

Bonneville Dam¹

1. Special Project Operations.

RCC will coordinate needed changes with the projects and authorize operations in teletype regulations.

1.1. Spill. Spill for fish passage will be provided during the spring and summer outmigration seasons in accordance with spill specifications in Appendix E and as coordinated through TMT. Alternative spill patterns to control dissolved gas levels or change fish passage conditions will be coordinated through the FPOM.

1.2. Spillway Erosion Monitoring. The Bonneville spillway ogees, pier noses, and stilling basin are badly eroded. The Corps has been monitoring the extent of this erosion through mid and post fish spill operation season surveys. In 2010, a mid season (approximately mid to late June) survey will be conducted. The survey will take approximately one-half day and require a full spillway outage. A post season survey will also be conducted. The survey will require shutting down adult attraction spill (bays 1 and 18) 1 bay at a time for a 2-hour period. The post season survey will be scheduled for late October / early November to minimize impacts on adult passage and provide enough time to use survey information for planning. FPOM and TMT will be coordinated with to determine the best timing for both surveys.

1.3. PH1 Turbine Rehabilitation Program and Turbine Commissioning. Bonneville Project is in the final phases of a 15 year turbine rehabilitation project at PH1. Units 7 & 9 remain out of service for rehab. Unit 9 is slated to return March and Unit 9 April 2010. Prior to return to service, the units have to undergo a series of commissioning tests that involve operating the unit throughout its full hydraulic operating range. These tests include loads above and beyond the 1% efficiency ranges for short durations as well as tests that deal with load rejections. Unit operations testing outside of the 1% range will be coordinated with the regional fish managers prior to testing and will be minimized as much as possible. Testing history and coordination from 8 previous units have produced little to no impacts on juvenile passage and is completed in a timely fashion to help limit unit operations outside the units 1% efficiency range. Also, once units have been cleared and are ready to be put online, a 72 hour heat run test will be started. This may require, depending on the time of year, a unit being put online at PH1 reducing the need to run a unit at PH2 during the fish passage season. As part of the acceptance testing a main unit needs to be operated at a specific load and kept on line for a minimum of 72 hours to pass commissioning.

1.4. PH2 Gatewell Hydraulics Testing. Modifications to turbine units at Bonneville Dam's second powerhouse (B2) have increased flows into the gatewell in an effort to enhance fish guidance efficiency. The modifications included installation of a gap-closure device on the intake ceiling, just downstream from the top edge of the submerged traveling screen (STS).

¹ The purpose of this section is to notify regional interests of planned activities that will or may affect fish passage. Further coordination may occur as needed.

In addition, a turning vane was installed just below the picking beam on the STS, and the size of the vertical barrier screen was increased (Ploskey et al. 2004). These changes increased the number of fish guided into the gatewell, and reduced loss of guided fish back into the turbine intake. However, little is known about hydraulic conditions in proximity to the VBS. High or shearing water velocity, or excessive turbulence in this region as well as high flows causing impingement have been investigated in studies from NOAA gatewell studies in 2009.

Hydraulic conditions in the gatewell may increase descaling or mortality for outmigrating smolts. Therefore more information is needed to determine what flow characteristics exist in the gatewell that could cause the injuries observed in Spring Creek fish.

Starting the week Feb 21, 2010 and continuing the week of 1 March, PNNL will conduct a study is to sample water velocities in the gatewell slot at Units 14A & 12A, from the entrance above the STS to the water surface and in close proximity to the vertical barrier screen (VBS) using Acoustic Doppler Velocimeters (ADV). Sampling will provide an estimate of velocity magnitude, and turbulence intensities that out-migrating smolts may encounters they pass through the gatewell. PNNL will deploy two ADVs in the gatewell at Unit 14A & 12A. Water velocities will be sampled from the bottom of the gatewell to the water surface in predetermined vertical increments and horizontally from one side of the gatewell to the opposite and in close proximity to the VBS providing x,y, z, and magnitude flow measurements. We will acquire water velocity data at four different turbine discharge levels: 17.8, 16.3, 14.7, and 12.0 kcfs. The anticipated duration of testing will be approximately 1 day per treatment. All test flow ranges will be conducted inside the 1% turbine efficiency range.

2. Studies.

2.1. Second Powerhouse Behavioral Guidance Structure (BGS) Biological

Evaluation/Project Survival. A third passage season of acoustic telemetry will be used to evaluate juvenile salmonid response to the BGS, second powerhouse and corner collector as well as all other passage routes at BON in 2010. Equipment will not be installed on the BGS in 2010. Additional transducer trolley pipes will be installed in mid March at PH1. Existing pipes on the second powerhouse pier noses and spillway installed in 2008 will also be used. Hydrophones will again be deployed along the Washington and Oregon shorelines to monitor passage at PH1 and specifically the gap between BGS and shore, which may require BRZ permits.

2.3. Lamprey Passage Evaluations. From early June to the end of August, up to 1000 adult Pacific lamprey will be captured and tagged with half-duplex PIT tags and up to 300 will be radio-tagged and released below the dam to evaluate efficacy of Cascades Island fishway entrance modifications and overall passage, including use of the Lamprey Passage Systems (LPS). An additional 300 fish will be radio-tagged and half-duplex PIT tagged to evaluate detection efficiency for each system and to determine LPS use by radio-tagged fish. Access to antenna and receivers for downloading and maintenance will be needed from March through October. LPS and half duplex PIT antennas will be operational no later than the middle of May and run until at least October 1. Any new antenna or receiver installations

will be completed during the 2009-2010 IWW period.

To evaluate the use of JSATS acoustic telemetry tags in adult Pacific lamprey studies and to determine the fate of adult lamprey in the FCRPS, 60 adult lamprey will be captured and tagged with a JSATS and half-duplex PIT tags. These JSATS-tagged fish will be released in the Bonneville Dam forebay and mobile tracked by boat through the reservoir reaches, tributary mouths, and tailraces of upstream dams.

2.4. Out of Criteria Operations Related to Research

2.5. Adult Salmon Studies Evaluations. From late March to June 1 600 adult Spring Chinook salmon will be captured and radio-tagged at the AFF and released below the dam to evaluate overall passage, with special focus on passage at the modified Cascade Island entrance. Access to antenna and receivers for downloading and maintenance will be needed from March until August. Any new antenna or receiver installations will be completed during the 2009-2010 IWW period.

2.6. Sea Lion Predation. Beginning when the first California sea lions return to Bonneville Dam until the last sea lion leaves, usually mid-November until June 1 (modifications to this date coordinated through FPOM), exclusion gates will be installed at all downstream slots of all entrances and barriers will be installed at B2 FOGs. In addition, NMFS-approved sea lion harassment activities will occur from land and water during sea lion season. The Fisheries Field Unit (FFU) will monitor sea lion predation and evaluate sea lion deterrent efforts from the powerhouse decks and the spillway public parking lot from early January through May 31.

2.7. Summary. All dates shown are approximate and could be advanced or delayed by a week or so depending on various factors such as river flows, contractor schedules, equipment failures, etc. Some evaluations may not proceed. Therefore, a final description of studies and outages being conducted will be coordinated with the region through AFEP (FFDRWG and SRWG), prior to April 1. All special operation requests or schedule changes will be coordinated with the fisheries agencies and tribes through the appropriate regional forum with the action agencies making the final decision.

The Dalles Dam²

1. Special Project Operations

RCC will coordinate needed changes with the project and authorize operations changes with issuance of a teletype describing the regulations.

1.1. Spill. Spill for fish passage will be provided during the spring and summer outmigration seasons in accordance with spill specifications in Appendix E (FOP) and as coordinated through TMT. Alternative spill patterns to control dissolved gas levels or change fish passage conditions will be coordinated through the FPOM.

2. Spillwall Construction. Construction of a spillway training wall (spillwall) extending downstream from the spillway between spillbays 8 and 9 will be completed during the in-water work period of 2009-10. As in 2008, a hard constraint for a 76.5' msl working hours and 76.0' all other hours tailwater elevation at The Dalles Dam will be needed for the entire construction period (8 September 2009 – 1 April 2010) to prevent construction barges from grounding in the shallow tailrace. The Corps has been and will continue to work with RCC, TMT, and the construction contractor to look for flexibility in this constraint and coordinate activities. New spill patterns developed for the new configuration will be coordinated through FFDRWG, FPOM, and RCC and included in this document.

2. Studies.

2.1. Adult Lamprey Studies. Half-duplex PIT and radio-telemetry antennas and receivers will be operational to monitor adult lamprey passage no later than mid-May. Access to RT antenna and receivers for downloading and maintenance will be needed from March until August. Any new antenna or receiver installations will be completed during the 2009-2010 IWW period.

JSATS-tagged adult lamprey will be released in the Bonneville Dam forebay and mobile tracked by boat through the reservoir reaches, tributary mouths, and tailraces of upstream dams. This work may require a permit for access to the tailrace BRZ of The Dalles Dam.

2.2. Adult Salmon Studies. Half-duplex PIT and radio-telemetry tagged adult Spring Chinook salmon (tagged at Bonneville Dam) will be used to evaluate adult salmon passage, with particular emphasis on assessing the effects of the new 8/9 spillwall and associated spill pattern. Radio-telemetry antennas and receivers will be operational to monitor adult Spring Chinook salmon passage no later than the end of March. Access to radio-telemetry antennas and receivers for downloading and maintenance will be needed from March until August. Any new antenna or receiver installations will be completed during the 2009-2010 IWW period.

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2.3. Steelhead Ice Trash Sluiceway Passage Study. Hydroacoustic data collection in the sluiceway and at turbine intakes will continue through April 10. All main units and sluice gates will be monitored for passage of adult steelhead kelts and kelt-sized targets. Equipment removal will occur by modified hoist and should not require main unit, fish unit and sluiceway outages. If outages are required for unforeseen problems, they will be coordinated through regional managers.

2.4 Lower Columbia River Survival Study. A project survival study will be conducted in the Spring of 2010. This acoustic telemetry study will serve as a post-construction evaluation of the new spillwall and as the first year of 2008 BiOp Performance Standard testing for yearling and subyearling Chinook salmon and steelhead. Data will include standard survival and passage behavior metrics. The study period runs from approximately 20 April to 20 July depending on fish availability at John Day Dam. Emergency outages may be requested for replacement or repair of damaged equipment during the study. These will be coordinated through FFDRWG/FPOM and RCC. Approximately every two weeks from May through July, battery changes will be necessary for hydrophones located in the TD forebay. This may require a BRZ permit for forebay access which may impact the level of spill allowed.

2.5. Summary. All dates shown are approximate and could be advanced or delayed by a week or so depending on various factors such as river flows, contractor schedules, and equipment failures, etc. Some evaluations may not proceed. All special operation requests or schedule changes will be coordinated with the fisheries agencies and tribes through the AFEP and with RCC, TMT, and BPA.

John Day Dam³

1. Special Project Operations.

1.1. Spill. Spill for fish passage will be provided during the spring and summer outmigration seasons in accordance with spill specifications in Appendix E Fish Operations Plan (FOP) and as coordinated through TMT. Alternative spill patterns to control dissolved gas levels or change fish passage conditions will be coordinated through the FPOM. Planning dates for spill are from April 10 through August 31 for spring and summer migrants as required in the 2008 BiOp. Prototype top spillway weirs (TSW) will be evaluated in 2010 to provide information for design of a permanent surface flow outlet system at John Day Dam. The evaluation will compare the performance of two TSWs operating with two different training spill levels. A repeat of the 2009 TSW test will occur. Two prototype TSWs that pass about 10 kcfs spill each will be relocated to spill bays 18 and 19. Training spill patterns to support the TSW jets and provide good downstream egress for juvenile salmonids have been developed by modeling at ERDC and coordination with regional agencies. The TSW test will occur between 20 April and 20 July. During testing, spill and operation of the TSWs will be provided 24-hours per day. Before this test, from April 10 to approximately April 20 (planning dates), spill discharges will be 30% of instantaneous project flow 24 hours per day using the TSW test pattern. Following the TSW test, from approximately July 21 through August 31, spill will be 30% of instantaneous project flow 24-hours per day. Spill will be provided in a manner consistent with TDG management to avoid excessive gas supersaturation conditions. Spill patterns and amounts may change following regional review of 2009 TSW test results.

2. Studies.

2.1. Adult Lamprey Studies. Half-duplex PIT and radio-telemetry antennas and receivers will be operational to monitor adult lamprey passage no later than mid-May. Access to RT antenna and receivers for downloading and maintenance will be needed from March until August. Any new antenna or receiver installations will be completed during the 2009-2010 IWW period.

JSATS-tagged adult lamprey will be released in the Bonneville Dam forebay and mobile tracked by boat through the reservoir reaches, tributary mouths, and tailraces of upstream dams. This work may require a permit for access to the tailrace BRZ of John Day Dam.

2.2. Adult Salmon Studies. Half-duplex PIT and radio-telemetry tagged adult Spring Chinook salmon (tagged at Bonneville Dam) will be used to evaluate adult salmon passage, with particular emphasis on assessing the effects of modifications to the upper sections of the North Fish Ladder. Radio-telemetry antennas and receivers will be operational to monitor adult Spring Chinook salmon passage no later than the end of March. Access to radio-telemetry antennas and receivers for downloading and maintenance will be needed from

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March until August. Any new antenna or receiver installations will be completed during the 2009-2010 IWW period.

The Fisheries Field Unit (FFU) will conduct periodic post-construction visual and/or video monitoring at the North Fish Ladder between September 1 and October 31 to identify and diagnose potential problem areas associated with the ladder modifications.

2.3. Evaluation of Top Spillway Weirs (TSW)

2.3.1. General. Two prototype top spillway weirs that pass ~10 kcfs each will be moved from Bays 15 and 16 from 2009 and placed in bays 18 & 19 in 2010. In 2009-10 in-water work season bay 20 has added a new spill deflector place at elevation 150' msl. Training spill patterns to support the TSW jets and provide good downstream egress for juvenile salmonids have been developed (Table ?) and will be used to replicate tests that occurred in 2009. Two spill levels will be tested to provide spill / TSW efficiency curves. These data will be used for designing surface flow outlet and tailrace improvements at John Day Dam. Passage distribution, forebay retention, tailrace egress, and survival will be estimated for yearling Chinook, steelhead, and subyearling Chinook salmon.

2.3.2. TSW Evaluations. An evaluation of the effects of operating two TSWs at two spill levels on juvenile Chinook and steelhead passage distribution, forebay residence time, tailrace egress conditions, and total survival will be conducted. Acoustic telemetry will be used to assess passage behavior and survival at the dam. Passage metrics will be collected under two training spill conditions, 30% spill vs. 40% spill. A randomized block design will be used to accomplish this, with each spill treatment lasting 2 or 3 days. The period for all of these study components will run from approximately 20 April – 20 July and will depend on fish availability and river conditions. Emergency outages may be requested for replacement or repair of damaged equipment during the study. These will be coordinated through FFDRWG/FPOM and RCC. Approximately every two weeks from May through July, battery changes will be necessary for hydrophones located in the JDA forebay. This will require a BRZ permit for forebay access which may impact the level of spill allowed.

Table 2.3.1. JDA TSW Spill Patterns.

Patterns pending.

2.4. Post Construction Balloon Tag Tests of New Spillbay Deflector at Bay 20. The Corps is completing a new spill deflector in spillbay 20 at John Day Dam. A post construction test of the new deflector will take place in late March/Early April to test the new deflector with training spill from a TSW in Bay 19. Approximately 400 fish will be released via a mid point release pipe at the center of bay 20 at 2.4 and 4K respectively. Training spill will be required through bay 19 each day of testing as well as a spill level of 2.4k or 4K during specific fish releases. Fish will be recovered downstream of John Day dam with recovery boats and held for 24 and 48hours for post passage survival. Testing will be completed prior to the start of the 2010 spill season on 10 April.

2.5. Out of Criteria Operations Related to Research. An extended in-water work period from 15 November 2009 to 30 March 2010 is needed to ensure completion of the second phase of the FCRPS BIOP required JDA north ladder modifications from the count window to the exit. Evaluations of the 2003-2007 fish run passage timing (Table 2.4.1) suggests that these dates should minimize the impacts on listed fish. Emergency outages may be requested for replacement or repair of damaged equipment during the study. These will be coordinated through FFDRWG/FPOM and RCC. Approximately every two weeks from May through July, battery changes will be necessary for hydrophones located in the JDA forebay.

Table 2.4.1. Adult fish run passage timing and counts during November and March 2003-2007.

Date	CA	CJ	KA	KJ	BB	SH	Chum	Pink	SY	Lamprey
2007 Nov 1-15	595	212	154	2	0	2157	0	0	481	5
	131									
2006 Nov 1-15	7	31	2714	0	0	9052	0	0	2323	0
2005 Nov 1-15	317	6	1840	6	0	5404	0	0	1582	0
2004 Nov 1-15	948	14	727	29	0	2405	0	0	842	0
2003 Nov 1-15	859	51	97	25	0	4275	2	0	1215	0
	403									
Total	6	314	5532	62	0	23293	2	0	6443	5
2007 Nov 16-30	362	87	33	4	0	3352	0	0	933	4
2006 Nov 16-30	362	0	1829	0	0	3857	0	0	899	0
2005 Nov 16-30	88	0	159	0	0	754	0	0	139	0
2004 Nov 16-30	508	2	27	0	0	1040	1	0	348	0
2003 Nov 16-30	73	1	30	0	0	1753	0	0	443	0
2007 Mar 1-15	0	1	0	0	0	1460	0	0	487	0
2006 Mar 1-15	0	0	0	0	0	144	0	0	4	0
2005 Mar 1-15	0	0	0	0	0	1405	0	0	92	0
2004 Mar 1-15	1	0	0	0	0	1138	0	0	291	0
2003 Mar 1-15	201	0	0	0	0	5682	0	0	1401	0
	159									
Total	5	91	2078	4	0	20585	1	0	5037	4
2007 Mar 16-30	1	0	0	0	0	1978	0	0	627	0
2006 Mar 16-30	0	0	0	0	0	1079	0	0	65	0
2005 Mar 16-30	15	0	0	0	0	1129	0	0	112	0
2004 Mar 16-30	122	0	0	0	0	1423	0	0	175	0
	277									
2003 Mar 16-30	5	0	0	0	0	3421	0	0	841	0
	291									
	3	0	0	0	0	9030	0	0	1820	0

Comment [U1]: This table needs to be updated with 2008-2009 fish count data and an extension to March 30 prior to publication.

2.5. Summary. All dates shown are approximate and could be advanced or delayed by a week or so depending on various factors such as river flows, contractor schedules, and equipment failures, etc. Some evaluations may not proceed. Therefore, a final description of studies and outages being conducted will be coordinated with the region through AFEP (FFDRWG and SRWG), prior to April 1. All special operation requests or schedule changes will be coordinated with the fisheries agencies and tribes through the AFEP and with RCC and BPA.

McNary Dam⁴

1. Special Project Operations.

- 1.1. Spill.** Spill for fish passage will be provided during the outmigration season in accordance with spill specifications in Appendix E and as coordinated through TMT. Alternative spill patterns to control dissolved gas levels or change fish passage conditions will be coordinated through the FPOM. During periods of high river flow, spill volumes and the elevation of McNary reservoir may need to be manipulated on a daily or every-other-day basis to provide safe conditions for loading the fish barge at the juvenile fish facility below the dam.
- 1.2. Doble Tests.** Four transformer banks, T1, T3, T6, T7 and the respective turbine units will be taken out of service for Doble testing in 2009. Turbine units 1 and 2 will be unavailable for up to 4 days during T1 testing between 9 and 12 March 2009. Turbine units 5 and 6 will be out of service for up to four days during T3 testing 24-27 August 2009. Turbine units 11 and 12 will be out of service for up to four days during T6 testing 21-23 September 2009 and turbine units 13 and 14 will be out of service for up to four days during T7 testing 28-30 September 2009. There may be some overlap between the 2 tests. Since McNary Dam has multiple transformer banks and transmission lines, and redundant switching capability, most turbine units will be available for operation during these tests. Turbine unit 1% efficiency operations and turbine priorities will continue to follow fish passage plan requirements. Outage dates will be coordinated with the region as they become available.
- 1.3. TSW Installation.** TSW1 is to be moved from spillbay 19 to spillbay 4 prior to the start of the 2009 spill season. This change will require a new spill pattern for a single treatment test. A new spill pattern has been accepted by the region for the 2009 fish passage season.
- 1.4. Headgate Repair.** This is a long term program to return the headgates to a safe operating condition by adding new roller chain, seals, anodes, and other miscellaneous components. The plan will require short unit outages throughout the year while transporting rebuilt gates from the turbine units to the repair pit and vice versa. Each swap will take from 4 to 6 hours to complete, and take place approximately every 2 months. Headgate movements are to take place concurrently with other outages as they occur, and no special operations outside the Fish Passage Plan are expected.
- 1.5. New Turbine Unit Oil Coolers.** The existing turbine unit thrust bearing oil coolers are failing and are in need of replacement. The project has been replacing the internal oil coolers with external coolers as they fail. The plan is to replace the remaining oil coolers

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during planned outages rather than through forced outages after internal oil cooler failure. This work started in July, 2007 and will continue into February 2009. No special operations are planned.

- 1.6. Navigation – Fish barge transit of tailrace.** In order to safely allow juvenile fish barges to pass across the spillway tailrace, the project may temporarily reduce spill (to 0 kcfs if necessary) to safely allow the juvenile fish barge to transit the tailrace from the navigation lock and tie up at the loading facility. Once the barge is loaded and ready to leave the facility, spill may again be reduced as needed until the barge has safely departed. Departure usually takes about 30 minutes to complete.
- 1.7. Waterfowl Nesting.** From the end of April to the beginning of July, the McNary pool may be restricted to operations to elevations between 337.0 and 340.0 feet in support of waterfowl nesting on Lake Wallula. Pool elevations are also operated between 338.5 and 339.5 feet at least once every 4 days during daylight hours for a period of 4 to 6 hours. A yearly teletype has been issued to regulate the McNary pool in this fashion since at least 1982.
- 1.8. Pedestal.** This contract is to build a 9'x 9'x 12' concrete structure capable of supporting one rotor at the North end of the powerhouse. There is a main water cooling valve that may need to be replaced which may require an outage for Unit (12) for (2 days) between January and March 2009.
- 1.9. Dewatering System Improvement.** The pumping system at McNary is inadequate to support two main unit dewatering at a time. Between January and September 2009, the unwatering pumps 1, 2, & 3 and drainage pump 4 motor control centers will be replaced. Unit outages will be required for this work for a very short period.
- 1.10. New 230 kv Transformer Installation.** Installation of new main unit transformers for transformer banks T2, T4, and T5, 3 transformers per bank, will be in the period July 2009-Oct 2009. The Government will shut down generator units 7 and 8 and de-energize transformer bank T4 on 1 July 2009. The installation for T4 is estimated to be complete and system in commercial operation not later than 31 August 2009. The Government will shut down generator units 1 and 2 and de-energize transformer bank T2 on 1 July 2009. The installation for T2 is estimated to be complete and system in commercial operation not later than 31 August 2009. The Government will shut down generator units 9 and 10 and de-energize transformer bank T5 on 1 September 2009. The installation for T5 is estimated to be complete and system in commercial operation not later than 31 October 2009. A further installation for transformer bank T1, generator units 3 and 4, is scheduled for calendar year 2010.
- 1.11. Periodic Inspection.** The McNary Dam Levee System (Tri-Cities Levees) are scheduled to be inspected on May 13 & 14, 2009. Most of the inspection is land based, but on the morning of May 14 we will be inspecting the levee riverward slope protection (RIP RAP) by boat and we request that the McNary Pool be lowered to as close to 335 as

possible for both days. These inspections are accomplished once every five years. There are several levees located in Richland, Pasco, Kennewick, and Finely. It may be only possible to get 336.5 or 337, but as I requested as low as possible. The inspection team will look for damage or benching of the slope protection and since we can not see below the water level it works better if we can have a lower pool elevation. May 13 is the land based inspection and the morning of May 14 is by water.

1.12. Trilateration surveys. Dam safety has scheduled the performance of Trilateration surveys at McNary in the February/March 2009 time frame. This requires the contracted surveyors to have a direct line of site to the upstream face of the dam and access to survey point across the parapet walls and spillway piers on the upstream face of the dam.

1.13. Steady State Model Validation Testing. Western Electricity Coordinating Council requires steady state model validation testing on a periodic basis to ensure the generating equipment will meet real and reactive power ratings. All units will be tested on a 1-2 year cycle. Test will involve running the unit out of fish priority sequence and outside the 1% criteria. Testing can take place at any time except from 1 April to 31 August due to fish considerations. Tests will preferably be conducted just after unit annual maintenance, but may happen at other times. Tests will last for a standard of 30 minutes at maximum load with additional time to run the unit along the maximum real/reactive power curve to the minimum settings. Total test time is anticipated to be 90 minutes or less. Test durations will be minimized to the extent possible and will only be run for the purpose of completing the required model validation testing.

1.14. Transient Model Validation (Exciter Step Response) McNary. Western Electricity Coordinating Council requires model validation testing on a five year minimum cycle to ensure the generating equipment responds to as planned to system requirements and disturbances. Unit tests will be accomplished on all 14 units at McNary. Testing will involve running the test unit out of fish priority sequence and outside the 1% criteria. Testing will take place at some time from October 1 to April 1; each unit will be run for approximately 1 hour with 30 minutes outside the 1% criteria. Test durations will be minimized to the extent possible.

2. Studies.

2.1. Evaluation of Juvenile Salmonid Passage, Behavior and Survival. A passage, behavior, and survival study to evaluate the performance of two top-spill weirs (TSW) will again be conducted during the spring and summer of 2009. The configuration of these weirs will be changed from 2007-2008, and the ability to optimize passage through TSW's further investigated. The spring and summer evaluations will consist of a single project operation for each season – 40% spill in the spring and 50% spill in the summer. Equipment setup and installation requiring diving and considerable boat activity in the forebay BRZ will take place from February 18 through March 30. The spring evaluation

will begin April 14 and continue into early June. The summer evaluation will begin later in June and continue until late July.

During the evaluations, juvenile salmonids will be collected at the juvenile fish facility for tagging with acoustic tags. The facility will alternate between days of primary bypass and secondary bypass in the spring (April 1 to approximately June 20). Within this time period (approximately April 14 to July 25) during days of primary bypass, the facility will switch to secondary bypass for up to a few hours each day to collect additional fish for tagging if necessary. Tagged fish will be released upstream of the project and monitored as they enter the forebay and pass the project. Also during the evaluation, daily boat access to the forebay BRZ will be required for equipment maintenance. Equipment removal is currently expected to take place after spill ceases during September. There is a chance that other work at the project may necessitate delaying equipment removal until October.

A single treatment test with a 40% spill level is planned for spring. The summer would also be a single treatment 50% spill regime based on the results from testing during 2006-2008. Treatment schedules and the test spill patterns have been developed and coordinated through SRWG and FFDRWG.

2.2. Developing a separator for Juvenile Lamprey. This study will require access to fish collection facilities at McNary Dam and access to the fish collection channel and orifice trap. In addition, project assistance may be needed to obtain lamprey from bypass collection operations. No special turbine or spill operations will be necessary as all work will take place within the collection channel. Project assistance may be required during installation and removal of test screen material in the JBS exit raceways. Pacific lamprey macropthalmia and ammocoetes collected at the JBS are inadvertently transported downstream during barging and trucking operations to transport juvenile salmonids past dams. The ability to separate lamprey at these operations would allow release of both anadromous and resident lamprey juveniles back into the river after collection. Methods to separate lamprey at JBS exit raceways may provide insights into ways to reduce other sources of juvenile lamprey mortality at dams. Study is to continue in 2009, may be moved to Lower Monumental raceway.

2.3. Evaluation of Adult Pacific Lamprey Passage Success at McNary and Lower Snake River Dams. This study will evaluate passage success for adult Pacific lamprey *Lampetra tridentata* at McNary Dam, Ice Harbor Dam, and the remaining lower Snake River dams and associated river segments using a combination of radio telemetry and half duplex passive integrated transponder (HD PIT) systems. Adult lamprey will be trapped in adult fishways at McNary dams, held and then tagged at the juvenile smolt sampling facility prior to release. This study will require McNary, Ice Harbor and potentially other Snake River dams to provide power for electronics equipment in the fishways and tailrace areas, access for the installation, repair, and testing of electronic and trapping equipment and access for the downloading of data from radio and PIT tag detection equipment. Some project crane support may be needed to install antennas in

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and near fishways. Maintenance and installation of equipment will occur during the winter maintenance period when adult fishways are dewatered. Work is continuing in 2009.

SPO-MCN-10

Ice Harbor Dam¹

1.Special Project Operations.

1.1. Spill. Spill for fish passage will be provided during the outmigration season in accordance with spill specifications in Appendix E and as coordinated through TMT. Alternative spill patterns to control dissolved gas levels or change fish passage conditions will be coordinated through the FPOM.

1.2. Doble Tests. Two transformers, TW5 and TW6 and turbine units 5 and 6 will be taken out of service for Doble testing in 2009. The outage is tentatively scheduled for 3-6 August 2009. Since Ice Harbor Dam has multiple transformer banks and transmission lines, and redundant switching capability, the remaining turbine units will be available for operation during these tests. Turbine unit 1% efficiency operations and turbine priorities will continue to follow fish passage plan requirements during these tests.

1.3. Navigation. Short term adjustments in spill patterns, spill discharge rates and/or turbine operations may be required for navigational safety. This includes both commercial tows and fish barges.

1.4. Ice Harbor RSW Tests. Tests are tentatively scheduled for February or March. The RSW developed a significant vibration during the 2007 operating season, and underwent transition plate repairs in 2008. The RSW is to be monitored for any additional vibrations in 2009. CENWW may request short outages of the structure, adjacent spillbay, or Unit 6 to allow for installation of, or collection of vibration data. Should the severity of the vibration issue increase where structural integrity or safe operation of the Project are a concern the RSW will be removed from service. Either the spillway will be closed or the RSW stowed to allow for full spillway capacity. No additional outages are anticipated during the fish passage season to assist operation of the RSW.

1.5. Ice Harbor North Shore AWS Fish Pumps. Gear Reducers on Fish Pumps 1, 2, and 3 are being repaired. Pump 2 gear box is to be repaired by December 2, 2008, and the other 2 pump gearboxes are to be completed by March 23. Two pump operation is scheduled on March 1, 2009, while the backup work completion is by the week of March 22.

1.6. Turbine Unit Priority Change. A major transformer has failed at the Sacajawea Substation which in turn restricts turbine operations at Ice Harbor Dam. Transformer design, build and replacement is expected to take a year or more to complete. Additionally, powerhouse transformer TW-6 is experiencing gassing during operation due to internal arcing or faults. Because of power distribution restrictions, the turbine unit priority will be 3,

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1, 4, 5, 2 and 6 until the transformers are replaced. It is anticipated that the Sacajawea transformer will be replaced in late FY09; at this time unit 1 and 3 priorities will be switched.

1.7. Lightning Arrestor Installation. New lightning arrestors are to be installed on the powerhouse 115kV bus structure. This will require the following outages:

8/3/09 – 8/14/09 Units 5 and 6

8/17/09 – 8/21/09 Units 3 and 4

8/24/09 – 8/28/09 Units 1 and 2.

To the extent practical (manpower limited), unit annuals will be aligned with the buswork outages to limit the number of unit annuals. These outage dates are approximate and may vary by start date and length.

1.8. NERC Reactive Limit Testing. Reactive limit testing is required for generator owners to be performed every two years. The test quantitatively measures machine performance limits to ensure it is capable of providing protective functions during grid disturbances and to ensure it is not a contributor to these disturbances. The test requires exit from the best 1% efficiency range to ensure the reactive limits of the generator can be met and held for a period of time, typically 15 minutes (Scheduled for the winter maintenance period).

1.9. Periodic Inspection. Ice Harbor is scheduled for a periodic Inspection for March 31, 2009. These inspections are only scheduled once every five years. Inspect the upstream and downstream face of the dam by boat and will be requesting Minimum Operating Pool (MOP) to see as much of the dam's wetted surface as possible. Need as low a tailwater and forebay as possible. No voluntary spill on that day, if possible. The inspection team will also be scheduling testing of the operations of the spillway gates on emergency power. This is accomplished by operating as many gates under emergency power by lifting the gates up one foot then lowering them. The test can be done up to 30 days in advanced of the actual periodic inspection and may only take a couple of hours. Water will be spilled through the gates and we will be operating as many as we can by raising them up one foot then lowering them.

1.10. Trilateration surveys. Dam safety has scheduled the performance of Trilateration surveys at Ice Harbor in the February/March 2009 time frame. This requires the contracted surveyors to have a direct line of site to the upstream face of the dam and access to survey point across the parapet walls and spillway piers on the upstream face of the dam.

1.11. Transformer TW-6. Generating unit 6 has operability concerns and the oil is gassing when the unit is in operation. Part of the effort to maximize reliability of this transformer includes the purchase and installation of an oil purification unit. An outage of unit 6 is planned for the week of May 4, 2009 to allow installation of the oil purifier components on the transformer. Start up testing and verification of the oil purification unit is planned for the week of May 11, 2009. This will likely require the operation of unit 6 outside the unit priority requirements.

1.12. Steady State Model Validation Testing. Western Electricity Coordinating Council requires steady state model validation testing on a periodic basis to ensure the generating equipment will meet real and reactive power ratings. All units will be tested on a 1-2 year cycle. Test will involve running the unit out of fish priority sequence and outside the 1% criteria. Testing can take place at any time except from 1 April to 31 August due to fish considerations. Tests will preferably be conducted just after unit annual maintenance, but may happen at other times. Tests will last for a standard of 30 minutes at maximum load with additional time to run the unit along the maximum real/reactive power curve to the minimum settings. Total test time is anticipated to be 90 minutes or less. Test durations will be minimized to the extent possible and will only be run for the purpose of completing the required model validation testing.

1.13. Transient Model Validation (Exciter Step Response) for Ice Harbor. Western Electricity Coordinating Council requires model validation testing on a five year minimum cycle to ensure the generating equipment responds to as planned to system requirements and disturbances. Unit tests will be accomplished on all 6 units. Testing will involve running the test unit out of fish priority sequence and outside the 1% criteria. Testing will take place in September; each unit will be run for approximately 1 hour with 30 minutes outside the 1% criteria. Test durations will be minimized to the extent possible.

2. Studies.

2.1. Evaluate the Impacts of Avian Predation on Salmonid Smolts from the Columbia and Snake Rivers. This is a continuation of a pilot study to determine how various biotic and abiotic factors are associated with differences in steelhead smolt vulnerability to predation by Crescent Island terns and Foundation Island cormorants. The study request PIT tagging both hatchery and wild steelhead collected in the smolt monitoring sample at Lower Monumental and Ice Harbor dams from April through July. The recorded condition of a fish will be attached to a specific tag code and vulnerability to avian predation will be evaluated using PIT tag recovery data collected from the avian bird colonies. A sample of 500 fish per week is desired. Some collection will take place prior to the start of the regular transport season. The number of fish desired means the collection at times will exceed the numbers of fish needed to determine fish condition. Some fish will also be held greater than the maximum 2 days normally allotted.

2.2. Evaluation of Adult Pacific Lamprey Passage Success at McNary and Lower Snake River Dams. This study will evaluate passage success for adult Pacific lamprey *Lampetra tridentata* at McNary Dam, Ice Harbor Dam, and the remaining lower Snake River dams and associated river segments using a combination of radio telemetry and half duplex passive integrated transponder (HD PIT) systems. Adult lamprey will be trapped in adult fishways at McNary Dam, held and then tagged at the juvenile smolt sampling facility prior to release. This study will require McNary, Ice Harbor and potentially other Snake River dams to provide power for electronics equipment in the fishways and tailrace areas, access for the installation, repair, and testing of electronic and trapping equipment and access for the

downloading of data from radio and PIT tag detection equipment. Some project crane support may be needed to install antennas in and near fishways. Maintenance and installation of equipment will occur during the winter maintenance period when adult fishways are dewatered.

2.3. Evaluation of juvenile fish passage and survival at Ice Harbor Dam. Fish released upstream and downstream of Lower Monumental Dam will be monitored for passage route and survival (route specific and concrete survival). Forebay and tailrace behavior and residence time will also be monitored. There will be no tailrace release of reference fish at Ice Harbor in 2009, so survival estimates will be done using single release model. One operation is anticipated at this time.

Lower Monumental Dam¹

1. Special Project Operations.

1.1. Spill. Spill for fish passage will be provided during the outmigration season in accordance with spill specifications in Appendix E and as coordinated through TMT. Alternative spill patterns to control dissolved gas levels or change fish passage conditions will be coordinated through the FPOM. During periods of high river flow, spill volumes and the elevation of Lower Monumental reservoir may need to be manipulated on a daily or every-other-day basis to provide safe conditions for loading the fish barge at the juvenile fish facility below the dam.

1.2. Doble Tests. Transformer bank T2 and turbine units 5 and 6 will be taken out of service for Doble testing in 2009. The outage is tentatively scheduled for 22-25 June 2009. This work will require a total powerhouse outage, and 100% spill (except for station service) for up to 4 hours. By then, all clearance tags should be hung, and the line could be re-energized allowing generation availability of Units 1-4. Turbine unit 1% efficiency operations and turbine priorities will continue to follow fish passage plan requirements during these tests. Another total plant outage will be required on the last day of testing to remove clearance tags and restore T2 bank.

1.3. Navigation. Tailrace Transit – Fish Transportation Barge. Transit across the Lower Monumental tailrace, docking at and disembarking from the fish collection facility requires some degree of flow control depending on tug/barge size and power, wind, pilot experience, current and other factors. Spill needs to be reduced to the level needed for safe passage. Towboat captain may request zero spill during this transit. During juvenile fish loading operations, spill is typically reduced to 15 kcfs, but can be reduced further if needed for safety reasons. Loading periods can take up to 3.5 hours. Because of the time needed to complete loading, the Little Goose Project Biologist notifies the Little Goose Operator when the fish barge departs. BPA scheduling is then provided advance notice for spill control at Lower Monumental Dam. Reducing spill may cause Lower Monumental project to briefly operated outside of MOP conditions.

1.4. RSW. CENWW may request short outages of the structure or adjacent spillbay, or Unit 6 should adjustments need to be made to either the RSW or biological monitoring equipment during the fish passage season. When the RSW is in operation, the spillgate shall be raised to where it does not touch flow passing down the RSW. Vertical fish distributions, passage injury and mortality will be investigated during the 2009 season.

1.5. Turbine Fire Suppression System: Currently, all six turbine units are protected by a single CO₂ fire protection system. When a single turbine unit is being serviced, the entire fire

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protection system is shut down as a safety precaution. New valves are to be installed so that individual turbine units can be isolated from the fire protection system and turbine units in normal operation continue to be protected. A single outage lasting a maximum of 2 days will be required to complete this work.

1.6. Lower Monumental Dam – Underwater Sounding Inspections. Underwater sounding safety inspections of the Lower Monumental Dam stilling basin and channel are planned in September 2009. These soundings are required to be conducted once every 5 years. This will require changes in turbine unit priorities and some restrictions in spill. Water surface is monitored on a continuous basis to determine and account for causes of changes in elevations. During the surveys, turbine units nearest the stilling basin will not be in use, and no spills will be taking place to avoid water level fluctuations. Winter time tests are impractical as this is the time of peak power demand and the highest likelihood of pool fluctuations.

1.7. Trilateration surveys. Dam safety has scheduled the performance of trilateration surveys at Lower Monumental Lock and Dam in the February/March 2009 time frame. This requires the contracted surveyors to have a direct line of site to the upstream face of the dam and access to survey point across the parapet walls and spillway piers on the upstream face of the dam.

1.8. Steady State Model Validation Testing. Western Electricity Coordinating Council requires steady state model validation testing on a periodic basis to ensure the generating equipment will meet real and reactive power ratings. All units will be tested on a 1-2 year cycle. Test will involve running the unit out of fish priority sequence and outside the 1% criteria. Testing can take place at any time except from 1 April to 31 August due to fish considerations. Tests will preferably be conducted just after unit annual maintenance, but may happen at other times. Tests will last for a standard of 30 minutes at maximum load with additional time to run the unit along the maximum real/reactive power curve to the minimum settings. Total test time is anticipated to be 90 minutes or less. Test durations will be minimized to the extent possible and will only be run for the purpose of completing the required model validation testing.

1.9. Transient Model Validation (Exciter Step Response) for Lower Monumental. Western Electricity Coordinating Council requires model validation testing on a five year minimum cycle to ensure the generating equipment responds to as planned to system requirements and disturbances. Unit tests will be accomplished on all 6 units. Testing will involve running the test unit out of fish priority sequence and outside the 1% criteria. Testing will take place in September; each unit will be run for approximately 1 hour with 30 minutes outside the 1% criteria. Test durations will be minimized to the extent possible.

2. Studies.

2.1. Evaluate the Impacts of Avian Predation on Salmonid Smolts from the Columbia and Snake Rivers. This is a continuation of a pilot study to determine how various biotic and abiotic factors are associated with differences in steelhead smolt vulnerability to predation by Crescent Island terns and Foundation Island cormorants. The study request PIT tagging both hatchery and wild steelhead collected in the smolt monitoring sample at Lower Monumental and Ice Harbor dams from April through July. The recorded condition of a fish will be attached to a specific tag code and vulnerability to avian predation will be evaluated using PIT tag recovery data collected from the avian bird colonies. A sample of 500 fish per week is desired. Some collection will take place prior to the start of the regular transport season.

2.2. Lower Monumental RSW Post Construction Evaluation. A radio telemetry passage and survival study will be conducted with yearling Chinook, juvenile steelhead, and sub-yearling Chinook salmon through Lower Monumental Dam during the spring and summer of 2009. This research is designed to measure progress toward meeting performance standards as outlined in the 2008 FCRPS Biological Opinion (NMFS 2008). Radio telemetry equipment installation will begin in February and continue until the end of March, 2009. Smolts will be radio tagged, released upstream of the project, and monitored as they pass the project beginning in mid-April 2009. Spill using a high-gate opening alternate bay configuration will be evaluated compared to a flat pattern to maximize passage through the RSW and survival through both the RSW and spillway as in 2008. Additionally, a vertical fish distribution study will be undertaken at the entrance to the RSW in spring and summer 2009. The vertical distribution of fish entrained in the RSW flow from its entrance to the crest will be evaluated and compared to direct injury data collected in 2008 where deep released juvenile salmon were found to have an elevated occurrence of injury compared to shallow releases.

2.3. Lower Monumental RSW Post Construction Evaluation – Study Fish. Some or most of the test fish for the Lower Monumental RSW survival evaluation will be taken from the Lower Monumental juvenile fish facility daily sample during spring and summer juvenile migrations in 2009. If insufficient numbers of fish are available for tagging at the Lower Monumental juvenile fish facility on a daily basis, fish will be taken from the Little Goose juvenile fish facility.

2.4. Bull Trout PIT Tag Study. Incidental bull trout passing through the Lower Monumental Juvenile Fish Facility will be collected and held for PIT tag insertion, then released through the Lower Monumental primary bypass outfall. Project duration begins and ends with scheduled juvenile fish facility operations. No special turbine or spill operations will be necessary.

2.5. Developing a separator for Juvenile Lamprey. Juvenile lamprey collected at McNary may be moved to the Lower Monumental Juvenile Fish Facility raceways to study behavior and passage success through the LMO raceway screen material. No special project or facility operations are expected for this research.

Little Goose Dam¹

1. Special Project Operations.

- 1.1. Spill.** Spill for fish passage will be provided during the outmigration season in accordance with spill specifications in Appendix E and as coordinated through TMT. Alternative spill patterns to control dissolved gas levels or change fish passage conditions will be coordinated through the FPOM.
- 1.2. Navigation.** Short term adjustments in spill patterns, spill discharge rates and/or turbine operations may be required for navigational safety. This includes both commercial tows and fish barges.
- 1.3. Doble Tests.** Transformer bank T2 and turbine units 5 and 6 will be taken out of service for Doble testing in 2009. The outage is tentatively scheduled for 17-20 August 2009. This work will require a total powerhouse outage, and 100% spill (except for station service) for up to 4 hours. By then, all clearance tags should be hung, and the line could be re-energized allowing generation availability of Units 1-4. Turbine unit 1% efficiency operations and turbine priorities will continue to follow fish passage plan requirements during these tests. Another total plant outage will be required on the last day of testing to remove clearance tags and restore T2 bank.
- 1.4. Little Goose Dam – Underwater Sounding Inspections.** Underwater sounding safety inspections of the Little Goose Dam stilling basin and channel are planned in September 2009. These soundings are required to be conducted once every 5 years. This will require changes in turbine unit priorities and some restrictions in spill. Water surface is monitored on a continuous basis to determine and account for causes of changes in elevations. During the surveys, turbine units nearest the stilling basin will not be in use, and no spills will be taking place to avoid water level fluctuations.
- 1.5. Little Goose Dam – Juvenile Full Flow Pit Tag Detector.** A new full flow PIT tag detector is to be installed in the bypass flume. Once in operation PIT tag detection will be possible without passing fish through the collection and transport facility. Included in this contract is the relocation of the bypass outfall to the current PIT tag outfall. The new outfall will route fish downstream of strong eddies that form under some spill conditions. Although work is to be completed by March 1, inclement weather or other construction issues may delay completion further into March.

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1.6. Little Goose Dam – Primary Dewaterer Repairs. The primary dewaterer is to undergo modification and repairs in conjunction with work on the bypass flume. This work is to be completed by March 1. Should inclement weather or other construction issues be encountered, completion may be delayed further into March.

1.7. Turbine Operations. To enhance juvenile passage survival, turbines at Little Goose will be operated within 1% of peak efficiency during the juvenile and adult migration seasons (April 1 through October 31). (See appendix C, Corps of Engineers 2008 Fish Passage Plan).

Additionally, during the juvenile migration season (through Aug 31 or until the 300 fish collection criteria allows spill to be curtailed), the lower operating limit of unit 1 will be manually re-set as indicated.

Little Goose Unit 1 2009 Spill Season Operating Limits

Lower Limit	Upper Limit	Condition
1% Lower Generation Limit (Varies w/Head)	1% Upper Generation Limit (Varies w/Head)	With extended-length submersible bar screens installed. Powerhouse Discharge \leq 16 kcfs
115 MW (16 kcfs)*	1% Upper Generation Limit (Varies w/Head)	With extended-length submersible bar screens installed. Powerhouse Discharge $>$ 16 kcfs
1% Lower Generation Limit (Varies w/Head)	1% Upper Generation Limit (Varies w/Head)	Without extended-length submersible bar screens installed. Powerhouse Discharge \leq 17.5 kcfs
125 MW (17.5 kcfs)*	1% Upper Generation Limit (Varies w/Head)	Without extended-length submersible bar screens installed. Powerhouse Discharge $>$ 17.5 kcfs

See Tables LGS-6 to 9 for the 1% Generation Limits at specific heads at the following link: http://www.nwd-wc.usace.army.mil/tmt/documents/fpp/2009/sections/09_LGS.pdf
Discharges are approximate.

Historic operation within the GDACS program tended to balance flows out of any units in operation. This year’s operation will, at times, result in an unbalanced operation where more flow is passing through unit 1 than other operating units. A heavier flow out of unit 1 has been shown in the Little Goose physical model to be very important in disrupting the eddy that tends to form along the south shore downstream of the powerhouse. Disrupting the eddy optimizes the tailrace conditions for both adult passage and juvenile egress with the temporary spillway weir operating in spillway bay 1.

1.8. Trilateration surveys. Dam safety has scheduled the performance of Trilateration surveys at Little Goose Lock and Dam Reservoir in the February/March 2009 time frame. This requires the contracted surveyors to have a direct line of site to the upstream face of the dam and access to survey point across the parapet walls and spillway piers on the upstream face of the dam.

1.9. Steady State Model Validation Testing. Western Electricity Coordinating Council requires steady state model validation testing on a periodic basis to ensure the generating equipment will meet real and reactive power ratings. All units will be tested on a 1-2 year cycle. Test will involve running the unit out of fish priority sequence and outside the 1% criteria. Testing can take place at any time except from 1 April to 31 August due to fish considerations. Tests will preferably be conducted just after unit annual maintenance, but may happen at other times. Tests will last for a standard of 30 minutes at maximum load with additional time to run the unit along the maximum real/reactive power curve to the minimum settings. Total test time is anticipated to be 90 minutes or less. Test durations will be minimized to the extent possible and will only be run for the purpose of completing the required model validation testing.

1.10. Transient Model Validation (Exciter Step Response) Little Goose. Western Electricity Coordinating Council requires model validation testing on a five year minimum cycle to ensure the generating equipment responds to as planned to system requirements and disturbances. Unit tests will be accomplished on all 6 units at Little Goose. Testing will involve running the test unit out of fish priority sequence and outside the 1% criteria. Testing will take place at some time from October 1 to April 1; each unit will be run for approximately 1 hour with 30 minutes outside the 1% criteria. Test durations will be minimized to the extent possible.

2. Studies.

1.1. Direct Injury Study. A contractor will make fish releases beginning on about March 11, 2009 and continuing until about March 28, in spill bays 1 and 8. Spill in bay 1 will be over the new TSW with the high and low crest at approximately 6.7 and 10.7 kcfs of spill, respectively. Spill in bay 8 will be approximately 7 kcfs. Additional spill may be determined by the Project at whatever level is necessary to simulate TSW egress under normal spill operations. The Contractor will require multiple spill stoppage on a daily basis throughout the study in order to safely enter the tailrace BRZ to retrieve tagged fish. There are no anticipated turbine outages necessary for this study. No conflicts with the radio-telemetry study are anticipated as the direct injury study is scheduled to conclude prior to initiation of regular fish passage spill on April 5.

1.2. A Study to Determine Migration Behavior and Survival of Juvenile Salmonids. A radio telemetry survival and behavior study will be conducted with yearling and sub-yearling Chinook and hatchery steelhead through Little Goose Dam during the spring and summer migration in 2009. Radio telemetry equipment set-up will begin in February and continue until the end of March. Smolts will be radio tagged, released upstream of the project, and monitored as they pass the project beginning in mid-April. Spill over the adjustable crest temporary spillway weir (TSW) will be evaluated using the 2008 BiOp spill of 30%, 24-hours a day for the spring season. The TSW crest will be changed for summer spill (sub-yearling Chinook passage) when project discharge falls below 75 kcfs for at least three consecutive days.

The goals of this study include: (1) Determine the timing and route of passage for yearling and sub-yearling Chinook salmon, and juvenile steelhead relative to TSW spill and powerhouse operations; (2) Estimate route-specific survival of hatchery yearling and sub-yearling Chinook and hatchery steelhead; (3) Determine the effects of TSW operation and associated training spill, as well as powerhouse operations, on smolt approach paths in the forebay of Little Goose Dam.

Radio tag antennas will be placed on the dam in order to cover selected passage routes, as well as in the forebay and tailrace of Little Goose Dam.

Dive work (and associated turbine and spill outages) may be necessary to install spillway and powerhouse antennas. Antenna repair and installation may also be necessary on the ESBSs and VBSs. Dive work will be necessary for replacing one damaged trolley pipe in spillway 2 between spillways 2 and 3. The research biologists may also need access to the BRZ for radio tracking antenna placement if barges are necessary to obtain the passage information needed.

1.3. Bull Trout PIT Tag Study. Incidental bull trout passing through the Little Goose Juvenile Fish Facility will be collected and held for PIT tag insertion, then released through the Little Goose primary bypass outfall. Project duration begins and ends with scheduled juvenile fish

April 2009

facility operations. No special turbine or spill operations will be necessary. Study continues in 2009.

SPO-LGO-5

Lower Granite Dam⁸

1. Special Project Operations.

- 1.1. Spill.** Spill for fish passage will be provided during the outmigration season in accordance with spill specifications in Appendix E and as coordinated through TMT. Alternative spill patterns to control dissolved gas levels or change fish passage conditions will be coordinated through the FPOM. During periods of high river flow, spill volumes and the elevation of Lower Granite reservoir may need to be manipulated on a daily or every-other-day basis to provide safe conditions for loading the fish barge at the juvenile fish facility below the dam.
- 1.2. Doble Tests.** Transformer bank T2 and turbine units 5 and 6 will be taken out of service for Doble testing in 2009. The outage is tentatively scheduled for 10-13 August 2009. This work will require a total powerhouse outage, and 100% spill (except for station service) for up to 4 hours. By then, all clearance tags should be hung, and the line could be re-energized allowing generation availability of Units 1-4. Turbine unit 1% efficiency operations and turbine priorities will continue to follow fish passage plan requirements during these tests. Another total plant outage will be required on the last day of testing to remove clearance tags and restore T2 bank.
- 1.3. Power System Stabilizer (PSS) installation on Units 4, 5, 6.** Units will be scheduled OOS for approximately 1 week (one unit at a time) to perform the physical installation of PSS. After physical installations are complete, each unit will then be scheduled OOS (one unit at a time) for 1 to 2 days to tie in to existing system and commission each PSS. These outages are estimated to begin in late July to late August during mandatory spill season when river flows are low.
- 1.4. Arc Flash.** Data collection to establish PPE levels or changes to equipment will require various unit outages for personnel safety for 1 hour on 6 different occasions to open cabinet doors for verification purposes between April and Nov 2008, then again between March and September 2009.
- 1.5. Navigation at Lower Granite Dam.** When spill at Lower Granite is greater than 60 kcfs, there is a danger of having the fish barge being pushed upstream into the dam, causing a hazardous situation. Under these conditions, spill is reduced to 60 kcfs when fish transport barges approach or leave the barge dock. This reduction should be limited to no more than 1 hour. The project biologist will notify the control room prior to a barge leaving the loading dock so that spill can be reduced.
- 1.6. 100 Ton Intake Crane Outage.** The 100 Ton intake crane is scheduled to be OOS for rehab October thru January. We would be looking at 3 units (4,5, & 6) OOS from Oct 1

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thru Dec 15 for having the fish screens removed early. In addition, then we would again be looking at 3 units (1,2, & 3) OOS from Dec 15 thru the end of Jan for having fish screens installed and no operational juvenile bypass system (shut down for winter).

The Fish Passage related issue is the installation of Hydraulic cylinders on Units 4 & 6, from Dec 15 thru the end of Jan, units 4 & 6 would not be in compliance with running units with the head gates up, dogged off and cylinder removed. We would need a waiver to deviate from the FPP here. The benefit to installation of cylinders would be to allow for unit annuals on 4 & 6 during the time period Oct 1 thru Dec 15, in addition, between Dec 15 and end of Jan, two of the three units available would have the ability to lower head gates in the event of a governor problem, and then could be worked on and brought back into service, if not, they could be out the whole duration.

- 1.7. Trilateration surveys.** Dam safety has scheduled the performance of Trilateration surveys at Lower Granite Lock and Dam, in the February/March 2009 time frame. This requires the contracted surveyors to have a direct line of site to the upstream face of the dam and access to survey point across the parapet walls and spillway piers on the upstream face of the dam.
- 1.8. Steady State Model Validation Testing.** Western Electricity Coordinating Council requires steady state model validation testing on a periodic basis to ensure the generating equipment will meet real and reactive power ratings. All units will be tested on a 1-2 year cycle. Test will involve running the unit out of fish priority sequence and outside the 1% criteria. Testing can take place at any time except from 1 April to 31 August due to fish considerations. Tests will preferably be conducted just after unit annual maintenance, but may happen at other times. Tests will last for a standard of 30 minutes at maximum load with additional time to run the unit along the maximum real/reactive power curve to the minimum settings. Total test time is anticipated to be 90 minutes or less. Test durations will be minimized to the extent possible and will only be run for the purpose of completing the required model validation testing.
- 1.9. Transient Model Validation (Exciter Step Response).** Lower Granite. Western Electricity Coordinating Council requires model validation testing on a five year minimum cycle to ensure the generating equipment responds to as planned to system requirements and disturbances. Unit tests will be accomplished on all 6 units at Lower Granite. Testing will involve running the test unit out of fish priority sequence and outside the 1% criteria. Testing will take place at some time from October 1 to April 1; each unit will be run for approximately 1 hour with 30 minutes outside the 1% criteria. Test durations will be minimized to the extent possible.

2. Studies.

2.1A. study to compare seasonal SARs of early in-river migrating versus transported Snake River yearling anadromous salmonids. A study will be conducted to determine seasonal effects of transporting fish from the Snake River to optimize a transportation strategy. At Lower Granite, fish will be collected for this study starting on April 5, with marking beginning on April 6, 2009. Depending on the number of fish available, fish will be collected 1-2 days with tagging occurring on the day following collection. A barge will leave each Thursday morning with all fish collected during the previous 1-3 days. By barging all fish (minus the in-river group) during 1 to 3 days of collection, barge densities will be maintained at a level similar to what would occur under normal transport operations that time of year. This pattern will occur in the weeks preceding general transportation and will be incorporated into general transportation once that operation begins. The desired transported sample size is 6,000 wild Chinook and 4,000 - 6,000 wild steelhead weekly for approximately eight weeks.

2.2. Bull Trout PIT Tag Study. Incidental bull trout passing through the Lower Granite Juvenile Fish Facility will be collected and held for PIT tag insertion, then released to the Lower Granite primary bypass outfall. Project duration begins and ends with scheduled juvenile fish facility operations. No special turbine or spill operations will be necessary. Study continues in 2009.

2.3. A study to compare SARs of Snake River fall Chinook salmon under alternative transportation and dam operational strategies. A sample of Subyearling Chinook salmon will be collected at Lower Granite juvenile fish facility using the sort by code system. Fish will be measured and compared to fish captured at Bonneville Dam to determine growth for in-river migrants. Sort by code will also be used to collect holdover fall Chinook juveniles in the spring. Scale samples will be collected from returning adults at the adult trap using sort by code.