



THE STATE  
of **ALASKA**  
GOVERNOR SEAN PARNELL

Department of Environmental  
Conservation

OFFICE OF THE COMMISSIONER

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January 8, 2013

The Honorable Charlie Huggins  
President of the Senate  
Alaska State Capitol  
Juneau, AK 99801-1182

The Honorable Mike Chenault  
Speaker of the House  
Alaska State Capitol  
Juneau, AK 99801-1182

Re: Cruise Ship Wastewater Discharge, Preliminary Report to the Legislature

Dear President Huggins and Speaker Chenault:

The legislature passed House Bill (HB) 134 (copy enclosed) in 2009 authorizing the Department of Environmental Conservation (DEC or Department) to grant cruise ships limited relief from a requirement that the vessels treat their wastewater effluent to meet all Alaska water quality standards "at the point of discharge." This requirement, which is more stringent than requirements for other wastewater dischargers in the State, had come into effect as the result of a 2006 voters' initiative, but as of 2009, the cruise ship companies were not meeting this rigorous standard, at least not for certain pollutants. There were questions whether cruise ships could meet the initiative's requirements in the foreseeable future, either through enhancements to their existing treatment systems or by employing emerging technologies.

To examine this, HB 134 directed the Department to establish a Cruise Ship Science Advisory Panel (SAP or panel) and, in consultation with that panel, submit preliminary and final reports to the legislature about cruise ship wastewater treatment. The requirements of HB 134 were primarily codified in AS 46.03.462 and .464. This letter and enclosures serve as the "preliminary report" (enclosed) required by AS 46.03.464.

As required by AS 46.03.464(c), the preliminary report summarizes: (1) the methods of pollution prevention, control, and treatment in use and the level of effluent quality achieved by commercial passenger vessels; (2) additional economically feasible methods of pollution prevention, control, and treatment that could be employed to provide the most technologically effective measures to control all wastes and other substances in the discharge; and (3) the environmental benefit and cost of implementing additional methods of pollution prevention, control, and treatment identified.

#### **Science Advisory Panel Process**

The Department convened the eleven-member science panel in late 2009. As required by AS 46.03.464(a), the panel includes members from a coastal community (someone with experience in domestic wastewater management); the cruise ship industry; the commercial fishing industry; and a nongovernmental organization with an interest in water quality matters. The panel members come from different Alaska communities, with some members from other countries. Panel members have expertise in wastewater plant design and operation; wastewater engineering and science; ship engineering, design and construction; environmental science; shipping economy; fisheries; or environmental policy. The Department has been fortunate to have the research and advice of such a dedicated, strong and technically competent panel.

The panel has met fifteen times and held one public workshop. All meetings were publicly noticed, open to the public, and included the opportunity for the public to comment. A contractor facilitated the meetings and the panel work. The Department provided financial and technical support to the panel. The Department's support included providing reports and data from the Department's vast body of historical information; summarizing large amounts of effluent and water quality data; and answering panel member questions about the data and state law. As required by AS 46.03.464(b)(2), the panel hosted a public technical workshop on September 20, 2012. Handouts and summaries from the panel meetings may be found at: [http://dec.alaska.gov/water/cruise\\_ships/SciencePanel/index.htm](http://dec.alaska.gov/water/cruise_ships/SciencePanel/index.htm).

### **Science Advisory Panel Assistance**

The role of the panel has been to assist and advise the commissioner in the analyses and preparation of the preliminary and final reports. The statute does not require the panel to produce specific deliverables. The panel elected to provide consultation, assistance, and advice to DEC through their meetings and then summarize their analyses, conclusions and findings in a preliminary report to the commissioner. The panel's report, dated November 1, 2012, is an attachment to the Department's enclosed preliminary report to the legislature.

At its meetings, panel members listened to presentations delivered by state and federal government officials, ship builders, academic scientists, economists, and wastewater engineers, and engaged them in discussions. The Department and panel members went onboard a cruise ship and looked at wastewater systems. They talked directly with vessel managers and crew about installing, maintaining and operating advanced wastewater treatment systems. They also inquired about retrofitting vessels with new or add-on systems. They learned about and discussed the complexity of managing onboard wastewater treatment methods; state water quality criteria and how they apply to the cruise ship industry; detailed explanations about wastewater dilution studies; and the many varied sources of pollutants that can become a part of a vessel's waste stream. During the statutorily required public technical workshop, Department staff, panel members, and the general public had the opportunity for one-on-one interaction with visiting vendors and manufacturers of Advanced Wastewater Treatment Systems (AWTS).

The presentations and meetings helped panel members develop a solid foundation of the regulatory requirements; the challenges of wastewater treatment onboard ships; capabilities of existing and emerging treatment systems; economic issues associated with retrofitting existing ships; the quality of current discharges; and the relationship of wastewater discharges to the marine environment.

Panel members benefitted from public statements and from the one-on-one discussions. Public input has been constructive and prompted further work by the panel and Department which has been incorporated into the panel's and Department's reports.

### **Preliminary Findings**

Both the panel's and the Department's findings in this report are labeled as "preliminary." As described below, it is very speculative that any new technologies will emerge by 2015 that will be able to produce treated wastewater that meets all of the Alaska water quality standards "at the point of discharge." As is pointed out in the panel's and Department's reports, there is a significant question of how much net environmental benefit would be gained by switching from an existing ATWS on a vessel to a new treatment system, even if it was otherwise feasible to make the change.

With assistance and advice from the science advisory panel, the Department's preliminary findings for each of the three tasks mandated by HB 134 (AS 46.03.464(c)) follow:

1. **“the methods of pollution prevention, control, and treatment in use and the level of effluent quality achieved by commercial passenger vessels” (AS 46.03.464(c)(1))**

AWTS were designed to meet required criteria for conventional pollutants (i.e. biochemical oxygen demand, fecal coliform bacteria, and total suspended solids) and are the most advanced, effective, and proven treatment systems available. When compared to municipal treatment plants discharging to marine waters in Alaska, the AWTSs in operation on discharging cruise ships are significantly more effective than most municipal systems.

There are a variety of advanced wastewater treatment systems (manufactured by Hamworthy, Scanship, Ovivo, Zenon, Hydroxyl, Hamman, Hammon/Lazarus, ROCHEM, Marisan, and Triton) on board now, or that have been used since 2003. After evaluating all brands of AWTS currently installed on cruise ships operating in Alaskan waters and a large volume of wastewater analytical data, the panel found that, of those treating mixed blackwater and graywater, the AWTS could consistently meet Alaska’s marine water quality criteria at the point of discharge for all pollutants other than ammonia and dissolved copper, dissolved nickel, and dissolved zinc. The Department concurs with this finding.

2. **“additional economically feasible methods of pollution prevention, control, and treatment that could be employed to provide the most technologically effective measures to control all wastes and other substances in the discharge” (AS 46.03.464(c)(2))**

The panel sought technical and cost information from vendors for potential treatment technologies. The panel looked at supplementing or replacing existing AWTS with other known treatment technologies which could be expected to further reduce ammonia and dissolved metal concentrations, such as nitrification, ion exchange (IX), and reverse osmosis (RO). The panel was unable to identify technologically effective and economically feasible treatment methods capable of consistently meeting all numeric water quality criteria at the point of discharge and that have been proven effective on ships.

The panel identified life cycle costs – direct and indirect capital costs; annual operations and maintenance; and net present value of these costs – as the preferred method to evaluate the economic feasibility of installing and implementing additional treatment methods that could meet water quality criteria at the point of discharge. However, the panel was unable to perform a life cycle analysis since no commercially available additional treatment methods were identified, and no detailed cost estimates were provided in response to vendor information requests or surveys of cruise line operators conducted by the panel. While the panel concluded that there could, in the future be potential improvements to the quality of the effluent, they did not have sufficient financial data from the companies to determine if the companies could “afford” additional control or treatment technologies.

The panel also evaluated the economic characteristics of the cruise ship industry in order to gain an understanding of how costs could influence where in the world cruise ship operators deploy their ships; passenger traffic; or passenger purchases whether on board or in Alaskan communities. There are no readily available new technologies or methods that will result in cruise ship’s consistently meeting water quality criteria at the point of discharge for ammonia, copper, nickel, and zinc. The Department concurs with this preliminary finding. The Department also recognizes that adapting emerging technologies from other industries to cruise ships presents significant feasibility challenges, and therefore additional methods will not be readily available to consistently use on cruise ships in the near future. The Department has substantial doubt whether any new system that

could meet all water quality criteria at the point of discharge could become commercially available, much less installed on large commercial passenger vessels operating in Alaska, before the 2016 cruise season.

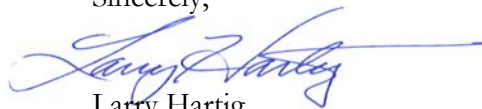
**3. “the environmental benefit and cost of implementing additional methods of pollution prevention, control, and treatment identified” (AS 46.03.464(c)(3))**

The panel identified little additional environmental benefit to be gained by further work to bring cruise ships into compliance with the water quality criteria for ammonia, copper zinc and nickel at the point of discharge. Aquatic organisms, including fish and marine mammals, and human health are protected through provisions in the current cruise ship General Permit that restrict the location of discharge and when ships must be underway before they discharge.

A dilution model developed by the first Alaska Cruise Ship Wastewater Science Advisory Panel and dye studies conducted by EPA demonstrate that concentrations in the ocean lower than the water quality criteria are attained within seconds following AWTS discharge from a vessel traveling at 6 knots or greater. Therefore acute and chronic exposures to aquatic life or humans would not occur. Similar dilution modeling is used for permitting other wastewater discharges.

The panel concluded that given the current quality of effluent and the very large dilution factors there would be little, if any, demonstrable environmental benefit in requiring cruise ships to adopt, in the future, potential additional treatment methods. The Department concurs.

Sincerely,



Larry Hartig  
Commissioner

cc: Kirsten Waid, Senate Secretary  
Suzi Lowell, House Chief Clerk

Enclosures:

House Bill 134

Department of Environmental Conservation, Preliminary Report to the Legislature, Cruise Ship Wastewater  
Cruise Ship Wastewater 2009-2012 Science Advisory Panel Preliminary Report