

State of Oregon
Department of Environmental Quality

**Industrial Stormwater Advisory Committee
Meeting 11- September 15, 2010**

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Subject: Dilution Evaluation

Background:

At the 9th meeting, DEQ recommended retaining the dilution rate of 5 in the current permit based on the dilution study that DEQ conducted. The study involved estimating the potential dilution based on commonly occurring storm events in different regions of the state, stormwater runoff from 48 randomly selected facilities and the streams to which they discharge. DEQ found that the estimated dilution rate was 5 or more for approximately 80% of the facilities in the study. 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. Facilities that may have a dilution rate that is higher than 5 have the opportunity to apply for an individual permit where DEQ could evaluate site specific conditions.

Some advisory committee members commented that DEQ should consider using the dilution data from the study in the benchmark model as a stochastic variable rather than using a constant dilution rate. Committee members preferred DEQ follow a similar approach used for developing the ambient conditions that will be input to the model (i.e., using variable dilution data instead of a constant number).

Evaluation:

If dilution was based on a stochastic variable, DEQ would need to make changes to the model to include flexibility to input different dilution rates. DEQ could not simply change the dilution rate in the model to reflect the different dilution rates from the various facilities included in the initial dilution study. As a result, additional time is needed to change the model and to process the results such as ensuring that proper QA/QC practices are employed and comparing the results amongst parameters and between dilution rates for a given parameter.

To define dilution as a stochastic variable, its distribution must be characterized, or its uncertainty must be estimated. A rigorous approach is needed to develop a dilution distribution which is an essential ingredient in Monte Carlo simulations. DEQ can not simply characterize the distribution for dilution based on the estimated dilution rates for 48 facilities for the following reasons:

- The dilution rate for each facility was estimated based on commonly occurring storm events in different regions of the state, stormwater runoff from 48 randomly selected facilities and the streams to which they discharge. Although these parameters are dynamic and change over time, a single value was used for each of these parameters to calculate each facility's dilution rate.
- This resulted in estimating a dilution rate for each facility as a single value, with no estimate of range, distribution or uncertainty.

- Simplified calculations (such as the rational method) were used to develop the dilution rates for each facility. These approximate methods mean that there is uncertainty inherent in the methods.

Because DEQ did not assess these variables and uncertainties, the analysis of 48 facilities does not provide an adequate basis for defining a distribution of dilution rate. In order to build a stochastic variable from this starting point, it would be necessary to:

- Estimate distributions (or uncertainty) for the parameters used for each of the 48 facilities. One approach for the receiving water flow would be to obtain flow data for a 10-year period, then extract flow rates for wet weather based on historical weather data, and then develop a distribution based on the resulting “wet weather flows.” This would need to be done for each of the 48 facilities.
- Estimate the uncertainty (as a distribution) associated with the simplified supporting calculations, or else use a more complex approach. For example, information on the accuracy of the Rational Method could be researched or a runoff model could be used to estimate stormwater runoff.
- Combine the distributions representing variability and uncertainty across the 48 facilities to obtain a distribution for dilution.

DEQ plans to conduct the majority of the benchmark modeling work in December 2010 and share the preliminary results with the committee at the January 2011 meeting. DEQ estimates that it will take at least two more months to develop a sufficient dilution distribution based on the data from the 48 facilities. This additional work is beyond the scope of the current project and would result in DEQ not meeting its commitments in the work plan.

Summary:

DEQ is comfortable using the dilution study on the 48 facilities to make a policy decision that the dilution of 5 is appropriate for the 1200-Z general permit and is protective of water quality. While the dilution rate study met its intended goals of determining whether the dilution rate of 5 is appropriate for the majority of the facilities operating under the general permit, it does not satisfy a very different goal of defining dilution as a stochastic variable that can be inputted into the model. Also, given the complexity of considering variant site specific conditions under this general permit approach, DEQ believes that it is reasonable to use a constant dilution rate that can be broadly applied to develop water quality based benchmark. If a facility deems that further site specific analysis should be conducted they have the opportunity to apply for an individual permit.