State of Oregon
# Department of Environmental Quality Memorandum

**Date:** July 5, 2019

**To:** Environmental Quality Commission

**From:** Richard Whitman, Director

**Subject:** Agenda item D, Informational item: Willamette Basin Mercury Total Maximum Daily Load
July 18-19, 2019, EQC meeting

**Why this is important**

DEQ released the draft Willamette Basin Mercury TMDL for public comment on July 3, 2019. Public comment is being requested until the end of August. DEQ will inform the commission about progress on the TMDL in preparation for the agency to finalize and issue the TMDL in November 2019 as required by court order.

**Prior EQC involvement**

In November 2018 and January 2019, DEQ updated the commission on agency efforts to date to revise the Willamette Basin Mercury TMDL and coordination on associated permitting and the development of a proposed rule for a multi-discharger for mercury.

**Background**

A Total Maximum Daily Load, commonly called a TMDL, is required when a waterbody does not meet state water quality standards and is listed on the Clean Water Act list of impaired waters. A TMDL identifies the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards. It also establishes a framework for the reductions in pollution that must occur from both point and nonpoint sources of water pollution.

Many Willamette Basin streams are currently impaired for mercury. In addition, fish consumption advisories have been issued for mercury by the Oregon Health Authority throughout the basin. The TMDL and accompanying Water Quality Management Plan document are DEQ proposed analysis of the mercury reductions needed to meet mercury standards for the Willamette Basin over time. DEQ is revising the 2006 Willamette Basin Mercury TMDL at this time due to an April 2017 US District Court ruling requiring EPA and DEQ to revise the TMDL within two years. That ruling was later amended to require TMDL adoption and EPA action by Nov. 30, 2019.

**TMDL scope and development timeline**

The TMDL and Water Quality Management Plan will cover the 11,478-square-mile area of the Willamette Basin. The revised TMDL sets out reductions necessary to achieve levels of mercury in the Willamette Basin allowing safe consumption of fish and shellfish and that will meet all relevant water quality standards.

Throughout the development of the TMDL, DEQ and EPA frequently coordinated on technical and policy elements as they were developed.

- **December 2017-June 2019:** Advisory committee meetings
- **June 2019:** Draft TMDL and Water Quality Management Plan
- **July-August 2019:** Public comment period
- ***Projected* - September-October 2019:** DEQ response to public comments
- ***Projected* - November 2019:** DEQ submits revised TMDL to EPA
- ***Projected* - November 2019:** EPA issues its decision on the TMDL

**Public engagement and Tribal coordination**

DEQ established an advisory committee to provide input and feedback on the data and information used in the development of the TMDL, as well as on approaches to implement of the Willamette Basin Mercury TMDL. The 25 committee members were representatives of a range of partners and stakeholders that may be affected by implementation of the TMDL. DEQ held advisory committee meetings on a broad range of topics. The meetings were open to the public.

Advisory committee meetings in 2017 and 2018 focused on obtaining input on source characterization and data used. In 2019, DEQ held three advisory committee meetings. The March 2019 meeting topics included updating the advisory committee on modeling changes and enhancements based on the committee's input, describing the model results, and responding to technical questions. In the April 2019 meeting, topics included proposed allocations, the factors and options considered in developing the allocation approach, and proposed implementation approaches The June 2019 meeting focused on implementation and addressing topics raised by committee members.

EPA and DEQ are also coordinating with Tribal governments to share information regarding the TMDL development process and receive their input.

DEQ also met with nonpoint source Designated Management Agencies regarding allocations and measurable objectives. Measurable objectives represent specific implementation actions that can be tracked and assessed against interim milestones and goals. For example, a Designated Management Agency may have a measurable objective of reducing bare ground by 10 percent within five years, and 15 percent within ten years. Reducing bare ground is an implementation

action that reduces soil runoff and erosion, thus also reducing soil-bound mercury from entering rivers and streams.

**Technical approach**

The Willamette Basin Mercury TMDL is being developed to meet applicable water quality standards to protect the most sensitive beneficial uses for mercury, which are: Fish and Aquatic Life; Wildlife and Hunting; and Fishing (fish consumption). The beneficial use of fishing applies to the entire mainstem Willamette River and its tributaries. Meeting water quality standards for the most sensitive beneficial uses will be protective of all other uses. DEQ and EPA are using a technical approach similar to what was used in the 2006 TMDL.

The pathways that mercury moves through in the environment are complex, and it is difficult to fully document all of its transformations. However, the revised TMDL will benefit from the inclusion of data collected since development of the 2006 TMDL and additional modelling and scientific research. The technical approach is divided into three components as described below:

**1. Watershed/Mass Balance Model**
This model connects mercury sources to mercury levels in the river network. A comprehensive watershed model, which uses the Hydrological Simulation Program - FORTRAN, is being used to simulate movement of mercury via flow and sediment routing.

**2. Food Web Model**
This model identifies links between fish exposure to mercury in the environment and mercury contamination in fish. Environmental mercury experts reviewed the food web model used in the 2006 TMDL for its application in the revised TMDL. They concluded that it remains representative of best available science.

**3. Mercury Translator**
This model enables managers to converts measurements of total mercury in water to dissolved methylmercury. Total mercury is one of the most commonly sampled forms of mercury and this translation allows greater use of total mercury data by providing reasonable estimates of dissolved methylmercury, which is the primary mercury form for fish uptake.

**TMDL and Water Quality**

The Willamette Basin Mercury TMDL is being developed in cooperation between DEQ and EPA, along with EPA's lead contractor TetraTech, to address mercury impairments in the Willamette Basin.

**Management Plans**

The Willamette Basin Mercury TMDL identifies sources of mercury, and how much mercury needs to be reduced in order to meet water quality standards. The TMDL expresses mercury reductions as nonpoint source load allocations and point source wasteload allocations. The accompanying Water Quality Management Plan describes DEQ's plan for implementing these allocations, as well as who is responsible for implementing actions to reduce mercury.

The greatest source of mercury in the basin is from atmospheric deposition, which includes local air emissions but originates mainly from global sources. While the primary source of mercury is air deposition, the major pathway to rivers and streams is through runoff and erosion of sediment-bound mercury.

Many different types of land use exist within the Willamette Basin; however forestry, agriculture and urban uses dominate land use across the basin. For this reason, management measures described in the Plan primarily address runoff and erosion from nonpoint sources of pollution and urban stormwater. Management measures for point sources are also described in the Water Quality Management Plan; however, point sources contribute significantly less mercury to the basin.

There is inherent uncertainty in any analysis of very complex physical, chemical and biological processes of mercury generation and transport in a large riverine system like the Willamette Basin. DEQ recognizes that the models and techniques are necessarily estimations of these complex processes and are unlikely to replicate exactly how streams and other waterbodies will respond to the application of various management measures. Even so, nonpoint source and point source reductions in mercury are necessary and expected to occur through implementation of permits, best management practices, conservation practices, and other management strategies designed to reduce air emissions, point source discharges, and runoff and erosion. Over time, these tools and actions will reduce mercury, allow for safe consumption of fish and shellfish, and meet water quality standards for the protection of aquatic life.

**Key issues**

There are several key issues related to the Willamette Basin Mercury TMDL:

- Proposed allocations
- Legacy Metals Mining Sources, and proposed suction dredge mining prohibitions
- Water Conveyance Entities
- Non-MS4 permitted urban stormwater control requirements
- TMDL implementation planning with the Designated Management Agencies

Each of these key issues are described in detail below.

**Proposed Allocations**

Allocations are quantified measures that define the reductions in pollutants necessary to meet water quality standards. Load allocation are given to nonpoint sources, and wasteload allocations are given to point sources.

For this TMDL, a percentage reduction is being proposed for all of the nonpoint source load allocation, including background, natural, and anthropogenic sources. Background sources include sources of a pollutant that DEQ or other DMAs don't have authority to regulate. DEQ's current analysis does not support giving different percentage reductions to different nonpoint sources, so DEQ is using a consistent reduction across all nonpoint sources to capture the total reduction needed. The proposed reduction is 88 percent.

There is one exception to the 88 percent level required for nonpoint source. That is urban Designated Management Agencies that are not covered by an MS4 permit. Contributions from these urban areas not covered by a stormwater permit were estimated based on the overall load of mercury from these areas using the jurisdictional boundaries of these communities. The proposed reduction for these areas is 75 percent. Most of the mercury reaching Willamette Basin streams comes from atmospheric deposition, but controlling surface runoff and soil erosion will reduce the mercury loads from these urban areas from entering the river and streams. The same is true for all of the other nonpoint sources.

For point sources, DEQ is proposing to assign aggregate waste load allocations for municipal and industrial wastewater and municipal stormwater point source discharges. Establishing wasteload allocations for each sector meets the intent of individual allocations by incorporating site-specific permit requirements and monitoring with enforceable conditions, such that individual site reductions will be optimized and will cumulatively add up to the aggregate percent reduction requirements by sector set by the TMDL. Most point sources are already removing significant proportions of mercury from their waste loads, and as a result the percentage reduction proposed is lower (ten percent).

The relative contribution of all categories of sources to existing mercury loads is provided in the following table. The relative contribution is expressed as the percent of the total load coming from a source. Although the initial sources of mercury for many of these sources may be background, such as atmospheric deposition from global sources or geologic material, anthropogenic activities can increase the amount of this background mercury that reaches the streams. The allocations and associated implementation focuses on the anthropogenic activities, such as reducing soil erosion or excess runoff.

| | |
|---|---|
| Mercury Water Quality Criterion | 0.040 mg/kg fish tissue |
| Total Mercury TMDL Water Column Target | 0.14 ng/L |
| Total Mercury Loading Capacity | 42.17 g/day or 15.40 kg/year |

| SOURCE SECTORS | EXISTING LOADS | | | ALLOCATIONS | | | |
|---|---|---|---|---|---|---|---|
| | g/day | kg/year | Relative Contribution to Total Load | Percent Reduction | g/day | kg/year | Relative Allocation of Load Capacity |
| **General Nonpoint Source and Background**[1] Captures: Forestry, Agriculture, Water Impoundments, Water Conveyance Entities, Non-Permitted Urban Stormwater, Atmospheric Deposition | 341.74 | 124.82 | 94.5% | 88%[2] | 28.87 | 10.54 | 68.46% |
| **Non-Permitted Urban Stormwater** | | | | 75% | 0.63 | 0.23 | 1.5% |
| **Atmospheric Deposition** | | | | 11% | 5.22 | 1.91 | 12.38% |
| **Legacy Metals Mines** | 4.00 | 1.46 | 1.1% | 95% | 0.20 | 0.07 | 0.5% |
| **NPDES Wastewater Point Source Discharges** | 4.44 | 1.62 | 1.2% | 10% | 4.00 | 1.46 | 9.5% |
| **NPDES MS4 Stormwater Point Source Discharges** | 11.31 | 4.13 | 3.2% | 75% | 2.83 | 1.03 | 6.7% |
| **Reserve Capacity** | NA | NA | NA | 1%[3] | 0.42 | 0.15 | 1.0% |
| **Margin of Safety** | NA | NA | NA | implicit | implicit | implicit | implicit |
| **TOTALS** | **361.49** | **132.03** | **100%** | **NA** | **42.17** | **15.39** | **100%** |

NOTES:

[1] Combines the following source categories from the TMDL Technical Support Document: Sediment Erosion, Surface Runoff, Groundwater, Atmospheric Deposition to Water

[2] There is an additional 3.5% reduction from General Nonpoint Source and Background that results from the 11% decrease in Atmospheric Deposition, which reduces the mercury in precipitation that generates surface runoff. The additional reduction is calculated from the output of the Mass Balance Model.

[3] Reserve Capacity is not allocated as a percent reduction, rather an additional 1 percent reduction is required from atmospheric deposition, which will be used for any needed reserve capacity.

**Legacy Metals Mining Sources**

Within the Willamette Basin, there are five abandoned mercury mines, seven mercury prospects (where no extraction or production yet has taken place) and five districts focused on gold mining. The Black Butte Mine is the most significant mercury source in the Willamette Basin associated with mining and is contributing a substantial percentage of the mercury load to the Coast Fork of the Willamette River. The Black Butte mine area has largely been addressed through remediation actions up through 2018 under the Superfund program, which DEQ anticipates will achieve the majority of the needed 95 percent reduction for aggregated mining nonpoint sources.

The second most significant source of mercury from mining in the basin is associated with the Bohemia Mining District situated among the tributaries of the Row River upstream of Dorena Reservoir.

Soils and stream sediment sampling in the former Bohemia Mining District indicate high concentrations of mercury, and these streams are tributary to the

Dorena Reservoir, which is listed as impaired for mercury and has fish advisories for mercury contamination. This area of the Willamette Basin is one of two areas within the Basin that has ongoing suction dredge mining. Studies in Oregon, California, Nevada, Wisconsin and Florida show that mercury in stream beds is disturbed, mobilized and methylated by suction dredging. DEQ is proposing a 95 percent wasteload allocation to the mining sector. To help achieve this reduction, DEQ is proposing to prohibit suction dredge mining in streams that flow from the former Bohemia Mining District and are tributary to the Dorena Reservoir (including Row River, Brice Creek, Sharps Creek, Champion Creek) and would, upon renewal of the NPDES 700PM general wastewater permit for suction dredging, prohibit suction dredge mining in these streams.

**Water Conveyance Entities**

There are approximately 46 districts, associations, and other public and private entities that have been identified as potentially managing surface water conveyance systems, e.g. canals, laterals, diversions, ditches, streams. Water transport and delivery, including dam operations, are considered nonpoint sources that influence the quantity and timing of sediment, heat, bacteria, and other pollutants to downstream river reaches.

Transport of water through these systems in a manner that reduces sediment and erosion requires implementation of best management practices when performing system maintenance, for example when clearing vegetation or dredging canals. DEQ is considering identifying some of these entities as responsible persons in the Willamette Basin Mercury TMDL Water Quality Management Plan. As responsible persons, they would be required to develop and implement TMDL strategies and actions that reduce sediment and erosion associated with their maintenance of conveyances.

While some of these entities are members of existing professional organizations such as the Oregon Water Resources Congress, or the Special Districts Association of Oregon, many of these entities are not familiar with State regulatory processes.

DEQ communicated with these organizations, conducted direct outreach to them, and will hold an informational meeting July 17, 2019, for owners/operators of water conveyance systems. DEQ staff will present background information on the 2006 TMDL, revisions made in the 2019 TMDL, and what implementation requirements DEQ is proposing for water conveyance entities in the 2019 TMDL. DEQ will work with these entities on implementation planning *after* the TMDL is approved in order to determine whether or not current operations and maintenance include adequate measures that address sediment and erosion, and whether or not they should have annual or other periodic TMDL reporting requirements.

**Non-MS4 permitted urban stormwater control requirements**
DEQ is using the term "non-MS4 permitted urban stormwater" to refer to areas of cities and counties without MS4 stormwater permits.

The TMDL estimates that mercury loads from all combined non-permitted urban area stormwater discharges is approximately one percent of the overall load in the Basin. The draft TMDL would require a 75 percent reduction of mercury loads across this sector.

Based on DEQ's analysis of mercury loads in urban stormwater, DEQ is proposing to require cities and counties with populations greater than 5,000 people that are not required to obtain an MS4 permit, to implement (at a minimum) six stormwater control measures described in the Water Quality Management Plan. DEQ required these six stormwater control measures in the 2006 mercury TMDL for cities with populations greater than 10,000 people. Because of the additional nonpoint source reductions needed to meet applicable water quality standards, DEQ believes it is reasonable for smaller communities to also manage stormwater runoff and plan for future growth. In addition, a number of communities with populations less than 10,000 people are already implementing many of these stormwater measures.

The requirement to develop stormwater control measures would apply to areas within the city or county boundary if not already under the jurisdiction of Oregon Department of Agriculture, Oregon Department of Forestry, Bureau of Land Management, or U.S. Forest Service.

The recommended approach includes an implementation schedule where communities greater than 10,000 people will have five years to implement all six stormwater control measures, and communities of less than 10,000 people will have 10 years to fully implement all six stormwater control measures. There may be exceptions based on specific circumstances.

Although not required, it is DEQ's expectation that urban Designated Management Agencies with populations less than 5,000 people will implement strategies, such as erosion control practices and stormwater infiltration, to control movement of mercury from urban and rural landscapes to local waterbodies. The six minimum stormwater controls support such practices.

Under certain circumstances, such as when population growth exceeds 5,000 people or DEQ determines it is necessary to meet load allocations and mercury reduction targets, DEQ may require these urban Designated Management Agencies to implement all or a subset of the six stormwater control measures.

DEQ is holding a public comment period on the draft TMDL and Water Quality Management Plan from July 3 through August 31. DEQ will review public comments received during the public comment period to finalize the TMDL and Plan.

**EQC involvement**

There is no direct EQC action required for this TMDL. DEQ will return to the EQC in September 2019 to provide an overview of public comments received prior to DEQ's planned TMDL and Water Quality Management Plan issuance in November 2019.

DEQ is developing a multiple discharge variance to allow DEQ to issue permits in the Willamette Basin if issuance and/or EPA approval of the revised TMDL is delayed for any reason. DEQ intends to bring a rule proposal on the multiple discharger variance for commission action at the January 2020 EQC meeting.

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