OREGON WATER QUALITY STANDARDS RULEMAKING WORKGROUP

DRAFT DISCUSSION OF NPDES PERMIT IMPLEMENTATION ISSUES FOR HUMAN HEALTH CRITERIA

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Most, and perhaps all, Oregon waterbodies contain one or more pollutants at concentrations that exceed the human health criteria for that pollutant.[1] Proposals to make the criteria more stringent, together with expanded monitoring and attention to this issue, are likely to substantially lengthen the list of pollutants and waterbodies that exceed the criteria. Moreover, many of these pollutants are ubiquitous in the environment because they occur naturally or result from a diffuse variety of human activities. As such, they may contaminate a facility's wastewater through the facility's intake water or raw materials, through occurring naturally in the facility's soils, or through being transported to the facility by air deposition and stormwater run-on. NPDES permit holders are worried that the presence of these background pollutants in their wastewater discharges may lead to the imposition of unachievable permit discharge limits that are intended to address a water quality problem that they did not create and can do little or nothing about.

Here is the general combination of circumstances that is most likely to fuel this worry for any given pollutant for which there is a human health criterion:

1. The pollutant is a widespread or ubiquitous in the environment and is present in the facility's wastewater discharge because it is a contaminant in the facility's intake water, raw materials, stormwater run-on, air fallout, natural soil, *etc*.

2. The facility is meeting all applicable water pollution control technology standards under state and federal law. Furthermore, the facility has evaluated additional control methods and discharge alternatives, but there are no technically and economically feasible means of eliminating the discharge or reducing the pollutant's concentration so as to achieve the water quality criterion at the point of discharge. [2]

[1] For example, it would be surprising if any waterbody in Oregon met the arsenic human health criterion of 2.2 nanograms per liter.

[2] Because background pollutants are ordinarily present in minute concentrations and are unrelated to the facility's industrial processes, they are often extremely expensive or impossible to remove from wastewater.

3. The waterbody to which the facility discharges cannot dilute the discharge pollutant concentration to the human health criterion because either (i) the concentration in the waterbody already equals or exceeds the criterion or (ii) the waterbody has no flow or insufficient flow in relation to the discharge flow.

4. The facility's discharge poses no risk or no significant risk to human health. Although it is easy to imagine circumstances in which a facility might substantially increase human health risks by discharging background pollutants—for example, by drawing large amounts of intake water from a highly polluted waterbody and discharging it to a pristine waterbody—most facilities will essentially be moving background pollutants from one polluted location to another without altering or significantly altering the risk to human health. NPDES permittees are concerned that, in the latter circumstance, they will be forced to install expensive treatment systems or to shut down their facilities for no corresponding human health gains.

To take a more concrete and specific example:

A facility withdraws 25 liters of water per second from a river for use as noncontact cooling water. The flow of the river is 15,000 liters per second. The intake water contains antimony at a concentration of 20 micrograms per liter (µg/l) and polychlorinated biphenyls (PCBs) at a concentration of 1000 picograms per liter (pg/l). The antimony concentration is natural; the PCB concentration is a legacy of past human activities. Both background concentrations exceed the human health water quality criteria for antimony and PCBs, which are 5.6 µg/l and 64 pg/l, respectively. The facility recycles its cooling water in order to reduce its withdrawals of water from the river and its contributions of heat to the river. The recycling causes 50 percent of the intake water to evaporate before it is discharged back to the river. Because of this evaporation, the concentrations of antimony and PCBs in the discharge are 40 µg/l and 2000 pg/l, respectively. After the discharge fully mixes again with the river, however, the concentrations closely approach, but do not quite reach, the intake concentrations. This is because the facility has evaporated 12.5 liters of the 15,000 liter flow of the river. The facility's operations increase the concentration of antimony from 20 µg/l to 20.017 µg/l (in relation to the 5.6 µg/l criterion) and the concentration of PCBs from 1000 pg/l to 1000.8 pg/l (in relation to the 64 pg/l criterion). These results are displayed in the following table, where the figures are in µg/l for antimony and pg/l for PCBs:

	Criterion	Intake Conc.	Discharge Conc.	Remixed Conc.[3]	Conc. Increase	Loading Increase	% Increase in Conc.
Antimony	5.6	20	40	20.017	0.017	0	0.08%
PCBs	64	1000	2000	1000.8	0.8	0	0.08%

Let us assume that the facility is employing all applicable technology-based pollution controls and that it has evaluated other options for not discharging at concentrations in excess of the intake concentrations, but no economically and environmentally[4] feasible options have been identified. The issue then becomes whether the facility should be forced to incur substantial financial costs or even shut down in order to avoid an increase in pollutant concentrations that can be mathematically calculated but that may not be detectable in the river or have any significance for human health.[5]

There are a multitude of variations on these circumstances and pollutant effects. But the fundamental question is whether Oregon should require NPDES permittees to make extraordinary expenditures or shut down their facilities in order to avoid instream changes in pollutant concentrations that are inconsequential to human health risks (and that may have other adverse environmental consequences). Assuming that the answer to that question is "no," the

[3] This assumes complete remixing of the effluent with the receiving waterbody. Note that human health criteria are generally developed to protect against much longer exposures than aquatic life criteria. For example, human health criteria for protection against carcinogens assume a human lifetime of exposure at the criterion, whereas acute aquatic life criteria generally assume only an hour of exposure at the criterion. Therefore, evaluation of compliance with human health criteria may in appropriate circumstances take into consideration long-term average receiving water concentrations after complete mixing of the effluent with a higher receiving water flow than might be appropriate when evaluating compliance with aquatic life criteria. Typically, DEQ uses the harmonic mean receiving water flow for carcinogens and the lowest 30-day average receiving water flow in a five-year period (30Q5 flow) for noncarcinogens, whereas it uses the often much smaller lowest 7-day receiving water flow in a 10-year period (7Q10 flow) for aquatic life criteria. *See, e.g.*, DEQ, *Reasonable Potential Analysis for Toxic Pollutants Internal Management Directive* 31 (2005). Of course, if an outfall were adjacent to a municipal drinking water intake or a shellfish harvesting area, for instance, it might be inappropriate to evaluate the effects of the discharge based on complete mixing with the receiving water because complete mixing might not occur until the effluent was beyond the intake or harvesting area.

[4] For example, even if it were economically feasible to evaporate or land apply the remaining noncontact cooling water in order to avoid returning it to the river, the adverse environmental consequences of these alternatives (increased energy consumption, additional air pollution and greenhouse gas emissions, soil and groundwater contamination) would need to be evaluated against any benefit to human health from reducing the antimony concentration from 20.017 to 20 µg/l and the PCB concentration from 1000.8 pg/l to 1000.0 pg/l.

[5] Because the facility's discharge concentrations of antimony and PCBs would exceed its intake concentrations, it would not be able to make use of the intake credit provisions described by DEQ and EPA at the workgroup's previous meeting.

challenge is to create a regulatory mechanism that will fully protect human health without imposing these economic and environmental costs.

As a starting point for discussions, I would like to suggest the following conceptual provisions for inclusion in Oregon's water quality standards:

> If the concentration of a pollutant would otherwise exceed a human health water quality criterion in OAR 340-041-0033 at the point of discharge or at the boundary of any applicable mixing zone for the facility, the pollutant nonetheless does not cause or contribute to an excursion above the human health criterion if and to the extent that:
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> (1) The pollutant is present in the facility's discharge because it is:
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> (a) Present in the facility's intake water;
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> (b) Present in stormwater or other water that flows onto the facility from a property that is not controlled by the owner or operator of the facility;
>
> (c) Naturally present in facility soils;
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> (d) Deposited onto the facility from air emission sources that are outside the facility and that are not controlled by the owner or operator of the facility; or
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> (e) An environmentally ubiquitous or widespread[6] contaminant in the facility's raw materials that does not serve any industrial or other process in which the facility is engaged;
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> (2) The facility meets all applicable water pollution control technology requirements under the Clean Water Act and Oregon law;
>
> (3) No other technologically and economically feasible means that would not have significant adverse environmental consequences are available to reduce the pollutant concentration in the discharge[7] or to eliminate the discharge; and

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[6] By "ubiquitous or widespread," I mean a contaminant that is present throughout all or much of the environment—and therefore cannot readily be avoided. This provision is not intended to address raw materials that contain contaminants in unusually high concentrations or that are from a limited area, regardless whether those contaminants serve any industrial purpose. Note also that, if a raw material contaminant were localized, the discharger likely could find a substitute raw material that was not contaminated, and thus it could not satisfy criterion (3), below, which requires that there be no other technologically and economically feasible means to reduce the pollutant concentration in the discharge.

[7] Among the means that might be considered to reduce the discharge concentration is pre-mixing the effluent with the receiving water (assuming that the receiving water has a lower pollutant concentration). The expense and additional environmental costs of withdrawing more water from the

(continued . . .)

(4) The discharge of the pollutant does not create a significant risk to human health. DEQ may presume that the risk is insignificant if, after complete mixing with the harmonic mean flow (for carcinogens) or 30Q5 flow (for noncarcinogens) of the receiving water,[8] the discharge does not increase the concentration of the pollutant in the receiving water by more than ____ percent. The circumstances in the preceding sentence are not essential, however, to a finding that the discharge does not create a significant risk to human health.[9] In addition, DEQ may not rely on this presumption if other evidence demonstrates that the discharge of the pollutant poses a significant risk to human health.

(. . . continued)
receiving water would need to be evaluated against any reduction in human health risk achieved by reducing the concentrations in the receiving water immediately adjacent to the outfall. Pre-mixing might be appropriate, for example, if the point at which complete mixing would be achieved were downstream of a particularly sensitive human health use (*e.g.*, a municipal drinking water intake). Note also that, although a reduction in the discharge concentration might be beneficial, pre-mixing cannot achieve the human health criterion at the point of discharge if the receiving water concentration is already equal to or greater than the human health criterion.

[8] See footnote 3, above.

[9] Although the percentage increase in concentration above background might be an appropriate and easily implementable means of evaluating the human health risks of a discharge to a large waterbody, it would not be appropriate for a stream with intermittent or low flow. For instance, in the example described in the text above, suppose the facility did not discharge directly to the river but discharged to an intermittent stream that flowed into the river. Because the intermittent stream has little or no flow, it may or may not, depending on the human uses associated with the intermittent stream, to evaluate the discharge against the flow of the river rather than that of the stream.