White Paper
Wastewater Discharge from Commercial Passenger Vessels
Preliminary List of Topics

Dilution – Using all available field studies and mathematical models, estimate the minimum dilution of wastewater discharged from a moving cruise ship. Discuss how WQ standards, dilution and mixing zones are related and estimate the minimum dilutions required to achieve WQ standards based upon sample results. Estimate dilution from small cruise ships – stationary & under way.

Bacteria – Address origin, concentration and types of bacteria (environment, background, wastewater). Describe the fate of bacteria once discharged (die-off, persistence, consumption, settling of particles).

On board chemical use - Develop a table listing products/chemicals used and the range of quantities. Compare or relate this to priority pollutants or other toxics found in wastewater samples. Recommend best management practices (BMP's).

Nutrients – Describe background nutrient levels and nutrients in cruise ship wastewater. Determine whether nutrient loading is an issue.

Sediments – Describe background values in Alaska sediments. Estimate the area over which sediments may spread from typical cruise ship discharge. Compare to landside discharges including those from municipal wastewater treatment plants.

Sensitive areas - How is a sensitive area defined in relation to wastewater discharge? Develop recommendations for dilution and distance from sensitive areas.

Sampling - Develop guidelines for representative sampling, review QA/QC. Describe what constitutes a representative sample.

Sampling results analysis – Analyze and interpret sample results. Review sample variability. List max/min/mean and describe relationship to WQ standards. Review WET results. Summarize results, and what the results mean. Make recommendations regarding future sampling.

Surface fresh water lens / micro layer – Describe the effect of cruise ship mixing and turbulence on the sea surface micro-layer. Investigate the possibility that wastewater discharge creates a freshwater lens and describe the interaction of this discharge with natural freshwater discharge (rivers, estuaries).

Small cruise ships – Identify the differences between large and small cruise ship discharges. Address the different concerns; including, rate of discharge, proximity to sensitive species/areas, stationary vs under way, control of chemicals and products used, sampling and variability, "no holding tank" issue.

Recommendations

- Place issues in context. List the issues by order of concern/urgency.
- Best monitoring practice (when, where, representative sampling).
- Best management practices (where/when/how to discharge, level of treatment/effluent limits, use of certain toxic chemicals, use of technology).
- Different requirements for large and small cruise ships