State of Oregon
Department of Environmental Quality Memorandum

Date: Nov. 8, 2024

To: Environmental Quality Commission

From: Leah Feldon, Director

Subject: Agenda item F, Action item: Total Dissolved Gas Modification Order on the Mainstem Columbia River

Why this is important

This is an action item. DEQ recommends the EQC modify Oregon's water quality standard for total dissolved gas in the Columbia River mainstem for five years, 2024-2029. The purpose of the proposed modification is to allow voluntary spill to implement agreed-to operations in the 2023 Resilient Columbia Basin Agreement to proceed. In a July 2024 letter, the U.S. Army Corps of Engineers requests DEQ to renew the total dissolved gas water quality standard modification on the lower Columbia River mainstem by January 2025.

Prior EQC involvement

The commission has granted modifications for total dissolved gas water quality standard on the Columbia River since 1994. The most recent modification order, which expired on Aug. 31, 2024, was approved by the commission in 2020. The commission granted the modifications based on the effectiveness of voluntary spill for fish passage compared to other in-river migration options (i.e., powerhouse passage) and the low incidence of gas bubble trauma.

Background

There are 13 evolutionarily significant units of Columbia River Basin salmon or steelhead species listed as threatened or endangered under the Endangered Species Act. Out-migrating juvenile salmonids pass the lower mainstem Columbia River dams through turbines and over the spillways. Fish experience increased incidence of mortality from turbine passage as compared to spillway passage. Releasing water over a dam's spillway is a management tool for anadromous salmonid fisheries, to reduce mortality and assist out-migrating juvenile salmonids in the Columbia River. However, spilling water over the dams increases the level of total dissolved gas in the river. Water plunging from a spillway traps air and carries it to a depth where the pressure forces the gas to dissolve into water. Total dissolved gas levels above 110 percent of saturation can cause gas bubble trauma in fish, which can cause adverse health impacts, including mortality.

Oregon adopted the U.S. Environmental Protection Agency's recommended total dissolved gas criteria of 110 percent of saturation. The 110 percent total dissolved gas standard protects beneficial uses of the Columbia River and protects aquatic life, such as endangered and threatened salmon and trout salmonid species. In

2002, Oregon and Washington issued the Total Maximum Daily Load for Lower Columbia River Total Dissolved Gas that was approved by EPA. The U.S. Army Corps of Engineers operates the four dams – Bonneville, The Dalles, John Day, and McNary – on the lower Columbia River and is responsible for implementing the operational and structural modifications identified in the TMDL. The goal of the TMDL is to meet the 110 percent total dissolved gas criteria while allowing for voluntary fish passage spill.

The Endangered Species Act requires the agencies that operate the Federal Columbia River Power System ensure their actions are not likely to jeopardize the continued existence of a listed species, nor destroy or adversely modify designated critical habitat. In the 2020 Biological Opinion for the operation and maintenance of the Federal Columbia River Power System, the U.S. National Oceanic and Atmospheric Administration National Marine Fisheries Service has identified voluntary spill as the safest, most effective tool available for improving downstream smolt survivorship for salmonids listed under the Endangered Species Act. The Corps operates in accordance with the 2020 Columbia River System Supplemental Biological Opinion reasonable and prudent alternative actions.

There is broad scientific consensus that increased spill proportion is expected to increase Endangered Species Act listed salmonid survival through decreased rate of powerhouse passage, with improvements in other associated fish passage metrics (e.g. water transit time, forebay residence time). Planned spill that meets without exceeding the spill cap 24 hours per day/7 days per week is expected to reduce effects associated with hydrosystem operations such that life cycle survival improves to more regularly meeting Northwest Power and Conservation Council's smolt-to-adult return goal of 4% (2-6%).

Resilient Columbia Basin Agreement

In 2020, the Federal Government released the Record of Decision for continued operations of the Columbia River System dams. Multiple parties, including the State of Oregon, Nez Perce Tribe, and National Wildlife Federation subsequently filed suit due to the Record of Decision's lack of compliance with the National Environmental Policy Act and Endangered Species Act. In 2021, the Biden Administration offered to negotiate a Stay of Litigation, resulting in the December 2023 Resilient Columbia Basin Agreement. The Agreement stays the litigation for up to 10 years in exchange for a list of federal commitments to increase fish and wildlife funding for the Columbia River Basin and to assess the viability of breaching the four Lower Snake River dams (i.e., replace the services those dams currently provide). The agreed-to operations in Appendix B of the Agreement (included as Attachment C) are substantially similar to the 2019-2021 Spill Operation Agreement that formed the basis for the most recent modification order.

Request to renew Total Dissolved Gas Water Quality Standard modification

In July 2024, the Corps sent a letter to DEQ requesting a renewal of Oregon's total dissolved gas modification order by January 2025 to allow for the planned Spring spill operations to proceed in a manner consistent with Oregon's water quality standards and the Clean Water Act. The Corps expects to continue implementation of spill operations for fish passage as outlined in Appendix B of the Agreement.

The letter requesting the renewal of the modification order is included as Attachment B. Appendix B of the Agreement which details the agreed-to operations are included as Attachment C. The full text of the Agreement is available upon request.

Public input

On Sep. 6, 2024, DEQ issued a public notice, opening a 30-day public comment period. DEQ held a public hearing to receive oral comments on Sep. 20, 2024, and presented an informational item to the EQC on Sep. 27, 2024. Following a request, DEQ extended the comment period by seven days. Written comments on the draft proposed total dissolved gas water quality standard modification order were due by 4 p.m. on Oct. 13, 2024.

DEQ received eight written comments and no oral testimony. More than half of the commenters supported the proposed modification allowing elevated total dissolved gas levels. While no commenters expressed opposition to the proposed modification, one commenter expressed concerns about potential impacts to resident aquatic species. Multiple commentators suggested the proposed order include additional details on gas bubble trauma incidence rates, include reference to recently published science, and note the exceedances of the gas bubble trauma biological thresholds on the Lower Snake River in 2023.

Comments included:

- Half of the commenters supported providing the DEQ Director discretion to curtail spill during the spring season based on biological monitoring results, rather than require an automatic curtailment of spill.
- Multiple commenters requested the dates (within the calendar year) the Order applies. The changes were requested both to allow for potential operations to occur in the fall-winter, both in early 2025 (Jan. 1 – Mar. 31) and through the end of the calendar year in 2029 (Sep. 1 – Dec. 31).
- Multiple commenters requested DEQ clarify how it interprets the calculation of total dissolved gas levels during the fall-winter period.
- Multiple commenters requested the Order include additional information on gas bubble trauma incidence rates and reference to recently published science, specifically the U.S. Geological Survey's 2024 report *Nonsalmonid Gas Bubble Trauma Investigations.*
- Multiple commenters requested the Order reference the exceedances of gas bubble trauma thresholds in 2023 below Ice Harbor Dam on the Lower Snake River that caused reductions in voluntary spill.

Summary of DEQ Response to Comments:

DEQ recommends the commission remove the automatic spill curtailment and instead provide the DEQ Director discretion to curtail spill or not following a review of the gas bubble trauma data. This discretion would allow for spill to continue if biological thresholds are exceeded due to gas bubble trauma incidence rates in non-native fish.

DEQ acknowledges the dates in the draft order unintentionally restricted the implementation of agreed-to operations at the lower four Columbia River dams in the fall-winter, specifically in early 2025 (prior to April 1) and late 2029 (Sep. 1 – Dec. 31). Therefore, DEQ recommends the modification order apply on a calendar year basis, from 2025 through 2029.

DEQ updated the text of the Order to specify the calculation of the 120 percent total dissolved gas criteria outside of the spring and summer periods be calculated using the methodology specified under Section 8a)i., defined as the average of the twelve highest total dissolved gas measurements in the tailrace of a dam in a calendar day.

DEQ updated the text of Findings 2.b) to include information from and reference to the U.S. Geological Survey 2024 report, *Nonsalmonid Gas Bubble Trauma Investigations.* DEQ acknowledges there were exceedances of biological thresholds at Ice Harbor Dam on the Lower Snake River in 2023 but will focus its review of monitoring results to the lower Columbia River in Oregon's waters.

Please refer to Attachment D for the list of commenters and DEQ response to comments document. Attachment E contains the full written comments.

Evaluation of modification criteria

Under Oregon Administrative Rules, the commission may modify the total dissolved gas criteria on the mainstem Columbia River for the purpose of allowing increased spill for salmonid migration (OAR 340-041-0104(3)).

The commission may modify the total dissolved gas criteria in the Columbia River for the purpose of allowing increased spill for salmonid migration if it finds that:

(a) Failure to act would result in greater harm to salmonid stock survival through in-river migration than would occur by increased spill;

Failure to act would leave the TDG standard at the statewide level of 110 percent. That level would substantially curtail voluntary spill at the four lower Columbia River dams. Approving a modification to 125 percent for the spring season and up to 120 percent for the summer, with the ability to request additional periods of application in the fall-winter, would enable the Corps to operate the system

consistent with the agreed-to operations in the Agreement.

(b) The modified total dissolved gas criteria associated with the increased spill provides a reasonable balance of the risk of impairment due to elevated total dissolved gas to both resident biological communities and other migrating fish and to migrating adult and juvenile salmonids when compared to other options for in-river migration of salmon;

Based on the Comparative Survival Study results and biological monitoring of gas bubble trauma below the four lower Columbia River dams, the increased risk to salmonids and resident aquatic species due to exposure to higher levels of total dissolved gas, up to 125 percent during spring spill, is reasonably balanced by the benefits of reducing powerhouse passage and increasing downstream migration via spill.

(c) Adequate data will exist to determine compliance with the standards; and

Total dissolved gas is monitored in the tailrace of each of the four lower Columbia River dams. Monitoring data exists to allow hourly reporting of total dissolved gas levels required to determine compliance with the standards as they are proposed to be modified.

(d) Biological monitoring is occurring to document that the migratory salmonid and resident biological communities are being protected.

Biological monitoring for signs of gas bubble trauma in juvenile salmonids and resident aquatic species is conducted during periods of elevated total dissolved gas levels. DEQ plans to work with the U.S. Army Corps of Engineers to develop an approvable biological monitoring plan that details monitoring protocols and requirements.

(e) The commission will give public notice and notify all known interested parties and will make provision for opportunity to be heard and comment on the evidence presented by others, except that the Director may modify the total dissolved gas criteria for emergencies for a period not exceeding 48 hours;

Public notice and hearings have been provided for the proposed modification, as described earlier in this report.

(f) The commission may, at its discretion, consider alternative modes of migration.

DEQ did not evaluate other modes for migration.

Key issues	A new modification is needed in order to implement the December 2023 Resilient Columbia Basin Agreement, of which Oregon is a party, in addition to the Biological Opinions issued by the National Marine Fisheries Services and the U.S. Fish and Wildlife Service. If voluntary fish passage spill operations are not implemented, it is expected that powerhouse fish passage rates would substantially increase, causing increased mortality to out-migrating fish traveling past the four lower Columbia River dams.
DEQ recommendation	DEQ recommends that the EQC modify the total dissolved gas water quality standard on the mainstem Columbia River, as set forth in Attachment F.
Supporting materials	A. Oregon Administrative Rules for total dissolved gas on the mainstem Columbia River B. July 2024 Request by U.S. Army Corps of Engineers to renew total dissolved gas water quality standard modification C. Appendix B of the U.S. Government Commitments in Support of the Columbia River Restoration Initiative of the Resilient Columbia Basin Agreement D. Response to Public Comments E. Public Comments F. Draft Recommended EQC Order for Total Dissolved Gas Modification Order on the Mainstem Columbia River
Available upon request	1. 2002 Lower Columbia River Total Dissolved Gas Total Maximum Daily Load 2. U.S. Government Commitments in support of the Columbia Basin Restoration Initiative of the Resilient Columbia Basin Agreement (2023)

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Translation or other formats

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