Name of Toolbox Element – Pollutant Equivalency – Dynamic Permit Limits (for Internal Point Source Pollutant Trading and Potential Future Bubbling Conditions in NPDES Permits)

1. Introduction / Overview

The Revised February 2010 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 Biochemical Oxygen Demand (CBOD). These WLAs were established for each discharger based on TMDL Model Scenario 1 inputs into the CE-QUAL-W2 model as described in the Spokane River Modeling Final Scenario Report (PSU, January 29, 2010).

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.

Modeling has shown that the predicted dissolved oxygen water quality impacts in Lake Spokane vary from parameter to parameter. Equal mass discharges of each parameter from the same discharge location in the Spokane River Watershed produce different predicted dissolved oxygen impacts. For example, for identical discharge rates of phosphorus and ammonia from the same location into the watershed, the phosphorous discharge has been shown to have, through modeling, a larger impact on dissolved oxygen water quality in Lake Spokane than the ammonia discharge.

2. Toolbox Concept

Two toolbox concepts for pollutant equivalency are provided for in this manual: static permit limits and dynamic permit limits. The static permit limits concept establishes set seasonal limits for each of the parameters based on equivalency. It is defined separately under "Pollutant Equivalency – Static Permit Limits."

The toolbox concept for pollutant equivalency using dynamic permit limits can be used for internal point source pollutant trading and potential future "bubbling" conditions in NPDES permits. It is based on establishing, through agreed upon and calibrated modeling, the "exchange rate" between equivalent impacts on dissolved oxygen water quality in Lake Spokane from the discharge of phosphorous, ammonia, and carbonaceous biochemical oxygen demand from the same point source discharge location in the watershed.

Permitted Discharge	Phosphorous Equivalency Ratio	Equivalent Phosphorus Discharge
TP, NH3-N or CBOD Discharge limit (lb/day)	1 lb equivalent phosphorous/day	= Equivalent lb phosphorous/day
	Exchange rate (lb phosphorous/day)	

For example, for a specific NPDES permitted point source, the modeling effort may show that a 1 lb/day phosphorous discharge, a 50 lbs/day carbonaceous biochemical oxygen demand discharge, and a 20 lbs/day ammonia discharge each have the same impact on dissolved oxygen water quality in Lake Spokane over a specified period of time. Taking this modeled impact information, the permitted point source's discharge limitations for phosphorous, ammonia, and carbonaceous biochemical oxygen demand can be converted to an "equivalent phosphorous" discharge limitation through the application of the exchange rates established for the permitted point source.

For example, at a point source with permitted discharge limitations of 5 lbs/day for phosphorous, 10 lbs/day for ammonia, and 100 lbs/day for carbonaceous biochemical oxygen demand and the application of the exchange rates established through the modeling effort discussed above, an equivalent phosphorous discharge is calculated as shown below for Lake Spokane dissolved oxygen effects over a specified period of time.

Phosphorous

5 lbs phosphorous/day	1 lb equivalent phosphorous/day	= 5 lbs equivalent phosphorous/day
	1 lb phosphorous/day	
Ammonia		

10 lbs ammonia/day	1 lb equivalent phosphorous/day	= 0.5 lbs equivalent phosphorous/day
	20 lbs ammonia/day	

Carbonaceous Biochemical Oxygen Demand

100 lbs CBOD/day	1 lb equivalent phosphorous/day	= 2 lbs equivalent phosphorous/day
	50 lbs CBOD/day	

Thus, the combined impact on dissolved oxygen water quality in Lake Spokane due to the permitted discharges of phosphorous, ammonia, and carbonaceous biochemical oxygen demand is equivalent to a discharge of 7.5 lbs/day of phosphorous equivalent for that discharge location over the specified period of time. Based upon this, any combination of actual discharges of phosphorous, ammonia, and carbonaceous biochemical oxygen demand that has an equivalent phosphorous discharge of 7.5 lbs/day or less has demonstrated compliance with permit discharge limitations for phosphorous, ammonia, and carbonaceous biochemical oxygen demand.

It must be noted that in addition to the impact on dissolved oxygen water quality in Lake Spokane, any potential near field impacts related to water quality (dissolved oxygen and ammonia) must also be evaluated during the determination of the exchange rates between discharge parameters.

The use of pollutant equivalency using dynamic permit limits will be available to Washington NPDES permittees with discharges to the Spokane River. In addition, this compliance toolbox element will be submitted to the Environmental Protection Agency (EPA) for consideration relative to Idaho NPDES permits. If approved by EPA, Idaho permittees will be able to participate in a cooperative permit compliance effort using dynamic pollutant equivalency.

3. Data Collection, Sampling, and Research Needed

For the demonstrations that will be required to determine the pollutant equivalency exchange rates between parameters, no additional data collection, sampling efforts, or research are needed. Each point source's future permitted discharge limitations have been set based on the WLAs established in the TMDL and the CE QUAL W2 Model that has been used for the TMDL related modeling efforts. This model (and the agreed upon, calibrated successors) is the appropriate mechanism for determining the exchange rates between parameters and is available.

4. CE QUAL W2 Modeling Requirements for DO TMDL Equivalency

To be developed after agreement on items 1 through 3.

5. Permit Provisions

To be developed after modeling is completed.