

MEMORANDUM FOR THE RECORD

TITLE - 21BCL02 MFR Spill Gate Malfunction**PROJECT** - Big Cliff Dam**RESPONSE DATE** - 08 February 2021**Description of the problem**

From 0500-1100 hours on Saturday, 16 January, flows released from Big Cliff were scheduled to be increased from 3,000 to 6,200 cfs following a heavy rain event that led to Detroit Reservoir rising approximately 37 ft above rule curve. With increased flow through the turbine to 3,400 cfs (near the maximum allowable capacity), the operator intended to pass the remaining 2,800 cfs through the spillway, split between three spillway gates to minimize Total Dissolved Gas (TDG) levels. The operator successfully raised spillway gates 1&2, but when attempting to pass flow through spillway gate 3, the gate tripped on an overload condition. Therefore, all spill flow was passed through the two functioning spillway gates. As flows were increased to the scheduled 8,200 cfs the following day, TDG levels peaked near 127%.

On 20 January, operations staff concluded that disabling the autogate and intending to spill through all three gates would not be in compliance with section 3.3.1.1 of Chapter 2 to the 2020 Willamette Fish Operations Plan (WFOP). At 6,200 cfs, if the generator tripped offline downstream flows would be reduced 55% to 2,800 cfs, which equates to a ramp down of 1.7 ft at the BCLO gage station (far in excess of the 20% rate of decrease per hour specified in Table NS-3 of the WFOP for high flows). With an autogate enabled, if the unit tripped offline the auto-gate would have raised to 1 ft open, which would have added some spill (+1400 cfs) to replace flow lost through the turbine, and limited the overall flow reduction observed at BCLO to 4200 cfs (a ramp down of approximately -0.9 ft and flow decrease of 32%).

Realizing the deviation from the WFOP in disabling the autogate, the Detroit O&M Manager directed the operator on duty to close Big Cliff gate 1 and place it in auto, and pass all flow in excess of the maximum generator capacity through Gate 2. This resulted in a TDG increase from approximately 125% to 130% after 0800 on 20 January 2021.

Gate 3 was repaired and returned to service on 21 January 2021, and scheduled spill was subsequently passed through gates 1&2 while gate 3 remained shut and in auto. Between 0900 and 1000, TDG levels were reduced from 128% to 122% by spreading 2,320 cfs in spill through two gates instead of one and 3,580 cfs through the turbine (total discharge of 5,900 cfs observed at BCLO).

ROOT CAUSE. On 19 January, the cause of the spillway gate 3 failure was determined to be a faulty timing relay that prevented the gate breaks from releasing. Parts needed to complete repairs arrived at Detroit Dam in the morning of 21 January 2021, and repairs were completed by 0900 the same day.

CORRECTIVE ACTION. Applicable portions of the WFOP and any resulting MOC's for the event will be reviewed with Detroit operations staff, with the intent of reinforcing that spillway gate operations performed to minimize TDG impacts are executed in compliance with the applicable WFOP sections.

Type of event

Impact on facility operation

Elevated TDG levels (130%) were observed in the reach between Big Cliff Dam and the Minto Fish Facility. It is unknown what levels of TDG were observed at the Minto Fish Facility.

Expected impacts on fish

Elevated TDG levels (130%) were observed in the reach between Big Cliff Dam and the Minto Fish Facility.

Comments from agencies

No comments

Please email or call with questions or concerns.
Thank you,

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