Appendix E

2020 TDG TMDL

Implementation Summary

Introduction

This appendix summarizes the Corps' implementation of the gas abatement measures contained in the Total Maximum Daily Load (TMDL) for the Lower Columbia River Total Dissolved Gas (approved by EPA on November 18, 2002), and for the Total Maximum Daily Load for the Lower Snake River Total Dissolved Gas (approved by EPA on September 30, 2003). These Total Dissolved Gas (TDG) TMDLs include a Summary Implementation Strategy (SIS), developed in coordination with NOAA Fisheries, which identifies gas abatement actions that are compatible with meeting ESA responsibilities. The SIS describes the TMDL Implementation Plan which has two phases. Phase I (through 2010) involves improving water quality, while ensuring that salmonid passage is fully protected in accordance with ESA biological opinions; and Phase II (2011 through 2020) involves structural and operational changes to dams to achieve the TDG water quality standard. SIS Phase I tables include "Short-term Implementation Activities" that are directly related to achievement of the applicable TDG water quality standard; and "Additional Short-term Implementation Activities" that are indirectly related to achieving the applicable TDG water quality standard. SIS Phase II table: "Fish Passage Actions That Support TDG Water Quality Goals," is intended to identify long-term actions that will protect fish passage while moving the system toward attainment of the water quality standard for TDG.

The following tables provide information about the status of the SIS Implementation Plan actions undertaken by the Corps. The Corps has implemented numerous gas abatement modifications that have been incorporated into measures and operations designed to benefit ESA-listed fish. Table E-1 reports on "Short-term Implementation Activities," and Table E-2 reports on "Additional Short-term Implementation Activities." Table E-3 reports on "Fish Passage Actions That Support TDG Water Quality Goals."

TABLE E-1
PHASE I – SHORT-TERM TMDL IMPLEMENTATION ACTIVITIES

2000 Biological Opinion Action Item Description	Status	Estimated Completion Date	Actual Completion Date
Ice Harbor Deflectors	Deflectors installed in spillbays 2 - 9 (1997); and spillbays 1 and 10 (1998 - 1999).	1998	1999
John Day Deflectors	Deflectors installed in spillbays 2 – 19; spillbay 20.	1998 2011	1998 2010
All Projects - Survival based spill caps at all dams (e.g. 40% at The Dalles).	Juvenile dam passage survival studies are underway to determine if current project configurations and spill levels are meeting the juvenile dam passage survival performance standards specified in the 2014 Supplemental BiOp.	2018	2019
Bonneville Endbay Deflectors	Deflectors installed in spillbays 1 18.	2002	2002
McNary Endbay Deflectors	Deflectors installed in spillbays 1, 2, 21, and 22.	2002	2002
Lower Monumental Endbay Deflectors	Deflectors installed in spillbays 1 and 8. Repaired spillbay 2 deflector.	2003	2003
Little Goose Endbay Deflectors	Deflectors installed in spillbays 1 and 8.	2009	2009
Chief Joseph Deflectors	Deflectors installed in all 19 spillbays.	2008	2008
The Dalles Deflectors	No deflector construction planned. Existing spillway stilling basin provides adequate degassing properties during spill operations for fish passage.	N/A	N/A
Divider Walls at Appropriate Dams	(See below for itemized list of divider walls.)		
The Dalles Spillwall I	Spillwall constructed between spillbays 6 and 7 to improve survival of fish passing through the spillway.	2004	2004
The Dalles Spillwall II	Spillwall constructed between spillbays 8 and 9 to improve survival of fish passing through the spillway.	2010	2010

Table F-1 corresponds to Table 15 of the 2002 TMDL for Lower Columbia River TDG and Table 18 of the 2003 TMDL for Lower Snake River TDG.

TABLE E-2
PHASE I – ADDITIONAL SHORT-TERM TMDL IMPLEMENTATION ACTIVITIES

2000 Biological Opinion Action Item Description	Status	Estimated Completion Date	Actual Completion Date
Bonneville Powerhouse 2 Corner Collector (B2CC)	Construction of corner collector at powerhouse 2.	2004	2004
Bonneville Powerhouse 2 Fish Guidance Efficiency (FGE) Improvement	Installed turning vanes on Submerged Traveling Screens (STS). Installed ceiling gap closure device.	1997	1997
Bonneville Powerhouse 2 FGE Improvement	Modified Vertical Barrier Screens (VBSs).	2008	2008
Lower Granite Removable Spillway Weir (RSW)	Installed spillway weir (SW).	2001	2001
The Dalles Turbine Intake Blocks	Installed turbine intake blocks in 2001 and removed in 2004 after biological testing confirmed the blocks did not reduce turbine entrainment of juvenile fish.	2001	Completed in 2001; removed in 2004
Lower Monumental Bypass Outfall Relocation	Relocation completed.	2012	2012
The Dalles Sluiceway Outfall Relocation	Not being investigated at this time; current sluiceway being used as is with high survival of juvenile fish passing through the existing outfall.	N/A	N/A
Bonneville Powerhouse 1 Surface Bypass or Extended Screens	Screens were removed from Bonneville Powerhouse 1 turbine intakes. Bonneville Powerhouse 1 sluiceway modifications completed in 2010 to provide surface bypass route for juvenile salmonids.	2002	2010

Table F-2 corresponds to Table 16 of the 2002 TMDL for Lower Columbia River TDG and Table 19 of the 2003 TMDL for Lower Snake River TDG.

TABLE E-3
PHASE II –
Fish Passage Actions That Support TDG Water Quality Goals

2000 Biological Opinion Action Item Description	Status	Estimated Completion Date	Actual Completion Date
John Day Spillway Weir (SW)	Construction of 2 SWs completed.	2008	2008
Removable Spillway Weirs (RSWs) at Lower Monumental, Little Goose and Ice Harbor dams	See Details below	See Details below	See Details below
Lower Monumental SW	Construction completed.	2008	2008
Little Goose SW	Construction completed.	2009	2009
Ice Harbor SW	Construction completed.	2005	2005
McNary Bypass Improvements (New Outfall)	Construction completed.	2012	2012
McNary Bypass Improvements (temperature)	Warm Water Operations have been developed for the McNary Dam juvenile bypass system when system water temperature exceeds 68° F and are included in the annual Fish Passage Plan.	Ongoing	Ongoing
Lower Monumental Extended Screens	Installed spillway weir to improve fish passage.	N/A	N/A
John Day Extended Screens	Evaluated prototype but did not complete full installation. Two SWs were constructed as an alternative.	2003	2003
All Projects - Spill Effectiveness Studies	Juvenile dam passage survival studies are underway to determine if current project configurations and spill levels are meeting the juvenile dam passage survival performance standards specified in the 2014 Supplemental BiOp.	Ongoing	Ongoing
Predator Removal and Abatement	Ongoing at projects includes avian hazing and installation of avian deterrent wires, pikeminnow removal, and sea lion hazing.	Ongoing	Ongoing
All Projects - Improved O&M	Ongoing	Ongoing	Ongoing
Bonneville Powerhouse 1 Minimum Gap Runners	Installed MGRs in turbines 1-10.	2010	2010
Implement Turbine Survival Program Results	Ongoing	Ongoing	Ongoing

Table F-3 corresponds to Table 17 of the 2002 TMDL for Lower Columbia River TDG and Table 20 of the 2003 TMDL for Lower Snake River TDG.