OCEANUS ALASKA
MARINE ENVIRONMENTAL SERVICES

PO Box 211470
Auke Bay, Alaska 99821
TEL (907) 957-2277

To: **Mr. Larry Hartig** 17 January 2013
Office of the Commissioner
Alaska Department of Environmental Conservation
410 Willoughby Avenue, Suite 303
Juneau, Alaska 99811-1800

Re: **Dissent** to ADEC Cruise Ship Science Panel Preliminary Report Selected Findings

Dear Commissioner Larry Hartig:

Thank you for appointing me to the State of Alaska Cruise Ship Wastewater Science Advisory Panel. I have the highest regard for the panelists with whom I serve, and appreciate the efforts of the contractors and ADEC staff to shepherd us through our challenging tasks.

In response to HB 134, the Panel has provided the Department with a **Preliminary Report** which addresses methods of pollution prevention, cruise ship effluent toxin levels discharged in Alaskan waters, current and future technology and methods which may be used for ship pollution reduction and the environmental benefits to Alaska's exceptionally productive marine waters of reducing toxins in cruise ship effluent.

As with any diverse science panel, however, the Preliminary Report does not fully contain the perspective of each member, nor their constituencies. In this case, I must convey that there are sections of the report to which I take exception, and some findings with which I strongly DISAGREE. I expressed my concerns to my fellow panel members during our meetings, and respect their diverse views. But in some cases, only the majority voice was expressed in our report.

With the stakes for protecting our superlative marine ecosystem and our "Wild (clean) Alaska" brand being so high, and the fact that your ADEC staff have emphasized points from the panel's preliminary report in their ADEC report the legislature with which I stridently disagree, I must alert you of my dissent to selected findings contained therein.

Specifically, **I DO NOT CONCUR** with statements from the report findings highlighted in the Executive Summary, as follows:

1. Paragraph 7 "Aquatic organisms, including fish and marine mammals, are protected through the cruise ship General Permit."

Comment: this is not accurate. Data provided in Table 19 of the report indicates that the effluent concentrations of the toxins of concern, ammonia, zinc, nickel and copper discharged by vessels under the GP from 2008-2009 exceeded the WQC allowable concentration by six to 160 TIMES, and in some cases discharged effluent exceeded ambient (natural) levels for these constituents in seawater by 90 to OVER 7,500 TIMES . The permitted levels in the GP allow ships to discharge effluent along their transit routes which has ***5 to 143 times higher concentration of heavy metals and ammonia*** *than the WQC protective standards. Moreover, the GP allows discharge of these constituents at levels that are 63 to 6,809 times higher than ambient, or natural background levels. Alaska WQC are based upon USEPA acute and chronic toxicity levels affecting marine life. Since the GP allows for vessels to discharge effluent containing (much) higher levels of toxins than the WQC protective levels, the statement that fish and aquatic organisms are protected under the GP is* ***not*** *accurate.*

Whether vessels discharge in Alaskan ports, or in a "continuous" or "underway" discharge mode along their routes in coastal Alaska, the effluent toxin levels from individual vessels under the GP exceed US EPA standards for aquatic life. These are not safe levels of heavy metals and ammonia for Alaskan marine life, and the cumulative effects of many vessels (up to six or more per day) using the same port or route likely increases the total concentration, volume of contaminated effluent and duration of exposure to marine organisms in the upper 10 meters of the water column. Therefore, the General Permit allowable levels for the cruise ship effluent discharge in Alaskan marine waters for in-port, continuous discharge or underway discharge greatly exceed USEPA identified safe levels for marine aquatic life, do not take into account short and long term cumulative effects and ARE ***NOT*** *PROTECTIVE OF AQUATIC ORGANISMS, FISH OR MARINE MAMMALS.*

Wild Salmon It is particularly noteworthy to observe the effects of one of the constituents of concern on one key species in the Alaskan marine ecosystem and cultural life: the Pacific salmon. Subsequent to the development of US EPA acute and chronic criteria for marine life, dozens of studies have illuminated the highly toxic effects of copper at very low levels to Pacific salmonids. ***For example, juvenile coho salmon and steelhead olfactory neurosensory organs are damaged or destroyed at copper levels as low as 2 ppb, in the first few minutes of exposure (Baldwin et al 2003).*** *Steelhead and Chinook alevin, parr and smolts are highly sensitive to copper and zinc in freshwater, with studies showing 50% lethal (96-hour LC50) effects at copper levels from 17-38 ppb and zinc 93-815 ppb (Chapman 1978).*

Salmon immune responses, ability to escape predation, migratory navigation and overall health are significantly impaired at 2 ppb copper, and levels as low at 10 ppb incur further impacts to salmon survival. Authors concluded that "… short term influxes of copper to surface waters may interfere with olfactory-mediated behaviors that are critical for the survival and migratory success of wild salmonids." According to the National Oceanic and Atmospheric Association, all of Alaskan state waters offshore from Metlakatla to beyond Barrow out to three nautical miles are considered essential fish habitat for salmonids. Due to the critical importance of this key species to the marine foodweb and to Alaskan communities and our economy, the lethal and sublethal effects of the invisible copper effluent emitted by ships must not be overlooked. Considering that significant, quantifiable lethal effects on salmon occur at levels half of that

established under the WQC and at levels far lower than GP permitted levels for copper, it seems imperative that we earnestly consider all means to protect salmon habitat from the effects of copper in effluent.

2. Paragraph 9 "A dilution model developed by the first Alaska Cruise Ship Wastewater Science Advisory Panel and dye studies conducted by EPA demonstrate that concentrations lower than the Water Quality Criteria were attained within seconds following AWTS discharge and that acute and chronic exposures would not occur."

Comment: Cruise ship regulations are based upon performance in attaining WQC or permitted effluent levels at the point of discharge, not in the context of dilution models and mixing zones. Both dilution modeling and the dye study were conducted under a number of very specific and narrow assumptions about vessels used 10-15 years ago, with their effluent characteristics and simplistic receiving waters assumptions.

Unique features of coastal Alaskan oceanographic conditions – with highly variable salinity, temperature and mixing conditions in fjiords, estuaries, bays and open water areas – were not adequately considered in the model estimating dilution through mixing, diffusive and other processes. The fact that our highly stratified watercolumn has pycnoclines and haloclines which form strong barriers to vertical mixing brings into question the model "demonstration results" that the entire water column is nearly instantaneously and homogeneously mixed with the addition of thousands of gallons of cruise ship effluent on a daily and repeated basis.

The buoyant, low-saline upper surface waters in Alaska comprises the sunlit photic zone where vital biological processes such as primary production of phytoplankton, growth and foraging by zooplankton, juvenile fish aggregate, and where seabirds and marine mammals forage during the very compressed summer season. Dozens of scientific studies have shown that copper at very low levels impairs growth, development and reproduction or is lethal to marine and aquatic life such as algae, clams, plankton, abalone, and fish (Eisler 1998) .

We must cautiously reject estimations of overly simplistic models that suggest rapid toxin dilution in the critical surface environment. Fresh water does not readily mix with colder, saltier deep water, therefore ship effluent likely remains in upper surface layers of the ocean for prolonged periods of time. Migrating salmonid juveniles and myriad young life stages of other organisms use this environment almost exclusively in summer, and the risk of underestimating the impact of exposure to toxins on these species has deep ecological degradation implications which may be overlooked under such simple model scenarios.

3. Paragraph 12 "The Panel identified little additional environmental benefit to be gained by lowering the current permitted effluent limits to Water Quality Criteria at the point of discharge.

Comment: The Panel acknowledged repeatedly that WQS are based upon scientifically derived USEPA Aquatic Toxicity testing, and set at limits to protect aquatic life. It was therefore clear

that an environmental benefit would be gained by lowering permitted effluent limits to WQC to protect the aquatic foodweb that supports wild salmon, plankton, herring, crab, whales, seabirds and other organisms from toxic levels of ammonia, copper, zinc and nickel in cruise ship effluent.

In addition to these comments on specific points in the SAP Preliminary Report, it need be recognized that input from many members of the Alaskan public and vendors to the panel and to ADEC was not sufficiently addressed. Thoughtful comments on technology, environmental benefits and economic feasibility and other input was contributed, and not addressed in the SAP Preliminary Report or in ADEC's report to the Legislature. Examples of two letters received but not addressed in discussion or the report from Oceana and the Southeast Alaska Conservation Council are attached.

I strongly encourage you to withhold from downgrading Departmental or State policy based upon the panel's preliminary report. Rather, incentivize performance based technological solutions to improving sustainable stewardship practices through maintaining high standards for clean cruise ship effluent at the point of discharge.

Alaska's wild salmon foodweb supports our commercial fisheries, subsistence fisheries, sport fisheries, and feeds Alaskan families. The unique, world class oceanographic conditions in coastal Alaska during the cruise ship season, sensitivity of plankton, forage fish, juvenile salmon, plus the seabird, seal, sea lion, and whale populations that foodweb supports merit special consideration and protection from adverse effects of unnecessary toxic effluent.

Please contact me at any time to discuss my comments contained herein.

Respectfully,

Michelle Ridgway

Michelle Ridgway, Marine Ecologist

Member, Alaska Cruise Ship Science Advisory Panel

Baldwin, D., J. Sandahl, J. Labenia and N. Scholz 2003. Sublethal effects of copper on coho salmon: impacts on nonoveralapping receptor pathways in the peripheral olfactory nervous system. Environmental Toxicology and Chemistry, Vol. 22, No. 10, pp 2266-2274

Chapman, G. A. 1978. Toxicities of cadmium, copper, and zinc to four juvenile stages of chinook salmon and steelhead. Trans. Am. Fish. Soc. 107(6):841-847.

Eisler, R. 1998. Copper hazards to fish, wildlife, and invertebrates: A synoptic review. Patuxent Wildlife Research Center, U. S. Geological Survey. Biological Science Report USGS/BRD/BSR--1997-0002, Contaminant Hazard Reviews Report No. 33.