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Thank You Madam Chairman, For the record I am……

I would like to make a few short comments on the science report behind SB29. Comp w/ natural Runs Mix zones
Land based TW + treatment technology

Comparisons of cruise ship waste water dumping of contaminants into the environment with natural sources such as the Mendenhall River is unwarranted and scientifically invalid. The reasons are: Copper loading

The form matters. Many metals come in different oxidative states or species. Some species are absorbed by life forms and some is not. The comparison between natural sources and cruise ship discharges does not make that distinction. For example, ferrous iron is absorbed by the body, ferric iron is not.

Type matters. Science panel report makes no distinction between elemental metals (total) and dissolved metals in the Mendenhall River. In general, elemental forms of heavy metals are not overly toxic. For instance, one may swallow a handful of copper pennies (pre-1982) without harm, but the equivalent amount of copper dissolved into water is likely fatal.

Source matters: Aquatic life becomes adapted to elevated levels of copper over time as in the Copper River where natural copper levels tend to be above the aquatic life criteria. The salmon have had thousands of years and hundreds of generations to make the adaptations. Yes, the copper levels in the Copper River often exceed the water quality criteria. This does not mean that additional copper will have no effect. Science has shown that increasing the level of copper in a short time is still detrimental to fish populations even in fish adapted to the higher background levels.

At the final level, it is a false comparison. The argument that cruise ships only contribute a fraction of the loading as the Mendenhall River does not justify additional contributions from cruise ships. It is the same false logic used by every teenager, "but Mom, everyone's doing it." This logic has no place in a science report.

The comparison between cruise ship technology and land based waste water treatment facilities.

The argument is made that cruise ships already perform better than publically owned waste water treatment facilities. Again, this is a false comparison on a number of levels. Public facilities are many decades old and are often combined with stormwater systems. This caused overflow conditions during storm events that contribute to their exceedances. The fact is that the standards have remained in place despite a history of non-compliance. This has driven the investment toward improvement. The CBJ has spent millions of dollars separating stormwater and waste water systems.

In contrast, SB29 seeks to remove protective requirements. Where's the incentive to continue to improve treatment systems? Regardless, these types of comparisons have no place in a "science" based assessment.

Mixing Zones.

All mixing zones contain an area of acute levels of toxins surrounded by an area of chronically toxic levels. Mixing zones must be as small as practicable and must meet water quality criteria at the edge of the mixing zone. The mixing zone model used in the science panel report was overly simplified and does not accurately reflect the conditions of the receiving waters.

This not adequate on a number of levels. The marine environment is not homogenous and does not mix completely as assumed in the model. The marine environment is stratified and a less dense fresh water discharge from a ship tends to be buoyant and accumulate in the upper 10 feet. This is exactly where the juvenile stages of marine life live. We are not talking about exposure times for a passing salmon, but prolonged exposure to the toxic portion of the mixing zone to floating organisms that form the basis of the entire marine food chain.

The mixing zone model software used was written as a design tool for engineering a discharge operation, not as a model used to assure compliance with a regulatory mixing zone. The software only produceds a model. Models are not to be confused with reality. If you mentally picture an atom, I can safely assume you are seeing something like a solar system with electrons flying around the

nucleus in highly elliptical orbits. This is called the Bohr model. In reality atoms look nothing like this. Do not confuse the model with reality. Planes may be modeled after birds, but they do not flap their wings.

Mixing zones are an exception to the requirements of the Clean Water Act. If every discharge is granted an exemption, why is there a rule? Again, where is the incentive to innovate and improve?

Are current treatment systems adequate?

The bottled water here is just some city water ran through a reverse osmosis system. Reverse osmosis could meet the end of pipe criteria but was not considered because of the high cost. Steam distillation could meet the end of pipe requirements and has been used for hundreds of years. Steam distillation was not considered because of the cost. In- pipe dilution where the effluent is diluted to the water quality criteria with sea water prior to discharge is very simple and not that much of a cost, but because it will still have SOME cost to the industry, it was not considered. As it turns out, cost to the cruise industry was really the only factor that was considered. Is that a reasonable way to protect our valuable water resources?

Is any treatment system efficient? "No" according to the science panel report, but are automobile safety devises are also not 100% effective, but do we use that as a reason to roll back mandatory seat belt laws.

I ask that the Science Panel not be sun-setted, but that the report be finalized and published for peer review as is the norm in the scientific community.

I further ask that end of pipe compliance with water quality criteria be retained as an incentive for the industry to continue to improve the technology.