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October 24, 2008

Mr. Michael Gearheard, Director
Water Division, USEPA Region 10
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Gearheard:

The intent of this letter is to provide written interpretative guidance on the application of Washington's Water Quality Standards in relation to reservoirs, particularly for development of the Spokane River Dissolved Oxygen TMDL. The application of criteria, establishing natural background levels for the reservoir, and the role of dams as a contributing source in meeting dissolved oxygen standards for the Spokane River and Lake Spokane, have been areas of confusion for EPA staff. We appreciate the opportunity to clarify these issues so this TMDL can effectively move forward.

What criteria apply to reservoirs?

Washington water quality standards have criteria for fresh and marine waters. A definition of "lake" is included in the standards for the purpose of applying criteria to fresh waters, WAC 173-201A-020 – ("**Lakes**" shall be distinguished from riverine systems as being water bodies, including reservoirs, with a mean detention time of greater than fifteen days). Ecology bases this definition on detention time, regardless of whether the lake is natural or is a reservoir formed by a human structure, such as a dam. Lake Spokane has a mean detention time of greater than 15 days, and is therefore a lake under Washington's water quality standards.

How does Ecology apply the dissolved oxygen criteria to a reservoir?

The water quality standards for dissolved oxygen [WAC 173-200(1)(d)(ii)] state that "For lakes, human actions considered cumulatively may not decrease the dissolved oxygen concentration more than 0.2 mg/L below natural conditions."

"Natural conditions" or "natural background conditions" are defined as the water quality absent any human-caused pollution. (WAC 173-201A-020.) As discussed above, reservoirs are specifically included within the definition of "lakes" and are treated the same as a natural lake. This is consistent with the way we determine natural conditions in temperature TMDLs.

Ecology believes our approved water quality standards are also consistent with federal water pollution control laws which focus on identifying and protecting the highest attainable uses for water bodies.

Does the application of Washington's water quality criteria to a reservoir mean that the dam that created the reservoir is considered natural as well?

No. The dam and the lake behind it are not natural, since they were created by human actions. This means that Ecology cannot treat the effects of dams on water quality as natural. For example, while we may consider the temperature or dissolved oxygen measurements of water draining from a natural lake that has no anthropogenic pollution sources as meeting water quality standards, we cannot make the same assumption for a reservoir.

In order to apply the criteria for lakes in a meaningful and consistent way, Ecology implements the standards (TMDL, NPDES and 401 certifications) with the assumption that the dammed system will be operated and maintained to comply with water quality standards in the reservoir.

Modeling the TMDL with the dam in place allows the TMDL to move forward with the analysis of upstream sources to determine loads and allocations. It is appropriate to model with the dam in place because the impacts of pollutants must be evaluated under critical conditions in the TMDL process. The reservoirs and the reservoir basins greatly contribute to the critical hydraulic conditions for dissolved oxygen. If we run the model without the reservoirs, then the critical conditions would be greatly altered and the problems with dissolved oxygen would appear to be non-existent, when in fact this is not the case.

How does Ecology ensure that a dam system operates to achieve compliance with water quality standards in the reservoir?

In July 2003, Ecology adopted specific provisions for bringing dams into compliance with the water quality standards. That process mandates activities that will either bring the dam operations into compliance with the established criteria, or that will collect sufficient data to determine what is achievable (WAC 173-201A-510). Ecology has applied the compliance schedule to dams that have gone through FERC re-licensing in the past four years. Our intent is to have the dam operators implement actions that will have the dam comply with water quality standards. We are doing this with the Avista 401 certification. This certification is intended to complement the associated TMDL for Spokane River, consistent with what was done for the total dissolved gas TMDL on the Columbia that we jointly developed with you as well as the Pend Oreille temperature TMDL that we are currently working to finalize.

How will the Spokane TMDL incorporate contributions from the dam system?

To align the TMDL and 401 certification, Ecology proposes that the model be run similarly to that described in the attachment, with the idea that wasteload allocations be set for all dischargers, load allocations set for nonpoint sources, and the resulting oxygen deficit determined at the most critical location in Lake Spokane. The contribution from Avista will then be determined. To mitigate identified contributions, Avista is expected to participate in the TMDL and its implementation. These requirements will be reflected in and enforced through the dischargers' NPDES permits and Avista's 401 certification.

Ecology believes this approach allows the melding of timeframes for the review of the 401 certification for the Long Lake Dam, the TMDL process, and NPDES permitting of the upstream point sources in the most reasonable manner. In the end, the effects of dams, diversions, and point and nonpoint sources of water quality degradation (i.e., all human effects) must cumulatively not cause greater than a 0.2 mg/l decrease beyond natural conditions for dissolved oxygen.

Sincerely,

Kelly Susewind, P.E., P.G.
Interim Program Manager
Water Quality Program

Attachment

Attachment A

How were the dissolved oxygen (DO) standards applied in the original model for the current draft of the Lake Spokane TMDL?

As described in Part B of the current draft, the 0.2 mg/L allowance for lakes was used as the water quality standard but only applied to the most critical model segment (at the Long Lake Dam) and only to the model "layers" that were below 8 mg/L during the most critical day of 2001. The "natural background" for DO was defined as the reservoir without Washington point and nonpoint sources (the NO-SOURCE modeling scenario in the TMDL) with the dams in place. Natural conditions or background water quality was defined at the Idaho state line using model-predicted water quality provided by EPA (with Idaho point sources). For the tributaries, natural conditions were defined using a combination of historical water quality data from a tributary in the Little Spokane watershed and the outlet of Lake Coeur d'Alene. Under the NO-SOURCE scenario, the minimum lake DO is still predicted to be <2 mg/L in September in the deep part of the lake. However, the sediment oxygen demand (SOD) scenario suggests that if SOD improves over time the minimum lake DO could be about 5-6 mg/L. As the possible future "best case scenario," the SOD scenario for Lake Spokane suggests that dissolved oxygen would still be well below the numeric criterion of 8.0 mg/L.

Ecology believes 0.2 mg/L human allowance below natural background makes the most sense for a reservoir since DO decreases with depth during stratification and the numeric criterion of 8.0 mg/L is very likely not possible even if lake aeration or oxygenation were implemented.

For the current TMDL, 0.2 mg/L deficit was determined as follows:

1. Subtract natural-condition DO estimates for each layer from other scenario DO estimates in the most critical model segment (i.e., segment 188 – Long Lake Dam) during the most critical day during 2001.
2. Average the model layer differences in those layers that were predicted to be <8 mg/L for each scenario (i.e., if DO was predicted to be >8mg/L the difference was not included to get a water column average deficit).