

Name of Toolbox Element - Location Ratios for Potential Future Trading or Bubbling Conditions in NPDES Permits

1. Introduction / Overview

The Spokane River and Lake Spokane Dissolved Oxygen Total Maximum Daily Load Water Quality Improvement Report (TMDL) established wasteload allocations (WLAs) for Washington dischargers, which are illustrated in Table 5 of the TMDL. The WLAs are for Ammonia (NH₃-N), Total Phosphorus (TP), and Carbonaceous Biological Oxygen Demand (CBOD). These WLAs were established for each discharger based on TMDL Model Scenario 1 inputs into the CE-QUAL-W2 model.

The TMDL also provides for “Delta Elimination” and “Target Pursuit Actions” in recognition that the implementation of additional treatment technologies alone at a point source may not be able to reduce permitted discharges to the levels derived from the WLAs established in the TMDL.

Because the physical location of each point source on the river with respect to a fixed point downstream varies, the impact on dissolved oxygen of equal masses of discharges (TP, NH₃-N, and CBOD) from point sources will also vary with respect to its physical location relative to that same fixed downstream location. In order to equate the dissolved oxygen impacts at the fixed downstream location from the individual point sources, a “location ratio” for each point source location must be developed and applied.

2. Toolbox Concept

The toolbox concept for location ratios for potential future point source to point source pollutant trading or potential future “bubbling” conditions in NPDES permits is based on the need to establish, through modeling, “location ratios”. These ratios are derived by determining the equivalent impact on dissolved oxygen water quality in Lake Spokane from identical mass discharge of phosphorous, ammonia, and carbonaceous biological oxygen demand from point source discharges located at different distances from a fixed point downstream on the river.

For example, for a point source at Location A, the modeling effort may show that a 1.0 lb/day total phosphorous discharge has been attenuated in the watershed such that at the fixed point downstream, its impact has been reduced to that of a 0.5 lb/day total phosphorous when it reaches the fixed downstream point. The location ratio for the Location A point source is therefore 0.5. Similarly, for a point source at Location B, the modeling effort may show that a 1.0 lb/day total phosphorous discharge has been attenuated in the watershed such that at the

fixed point downstream, its impact has been reduced to that of a 0.3 lb/day total phosphorous when it reaches the fixed downstream point. The location ratio for the Location B point source is therefore 0.3.

Having determined the location ratios that apply to each of the point source locations, the equivalency of impact for mass discharge rates can be calculated. For a 1.0 lbs/day total phosphorous discharge at Location A in this example, the amount of total phosphorous that can be discharged at Location B with the same impact at the fixed downstream location is 1.6 lbs/day. This is determined by dividing the location ratio for Location A by the location ratio for Location B ($0.5 / 0.3$).

Taking this modeled impact information, the point sources involved would then be able to trade equal impact discharge rates or bubble their discharge rates if provided for in their respective NPDES Permits.

3. Data Collection, Sampling, and Research Needed

For the demonstrations that will be required to determine the location ratios at various points along the river, no additional data collection, sampling efforts, or research are needed. The CE QUAL W2 Model that has been used for the TMDL related modeling efforts, the appropriate mechanism for determining equivalent impacts from different locations on the river, is available.

4. CE QUAL W2 Modeling Requirements for DO TMDL Equivalency (developed as part of step 2)

5. Permit Provisions (developed as part of step 3)