

Background:

ADEC provided SRE incompleteness letter to Princess on July 28, 2008. This letter included the SRE items that needed more detail and or additional information.

On August 19, 2008 and October 10, 2008 Princess responded by providing updates. On August 19, 2008 a mini meeting was held in ADEC JNU offices between ADEC CPVEC and Princess. In this meeting was the proposed SRE responses discussed.

This review includes the review of Princess Responses of August 19, 2008, and Princess' October 10, 2008 Responses (updates).

The review items in this internal document identifies the items that to be addressed / included in the future Source Reduction Evaluation (SRE) reporting by Princess.

The items are set out below.

Discussion:

Princess provided (binder) the proposed SRE. This SRE include all Princess responses of the August 18, 2008 and October 10, 2008 discussions. Princess did include also an "extended" process discussion in the (updated)proposed SRE regarding the "ammonia problem". AWTS Vendor information (Hamworthy) includes the "mechanisms of Ammonia formation" and is in detail discussed. Princess categorized the items in 1 to 7 categories; we will in this review refer to these categories.

Princess did not "split" for each specific fleet vessel (Class / or yard built) the specifics, the entire fleet is included, and it appears that the "Star Princess" is used as "basis" for the proposed SRE.

Category 1: Pre-Treatment Products: Princess included much information and spec sheets about Hepburn pre treatment bio care products. These products could reduce the Ammonia production and enhance the effluent quality. Appendices A-J includes all the Bio Care products Princess intends to use. Princess needs to discuss how these products are 'metered in", how the effluent performance is monitored by using the products. Also relation of product use (metering) and effluent improvement monitoring is not 100% clear. Princess does include in the October 2008 update Tables which identifies for each 2009 vessel the Hepburn Bio Care products use.

- **Category 2: Piping:** Princess included in details the piping materials and classifications in the SRE. Princess discusses the for example the Stainless Steel (SS) piping, staff believes that also evaluation of the fittings, valves, apertures etc. of these SS piping systems must included. Princess included in Appendix L a piping material overview of the vessel(s) built by Mitsubishi Shipyards. Princess needs to include for each vessel such overview; to confirm that similar piping materials are used. Piping specs and material may differ for vessels not built by same shipyards. Drain piping is not clear mentioned in the SRE, this need to be included.
- **Category 3: Identification of sources of NI, Cu, Zn, and NH3:** Table IV does not give correlation where bunkered to which vessel. Recommend to include in one overview in reporting. Seattle

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WA appears to have high Zn values, is bunkering for potable water “crucial” according SRE. Princess identifies / suggests that bunkering potable water in Seattle will continue. Stopping bunkering potable water in Seattle WA would in the Alaska trade compromise vessel safety efficient fuel use. Princess did not provide detailed support information for these items, staff could not evaluate them. Princess did not include any “separation” tankage storage regime of potable water. Therefore “isolating” water flows, and related water quality per flow is not possible. Table in future reporting must include “correlation” / “reference” otherwise are the tabled data hard to “relate” and to see which actions would reduce the source intake. Final report of intake potable water will be available at the end of October 2008.

- **Category 4: Treatment Technology evaluation:** Princess will work the coming 24 month with MBR supplier (Hamworthy) to look to improve the NH₃ controls. Appendix O includes a complete set out and discussion of the “better nitrification”. Trials are planned as well. Princess included verbiage regarding EPA proposed control technologies, the statement Princess made are not correct and do not have any bearing. These statements should be “rejected” / removed from the future reports submitted by Princess. Action plans proposed by Princess are looking good, although it appears that there are installation (physical) limitations. Hamworthy did mention Biological Nitrogen Removal Process (BNR) technology, but did not provide detailed information of this process in the SRE. Future reporting should include this technology (BNR) if applies. Princess will hire also consultant ACAV Blue water Innovations Co. Details of scope of work or project for this consultant was not provided. Action plans include also that ships should be looked at with low pH, in 2008 was “only” one ship low in pH. Heavy metals will be reduced by studying on-shore carbon filtering, and controlling the Langlier numbers / balance. Staff believes that this “balancing” is an indicator that the vessel have very “soft” water, which is corrosive. Especially un-conditioned Evaporator water and technical waters. Future reporting must distinguish these waters. Also corrosion inhibitors may be used (FDA approved).
- **Category 5: Consultant:** Princess mentioned that they would like to find AK consultants to help with their studies. Princess would like to do (if necessary) studies on the subject. Staff likes to identify that this category suggests that it is not easy to retain qualified consultants for this project.
- **Category 6: Data submittal:** Provide ADEC which so much data sampling: No findings.
- **Category 7: Time line:** Princess updated the time. At this time ADEC was not informed or notified by Princess for the actions taken in 2008. Assuming that Princess would already voluntary “pro active” implemented the actions of the proposed SRE, about 8 weeks of active testing / working on the project for the average Princess vessel while in Alaska was possible.

Conclusion:

The proposed SRE is acceptable and ADEC staff recommends approving the Princess 2008 SRE.

Please note that following items below are recommended for consideration of the review of future Princess SRE reporting:

ADEC Princess Future SRE Reporting Attention Items:

CAT 1: Dosing / time / date / conditions when bio chemicals are applied, and the method of application.

CAT 2: For each vessel dedicated piping / system materials data (if applies) including drain pipe system. Princess to include tankage storage strategy to isolate / track down the potable water flow from different sources. Princess did not expand much on EVAP water, other waters in this category.

CAT 4: Progress results from Hamworthy MBR consultation to be shared in detail.

In addition:

@ Proposed SRE appears to be valid for all the vessels in the Princess fleet. Not all the vessels in the Princess fleet are built at the same shipyard, and ship specific items do exist. This in relation piping materials and operations, and MBR systems (from same maker).

The MBR's are NOT similar for the entire Princess fleet's vessel's; Princess operates several "first generation" and "second generation" Hamworthy MBR equipment.

@If Princess operational changes of MBRs, use of products that could lead to pollutant reductions, the operations / procedures / products should be identified for future reference (compliance verification).

@Princess must include in future reporting the "breakdown" of operation changes and the results (e.g. change mixing ratio's etc.)

@Technical water, boiler water, equipment wash waters, spa and pool waters are not addressed in SRE. The future reporting should include (if applicable) these waste streams as well.

@Spent Bio products may harm full for the environment and should stored / handles / disposed off according existing laws and regulations. The off load of these products should be included in the "AK Garbage off load plans", and reporting is required.

Juneau, November 25, 2008