

**OFFICIAL COORDINATION REQUEST FOR  
NON-ROUTINE OPERATIONS AND MAINTENANCE**

**COORDINATION TITLE-** 14BON84 PH1 ITS end gate and WG1 repair

**COORDINATION DATE-** Updated 11 February 2015

**PROJECT-** Bonneville Lock and Dam

**RESPONSE DATE-** 12 February 2015

**Description of the problem** - Bonneville project requires an Ice and Trash Sluiceway (ITS) outage to reinstall the repaired south end gate and repair the adult ladder entrance weir gate (WG1) at the south end of PH1.. The end gate allows the project to close the sluiceway in the event of an emergency and to float large woody debris free of the channel when it becomes at fish passage obstacle. The reinstallation requires a complete ITS outage with all bulkheads installed across the face of PH1. While the ITS is out of service, the project will also utilize divers to repair the adult ladder entrance weir gate (WG1) at the south end of PH1.

FPOM has requested that during this operation PH1 operations will be minimized by by operating PH2 units to the upper 1% and if additional water needs to pass that spill is increased is increased above the level outlined in the FOP (fish operating plan) up to the 120% TDG cap before utilizing BON1 units. (Operation outside FPP criteria would only occur when flows exceeded Project capacity. Please see *Table 1. 10 year Average Flow for 1-31 August 2004 – 2013* below for information about when average flows might exceed capacity.

**Type of outage required** – ITS out of service (OOS) for the end gate installation. South end PH1 units and ITS OOS to allow divers to access WG1[BPA\_USER1].

**Impact on facility operation** – The WG1 repair/replacement and the ITS end gate installation will take about 12 days.

*FPP section 2.5.3.1.a. Gate Pairing. The four weir gates will be operated in two pairs. Only one gate pair will be allowed to operate at any given time. Gates 1 and 65 will operate together as the active pair for tailwater elevations greater than 23' msl, while gates 2 and 64 will operate together as the active pair for tailwater elevations less than 26' msl. For tailwater elevations between 23' and 26', the designated active pair will depend on whether the tailwater elevation has been rising or falling with a "dead band" of 1.5'.*

WG-1 and -65 have a concrete sill at elevation 8.5' msl. Therefore these gates can maintain the 8' submergence criteria down to tailwaters of 16.5' msl at the minimum. The gate sits behind a concrete sill and is comprised of three knife gate sections that are pulled up from the bottom via pulleys attached to a lifting beam. This lifting beam and pulley system is what has fallen from the gate slot and is sitting at an unknown location. The lack of support from above means the gate itself has fallen to an unknown elevation.

WG-2 and -64 sit on the downstream site of a concrete sill that sits at elevation 2' msl. Therefore while they allow FPP criteria to be maintained at lower tailwaters, the maximum extension of these gates is to a height of 11' msl. When tailwater becomes high enough so that the gate in use switches from WG-2 to WG-1, a bulkhead descends automatically in the WG-2 slot to completely block water flow at that particular entrance. Currently WG-2 has been placed in manual and the gate is at maximum extension (to 11' msl). This has allowed differentials through WG-1 to remain in criteria, though tailwater is currently high enough to crest both WG-1 and -2 entrances.

**As tailwaters rise, the WG-2 bulkhead may be lowered forcing all water out of the WG-1 entrance.**

Tailwater rises from the low winter levels in the spring, and accordingly the switch from utilizing WG-2 to utilizing WG-1 (at a tailwater of ~25') generally occurs in mid-May. This has been the case from 2011-2014, the exception being during the 2012 high flows, when the tailwater-induced switch occurred at the end of March. Assuming that the WG-1 gate structure fell to the concrete sill (which is unknown), an 8.5' submergence would be maintained at a tailwater of 17'.

Current tailwater elevations at BON at the beginning of February have been ~18.0' during the day. Tailwater is expected to increase through the spring resulting in low entrance differentials and a large submergence (>>8.4'). At low tailwaters during the winter, WG-2 may be able to be manipulated to increase entrance differentials, as is currently being done. However, this can cause FV1-1, which supplies water to the PH1CC diffusers, to open significantly and has caused debris issues on the FV1-1 trash rack.

During August, BON would normally operate , PH2 up to mid-range, PH1 and spill as per the Summer FOP. With the proposed operation, PH1 use will be limited, PH2 units might operate up to the 1% , and spill might exceed FOP daytime spill . Please see **Table 1. 10 year Average Flow for 1 – 31 August 2004 – 2013** for more details on average flows and Bonneville capacity at both mid-range and upper 1% Powerhouse 2 operations.

**Dates of impacts/repairs** – The ITS bulkhead installation for non-FPP criteria gates will be completed prior to 1 August. BON will take a day to install bulkheads in the remaining five gates. The length of time to cinder and dry the channel is unknown, but the estimate is about 2-3 days. Pulling bulkheads from the five FPP criteria gates will take about a day; removal of bulkheads from the rest of the gates will occur as BON maintenance schedules allow. If everything goes as planned, the outage is expected to start on 3 August and end on 15 August.

**Length of time for repairs** – Repairs to WG1 would take about a day. Installation of the ITS end gate would take about a week. Both require the complete closure of the ITS, this includes installation of the bulkheads. Installation and removal of the ITS bulkheads take about a four days. Total time for repairs would be about twelve days.

**Table 1. 10 year Average Flow for 1 – 31 August 2004 – 2013.**

Outflow 10 Yr Avg (kcfs)		Bonneville 2004-2013	
Date	Avg. Flow	Capacity at PH2 mid- range(kcfs)	Capacity at PH2 upper 1% (kcfs)
1-Aug	176.05	209	235
2-Aug	167.55	209	235
3-Aug	160.25	209	235
4-Aug	160.75	209	235
5-Aug	160.38	209	235
6-Aug	154.02	209	235
7-Aug	154.72	209	235
8-Aug	151.34	209	235
9-Aug	149.54	209	235
10-Aug	151.26	209	235
11-Aug	155.05	209	235
12-Aug	156.51	209	235
13-Aug	152.96	209	235
14-Aug	143.17	209	235
15-Aug	143.9	209	235
16-Aug	146.3	209	235
17-Aug	145.05	209	235
18-Aug	151.17	209	235
19-Aug	148.85	209	235
20-Aug	146.39	209	235
21-Aug	140.92	209	235
22-Aug	146.16	209	235
23-Aug	142.59	209	235
24-Aug	146.11	209	235
25-Aug	140.61	209	235
26-Aug	139.74	209	235
27-Aug	142.06	209	235
28-Aug	136.96	209	235
29-Aug	139.32	209	235
30-Aug	144.3	209	235
31-Aug	138.17	209	235

**Expected impacts on fish passage** – FPOM had been agreeable to taking the ITS out for the end gate installation in August, once flows decrease, because fewer PH1 units usually operate this time of year due to the spill and PH2 as the priority powerhouse. There would be no surface passage route at PH1 during the ITS outage. South end PH1 units would be OOS while divers are recovering WG1.

Impacts will be minimized by attempting to reduce operation of PH1 units to the extent practicable. Looking at Table 1, it is highly likely PH1 units would not operate even if PH2 units are held to the mid-range.

**Downstream passage** – Downstream passage through the ITS will not be available from 3 – 15 August. Scheduling the outage to occur during August will ensure the B2CC is open for juveniles and kelts. The B2CC will be open, spill will occur as per the 2015 Summer FOP, and DSM2 will be operating. We should insert turbine survival rates here. The impact described in the FPOM meetings has been due to predation and not due to problems associated with passing through the turbines.

**Lamprey passage** – This work will occur toward the end of the normal adult lamprey migration period. Juvenile lamprey traveling downstream during August will be impacted similar to the Downstream passage noted above.

**Upstream passage (including Bull Trout)** – upstream passage is expected to be impacted for a day or two while divers are in the water looking for WG1. Table 2 shows the ten year average passage by date at Bradford Island. The dive would need to be scheduled between 4-14 August.

**Table 2. Bradford Island fish passage. 10 year average for 2004 – 2014 from 1-31 August**

Date	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
1-Aug	2118	2641	3547	4889	4351	4912	6679	3860	3795	4344
2-Aug	2886	2487	2462	5265	3395	5990	4834	2402	3922	3795
3-Aug	3961	2492	3234	4828	3060	6186	8317	2322	4262	4557
4-Aug	4952	2790	5538	4776	3110	3519	7708	2634	5557	3825
5-Aug	4594	3766	5960	5357	1682	2915	7128	2246	7890	3466
6-Aug	3645	5542	5364	4174	1006	6001	7674	2060	10934	4551
7-Aug	4563	5420	5315	3906	2717	7178	7592	2216	15496	3513
8-Aug	4520	6010	3556	4125	5574	7144	6591	2511	11734	4878
9-Aug	3668	5705	3598	3729	6568	4741	6387	3500	11274	3510
10-Aug	3483	3820	2700	3463	8141	3773	6920	2770	8371	4753
11-Aug	2636	3455	3018	3460	17894	3280	10798	3385	6753	6126
12-Aug	2523	4327	4138	3886	32198	3081	8510	3183	5516	9262
13-Aug	3888	5788	6770	3750	34201	3963	10908	2813	3012	10892
14-Aug	4062	4654	5458	3530	28699	5693	8868	3540	3559	6786
15-Aug	5449	5980	4732	3832	31703	5551	11542	4420	8511	9343
16-Aug	5887	6128	6185	4376	25498	6458	10213	3518	8461	4406
17-Aug	4549	6263	8148	5398	25306	6190	11697	3468	5250	4170
18-Aug	2412	3431	11778	4520	22027	4240	11806	3003	4972	7926
19-Aug	2666	4068	13415	3445	15468	2884	7329	2778	8093	8926
20-Aug	3338	5177	12048	2752	17727	2942	9058	2878	4884	6787
21-Aug	6540	4340	8402	2506	22252	2146	10160	1610	8204	3912
22-Aug	8364	4446	6775	4914	23095	5864	9593	3808	9386	1331
23-Aug	5958	4478	6689	11938	19457	6371	6229	5362	13666	2666
24-Aug	5028	4850	8815	22468	20661	6858	6894	4884	14750	7168
25-Aug	7192	4648	8808	29286	23866	10055	5617	6112	15139	7159
26-Aug	9369	4786	9412	12612	18886	14298	5286	6600	15872	8834
27-Aug	7286	6754	8139	10778	20826	18984	4643	10016	18988	13554
28-Aug	9912	13116	8692	13124	24134	14760	7819	10868	28967	14637
29-Aug	8626	10978	11117	16122	25822	12616	7248	12652	45604	17204
30-Aug	6478	6568	11692	24480	22628	20700	9297	10172	51175	11232
31-Aug	7982	10374	12988	23148	20252	15249	10745	17310	31641	18174

**Comments from others:**

**08 January 2015 FPOM - 14BON84** PH1 ITS end gate and WG1 repair. Hausmann provided some explanation of the need. He said the bulkhead install/removal could be scheduled to prioritize the non chain gate slots. This would keep the ITS operating longer and bring it back a bit sooner. This could take 4 – 7 days off the schedule. Hausmann said the Project is willing to work the necessary hours to keep the installation to a week. Fredricks and Lorz were agreeable with the schedule as long as operation of PH1 is minimized to the capacity we can. This may lead to increased spill. Fredricks stressed that the ITS is the juvenile bypass and if we do not have a bypass system we should not be operating the units. **ACTION: Hausmann will need to update the MOC with more information – this should include a risk assessment of what flows could be, powerhouse capacity, ability to reduce the schedule.** The Project is now leaning heavily on the safety issues with the ITS being open and little way to close it. Fredricks and Lorz said the three week impact is a big impact and while safety is a concern, the fish impacts needs to be considered. Baus suggested looking at PH2 operation at mid-range and upper end of 1%.

**12 February 2015 FPOM. 14BON84** PH1 ITS end gate and WG1 repair. Fredricks said understanding the impacts of WG1 and WG2 being left until August is important. FPOM generally agreed August was a better timeframe since operating PH1 is undesirable. Bettin clarified that the request to spill, rather than operating PH1, did not include a request to spill above the gas cap. Hausmann said an ROV inspection would require the ITS and several units be OOS so it hasn't been done yet. **FPOM concurred with waiting until August.**

**Final results - FPOM concurred with waiting until August.**

Please email or call with questions or concerns.

Thank you,

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