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Public Utility District No. 1 of Douglas County

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Via Electronic Filing

Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 1st Street N.E.
Washington, D.C. 20426

February 26, 2016

Subject: Wells Hydroelectric Project No. 2149
Gas Abatement Plan and Bypass Operating Plan – License Article 401(a)

Dear Secretary Bose:

Pursuant to Article 401(a) of the license for the Wells Hydroelectric Project (Wells Project), the Public Utility District No. 1 of Douglas County (Douglas PUD) hereby submits for approval the 2016 Total Dissolved Gas Abatement Plan (GAP) and the 2016 Bypass Operating Plan (BOP) for the Project.

Article 401(a) requires Douglas PUD to file a GAP approved by the Washington State Department of Ecology (Ecology) by February 28th during each year of the license. The final GAP is attached as Appendix A to this letter and was reviewed and approved by all of the parties to the Aquatic Settlement Agreement (ASA) and Habitat Conservation Plan (HCP) including Ecology, the National Marine Fisheries Service (NMFS), United States Fish and Wildlife Service (USFWS), U.S. Bureau of Land Management (BLM), Washington State Department of Fish and Wildlife (WDFW), the Confederated Tribes of the Colville Reservation (CCT) and the Confederated Tribes and the Bands of the Yakama Nation (YN). The Bureau of Indian Affairs (BIA) was also provided an opportunity to review and comment on the GAP during the 30-day ASA comment period. The BIA is currently a non-voting observer within the ASA process.

The enclosed 2016 GAP is consistent with (1) the Water Quality Management Plan that is contained within the ASA and Condition 6.7(2)(a) of Ecology's Clean Water Act section 401 Water Quality Certification (401 Certification) and (2) the NMFS Endangered Species Act Incidental Take Statement (ITS) Reasonable and Prudent Measure No. 2 for the Wells Project.

Article 401(a) also requires Douglas PUD to file a BOP that has been approved by the NMFS within year one of the new license. The Wells HCP requires Douglas PUD to annually submit the BOP to the HCP Coordinating Committee for review and approval. Section 6.7(2)(d) of the 401 Certification requires Douglas PUD to closely coordinate the content and review processes for the GAP and BOP. The final 2016 BOP is attached as Appendix B to this letter. The 2016 GAP and

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BOP were reviewed by all of the agencies and tribes participating in the HCP process, including the NMFS. After distributing the 2016 GAP and BOP to the HCP on January 6, 2016, they were subsequently approved by the HCP Coordinating Committee, including the NMFS, at the January 26, 2016 meeting.

A draft copy of the 2016 GAP and BOP was provided to the Aquatic Settlement Work Group on January 5, 2016 to ensure close coordination between the review of the BOP and the GAP. No comments on the 2016 GAP and BOP were received by the end of the 30-day comment deadline. On February 10, 2016, parties present during the Aquatic Settlement Work Group monthly meeting approved the 2016 GAP and BOP. On February 18, 2016 Ecology provided Douglas PUD with an email reaffirming its approval of the 2016 GAP and 2016 BOP in accordance with the requirements of the 401 Certification, section 6.7 (2)(d).

The pre-filing consultation record supporting the review and approval of the 2016 GAP and 2016 BOP is attached as Appendix C to this letter. Douglas PUD respectfully requests that the FERC approve the enclosed GAP and BOP for the Wells Project prior to the start of the fish spill season that begins on April 1, 2016. If you have any questions or require further information regarding the enclosed plans or the consultation record supporting the approval and coordination of these plans, please feel free to contact Andrew Gingerich at (509) 881-2323, andrewg@dcpud.org or Tom Kahler at (509) 881-2322, tomk@dcpud.org.

Sincerely,

Shane Bickford
Natural Resources Supervisor

Enclosure:
1) Appendix A – 2016 Total Dissolved Gas Abatement Plan – Wells Project
2) Appendix B – 2016 Bypass Operating Plan – Wells Project
3) Appendix C – Pre-filing consultation record for the 2016 Gas Abatement Plan and Bypass Operating Plan

Cc: Wells HCP Coordinating Committee
Wells Aquatic Settlement Work Group
Mr. Andrew Gingerich – Douglas PUD
Mr. Tom Kahler – Douglas PUD

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APPENDIX A – 2016 TOTAL DISSOLVED GAS ABATEMENT PLAN – WELLS PROJECT

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2016 TOTAL DISSOLVED GAS ABATEMENT PLAN

WELLS HYDROELECTRIC PROJECT

FERC PROJECT NO. 2149

Prepared by:

Public Utility District No. 1 of Douglas County
East Wenatchee, Washington

Prepared for:

Hydropower Projects Manager
Washington Department of Ecology
Yakima, Washington 98902-3452

And

Aquatic Settlement Work Group

January 2016

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EXECUTIVE SUMMARY

Washington State Water Quality Standards (WQS) are defined in Washington Administrative Code (WAC) Chapter 173-201A, and are administered by the Washington Department of Ecology (Ecology). Compliance with the total dissolved gas (TDG) standard requires that TDG not exceed 110 % at any point of measurement in any state water body. A dam operator is not held to the TDG standards when the river flow exceeds the seven-day, 10-year frequency flood (7Q-10). In addition to allowances for natural flood flows, Ecology has approved a TDG exemption for Columbia and Snake River dams on a per-application basis (WAC 173-201A-200(1)(f)(ii)). The exemption allows for the TDG criteria to be adjusted to allow spill for juvenile fish passage past hydroelectric dams when consistent with an Ecology-approved Gas Abatement Plan.

On the Columbia and Snake rivers there are three separate standards that are applicable to the TDG exemption: 1) TDG shall not exceed 125 % in the tailrace of a dam, as measured in any one-hour period; 2) TDG shall not exceed 120 % in the tailrace of a dam; and 3) shall not exceed 115 % in the forebay of the next dam downstream. Compliance with the latter two standards is determined using an average of the 12 highest consecutive hourly readings in any 24-hour period. The increased levels of spill, resulting in elevated TDG levels, are intended to allow increased fish passage with less harm to anadromous fish populations than what would be caused by turbine fish passage. Ecology's scientific basis for the TDG exemption is based on a risk analysis conducted by the National Marine Fisheries Service (NMFS; NMFS 2000).

The goal of the 2016 Wells Total Dissolved Gas Abatement Plan (GAP) is to implement a long-term strategy to achieve compliance with the Washington State WQS criteria for TDG in the Columbia River at the Wells Hydroelectric Project (Wells Project) while continuing to provide safe passage for downstream migrating juvenile salmonids. Public Utility District No. 1 of Douglas County (Douglas PUD), which owns and operates the Wells Project, is submitting this GAP to Ecology as required for receipt of a TDG exemption at Wells Dam.

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1.0 INTRODUCTION AND BACKGROUND

The Wells Hydroelectric Project (Wells Project or Project) Gas Abatement Plan (GAP) provides details on operational and structural measures to be implemented by Public Utility District No. 1 of Douglas County, Washington (Douglas PUD) at Wells Dam under the Federal Energy Regulatory Commission (FERC) license for Project No. 2149. These measures are intended to result in compliance with the modified Washington State water quality standards (WQS) for total dissolved gas (TDG) allowed under the TDG exemption, provided incoming water to the Project is in compliance and flows are below the seven-day, 10-year frequency flood levels (7Q-10: 246 kcfs).

The goal of the GAP is to implement a long-term strategy to achieve compliance with the Washington State WQS for TDG in the Columbia River at the Wells Project or Project, while continuing to provide safe passage for downstream migrating juvenile salmonids via spill. Douglas PUD is the owner and operator of the Wells Project and is submitting this GAP to the Washington Department of Ecology (Ecology) for approval as required for receipt of a TDG exemption for fish passage.

Since 2003, Ecology has approved GAPs and issued TDG exemptions for the Wells Project on an annual basis. The most recent GAP was approved by Ecology in February 2015.
This GAP contains the following information: Section 1.0 summarizes the background information related to regulatory and project-specific TDG information at the Wells Project. Sections 2.0 and 3.0 contain proposed Wells Project operations and activities related to TDG management. Section 4.0 provides a summary of compliance and physical monitoring plans, quality assurance and quality control procedures, and reporting.

1.1 Project Description

The Wells Project is located at river mile (RM) 515.6 on the Columbia River in the State of Washington (Figure 1). Wells Dam is located approximately 30 river miles downstream from the Chief Joseph Hydroelectric Project, owned and operated by the United States Army Corps of Engineers (USACE); and 42 miles upstream from the Rocky Reach Hydroelectric Project owned and operated by Public Utility District No. 1 of Chelan County (Chelan PUD). The nearest town is Pateros, Washington, which is located approximately 8 miles upstream from Wells Dam.

The Wells Project is the chief generating resource for Douglas PUD. It includes ten generating units with a nameplate rating of 774,300 kW and a peaking capacity of approximately 840,000 kW. The spillway consists of eleven spill gates that are capable of spilling a total of 1,180 thousand cubic feet per second (kcfs). The crest of the spillway is approximately five and a half feet above normal tailwater elevation and two feet below tailwater elevation when plant discharge is 219 kcfs. The design of the Wells Project is unique in that the generating units, spillways, switchyard, and fish passage facilities were combined into a single structure referred to as the hydrocombine. Fish passage facilities reside on both sides of the hydrocombine, which is 1,130 feet long, 168 feet wide, with a dam top elevation of 795 feet above mean sea level (msl). The Juvenile Bypass System (JBS) was developed by Douglas PUD and uses a barrier system to modify the intake velocities on all even numbered spillways (2, 4, 6, 8 and 10). The

Wells Project is considered a “run-of-the-river” project due to its relatively limited storage capacity.

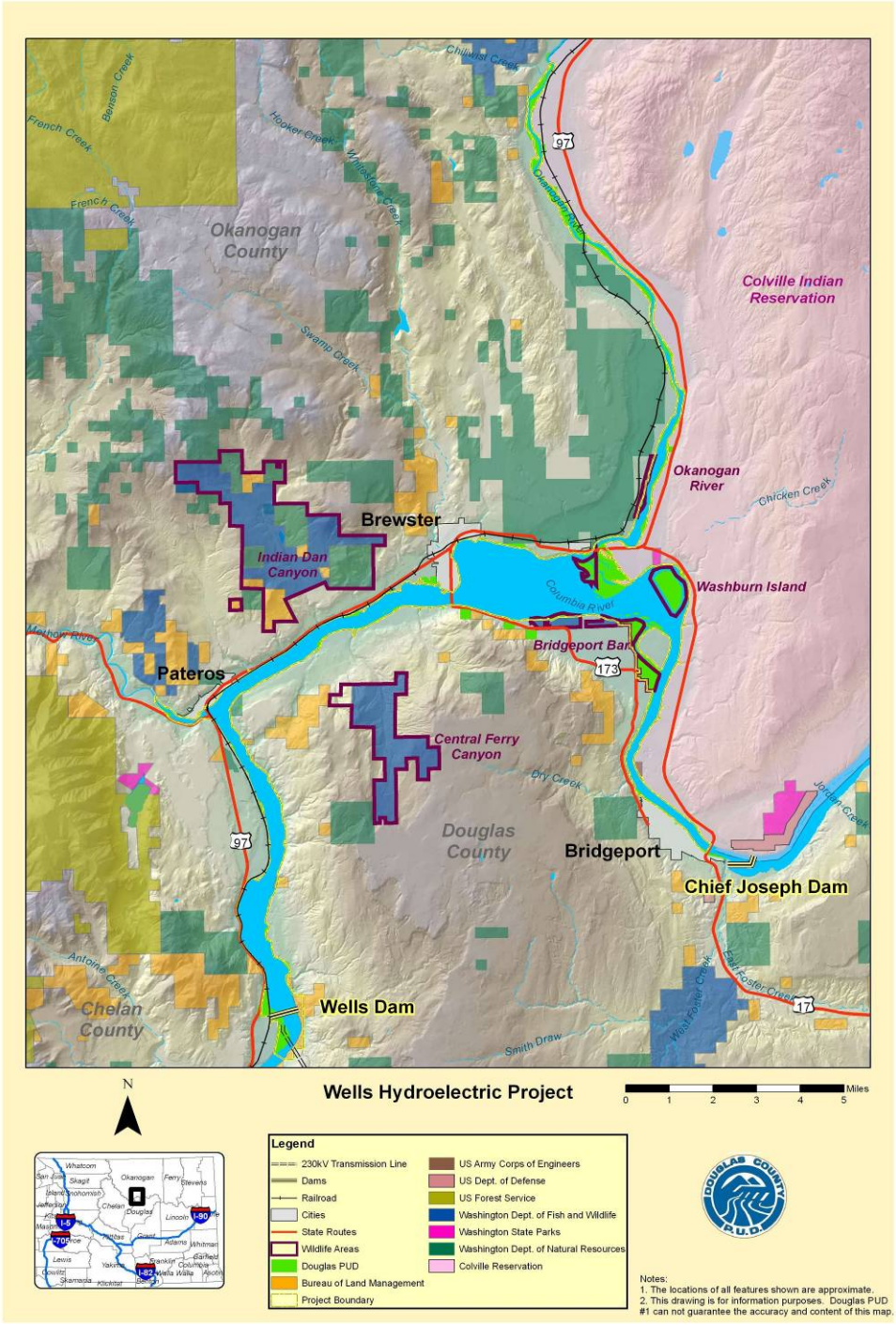

Figure 1. Map of the Wells Hydroelectric Project in Central Washington.

The Wells Reservoir is approximately 30 miles long. The Methow and Okanogan rivers are tributaries of the Columbia River within the Wells Reservoir. The Wells Project boundary extends approximately 1.5 miles up the Methow River and approximately 15.5 miles up the Okanogan River. The surface area of the reservoir is 9,740 acres with a gross storage capacity of 331,200 acre-feet and usable storage of 97,985 acre-feet at the normal maximum water surface elevation of 781 feet.

1.2 Regulatory Framework

Article 401(a) of the FERC license for the Wells Project requires that the GAP be developed in consultation with the United States Fish and Wildlife Service (USFWS), Washington State Department of Fish and Wildlife, Ecology, Confederated Tribes of the Colville Reservation (Colville Confederated Tribes), Confederated Tribes and Bands of the Yakama Nation, United States Bureau of Land Management, and United States Bureau of Indian Affairs. The GAP must also be developed in consultation with the National Marine Fisheries Service (NMFS) where the Wells Bypass Operating Plan is integrated with the GAP in order to minimize TDG production during periods of JBS operation. The Ecology-approved GAP must then be submitted to the FERC for approval by February 28 of each year as required by the Wells Project license (FERC license article 401[a]). The GAP is also due to Ecology by February 28 each year (401 Certification 6.7[2][a][i]).

Under the WQS [WAC Chapter 173-201A, Section 200(1)(f)], TDG shall not exceed 110 % at any point of measurement in any state water body. However, the standards exempt dam operators from this TDG standard when the river flow exceeds the 7Q-10 flow. The 7Q-10 flow is the highest calculated flow of a running seven consecutive day average, using the daily average flows that may be seen in a 10-year period. The 7Q-10 total river flow for the Wells Project was computed using the hydrologic record from 1974 through 1998, coupled with a statistical analysis to develop the number from 1930 through 1998. These methods follow the United States Geological Survey (USGS) Bulletin 17B, “Guidelines for Determining Flood Flow Frequency” and determined that the 7Q-10 flow at Wells Dam is 246,000 cfs (Ecology et. al. 2004).

In addition to allowances for natural flood flows, the TDG criteria may be adjusted to aid fish passage over hydroelectric dams when consistent with an Ecology-approved GAP (as defined in subsection ii of Section 200(1)(f)). This plan must be accompanied by fisheries management and physical and biological monitoring plans. Ecology may approve, on a per application basis, an exemption to the TDG standard (110 %) that allows Columbia and Snake River dam operators to spill water at projects that often increase TDG beyond 110% but allow for safe juvenile fish passage through non-turbine passage. The Ecology-approved TDG exemption comprises three separate criteria:

1. TDG shall not exceed 125 % in any one-hour period in the tailrace of a dam;
2. TDG shall not exceed 120 % in the tailrace of a dam; and
3. shall not exceed 115 % in the forebay of the next dam downstream.

Compliance criteria 2 and 3 above are measured as an average of the 12 highest consecutive hourly readings in any 24-hour period (12C-High). Ecology's scientific basis for the TDG exemption at Columbia and Snake River hydroelectric projects is based on a risk analysis conducted by the NMFS (NMFS 2000).

1.2.1 Federal Columbia River Power System Above Wells Dam

A significant portion of the Wells Reservoir occupies lands within the boundaries of the Colville Indian Reservation. Wells Project operations do not affect TDG levels in tribal waters, where the Colville Tribes' TDG standard is a maximum of 110 %, year-round, at all locations. This TDG standard is also the U.S. Environmental Protection Agency's (EPA) standard for all tribal waters on the Columbia River, from the Canadian border to the Snake River confluence. TDG levels on the Colville Reservation portion of the mainstem Columbia River within Wells Reservoir result from the operations of upstream federal dams but in particular, the USACE's Chief Joseph Dam (located immediately upstream of Wells Dam) and the US Bureau of Reclamation's Grand Coulee Dam (located immediately upstream of Chief Joseph Dam).

In 2004, Ecology, the Spokane Tribes of Indians, and the U.S Environmental Protection Agency (EPA) developed a Total Maximum Daily Load (TMDL) report for TDG in the Mid-Columbia and Lake Roosevelt (Pickett et al. 2004). The document indicates that compliance in the Chief Joseph Dam tailrace is carried out by Ecology, the Colville Confederated Tribes and EPA. Ecology's standards differ between Phase I and Phase II of implementation of the TMDL with Phase I having identical WA State WQS TDG criteria during fish passage periods (i.e., TDG exemption criteria) and Phase II being 73 mm of Hg (or 110% TDG) in the tailrace of Chief Joseph up to the mouth of the Okanogan River (Pickett et al. 2004). In addition, TDG standards in the tailrace of Chief Joseph Dam are enforced by the Colville Confederated Tribes, whereby standards are 110% as measured at any time of year along the reservation boundary, including the Chief Joseph tailrace, and as an instantaneous measurement (Pickett et al. 2004; Colville Confederated Tribes 2010). In 2016, the TDG standard in the Chief Joseph tailrace is expected to be 110% year round because Phase I of the TMDL is complete and Phase II of the TMDL is officially being implemented. A spill plan filed by the USACE in July 2015, for the purposes of modifying the TDG standards to facilitate fish passage at the federal Columbia River dams, did not include Chief Joseph Dam as it had in previous years. As such, Ecology did not provide a TDG exemption to the statewide TDG standard of 110% and incoming TDG to the Wells Project is expected be <110% year round.

1.2.2 7Q-10 Flood Flows

The 7Q-10 flood flow at the Wells Project is 246.0 kcfs. TDG values are not considered in the context of WQS compliance when flows at the Project are at or above the 7Q-10 value.

1.2.3 Fish Passage Season and Spill

The juvenile fish passage season as defined in the HCP runs from the first of April through to the end of August. Juvenile fish spill at the Wells Project is a defined action found in the Habitat Conservation Plan (HCP) Coordinating Committee (CC) and any spill at the project between April 1st and August 31st results in an increase in the survival of downstream migrating

juvenile salmonid by passing fish over the spillways instead of through the turbines. The HCP requires that fish spill take place during at least 95% of the juvenile fish passage season and normally fish spill is implemented to cover the middle 99% of the spring and summer juvenile fish migration. Outside the juvenile fish passage season (September 1st to March 31st), Douglas PUD intends to remain in compliance with the 110% TDG standard. During the juvenile fish passage season, Douglas PUD operates within Project constraints toward compliance with the TDG exemption criteria as detailed in Section 1.2 above. Nothing in these special conditions allows an impact to existing and characteristic uses.

1.2.4 Incoming TDG Levels

During the fish spill season, TDG concentrations in the Wells Project forebay are primarily determined by the USACE's upstream water management activities at Chief Joseph Dam and the Bureau of Reclamation's activities at Grand Coulee Dam.

Since the completion of spill deflectors at Chief Joseph Dam in 2008, there has been a significant increase in the amount of spill at the Chief Joseph Project resulting from wind integration and transmission congestion issues and operational constraints on the other dams in the Federal Columbia River Power System (FCRPS). Recent increases in the amount of spill at Chief Joseph Dam have resulted in a dramatic rise in the volume of supersaturated water entering the Wells Project. For example, in 2012 Wells Dam received non-compliant water (>110 % [EPA and CCT standard]) on 125 days of the 133 days juvenile fish passage season. This mass influx of supersaturated water has resulted in significantly higher TDG concentrations observed in the forebay of Wells Dam that often exceeds TDG values of 115 % (previous Ecology TDG exemption for Chief Joseph Dam allowed 115 % TDG in the Chief Joseph Dam tailrace up until February 2015).

Prior to 2016, the USACE operated under the assumption that the fish passage TDG exemption, approved by Ecology, applied to all FCRPS dams, rather than the eight dams with fish passage in the lower Snake and Columbia rivers. Chief Joseph and Grand Coulee dams do not currently have upstream or downstream fish passage. Further, Chief Joseph operators have not developed a biological monitoring plan specific to the project, which is an Ecology requirement of a fish passage exemption to the 110 % state standard. Despite these discrepancies, the USACE obtained a fish passage waiver from Ecology in 2012 that provides a TDG exemption consistent with fish spill exemptions that is valid until the end of February 2015 (Ecology 2010). Starting in 2016, the USACE will implement a new TDG Monitoring Plan under Phase II of the TMDL. With the absence of fish passage at Chief Joseph and no TDG adjustment, the Chief Joseph Hydroelectric Project will be required to meet the 110 % standard (see TDG exemption criteria as defined in WAC Chapter 173-201A Section 200(1)(f)(ii)) and therefore incoming TDG levels at Wells Dam should be less than 110%.

1.2.5 Additional 401 Certification Requirements

On May 27, 2010 Douglas PUD filed an application for a new license with the FERC for the Wells Project. On September 30, 2010, Ecology received an application for a 401 Certification from Douglas PUD, requested pursuant to the provisions of 33 USC §1341 (§401 of the Clean Water Act). On September 12, 2011, Douglas PUD withdrew its request and reapplied. On

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February 27, 2012, Ecology concluded that the Wells Project, as conditioned by its 401 Certification/Order No. 8981, would comply with all applicable provisions of 33 USC 1311, 1312, 1313, 1316, 1317 and appropriate requirements of Washington State law. The 401 Certification general conditions that are relevant to the GAP and the abatement of TDG under the TDG exemption are as follows:

- Douglas PUD shall consult with Ecology before it undertakes any change to the Project or Project operations that might significantly and adversely affect compliance with any applicable water quality standard (including designated uses) or other appropriate requirement of state law.
- Copies of the Wells Project 401 Certification and associated permits, licenses, approvals and other documents shall be kept on site and made readily available for reference by Douglas PUD, its contractors and consultants, and by Ecology.
- Douglas PUD shall allow Ecology access to inspect the Project and Project records required under the 401 Certification for the purpose of monitoring compliance with conditions of the 401 Certification. Access will occur after reasonable notice, except in emergency circumstances.
- Douglas PUD shall, upon request by Ecology, fully respond to all reasonable requests for materials to assist Ecology in making determinations under the 401 Certification and any resulting rulemaking or other process.
- Douglas PUD shall operate the Wells Project in compliance with a GAP approved by Ecology. By February 28 of each year, Douglas PUD shall submit a GAP to Ecology for approval. Pending Ecology's approval of each subsequent GAP, Douglas PUD shall continue to implement the activities identified within the previously approved plan.
- The GAP will include the Spill Operations Plan and will be accompanied by a fisheries management plan (section 2.2.1) and physical (section 4.1.1) and biological (section 2.2.2) monitoring plans. The GAP shall include information on any new or improved technologies to aid in the reduction in TDG.
- Commencing one year after issuance of a new FERC license, Douglas PUD shall monitor and report spills and TDG during non-fish spill season to determine TDG compliance with the 110 % standard (see section 4.1.1). The non-fish spill season is defined as the times of the year that are not considered the fish spill season (generally April to end of August).
- If Douglas PUD, at any point, considers modifying any of the measures identified in the Spill Playbook, they will immediately develop proposed alternative(s) that will produce levels of TDG equal to or less than those estimated to be produced by the measures to be replaced. These measures should be implementable in a similar timeframe and must be submitted to Ecology for review and approval prior to implementation.
- The Project shall be deemed in compliance with the TMDL for TDG as long as it remains in compliance with the terms of the 401 Certification. The certification, including the GAPs and the Water Quality Attainment Plan (section 2.2.4), is intended to serve as the Project's portion of the Detailed Implementation Plan for the TDG TMDL.

Specific 401 Certification conditions that are relevant to the GAP and the abatement of TDG under the TDG exemption are as follows:

- Commencing one year after issuance of the new license, Douglas PUD shall monitor and report spills and TDG during non-fish spill season to determine compliance with the 110% standard *(Note. As of August 2013 Douglas PUD began collecting TDG data toward determining compliance with the 110% standard during the non-fish spill season).*
- Douglas PUD shall maintain a TDG monitoring program at its Fixed Monitoring Locations in the forebay and tailrace of Wells Dam and/or at other locations as determined by Ecology, in order to monitor TDG and barometric pressure. Douglas PUD shall monitor TDG hourly throughout the year. *(Note. Since the early 2000s, Douglas PUD has maintained fixed monitoring stations in the forebay and tailrace of Wells Dam. Since 2013 data has been collected hourly and year round).*
- The TDG monitoring program shall conform to the Ecology Quality Assurance Project Plan (QAPP) requirements per Section 6.7 (f) of the [license] order and the procedures shall be at least as stringent as the quality assurance/quality control calibration and monitoring procedures developed by the USGS for the Columbia River. *(Note. In 2013, Douglas PUD worked with Ecology and filed with the FERC a QAPP for TDG and water temperature monitoring. The FERC issued an Order approving the QAPP on August 8, 2013).*
- Douglas PUD shall provide an annual TDG report to Ecology for review and approval by February 28 of each year.
- Within one year of issuance of the new license, Douglas PUD shall coordinate the annual HCP Project Fish Bypass/Spill Operations Plan with the GAP, using best available information to minimize the production of TDG. This coordination shall be accomplished in consultation with the Wells HCP CC and the Aquatic SWG. *(Note. Since 2013, Douglas PUD works with Ecology and the HCP CC to develop the GAP and Bypass Operation Plan concurrently. Once developed these documents are approved by the Aquatic SWG and HCP CC before being filed and approved by the FERC).*
- Within one year of license issuance, Douglas PUD shall submit a TDG Water Quality Attainment Plan for Ecology to review and approve. The plan shall include a compliance schedule to ensure compliance with the TDG water quality criteria within 10 years of approval of the WQAP. *(Note. In 2013, Douglas PUD, in consultation with Ecology, developed a TDG WQAP and filed it with the FERC. The FERC filing date was October 21st, 2013). See section 2.2.4 below for additional detail on the WQAP.*
- Douglas PUD shall manage spill toward meeting water quality criteria for TDG during all flows below 7Q10 by minimizing voluntary spill through operations, including scheduling maintenance based upon predicted flows, avoiding spill by coordinating operations with upstream dams to the extent that it reduces TDG, maximize power house discharge, especially during periods of high river flows, and manage voluntary spill in real time in an effort to continue to meet TDG numeric criteria consistent with the GAP. *(Note. Wells Dam operations continue to manage spill via an annually updated spill playbook and GAP).*

1.2.6 Additional Requirements of the FERC Operating License

Article 401(a) of the FERC operating license for P-2149 requires that the Gas Abatement Plan be filed with the Commission for approval following the approval of the GAP by NMFS, USFWS and Ecology. Article 401(b) requires the TDG report be submitted to the Commission by February 28 of each year. Article 401(c) requires Commission authorization of an application to amend the license, prior to the implementation of measures to address non-compliance with numeric water quality criteria.

1.3 History of Operations and Compliance

1.3.1 Historical Flows

Flow from the Columbia River originates in the headwaters of the Canadian Rockies and picks up snow melt from tributary streams as it travels over 1,243 miles before emptying into the Pacific Ocean. There are 85,300 square miles of drainage area above Wells Dam. The natural hydrograph had low flows in November through January with high flows in May through July. Storage dams on the Columbia River and its tributaries upstream of the Wells Project in the U.S. and Canada capture high spring and summer flows to hold for release in the fall and winter months (Table 1; Figure 2). The current hydrograph of the Columbia River is controlled by upstream, federally managed storage and release regimes, but typically mimics the average hydrograph since 1969 (Figure 2). Juvenile anadromous salmonid migration occurs within a regime of reduced high flows during the spring migration period.

Table 1. Average monthly flows (kcfs) at Wells Dam.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
2015	130.2	144.3	134.5	109.6	113.1	106.6	101.5	111.0	71.9	68.5	87.1	86.7	107.1
Average since 1969	108.8	107.8	106.5	116.7	150.0	163.7	135.2	106.2	75.3	75.7	87.7	101.4	111.1
Minimum since 1969	67.4	69.9	56.0	51.9	55.2	73.7	53.4	63.9	53.5	56.0	63.8	72.6	
Maximum since 1969	159.2	180.7	193.9	184.9	262.6	348.7	253.8	181.3	123.0	108.9	110.0	149.0	
2006-2015 (10 year Mean)	106.3	95.7	99.2	129.6	161.8	182.1	149.4	109.8	65.2	66.5	84.1	97.7	112.4

Figure 2. Historic and Ten Year Flow Average as Observed at Wells Dam

In general, the hydropower system and reservoir operations in the Columbia River are coordinated through a set of complex agreements and policies that are designed to optimize the benefits and minimize the adverse effects of project operations. The Wells Project operates within the constraints of the Pacific Northwest Coordination Agreement, Canadian Treaty, Canadian Entitlement Agreement, Hourly Coordination Agreement, the Hanford Reach Fall Chinook Protection Program and the FERC regulatory and license requirements.

1.3.2 Spill Operations

1.3.2.1 General Operation

The Hourly Coordination Agreement is intended to efficiently manage the power and non-power operations for the seven dams from Grand Coulee to Priest Rapids. "Coordinated generation" is assigned to meet daily load requirements via Central Control in Ephrata, WA. Automatic control logic is used to maintain pre-set reservoir levels to meet load requirements and minimize involuntary spill. These pre-set reservoir levels are maintained at each project via management of a positive or negative "bias". Positive or negative bias assigns a project more or less generation based on its reservoir elevation at a given time and thus, maximizes system benefits and minimizes involuntary spill.

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1.3.2.2 Spill for Fish

Wells Dam is a hydrocombine design where the spillway is situated directly above the generating units. Research at Wells Dam in the mid-1980s showed that a modest amount of spill effectively guided 92.0-96.2 % of the spring and summer downstream migrating juvenile salmonids through the JBS (Skalski et al. 1996; Table 2). The operation of the Wells JBS utilizes the five even-numbered spillways. These spillways have been modified with constricting barriers to improve the attraction flow while using modest levels of water. These modified spillways are used to provide a non-turbine passage route for downstream migrating juvenile salmonids from April through August. Normal operation of the JBS uses 10 kcfs. During periods of extreme high flow, one or more of the JBS barriers will be removed to provide adequate spill capacity to respond to an emergency plant load rejection. Spill barriers may also be removed to minimize TDG production during high spill events, or when flood flows are forecast. Bypass gates are opened when adjacent turbines are operating.

Typically, the JBS will use approximately 6% to 8% of the total river flow for fish guidance. Between the years 1997 and 2004, the volume of water dedicated to JBS operations ranged from 1.5 to 3.2 million acre-feet annually. The operation of the JBS adds a small amount of TDG while meeting a very high level of fish guidance and survival. This high level of fish survival at Wells Dam has met the approval of the fisheries agencies and tribes and is vital to meeting the survival performance standards contained within the FERC-approved HCP. The Wells Project JBS is the most efficient bypass system on the mainstem Columbia River.

Table 2. Wells Hydroelectric Project Juvenile Bypass System Efficiency.

Species	% JBS Passage
Yearling (spring) Chinook	92.0
Steelhead	92.0
Sockeye	95.7
Subyearling (summer/fall) Chinook	96.2

The JBS is used to protect downstream migrating juvenile salmonids. Fish passage operations at Wells Dam fall into two seasons, Spring Bypass and Summer Bypass. For 21 years, the status of the fish migration for both spring and summer periods was monitored by an array of hydroacoustic sensors placed in the forebay of Wells Dam. That monitoring data was used to establish that the operation period for the juvenile bypass begins in April and ends in August. Annual start and stop dates within that period are set by the HCP Coordinating Committee based on annually updated long-term monitoring, to bracket the run timing of greater than 95 % of both the spring and summer migrants. Up to thirteen million juvenile salmonids annually migrate downstream past Wells Dam each year.

1.3.2.3 Flows in Excess of Hydraulic Capacity

The forebay elevation at Wells Dam is maintained between 781.0 and 771.0 msl. The Wells Project has a hydraulic generating capacity of 219 kcfs (ASL 2007) and a spillway capacity of 1,180 kcfs. In recent years however the Wells Project has had less than 200 kcfs generating capacity due to ongoing generator and turbine rebuild and upgrade projects.

The Wells Project is a "run-of-the river" project with a relatively small storage capacity (~98,000 acre ft). By comparison, Grand Coulee Dam, two projects upstream of Wells Dam, has a reservoir with 58 times the storage capacity of the Wells Reservoir. River flows in excess of the ten-turbine hydraulic capacity (219 kcfs) at Wells Dam must be passed over the spillways.

1.3.2.4 Flow in Excess of Power Demand

Spill may occur at flows less than the Wells Project hydraulic capacity when the volume of water is greater than the amount required to meet electric power system loads. This may occur during temperate weather conditions and when power demand is low or when non-power constraints on river control result in water being moved through the Mid-Columbia at a different time of day than when power is required (i.e. off-peak periods). Hourly coordination (Section 3.2) between hydroelectric projects on the river was established to maximize generation and minimize spill. Spill in excess of power demand provides benefit to migration juvenile salmonids because fish passing through the spillway survive at a higher rate relative to passage through a turbine. Turbulence in the tailrace generated by spill in excess of power demand increases tailrace velocity and reduces tailrace egress times. The reductions in tailrace egress time and increases in water turbulence and velocity reduce predation in the Wells tailrace.

1.3.2.5 Gas Abatement Spill

Gas Abatement Spill is used to manage TDG levels throughout the Columbia River Basin. The Technical Management Team (including NMFS, USACE, and Bonneville Power Administration [BPA]) implements and manages this spill. Gas Abatement Spill is requested from dam operators at other projects in the Columbia and Snake Rivers where gas levels are high. A trade of power generation for spill is made between operators, providing power generation in the river with high TDG and trading an equivalent amount of spill from a project where TDG is lower. Historically, the Wells Project has accommodated requests to provide Gas Abatement Spill. However, in an effort to limit TDG generated at the Wells Project, Douglas PUD has adopted a policy of not accepting Gas Abatement Spill at Wells Dam.

1.3.2.6 Other Spill

Other spill includes spill as a result of maintenance or plant load rejection. A load rejection occurs when the generating plant is forced off-line by an electrical fault, which trips breakers and shuts off generation. At a run-of-the-river hydroelectric dam, if water cannot flow through operating turbines, then the river flow that was producing power has to be spilled until turbine operation can be restored. These events are extremely rare, and would account for approximately 10 minutes in every ten years.

Maintenance spill is utilized for any activity that requires spill to assess the routine operation of individual spillways and turbine units. These activities include checking gate operation, conducting index and generator load testing and all other maintenance activities that would require spill to pass water. The FERC requires that all spillway gates be operated once per year. To control TDG levels associated with maintenance spill, Douglas PUD limits, to the extent practical, maintenance spill during periods of peak flow and high TDG.

1.3.3 Compliance Activities in Previous Year

1.3.3.1 Operational

Since the Wells Project is a "run-of-the river" project with a relatively small storage capacity, river flows in excess of the ten-turbine hydraulic capacity must be passed over the spillways. Outside of system coordination and gas abatement spill (Douglas PUD has adopted a policy of not accepting the latter), minimization of involuntary spill has primarily focused on minimizing TDG production dynamics of water spilled based upon a reconfiguration of spillway operations. The 2009 Wells Project GAP (Le and Murauskas, 2009) introduced the latest numerical model developed by the University of Iowa's IIHR-Hydroscience and Engineering Hydraulic Research Laboratories. The two-phase flow computational fluid dynamics tool was used to predict hydrodynamics of TDG distribution within the Wells Dam tailrace and further identify operational configurations that would minimize TDG production at the Project. In an April 2009 report, the model demonstrated that Wells Dam can be operated to meet the TDG exemption criteria during the passage season at flows up to 7Q-10 levels provided the forebay TDG levels are below 115 %. Compliance was achieved through the use of a concentrated spill pattern through Spillbay No. 7 and surplus flow volume through adjacent odd numbered spillways in a defined pattern and volume. These preferred operating conditions create surface-oriented flows by engaging submerged spillway lips below the ogee, thus increasing degasification at the tailrace surface, decreasing supersaturation at depth, and preventing high-TDG waters from bank attachment. These principles were the basis of the 2009 Wells Project Spill Playbook and were fully implemented for the first time during the 2009 fish passage (spill) season with success. Overall, no exceedances were observed in either the Wells Dam tailrace or the Rocky Reach forebay in 2009.

In 2010, the concepts from the 2009 Spill Playbook were integrated into the 2010 Wells Project Spill Playbook given their effectiveness in maintaining levels below TDG criteria during the previous year. High Columbia River flows in June, which exceeded the preceding 15-year average flow, resulted in several exceedances of the hourly (125 % maximum) and 12C-High (120 %) TDG limits in the Wells Dam tailrace, and Rocky Reach forebay (115 %). In response, Douglas PUD implemented an in-season analysis of the 2010 Spill Playbook and determined that full implementation of the recommendations from IIHR Engineering Laboratory would require the removal of the juvenile fish bypass system flow barriers in one even numbered spillbay. Following the in-season analysis and consultation with the HCP Coordinating Committee, changes were made to the 2010 Spill Playbook that allowed for the removal of the juvenile fish bypass system barriers in spillbay 6. Specifically, the Spill Playbook was modified to state that when spill levels approach the 53 kcfs threshold, the JBS barriers in spillbay 6 would be removed in order to remain in compliance with the TDG criteria in the Wells Dam tailrace and Rocky Reach Dam forebay. When spill exceeded 53 kcfs, excess spill would be directed through spillways 6 and 7 rather than through spillways 5 and 7. This operational configuration resulted in a more compact spill pattern that reduced the air-water interface surface area between spillway flows and the subsequent potential for lateral mixing and air entrainment.

In February 2011, Douglas PUD conducted an additional technical analysis of the 2010 Spill Playbook (after in-season changes) and confirmed that continued implementation would be appropriate for 2011 with additional minor modifications. Following approval of the 2011 GAP

by Ecology, the 2011 Spill Playbook was implemented. Only minor changes were made to the 2012 Spill Playbook as a result of high compliance during the 2011 spill season.

In December of 2012, the final GAP report was completed for the 2012 spill season. After analysis it was determined that the 2012 spill season had the 3rd highest average monthly flows since 1969 (April- August). In addition incoming flows from Chief Joseph Dam were reliably above 115 %. Despite these conditions Wells Dam demonstrated high compliance with all standards aside from the Rocky Reach Forebay 115 % 12C-High standard since incoming flows to Wells Dam were above 115 % greater than 50 % of the spill season days.

A Spill Playbook nearly identical to 2012, was employed in 2013-2014. One minor modification included the use of Spillways 5 and 6 when flows exceeded 40 kcfs instead of Spillway 7 since the prolonged rebuild of unit 7 precluded spilling over a loaded unit. Flows for the 2013 and 2014 fish passage season were lower compared to flows observed in the previous two years, which allowed Douglas PUD to reduce spill volumes and maintain normal bypass operations for great lengths of time compared to 2011 and 2012. In addition this resulted in improved TDG performance. The 2015 Spill Playbook returned to concentrating spill over 40 kcfs through Spillway 7 rather than 5 since unit 7 returned to service. Given the high compliance with the TDG adjusted criteria and considering the incoming TDG conditions, no changes are suggested for the 2016 Spill Playbook.

1.3.3.2 Structural

No structural modifications were implemented (none were scheduled) during the 2015 fish passage season. Unit 10 is schedule for rebuild in June or July of 2016, but is not expected to affect Spill Playbook or GAP implementation. No other structural modifications are expected in 2016.

1.3.3.3 Biological Monitoring

NMFS has shown that Gas Bubble Trauma (GBT) is low if the level of TDG can be managed to below 120 % (NMFS 2000). They recommend that "the biological monitoring components will include smolt monitoring at selected smolt monitoring locations and daily data collection and reporting only when TDG exceeds 125 % for an extended period of time." Since the early 2000's, Douglas PUD has monitored smolts at the Rocky Reach Juvenile Bypass Sample Site and Wells Dam adult fish ladders on days following 125 % observed exceedances in the Wells Tailrace.

1.3.4 Compliance Success in 2015

Three standards are monitored closely during the juvenile fish passage season towards determining effectiveness and developing the subsequent year's GAP. TDG compliance during the juvenile fish passage season was exceptional in 2015.

Wells Tailrace 125% hourly standard

No exceedances occurred in 2015.

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Wells Tailrace 120% 12C-High standard
No exceedances occurred in 2015.

Rocky Reach Forebay 115% 12C-High standard
No exceedances occurred in 2015.

2.0 PROPOSED OPERATIONS AND ACTIVITIES

2.1 Operational Spill

Based on the Wells Project's improved TDG performance as a result of 2012-2015 operations associated with implementation of the Wells Project Spill Playbook, similar operating principles will be implemented for the 2016 juvenile fish passage season.

The 2016 Spill Playbook proposes to shift concentrated spill to spillway 7. In 2011-2014 concentrated spill was met using Spillways 5 and 6 since unit 7 was being rebuilt and spill over unit 7 would not be able to make use of generation flows leaving the draft tube of unit 7. Douglas PUD is proposing concentrating spill through unit 7. Spillway 7 was selected because spill through this bay can be more reliably supported by discharge from adjacent turbine units. The turbine discharge from units 6 and 7 are expected to further enhance the surface jet being spilled through Spillway 7. The 2016 Spill Playbook is attached as Appendix 1.

In addition to minimizing involuntary spill through the implementation of the Spill Playbook, Douglas PUD shall manage spill toward meeting water quality criteria for TDG during all flows below 7Q-10 as follows:

- Minimize voluntary spill through operations including to the extent practicable, by scheduling biannual maintenance[1] based on predicted flows;
- Avoid spill by continuing to coordinate operations with upstream dams, to the extent that it reduces TDG;
- Maximize generation and powerhouse discharge, especially during periods of high river flows; and
- During fish passage season, manage voluntary spill levels in real time in an effort to continue to meet TDG numeric criteria.

2.2 Implementation

2.2.1 Fisheries Management Plans

Juvenile salmon and steelhead survival studies conducted at the Wells Project in accordance with the HCP have shown that the operation of the Wells Project, of which the JBS is an integral part, provides an effective means for outmigrating salmon and steelhead to pass through the Wells Project with a high rate of survival (Bickford et al. 2001, Bickford et al. 2011) (Table 3). The

[1] Biannual maintenance is the regular schedule maintenance that units would regularly receive. This maintenance would not include the long term outage of the ten generating unit that are being completely rebuilt one at a time.

Wells JBS is the most efficient juvenile fish bypass system on the mainstem Columbia River (Skalski et al. 1996). The Wells Anadromous Fish Agreement and HCP (Douglas PUD 2002) is the Wells Project's fisheries management plan for anadromous salmonids, and directs operations of the Wells JBS to achieve the No Net Impact (NNI) standard for HCP Plan Species. The Aquatic Resource Management Plans (for white sturgeon, bull trout, Pacific lamprey, resident fish, water quality, and aquatic nuisance species) in the Wells Project's Aquatic Settlement Agreement (developed in support of the pending Wells Project operating license) are the fisheries management plans for all other aquatic life designated uses.

Table 3. 1998 -2000, 2010 Wells Hydroelectric Project Juvenile Survival Study Results.

Species	% Project Survival
Yearling Chinook (2010)	96.4
Yearling Chinook and Steelhead (1998-2000)	96.2

In spring 2010, Douglas PUD conducted a survival verification study with yearling Chinook salmon, a required 10-year follow-up study to confirm whether the Wells Project continues to achieve survival standards of the Wells Anadromous Fish Agreement and HCP. Approximately 80,000 Passive Integrated Transponder (PIT)-tagged yearling summer Chinook were released over a 30 day period in 15 replicates. The study determined that juvenile Chinook survival from the mouth of the Okanogan and Methow rivers averaged 96.4 % over the 15 replicate releases of study fish (Table 4). This result confirms conclusions from the three previous years of study, and documents that juvenile fish survival through the Wells Project continues to exceed the 93 % Juvenile Project Survival Standard required by the HCP (Bickford et al. 2011).

The current phase designations (status of salmon and steelhead species reaching final survival determination) for the HCP Plan Species are summarized in Table 4. Specific details regarding survival study design, implementation, analysis, and reporting are available in annual summary reports prepared and approved by the Wells HCP Coordinating Committee.

Table 4. Wells Hydroelectric Project Habitat Conservation Plan Species Phase Designations.

Species	Phase Designation
Yearling (spring) Chinook	Phase III[2] – Standard Achieved (22-Feb-05)
Steelhead	Phase III – Standard Achieved (22-Feb-05)
Sockeye	Phase III – Additional Juvenile Studies (22-Feb-05)
Subyearling (summer/fall) Chinook	Phase III – Additional Juvenile Studies (22-Feb-05)
Coho	Phase III – Standards Achieved (16-Dec-15)

In 2016, Douglas PUD will continue to operate the Wells Dam adult fishways and the JBS in accordance with HCP operations criteria to protect aquatic life designated uses. Furthermore, all fish collection (hatchery broodstock and/or evaluation activities) or assessment activities that occur at Wells Dam will require approval by Douglas PUD and the HCP CC to ensure that such activities protect aquatic life designated uses.

Douglas PUD shall continue to operate the Wells Project in a coordinated manner that reduces forebay fluctuations and maintaining relatively stable reservoir conditions that are beneficial to multiple designated uses (aquatic life, recreation, and aesthetics). Coordinated operations with upstream projects reduces spill at Wells Dam and thus reduces the potential for exceedances of the TDG numeric criteria and impacts to aquatic life associated with TDG.

2.2.2 Biological Monitoring

As in past years, if hourly TDG levels exceed 125 % in the tailrace of Wells Dam, Douglas PUD will conduct adult and juvenile salmonid GBT sampling. Douglas PUD will work with the Washington Department of Fish and Wildlife hatchery programs to monitor the occurrence of GBT on adult salmon collected in the Wells Dam and Wells Hatchery fishways. Upon collection of broodstock, hatchery staff will anesthetize each fish, place a marking identification tag on them and look for any fin markings or unusual injuries. It is expected that adult broodstock sampled for GBT will consist of spring and summer Chinook and sockeye since they are the species migrating through the Wells Project during fish spill periods where high TDG is a concern, however all encountered salmonids including steelhead and bull trout will be examined.

The JBS at Wells Dam does not have facilities to allow for juvenile fish sampling and observation. To address GBT sampling for juvenile anadromous salmonids, if hourly TDG levels exceed 125 % in the tailrace of Wells Dam, Douglas PUD will request biological sampling of migrating juveniles for symptoms of GBT at the Rocky Reach juvenile bypass sampling facility on the subsequent business day to the exceedance. Target species for juvenile GBT sampling will consist of coho, sockeye, and yearling and subyearling Chinook and steelhead. If flood flows above 7Q-10 persist for extended timeframes (more than one week), sampling effort will be reduced to 3 days per week.

[2] Phase III (Standards Achieved) = Juvenile Project Survival greater than or equal to 93 percent or combined juvenile and adult survival greater than or equal to 91 percent.

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2.2.3 Water Quality Forums

Douglas PUD actively participates in regional water quality forums including those that include other hydroelectric operators on the mainstem Snake and Columbia Rivers. The USACE meets with PUD technical leads to review yearly data collections and completeness. In addition, Douglas PUD observes the Technical Management Team water management process, particularly in spring to understand river operations and actions designed to limit TDG production. Finally, Douglas PUD is involved in Columbia River Treaty actions that are dedicated to water quality considerations.

2.3 Water Quality Attainment Plan and Quality Assurance Project Plans

In November 2012, Douglas PUD received a new FERC operating license for Wells Project. As required by Douglas PUD's Clean Water Act 401 Certification, a Water Quality Attainment Plan (WQAP) for TDG and a Quality Assurance Project Plan (QAPP) for water temperature and TDG were developed, approved by the Aquatic Settlement Work Group and the HCP CC and filed with the FERC for approval prior to Oct 31st of 2013 (within one year of license issuance). Both the WQAP and the QAPP were approved by the FERC in 2013.

The WQAP includes a compliance schedule to ensure compliance with TDG criteria within 10 years. The WQAP also allows time for the completion of the necessary studies or for the resolution of the issue of elevated incoming TDG from upstream projects through rule-making or other means. The WQAP was developed to meet the requirements of WAC 173-201A-510(5).

If implementing the compliance schedule does not result in compliance with TDG criteria at the time the compliance schedule expires, Douglas PUD may explore other alternative approaches available in the water quality standards, including a second compliance schedule or alternatives provided in WAC 173-201A-510(5)(g).

Specific measures in the WQAP that will be conducted in 2016 include:

1. Testing and modifying an adaptive Spill Playbook in and outside of fish passage season
    a. Douglas PUD will implement the Spill Playbook and track its progress towards improving TDG performance and assessing compliance capability.
2. Monitoring gas bubble presence in biota
    a. At TDG levels above 125 % in the Wells tailrace, Douglas PUD will initiate GBT monitoring. The collection of biological data serves two primary purposes. First, Douglas PUD is required to collect biological data to meet GAP requirements associated with the annual TDG adjustment for fish passage. Secondly, Douglas PUD's 401 Certification identifies potential alternative approaches (e.g., use attainability analysis and site specific variance) as part of implementing the TDG compliance schedule (WAC 173-201A-510(5)(g).
3. Begin developing a Wells Project Database towards improved Project operations that might limit TDG production

The development of a higher resolution Project operations database would better inform operations toward the improvement of TDG management. Operations and data parameters may include but are not limited to bypass barrier use and removal, unit flow, unit outages, spill gate flow and pattern, forebay/tailrace water surface elevation, incoming TDG, and water temperature. Douglas PUD will also work with Wells Dam engineers, technicians and plant operators to identify opportunities for operational optimization (e.g., spill gate availability, automation, potential utility of spillways 1 and 11, restrictions to bypass removal, etc.). While this process began in 2015, Douglas PUD will continue to develop the fine-scale operations database in 2016.

3.0 COMPLIANCE AND PHYSICAL MONITORING

3.1 Monitoring Locations

TDG monitoring has been implemented in the Wells Dam Forebay since 1984. Douglas PUD began monitoring TDG levels in the Wells Dam Tailrace in 1997 by collecting data from a boat and drifting through the tailrace at four points across the width of the river. During the transect monitoring, no TDG "hot spots" were detected; the river appeared completely mixed horizontally. A fixed TDG monitoring station was established in 1998. The placement of the fixed monitoring station was determined based upon the 1997 work and was further verified as collecting data representative of river conditions during a 2006 TDG assessment at Wells Dam (EES et. al. 2007). Results of the 2008-2009 TDG numerical modeling activities conducted by University of Iowa/IIHR also confirmed that the tailrace monitoring station is located at a site representative of the mixed river flow, particularly during higher flows. Furthermore, locations of both forebay and tailrace sensors had to be protected to avoid sensor/data loss and damage and for safe accessibility during extreme high flows. The current locations of both the forebay and tailrace monitors took these criteria into consideration.

Prior to November 2012, TDG monitoring at the Wells Project typically commenced on April 1 and continued until September 15, annually. This monitoring period encompasses the juvenile fish migration, the operation of the Wells JBS as well as when river flows are at their highest and when a majority of spill occurs. As of August 2013, Douglas PUD continued to collect TDG following the completion of the bypass period towards monitoring TDG outside of the spill and fish passage season (as required by the Wells Project 401 Certification). Currently, year round data from both forebay and tailrace sensors are transmitted by radio transmitters to a master radio at Wells Dam. This system is checked and calibrated monthly or more frequently, as required. TDG data are sent and logged at the Douglas PUD Headquarters' building in 15-minute intervals. Information on barometric pressure, water temperature and river gas pressure is sent to the USACE on the hour over the Internet and uploaded in real-time to Douglas PUD's public website (www.dcpud.org). The four data points (15 minute) within an hour are used in calculating the hourly compliance TDG values, the 24-hour TDG average and the 12C-High readings in a day (24-hour period).

In 2014, Douglas PUD installed and began operating an additional TDG sensor station in the Wells Reservoir located several miles downstream of Chief Joseph Dam and upstream from the Okanogan River (Washburn Island). This new TDG sensor station provides reliable mixed flow

TDG being generated at Chief Joseph Dam (Army Corps of Engineers studies show mixing of power house and spill flows at least 7 miles from Chief Joseph Dam) before being diluted by degassing processing at the surface water interface and diluted via tributary influence in the Okanogan River (Easthouse, 2012; pers. comm. with Mike Schneider, USACE). The current system operated by the USACE below Chief Joseph Dam collects TDG values primarily from the project's spillways and does not provide a reliable measure of mixed flow (powerhouse and spillway combined) TDG values and therefore does not provide a reliable estimate of TDG headed for the forebay of Wells Dam. In 2016, Douglas PUD will continue to monitor TDG in the tailrace and forebay at Wells Dam but also at Washburn Island.

3.2 Quality Assurance

The broad purpose of a well-designed Quality Assurance Project Plan (QAPP) is to attain data of the type and quality needed to make future decisions surrounding the need, or lack thereof, for changes to project operation and construction related to compliance with TDG and temperature standards.

Douglas PUD developed a QAPP for TDG in 2013 in coordination with Ecology. The QAPP was filed on June 24th, 2013 and approved by the FERC on August 8, 2013. An important part of Douglas PUD's Quality Assurance/Quality Control (QA/QC) program is the requirement that Douglas PUD's water quality consultant visit each of the TDG sensor sites monthly for maintenance and calibration of TDG instruments. Calibration follows criteria established by the USACE, with the exception of monthly rather than bi-weekly calibration of sensors. A spare probe is available and field-ready at all times in the event that a probe needs to be removed from the field for repairs.

Douglas PUD started collecting TDG data year round beginning April 1, 2013 but spill season data (April – August) will be reported separately in an annual GAP report submitted to Ecology and the FERC. Real time data is available at dcpud.org consistent with reporting requirements found in Douglas' 401 Certification.

3.3 Reporting

Upon approval of the Wells GAP and issuance of a Wells Project TDG exemption, Douglas PUD will submit an annual report to Ecology no later than February 28 subsequent to each year that the TDG exemption is approved. The annual report will summarize all GAP activities conducted for the prior year (i.e., annual report filed February 28, 2017 will be for all GAP activities conducted in 2016) as required by Ecology and the FERC. In addition to reporting on spill season compliance, the annual report will include TDG compliance outside the spill season (110%), per the 401 Certification Section 6.7 2) c) iii). Additional analyses for the annual report may include examining TDG production above and below Wells Dam to understand TDG production and abatement through the Wells Project. For example, Douglas PUD may plot TDG profiles at the Grand Coulee forebay, Grand Coulee tailrace, Chief Joe forebay, Chief Joe tailrace, Wells forebay, Wells tailrace and Rocky Reach forebay over multiple time scales. Results will be shared with the Aquatic SWG, Ecology, and within water quality forums (see section 2.2.3).

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4.0 CONCLUSIONS

Pending approval by Ecology, implementation of the measures identified within the 2016 GAP are intended to serve as a long-term strategy to maintain compliance with the Washington State WQS for TDG in the Columbia River at the Wells Project while continuing to provide safe passage for downstream migrating juvenile salmonids. In addition, the implementation of this GAP will be used as a tool to implement relevant measures identified in the Ecology-approved Wells Project WQAP.

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5.0 LITERATURE CITED

ASL Environmental Sciences (ASL). 2007. Turbine Discharge Measurements by Acoustic Scintillation Flow Meter at Units 1 and 2, Wells Hydroelectric Project, Pateros, Washington, August 2006. Prepared by ASL Environmental Sciences Inc. Prepared for Public Utility District No. 1 of Douglas County, East Wenatchee, WA.

Bickford, S. A., J. R. Skalski, R. Townsend, S. McCutcheon, R. Richmond, R. Frith and R. Fechhelm. 2001. Project survival estimates for yearling summer steelhead migrating through the Wells Hydroelectric Facility, 2000.

Bickford, S.A., T. Kahler, R. Townsend, J.R. Skalski, R. Richmond, S. McCutcheon and R. Fechhelm. 2011. Project survival estimates for yearling Chinook migrating through the Wells Hydroelectric Project, 2010.

Colville Confederated Tribes. 2010. Colville Tribe Water Quality Standards. Chapter 4-8. September 2010 Version. http://www.colvilletribes.com/media/files/4-8-Waterqualitystandards.pdf

Douglas PUD. 2002. Wells Hydroelectric Project Anadromous Fish Agreement and Habitat Conservation Plan. Public Utility District No. 1 of Douglas County, East Wenatchee, Washington.

Easthouse, K.B. 2012. Chief Joseph Dam 2012 Two Bay Uplift Spill Test: Total Dissolved Gas Exchange. U.S. Army Corps of Engineers. Seattle, WA.

Ecology. 2010. Letter to Mr. David Ponganiss, U.S. Army Corps of Engineers from Melissa Gildersleelve, WA Department of Ecology approving TDG abatement plan and TDG criteria adjustment. June 30, 2010.

EES Consulting, Carroll, J., ENSR, and Parametrix. 2007. Total Dissolved Gas Production Dynamics Study. Wells Hydroelectric Project. FERC No. 2149. Prepared by EES Consulting, Joe Carroll, ENSR, and Parametrix. Prepared for Public Utility District No. 1 of Douglas County, East Wenatchee, WA.

Le, B. and J. Murauskas. 2009. Total Dissolved Gas Abatement Plan. Wells Hydroelectric Project. April 2009. Prepared for Washington Department of Ecology, Yakima, Washington, 98902-3452.

National Marine Fisheries Service (NMFS). 2000. Endangered Species Act – Section 7 Consultation: Biological Opinion. Consultation on Remand for Operation of the Columbia River Power System and 19 Bureau of Reclamation Projects in the Columbia Basin. F/NWR/2004/00727. November 30, 2005. Pages 5-6, 5-7, 5-53, 10-9, and Appendix E: Risk Analysis.

20160229-5140 FERC PDF (Unofficial) 2/26/2016 7:55:24 PM

Pickett P.J, Rueda H., and Herold M. 2004. Washington Department of Ecology (Ecology), Spokane Tribe of Indians and U.S. Environmental Protection Agency. 2004. Total Maximum Daily Load for Total Dissolved Gas in the Mid-Columbia River and Lake Roosevelt: Submittal Report.

Skalski, J. R., G. E. Johnson, C. M. Sullivan, E. Kudera and M. W. Erho. 1996. Statistical Evaluation of Turbine Bypass Efficiency at Wells Dam on the Columbia River, Washington. Canadian Journal of Fisheries and Aquatic Science. Volume 53, No. 10, 1996. Pages 2188-2198.

Washington Department of Ecology, Spokane Tribe of Indians and U.S. Environmental Protection Agency. 2004. Total Maximum Daily Load for Total Dissolved Gas in the Mid-Columbia River and Lake Roosevelt: Submittal Report. Accessed online December 7, 2010 at: http://www.ecy.wa.gov/biblio/0403002.html

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Appendices

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Appendix 1 Wells Hydroelectric Project Spill Playbook

I. No Forced Spill

The Wells Dam JBS should be operated continuously throughout the juvenile salmon outmigration (April 9 to August 19 for 2016). The standard Wells HCP operating criteria, as described in Section 4.3.1 of the Wells HCP, will apply to the 2016 operating season. The operating criteria includes requirements that at least one bypass bay be operated during the entire JBS season, requires that no turbine is operated without an adjacent bypass bay being open and requires that all five bypass bays be operated continuously for 24 hours when the Chief Joseph Dam uncoordinated discharge estimate for that day is 140 kcfs or greater. The Wells JBS is normally operated with 1.7 kcfs passed through S2 and S10, and 2.2 kcfs through S4, S6, and S8. Figure 1 (below) assumes that the Chief Joseph Dam uncoordinated discharge estimate is greater than 140 kcfs or sufficient turbines units are operating that all five bypass bays are open.

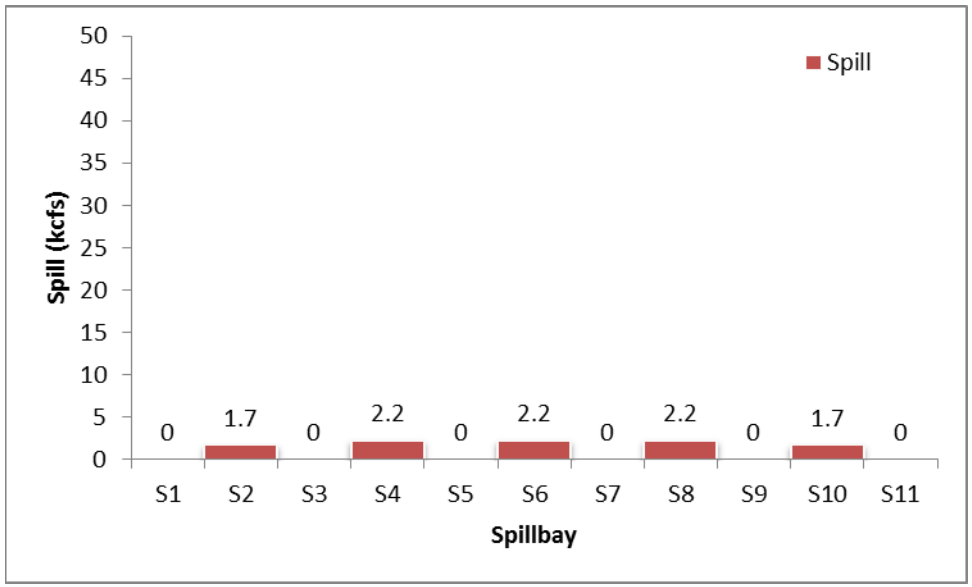

Figure 1. Operational configuration under no forced spill (JBS only).

I. Total Spill ≤ 53.0 kcfs, JBS barriers in place

As forced spill increases, Project Operators should allocate all spill through *S7* until the maximum capacity is reached through that spillbay (~43.0 kcfs). Note that *S7* spill requires support of generation flows from units 6 and 7 to minimize TDG production. This, along with the already established JBS spill (10.0 kcfs) would equal 53.0 kcfs (Figure 2). Over 90% of the spill events over the past decade could have been handled under this configuration.

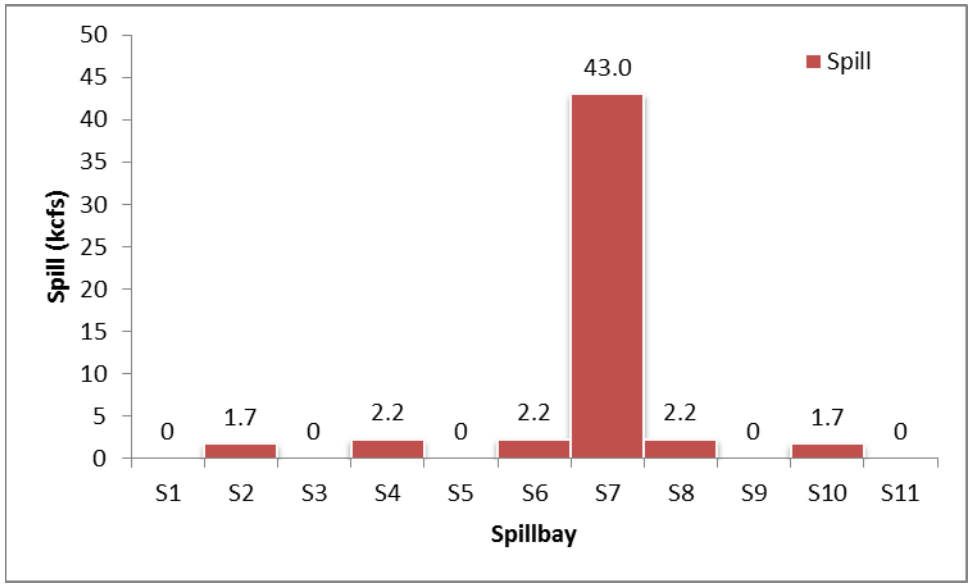

Figure 2. Operational configuration under spill ≤ 53.0 kcfs (including JBS).

II. JBS Barrier Removal Criteria

When either of the following occurs, remove the JBS barrier in *S6*:

Spill in *S7* reaches 30 kcfs and total spill is expected to exceed 40 kcfs for more than 8 hours, *or* total spill is expected to exceed 53 kcfs. After the JBS barrier is removed from *S6* and when flow through S7 is at least 30kcfs, shift 15 kcfs to *S6* (Figure 3). It is best to have generating units 6, 7, and 8 operating to support this spill configuration. Once at least 15 kcfs is being spilled through *S6*, spill can be allocated to *S7* until 43.0 kcfs is reached.

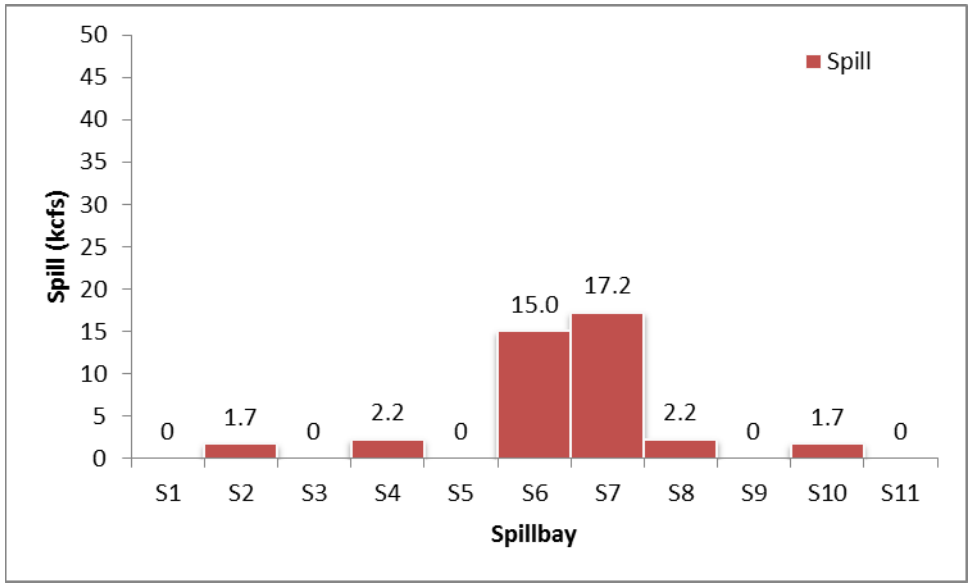

Figure 3. Operational configuration once spill reaches 30 kcfs in S7 and is expected to be above 40 kcfs for more than 8 hours (JBS removed). Shift sufficient spill from S7 to maintain a minimum of 15 kcfs spill at S6. Note that the 15.0 kcfs includes the existing 2.2 kcfs JBS flow.

III. Short duration decreases in Forced Spill (<53.0 kcfs) and JBS Barriers in *S6* Removed

If after removal of JBS barrier in *S6*, total spill drops below 53 kcfs (between 10-53 kcfs), and is expected to stay in this range for only a short period (4 days or less), direct spill through *S6* up to 15 kcfs (total spill < 22.9 kcfs). When total spill exceeds 22.8 kcfs, direct the remainder of spill through *S7*.

IV. Forced Spill (> 53.0 kcfs) and JBS Barriers in *S6* Removed

After *S7* reaches 43.0 kcfs, additional spill should be allocated to *S6* (*S6* is already spilling at least 15.0 kcfs needed to fully engage the submerged spillway lip below the ogee). As flow increases, spill should continually increase through *S6* until paired with *S7* (e.g., 43.0 kcfs through *S7* and 26.0 kcfs through *S6*) (Figure 4). Eventually, *S6* will reach 43.0 kcfs (93.8 kcfs, **Figure** 5).

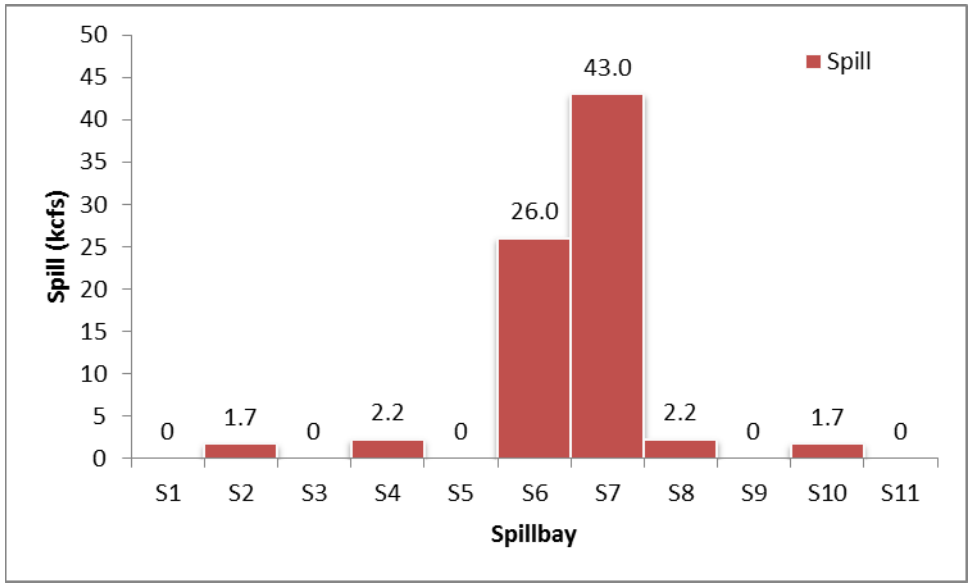

Figure 4. Operational configuration under forced spill > 53.0 kcfs (including JBS flow, with removal of JBS barriers in *S6*). In this instance spill has reached the 43.0 kcfs maximum in S7 and additional spill is being allocated to S6 (26.0 kcfs).

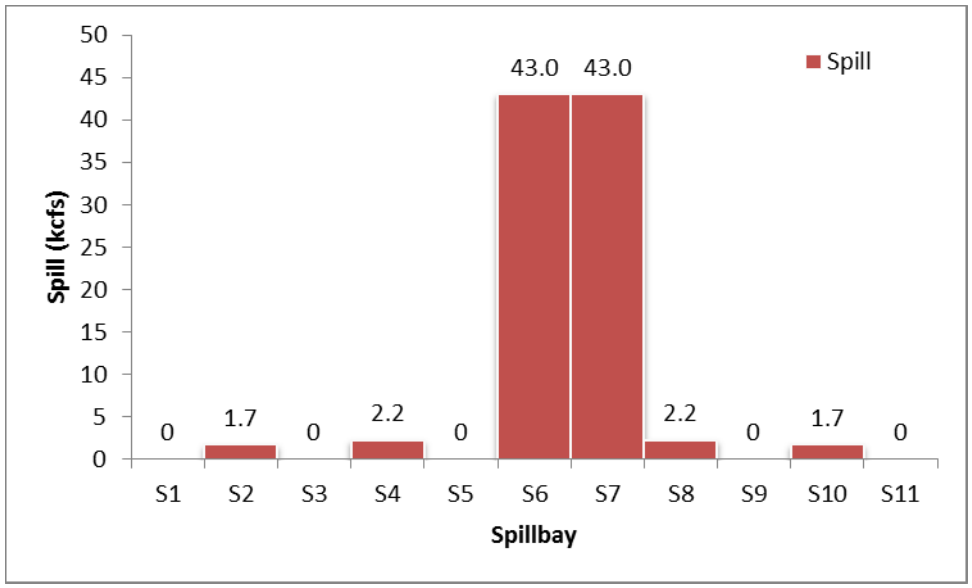

Figure 5. Operational configuration under forced spill > 53.0 kcfs (including JBS). In this instance (93.8 kcfs of spill), S6 has been fully allocated and 43.0 kcfs is now allocated through both *S7* and *S6*.

V. Forced Spill (> 93.8 kcfs) and JBS Barriers in *S6* Removed

After both *S7* and *S6* reach 43.0 kcfs, spill can also be allocated to *S5*. Since a minimum of 15.0 kcfs is needed to fully engage the submerged spillway lip below the ogee, spill through *S6* should be relocated to *S5* (Figure 6). As flow increases, spill can be continually increased through *S5* until paired with *S6* (30.0 kcfs through S6 and S5, while S7 continues at 43.0 kcfs). After this point, both *S6* and *S5* can be increased until all three spillways have reached 43.0 kcfs (136.8 kcfs of spill, Figure 7).

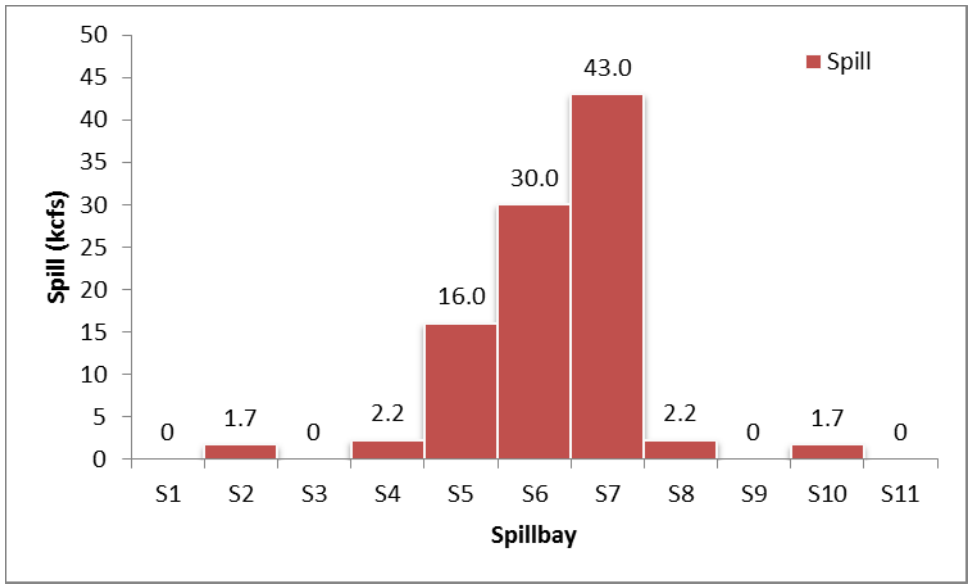

Figure 6. Operational configuration under forced spill > 96.0 kcfs. In this instance (96.8 kcfs of total spill), spill from *S6* is relocated to *S5* to maintain concentrated flow with *S7*. A spill of 16.0 kcfs is maintained in *S5* as to engage the submerged spillway lip.

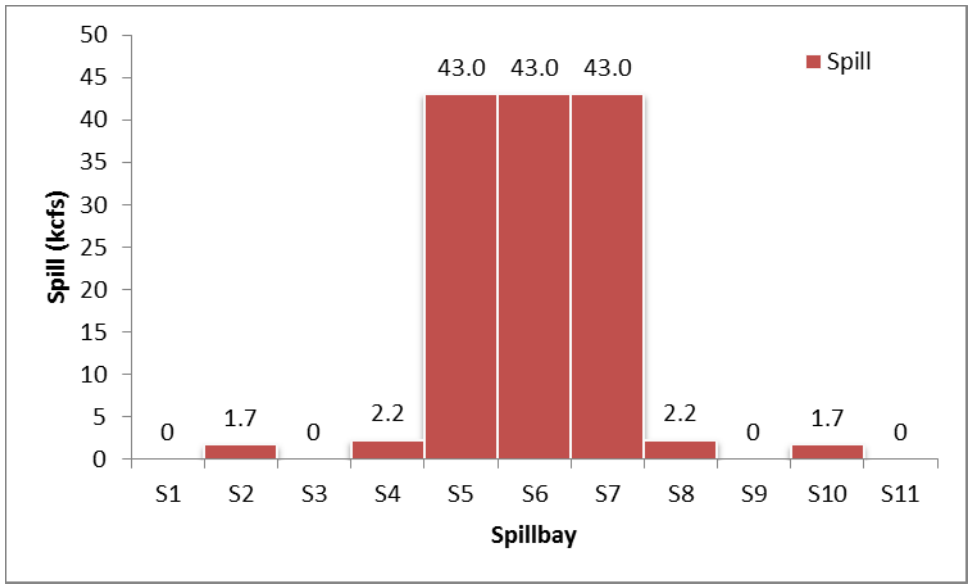

Figure 7. Operational configuration under forced spill > 96.0 kcfs (with removal of JBS barriers in *S6*). In this instance (136.8 kcfs of total spill), 43.0 kcfs is allocated through *S5*, *S6*, and *S7*.

VI. Forced Spill (> 136.8 kcfs)

Forced spill exceeding 136.8 kcfs rarely occurs (less than 0.5%). If these conditions arise and total river flow exceeds 246.0 kcfs, then 7Q-10 conditions are occurring and Wells Dam is exempt from the TDG standards. Under this situation, Project Operators may perform any combination of operations to ensure that flood waters are safely passed. Also, at this point, JBS barriers will likely be removed allowing additional flexibility to spill up to 43 kcfs each through *S2*, *S4*, *S6*, and *S8*. Project Operators may pass spill through *S9* in a similar fashion to operations mentioned above (starting at a minimum of 15.0 kcfs to ensure that spillway lips are engaged).

VII. JBS Re-Installment Criteria

Once spills of less than 40.0 kcfs are predicted for at least four days, JBS barriers should be re-installed in *S6*.

II. Spill Lookup Table

Operation	Total Spill	Spillbay Number										
		S1 -	*S2* JBS	*S3*	*S4* JBS	*S5*	*S6* JBS	*S7*	*S8* JBS	*S9*	*S10* JBS	*S11* -
I. No Forced Spill	10.0	0.0	1.7	0.0	2.2	0	2.2	0	2.2	0.0	1.7	0.0
II. Spill (≤ 53.0 kcfs), min.	11.0	0.0	1.7	0.0	2.2	0	2.2	1.0	2.2	0.0	1.7	0.0
II. Spill (≤ 53.0 kcfs), max.	53.0	0.0	1.7	0.0	2.2	0	2.2	43.0	2.2	0.0	1.7	0.0
III. Spill (> 53.0 kcfs, *S6* JBS out), min.	54.0	0.0	1.7	0.0	2.2	0	15.0	31.2	2.2	0.0	1.7	0.0
III. Spill (> 53.0 kcfs, *S6* JBS out), max.	93.8	0.0	1.7	0.0	2.2	0	43.0	43.0	2.2	0.0	1.7	0.0
IV. Spill (> 93.8 kcfs, *S6* JBS out), min.	96.8	0.0	1.7	0.0	2.2	16.0	30.0	43.0	2.2	0.0	1.7	0.0
IV. Spill (> 93.8 kcfs, *S6* JBS out), max.	136.8	0.0	1.7	0.0	2.2	43.0	43.0	43.0	2.2	0.0	1.7	0.0
V. Spill (>137.0 kcfs), min.	137.0	0.0	1.7	0.0	2.2	28.2	43.0	43.0	2.2	15.0	1.7	0.0
V. Total Flow (>246 kcfs), max.	-	*Operators may adjust as needed.* *TDG exemption in place when total river flows exceed 246.0 kcfs.*										

Notes: (1) No spill through *S1* and *S11* as to minimize interference with fish ladders. (2) Even-numbered spillways are designated as the Juvenile Bypass System (JBS). (3) Primary spillways for forced spill are *S7*, *S6*, *S5*, *S9*, and *S3* (in that order).

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APPENDIX B – 2016 BYPASS OPERATING PLAN – WELLS PROJECT

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Appendix 2 Wells Bypass Operating Plan

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Wells Hydroelectric Project

Final 2016 Juvenile Fish Bypass Operating Plan

Approved January 26, 2016

Operation of the Wells Dam juvenile bypass system throughout the 2016 season will follow the criteria contained within the Wells Dam Juvenile Dam Passage Survival Plan found in Section 4.3 of the Wells HCP, which specifies a goal of providing bypass operations for at least 95 percent of both the spring and summer migrations of juvenile Plan Species.

Since 2012, bypass operations at Wells Dam have commenced on April 9 and ended on August 19. Annual analyses of bypass performance indicate that these dates of bypass operations provide bypass passage during 98 to 100 percent of the migrations of all Plan Species. Based upon this high level of compliance with the HCP bypass operating criteria (exceeding the 95% bypass-passage criteria for the migrations of all plan species), Douglas PUD proposes to commence operation of the bypass system in 2016 starting at 00:00 on April 9 and to end operations at 24:00 hours on August 19.

Dam safety emergency action planning, as required by the Federal Energy Regulatory Commission (FERC), calls for Douglas PUD to operate Wells Dam with sufficient automatic-gate-opening capacity in the spillways to pass the flow from a plant load-rejection of up to 200 thousand cubic feet per second (kcfs), in addition to any concurrent initial spillway discharge. Of the 11 spillways at Wells Dam, only spillways 3 through 9 have automated gate hoists. Thus, the seasonal installation of bypass barriers in spillways 2, 4, 6, 8 and 10, substantially reduces the automatic-gate-opening capacity of Wells Dam by reducing the capacity of each bypass spillway to 8.6 kcfs. Consequently, Douglas PUD must remove bypass barriers systematically when discharge-volume estimates exceed certain thresholds, as per Table 1, sufficient to provide the necessary automatic-gate-opening flow capacity as described in Appendix I of the FERC-required Emergency Action Plan for the Wells Project. Douglas PUD will make decisions to remove bypass barriers for dam-safety considerations each Monday (or at other times as necessary) during the bypass period based on weekly forecasts of combined discharge from Chief Joseph Dam and side-flows from the Okanogan and Methow rivers (from the National Weather Service Northwest River Forecast Center [NWRFC]).

Table 1. Schedule for removal of spillway flow-barriers (bypass barriers) to accommodate flood flows and load rejections.

Inflow Forecast (kcfs)	Bypass Barriers Removed
Up to 200	None
200 – 240	Spillway 6
240 – 275	Spillways 6, 8
275 – 310	Spillways 4, 6, 8
310 – 350	Spillways 4, 6, 8, 10, & preset gates 10, 11 to spill excess of 312 kcfs
350 – 400	Spillways 4, 6, 8,10, & preset gates 1, 10, 11 to spill excess of 312 kcfs
400 – 450	All spillways (2, 4, 6, 8, 10)

Juvenile Fish Bypass Operations and Clean Water Act TDG Compliance

Seasonal bypass operations generally coincide with the spring freshet, an event during which operators of hydroelectric projects must cope with flows that often exceed the hydraulic capacity of their powerhouses. During such events, project operators must pass water via the spillway as "involuntary spill," which increases the concentration of atmospheric gases in the water below hydroelectric projects, and can result in levels of total dissolved gas (TDG) that may injure fish. To minimize the potential for fish injury, the Washington Department of Ecology (WDOE) imposes TDG standards on operators of hydroelectric projects.

Extensive modeling and study of spill operations at Wells Dam provide the basis for the development of annual "spill playbooks" for dam operations aimed at achieving the WDOE standards for TDG. These spill playbooks prescribe spillgate configurations to implement under various flow scenarios. From modeling and physical-spill studies, Douglas PUD determined that concentrating spill through the middle of the spillway and on top of turbine discharge results in the most effective minimization of TDG. The best TDG performance is achieved when concentrating involuntary spill through Spillway 7, and allocating additional spill, beyond the capacity of Spillway 7, to Spillways 6 and then 5, up to a maximum of 43 kcfs per spillway.

To accomplish this TDG-minimizing pattern of concentrated spill requires the removal of the bypass barriers from at least one spillway during periods of excessive involuntary spill. The removal of the bypass barriers from one spillway takes approximately eight hours and requires the use of a four-man mechanical crew and the powerhouse gantry cranes. To comply with the TDG standards below Wells, the bypass barriers must be removed from at least one spillway whenever involuntary spill exceeds 30 kcfs and one or both of the following conditions applies: 1) prolonged (> 8 hours) involuntary spill in excess of 40 kcfs is predicted (based on forecasted tributary inflows from the NWRFC and estimated discharge from Chief Joseph Dam provided by the US Army Corps of Engineers); or 2) total spill is predicted to exceed 53 kcfs, regardless of duration. Once involuntary spill of less than 40 kcfs, for a period of at least four days is predicted, the respective bypass barriers would be reinstalled. At river flows greater than 240 kcfs, bypass barriers would be removed from additional bypass bays as described above (see Table 1) and reinstalled sequentially as appropriate.

Juvenile Fish Bypass Contingency Plan

Following the failure of a gate-hoist cable in a bypass spillway at Wells Dam in late August 2010, Douglas PUD developed a contingency plan for bypass operations during an accident or unanticipated mechanical failure that would preclude normal bypass operations. High river discharge in 2011 and 2012 led to the incorporation of provisions for the management of TDG into the Bypass Contingency Plans in 2013. The 2016 Bypass Contingency Plan continues those provisions, as described below.

Section 4.3 of the Wells HCP directs Douglas PUD to shut down the turbine units adjacent to a bypass spillway that is not operating due to either low flow or an inability to operate the bypass spillway. Under the 2016 Bypass Contingency Plan, if shutting down the turbines would not threaten compliance with TDG standards, Douglas PUD would shut down the associated turbine units. However, if doing so would threaten compliance with TDG standards, Douglas PUD would not shut down the associated turbines but would instead direct spill through spillways

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adjacent to the affected turbine units in a manner that provides bulk flow for fish passage while minimizing TDG (Figure 1, Option 1). Douglas PUD would consult the Spill Playbook (see above) to select such spill configurations, and would spill at least 10 kcfs through selected spillways to engage the submerged flip-lip as a TDG minimization measure and to provide bulk flow for fish attraction to the surface passage route. In circumstances where turbine shutdown would not jeopardize TDG compliance, Douglas PUD would shut down the associated turbine units to evaluate and repair the malfunction, but may then elect to move the bypass barriers from the inoperable bypass spillway to an adjacent, non-bypass spillway to obtain the use of an additional turbine unit (see Figure 1, options 2 and 3). The gate for that substitute bypass spillway would then be set at the standard 1-foot opening for bypass spillways and the adjacent turbine unit(s) could be operated without constraints. This configuration would meet the intent of HCP Section 4.3 by providing bypass spill immediately adjacent to every operating turbine unit and would comply with the goal of the Total Dissolved Gas Abatement Plan.

During the repair of a bypass malfunction, Douglas PUD would daily reevaluate forecasts of Chief Joseph Dam discharge, tributary inflows, and TDG conditions, as well as repair progress, and determine which bypass option to implement as per Figure 1.

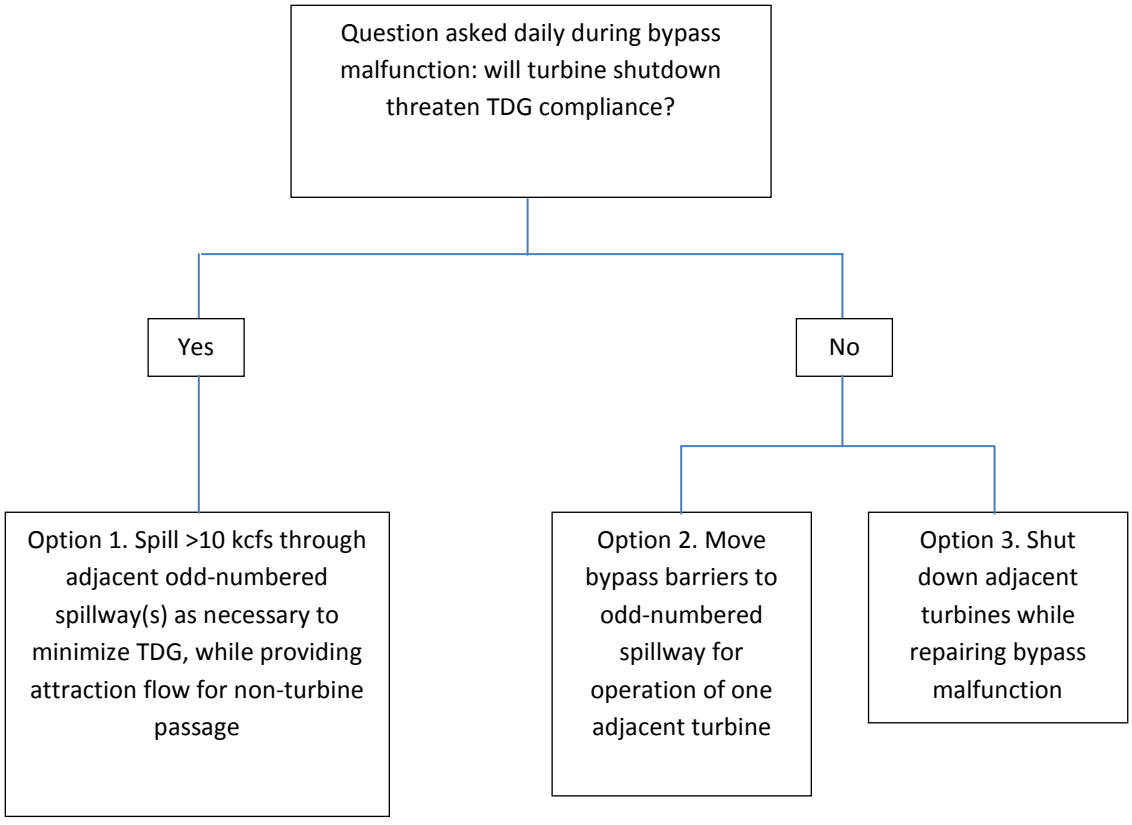

Figure 1. Evaluation flow chart for daily decisions regarding bypass, spill, and turbine operations during a bypass malfunction.

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APPENDIX C – PRE-FILING CONSULTATION RECORD FOR THE 2016 GAS ABATEMENT PLAN AND BYPASS OPERATING PLAN

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NOTICE TO THE HABITAT CONSERVATION PLAN COORDINATING COMMITTEE TO REVIEW THE 2016 GAS ABATEMENT PLAN AND BYPASS OPERATING PLAN

From: Kristi Geris <kgeris@anchorqea.com>
Sent: Wednesday, January 06, 2016 10:08 AM
To: Bob Rose (rosb@yakamafish-nsn.gov); Jim Craig (jim_l_craig@fws.gov); John Ferguson; Keller, Lance; Kirk Truscott; Korth, Jeff (DFW) (Jeff.Korth@dfw.wa.gov); Kristi Geris; Scott Carlon; Tom Kahler
Cc: (Carmen.andonaegui@dfw.wa.gov); Aaron Beavers; Alene.Underwood@chelanpud.org; Bill Tweit; Dale Bambrick; Gallaher, Becky; Justin Yeager; Keith Truscott; Mary Mayo; Ritchie Graves; Shane Bickford; Steve Hemstrom (steven.hemstrom@chelanpud.org); Steve Parker; Verhey, Patrick M (DFW); 'william_gale@fws.gov'; Andrew Gingerich
Subject: FW: Draft 2016 GAP/BOP for CC review
Attachments: 2016_01_06 Douglas - Draft 2016 Wells Dam Gas Abatement Plan and Bypass Operating Plan.doc

Hi HCP-CC: please see the email below from Tom and the attached Draft 2016 Wells Dam Gas Abatement Plan (GAP) and Bypass Operating Plan (BOP) for review. The attached draft plan is available for a 35-day review period, with comments due to Tom by **Wednesday, February 10, 2016**.

The attached draft plan is also available for download from the HCP Coordinating Committees Extranet site under: Draft Documents (instructions below). Thanks! –kristi ☺

Instructions:

To gain access to the HCP Coordinating Committees Extranet Homepage, please use the following procedure:

* Visit: https://extranet.dcpud.net/sites/nr/hcpcc/
* Login using "Forms Authentication" (for non-Douglas PUD employees)

You should now be at the HCP CC homepage.

If you encounter problems, or need a login username and password to access the site:
Please feel free to contact me or Julene McGregor [jmcgregor@dcpud.org; (509) 881-2236] and we will gladly assist you with questions or issues.

Kristi Geris

ANCHOR QEA, LLC
kgeris@anchorqea.com
T 509.491.3151 x104
C 360.220.3988

From: Tom Kahler [mailto:tomk@dcpud.org]
Sent: Wednesday, January 06, 2016 9:56 AM
To: Kristi Geris <kgeris@anchorqea.com>
Cc: John Ferguson <jferguson@anchorqea.com>; Shane Bickford <ShaneB@dcpud.org>; Andrew Gingerich <andrewg@dcpud.org>
Subject: Draft 2016 GAP/BOP for CC review

Hi Kristi,

I've attached the draft 2016 Gas Abatement Plan/Bypass Operating Plan (GAP/BOP) for CC review. We need approval of these combined documents by Feb. 10, and thus we request a 35-day review (besides, 30-day reviews are so 2015). Rather than add the confusion of multiple documents to review, I'm sending a review draft of the combined document that we'll send to FERC, in which the BOP is Appendix 2. While the annual approval of the BOP has been the purview of the CC for years, the HCP specifies nothing regarding a GAP document. However, recall that in the 2012 FERC license for Wells, FERC, at the request of Ecology, required the coordination of the annual development of the GAP and BOP and that the development of the GAP occur in "consultation" with the CC. The CC review of both documents fulfills the FERC license requirements and our HCP needs.

Thanks,

Tom Kahler
Fisheries Biologist
PUD No. 1 of Douglas County
509-881-2322, work
509-679-1232, cell

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NOTICE TO THE AQUATIC SETTLEMENT WORK GROUP TO REVIEW THE 2016 GAS ABATEMENT PLAN AND BYPASS OPERATING PLAN

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From: Kristi Geris <kgeris@anchorqea.com>
Sent: Tuesday, January 05, 2016 5:23 PM
To: Andrew Gingerich; Bob Rose; Chris Sheridan; Harris, Anna (ECY); Jason McLellan; Patrick Verhey (Patrick.Verhey@dfw.wa.gov); 'Steve Lewis'; John Ferguson; Kristi Geris; Keith Hatch (Keith.Hatch@bia.gov); Bob Dach (Robert.dach@bia.gov)
Cc: Bao Le; Bill Towey (bill.towey@colvilletribes.com); 'Brad James'; 'Bret Nine'; 'Chad Jackson'; Charlie McKinney (cmck461@ecy.wa.gov); Chas Kyger; Donella Miller (mild@yakamafish-nsn.gov); Fortier, Ryan T (DFW); Jeff Korth; 'Jessi Gonzales'; Keith Kirkendall (Keith.Kirkendall@noaa.gov); Kirk Truscott; Mark Peterschmidt (mape461 @ecy.wa.gov); Mary Mayo; Paul Ward (warp@yakamafish-nsn.gov); Ralph Lampman (lamr@yakamafish-nsn.gov); Shane Bickford; Steve Parker
Subject: FW: 2015 TDG Report and 2016 Gas Abatement Plan/Bypass Operating Plan
Attachments: 2016_01_05 Douglas - Draft 2015 Wells Dam TDG Annual Report.doc; 2016_01_05 Douglas - Draft 2016 Wells Dam GAP and BOP.doc

Hi Aquatic SWG: please see the email below from Andrew and the attached Draft 2015 Wells Dam Gas Abatement Plan (GAP) and Total Dissolved Gas (TDG) Report and Draft 2016 Wells Dam GAP and Bypass Operating Plan (BOP) for review. The attached draft 2015 report and draft 2016 plan are available for a 30-day review period, with comments due to Andrew by **COB Monday, February 8, 2016**. Douglas PUD will request approval of the draft 2015 report and draft 2016 plan during the Aquatic SWG meeting on February 10, 2016.

The attached draft 2015 report and draft 2016 plan are also available for download from the Aquatic SWG Extranet site under: Documents > All by Mtg Date > 1/13/2016 (instructions below). Thanks! –kristi ☺

Instructions:

To gain access to the Aquatic SWG Extranet Homepage, please use the following procedure:

* Visit: https://extranet.dcpud.net/sites/nr/aswg/
* Login using "Forms Authentication" (for non-Douglas PUD employees)

You should now be at the Aquatic SWG homepage.

If you encounter problems, or need a login username and password to access the site:
Please feel free to contact me, Andrew Gingerich, or Julene McGregor [jmcgregor@dcpud.org; (509) 881-2236] and we will gladly assist you with questions or issues.

Kristi Geris

ANCHOR QEA, LLC
kgeris@anchorqea.com
T 509.491.3151 x104
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From: Andrew Gingerich [mailto:andrewg@dcpud.org]
Sent: Tuesday, January 05, 2016 5:04 PM
To: Kristi Geris <kgeris@anchorqea.com>
Subject: 2015 TDG report and 2016 Gas Abatement Plan/Bypass Operating Plan

Hi Kristi, please distribute to the technical reps within the Aquatic SWG. Please make sure that we include BIA, and BLM.

As I discussed during the December call, every year at this time Douglas PUD provides two documents to the Aquatic SWG for consideration. The first summarizes TDG compliance during the previous year and the second provides the plans that will be in place to provide safe and effective passage of juvenile salmonids, meet TDG criteria, and operate the Project safely. The latter of these documents get reviewed concurrently with the HCP CC per our 401 Certification and FERC license requirements. These two documents are:

1. 2015 Annual TDG (GAP) Report
2. 2016 Gas Abatement Plan and Bypass Operating Plan

The latter document is also required in order to obtain an Ecology's approved TDG adjustment during the bypass season, which facilitates survival of downstream migrating fish. Both documents are attached for committee review and consideration. Douglas PUD is hoping to have them reviewed and approved by the Feb 10th call, since both are due to the FERC by Feb 28th.

Please let me know if you have questions.

Andrew Gingerich
Senior Aquatic Resource Biologist
Public Utility No. 1 of Douglas County
1151 Valley Mall Parkway
East Wenatchee, WA 98802
Office: (509) 881-2323

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APPROVAL OF THE 2016 GAS ABATEMENT PLAN AND BYPASS OPERATING PLAN FROM THE HABITAT CONSERVATION PLAN COORDINATING COMMITTEE

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ANCHOR QEA

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FINAL MEMORANDUM

To:	Wells, Rocky Reach, and Rock Island HCPs Coordinating Committees	**Date:**	January 27, 2016
From:	John Ferguson, HCP Coordinating Committees Chairman		
Cc:	Kristi Geris		
Re:	Final Action Items and Agreement Summary from the January 26, 2016, HCP-CC Meeting		

This memorandum provides a summary of action items, decisions, and documents out for review as agreed on at the Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Coordinating Committees meeting that met at the Radisson Gateway Hotel, in SeaTac, Washington, on Tuesday, January 26, 2016, from 9:30 am to 12:00 pm. Attendees are listed in Attachment A. These action items include the following:

ACTION ITEM SUMMARY

- Douglas PUD will revise the Sub-yearling Chinook Salmon Life-history Study dates in the draft 2016 Wells HCP Action Plan, as discussed, and will provide the final plan to Kristi Geris for distribution to the Coordinating Committees (Item III-A). *(Note: Tom Kahler revised the plan, as discussed, and provided the final plan to Geris on January 27, 2016, which Geris distributed to the Coordinating Committees that same day.)*
- Douglas PUD will revise the historical flows language in the Draft 2016 Wells Dam Gas Abatement Plan (GAP) and Bypass Operating Plan (BOP), as discussed, and will provide the final plan, when available, to Kristi Geris for distribution to the Coordinating Committees (Item III-B).
- Douglas PUD will provide photographs of the lamprey entrance boxes installed in the low-level entrances at Wells Dam to Kristi Geris for distribution to the Coordinating Committees (Item III-C).
- Chelan PUD will discuss with Dr. John Skalski (Columbia Basin Research) possibly adjusting the Data Access in Real Time (DART) database outputs to better capture the

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early portion (prior to June 1) of the annual subyearling Chinook salmon counts at the Rock Island Bypass (Item IV-A).

- Chelan PUD will add expected dates to receive Hatchery and Genetic Management Plan (HGMP) permits from the National Marine Fisheries Service (NMFS) to the Draft 2016 Rocky Reach and Rock Island HCP Action Plans, as discussed, and will provide the revised draft plans to Kristi Geris for distribution to the Coordinating Committees. Chelan PUD will request approval of the revised draft plans during the Coordinating Committees meeting on February 23, 2016 (Item III-B).
- Chelan PUD will develop a trip report regarding progress on the refurbishing of the Rock Island Dam right fish ladder sluice gate, RO4, following a site visit to the contractor's facilities in Massachusetts, and will provide the report to Kristi Geris for distribution to the Coordinating Committees (Item III-C).
- Chelan PUD will summarize potential operations scenarios for the Rock Island Dam right fish ladder operating with a bulkhead installed in place of the sluice gate, RO4, including potential effects on salmonid passage past the dam, and will provide the summary to Kristi Geris for distribution to the Coordinating Committees (Item III-C).
- Chelan PUD will provide weekly reports on the progress of repairing and installing the Rock Island Dam right fish ladder sluice gate, RO4, to Kristi Geris for distribution to the Coordinating Committees (Item III-C).
- Chelan PUD will notify the Coordinating Committees when the last denil structure is removed from the Rock Island Dam fishways (Item III-D).
- John Ferguson will discuss with Denny Rohr (Priest Rapids Coordinating Committee [PRCC] Facilitator) possibly holding both the PRCC and Coordinating Committees June 2016 meetings on June 21, 2016, and holding the 2016 Subyearling Chinook Salmon Workshop the next day on June 22, 2016 (Item V-A). *(Note: Ferguson discussed the topic with Rohr following the Coordinating Committees meeting on January 26, 2016.)*
- John Ferguson will communicate developing details about the 2016 Subyearling Chinook Salmon Workshop to the Coordinating Committees during the monthly Coordinating Committees meetings (Item V-A).
- Kristi Geris will contact Julene McGregor (Douglas PUD Information System Staff) to

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request member access to the HCP Hatchery Committees Extranet site for Deanne Pavlik-Kunkel (Grant PUD), as approved by the Coordinating Committees, and will and coordinate with Sarah Montgomery (HCP Hatchery Committees support staff) about adding Pavlik-Kunkel to the requested HCP Hatchery Committees email distribution lists (Item V-A). *(Note: Geris contacted McGregor and Montgomery following the Coordinating Committees meeting on January 26, 2016, about getting Pavlik-Kunkel Extranet access and on the distribution lists.)*

- **The Coordinating Committees meeting on February 23, 2016, will be held in-person at the Radisson Hotel in SeaTac, Washington (Item VI-C).**

DECISION SUMMARY

- The Wells HCP Coordinating Committee representatives present approved the 2016 Wells HCP Action Plan, as revised (Item III-A).
- The Wells HCP Coordinating Committee representatives present approved the 2016 Wells Dam GAP and BOP, as revised (Item III-B).
- The Rocky Reach and Rock Island HCP Coordinating Committees representatives present approved the 2015 Rocky Reach and Rock Island Spill Report, as revised (Item IV-A).

AGREEMENTS

- The Rock Island HCP Coordinating Committee representatives present agreed to extend the 2015/2016 winter maintenance work period at Rock Island Dam by 15 days to allow more time to complete required work, contingent on Chelan PUD providing weekly reports on the progress of repairs. Rather than the typical March 1 completion date, the Rock Island fish ladder will be fully operational by March 15, 2016 (Item III-C).
- Coordinating Committees representatives present agreed to reschedule the Coordinating Committees meeting on June 28 to June 21, 2016, to accommodate the 2016 Subyearling Chinook Salmon Workshop (Item V-A).

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- Coordinating Committees representatives present agreed to provide Deanne Pavlik-Kunkel member access to the HCP Hatchery Committees Extranet site, and add Pavlik-Kunkel to the requested HCP Hatchery Committees email distribution lists (Item VI-A).

REVIEW ITEMS

- Kristi Geris sent an email to the Coordinating Committees on January 22, 2016, notifying them that the Draft 2016 Rocky Reach and Rock Island HCP Action Plans were available for review. Chelan PUD will request approval of the draft plans during the Coordinating Committees meeting on February 23, 2016 (Item IV-B).

FINALIZED DOCUMENTS

- The Final 2016 Wells HCP Action Plan, which was approved by the Wells HCP Coordinating Committee on January 26, 2016, was distributed to the Coordinating Committees by Kristi Geris on January 27, 2016 (Item III-A).

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Attachment A
List of Attendees

Name	Organization
John Ferguson	Anchor QEA, LLC
Kristi Geris	Anchor QEA, LLC
Tracy Hillman††	BioAnalysts
Lance Keller*	Chelan PUD
Alene Underwood†††	Chelan PUD
Tom Kahler*	Douglas PUD
Scott Carlon*	National Marine Fisheries Service
Jim Craig*	U.S. Fish and Wildlife Service
Jeff Korth*	Washington Department of Fish and Wildlife
Bob Rose*	Yakama Nation
Kirk Truscott*†	Colville Confederated Tribes

Notes:
- * Denotes Coordinating Committees member or alternate
- † Joined by phone
- †† Joined by phone for the HCP Tributary and Hatchery Committees Update
- ††† Joined by phone for the Chelan PUD agenda items

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APPROVAL OF THE 2016 GAS ABATEMENT PLAN AND BYPASS OPERATING PLAN FROM THE AQUATIC SETTLEMENT WORK GROUP

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Final Meeting Action Items

Aquatic Settlement Work Group

To: Aquatic SWG Parties **Date**: February 11, 2016

From: John Ferguson, Chairman (Anchor QEA, LLC)

Re: Final Action Items of the February 10, 2016 Aquatic SWG Meeting

Below is a summary of Action Items from the Aquatic SWG meeting that was held in-person at Wells Dam in Azwell, Washington, on Wednesday, February 10, 2016, from 10:15 a.m. to 12:00 p.m. Attendees are listed in Attachment A. These action items include the following:

I. Summary of Action Items

1. Bob Rose will discuss internally the Colville Confederated Tribes' (CCT's) proposed criteria for culling juvenile white sturgeon, and will report back to the Aquatic SWG (Item VI-1).
2. Steve Lewis will investigate what actions are required of agencies conducting Pacific lamprey translocation activities in the Mid-Columbia Basin, with regard to Section 7 consultation with the U.S. Fish and Wildlife Service (USFWS; Item VI-1).
3. Bob Rose will provide a report detailing the 2015 Yakama Nation (YN) Lamprey Translocation Releases in the Methow Basin, and the YN Pacific Lamprey Supplementation and Monitoring Frameworks, once available, to Kristi Geris for distribution to the Aquatic SWG (Item VI-1).
4. John Ferguson will follow-up with Bob Rose regarding YN approval of the 2016 Lamprey Approach, Passage, and Enumeration Study Plan, as revised (Item VI-3).
5. **The Aquatic SWG meeting on March 9, 2016, will be held by conference call (Item VII-1).**

II. Summary of Decisions

1. The Aquatic SWG members present approved the 2015 Juvenile Lamprey Habitat Evaluation Study Report (Item VI-2).

2. The Aquatic SWG members present approved the 2016 Lamprey Approach, Passage, and Enumeration Study Plan, as revised (Item VI-3).
3. The Aquatic SWG members present approved the 2016-2017 Bull Trout Passage and Take Monitoring at Wells Dam and Twisp River Weir Study Plan, contingent on incorporating comments received from USFWS, which were reviewed and discussed during the meeting on February 10, 2016 (Item VI-4).
4. The Aquatic SWG members present approved the 2015 Wells Dam Gas Abatement Plan (GAP) and Total Dissolved Gas (TDG) Report, contingent on approval by the Washington State Department of Ecology (Ecology; Item VI-5).
5. The Aquatic SWG members present approved the 2016 Wells Dam GAP and Bypass Operating Plan (BOP), contingent on approval by Ecology (Item VI-6).
6. The Aquatic SWG members present approved the 2016 Aquatic Settlement Agreement (ASA) Action Plan (Item VI-7).

III. Agreements

1. The Aquatic SWG members present agreed to a March 1, 2016, deadline to transfer surplus white sturgeon offsite that are in excess of the Douglas PUD 5,000-fish White Sturgeon Program, in order to grow program fish to the target size at release (Item VI-9).

IV. Review Items

1. Kristi Geris sent an email to the Aquatic SWG on February 8, 2016, notifying them that the Draft 2015 Aquatic Nuisance Species Management Plan Annual Report is available for a 30-day review period, with edits and comments due to Chas Kyger by Tuesday, March 8, 2016.

V. Documents Finalized

1. The Final 2016 Wells Dam GAP and BOP that was approved by the Aquatic SWG on February 10, 2016, and by the Wells Habitat Conservation Plan (HCP) Coordinating Committee on January 26, 2016, was distributed to the Aquatic SWG by Kristi Geris following the Aquatic SWG meeting on February 10, 2016 (Item VI-6).
2. The Final 2015 Juvenile Lamprey Habitat Evaluation Study Report that was approved by the Aquatic SWG on February 10, 2016, was distributed to the Aquatic SWG by Kristi Geris on February 11, 2016 (Item VI-2).

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Attachment A

List of Attendees

Name	Role	Organization
John Ferguson	Aquatic SWG Chairman	Anchor QEA, LLC
Kristi Geris	Administration/Technical Support	Anchor QEA, LLC
Andrew Gingerich	Aquatic SWG Technical Representative	Douglas PUD
Chas Kyger	Technical Support	Douglas PUD
Chad Jackson	Technical Support	Washington Department of Fish and Wildlife
Jason McLellan	Aquatic SWG Technical Representative	Colville Confederated Tribes

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APPROVAL OF THE 2016 GAS ABATEMENT PLAN AND BYPASS OPERATING PLAN FROM WASHINGTON DEPARTMENT OF ECOLOGY

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From: McKinney, Charlie (ECY) <cmck461@ECY.WA.GOV>
Sent: Thursday, February 18, 2016 12:01 PM
To: Andrew Gingerich
Cc: Peterschmidt, Mark F. (ECY)
Subject: TDG Reports

February 18, 2016

To: Andrew Gingerich, Douglas County PUD

From: Charles McKinney, WA Dept. of Ecology, Water Quality Program

The Washington Department of Ecology (Ecology) has reviewed and approves the 2015 GAP and TDG report submitted by Douglas PUD for the Wells Project.
Ecology has also reviewed and approves the 2016 Gas Abatement Plan, Spill Play Book and Bypass Operating plan.

Ecology grants PUD District No. 1 of Douglas County an adjustment to the 110% TDG standard for the purposes of 2016 Spill Season, as authorized under WAC 173-201A-200(1)(f)(ii), in order to facilitate the passage of ESA listed salmonids at the Project.

Please let me know if you have any questions.

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Document Content(s)

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