

State of Oregon  
 Department of Environmental Quality

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**Industrial Stormwater Advisory Committee  
 Meeting 9- June 15, 2010**

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**Subject: Assessment of dilution rate used to develop benchmarks in current 1200-Z permit**

**Background:**

DEQ is using a risk based modeling approach to develop industrial stormwater benchmarks for copper, lead, and zinc. The method is very similar to that used by Herrera Environmental Consultants (Herrera) to develop industrial stormwater benchmarks for the Washington Department of Ecology. The model is a simple dilution equation that requires inputs including water quality characteristics of the receiving body, stormwater runoff concentration, and dilution rates (e.g., 1, 5 and 10). 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:**

Dilution estimates require consideration of the stormwater runoff from a facility and the corresponding in-stream flow. DEQ's current benchmarks in the 1200-Z permit current are based on a dilution rate of 5, which accounts for higher receiving stream flows during storm events. Since the last advisory committee meeting, DEQ assessed the adequacy of the current dilution rate. DEQ estimated potential dilution based on commonly occurring storm events in different regions of the state, the stormwater runoff from 50 randomly selected facilities and the streams to which they discharge. The facilities that DEQ selected were "weighted" based on the stream size they discharged to (see chart below). Because more facilities discharge to streams in larger watersheds (e.g., between 1 and 10 square miles and 10 and 100 square miles), DEQ evaluated a larger number of facilities in those watersheds.

Bin	Watershed Size		Number of Facilities	
	larger than (mi <sup>2</sup> )	equal to or less than (mi <sup>2</sup> )	NWR & WR region	ER region
A	--	0.001	1	
B	0.001	0.01		
C	0.01	0.1	1	
D	0.1	1	5	
E	1	10	10	1
F	10	100	10	
G	100	1000	10	2
H	1000	10000	9	1
I	10000	--	1	

The assessment utilized 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. To calculate the dilution for each facility, DEQ compared the estimated facility runoff to the receiving water streamflow.

- Runoff from facility
  - DEQ used the impervious areas for each facility to calculate the total area of contributing runoff for each facility. DEQ obtained the facility's impervious area from the facility's application form and Stormwater Pollution Control Plan.
  - DEQ also used rainfall intensity to calculate runoff from the facility. DEQ evaluated rainfall data from three regions in the state (Rogue Valley, Willamette Valley and Eastern Oregon). For each region, DEQ calculated the median storm size and then randomly selected three storms with median flow. The rainfall intensity was estimated by looking at the maximum sustained intensity for the three storms.
- Stream flow
  - DEQ estimated a median streamflow using the daily average flows from the rainy season for the last three years.
  - DEQ estimated the flows for each facility's stream based on their contributing area size of the watershed

Given that dilution is the total streamflow divided by effluent flow, a higher dilution rate is more protective of the environment (less effluent in the receiving water) than a lower dilution rate.

**Results:**

DEQ's analysis indicated that the dilution rate of 5 in the current permit is reasonable for the following reason:

- The estimated dilution rate was 5 or more for approximately 80% of the facilities (see histogram below). Approximately 20% of the facilities had estimated dilution rates that were less than 5. These facilities all discharged to smaller watersheds (less than 5 square miles), and typically had a large impervious areas contributing to stormwater runoff (see watershed size chart below).
- The estimated dilution rate was more than 10 for over three-quarters of the facilities.
- The estimated dilution rate was greater than 200 for over half of the facilities.

Given that this is a general permit that applies to wide variety of sources discharging to a many different waterbodies, DEQ believes that the dilution rate of 5 in the current permit is appropriate for the majority of the facilities and is protective of the environment.

