March 27, 2008

MEMORANDUM FOR: Paul Picket / Karin Baldwin, Washington Department of Ecology
Robert Steed, Idaho Department of Environmental Quality
Don Martin, Environmental Protection Agency
Michele Wingert, Kalispel Tribe of Indians

SUBJECT: COE reply to WDOE Draft Comments for Pend Oreille River TMDL, Pre-Public Comments

The following memorandum contains comments from the Seattle District Corps of Engineers (Seattle District) regarding the February 24, 2008 *Draft Comments for Pend Oreille River TMDL, Pre-Public Comments* prepared by Washington Department of Ecology. Comments were provided by Kent Easthouse and Ed Zapel, Seattle District Corps of Engineers and Mike Schneider, U.S. Army Engineer Research and Development Center (ERDC).

1. Comment Index AC-4a,b,c

WDOE Draft Response:

Ecology is performing preliminary analyses to evaluate the temperature using frequency distributions that minimize the effect of lag time. It appears that the impairments identified do not change, and if supported by additional analysis, we will report that and stick with the original approach. Biological significance of lag time can be addressed during implementation or 401 certification.

Seattle District Reply:

Based on conversations with Paul Pickett and Karin Baldwin and the presentation at the February 25, 2008 WAG meeting, the Seattle District believes that the method Ecology is using to perform frequency analysis is not correct and will provide little information pertaining to minimizing the effect of lag time. It is our understanding that Ecology is performing frequency analysis on "existing" vs. "natural" conditions for a reach of the river (i.e. from the state line to Usk) for moving 7 day periods. Thus, you would have multiple frequency analysis for the river reach in question and each frequency analysis would be for a sequential 7 day period of daily maximum temperatures.

The Seattle District feels that the range of thermal characteristics will be limited using a 7 day time period so there would be limited statistical information about the cumulative percent of time the river exceeds temperatures over the course of the critical summer period (i.e. June 21 to Sept 21). We believe that a 7 day frequency analysis will do little to remove the day to day variability in the model output and will provide little statistical information from which to judge the frequency of compliance with the desired standard or the frequency and duration of temperatures exceeding a desired temperature. Indeed, the lag time/travel time difference calculated by the Seattle District for "existing" vs. "natural" conditions ranged from about 3 to 8 days in the

summer and such a lag time effect would not be removed by looking at a 7 day frequency analysis of daily maximum temperatures. The Seattle District took a different approach by lumping daily maximum temperatures over the critical period of the summer. For example, we performed a frequency analysis on daily maximum surface temperatures at Albeni Falls Dam for the time period from June 21 to September 21. This 93 day time period encompasses all days above 18C for the 2004 period. The use of frequency analysis over a longer period of time was how Oregon DEQ used frequency analysis on the Willamette TMDL in order to assess if projects or scenarios had an overall impact on the river instead of just a day to day impact.

2. Comment Index AC-8(PP3)

WDOE Draft Response:

Ecology standards are not set up to allow for volume weighted averaging. TMDLs must take into account worse case scenarios, so Ecology will not use volume weighted averaging. The model does average horizontally and vertically within each cell. Averaging throughout the water column could be less representative of the temperatures in the river.

Seattle District Reply:

The Seattle District maintains that Ecology standards do not specify how to deal with interpretation of model analysis for temperature standards. These standards do not state whether you can or cannot volume or flow weight model data. Ecology has approved the use of volume and flow weighted CE-QUAL-W2 temperature data for 401 certification at Rocky Reach Dam so there is a precedent for allowing volume and/or flow weighted data from CE-QUAL-W2 models (WDOE letter March 17, 2006 401 Certification Order 3155). Moreover, any Ecology temperature TMDL based on 1-D models such as QUAL 2k or Heat Source are already inherently using volume or flow weighted data by default. Models such as QUAL 2k are 1-dimensional and model an average water column temperature. These models do not predict the extrema temperatures associated with the water surface but rather assume a completely mixed temperature environment. There are numerous examples of Ecology temperature TMDLs that used QUAL 2k to model existing conditions and natural conditions, and compare these weighted temperature data to Ecology standards.

The Seattle District respectfully disagrees with the statement *"Averaging throughout the water column could be less representative of the temperatures in the river."* The Draft TMDL, the Boundary model calibration report, and the Box Canyon model calibration report all state that the Pend Oreille River in Washington is well mixed and has very little thermal stratification, generally less than 1°C. We fail to understand how then a volume or flow weighted average of the water column of a well mixed river can be less representative of temperatures in the river than the surface cell temperature. The surface cell is exposed to air temperatures, solar radiation, and wind, and has a greater error and uncertainty than the volume or flow weighted data. If there is little to no thermal stratification, a volume or flow weighted sample is equally representative of temperature in the river as a surface cell. A volume or flow weighted sample is an aggregate of many model cells, and as such has less error and is more representative of a predicted temperature than a single model cell.