**STUDY CODE: WQFM-XX-21-BCL**

**TITLE: *Big Cliff TDG Monitoring with Modified Spill Gate Interim Operations: Interim Measure #6***

**MANAGEMENT PURPOSE:** The Corps will monitor TDG downstream and identify the extent that TDG criteria is met under this operation.

**FISH PROGRAM FEATURE:** Monitoring of TDG Impacts below Big Cliff (from interim operations at Big Cliff IM #6)

**REFERENCE**:Beginning in 2020, the Corps will operate multiple spillway gates at Big Cliff Dam to spread total flow across the spillway and reduce TDG levels below Big Cliff Dam. The operation occurs when the Corps is operating the spillway (e.g., high flow events). This operation is within the range of potential routine operations and is therefore feasible to start immediately.

**BIOLOGICAL OPINION ACTION:** RPA measure 5.1

**BACKGROUND:**

The construction and operation of the WV dams has played a significant role in the decline of Willamette ESA-listed salmonid populations (NMFS 2008). Operations of dams have altered dissolved gas and water temperatures below dams. This work would support RPA measure 5.1 - Interim Water Quality Measures: “Until permanent temperature control facilities and water quality improvements are constructed or operations are established, the Action Agencies will evaluate and carry out, where feasible, interim operational measures… to achieve some measure of temperature control and reduced TDG below Project dams, including Detroit/Big Cliff…”

**OBJECTIVES:** This monitoring program will help evaluate Big Cliff dam spill gate operations and TDG impacts.

1. Monitor and determine how often TDG fell within the target ranges under the new proposed operations observed.
   1. Identify times and duration of TDG exceedance events and the operations that led to the exceedance event.

2) Total Dissolved Gas Production Information

* + 1. TDG production from powerhouse and spill operations, cross-channel and downstream impacts
    2. TDG dissipation rates
    3. Depth compensated TDG
    4. Correlate TDG exceedance events with fish migration timing.

**SCHEDULE:** 2020

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**ODFW Comments:**

The Minto-Big Cliff reach is an important area for Oregon’s native fish. This study should include measuring TDG upstream of Niagara closer to Big Cliff (minimum of 1-2 locations) to provide field data to validate a modelled dissipation curve between Big Cliff and Niagara. This relationship to the existing Niagara gage may inform fish disposition decisions in future.

**NMFS Comments:**

Harmful levels of TDG are often seen in the reach below Big Cliff; if this monitoring can review past levels as well as monitor future events that are causing TDG it would be more helpful. The list of items includes TDG production from powerhouse and spill operations; it would also help to have values closer to Big Cliff to compare to Niagara values.