Tim Berge

Below is text from an email exchange referring to Salmon Creek WWTP's action level, TIN lbs/year. Individual NPDES permit # WA0022772.

Southwest Suburban Sewer district respectfully requests a review of the means and methods that set our action level to 199,000 TIN lbs/year.

8/22/2022

Some follow up on the SWSSD action level calculations: Ecology used all of the historical nutrients data from DMRs for the bootstrap calculation (see attached, Salmon Creek date range: 4/8/2013-10/13/2020; Miller Creek date range: 10/22/2013- 10/13/2020). We gave permittees the opportunity to indicate if any of their data was unrepresentative during the development of the permit and I don't recall SWSSD arguing that any of theirs was unrepresentative. I've attached the data files, the link to the calculator (action level calculator), and screencaps of the bootstrap calculator inputs we used for your reference in case you want to confirm the action level outputs.

Regarding why the action level differs from historical maxima: During the call today, Shawn indirectly referenced the "regression to the mean" principle when he mentioned an expectation that more frequent monitoring as required by the PSNGP should tend to lower annual load calculations relative to the action levels that were calculated using less frequent data. This doesn't mean there's a 0% chance SWSSD will exceed the action level, it just explains why the calculated trigger (which is in part a function of expected monitoring frequency) can be lower than a historical maximum. I believe Steve Hood attempted to explain this during the meeting he, Ellie Ott and I had with you and SWSSD about these action levels on February 25, 2021. Please let me know if you would like another meeting with Steve and me to discuss the bootstrap calculation and these action levels, though keep in mind we are unlikely to be able to reopen the general permit for revisions at this point.

9/27/2022

I think I found the issue as to why my calculation kept coming up with 215,000 lb/yr for Salmon Creek (vs. 199,000 lb/yr in the permit). It has everything to do with # of samples per month selected. Ecology selected 4 samples per month for the sampling frequency. That's the new sampling frequency for the updated permit. The old frequency was 1 sample per month for the actual data. That makes the difference between the two numbers. The same issue comes up for the data using miller creek as well, where the level raises to 323,000 lb/yr if 1 sample per month is selected. See attached screenshots.

So our question is, why is the selected number 4 samples per month? My understanding of bootstrap is that the samples selected should reflect the original dataset to be used for calculations, not the future data, as the point of bootstrap is to

create thousands of new datasets of the same size as the original dataset based on randomly sampling all of the original data. Then you now have several thousand new data sets of the same original size. You can then calculate annual averages of all the new datasets and develop confidence intervals from those thousands of values. By selecting more sample days per month, I think the calculation is artificially reducing the number of samples in the new dataset used to calculate annual average (by a factor of √ from the original dataset), thus reducing the overall calculated value. This inherently results in a dataset with a smaller overall confidence interval than the original dataset due to fewer samples used in the calculation. But perhaps I'm wrong about that if the calculator doesn't work in the manner that I've researched about boostrap datasets. Either way, maybe we should talk through this further.

9/29/2022

The monitoring frequency used in the bootstrap calculation definitely impacts the resulting action level. Ecology concluded that historical data previously reported to us is our best representation of the discharge, and we assumed future data would resemble this historical distribution (at least initially). The method used to calculate the action levels uses past observed data to create multiple sets of probable data points the facility is likely to observe in future years when sampling at the new monitoring frequency. The action level is calculated based on a confidence interval appropriate to the number of samples. You're welcome to contact Steve Hood if you want to discuss the calculator further (360-255-4396).

Note that the permit includes a provision for Modification of Permit Coverage (Condition S2.D.), including requesting action level reassessment (following at least 1 year of permit monitoring). In order for Ecology to process this modification of permit coverage, Permittees must show that influent organic loads did not increase and that the increased sampling density resulted in better effluent characterization.

Also keep in mind that the narrative effluent limits, of which action levels are a part, will be superseded by numeric effluent limits in the next permit term. Action levels will no longer be applicable once Ecology places permittees on compliance schedules working towards compliance with a numeric water quality-based effluent limit. Monitoring frequencies may change in future permit cycles, however no changes will occur until the nutrient reduction plan has been finalized.

Finally, action levels are not numeric effluent limits, and an exceedance of an action level is not a permit violation rather it just calls for permittee corrective action.