the Norwegian Star, the Norwegian Spirit and the Holland America Oosterdam for the purpose of allowing discharge to waters subject to the MOU. Other sampling results and documentation were received for the Holland America Veendam, the Holland America Zaandam, the Holland America Volendam and the Holland America Ryndam.

Documentation was not received per requirements prior to discharge for the Holland America Zaandam and the Princess Sapphire.

Ship(s) receiving approval to discharge one mile or more from berth while traveling at a speed of 6 or more knots:

The Holland America Oosterdam submitted documentation that the system was certified by the USCG for continuous discharge in Alaska on June 2, 2004. Schematics were received for the ship on May 18, 2004. Sixty days from the receipt of the vessel specific information is July 17, 2004.

Ships receiving approval to discharge while at berth or at a distance less than one nautical mile from berth:

The Norwegian Star submitted documentation that the system was certified by the USCG for continuous discharge in Alaska on May 28, 2004. Schematics and other documentation were first provided on May 20, 2004. Ecology staff reviewed the documentation and on several occasions requested supplemental documentation due to insufficient information. On August 12, 2004, approval was given for the system per the MOU for discharges at berth or within 1 nautical mile from berth.

The Norwegian Spirit submitted documentation that the system was certified by the USCG for continuous discharge in Alaska on July 23, 2004. Schematics and other documentation were also provided. Ecology staff reviewed the documentation and on several occasions requested supplemental documentation due to insufficient information. On August 12, 2004, approval was given for the system per the MOU for discharges at berth or within 1 nautical mile from berth.

3.3 Approvals

Table 4: 2004 Approval to Discharge

Vessel Operator	Vessel Name	Discharging in Washington ¹ ≥ 1nm from berth and ≥ 6 knots		Discharging in Washington ¹ continuously (at berth or within 1 nm of berth)	
		BW	GW	BW	GW
NWCA MEMBERS					
Celebrity Cruises	<i>Mercury</i>	NO	NO	NO	NO
Holland America Cruise Line	<i>Amsterdam</i>	NO	NO	NO	NO
Holland America Cruise Line	<i>Oosterdam</i>	YES ²	YES ²	NO	NO
Holland America Cruise Line	<i>Veendam</i>	NO	NO	NO	NO
Holland America Cruise Line	<i>Zaandam</i>	NO	NO	NO	NO
Norwegian Cruise Lines	<i>Norwegian Star</i>	YES ³	YES ³	YES ⁴	YES ⁴
Norwegian Cruise Lines	<i>Norwegian Sun</i>	NO	NO	NO	NO
Norwegian Cruise Lines	<i>Norwegian Spirit</i>	YES ⁵	YES ⁵	YES ⁶	YES ⁶
Norwegian Cruise Lines	<i>Norwegian Wind</i>	NO	NO	NO	NO
Princess Cruises	<i>Diamond Princess</i>	NO	NO	NO	NO
Princess Cruises	<i>Sapphire Princess</i>	NO	NO	NO	NO
Princess Cruises	<i>Dawn Princess</i>	NO	NO	NO	NO
Radisson Seven Seas	<i>Seven Seas Mariner</i>	NO	NO	NO	NO
Silver Sea Cruises	<i>Silver Shadow</i>	?	?	?	?
NON NWCA MEMBERS					
Cruise West	<i>Spirit of Oceanus</i>	?	?	?	?
Mariser Marine	<i>Universe Explorer</i>	?	?	?	?
West Steamship	<i>Empress of the North</i>	?	?	?	?
BW=Black Water; GW=Gray Water 1Washington waters refers to the "waters subject to this Memorandum of Understanding (MOU)" as defined in the MOU signed April 20, 2004 2Allowed as of 7/17/04 3Allowed as of 8/12/04 4Allowed as of 8/12/04 5Allowed as of 8/12/04 6Allowed as of 8/12/04 ?=unknown					

4. SAMPLING

4.1 Sampling Required

Alaska requires twice-monthly sampling of conventional pollutants. Per the MOU, the cruise lines are required to sample the quality of the treated effluent using a Washington state-certified laboratory at least one time per month while at port in Seattle during each cruise season. The cruise lines must use the sampling requirements established per the USCG, Captain of the Port, Southeast Alaska Policy for conventional pollutants continued compliance monitoring regime. Parameters sampled include pH, Biochemical Oxygen Demand (BOD), Fecal Coliform, Total Suspended Solids (TSS), and Residual Chlorine (RC).

Whole Effluent Toxicity (WET) testing is required once every 2 years. WET testing guidelines were developed specifically for cruise ships by Ecology and are available on Ecology's website on cruise ships.

http://www.ecy.wa.gov/programs/wq/wastewater/cruise_mou/wet_testing_guide_6-3-04.pdf

4.2 Sampling Data

Sampling results were received for the cruise ships that discharged in waters subject to the MOU, the Norwegian Spirit, the Norwegian Star, and the Holland America Zaandam as well as for ships that did not discharge including the Norwegian Sun, Holland America Oosterdam, the Holland America Veendam, the Holland America Volendam, and the Holland America Ryndam. Sampling results were compared to the limits established by Alaska, the Washington Cruise MOU and are also compared to Washington’s water quality standards. Sampling results are summarized for all data received in Appendix A.

The Norwegian Spirit, the Norwegian Star, the Princess Sapphire and the Holland America Zaandam were the only ships that reported discharges during the 2004 season. The Norwegian Spirit began discharging on August 14, 2004. The Norwegian Star began discharging on August 15, 2004. The Holland America Zaandam only discharged on May 13, 2004. The Princess Sapphire discharged from the AWTS throughout the season starting June 11, 2004 and discharged untreated galley/laundry gray water from June 11, 2004 through June 13, 2004. Table 5 below shows the results for the cruise ships that discharged into Washington waters.

Princess cruises had submitted testing data related to galley/laundry gray water to the Alaska Department of Environmental Conservation (ADEC) for 2001 and 2002. The data shows that at that time, the untreated effluent consisted of high fecal coliform (> 1 million colony forming units per 100 ml), high biochemical oxygen demand (BOD >1000 mg/l), high total suspended solids (TSS > 500 mg/l) and low pH (< 5 standard units). No samples were taken of the galley/laundry gray water from the Princess Sapphire near the time of the unauthorized discharge. Princess Cruises has agreed to take samples and submit results from the Princess Sapphire untreated galley/laundry graywater discharge. Results will be included on Ecology’s cruise discharge website.

For the ships that discharged from the AWTS’s, the results were in compliance with the Washington MOU and Alaska limits. However, when the samples were compared to Washington’s water quality standards, pH and fecal coliform were exceeded. The discharges from the cruise ships does not account for a mixing zone. On land sewage treatment plants do have mixing zones. The results from the cruise ships are of a far better quality than most of the on-land plants.

Table 5: Sample Results – Cruise Ships Discharging into Washington Waters

SHIP: NORWEGIAN SPIRIT		AK cert	7/23/04	Start date of discharges in WA: 8/14/04			
		pH	BOD	TSS	Chlorine Residual	Fecal Coliform	Comments
		St. Units	mg/l	mg/l	mg/l	#/100 ml	
MOU/Alaska Limits¹		6-9	30/45	30/45	10ug/l	20/40	
WA State Water Quality Standards²		6.5-9.0	NA	NA	NA	14/43	
Sample Date	Location/ Lab						
8/3/04	JUN/SGS	7.00	5.4	3.4	ND	ND	

2004 Assessment of Cruise Ship Environmental Effects in Washington

8/10/04	JUN/Analytica TWW	7.75	14.0	ND	ND	2	
8/10/04	JUN/Analytica WW	7.70	14.0	ND	ND	ND	
8/14/04	SEA/NCA (DOE)	6.84	6.1	ND	0.2	ND	pH and chlorine field results
8/14/04	SEA/Laucks	6.3	9	10	ND	ND	
8/24/04	JUN/SGS	7	16	3.4	ND	ND	
9/7/04	JUN/SGS	6.5	ND	8.4	ND	ND	
9/18/04	SEA/Laucks	6	ND	2	ND	ND	
9/20/04	JUN/SGS	6	2.2	5.8	ND	ND	
	MINIMUM	6.00	ND	ND	ND	ND	
	AVERAGE		7.4	3.7	0.02		
	MAXIMUM	7.75	16.0	10.0	0.2	2	
	GEOMETRIC MEAN					1	

SHIP: NORWEGIAN STAR		AK cert	5/27/04	Start date of discharges in WA: 8/15/04			
		pH	BOD	TSS	Chlorine Residual	Fecal Coliform	Comments
		St. Units	mg/l	mg/l	mg/l	#/100 ml	
MOU/Alaska Limits¹		6-9	30/45	30/45	10ug/l	20/40	
WA State Water Quality Standards²		6.5-9.0	NA	NA	NA	14/43	
Sample Date	Location/ Lab						
8/3/04	JUN/SGS	7	5.4	3.4	ND	ND	
8/10/04	JUN/Analytica	7.49	3	ND	ND	ND	
8/29/04	SEA/Laucks	6.3	ND	9	ND	20	fecal = <20
9/7/04	JUN/SGS	7	ND	2.5	ND	ND	
9/21/04	SEA/Laucks	6.1	6	1	ND	ND	
	MINIMUM	6.10	ND	ND	ND	ND	
	AVERAGE		2.9	3.2	ND		
	MAXIMUM	7.49	6.0	9.0	ND	20	
	GEOMETRIC MEAN					2	

SHIP: HOLLAND ZAANDAM		AK cert	4/22/04	Start date of discharges in WA:			5/13/04 Only
		pH	BOD	TSS	Chlorine Residual	Fecal Coliform	Comments
		St. Units	mg/l	mg/l	mg/l	#/100 ml	
MOU/Alaska Limits¹		6-9	30/45	30/45	10ug/l	20/40	
WA State Water Quality Standards²		6.5-9.0	NA	NA	NA	14/43	
Sample Date	Location/ Lab						
5/17/04	JUN-Analytica	7.74	ND	ND	ND	ND	
5/24/04	JUN-Analytica	8.24	ND	ND	ND	ND	
5/24/04	JUN-Analytica	8.18	ND	ND	ND	ND	Unannounced Sampling
	MINIMUM	7.74	ND	ND	ND	ND	
	AVERAGE		ND	ND	ND		
	MAXIMUM	8.24	ND	ND	ND	ND	

2004 Assessment of Cruise Ship Environmental Effects in Washington

	GEOMETRIC MEAN					ND	
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SHIP: PRINCESS SAPHIRE							
		AK cert	6/9/04	Start date of discharges in WA: 6/11/04			
		pH	BOD	TSS	Chlorine Residual	Fecal Coliform	Comments
		St. Units	mg/l	mg/l	mg/l	#/100 ml	
MOU/Alaska Limits¹		6-9	30/45	30/45	10ug/l	20/40	
WA State Water Quality Standards²		6.5-9.0	NA	NA	NA	14/43	
Sample Date	Location/ Lab						
6/23/04	Not known	7.74	9.4	ND	ND	ND	
6/30/04	Not known	7.36	5.5	ND	ND	ND	
6/30/04	Not known	7.61	6.3	2.0	0.05	1	Unannounced ADEC
7/14/04	Not known	7.34	20.0	ND	ND	4	
7/28/04	Not known						
8/4/04	Not known	7.45	3.3	2.0	0.05	1	Unannounced ADEC
8/18/04	Not known	7.02	29.5	ND	ND	ND	
9/1/04	Not known	7.64	20.8	ND	ND	ND	
9/8/04	Not known	6.74	ND	ND	ND	2	
	MINIMUM	6.74	ND	ND	ND	ND	
	AVERAGE		11.9	0.5	0.01		
	MAXIMUM	7.74	29.5	2.0	0.05	4	
	GEOMETRIC MEAN					1	

ND = Non Detect

¹MOU/Alaska limits from Title XIV, Certain Alaska Cruise Ship Operations, Section 1404(c) /40CFR 133.102

BOD and TSS: 30-day average shall not exceed 30 mg/l, 7-day average shall not exceed 45 mg/l

Fecal Coliform: geometric mean of any 30-day period shall not exceed 20 fecal coliform/100 ml and not more than 10% of the samples exceed 40 fecal coliform/100 ml

²Washington State Water Quality Standards for Surface Waters of the State of Washington Chapter 173-201A WAC

Fecal Coliform: shall not exceed a geometric mean of 14 colonies/100 ml and not more than 10% of a samples shall exceed a geometric mean of 43 colonies/100 ml

pH: 7-8.5 with a human-caused variation within less than 0.5

5. INSPECTIONS

5.1 Reports

An inspection of the Norwegian Spirit was conducted on August 14, 2004 by Ecology staff. The inspection included a walk through of the treatment system, sampling of the treated effluent and discussion. Samples were pulled and sent to a Washington State accredited laboratory for BOD, TSS, and fecal coliform. pH and chlorine were checked while on ship, per the ships equipment. The results for all samples pulled are included in Table 5.

6. COMPLIANCE

6.1 Compliance with requirements

The Holland America Zaandam discharged in waters subject to the MOU on May 13, 2004. The discharge was not allowed per the MOU. The incident was reported on May 18, 2004 upon discovery of the unauthorized discharge which took place during a port call in Port Angeles. Holland America followed-up the phone report with a written report, received May 18, 2004, detailing the incident as well as with sampling results. Upon request, more detail was provided per e-mail including details of instructions given to ships on where and when they are allowed to discharge. The discharge was treated mixed black and gray effluent from a Zenon treatment system, which is one of the advanced wastewater treatment systems and is certified for continuous discharge in Alaska. Sample results from around the time of the discharge were within the limits specified in the MOU. This port call to Port Angeles was reportedly the only port call to a port other than Seattle. The discharge occurred without submitting the appropriate paperwork to achieve approval for continuous discharge. The MOU, as presently written, also applies only to wastewater discharges for ships calling to the Port in Seattle.

The Princess Cruises M.S. Sapphire discharged treated effluent from the Hamworthy AWTS throughout the season away from shore and discharged untreated gray water that consisted of galley and laundry water only during its inaugural sailing between Seattle and Victoria in June. These incidents were discovered upon reviewing the discharge records and plotting them out in December of 2004. The Princess Sapphire discharged from the AWTS throughout the 2004 season and discharged the untreated galley/laundry gray water from June 11, 2004 through June 13, 2004. The M.S. Sapphire uses a Hamworthy membrane bioreactor with ultraviolet disinfection and is certified for continuous discharge in Alaska. The galley/laundry waste streams are not included in the Hamworthy system due to capacity issues. Princess cruises had submitted testing data related to galley/laundry gray water to the Alaska Department of Environmental Conservation (ADEC) for 2001 and 2002. The data shows that at that time, the untreated effluent consisted of high fecal coliform, high biochemical oxygen demand, high total suspended solids and low pH. No samples were taken of the galley/laundry gray water from the Princess Sapphire near the time of the unauthorized discharge. Princess Cruises self-reported the incidents (although not immediately as required by the MOU) to Ecology and submitted a report and other documentation that was requested including written reports detailing the incidents and corrective actions taken or to be taken, sample results, and other requested documentation. Ecology staff met with Princess Cruises staff per their request on January 10, 2005 to discuss the incidents. The incidents probably would not have been discovered except for the comprehensive review that Princess Cruises initiated to verify compliance with the MOU. The Princess Diamond, which made more port calls than the Sapphire, nor the Princess Dawn, with one port call, did not have any incidents. At the beginning of the season, the ships were instructed not to discharge wastewater (mixed or gray) and to hold. The ships have a spreadsheet system that shows the requirements for the MOU. Princess Cruises believes that the incidents occurred because the staff did not understand the requirements and thought that either the Alaska requirements were also to be used in Washington waters or that the requirements in place prior to the MOU were the ones to be followed. The unauthorized discharges occurred while away from shore and not while at port. Communication issues may have also played a role with the lack of understanding of the

requirements. Reviewing discharge records after each voyage, training, technical assistance, and color-coded charts were some of the corrective actions being considered.

Letters detailing compliance with the MOU from member lines are included in Appendix B.

The hazardous waste regulations in Washington are more complex than most states, and the cruise industry has a number of hazardous waste materials that they use on board. It appears that the cruise industry has a good handle on the various requirements and manages the waste streams well. There were no incidents of non-compliance of the MOU that were reported to Ecology as related to hazardous waste.

7. CONCLUSIONS

7.1 Overall

Very few cruise ships discharged during the 2004 cruise ship season. This is partly due to the fact that newer ships were brought to the Seattle-Alaska route and had not gone through the whole Alaska certification process. Some of the ships that have achieved Alaska certification have not yet made updates to their systems to achieve approval per the MOU.

The MOU specifies that all of the parties agree to at least one annual meeting to review the effectiveness of the MOU, if feasible during October each year. The annual meeting was held on November 29, 2004. The Port of Seattle, the Department of Ecology, the Puget Sound Clean Air Agency, and representatives from the Northwest Cruiseship Association and some of its member lines (Princess Cruises, Holland America Line, Carnival Cruise Line, and Celebrity Cruises) convened for the meeting. Agenda items included 2004 Operations summary, Compliance documentation, marine sanctuaries, cost recovery, 2005 Operating schedules, air emissions update, tribal issues, and amendments to the MOU. The meeting notes are included in Appendix C. Action items included continuing on working out budget and funding issues, distribution of sample compliance letters, submittal of compliance letters by member lines, setting up a work session with the marine sanctuary group and the cruise industry, and preparing draft amendments to the MOU regarding including all port calls in the MOU and specifying end of season documentation requirements.

Advantages to the MOU include having something in place to protect water quality and timely (for the 2004 season), building a partnership with the cruise industry and other key stakeholders, and the State's authority is not lessened. Limitations of the MOU include the inability to effectively enforce on what is essentially a voluntary agreement, the lack of coverage under the MOU for large passenger ships that are not members of the Northwest Cruiseship Association, air quality issues are not currently covered in the MOU, and lack of funding outside of currently informal agreements to cover Ecology's costs.

The disposal of sludge from cruiseships, although outside of Washington's waters of the state, is of concern in that sludge has the potential of being used in a more beneficial way. Most on land treatment systems treat their sludge for usage to be applied on land for agronomic soil amendments, or it is turned into compost for widespread use.

7.2 Recommendations

1. The Department of Ecology recommends that the MOU continue to be used as an immediate step to manage discharges from cruise ships. It's likely that more ships will request continuous discharge approval during the 2005 season, and provide more opportunity for more inspections by Ecology.
2. Ecology recommends that every ship that discharges in waters subject to the MOU in 2005 should be inspected by Ecology staff, including closely looking at record-keeping as well as how the systems are operating.
3. Ecology recommends that the cruise industry develop a more established training protocol for crew members who operate treatment systems (e.g., set hours of classroom time and set hours of supervised system training) or establish a certification program.
4. Ecology recommends that options for potentially treating sludge to produce biosolids be discussed with the cruise industry during the next cruise season or at the next annual meeting.
5. Ecology recommends using ambient water-quality monitoring to analyze the effect of discharges where the ships dock or out where cruise ships regularly discharge. The question of who would lead, conduct and pay for the monitoring needs to be discussed by Ecology, the cruise industry and the port authorities.
6. Ecology recommends operating under the MOU for another year to evaluate its effectiveness. While a state law may be able to overcome some of the MOU's limitations, such as the lack of enforceability of the MOU, it needs to be consistent with the federal law that prohibits state regulation of discharges from marine sanitation devices.