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From: Tom.Dupuis@CH2M.com
Sent: Thursday, May 05, 2011 6:20 PM
To: Mary Anne Nelson; Don Essig
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Subject: Suggested Edits for Antideg Guidance Chapter 3
Attachments: Chapter 3 - Evaluating Potential to Degrade (edits suggested by Tom and Robbin).docx

Hi folks. Here are suggested edits from Robbin and I for Chapter 3, as promised some time ago. Sorry it took us so long, for me the steelhead up in the Upper Salmon have been calling (though not biting as much as hoped for). See you tomorrow AM.

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3 Evaluating Potential to Degrade

Edits to ~3/16/11 Version Suggested by Tom and Robbin

Characterizing Upstream Water Quality

Knowing the upstream water quality data is essential to calculating potential degradation. While it is important to adequately characterize upstream water quality, how much data this takes will depend on water quality variability and how much uncertainty can be tolerated in the analysis. Depending upon the quantity of available background data, DEQ will generally use a conservative estimate of pollutant concentrations when calculating degradation.

~~It is common practice to~~ EPA Region 10 typically uses the 95th percentile (i.e., the value that is expected to be exceeded 5% of the time) of measurements as a conservative characterization of ambient concentrations when evaluating permit limits.[1] In particular, EPA uses this value for evaluating limits based on receiving water criteria applicable to relatively short-term effects (e.g., acute and chronic aquatic life criteria). However, getting a reliable estimate of the 95th percentile requires sufficient data. Generally, 30 measurements across the full range of variation are recommended although as few as 12 (monthly samples for a year) will be acceptable. If fewer than 12 data are available, DEQ will use the maximum observed during low flow or other critical time period when receiving stream concentrations are expected to be high, rather than an estimated 95th percentile. If no data are available, DEQ may request that the applicant obtain such data.

For other types of receiving water criteria (e.g., criteria based on longer-term effects such as those applicable to human health or nutrients), a more appropriate assumption for upstream water quality would be a representation of the "central tendency" (such as a mean, geometric mean, or median).[2] In addition, DEQ recognizes that differing time periods will apply to derivation of central tendency values for different types of designated uses and associated criteria. For example, annual averaging would be appropriate for mercury, annual or seasonal for nutrients, and during summer critical periods for pollutants such as dissolved oxygen and temperature. Such temporal considerations apply not only to upstream concentrations, but to other elements of limits calculations (sections 3.2 and 3.3).

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[1] Idaho has proposed methods for calculating WQBELs, including how to define ambient concentrations, in both a WQBELs guidance document and a Board of Environmental Quality rule-making (both developed in 2002). EPA has not adopted DEQ's guidance or rule for permitting purposes, and thus DEQ's antidegradation calculation procedures will need to be consistent with EPA's permitting calculations for as long as EPA retains NPDES primacy.

[2] For example, DEQ's guidance for implementing its criteria for mercury recommends use of the mean value for water column or fish tissue concentrations as related to the human health criterion, and recommends the geometric mean for potential future aquatic life criteria (DEQ, 2005). Another example is the Idaho Falls NPDES permit in which EPA evaluated phosphorus limits using a median value for the upstream concentration.

DEQ expects sufficient data to be available in the permit or license application and discharge monitoring reports for existing NPDES-permitted discharges. For the latter, DEQ also expects to rely heavily on EPA's calculation of upstream water quality prepared in their drafting of effluent limitations for the permit. Depending on the permitting situations these calculations may need to address seasonal water flows and a flow-tiered discharge framework.

Measurements of upstream water quality are important but may not be sufficient. Measurement of upstream quality may not reflect potential upstream quality, the quality that would occur with other sources upstream discharging at their permitted limits. Potential upstream quality must be determined so that we know the estimated remaining unallocated assimilative capacity is and ensure that we do not over-allocate it. This also affects the determination of whether an increase in discharge is significant or not (see section 5.1). Therefore, some situations may require the calculation or modeling of upstream water quality.

3.2 Effluent Characteristics

Much of the needed information on effluent quality and quantity will be found in the current and/or proposed permit or license. Additional information may be found in the permit application and, for an existing discharge, in discharge monitoring reports.

For pollutants with quantitative limitations in a permit or license, those limits will be used in calculation of the discharge's effect on water quality. However, there are two used in calculation of the discharge's effect on water quality. However, there are two common situations in which data in the permit alone will be inadequate to assess the effect of a new or an increased existing discharge on water quality:

- **No permit limits:** In either a new or an increased existing discharge, a pollutant may be known to be present for which there are no effluent limitations (no technology-based effluent limitation requirements) and for which it has been determined there will be no reasonable potential to exceed (RPTE) criteria. In this case, there will be no permit limits in either the new or reissued permit from which to calculate degradation.
- **First time permit limits:** In the renewal of an existing permit, a pollutant may be added for the first time, either because of new regulation or due to an increase in discharge leading to RPTE. In this situation, there will be a limit in the reissued permit but not a limit in the old permit.

Even for pollutants without permit limits there can be degradation of water quality. Thus it will be necessary to determine both the current and proposed quality of the effluent for pollutants regardless of whether there are permit limits. For NPDES discharges this is typically limited to information on characteristics of the discharge as described in the permit application.

A first time permit limit implies degradation of water quality but this is not necessarily the case. A new limit could be due solely to a change in regulation, e.g., a new or more

stringent criterion or a new effluent limitation guideline, and therefore not result in worsening of water quality. In these situations, it will be necessary to determine the quality of the effluent prior to the limit, and compare it to the quality with the proposed new limit. Current quality for a pollutant without a prior effluent limitation must be based on discharge monitoring data or estimated based on other similar discharges.

Where new proposed limits are a result of reasonable potential analysis in absence of any actual increased discharge of pollutants, it is essential to use the same statistical procedures to characterize the quality of the effluent prior to a new limitation as is used in developing the new limit, e.g., procedures in EPA's Technical Support Document for Water-Quality Based Toxics Controls (TSD) (EPA, 1991).[3] To do otherwise would be an unfair comparison. Information on proposed effluent quality with regard to a limited pollutant may be found in the permit application or may be estimated based on other similar discharges.

"Critical Conditions" sub-section of section 3.3

Critical conditions are typically a combination of the maximum permitted effluent flow, maximum projected effluent concentrations or maximum allowable effluent limitations, critical conditions (e.g. "critical flows") of the receiving stream, and upstream water quality concentrations (as determined by monitoring, calculation or modeling). If there is consideration of seasonality or 'flow-tiered' effluent limits there will be multiple sets of these critical conditions.

The maximum discharge flow is based on the facility design capacity or production-based maximum discharge. This will be stated in the permit or license for the current discharge and in the permit application for the proposed discharge The receiving water body critical flow is determined according to the WQS (at §2 10.03) for each pollutant evaluated, e.g., for chronic aquatic life criteria, this is the 7Q10 flow. For nutrients, it is recommended that the 30Q10 flow during the growing season (e.g. April-September) be used. For mercury, it is recommended that the annual average flow be used. For temperature and dissolved oxygen, the 7Q10 flow is also useful but may be calculated on a monthly basis to account for seasonality.

[3] Citation of the TSD here is used as an example of the statistical procedures that are often used in deriving NPDES permit limits. This is not to say the TSD is appropriate for all pollutants or discharge situations, or that other statistical procedures may not be used. For example, as noted previously for defining upstream concentrations, the appropriate procedures for defining effluent quality should consider averaging periods and durations applicable to the different types of designated uses and applicable criteria.The point is that any statistical procedure used must be applied to both the current and future discharge scenarios when judging if discharge has increased.