

Cruise Ship Science Advisory Panel

Report to the Alaska Cruise Ship Initiative Work Group

Wastewater Constituents to Monitor in 2001 (Submitted June 15, 2001)

The Science Advisory Panel was asked to develop a recommended list of wastewater constituents to monitor in 2001. In developing these recommendations, a sub-group of the Science Advisory Panel (Loehr, Mearns and Watson) considered the 2000 analytical results, developed a table of maximum and average concentrations for each priority pollutant detected for the 21 ships monitored in 2001, conducted a cursory on-board review of waste handling practices on two cruise ships, considered stakeholder concerns and issues, and consulted with the full Science Advisory Panel.

The Panel notes that these recommendations are only for 2001. Recommendations for monitoring in 2002 and beyond will change, including a possible reduction in the number of constituents to monitor, as more information becomes available.

The water and wastewater constituents to be recorded in 2001, including their properties and the rationale for their selection, include:

- 1) Conventional materials and properties including total suspended solids (TSS), settleable solids (SS), oil & grease (O&G), total organic carbon (TOC), chemical oxygen demand (COD), biological oxygen demand (BOD), pH, alkalinity, and fecal coliforms. These are needed to help model fate of wastewaters, normalize trace contaminant data, anticipate changes to EPA methods for determining water quality criteria, and understand effectiveness of treatment alternatives.
- 2) Total nitrogen and total phosphorus. This analysis will determine whether nutrient loading needs further study and evaluation in 2002. Monitoring for nitrogen and phosphorus are needed in order to establish the N and P ratio for the wastewater effluent.
- 3) Metals, including cadmium (Cd), copper (Cu), mercury (Hg), lead (Pb), zinc (Zn), and nickel (Ni). To the extent that the analytical method simultaneously measures other metals, these data should be reported. Analysis should include both total recoverable and dissolved metals. In addition, landside freshwater taken on board in Skagway, Juneau, Ketchikan, Vancouver or other locations should be analyzed for metals. These samples should be taken from the freshwater hook-up line.
- 4) Base/Neutrals/Acids (BNA) and Volatiles. Although they are likely not very important, the database is not large enough yet to discontinue sampling for Volatiles and BNA.
- 5) PCB's. Although 2000 sample analysis did not report the presence of PCB's, PCB's are of sufficient environmental concern to merit further confirmation that they are indeed at low or undetectable levels.
- 6) Bilge water designated for discharge as a separate waste stream should be analyzed once on each vessel for the priority pollutants mentioned above. This recommendation is made under the assumption that bilge water is kept separate from graywater and blackwater, otherwise it should be analyzed in the same manner as gray and black water.

The Science Advisory Panel recognizes that modern cruise ships are likely to discharge less bilge water than other commercial vessels. If sample analysis identifies areas of concern, the bilge water discharge of all large commercial vessels, whatever the service or type, should be evaluated.

- 7) Measurement and estimation of applicable flow rates and discharge volumes. These data are needed to estimate flow-weighted constituent concentrations (mass loading or input). Ships are urged to maintain their discharge records, even when not discharging in Alaska waters, and the sampling team is encouraged to make full use of these records in preparing their sampling documentation.

The sub-panel reviewed 2000 monitoring data on organochlorine pesticides and briefly inspected information records aboard one cruise ship. We concluded that more information was needed before we would recommend additional analyses. The pesticides on the National Priority Pollutant List are pesticides that have been largely discontinued in North America. If the cruise lines or their pest-control contractors no longer use these chemicals (the 2000 monitoring data suggests they do not) then there would seem to be no need to analyze wastewater for these pollutants in 2001. However, pesticides and other chemicals not currently listed as 'Priority Pollutants' (such as chlorpyrifos, other pesticides, fungicides, etc.) may be present and used aboard ship. The Science Advisory Panel recommends that the types of pesticides that are used be identified and their application quantified.

Before adding or discontinuing certain chemical analyses, particularly for organic chemicals, the Science Advisory Panel recommends that the cruise industry review MSDS's (Material Safety Data Sheets) or other manifests and inventory sheets for all materials addressed in paragraphs 1-6, and all other chemicals used in high volume. Perhaps this study could be a follow-on to the paper on waste handling practices, which was developed by the International Council of Cruise Lines in 1999. Members of the Science Advisory Panel would welcome the opportunity to participate in this review. The results of the cruise industry review will allow the Panel to make further recommendations for monitoring and testing in subsequent years.

June 15, 2001

Marlin Atkinson, University of Hawaii

Kenwyn George, Alaska Department of Environmental Conservation

*Lincoln Loehr, Heller Ehrman White & McAuliffe LLP

Charles McGee, Orange County (CA) Sanitation District

*Alan Mearns, US National Oceanic and Atmospheric Administration

Michael Stekoll, University of Alaska

*Michael Watson, US Environmental Protection Agency

* denotes members of contaminant sub-panel