



**ALASKA**  
Department of  
Environmental  
Conservation

**Department of Environmental Conservation (DEC)**

**Cruise Ship Waste Water Science Advisory Panel  
Teleconference**

**May 23, 2012  
8:00 AM – 10:00 AM (AK Time)**

***Panel members***

Kenneth Fisher	EPA
Juha Kiukas	Ecomarine
Lincoln Loehr	Stoel Rives LLP
Hermann-Josef Mammes*	Meyer Werft
Steve Reifenstuhl	Southeast Herring Conservation Alliance
Dr. Silke Schiewer	University of Alaska Environmental Engineering

\*Hermann Josef-Mammes was substituting for Panel member Thomas Weigend

**ADEC**

Andrew Sayers-Fay  
Rob Edwardson  
Melissa Goldstein  
Albert Faure  
Ed White  
Mary Jane Winch

**Guests**

Mike Tibbles (ACA)  
Chip Thoma (Responsible Cruising in Alaska)  
Joe Geldof (Responsible Cruising in Alaska)  
Tim Burns (Disney)

**Meeting Objectives**

- The Panel will have identified a preferred methodology for evaluating economic feasibility
- A plan will have been developed and persons responsible will have been identified for completing report text data gaps

## Meeting Summary

The Panel began with a discussion of a potential approach for evaluating economic feasibility of technically effective additional methods. An outline was presented to the Panel in the agenda illustrating a potential approach to making some determination of economic feasibility.

The Panel discussed and reworded the outline. Highlights of the discussion are presented in this summary.

### Technical Effectiveness

- A) *Does method or technology, alone or in combination, cause effluent to meet **all** water quality standards (WQS)? (note, must be consistently met)*
- a. *If yes, is it technically effective to implement and operate on cruise ship?*
  - b. *If answer is still yes, go to economic feasibility questions.*

The Panel discussed that some technologies can meet standards when implemented on land or in lab testing but the larger question is can these systems be implemented on cruise ships. The question for the outline should be: “Are there systems that can treat all the effluent on cruise ships to meet WQS?”

The Panel debated whether ion exchange (IE) and reverse osmosis (RO) implemented as post treatment would be effective and whether that is true all the time. The Panel agreed that those methods technically work and can meet the required effluent limits BUT those systems are only effective when the influent flows and loadings/concentrations are somewhat consistent. All tested techniques were evaluated under consistent influent conditions. The main challenge to treating cruise ship wastewater is that the influent flow and loading/concentrations of contaminants is highly variable. There are technologies that can meet WQS, but is no available data to indicate that those technologies could meet WQS 100% of the time under the expected operating conditions of a cruise ship. Additionally, on cruise ships there is inadequate space to mix wastewater streams to create consistent influent concentrations.

The Panel agreed that the wide fluctuations of influent concentrations was critical to consider when evaluating technologies.

- B) *If answer to “A” is no, what reasonable improvements can be made in ~~performance~~ effluent quality?*
- a. *Add-on polishing systems*
  - b. *Replace with better performing AWTS systems*
  - c. *Improvements in pollution prevention*
  - d. ~~Installation~~ *Implementation of control methods*
  - e. *Operational improvements (dedicated trained wastewater engineers, increase replacement of reagents and membranes)*
  - f. *For each of the above,*
    - i. ~~What are the benefits~~ *changes in effluent quality?*
    - ii. ~~Is this a significant improvement~~ *reduction of COC concentrations?*
      1. *By itself?*
      2. *In conjunction with other methods?*
    - iii. ~~For methods that would result in significant improvement~~ *reduction of contaminant concentrations, go to economic feasibility questions.*

Panel modified wording of the outline as noted above to use less loaded words such as “improvement” to only state change or reduction in concentrations.

They discussed refining the question to understand “What is the change in contaminant concentrations expected as a result of implementing the method or technology?” However, they stated there are no real numbers or data available to evaluate. They are limited to being able to qualitatively identify whether contaminants will be removed by a large or small extent.

The Panel noted that RO and IE would remove large percentage of COCs in effluent. Furthermore, the current effluent pollutant concentrations expected from each existing AWTS are below the current Alaska permit limits – the AWTS are removing 90+% of the pollutants currently. If the change between meeting the current permit limits and meeting WQS is accomplished, does that constitute an environmental improvement?

The Panel noted that different cruise lines have different approaches to what waste streams they treat. These decisions have huge cost impacts and result in great variability of costs between treatment systems. They agreed that the report needs to accurately capture a sense of that variability. The question was asked if the variability is a function of what waste streams go into the system or changes in volume and the answer is both. The report must not give the impression that some “black box” will work.

The Panel discussed looking at two or three scenarios

1. Treat all wastewater
2. Treat all blackwater and part of the graywater
3. Treat graywater only (discharge black water offshore in federal waters)

Immediately the Panel noted that only treating graywater does not result in environmental improvement so it isn't a viable scenario.

No systems are problem-free. RO is much more effective as an after system, not as the primary AWTS, but after organics removal.

Another consideration that must be identified in the report is that all these systems create a sludge that contains all the metals removed from the effluent. This sludge is generally released off shore, which is not an environmental benefit.

### Economic Feasibility

- A) **What is the cost** (range) to install and annually operate the system/methods? (range of costs)
  - a. New Build (Note – they have to put an AWTS on new builds anyway – delta depends on comparison to current system installations)
  - b. Retrofit new AWTS to existing ships
  - c. Add-on polishing system/method
- B) Is the effluent quality benefit worth the cost?
- C) Is it economically feasible for industry to bear this cost?

Panel discussed how to obtain and use cost data, with the assumption that ballpark costs for installation and operation could be estimated. The discussion focused on how does the change in effluent pollutant concentrations compare to what it cost to do it. What is the cost of reducing pollutant concentrations to a specific endpoint? Is this feasible for the industry?

The Panel recommended including a table in the report showing the two scenarios and including a qualitative discussion about large and small reductions in effluent pollutant concentrations and the associated costs.

Members of the Panel brought up the issue that there are plenty of solutions, but they will not fit onto a ship. Space is extremely limited, it's just not possible to do.

For new ships, can the Panel assume that space = money? An increase in wastewater treatment plant space would result in a reduction of cabin space? Some members of the Panel confirmed that it is a much more complicated situation. The wastewater treatment areas of the ship are nowhere near the cabins and that locations of specific functions are important and not changeable. The question is much more complex than just what space is available.

The Panel did not receive any data regarding what the size of an RO or IE system would be.

Everything is a function of cost – with unlimited money, presumably anything can be done. However, it won't be possible to quantify different technologies as taking up a large or a little space and associating that with loss of passenger cabins. The systems and structure of ship are too complicated.

Panel noted that they wanted to discuss non water quality benefits in the report as well.

#### **Data available to estimate costs**

1. Questionnaire to cruise operators  
[http://dec.alaska.gov/water/cruise\\_ships/SciencePanel/documents/Binder/Att%201%20Compiled%20Responses%20to%20request%20to%20CI%20about%20indivdual%20systems.pdf](http://dec.alaska.gov/water/cruise_ships/SciencePanel/documents/Binder/Att%201%20Compiled%20Responses%20to%20request%20to%20CI%20about%20indivdual%20systems.pdf)
2. Vendor responses (distributed by email and on website):  
[http://www.dec.alaska.gov/water/cruise\\_ships/SciencePanel/documents/Abbreviated-Vendor-Responses-ADEC-Science-Advisory-Panel-Sept-2011-Mtg.pdf](http://www.dec.alaska.gov/water/cruise_ships/SciencePanel/documents/Abbreviated-Vendor-Responses-ADEC-Science-Advisory-Panel-Sept-2011-Mtg.pdf)
3. Anticipated data from the BAT worksheets

For category: add on, replacement, control, and prevention, the following data were requested:

- Rating of Technical Feasibility for each technology or method
- Subjective rating on scale of 10
- Estimated design capacity (m<sup>3</sup>/day)
- Capital Cost (detailed direct and indirect cost estimate)
- Est. Annual O&M Cost Add-On WWT option, \$ per year (detail broken out)
- Estimated Removal with Add-on System, per cent
- Subjective Rank Potential Systems 1, 2, 3, 4 (where 1= most likely to implement considering feasibility and cost)

#### **9:20 a.m. – 9:40 a.m. Report Updates – Krista Webb**

- The status of the report was discussed. Krista will insert the subjects of this meeting into the appropriate locations of report, identify authors for these specific sections and redistribute the draft.

**9:40 a.m. – 9:50 a.m.            Public Comment**

Chip Thoma of Responsible Cruising in Alaska let the Panel know that there are many options to meet the demands of the Alaskan Public, one of which is to expand the Juneau Douglas Treatment Plant. The plan is to hook up all four docks. Will be able to take all effluent except sludge. He recommended Panel look more at the land option and noted that there was ample money available from the State to help the cruise industry do this. It is his opinion that economic feasibility is not a limiting factor.

Joe Geldhof of Responsible Cruising in Alaska told the Panel he thought they had strayed from their mandate into the murky well of economics. He stated that the Public expected them to look at science and it expects clear water. WQS are critical, specifically with regard to copper toxicity.

**9:45 a.m. – 10:00 a.m.            Wrap up and Action Items – Krista Webb**

- Juha asked Melissa to send the Panel the report from EVAC<sup>1</sup> where they bench tested IE on shipboard wastewater.
- Next conference call scheduled for July 26.

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<sup>1</sup> EVAC requested that this new information not be shared with their competitors.