

State of Oregon

Department of Environmental Quality

Industrial Stormwater Advisory Committee Meeting 8 - April 20, 2010

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Subject: Industrial stormwater benchmarking project - examining the dilution rate used to develop current benchmarks in the 1200-Z

Background:

The Department will utilize a risk based modeling approach to develop industrial stormwater benchmarks for copper, lead, and zinc. The method to be used is nearly identical to that used by Herrera Environmental Consultants (Herrera) for the Washington Department of Ecology (Washington DOE). The model is a simple dilution equation that requires inputs including water quality characteristics of the receiving body, stormwater runoff concentration, and dilution rate. Monte Carlo simulations will generate variable background conditions based on regional, ambient surface water quality data. Modeling using the dilution equation results in receiving water concentration at the point of stormwater discharge. The results from large numbers of model runs, which use inputs of statistically characterized receiving body conditions, will be contrasted against water quality standards to assess stormwater benchmarks based on the acceptable risk of exceeding the standards.

Assessment of current dilution rate:

One of the project's initial tasks is the evaluation of dilution rate which is a key component in determining benchmarks. To illustrate that dilution can have a significant impact on benchmark values, the tables shown below summarize information provided to the Washington DOE resulting from the benchmarking exercise conducted by Herrera. Washington DOE's benchmarks are lower than Oregon's benchmarks in part due to the consideration of in-stream background conditions during modeling.

After internal discussions, it was determined that an appropriate first step is to assess the adequacy of the dilution rate used to develop the current benchmarks in our general industrial stormwater permit. Dilution estimates require consideration of the stormwater runoff and the corresponding in-stream flow. An assessment will be made of how the dilution rate of 5 compares to the dilution potential for commonly occurring storm events in site specific evaluations of 50 randomly selected permitted facilities and the streams to which they discharge.

The assessment will utilize the rational method, a simple rainfall-runoff equation, to estimate facilities' stormwater runoff given rainfall depth information. The rational method accounts for surface conditions, such as impervious areas, through a runoff coefficient. The in-stream flow will be estimated through historical rainfall and streamflow data. For those stream discharge locations for which no nearby streamflow data are available, streamflow will be estimated using contributing area. A precipitation recurrence interval will be selected to identify which storm event rainfall depths can be considered as commonly occurring for each site. The facility runoff and streamflow rates associated with the rainfall depths will be used to estimate typical dilution rates for the 50 facilities. These dilution rates will then be used to evaluate the adequacy of Oregon's dilution rate of 5.

Table 1. Possible metals benchmark values for Western Washington contrasted against Oregon 1200-Z stormwater benchmarks. Washington values are estimates of graphical data.

Western Washington Benchmarks at 10% Standards Exceedance Threshold Based on Dilution Modeling for WA DOE				Oregon 1200-Z Stormwater Benchmarks
Benchmark Parameter	Dilution Factor			Dilution Factor
	1	5	10	
TCu (µg/L)	4.5	14	25	100
TPb (µg/L)	62	310	610	400
TZn (µg/L)	48	200	400	600

Table 2. Possible metals benchmark values for Eastern Washington contrasted against Oregon 1200-Z stormwater benchmarks. Washington values are estimates of graphical data.

Eastern Washington Benchmarks at 10% Standards Exceedance Threshold Based on Dilution Modeling for WA DOE				Oregon 1200-Z Stormwater Benchmarks
Benchmark Parameter	Dilution Factor			Dilution Factor
	1	5	10	
TCu (µg/L)	8.0	32	64	100
TPb (µg/L)	130	630	1300	400
TZn (µg/L)	78	250	470	600