

# Royal Caribbean Cruises Ltd.

## Source Reduction Evaluation

In submitting the Notices of Intent for the discharge of sewage, graywater or other waste waters (as defined) under the Alaska Department of Environmental Conservation Large Commercial Passenger Vessel Wastewater Discharge Permit No. 2007DB0002 from the vessels identified in the table below, Royal Caribbean Cruises Ltd (Royal Caribbean International and Celebrity Cruises Inc.) has requested to discharge under the interim discharge limits for the identified constituents. We are including copper for Celebrity Infinity as the 2007 data is not yet available on the ADEC website and the previous data provided places the copper discharge at 3.07 micrograms with an upper limit of 3.1 micrograms.

<b>Vessel</b>	<b>Call Sign</b>	<b>Constituents Seeking Discharge Under Interim Limits</b>
Celebrity Infinity	9HJD9	Ammonia, copper, nickel, zinc
Serenade of the Seas	C6FV8	Ammonia, copper, zinc, nickel

Pursuant to section 1.9.1 in the General Permit No. 2007DB0002, Royal Caribbean Cruises Ltd. is submitting this Source Reduction Evaluation (SRE) to identify methods to reduce the presence of these constituents in the discharges authorized by this permit.

The goals of this Source Reduction Evaluation are to:

1. Identify the potential sources for each parameter (e.g. ammonia, copper, nickel and zinc) for which we have requested approval to discharge under the interim effluent limits.
2. Establish an action plan and timeline to meet the long term effluent limits.
3. Report on the success or failure of actions that are implemented to reduce pollutant loading.

It should be recognized that this Source Reduction Evaluation plan has been developed in response to the General Permit issued March 25, 2008. As such, it is anticipated that this plan will be updated and amended as further information is gathered in the process of completing this evaluation.

## **Source Reduction Evaluation Overview**

Efforts under our plan will fall into one of two categories of activities:

1. Source Reduction of inflows to reduce introduction of constituents to the waste water stream
2. Technology Evaluation / Implementation to identify and install (as necessary) technology to reduce effluent concentrations.

It should be noted that technology solutions are not yet commercially available for application on a large cruise ship, and therefore at present there remains much uncertainty in the evaluation and potential implementation of such technologies.

Activities under each of these categories is described further below:

## **Influent Source Reduction Evaluation**

A Source Reduction Evaluation will commence immediately and will include:

1. Identification of cleaning products, pesticides, or other industrial products that may be the source of the loading;
2. Identification of other sources such as shore-based drinking water supply or the possible introduction of contaminants through leaching or corrosion of plumbing, storage or waste handling systems;
3. Adoption of operational practices to reduce pollutant sources such as use of alternative cleaning products, selective source water bunkering or distillation,
4. Substitution of non-chemical methods for processes that involve chemicals.

The purpose will be to identify potential sources of copper, zinc, nickel or ammonia as they may enter the waste water stream, and to investigate and implement means to reduce their presence in the influent to the Advanced Wastewater Purification Systems (AWPS) on board. The major phases of this evaluation will be:

1. Document influent to waste streams as potential sources:
  - a. Most significant cleaning or other chemicals in terms of volume and/or concentration of constituents
  - b. Source water evaluation
  - c. Other potential contributors

**To be completed by November 31<sup>st</sup>, 2008**

2. Evaluate plumbing, storage, or conveyance systems as possible sources of contaminants through leaching or corrosion of metals or coatings associated with these systems.

**To be completed by December 30<sup>th</sup>, 2008**

3. Identification of potential product / source water substitution or operational practices to reduce constituent concentrations or environmental loading.

**To be completed by January 31<sup>st</sup>, 2009.**

### **Treatment Technology Evaluation**

Identification of potential treatment technologies for reducing or eliminating the target constituents is expected to be more complex than the initial source identification phase. Much of the information needed to select the proper system(s) will come from the influent source evaluation described above. Therefore during the next approximate 2 years, Royal Caribbean Cruises Ltd will work with our AWP system and other vendors and evaluate additional treatment technologies as may be appropriate for reduction of these pollutants that are practicable for implementation in a cruise ship environment. We will update this plan and report on our technology evaluation progress by **November 30<sup>th</sup>, 2008**.