



ALASKA
Department of
Environmental
Conservation

Department of Environmental Conservation (DEC)

**Cruise Ship Waste Water Science Advisory Panel
Meeting #3
Centennial Hall, Hickel Room
Juneau Alaska
October 21-22, 2010**

Panel members

Mark Buggins*	Municipality of Sitka
Kenneth Fisher	EPA
Dr. Reinaldo Gonzalez	Burns and McDonnell
Juha Kiukas	Ecomarine
Lincoln Loehr**	Stoel Rives LLP
Steve Reifentuhl***	Southeast Herring Conservation Alliance
Michelle Ridgway****	Oceanus Alaska Environmental Services
Lamberto Sazon	United States Coast Guard
Dr. Simon Veronneau	Quinnipiac University School of Business
Thomas Weigend	Meyer Werft

- * Mark Buggins fills the legislatively mandated coastal community Panel seat.
** Lincoln Loehr fills the legislatively mandated cruise ship industry Panel seat.
*** Steve Reifentuhl fills the legislatively mandated commercial fishing industry Panel seat.
**** Michelle Ridgway fills the legislatively mandated NGO Panel seat.

Alaska Department of Environmental Conservation

Rob Edwardson – Cruise Ship Program Manager
Ed White - Cruise Ship Program
Sharmon Stambaugh- Program Manager of Water Quality Programs

OASIS Environmental – Facilitators

Krista Webb
Max Schwenne
Mari Lee

Interested Public

Liam Carnahan – interested public
Guy Dichabala – South East Alaska Construction
Drew Green – Cruise Line Agencies of Alaska
Scott Guesno – US Coast Guard
Richard Heffern – ADEC
Casey Kelly – KTOO Radio
Kerry Lindley – interested public
Hannah McCarthy – Representative Beth Kerttula
Ray Paddock – Central Council Tinglit and Haida
Chip Thoma – Responsible Cruising in AK
Mike Tibbles – Alaska Cruise Association
David Wetzel- Admiralty Environmental, Juneau

Meeting Objectives

The objectives of the meeting are listed below:

- Conclude whether to use data from Alaska Cruise Association (ACA) Bunker Water Study or to draft a sample plan to collect more data.
- Gain understanding of naval architecture considerations and physical parameters, i.e. available space on cruise ships for waste water treatment systems.
- Gain understanding of the wastewater treatment system approval process.
- Summarize existing Panel knowledge.
- Develop plan to move forward.
- Identify specific tasks and data needed to advance development of the Panel report.

List of Meeting Summary Attachments

1. David Wetzel/ACA Bunker Water Study
2. Thomas Weigend/Meyer Weft Presentation
3. LTJG Salomee Fisher/USCG Certification Presentation
4. Tio Devaney/Lloyds of London Classification Society Presentation
5. Edited Schematic Diagram of Ship Processes
6. Juha Kiukas/Presentation on AWTs retrofits
7. Letter to Cruise Operators requesting information
8. Preliminary Outline for Science Advisory Panel report

Meeting Summary

Thursday, October 21, 2010

8:00 a.m. - 8:05 a.m.

Sign in and sign Final Charter

8:05 a.m. – 8:30 a.m. Krista Webb – Facilitator

Krista Webb welcomed the Panelists and public. Robert Edwardson, the new Cruise Ship Program Manager for the Alaska Department of Environmental Conservation (ADEC) introduced himself and shared his background and relevant professional experience. Panelists, other representatives from DEC, and facilitators introduced themselves.

The agenda was reviewed and approved unanimously by all Panelists.

The signature page of the Final Charter was signed by all Panelists. The Charter is now Final.

8:45 a.m. – 9:45 a.m. David Wetzel – Admiralty Environmental – ACA Bunker Water Study

Mr. Wetzel gave an informal presentation of the Bunker Water Study performed by Admiralty Environmental commissioned by the Alaska Cruise Association (ACA). A copy of the study is provided as Attachment 1.

The sampling procedures and limitations of the data were presented. Panelists questioned Mr. Wetzel in an effort to understand how the data were collected so that the usability of the data could be investigated.

9:45 a.m. – 10:15 a.m. Break

10:15 a.m. – 12:00 p.m. Facilitated Panel discussion to identify Bunker Water Study data gaps

The Panel discussed the finding that the data from the ACA report are highly variable. Large variations in metal concentrations were detected in single communities and even from identical water sources. There are some quality control issues, such as lack of duplicate samples, that limit usability of this data set.

The Panel noted that the results of the ACA study are controversial¹ and concluded that the Study only provides a snapshot in time. Actual concentrations of metals in bunker water may be higher or lower than the study findings.

The threshold concentrations of metals in the Drinking Water Standards (DWS) are higher than Water Quality Standards (WQS) for Protection of Aquatic Life. Municipal water supplies are only required to meet DWS. Copper and zinc are not primary drinking water standard pollutants; thus there is no requirement to sample for them by a drinking water supplier². All of the concentrations of metals detected in the ACA study were well below relevant DWS.

Future General Permit standards for Cruise Ships are DEC WQS. The WQS standards are far lower than drinking water standards; consequently, cruise ships may be taking on (bunkering) potable water that contains metals at higher concentrations than are permissible for discharge without treatment. Cruise ships operating in Alaska buy potable water from several communities, including Haines, Juneau, Ketchikan, San Francisco CA, Seattle WA, Seward, Skagway, Vancouver BC, Victoria BC, Whittier, and Wrangell.

The Panel discussed the adequacy of the data at great length. Debate focused on the need for new data and sampling protocol if additional samples are collected. Available funding was discussed and Sharmon Stambaugh of DEC offered to bring the budget numbers to the meeting.

Other issues discussed are summarized below:

Many factors affect the potential for metals to be present in potable bunker water. The potential contributors of dissolved metals in bunker water are water source (ground or surface water sources) and leaching from piping and delivery system infrastructure. Furthermore, bunkering practices, such as flushing pipes for an adequate period of time, may have a direct effect on reducing concentrations of contaminant metals in the bunker water.

¹ At the beginning of the meeting, a group called Responsible Cruising in Alaska handed out a memo to each Panel member individually, refuting the representativeness of data from the ACA Bunker Water study.

² Typically copper is introduced to system at household level due to leaching from copper pipes.

The Panel acknowledged that if bunker water were a significant source of metals in ship effluent, a recommendation of the Panel may be for pretreatment of bunker water, prior to loading it on a ship. The Panel discussed the feasibility of ship operators choosing to selectively not bunker water or to only bunker water in specific ports.

The Panel debated sampling water at the source (after potable drinking water treatment) in great detail. They considered asking each municipality for a list of piping materials and infrastructure information (such as age, length and diameters of pipe). Several potential issues were identified: 1) the feasibility to ask municipal water suppliers to collect samples, 2) would the labor to collect the samples need to be contracted, 3) how many samples would be necessary to create a statistically significant sample set and 4) over what time frame and how frequently would samples need to be collected?

The Panel also discussed the merits of performing an engineering evaluation and modeling effort to identify the alternatives for treatment depending on the magnitude of contribution of metals to effluent from bunker water. For the most part, agreement was reached that there was merit in doing an engineering modeling approach. The matter of debate was whether it was important to quantify input data and if not, how to justify selection of maximum and minimum brackets for the data. Some suggestions were to use the minimum concentrations found in source water as the minimum potential values. Potential brackets for maximum values were maximum values detected in the ACA study, maximum values in the EPA Cruise Ship Wastewater Study, or DWS.

The Panel began to discuss the relative contribution of metals from the bunker water, vs. the produced water on ship, vs. direct contaminant contributors such as laundry and human waste and decided to table this discussion for another time in the meeting.

12:00 p.m. – 1:00 p.m. No host lunch

1:00 p.m. – 2:15 p.m. Thomas Weigend – Meyer Werft

Thomas Weigend provided a presentation of cruise ship basic lay-out, space considerations, and engineering considerations associated with the installation of new types of WW tracking systems or add on controls. The slides from this presentation are provided as Attachment 2.

Ken Fisher asked about the connection between the waste water treatment systems (WWTS) and trim. Thomas Weigend replied that increasing the size of

the WWTS or water storage capacity will significantly decrease the balance of the ship.

Bert Sazon asked if customers consider expansions of WWTS during the design process. Mr. Weigend replied that it is very expensive to build those margins in to the design. Revenue on cruise ships is based on the number of passenger cabins. The bottom line is that space for systems is limited because space equals money. Mr. Sazon then commented that it is difficult now for the Panel to recommend that ships add equipment such as scrubbers, etc. to their WWTS because it might not be cost effective. He then asked was possible to add this equipment. Mr. Weigend replied that it was, but from a ship yard perspective, a ship will be more expensive with increased WWTS or other equipment. The big question for the shipbuilder is whether it makes economic sense to make the change.

Juha Kuikas asked if the ships being built now are being built to old laws or the new laws in Alaska that will eventually go into force. Mr. Weigend replied that ships are being built to the old specifications. Ship yards may attempt to build to newer laws as a selling point, if it doesn't compromise too much. But they won't restrict themselves by limiting their suppliers (for new technologies for example). Mr. Kuikas then asked if Mr. Weigend believed that a ship would have some space for additions and the reply was yes.

Michelle Ridgway asked if the ship yard considers a cost analysis between the current rules and newer rules when making design decisions. Mr. Weigend replied that he has not received reliable quotations from suppliers for the new targets. His ship yard still has doubts if suppliers can successfully manufacture emerging technology. Mr. Kuikas responded that suppliers have a difficult time giving cost estimates without reasonable information on what will be required in the future.

Reinaldo Gonzalez commented that land based technology could meet the standards but there is a significant difference between land treatment and ship treatment.

Bert Sazon asked Mr. Weigend if suppliers are difficult to find, and if one can give suppliers input and ask for a product. Mr. Weigend responded that sometimes it is a big risk for a supplier to try to develop a product. The market is very small (there are only three companies building cruise ships in the world at this time, for example). Mr. Sazon then asked if one can partner with suppliers, working with them to get equipment produced. Mr. Weigend answered that sometimes Meyer Werft may invest money into developing a technology, but that this practice is also large risk for the ship builder. Other ship yards may have different numbers than Meyer Werft.

2:15 p.m. – 2:30 p.m. Break

2:30 p.m. – 3:30 p.m. LTJG Salomee Fisher, USCG

LTJG Fisher provided a presentation on Wastewater Treatment Technology Certification Process under 33 CFR 159. The slides from this presentation are provided as Attachment 3.

Salomee Fisher clarified 33 CFR 159, stating that non US-flagged vessels are considered certified facilities i.e., systems certified by the International Maritime Organisation (IMO) are automatically accepted as being certified systems.

Juha Kuikas commented that system testing is not based on percent reduction, but on achieving the target numbers. There are no minimum values for concentrations of contaminants in the influent to the system, so tests may use an input with very low BOD in order to achieve the required (low) BOD effluent concentration. There is also very little similarity between the tested unit (a prototype that has been scaled down) and the as-built unit.

Juha asked if cruise ships need Coast Guard certification. Ms. Fisher answered that they do not if they have IMO certification. Bert Sazon clarified that with U.S. certification, the vessel can operate in U.S. waters.

3:00 p.m. – 3:30 p.m. Break

3:30 p.m. – 4:30 p.m. Tio Devaney - Lloyds of London

Tio Devaney gave a GoToMeeting teleconference presentation on the role of the Classification Societies, factors that affect a ship's classification, and the associated timelines of the classification process. The slides from this presentation are provided as Attachment 4.

Michelle Ridgway asked if Mr. Devaney could elaborate on the classification modification required for replacing a WWTS through hull, and if this is an extremely expensive re-classification process. Mr. Devaney replied that the approval process would be straightforward. He added that there may need to be several different reviews taking place concurrently and that if all documents were available for review that the process would take 8-12 weeks. He qualified his response that this was a very difficult question to answer because of the many different factors involved.

Krista Webb asked about the overall cost of re-classifying a ship. Mr. Devaney replied that the fees would likely be a couple thousand for design review. The surveyor's attendance at the installation would be another couple thousand.

The biggest cost would be design and research and development (which is not done by a classification society). Overall, classifications tend to be 1-2% of operational costs.

4:30 p.m. – 5:00 p.m. No public comments were offered.

Krista Webb asked for any final comments from the Panelists.

Michelle Ridgway expressed that she interested in looking deeper at the SRE summaries.

Simon Veronneau noted that the Panel still needs a lot of data to arrive at a Feasibility Study in January 2011, especially for the economic questions. He reminded the Panel that they need to consider the entire environmental impact (extra fuel usage, air pollution, etc) of recommendations. In general, there is more research that needs to be done.

Juha Kuikas commented that it will be challenging for the Panel to make recommendations on future systems, because they do not yet exist in real systems and have not been tested.

5:00 p.m. Adjournment for the day

Friday October 22, 2010

8:00 a.m. - 8:15 a.m. Sign in

8:15 a.m. – 8:30 a.m. Krista Webb

The agenda for the day was reviewed. A CD containing digital copies of the *2010 Vessel Specific Sampling Plans* was distributed to all the Panel members.

Max Schwenne and David Eley were introduced as technical experts with OASIS to help with any technical questions during the discussion.

8:30 a.m. – 10:00 a.m. Facilitated Discussion regarding sources of pollution on cruise ships.

The Panel discussed sources of contamination in produced water and as a result of operation and ship processes. A diagram of the general ship processes was used to help focus the discussion. This diagram is provided as Attachment 5. The Panel agreed they would like to see all available data compiled to get as close as possible to determining the relative contribution of metals from each process so that a system mass balance can be developed.

The Panel noted that produced water from desalination does not concentrate metals that may be in sea water because the process effectively removes the metals, but that the distilled water produced can be corrosive and have an increased potential to leach metals from pipes, tanks, valves, etc. in the distribution system.

Contamination sources discussed are listed below:

- Human waste is a significant source of ammonia and metals. Humans excrete metals ingested from food and water.
- Vacuum commodes with copper-nickel pipe (high pressure tends to erode piping)
- Galley
- Laundry
- Accommodations
- Cleaning solvents, both housekeeping and technical (equipment) cleaning
- Descaling pipes (punctuated events for cleaning and continuous addition of descaling chemicals to system).
- Metals may be added as a result of cathodic protection, zinc anodes, coatings or other processes in storage tanks designed to balance the electrolytic charge within the hull.
- Water from swimming pools and hot tubs is not added to the wastewater stream, waste water from these systems is direct discharged. In addition, many vessels are now using sea water for their swimming pools.

Action Items identified for ADEC/OASIS during this discussion:

1. Search for data regard regarding concentrations of metals in evaporated water, descaling processes, and bunker water samples in the SRE reports.
2. Get the detailed data from the EPA Cruise Ship reports³. Ken Fisher may be able to connect us with the appropriate contact at EPA.
3. Identify and compile any available sample data collected from sample points between the intake and discharge point to identify processes associated with the most significant sources of contamination.
4. Re structure the SRE data (back to 2008) to compare systems, rather than depict information on a ship by ship basis (the way the reports are organized now).

The Panel discussed the 2009 Feasibility Study report and the desirability or need to have a future technology conference. It was agreed that it isn't likely

³ EPA, 2008. Cruise ship discharge assessment report. Oceans and Coastal Protection Division, Office of Wetlands, Oceans and Watersheds. Document # EPA842-R-07-005. Published December

that there are new vendors and technologies available now that were not represented at the conference which occurred 18 months ago. However, the Panel agreed it would be useful to reconnect with vendors and provide a specific set of specifications and ask for cost and performance estimates. The Panel is specifically interested in life cycle and operating costs, and holding tank requirements.

Panel agreed that their goal was to make recommendations that will facilitate cruise ships treating 100% of the effluent produced rather than develop recommendations that would encourage operators to discharge offshore, outside the 3 mile limit. Agreement was also reached that there may be many combinations of methods and treatments that can be combined for individual operators to meet that goal. They noted that their recommendations would not be limited to treatment, but could include pollution prevention, management, and control alternatives as well.

Action items identified during this discussion:

- OASIS work with Juha Kiukas to identify specifications to provide to vendors from the Feasibility Study.
- Panelists provide to OASIS any suggested vendors to add to list.

The Panel returned to the bunker water discussion tabled the previous day.

The discussion returned to the need to justify or quantify, based on relevant information, the range of metals potentially in bunker water.

Juha Kiukas pointed out that compared to the concentrations of metals in effluent, the contribution of bunker water is not significant. It is his opinion that the waste streams from the ships are the main contributors of metals to the effluent and that the AWTs are effective at treatment and significantly reducing the metals and ammonia from the effluent.

The Panel was in general agreement that it was preferable to have representative data obtained with a suitable sample plan. Data they considered flawed would not be used in their report. They agreed that there is a need to prioritize how much additional effort and money should actually be spent to collect data on bunker water after the relative importance of the bunker water contribution is determined. Sharmon Stambaugh confirmed that money was available to perform a study, if warranted.

10:00 a.m. – 10:15 a.m. Break

10:15 a.m. – 11:00 a.m. Juha Kiukas – EcoMarine Oy

Mr. Kiukas gave a presentation on the logistics and considerations of installation and operation of AWTS and some summary of the EPA Cruise Ship Wastewater Sampling report. He provided detailed information about waste management on a cruise ship.

He concluded that cruise ship wastewater management varies between operators based on operational variations, ship size, route, collection and holding system variations, and operator views on wastewater holding, treatment, and sludge management. He believes that current Alaska regulations can be met because the AWTP sizing, operational and construction issues are 99% under control. He also noted that other new environmental rules challenge the AWTPs, for example, low sulphur fuels/scrubber and ballast water management compete with AWTPs on tanks and space and ballast water management versus wastewater holding are controversial if ballast tanks are used for holding treated wastewaters.

He concluded that what is treated, holding practices, and sludge management between companies varies, worse effluent quality may still mean higher environmental awareness and better technology and cautioned about judging the process effectiveness purely on end of pipe results.

The slides from his presentation are provided as Attachment 6.

Michelle Ridgway asked about ballast water and if wastewater tanks and ballast water had to be separated as per new IMO rules? Ballast water regulations are based on levels of bacteria, so it is very problematic to use ballast water tanks to hold wastewater.

Bert Sazon clarified that there are regulations that ensure certain vessels have ballast tanks that are dedicated to holding ballast for stability reasons and cannot be used to hold wastewater unless the ship is reclassified.

11:35 a.m. – 12:00 p.m. The Panel discussed requesting baseline data about their AWTS from the individual cruise lines. As a group, the Panel drafted a letter to send to individual cruise lines. This letter is provided as Attachment 7.

The Panel unanimously agreed to send this letter to individual cruise operators.

12:30 p.m. – 2:00 p.m. No host Lunch

The Panel reviewed and revised the Strawman Outline for the Report as a group. The revised outline is provided as Attachment 8.

3:45 p.m. – 4:15 p.m. Regroup in Hickel Room, Krista Webb, Facilitator

Outstanding requests for data were identified and are listed below. ADEC/OASIS to acquire and distribute this data prior to the next teleconference meeting.

1. GIS Data showing ports, anchorages, bunker water sources, travel routes, offshore discharge zones etc. The ADEC has GPS data for actual vessel routes available.
2. Get figure from USCG showing boundaries for discharge and where various regulations apply.
3. Background concentrations of contaminants in AK marine water within 12 miles of shore. Sources = NOAA and DEC AKMAP Project
4. Poll existing communities that treat cruise ship effluent in their ports to determine how each of these communities (Juneau, Helsinki, Copenhagen, Stockholm, Bermuda) manage cruise ship waste water. Find out what the arrangements for water disposal between cruise ship operators and ports are, how much it costs, and what parameters the systems treat.
5. Investigate the membrane treatment technology currently being used in Barrow to ascertain the methods applicability for cruise ships and its effectiveness at removing metals?

4:15 p.m. – 4:30 p.m. Schedule Next Meeting

The next meeting will be a conference call scheduled during the most central time window for Europe and Alaska. The meeting will be January 12 and last two hours.

The purpose of the call will be to discuss the data and information identified and collected as a result of this meeting.

4:30 p.m. – 5:00 p.m. Public Comment

Chip Thoma, of Responsible Cruising in Alaska, gave a public comment thanking the Panel for their work, telling them about the Juneau city assembly voting to expand the cruise ship dock space and include wastewater hookups for ships (to the Juneau Douglas Wastewater Treatment Plant). He asked the Panel to consider that there are ample State funds in the form of low interest loans and grants available to finance technological improvements for treating cruise ship wastewater.

When questioned by Reinaldo Gonzalez as to why cruise ships would have any incentive to install additional treatment systems to reach future General Permit levels, Mr. Thoma stressed that his priority was to prevent cruise ships from

discharging everywhere in Southeast Alaska and that discharging to a municipal wastewater plant with an existing mixing zone is preferable to him.

The Panel discussed that the Permit standards for cruise ship wastewater are significantly lower than the municipal standards for wastewater. They talked briefly about the futility of identifying feasible solutions to remove metals and ammonia from wastewater if communities and the cruise industry chose to discharge to municipal wastewater treatment systems that do not have the same Permit limits.

Liam Carnahan, an engineer for the City and Borough of Juneau, gave a statement of concern about the Panel using the ACA Bunker Water report. He discussed the data in detail, based on his experience. He cautioned the Panel not to invest in a scientific study because levels should not be variable from any specific bunker source. He gave the Panel advice on what data are available from DEC from the JDWWTP (Temp, pH, and alkalinity) and how much sampling could be expected from municipalities. He was reassured that the Panel was not giving too much importance to the ACA Bunker Water study. The Panel requested the data from his recent copper sampling and he offered to submit it to the Panel by emailing it to Krista in about a week.

5:00 p.m. Meeting Adjourned