Water Quality & Treatment / Wastewater Treatment: Studies, Design, Operation / Industrial Wastewater Management
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Review and Comments:
Spokane River and Lake Spokane
Dissolved Oxygen and Total Maximum Daily Load
Water Quality Improvement Report
Washington Department of Ecology
Publication No. 07-10-073, May 2008 DRAFT (Draft TMDL)

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Please accept the following comments:

1. RE: Spokane Modelers Meeting; November 2004
   "Basic Agreement: The CE-QUAL-W2 model framework is appropriate"
   In November 2004 approximately 20 persons with working familiarity with the CE-QUAL-W2 model used for the Spokane river met at Portland State University. A "Basic Agreement" was developed at the conclusion of the meeting. The agreement is appended to the Draft TMDL. The "Basic Agreement" included that:
   - The scientific basis of the model is adequate to support the draft TMDL and that non-point and point sources of BOD and nutrients would need to be reduced to near background levels, to meet the existing DO standard.
   - That there was no agreement on implementation and mitigation measures.
   - That model improvements were needed to allow use of the model to evaluate alternative targets and/or implementation and mitigation measures. A number of desired model improvements were listed.

   To date the model improvements have not been made. This makes use of the model for evaluating alternative targets and implementation and mitigation measures inappropriate, as has been done in this Draft TMDL, based on the collective opinion of the persons that signed the "Basic Agreement". Thus there is no consensus (of the group that met in Portland) that the scenarios evaluated (page 14) are valid.

2. The scenarios evaluated during the TMDL analysis, were based on the model as developed using 2001 data. The model range of application is questionable for all except the "CURRENT" alternative, due to the limitations discussed above. In addition some of the other assumptions that went into the analysis are questionable, e.g., the use of 90%ile data for BOD and phosphorus in the "PERMIT" alternative, and the "SOD" alternative which modified the sediment oxygen demand, which in turn was never verified.

3. Water quality requirements in the Spokane River downstream of Long Lake Dam as included in the Spokane Tribe water quality standards are mentioned, but not addressed as to how, if at all, the dissolved oxygen in the reach below Long Lake Dam will be improved by implementation of the TMDL, or any intention that there will be improvements.
4. The Water Quality Standard that the TMDL is purported to address in Long Lake (Lake Spokane) does not appear to result in an improvement in water quality from the standpoint of habitat for fish and other aquatic organisms, in that the improvements still do not result in meeting water quality criteria necessary for survival and reproduction in a greater portion of the water body than at present.
5. The Waste Load Allocations (WLA) as included in the Draft TMDL do not appear to correspond with the water quality objectives for the Spokane River and Long Lake. It is stated in the Abstract and elsewhere that the in-stream concentrations must be less than 10 µg/l phosphorus, and in the executive summary and elsewhere that the Wasteload allocations assigned to the dischargers are based on 10 µg/l of phosphorus. Yet the Wasteload Allocation section uses 8 µg/l phosphorus as applicable for the dischargers (except for Spokane where the WLA is indicated as 7 µg/l) (Table 5). The allocation values referred to during the "Collaboration" were 10 µg/l. There are no demonstrated treatment technologies or processes that will achieve this concentration of total phosphorus in wastewater effluent.
6. The proposed limitations imply that the limits will be for total phosphorus (see p. 5, Pollutants addressed by this TMDL). The model used to predict the outcome of effluent limitations (CE-QUAl-W2) used "reactive" phosphorus in its input files. There was also a compartment in the model for phosphorus liberation from CBOD during its degradation. Data collected during 201, which was used for the model development/calibration, showed the percentage of total phosphorus that was "reactive" (measured as ortho-phosphate phosphorus), which was used in the model. The relatively limited data indicated that a significant portion of the phosphorus was non-reactive. This non-reactive phosphorus may be liberated from its chemical bonding to become available for algae growth, but the kinetics of the liberation, and whether it is really released in proportion to the CBOD degradation was not demonstrated. Therefore, it would appear that the actual limitations on phosphorus as an essential ingredient for algae production should be the initially reactive, plus that which actually becomes reactive (available for algae uptake and production), as demonstrated by real data.
7. The WLA for carbonaceous biochemical oxygen demand (CBOD) are listed in Table 5 in the form of $CBOD_{ult}$, which stands for "ultimate" CBOD. A footnote indicates that permits will be issued using $CBOD_5$, or 5-day CBOD, rather than $CBOD_{ult}$. There is no translator provided to indicate how the application will be made. During studies in 2001, the ratio between BOD_{ult} and BOD_5 was shown to be from 3 to 10, depending on discharger, with time and sample variations for each. In addition the rate of exertion of the CBOD varied among the dischargers, with the ultimate being reached from between 20 and 60 days. Therefore it does not appear to be straight forward as to how the permits will be developed for $CBOD_5$ limits. If the limits based on the individual factors become 1/3 to 1/10 of the values in Table 5, the $CBOD_5$ requirements would become 0.1 to 0.4 mg/l. These values are not accurately measurable using normal (Standard) procedures. There are no demonstrated technologies or processes to achieve these concentrations of $CBOD_5$ in wastewater effluent.

8. The added water that will (may) be realized in the Spokane river if the Ecology water quality requests of Avista for 401 certification are complied with will potentially make a large difference in the capability of the river and Long Lake to accommodate the load of constituents to the system. There has been no evident attempt at analyzing the potential impact. It will be, in part at least, dependent on the amount of water available to supplement the flows to the extent requested.
9. A target pursuit action for Technology Selection is to select treatment (under the technology selection protocol in the Managed Implementation section) that will be capable of achieving a "seasonal average mass equivalent of 50 µg/l of phosphorus. Again it is unclear if this refers to total phosphorus or "reactive" phosphorus as used in the modeling. It is further unclear if this will be the 'interim' permit limits for the permits expected in 2008, as discussed later in this section.
10. Additional discussion in Managed Implementation Plan section appears to reflect on agreements that were incorporated in the "Foundation Concepts for the Spokane River TMDL Managed Implementation Plan" (June 30, 2006), as accepted by the agencies and dischargers in the March 7, 2007 Memorandum of Agreement (Appendix B). It appears that these concepts were abandoned in conjunction with some of the discussion in earlier sections this Draft TMDL. There is no indication if any of the provisions of the MIP are being honored in this Draft TMDL version, or if all conflicting provisions in the MIP are not being honored, in spite of agreement among the collaborating parties. References to the MIP in the abstract and executive summary of the Water Quality Improvement Report imply that the MIP and Foundation Concepts have guided the TMDL's plan for implementation. It is requested that the a summary of how each point in the Foundation Concepts Document is addressed in this Draft TMDL report.
11. The first paragraph in "Adaptive Management" appears to be impossible to fulfill in that the "No Source" scenario was developed using a model that has not been properly calibrated. Therefore, the water quality criteria being used (no more than 0.2 mg/l oxygen deficit from the background condition) is not possible to attain, even if the water quality improves to make the water quality adequate for fish and aquatic life.
12. The Ecology Response to previous comments regarding the potential need for an EIS was poor. The response referenced WAC 197.11.704 to justify no need for an EIS, but the referenced WAC would appear to include the TMDL and its implementation plan as an action requiring an EIS. The question of an EIS should be re-addressed. The need is demonstrated by:
    - The cost passed on to the constituents of the dischargers resulting from the significant capital and O&M expenditures required to meet the WLA requirements.
    - The energy required for production of the raw materials that will be required for reduction of the phosphorus (dose rates of 10 mg/l to 30 mg/l of primary coagulant are expected to meet the first level of compliance, 50 µg/l P) and energy required for operation of the facilities (pumping, aeration for low levels of BOD and NH_3).
    - The disposal of residuals that will accompany the processes for chemical precipitation. The chemical sludge has not been demonstrated as suitable for agricultural use.