



ALASKA  
Department of  
Environmental  
Conservation

**DEC CRUISE SHIP WASTEWATER SCIENCE ADVISORY PANEL (SAP)  
Second Face to Face FINAL Meeting Detailed Summary  
Thursday June 10, 2010  
8:00 a.m. to 5:00 p.m.  
Friday June 11, 2010**

The meeting objectives are listed below:

- Review OASIS/DEC feasibility study
- Review and evaluate source reduction evaluation plans and DEC summary
- Review existing on-board wastewater treatment systems
- Provide follow-up information based upon previous Panel information requests
- Panel decision regarding how to find out about existing, new, and emerging technologies

**Attendees**

*Cruise Ship Waste Water Science Advisory Panel*

Mark Buggins*	Municipality of Sitka
Ira Donovan^	Burns and McDonnell
Kenneth Fisher	EPA
Juha Kiukas	Ecomarine
Lamberto Sazon	United States Coast Guard
Lincoln Loehr**	Stoel Rives LLP
Hermann-Josef Mannes ^^	Meyer Werft
Steve Reifentuhl***	Southeast Herring Conservation Alliance
Michelle Ridgway****	Oceanus Alaska Environmental Services
Dr. Silke Schiewer	University of Alaska Environmental Engineering
Dr. Simon Veronneau	Quinnipiac University School of Business

- \* 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.  
^ Ira Donovan is the alternate for Dr. Reinaldo Gonzales.  
^^ Hermann-Josef Mannes is the alternate for Thomas Weigend.

*Alaska Department of Environmental Conservation*

Lynn Kent – Division of Water Director  
Märit Carlson-Van Dort – Acting Cruise Ship Program Manager  
Albert Faure – Cruise Ship Program  
Ed White - Cruise Ship Program

*OASIS Environmental – Facilitators*

JoAnn Grady  
Krista Webb  
Max Schwenne

*Interested Public (from sign in sheet)*

Tim Burns – Disney Cruise Lines  
Wei Chen – Hamworthy  
Bob Doll – City and Borough of Juneau Assembly  
Joe Geldhof  
Drew Green – Cruise Line Agencies of Alaska  
Mark Harris – Crowley  
Richard Heffern – DEC  
Chip Thoma – Responsible Cruising in Alaska  
Mike Tibbles – Alaska Cruise Association  
Dave Wetzel – Admiralty Environmental Juneau

**Attachments:**

1. Agenda
2. Final Charter
3. Feasibility Study Presentation Slides
4. SRE Presentation Slides Part 1
5. SRE Summary Report
6. SRE Presentation Slides Part 2
7. Princess Effluent to JDWWTP Data
8. Gold Standards Technology Presentation
9. Statement from Responsible Cruising in Alaska
10. Timelines for cruise ships for CSHB 134
11. Preliminary Strawman Outline for Final Panel Report
12. Spreadsheet of Panel requests for Data from Feb 2010 meeting
13. Publicly-owned WWTP and Section 301(h) Program

**Attachments not referenced in meeting summary:**

14. The Final Feasibility Study Report
15. All Effluent Sample data from each treatment system
16. 2010 Cruise Ship Final Permit Limits and Municipal Wastewater Treatment Plants with Marine Outfalls Permit Limits
17. System Specific Effluent Limits and Discharge Reporting Requirements

**Action Items:**

1. OASIS circulate signature pages for Charter finalization
2. OASIS send comments on the draft Feasibility Study to Panel
3. DEC provide Panel with information on the Passenger Tax
4. OASIS put together spreadsheet of data requested by Panel for Panel review and preparation of specific questions and parameters.
5. OASIS poll Panel to set meeting date

## Meeting Summary

Panelists introduced themselves and reviewed and approved the agenda (Attachment 1).

Amendments to the draft Cruise Ship Wastewater Science Advisory Panel Charter were reviewed and approved. The Charter is now final (Attachment 2).

**Action Item 1:** Circulate Charter to Panel for signatures.

While reviewing the Charter and the Process Document (Addendum 1 of the Charter), the Panel questioned the purpose of the Technology Conference and whether the timeframe scheduled for the Conference will help the Panel meet its Objectives. The discussion was tabled until the next day.

### Feasibility Study Presentation

Max Schwenne presented the Final Feasibility Study (FS) (Presentation slides are provided as Attachment 3).

Discussion centered on regulatory approval of new devices and technologies. Bert Sazon noted that Coast Guard regulatory approval of new technology was faster if approval was already given from IMO.

Albert Faure made the point that there is flexibility in time estimates to installation noting that the recent Scanship installation was four months from

approval to installation. Holland America Lines recently had scrubber system take two months for prototype to be installed.

Mr. Sazon noted that with one exception, all cruise ships are foreign and must get approval from regulators in home country. There are different classification societies and each ship may be in a different one. All the classification societies belong to the International Association of Classification Societies. IACS approves a device or technology, and then members will adopt (Slides 79 and 80 of Presentation).

Lincoln Loehr asked to see the comments on the FS. **Action Item 2:** OASIS send comments on the FS to Panel.

Juha Kiukas noted that the current systems used were designed for the old regulations and standards. In the past, it made sense to combine waste streams; however, it may not make sense to combine streams in order to meet the new Alaska standards. Lynn Kent confirmed that the effluent limits are Water Quality Standards at the point of discharge.

**Q:** Do any of the presently used systems meet those standards?

**A:** ROCHEM could meet the standards when black and gray water was separated. Mr. Faure added that black water requires more treatment. Mr. Loehr added that the effects of treatment are very dependent on the contents of the influent and that comparing the effectiveness of different systems was not possible because influents are different in each case.

Mr. Kiukas stated that the way to meet standards is to separate waste streams and/or go outside the regulated distance to discharge waste that does not meet standards.

Mr. Loehr challenged the accuracy of the information for ROCHEM on Table 8.1 (Slide 83 of Presentation). He clarified that reverse osmosis (RO) looks like a good technology on the table, but there are implementation problems. Mr. Schwenne agreed that more data was needed.

Ed White stated there are two parts to the ROCHEM data with black and gray water separated.

Michelle Ridgway asked if it wasn't true that the Panel's mandate to look at whole systems to treat all wastewater, not investigate separating waste streams

to go offshore and dump. Mr. Kiukas noted that rules are different in each state and country and that the industry needs various systems.

Simon Véronneau agreed that if the Panel recommended technologies that still required vessels to discharge blackwater offshore, it wouldn't serve a beneficial purpose. There is increased fuel, air pollution, and time to go offshore. The Panel is supposed to look at economically feasible solutions.

Steve Reifenstuhel noted that while the vessels must meet different standards at different ports, since Alaska is the most stringent, if a vessel can meet the Alaska standards, they will be likely to meet standards everywhere else. Mr. Reifenstuhel also agreed with Dr. Véronneau that the Panel must understand the larger footprint and not just push waste to different zones. He noted that he doesn't have a clear understanding of how to deal with that.

Mr. Sazon stated that the Coast Guard issues a particular letter responding to every ship that requests continuous discharge in Alaska. The ships ask for these letters to show other states they pass through (CA, BC, HI, WA etc.) that the Coast Guard has verified their samples meet limits for continuous discharge. Mr. Sazon said that he would like to see effluent limits move toward zero, like oil. We should be supporting good effluent water and need to evaluate what is good for industry and the environment.

Simon Véronneau pointed out that there is still the need to consider the idea of black box on shore to treat waste.

**Q:** Why was the Ion Exchange (IX) changed to moderate implementation feasibility (Table 8.1, Slide 83 of Presentation)?

**A:** Because it hadn't been used on a vessel.

### **Source Reduction Evaluation Presentation**

At 10:42 Albert Faure and Ed White of ADEC gave a presentation on the Source Reduction Evaluation (SRE) Reports from each cruise line (Presentation Slides Part 1, Attachment 4; SRE Summary, Attachment 5).

Bunker water was looked at as a potential source of metals into the waste stream. Bunker water tests were performed at port cities; however, there was a large variation in the results. Mr. Faure discussed the flaws in data collection and QA/QC and stated that it still needs to be evaluated why there is variability between same connections. He cautioned that we can't paint ports

with poor water quality based on this data; there is too much uncertainty in sources. DEC did not get access to the sampling plan to learn how samples were collected such as how much flushing occurred prior to collection.

**Q:** Was there any independent data from cities?

**A:** No.

**Q:** Wouldn't the municipality dispensing the bunker water identify high metal concentrations in their drinking water sampling program?

**A:** Metals are not analyzed in municipal drinking water systems. Copper and nickel are an issue in building pipes and are typically tested at the tap. In addition, WQS are protective of aquatic life and are much more stringent for metals than drinking water standards.

**Q:** Are there the same sampling problems with effluent sampling?

**A:** No, waste sampling methodology was well defined, but that bunker sampling methods were inconsistent. It is likely that there are metals in bunker water, but data set of bunker water in different cities is not conclusive to confirm from where.

## **Part II (Presentation Slides Part 2, Attachment 6)**

Mr. Faure and Mr. White continued the presentation of potential sources of metals. Various topics discussed included: metals are used in substances to prevent biofouling, because marine organisms are sensitive to metals; ballast water in the sea chests; and biofouling systems water continuously goes into the sea.

**Q:** Is there a design limit for copper in water to prevent fouling?

**A:** Yes, but value not available at that moment.

Mr. White pointed out that many operators turn off the biofouling system while in Alaskan waters.

A discussion ensued about the corrosivity of pipes and equipment and whether corrosion of pipes was adding metals to the waste stream. Silke Schiewer asked how often pipes and fittings are replaced. Hermann-Josef Mannes replied that pipes are intended to last for the lifetime of the ship. However, it is their experience that some ships have corrosivity problems. Plastic pipes are now being used in construction. Mr. Kiukas cautioned that plastic pipes are not appropriate for all uses. There are safety limitations to using plastic pipes and

metal pipes with copper nickel are necessary for some pipes containing sea water. If there isn't proper separation in the evaporator, might get corrosion.

## Lunch

### The presentation of SRE's continued.

Mr. Faure and Mr. White went through the SRE reporting and sample results for each cruise line.

### Presentation of City and Borough of Juneau Wastewater Treatment Plan and Princess Cruise Lines arrangement.

At 2:00 p.m. Scott Jeffers Deputy Director of the CBJ Wastewater Treatment Plant (JDWWTP) and Jim Dorn of Carson Dorn reviewed details of the arrangement between CBJ and Princess Cruise Lines (PCL) to treat wastewater.

PCL paid for connection to the JDWWTP and they discharge to that system in Juneau. Carson Dorn is contracted to sample their wastewater to calculate fees. The fees are based on volume and concentrations of BOD and TSS. They noted that when wastewater has increased BOD, the plant is treating solids and it is more sludge management than water treatment. The JDWWTP is a permitted treatment plant with primary and secondary treatment. Effluent concentration data was provided as a handout (Attachment 7).

They noted that the ships tend to discharge effluents that give their own systems problems such as galley graywater (problematic because the grease in galley gray water fouls treatment system membranes). They treat more solids than liquid fraction. They do a lot of sludge management.

PCL hooks up at the Franklin Dock. Carson Dorn collects composite samples every 30 minutes. PCL pays these separate consulting fees. Treatment is charged like any municipality user (based on volume and concentrations of BOD and TSS). Rates are the same as any group user such as an apartment building.

**Q:** Is the system taxed (stressed) by the addition of ship wastewater and if the city continues to grow, will the plant have to be upgraded and expanded.

**A:** There is a separate stormwater system from the sanitary system, so there is a hydraulic cushion. Scott Jeffers expects some slow growth to the JDWWTP over the years, but not much. He wouldn't be surprised if future changes were minor, if any.

**Q:** Is there a linear relationship to TSS and BOD and cost and would it be better to have a curved relationship equation than linear (higher proportional costs for higher BOD /TSS)?

**A:** A curved relationship would be beneficial for the city but the current cost structure was adequate.

Mr. Jeffers noted that there may be requirements on the plant to treat to cruise ship permit levels whenever they treat cruise ship waste, and that would significantly increase costs.

**Q:** Does the plant have effluent sample results?

**A:** They measure and report copper concentrations, but there is no limit in those constituents in their permit.

**Q:** Did Mr. Jeffers envision conceptual growth and did he think that their NPDES permit may be contingent on water conditions, volume and channel physical features?

**A:** They expected to be impacted by changes in those things in the future and that the end date of their NPDES permit was extended. It would be re-permitted under APDES, by the State.

**Q:** Confirm that cruise lines have copper limit of 3.1 mg/L, but if they discharge to the JDWWTP, there is no copper limit?

**A:** Yes, but he did not know what limits may be in future.

Mr. Dorn described how the assumptions were made for determining that the plant could support ship discharge – if they had surplus capacity. They assumed the capacity for hydraulics and organics would be adequate for one ship, but that two in a single day would be too much. That assumption has proved to be true. Present capacity is: 3290 avg BOD, 4259 avg TSS, 5980 max BOD, 7739 max TSS.

**Q:** Are there differences between winter and summer?

**A:** Yes, they have much higher stormwater volume in winter. In summer, they get 1.5 to 2 million gallons per day, and in winter, they get 4 to 7 million gallons per day. The plant does not operate well at higher water levels.

**Q:** Do they expected rates to change based on city rate increase proposal?

**A:** They are an enterprise utility; all revenue only supports their own costs. If costs are lower, fees are lower. The arrangement with PCL is not subsidized.

They pay the same as any user and pay their own consultant fees for sampling and reporting.

**Q:** Is this option open to the entire industry?

**A:** Yes, if they wanted to spend the money on infrastructure. No other operator was interested in doing that previously.

**Q:** Would the JDWWTP consider expanding?

**A:** CBJ wants to be supportive to cruise industry. If the industry wanted to pay for upgrades to their facility that would solve capacity problems, they would be happy to support them.

**Q:** What would the estimated upgrades cost? This appears to be important information for the Panel to compare shoreline solution costs to retrofitting ships.

**A:** The cost would be in the millions.

A discussion ensued about whether discharging cruise ship waste to municipal WWTPs would change the limits for the WWTP. Mark Buggins said that even if the WWTP has limits, when the city takes new waste streams, it doesn't change their limits. Mr. Reifenstuhl noted that if the city has no limit for copper or nickel, in the future, the WWTP's permit might change, which would likely change the fee structure.

Ms. Kent said that the plant could set limits for influent from cruise ships so that waste did not adversely affect their treatment systems. It was pointed out that if a cruise ship treated BOD and TSS (which their AWTS treat well) and then offloaded wastewater to city WWTP, the ship permit limits for metals are being avoided because the city has no limits for metals. Mr. Loehr pointed out that in that case, a different problem is created. The WWTP has percent removal requirements and they do not want clean water influent, because then they can't meet percent removal requirements.

Mr. Loehr pointed out that all NPDES permits look at WQS and a dilution allowance and have mixing zones. The mixing zone and dilution factor may be factors in why there are currently no limits on copper at JDWWTP. He pointed out that the permit limits being imposed on cruise industry must meet WQS at end of pipe, with no mixing zone. The 3.1 mg/L standard for copper in effluent is so low because there is no mixing zone.

Mr. Dorn confirmed that for example, JDWWTP has a 90 meter radius mixing zone. WQS need to be met at the edge of the mixing zone.

**Q:** Are there ammonia limits at the JDWWTP and what are they?

**A:** They only report ammonia concentrations and he did not know what those concentrations typically were.

**Q:** What is the capacity for facility expansion? Would it be feasible to add a tertiary treatment system to the current set up?

**A:** The dock and piping facilities are all owned by PCL.

Mr. Dorn said the incoming wastes are not separated. PCL effluent enters and joins all of the incoming wastewater. Dr. Véronneau and Mr. Buggins asked if it was possible for CBJ to keep the wastewater streams separate and perform tertiary treatment for metals onshore. Mr. Dorn confirmed that dock was now a half mile from plant. A mile and a half of piping would need to be added. There is adequate space at the JDWWTP to separately treat those waste streams.

Mr. Dorn asked if what they meant is that the ship would treat their effluent to standards they could meet easily, but then discharge waste to the plant for just treatment of metals. Dr. Véronneau confirmed that he was asking about feasibility of just doing tertiary treatment for metals on shore.

**Q:** Are there odor problems associated with the ship offloading wastewater.

**A:** Do not know.

The manhole for the system entrance is 8 by 12 feet by 6 feet deep.

There are 6 PCL ships (half the permitted vessels) using the Franklin dock to offload wastewater. They offload an unknown mixture of black and accommodations graywater and are not permitted to release laundry and galley graywater.

Simon Véronneau pointed out that older ships don't have much graywater tank capacity. They must combine gray and ballast water.

Mr. Faure stated that the vessel-specific sampling plans (VSSPs) document the advanced waste water treatment systems (AWWTS), the processes, the holding and storage capacity and which tanks are used. All ships have three to seven days of holding capacity. Some ships opted not to discharge for 5-6 weeks. Holding capacity is possible.

Dr. Véronneau responded that stability needs to be accounted for; ships can't just hold water in all cases.

Ms. Ridgway asked what the benefits are to linkage or partial linkage to shoreline treatment. She asked if the Panel mission is to determine what technology can be put on ships or on shore to meet WQS at end of pipe.

Mr. Sazon noted that it takes a great deal of time and fuel to travel offshore to discharge in donut holes. This increases fuel and carbon footprint.

Simon Véronneau responded to Ms. Ridgway that then the vessels could stay longer in port.

**Q:** Is PCL the only cruise line that discharges to JDWWTP?

**A:** Yes, Seven Princess vessels offload each week (5 large and 2 smaller ships on weekends). Last year, one vessel per week used the system, but this year all seven are using it. Mr. Sazon clarified that PCL had a leak last year, which is why they did not use it.

## **Break**

### **Gold Standard Shore-Based Technology Presentation**

Ira Donovan of Burns and McDonnell gave the presentation on Metals and Ammonia Removal from Wastewaters (Presentation Slides, Attachment 8).

Questions and answers about the presentation are listed below.

**Q:** What is the basis for identifying electro dialysis (ED) as less effective than reverse osmosis (RO)?

**A:** Retention time. ED needs lots of passes, same with ion exchange (IX). Both technologies need a lot of contact time, longer for more dilute wastes.

**Q:** What is the cost for RO system?

**A:** It depends on flow rates. Approximately 30/gal min would be \$650,000 for unit, \$35,000 for installation.

**Q:** What are percent suspended solids?

**A:** We prefer none. Adding something as simple as active carbon filter in front will allow IX resins to last 7-10 years.

**Q:** How big are the systems?

**A:** They can be 7x20x16.5 ft, but can be compartmentalized into separate pieces.

**Q:** What are ventilation requirements? Are there heat sources?

**A:** No ventilation requirements or heat sources. Systems can be completely enclosed.

**Q:** For same money you can get removal of the 3-4 target parameters with RO or IX. What is your recommendation to install one or the other?

**A:** It depends on operational and maintenance costs. The RO will reject 10-30 percent of treated water. IX will probably require 6000 gallons holding for regeneration.

**Q:** Can treated effluent from WWTP with RO be recycled?

**A:** Systems are only to be used for graywater reuse; potable water needs several more treatment steps.

**Q:** Is seawater better?

**A:** Sea water is harder, there is more stuff, salts, brines, biological materials. After RO treats effluent, it is cleaner than seawater, probably can use it for technical water.

**Q:** Are there problems with RO systems pertaining to chlorine?

**A:** There is no problem with chlorides; there is a significant problem with active chlorine (as from a pool).

**Q:** Will cationic surfactants (shampoos, shaving creams) foul membranes?

**A:** Yes, if they get past the Moving Bed Biological Reactor (MBBR). That's why carbon filter pre treatment is needed.

Mr. Faure stated that there are complexities associated with using RO. Systems are expensive and sensitive.

### **Public Comment Period**

Chip Thoma of Responsible Cruising in Alaska distributed and read a prepared statement (Attachment 9)

Bob Doll, a councilman of City and Borough of Juneau spoke. He told the Panel that CBJ has project planned to renovate municipal docks. The project plan is to renovate and build out toward water, so that the docks accommodate big ships. City plans to have Panama ships in both berths. The project will include at least stubbing all utilities. The CBJ has \$9M in state budget to do, and a total of \$20M available to supply power, water, and sewer to the docks.

He told the Panel that the CBJ plan dovetails with the Panel discussion. Once CBJ makes such a large capital investment, they want to have the most possible tourists.

### **Presentation of the 2010 General Permit – Lynn Kent**

Ms. Kent stated that the timelines of permit are the relevant information for the Panel. She passed out a handout of the timeline requirements for CS for CSHB 134 (Attachment 10). She directed the Panel's attention to Page 9, Tables 1 through 7. For each treatment system, specific effluent limits were set in two ways. For each parameter, 1) the technology-based effluent limit and 2) the water quality-based limit were calculated.

The more stringent of the two was selected as the effluent limit.

Different effluent limits were set for stationary discharge vs. underway discharge based on the following dilution factors:

- 1-28 stationary
- 1-50,000 underway

The 99 percentile was used to set the limits. DEC is confident that the limits are set for the industry to strive to meet them, but that exceedances won't hurt environment because of dilution. 99<sup>th</sup> percentile was chosen over 95 percentile to encourage high performance.

The Permit has been appealed by the Campaign to Safeguard America's Waters.

The appeal demands that all vessels use a ROCHEM; however, it is not accurate to judge the ROCHEM as the best system based on the effluent limits because what enters the system needs to be accounted for.

Ms. Kent said she does not want to get ahead of the panel. The Appeal process is established in regulation. The Appeal goes to the Commissioner's office. Each office, the Commissioner and the Director of the Division Water, gets an

attorney. A hearing may be held; however, the Commissioner has full power to make decision on the Appeal.

**Q:** If the Permit is remanded, is it in effect?

**A:** Yes. The Petitioner can ask for the Permit to be remanded. The Commissioner asks for public input, but can make any decision.

**Q:** The new permit embraces cruise ship industry practices and allows them to choose limits based on what they've been doing in the past

**A:** Right, limits are based on what a vessel has been able to achieve in past OR water quality standards, and whether a ship intends to discharge while stationary or only underway.

**Q:** Was the Assessment of no harm to receiving water based on data? What was the basis of "has no effect?"

**A:** The stationary factor is based on a study in Skagway. The underway factor is based on model and volumetric assessment and is applied generically.

**Q:** What about permit fees?

**A:** There used to be a registration fee. When we first issued a permit, we continued to rely on registration fees for permitting costs. The fee is based on capacity of vessel based on berths. It is charged at \$1 per passenger per voyage, also based on number of voyages.

**Q:** Is the permit specific to what they treat?

**A:** No they can chose to treat what they want. The do have specified authorization. They ask and get letter from DEC to discharge what they want. It's called a "Notice of Intent". They typically commingle wastes.

Mr. Faure pointed out that the DEC does not know how the vessels operate. If they do not know what goes into a treatment system, they can't determine the performance of the equipment.

Ms. Kent told the Panel that HB 134 added provisions for DEC to seek information from industry. The DEC now has authority to help Panel get information (regarding discharging wastewater from the industry.

**June 11, 2010 9:00-11:30 a.m.**

The morning began with discussion of Process Outline and preliminary outline for final report and that these documents are suggested to be used to set agendas as Panel moves forward.

Mr. Schwenne gave brief overview of existing and emerging technologies. Presentation slides are provided as Attachment 3. OASIS made conclusions in the FS of technologies they thought were feasible. The Panel can look at all of these again, or look at others if they wish.

FS conclusions are on Page 57 of the FS. The FS can be found at [http://www.dec.state.ak.us/water/cruise\\_ships/pdfs/6\\_08\\_10\\_Feasibility\\_Report\\_Final.pdf](http://www.dec.state.ak.us/water/cruise_ships/pdfs/6_08_10_Feasibility_Report_Final.pdf).

Denitrification was the most promising technology for ammonia removal. Moving bed reactors currently in ships are good for ammonia. Conclusion was that with some enhancements, this treatment system could possibly meet limits.

For metals, the most promising technology looked like Ion Exchange (IX) and Reverse Osmosis (RO), either multipass RO, or RO followed by IX. Systems are not off the shelf, but the components are, so individual systems could be fabricated and put together.

Other promising options included pretreatment of bunker water that has metals in it and using IX to remove ammonia as polishing step after biological treatment. Biological treatment would not need to be enhanced at all, could add IX afterward to remove ammonia.

There are also promising innovative technologies which also have a risk, but are worth looking at again.

Ms. Ridgway asked for clarification as to what each of the treatment systems were treating. She noted that it was important to establish both conventions for describing what is being treated and to clarify what is being treated. The Panel goal is to treat 100% of everything produced on board the ships.

Ms. Ridgway clarified that the treatment systems were evaluated in the FS in terms of treating the entire waste stream. The Panel is looking for a way to

comprehensively treat all the effluent, so that all the wastewater in a vessel goes through the WWTS.

Mr. Schwenne said there are options where they can segregate water and treat water from different streams differently. That would certainly be feasible.

Ms. Ridgway responded that, yes, hopefully the Industry will retain all their options to do what works best for the industry, but in terms of our discussion and our recommendations, we're basing this on everyone. The outcome of our recommendation is that everyone could get a permit and discharge 100% in state waters and meet effluent criteria. She asked if that understanding was consistent with the rest of the Panel for overarching objective or was the objective to get into the minutia of treating different streams with different systems. The FS shows us the top nine.

Dr. Véronneau responded that you can't force a particular system on the industry, or cause a monopoly either. There would be liability involved. Ms. Ridgway agreed that she hoped to avoid that as well.

Mr. Schwenne pointed out that the FS described broad categories of types of treatment. For example, within ion exchange, there are many different types of resins and configurations that can be used to get whatever quality you want out.

It will be up to the vendors to look at the short list the panel determines and figure out how to incorporate that information into their existing systems to make them work and meet the limits. That would be how you'd get the industry/government/vendor cooperation to work.

Mr. Fisher pointed out that the Panel's task was very broad – from doing nothing to doing everything and the proposed outcome would be a menu of options with the costs and benefits laid out for choosing those options.

Mr. Loehr agreed with Mr. Fisher. Both the legislation and the Panel goals statement contain a section on the environmental benefits and costs of implementing the additional methods. We should look at that environmental benefit question a bit more seriously, and that then goes to the issue of looking at this broader range of actions. And it doesn't necessarily mean that we go towards the Cadillac treatment recommendations.

Dr. Schiewer asked if it would be within the scope of the panel to recommend that if a ship concentrates the waste stream, they could have higher effluent limits. Can the Panel modify the final effluent limits?

Ms. Grady said Panel needs to refer back to the specifics within HB 134 mandating that the Panel should advise on what is technologically and economically feasible. Panel must be careful to stay within the intent of the HB 134.

Mr. Fisher said the legislation on Section 5 is broader than just treatment, it's also pollution prevention. The legislation has the Panel look at pollution prevention, control, and treatment. The Panel needs to look at the whole system and come up with a menu, from beginning to end with costs and benefits and environmental benefits and say "here is the end product."

Ms. Grady pointed out that the outline (Attachment 11) had been created to give the Panel a starting point. If you look at the outline, it starts with currently used methods, pollution prevention and control methods, wastewater treatment systems, and levels of effluent quantify achieved, and then moves to emergency methods and technologies. The outline provides a structure on which the Panel can focus efforts. Mr. Fisher pointed out the outline is straight from the statute.

Dr. Véronneau expressed frustration with lack of data. He stated that the Panel has no data to start with, just snapshots and noted that he had asked for specific information after last meeting. His data requests (and other panelist requests after first meeting) were summarized in a spreadsheet. This spreadsheet is provided as Attachment 12.

Dr. Véronneau reiterated that there is very little concrete data. While the SREs are interesting, they give no comparable data. The Panel has no idea, given the poor sampling that was done, how much this is really metal coming from the water that's bunkered, what's happening to this water onboard before it's being discharged.

Ms. Ridgway agreed that there was a lack of data, but noted that the discussions have illuminated some specific areas where data requests can be clarified. It has been suggested and there is some preliminary data that bunker

water could be a source of metals. The Panel should try and improve requests for data. If the Panel wants to resolve the specific issue of whether bunker water is contributing to metals in cruise ship effluent, request a statistically, significantly sampled source water test from SE Alaska ports to determine whether that is a source contributing to the challenges the industry has to face.

Ken Fisher agreed that we were at the point of asking for data.

Dr. Véronneau doesn't see the benefit of having a technology conference three months before we have a preliminary report

The specific list of data requests from the February 2010 meeting (Attachment 12) was distributed.

Ms. Grady suggested the Panel go through the list of requests and encouraged the Panel to focus on the main issues they would like to work on during the next three meetings. This discussion was to help the DEC formulate agenda items for their future meetings. Ms. Ridgway suggested that with the input of the think tank in the room, the list could be shaped to produce effective requests rather than overwhelm DEC.

Krista Webb noted that Simon's list was looked at and requests were prioritized. Some of the data was just not available in terms of his questions. She suggested that the Panel list the ideas and then prioritize and clarify as Ms. Ridgway was saying. The specific questions must be clarified to get the appropriate answer or data wanted.

Mr. Sazon noted that there are parameters that the industry needs to meet at a certain time. There is data regarding available technology from the FS. Two things missing are the feasibility of putting those technologies on cruise ships and the cruise industry's input as to whether they are willing to install those technologies. Mr. Sazon said they should be involved and some on the panel should talk to them and get their input. He suggested that without the industry, the Panel isn't going to get anywhere. The Panel can identify a goal and a solution, but without the cruise industry to agree, forget it.

Ms. Ridgway asked if there was industry representation. Lincoln Loehr was noted as the legislatively mandated industry representative. Mr. Loehr stated

that he represents the Alaska Cruise Association which represents all nine companies that operate in Alaska. Mr. White confirmed that represented 25 ships. Ms. Ridgway agreed that input from industry was necessary.

Mr. Loehr raised the issue of the environmental benefit. He stated that he has questions about the environmental benefit of going down the path being endorsed at that time. An analogy is that quadruple bypass heart surgery is the best available technology, but should we all get it? Maybe the symptoms don't warrant that.

Dr. Véronneau reiterated that it was beneficial to have a filtration system on board ships to reduce the effluent levels, but ridiculous that potable water would need an ultrafiltration system before it's loaded on board the ships just for the benefit of reducing those contaminants. For effluent levels to be stricter than water used for consumption in AK is ridiculous. That is asking the industry to buy the water and clean it up.

The Panel discussed Dr. Véronneau's request to get actual data on cost

- Where is the money coming in from a cruise ship?
- What is the cost of operation of the current equipment?
- What was the cost of installation?

In addition, he wanted to know the questions below, but was told by DEC that it was not part of mandate to look at the role of taxes.

- What is the head tax?
- What is the purpose of the head tax?
- Is there money that could be used for infrastructure improvement?

Dr. Véronneau does not want to revisit whether to tax people or not, just want to know why the tax is there and what we can do with that.

Dr. Schiewer agreed that was a good point and wanted to know who has the authority to decide how the money is spent.

Ms. Kent clarified that the tax is mandated by State law. It does not have a direct impact on the Panel and the Panel's work. However, it is appropriate for DEC to provide information; factual information about the tax and what the

law says it can be used for. Yesterday the Panel heard from a member of the public that asked why some of that money can't be used for wastewater infrastructure. It is fair for the Panel to ask and for DEC to provide some type of response. **Action Item:** DEC provide Panel with information on passenger tax: What is it? What is the purpose? What is it used for?

Dr. Véronneau said that he asked because he wants to make sure that the DEC has allocated enough money for research purposes. He stated he understood that a lot of the things asked for are time consuming and require a lot of resources. He wants to make sure there is adequate money and contractor resources so as not to rehash the same things at the next meeting.

Ms. Kent said the budget for coming year is already set by legislature. There is money available to do a certain amount of panel work and research on behalf of the panel. However, there are limitations to that money. A large sampling project could take it all. She suggested that the Panel develop a full list of information needs and see what cruise ship companies can provide, and what DEC contractors can provide.

DEC told the legislature that a significant portion of the Panel's work could be handled within our existing budget, but if necessary they could go back to the legislature and say the Panel really needs this specific information and there is not adequate funding and see if the legislature wants to fund it. DEC may not be successful, but they can ask.

Ms. Ridgway stated she was not sure that big studies are warranted, but some empirical data to corroborate the piecemeal information that has been provided.

Dr. Véronneau said that all the economic data he asked for was responded to as out of scope. He thinks it is important to know what the actual economic benefit to the cruise industry is in the states and what kind of revenue is generated because if Panel is going to do cost/benefit analyses and environmental impact, they need to know what the benefits are and not just the costs. If Panel is looking at retrofitting and asking the ships to put new equipment on board, it would be a good starting point to know how much money was spent the first time the equipment was installed which was not that long ago. There is a big difference in cost when you are retrofitting a ship vs. a

new build. The starting point is to understand what we are talking about in dollar figures and what will be the environmental benefits for the millions spent. If outcome is to reduce the effluent levels by 10 percent, and asking each cruise line to spend \$5M, is this the most economically feasible and best money use to improve the environmental quality of Alaska?

Dr. Véronneau specifically requested the price to install each different ship system. What is manufacturing status, theoretical capacity and quality of these systems? He would like to be able to compare not just the result, but what was claimed as the quality of the systems vs. the actual, so the Panel can get idea of next system. We can consider if the system worked only to a specified quality percentage, then it could be assumed to be the same percent successful in future.

Ms. Webb pointed out that requests must be clearly organized to get comparable data from different sources so that data can be tabulated and compared.

Ms. Grady reminded the Panel that Ms. Ridgway asked for specific missing data sets and suggested that those data set requests be resolved with the requests on the table now.

Ms. Ridgway asked about asking the industry to retrofit. She did not think we were even close to that. She asked Dr. Véronneau if the Panel had already decided that was intent.

Dr. Véronneau said no, but clarified that he wants information for comparative purposes. What are the options? He wants to understand what was already installed on board the ships and the associated costs so the costs to strip current systems and install new ones are in the larger context.

Mr. Faure stated that the DEC had asked the cruise industry for what the installations cost. The answer from industry was \$200 million total, but, despite asking, DEC was never told the breakdown of that figure. Is it per ship, over fleet? So now there is a perception that some installations cost over \$200 million, but that may or may not be true. DEC also requested ballpark installation costs, operation costs, and maintenance costs from Princess and Holland America Line. They also asked for equipment expected life spans and

amortization, for example, is the installation 2 or 10 years old. The answer was that that information is proprietary and nobody needs to know this information.

The DEC asked for performance specifications from vendors and was told that there were characterization problems. If you don't know what goes in, you can't guarantee the quality of what comes out. DEC asked operators to provide performance specifications from vendors, or how it was installed and what have you done together to make it work. The answer was that they didn't have it or that its proprietary information. DEC has not had access to that information.

Ms. Grady reminded the Panel that, due to the provision in HB134, the Panel could now make the request for that information.

Mr. Kiukas stated that on the cost side, every retrofit is different and every system has different costs. For example, an inexpensive system may have a higher consumption of chemicals. There is no single answer. However, it is approximately 2-3 million Euros (\$2.5M-\$3.7M) to retrofit a vessel.

Dr. Véronneau stated that according to a letter he had seen, it was \$204 million just for equipment, without installation. Mr. Kiukas clarified that the \$204 million would include equipment and installation.

Mr. Fisher said that information was not consistent with presentation from Mr. Donovan.

Mr. Kiukas clarified that he was referring to existing systems which are removing the BOD and TSS, not metal and ammonia treatment, just strictly the types of AWWTS on board now. In addition, the retrofit costs are specific to the ship (tank types etc.).

Ms. Webb stated that the Panel just can't say "tell us that information" to the cruise industry. All the questions and requests need to put within strict parameters so that resulting information is comparable from system to system or vessel to vessel.

With help from Ms. Grady, the Panel continued to look at the information request matrix (Attachment 12) and organize their requests for information. The resulting discussions are outlined and summarized below.

### *Shoreline treatment of municipal wastewater*

- There are few cruise port cities with secondary treatment. Only Juneau, Seward and Kenai (Attachment 13, Publicly-owned WWTP and Section 301(h) Program)
- Only Juneau treats cruise ship waste
- Panel to decide whether to look at different ports in world – makes sense if there is economic information on construction and volume
- Helsinki is one port that does it, but that is a 500,000 person city. The cost is 1 Euro (approximately 80 cents) per cubic meter of wastewater treated
- Would municipal wastewater treatment plant be held to Cruise Ship permit standards? Would they no longer have mixing zone if changed permit?
- If cruise ship WW discharge resulted in changes in the WWTP effluent quality, their permit would likely change (they'd need lower discharge concentrations to meet WQS at edge of mixing zone)
- While some cities don't have standards for metals such as copper (Juneau only reports, no limit), some do, such as Sitka (discharge concentration limit is 234 mg/L)
- The context of this discussion should be encapsulated in Panel Final Report

### *Understanding of Waste Streams*

- Inconsistency with how systems are run (separate black water, commingled streams etc.)
- Don't know how individual ships are meeting standards. Panel wants a mass balance of different waste streams with a process flow diagrams showing all the COCs, where they are entering the system.
- Without understanding what is going into system, impossible to compare treatment systems
- Need to see where, for example, copper is coming from.

Ms. Kent reminded the Panel that HB 134 has provision where DEC has the authority to ask for information from industry; however, no time frame is mandated for response.

The question was raised if the goal is to have ships treat all their waste and meet the standards, or is it up to ships to figure out how to meet the standards?

However, without understanding what each ship and system is doing, the Panel can't compare the effectiveness of existing systems. A mass balance evaluation and process diagrams would clarify this.

Mr. Kiukas pointed out that the industry has a good idea where BOD and solids come from and what streams are going into treatment, but metals are not known. There has not been a study of seawater going into the evaporator, what the evaporator materials are etc. The question was asked whether to commission a study, but pointed out that a single ship would not give a whole or accurate picture because each manufacturer uses different materials.

Mr. Donovan requested a survey of equipment on board each ship – a process or instrumentation diagram that showed piping materials, valve materials, or in general, evaporator materials. Dr. Veronneau suggested testing those materials for leaching of metals. Mr. Kiukas said that was not possible because the influent water quality is not known. If the RO is not working properly, the salt content might be higher in drinking water, so that pipes would corrode.

Mr. Buggins suggested request ship-by-ship mass balance and process diagrams with mass balance information on the constituents of concern -- so BOD, TSS, ammonia, and metals -- and any other information they would have that just shows us how the streams are segregated onboard, which ones are treated, and every value that they would have, so that the Panel could understand clearly all the flows on the ship and what is going to be discharged for all parameters, including the ones that are meeting standards in the effluent. Ms. Kent cautioned that DEC could only get that data from permitted vessels because vessels that do not discharge are not required to monitor.

Mr. Faure said that DEC had asked for that information in the form of Vessel Specific Sampling Plans (VSSPs). Some ships have very good metering systems, but closer inspection with Ocean Rangers determined that many meters were disconnected or not working. This information was requested, but DEC did not get cooperative responses.

Ms. Webb cautioned that all requests for information had to be made with very specific parameters so data could be comparable. She asked if it would be feasible to go through the VSSPs and clarify what information was wanted from each ship in order to compare or get mass balance information. Mr. Faure confirmed that DEC had requested information, but did not get comprehensive responses or full cooperation from the operators. He said that there is a great deal of data, but that it has to come from the industry.

**Action Item:** OASIS work with DEC to put together a matrix of data requested from the cruise industry by the Panel, have Panel review and revise to ask for mass balance and materials inventory in such a way that the resulting information will be usable to the Panel.

Ms. Ridgway said that source water in evaporators really needed to be looked at as a source of contamination. Source water to the evaporators is some percentage of bunker and seawater. Seawater in the sea chest may be subject to antibiofouling constituents in the sea chest or substances used for cathodic protection. Another source of metals may be bottom paint – water flowing over the surface of the ship to the influent valve may contribute. It would be very valuable to have source water constituent data (pH, hardness, copper, zinc, and nickel) from both bunker and influent seawater. Possibly it's the cathodic protection that is the source of most of the metals they are challenged with. Perhaps the substances used to prevent biofouling are adding the metals.

The Panel had a discussion of sampling procedures and how to sample bunker water. Need consistency of when water is sampled (end of pipe, standing water etc.) Ms. Ridgway suggested using drinking water sampling protocols. Mr. Loehr said he did not think those protocols were appropriate as they are specific to water that has been standing in pipes of household plumbing. Ms. Ridgway clarified that she meant in terms of sample vials, preservatives etc.

Dr. Schiewer said we need bunker water information for mass balance. Ms. Ridgway said that mass balancing would only tell them about the source water at the end of the mass balance process. She said she thought if the concentrations of metals in bunker water were confirmed, they'd have an answer to that discrete question.

Mr. Fisher said he had asked Mr. Donovan and was told there is no migration of copper through the evaporator because the evaporated water is distilled. Ms. Ridgway confirmed that is also what she heard, but that sampling right after the evaporator showed high levels of copper. Mr. Donovan confirmed that materials of construction may be contributing to those metals and that if the Panel knew the materials, there was published data to determine leaching of metals from specific materials to distilled water. Mr. Donovan said in addition, they could ask the cruise lines if they had done any nondestructive testing for pipe wall thickness.

Panel summarized that metals not likely entering system through evaporator, but may be from leaching of piping materials after evaporation. (exception: ammonia can enter the evaporated water, ammonia is not found in raw seawater).

Dr. Veronneau asked again about metals in city bunker water. Panel discussed getting properly sampled data set from bunker water sources, in order to determine average concentrations of metals in bunker water. Mr. Fisher asked why they couldn't just ask cities for data. Mr. Buggins responded that cities don't test for copper and nickel in drinking water. Those contaminants usually come from household piping.

Ms. Grady asked if that was an action item for the record; to collect samples during the bunkering from start, middle, and end over a number of days; pH, hardness, copper, nickel, and zinc.

Ms. Kent cautioned the Panel that a lot of water on ships is made, very little is bunkered. The Industry is looking at bunker water in their efforts to reduce those metals in their effluent. DEC already looked at bunker water. Panel may want to look at all their questions and prioritize in order to best use available budget. However, if panel wanted such a study, they should design it and DEC could cost it out.

Dr. Schiewer said that information was important to see if a pretreatment of influent was a sensible option to meet permit standards.

Ms. Kent replied that she could see that the panel would want that information and that bunker water data would be straightforward information to get, but

that a mass balance on every ship would not be cheap to do or even ask the industry to do in a consistent way. It will be a much harder question to design.

Mr. Kiukas agreed, and suggested that maybe they only need mass balance for copper and that they get specific influent data and what operators are doing on specific systems where they are already testing and trying to reduce ammonia (Scanship and Hamworthy).

Ms. Ridgway clarified that what the Panel has been given is information, not data. If Panel is going to continue to have information presented about southeast Alaska, the Panel should either strike it completely from discussion or get real data they can work with objectively. If it isn't real data, the Panel shouldn't use it. If it costs money to get data they should do it – form a proper study, fund it and do it right. Or, go back to the charter and mission and focus on treatment and let the industry work among themselves to do their studies to figure out how to make it work.

Ms. Grady asked if the Panel wanted to move forward to create an action item to collect source water contaminant data. Mr. Kiukas suggested following the source water, through all the systems and wastewater treatment system on one ship for every type of system.

Dr. Véronneau suggested that the Panel was discussing two projects – one to look at source water and one to look at ships processes. In addition, because it's not documented when a ship uses made water and when it uses bunker water, even if contamination in the sources were known, it would be difficult to predict what wastewater quality will be.

Ms. Kent suggested that Panel presume that source water exceeded standards for whatever reason and focus on what it would take to treat it and let the companies figure out what they need to do to meet WQS at end of pipe. She said there is a finite budget for studies and research projects and suggested the Panel prioritize their requests.

Dr. Schiewer pointed out that taking daily samples on one Alaska trip and document when they are using which water may be very burdensome sampling. Dr. Véronneau added that sampler would have to be independent – a sampler sent on the ship; thus, it wouldn't be a burden to an operator, it would

be independent. He agreed with Ms. Ridgway, either they have data, or they don't, but Panel should not move forward with partial information.

### **Break**

Ms. Grady reminded the Panel that they were past the scheduled end time for the meeting and requested that the Panel define specific requests and suggested they do this within the context of the preliminary report outline.

She suggested that OASIS take the meeting notes and transcripts and synthesize the information requests the Panel asked for, send edited draft back to Panel for approval and input, then the Panel could schedule a teleconference to discuss the specific items for research for the next Panel meeting.

Ms. Van-Dort asked to dovetail on Ms. Grady's direction. She directed the Panel's attention to the outline and noted that in the last two meetings, they learned about the law, the permit, and now they are starting to get into the potential sources of parameters of concern. She asked the Panel to think about how they request information and how it will be useful to them as they go forward. Specifically, to think about what they've been talking about in terms of currently-used technologies and emerging technologies and how the Panel wants to move forward. She suggested that the outline was helpful to keep on track and reminded that Panel that they take time to do this. Ms. Grady confirmed the Panel had two years to do the work.

Ms. Grady again asked the Panel for suggestions to prioritize how they would move forward with data requests and agenda items for next meeting.

Mr. Reifenstuhel asked for cost estimate for shoreline tertiary treatment. Mr. Buggins asked if that meant tertiary treatment of the waste that comes off the ship exclusively, or tertiary treatment of the entire flow through the plant. Mr. Reifenstuhel said that the Panel mandate is to identify methods to meet standards at end of the pipe, for the cruise ships to meet those standards.

Mr. Buggins asked the question of whether the requirement to meet standards at end of pipe transferred to the municipality when cruise ship waste went there. Both felt that question had been asked but not answered by DEC and may require lawyers. Mr. Buggins clarified that for cost estimating, need to know whether cost is to expand whole system to take all blackwater, or tertiary

treatment of cruise ship waste in a separate, standalone unit. For example, take treated graywater off, run it through tertiary treatment, then discharge that separately. Would that be a service to the cruise ship?

*Summary of discussions:*

- Mass Balance information
- Source water (bunker) data sampling?
- Equipment and Piping/Materials of construction list
- Three scenarios for cost estimate:
  1. Take cruise ship WW, apply tertiary treatment, discharge
  2. Upgrade WWTP so that it applies tertiary treatment and all waste meets cruise ship permit standards at end of pipe
  3. No action, just have cruise ships discharge to WWTP and meet their current permit standards

The Panel discussed scheduling teleconferences and meetings and an interim teleconference between next face to face meeting was decided. The purpose of a teleconference a month or so before face to face meeting is for the panel to evaluate available information and to have input on agenda and how to spend meeting time.

Ms. Ridgway asked about Table 8.1 from the FS and stated that while it is a big summary showing treatment methods and what they are effective for, it doesn't characterize influent streams. It would be helpful in discussions to adopt conventions for describing influent. What are these systems successful at treating? The Panel needs at least a qualitative characterization of – when we treat this influent, with that system, you get sludge that has to be burned in a landfill, or you get all the blackwater discharged at sea. The Panel needs conventions describing what is being treated – the influent stream.

Mr. Faure suggested asking for the most recent data sets from EPA which provide a great deal of characterization of percentages of effluent sources etc. Ms. Ridgway asked for influent data to be put in tables, not collect new data.

Ms. Webb pointed out that she did not think the requested data was available. There is no data for whether influent is graywater/blackwater or mixed. Ms.

Kent confirmed that the DEC gets effluent monitoring data, but there is no influent sample reporting to DEC.

The discussion was summarized by attempting to list all the data requests again. **Action Item:** In three weeks, OASIS will create meeting summary and identify all data requests to be distributed to the Panel to prioritize and clarify.

Wei Chen from Hamworthy stood and asked to make a comment regarding the concentrated stream from a metal separation process. What the Panel is discussing now does not stop the cruise companies from being proactive and working with the vendors to have trial plants onboard in terms of metal separation and removal. They make take that initiative. In the meantime, for operational purposes, the ship needs to know where and how they dispose of the separated concentrated stream, the waste stream. Whether wastewater should be discharged offshore 12 miles, to the local facilities, or to a local waste disposal contractor. It must all be operated within the regulatory framework. It is useful for the industry to have these options available in black and white, so when such a trial is happening on a ship, they can operate within regulatory guidelines.

Ms. Grady suggested the Panel propose a meeting date in October. The third week in October was proposed. **Action Item:** OASIS will send proposed dates to the Panel during the third week in October for meeting date selection. The meeting will be located in Juneau. There will be a conference call prior to the meeting to discuss agenda and adequacy of information.

The meeting was adjourned at 11:28 a.m.