

ALTERNATIVE SPILLWAY CONFIGURATION OPERATIONS PLAN TO MEASURE IMPACTS ON TDG

Background

Section 5.4(1) of the Rocky Reach 401 Water Quality Certification requires Chelan PUD to manage spill toward meeting water quality criteria for Total Dissolved Gas (TDG) during all flows below 7Q10 levels (252 kcfs at Rocky Reach), but only to the extent consistent with meeting the passage and survival standards set forth in the Habitat Conservation Plan (HCP) and Fish Management Plans, as follows:

- (1) Minimize voluntary spill.
- (2) During fish passage, manage voluntary spill levels in real time in an effort to continue meeting TDG numeric criteria, using the Operational Plan for TDG.
- (3) Minimize spill, to the extent practicable, by scheduling maintenance based on predicted flows.
- (4) Avoid spill by continuing to participate in the Hourly Coordination Agreement, or any successor agreement to which Chelan PUD is a party, to the extent it reduces TDG.
- (5) Maximize powerhouse discharge as appropriate up to 212 kcfs.
- (6) Implement alternative spillway operations, using any of gates 2 through 12, to determine, in consultation with the RRF and HCP Coordinating Committee, whether TDG levels can be reduced without adverse effects on fish passage. If effective, implement to reduce TDG.

Chelan PUD currently implements items 1-5, but has not yet implemented item 6 due to a lack of data regarding the impacts alternate spillway operations may have on TDG and fish passage.

In 2011, high flow volumes and high levels of TDG in the Columbia River provided an opportunity for Chelan PUD to implement a test of spillway operations not previously tested under the high-flow conditions. The purpose was to evaluate the effectiveness of alternative operations using gates 2-12 (item 6 above), to determine whether TDG levels could be reduced without adverse effects on fish passage. The testing utilized four spill configurations: standard (also referred to as “fish spill”), TDG Spill Pattern, Shallow Arc Spill, and Flattened Spill Pattern. This testing did not require any modifications to the TDG monitoring conducted on an annual basis.

The study was conducted from early June to the end of July while river flows were high. The testing schedule established that each configuration was to be run for 24 hours at a time (midnight to midnight, until the end of June; and 0700 -0700 until the end of the study). Upon the completion of one scenario, another would begin.

The data from this first year of testing showed some promise, but not enough data was collected to make a determination as to which, if any, of the alternate configurations would be effective at minimizing TDG without adversely affecting fish passage. For this reason, it is necessary to

collect additional data. Chelan PUD proposes to conduct another round of testing in 2012, following consultation with the HCP Coordinating Committee and Rocky Reach Fish Forum.

Spillway Configurations

The testing will utilize the same four spill configurations used in 2011: Standard (also referred to as “fish spill”), TDG Spill Pattern, Shallow Arc Spill, and Flattened Spill Pattern.

1. The Standard Spill (fish spill) configuration used at Rocky Reach uses gates 2-8 with a minimum discharge per spill bay of about 4 kcfs. The Standard Spill configuration was designed to create a crown-shaped pattern of turbulent flow below the spillway with decreasing velocities leading toward the fishway entrances. This spill pattern provides favorable guidance conditions for adult migrant salmon and steelhead. The same pattern is used for juvenile fish passage spill. During spill operations, whether for juvenile fish passage, TDG management, or for other purposes, the gates are operated via a computer automated system that follows the spill pattern. Gates 9-12 are used only in high flow conditions when gates 2-8 cannot pass enough water.
2. The TDG Spill Pattern was intended to utilize all of the available spillgates in an effort to avoid higher flows (shallow gate openings) through individual gates. These shallow gate openings of 2-3 feet may result in spill that is more surface oriented. Where practical the current "fish" pattern was mimicked on the proposed TGD configuration in an attempt to avoid fish ladder impacts.
3. The Shallow Arc Spill configuration was designed to spread spill volumes more evenly across the spillway while maintaining the majority of flow in the center of the river.
4. The Flattened Spill Pattern was intended to more evenly distribute the spill flow across the entire width of the spillway. The same number of gates are open the same amount but redistributed to promote more surface mixing and less concentration of deep spill at one location.

Study Schedule

The 2012 study is tentatively scheduled to begin on June 18 and run into July. The alternate (not Standard) spill configurations will be tested for 12 hrs from 0710 hrs to 1910 hrs Monday – Friday during the course of the study. The Standard Spill pattern will be used between 1910 hrs and 0710 hrs Monday-Friday and all day Saturday and Sunday.