Order Approving the U.S. Army Corps of Engineers' Request for a Modification to the State's Total Dissolved Gas Water Quality Standard

BEFORE THE ENVIRONMENTAL QUALITY COMMISSION

In the matter of the U.S. Army Corps of Engineers' request to spill water to assist out-migrating threatened and endangered salmon smolts	))))	FINDINGS and ORDER

Findings

1. The Department of Environmental Quality received a request from the U.S. Army Corps of Engineers (Corps) dated April 2, 2014, to adjust the 110 percent total dissolved gas water quality standard as necessary to spill water over McNary, John Day, The Dalles and Bonneville dams on the Lower Columbia River to assist out-migrating threatened and endangered salmonid smolts during the fish passage season of Apr. 10 to Aug. 31. The application sought approval for five years. The public was notified of the request on Sep. 10, 2014, and given the opportunity to provide written comments until 5:00 p.m. on Oct. 10, 2014.

2. Acting under **OAR 340-041-0104(3)** the commission 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:*

   Biological assessments and opinions have concluded that providing project spill for fish passage at levels that result in exceeding the 110 percent total dissolved gas water quality standard is necessary to assure adequate passage conditions for Endangered Species Act listed fish species. Voluntary fish passage spill is a low risk method for fish to move downstream. Depending on the dam and species, spill passes approximately 55 to 80 percent of juvenile salmonids. Although structural and operational modifications have improved survival through turbines, spill has greater survival of approximately 95 percent compared to turbine passage at approximately 90 percent survival. The Independent Science Advisory Board and National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries) continue to support transport in conjunction with spill to spread the risk of negative outcomes due the different types of passage. However, transportation is associated with greater likelihood of adult straying, in which adults do not return to spawn in their natal streams. Straying inhibits recovery of endangered and threatened salmonid species. The experience of in-river migration contributes to genetic adaptation of the species to altered conditions. The Biological Opinion incorporates hatcheries as a means of supplementing salmonid numbers until the species can sustain itself. The presence of in-stream migrating hatchery smolts reduces

the amount of wild smolts subject to predation and mitigates a portion of wild smolts lost to turbines or other causes during dam passage. However, hatchery fish can compete with wild fish for food and habitat and interfere with the wild fish's genetic adaptation to its environment.

(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:*

Fish Passage Center data estimate a 1.1 percent incidence of gas bubble trauma in salmon smolts in the Columbia River when total dissolved gas levels are managed to 120 percent in the tailrace. This estimate is based on smolt monitoring information collected between 1995 and 2014.

When the in-river total dissolved gas levels are below 120 percent, few adult fish (in some cases none) display signs of gas bubble trauma. Investigators have observed adult tolerance to total dissolved gas and hypothesized that it was attributable to the migration depth of adult salmonids. Depth-sensitive radio tags used in adult migration studies confirmed that adults migrate at depths up to 4 meters and find depth compensation protection from gas bubble trauma. For every meter below the surface water, a reduction of 10 percent total dissolved gas is measured in the water column. Resident fish and aquatic invertebrates in the Columbia River downstream of Bonneville Dam have been monitored by NOAA Fisheries for signs of gas bubble disease from 1993 to 1998. There were no signs of gas bubble disease observed in the aquatic invertebrates examined. There was a low incidence of gas bubble disease (less than one percent) in resident fish examined in 1993 and 1995 while in 1994, 1997 and 1998 none of the fish observed had signs of gas bubble disease. Signs of gas bubble disease were prevalent in 1996 but this was a high flow year with large volumes of involuntary spill and total dissolved gas levels above 120 percent in the tail races of dams. Given the past monitoring of gas bubble disease, the level requested in this petition strikes a reasonable balance between increased survival due to reduced turbine mortality and the risk of mortality from gas bubble disease.

c) *Adequate data will exist to determine compliance with the standards:*

Physical in-river total dissolved gas monitoring will be conducted at the tailraces of McNary, John Day, The Dalles and Bonneville Dams. Hourly data will be available on the Corps' website. The Corps has submitted a total dissolved gas monitoring plan available at: http://www.nwd-wc.usace.army.mil/tmt/wqnew/tdg_monitoring/2015-18.pdf Implementation of the physical monitoring plan will ensure that data will exist to determine compliance with the standards for the voluntary spill program identified in this Order. The Corps will report each year's physical monitoring results to DEQ.

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

The Corps has submitted a biological monitoring plan. Biological monitoring will occur according to the Fish Passage Center 2009 document "GBT Monitoring Program Protocol for Juvenile Salmonids," available at: ftp://ftp.fpc.org/gbtprogram/ . Juvenile salmonids will be collected at Bonneville and McNary Dams and examined and evaluated for incidence of gas bubble trauma, and will be assigned ranks based on severity of their symptoms. The Corps will report each year's biological monitoring results to DEQ.

Order

1. The Environmental Quality Commission approves a modification to the 110 percent total dissolved gas water quality standard for voluntary fish passage spill at McNary, John Day, The Dalles and Bonneville Dams on the Lower Columbia River, subject to the following conditions:

   (i) The modified total dissolved gas standard for the Columbia River applies during the voluntary spill period from 00:00 Apr. 1 to 24:00 Aug. 31 for the purpose of fish passage.

   (ii) The DEQ Director may approve additional periods of modified total dissolved gas standard for the Columbia River for voluntary spill to benefit fish passage, including the Spring Creek Hatchery fish release, maintenance activities, and biological or physical studies of spillway structures and prototype fish passage devices. The Corps must notify DEQ in writing describing the purposed action, the purpose of the action and dates of action at least one week prior to the voluntary spill. The Corps must obtain approval from the Director prior to such spill.

   (iii) The modified total dissolved gas criteria will apply for five years, 2015, 2016, 2017, 2018 and 2019.

   (iv) The Corps must conduct physical and biological monitoring during all periods of voluntary spill. The monitoring must be adequate to implement the requirements set out in subsections (v) to (x) below.

   (v) Spill must be reduced when the average total dissolved gas concentration of the 12 highest hourly measurements per calendar day exceeds 120 percent of saturation in the tailraces of McNary, John Day, The Dalles and Bonneville Dams monitoring stations.

   (vi) Spill must be reduced when instantaneous total dissolved gas levels exceed 125 percent of saturation for any 2 hours during the 12 highest hourly measurements per calendar day in the tailraces of McNary, John Day, The Dalles and Bonneville Dams monitoring stations.

   (vii) If either 15 percent of the fish examined show signs of gas bubble disease in their non-paired fins, or five percent of the fish examined show signs of gas bubble trauma

in their non-paired fins where more than 25 percent of the surface area of the fin is occluded by gas bubbles, the DEQ Director will halt the spill program.

(viii) The Corps must provide written notice to DEQ within 24 hours of any violations of the conditions in the modification as it relates to voluntary spill. Such notice must include actions proposed to reduce total dissolved gas levels or the reason(s) for no action.

(ix) No later than Jan. 31 following each year of this modification, the Corps must provide an annual written report to DEQ detailing the following:
a) flow and runoff descriptions for the spill season;
b) spill quantities and durations;
c) quantities of water spilled for fish versus spill for other reasons for each project;
d) data results from the physical and biological monitoring programs, including incidences of gas bubble trauma;
e) description and results of any biological or physical studies of spillway structures and prototype fish passage devices to test spill at operational levels; and
f) progress on implementing the gas abatement measures contained in the 2002 Total Maximum Daily Load (TMDL) for Lower Columbia River Total Dissolved Gas and other gas abatement activities identified through adaptive management.

(x) If requested, the Corps must report to the commission on any of the above matters or other matters relevant to this order.

(xi) The commission reserves the right to terminate or modify this order at any time.

Adaptive Management

Implementation of the TMDL for Lower Columbia River Total Dissolved Gas will continue. Oregon and Washington may request further studies to determine additional structural and operational gas abatement actions that can be feasibly implemented to reduce total dissolved gas.

Dated: 2-6-2015

ON BEHALF OF THE COMMISSION

Director