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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 22, 2018

Subject: Wells Hydroelectric Project No. 2149
2018 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 2018 Total Dissolved Gas Abatement Plan (GAP) and the 2018 Bypass Operating Plan (BOP) for the Wells 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 2018 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 (HCP CC) 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 2018 BOP is attached within Appendix A to this letter. The 2018 GAP and BOP were reviewed by all of the agencies and tribes participating in the HCP process, including the NMFS. The 2018 GAP and BOP were distributed to the HCP

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CC on January 16, 2018 and was approved by the HCP CC, including the NMFS, via email on or before February 2, 2018. The HCP CC consultation and approval process is attached in Appendix B.

A draft copy of the 2018 GAP and BOP was provided to the Aquatic Settlement Work Group (Aquatic SWG) on January 16, 2018 to ensure close coordination between the review of the BOP and the GAP. No additional comments on the 2018 GAP and BOP were received by the end of the comment deadline. Ecology provided formal approval of the 2018 GAP and BOP by letter dated February 13, 2018 (in accordance with the requirements of the 401 Certification, section 6.7 [2][d]) and the remaining Aquatic SWG members either approved or abstained from voting on February 14, 2018 by conference call. The Aquatic SWG's consultation and approval process specific to the 2018 GAP and BOP is attached as Appendix C.

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, 2018. 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 – 2018 Total Dissolved Gas Abatement Plan and Bypass Operating Plan – Wells Project

2) Appendix B – HCP Coordinating Committee Pre-filing consultation record for the 2018 Gas Abatement Plan and Bypass Operating Plan

3) Appendix C – Aquatic SWG Pre-filing consultation record for the 2018 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

2018 TOTAL DISSOLVED GAS ABATEMENT PLAN AND BYPASS OPERATING PLAN FOR THE WELLS HYDROELECTRIC PROJECT

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2018 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:

Washington Department of Ecology
Water Quality Program
Central Regional Office
1250 West Alder Street
Union Gap, WA 98903-0009

And

Aquatic Settlement Work Group

January 2018

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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 a risk analysis conducted by the National Marine Fisheries Service (NMFS; NMFS 2000).

The goal of the 2018 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 2018 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 (7Q10: 246 kcfs).

The goal of the 2018 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, 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 2018 GAP contains the following information: Section 1.0 summarizes the background 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; see

Figure 2). The Wells Project is considered a "run-of-the-river" project due to its relatively limited usable storage capacity.

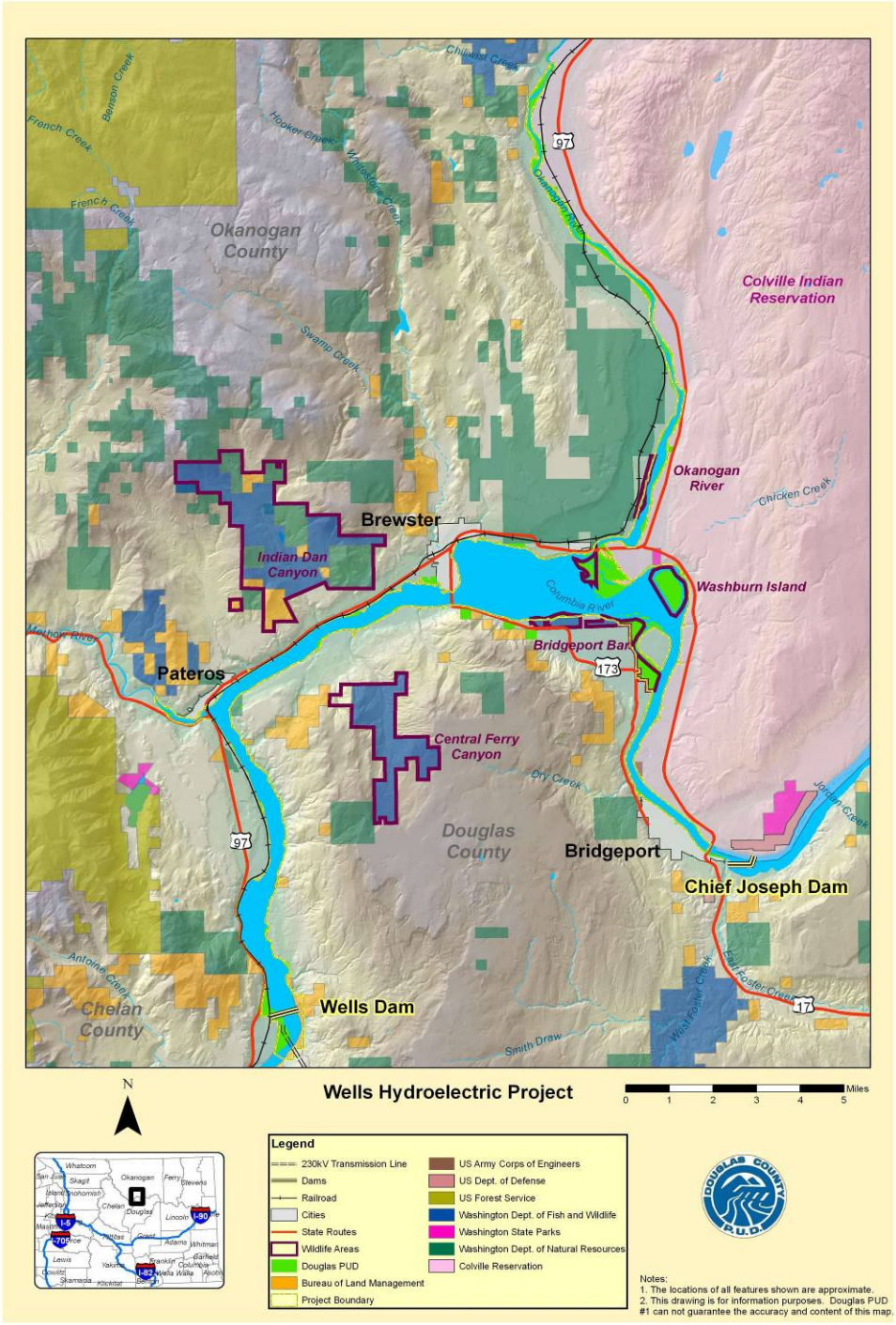

Figure 1. Map of the Wells Hydroelectric Project in Central Washington.

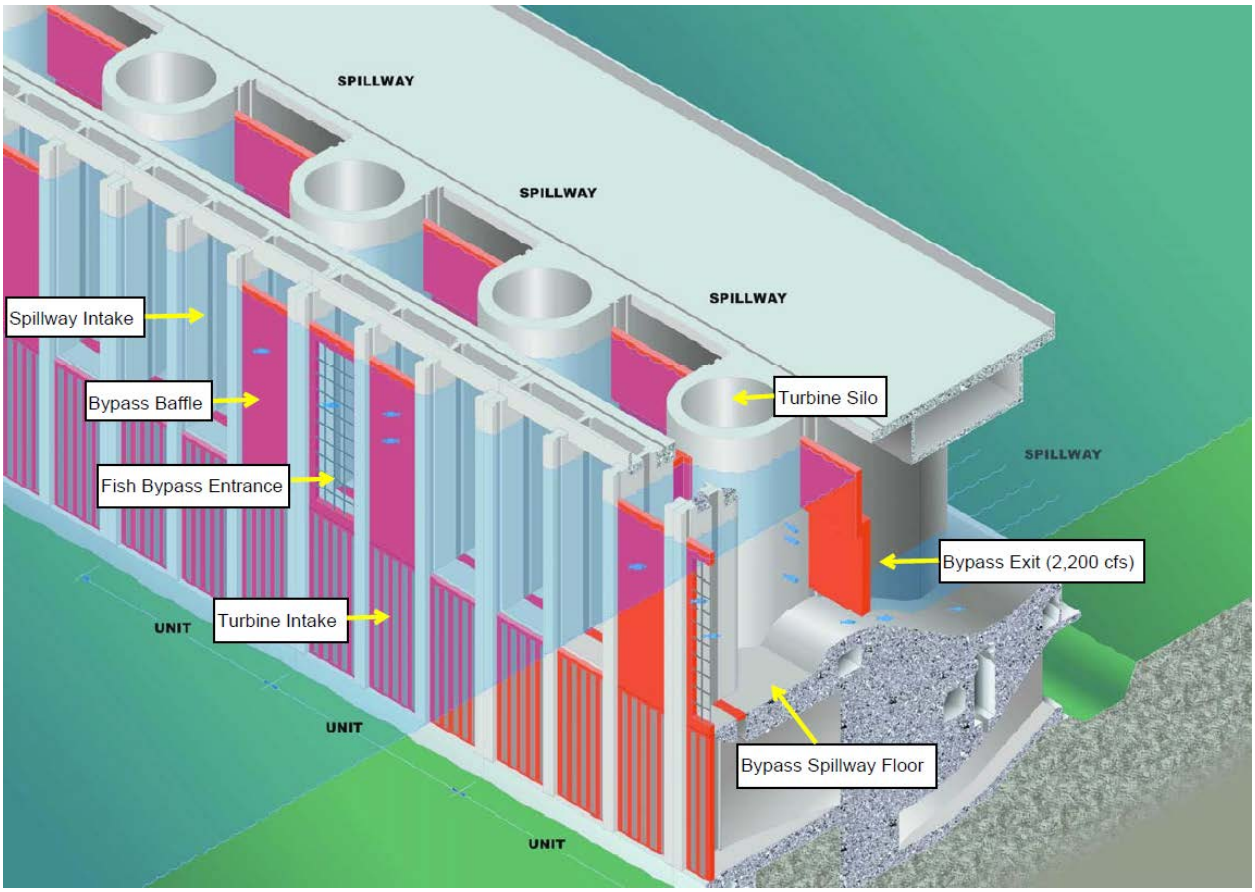

Figure 2. **Artistic depiction of Wells Dam and its hydrocombine design. During juvenile salmon migration *Bypass Baffles* are inserted on either side of *Fish Bypass Entrances* in order to restrict surface flows and direct fish towards the *Bypass Exit*. *Fish Bypass Entrances* provide 4x4 foot openings in the first 75 feet of the water column and extend to the *Bypass Spillway* floor. *Turbine intakes* begin at approximately 75 feet below the water surface. Forebay depth is approximately 130 feet. Ten *Turbine Silos* are straddled by 11 spillways, 6 of which are operated to function as *bypass exits*.**

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 (WDOE 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 Confederated 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 approximately 30 miles upstream of Wells Dam) and the US Bureau of Reclamation's Grand Coulee Dam (located approximately 52 miles upstream of Chief Joseph Dam).

In 2004, Ecology, the Spokane Tribes of Indians, and the U.S 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).

Since 2016 the TDG standard in the Chief Joseph and Grand Coulee tailraces was 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 or Grand Coulee dams as it had in years before 2015. As such, incoming water and subsequent TDG concentration entering the Wells Project is expected be ≤110% year round. However, the USACE should be consulted for updated Spill Priority lists and their performance around the state water quality standard for TDG.

In 2017 and 2018 BPA and the USACE were negotiating a spill plan for the four lower Columbia and Snake River Projects in order to meet obligations to spill to the TDG gas caps and fulfill judiciary orders associated with the Biological Opinion for those Projects. As of January 2018, it is unclear how spill operations at these projects will effect TDG production or abatement at the FCRPS above Wells Dam including Grand Coulee and Chief Joseph.

1.2.2 7Q-10 Flood Flows

The 7Q10 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 7Q10 value.

1.2.3 Fish Passage Season and Spill

The juvenile fish passage season as defined in the Wells Habitat Conservation Plan (HCP) runs from the first of April through to the end of August. Juvenile fish spill at the Wells Project is a defined action implemented by the HCP Coordinating Committee (CC) and juvenile fish spill at the project during the fish passage season results in an increase in the survival of downstream migrating juvenile salmonids 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 migration of juvenile salmonids, and normally fish spill is implemented such that those spill operations have provided non-turbine passage for the middle 99% of the spring and summer migration of juvenile salmonids. 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 juvenile 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 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 Colville Confederated Tribes standard]) on 125 days of the 133-day 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 exceeded TDG values of 115%. Similar challenges were observed at Wells Dam in the month of March through June of 2017, when water entering the Wells Project was well above TDG standards making it impossible for Douglas PUD to meet compliance criteria during these periods.

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 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. Douglas PUD began collecting the required TDG data toward determining compliance with the 110% standard during the non-fish spill season starting on August 2013).*
- 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 Settlement Work Group (Aquatic SWG). *(Note. Since 2013, Douglas PUD has annually worked with Ecology and the HCP CC to develop the GAP and Bypass Operation Plan concurrently. Once developed these documents are approved by Ecology, 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 (WQAP) to Ecology for review and approval. The plan shall include a detailed 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). FERC subsequently reviewed and approved the WQAP in an order issued on December 20, 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 FERC for approval following the approval of the GAP by NMFS, USFWS and Ecology. Article 401(b) requires the TDG report be submitted to the FERC by February 28 of each year. Article 401(c) requires FERC 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 Project Operation Flows

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 historic 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 3). The current hydrograph of the Columbia River is controlled by upstream, federally managed storage and release regimes and typically mimics historical flow regimes, in terms of the highest flows being observed from May through July (Figure 3). 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
2017	125.5	118.3	157.6	203.8	230.9	200.5	122.8	93.6	73.5	56.8	73.6	95.5	129.4
Average since 1969	108.8	107.8	107.7	119.3	151.3	163.7	134.4	105.7	75.1	75.3	87.7	101.2	111.3
Minimum since 1969	67.4	69.9	56	51.9	55.2	73.7	53.4	63.9	53.5	56	63.8	72.6	
Maximum since 1969	159.2	180.7	193.9	203.8	262.6	348.7	253.8	181.3	123	108.9	110	149	
10YR mean (2008-2017)	106.7	98.4	105.3	134.9	165.6	180.4	146.8	107.1	66.6	66.6	85.7	100	113.7
2017% of average	115%	110%	146%	171%	153%	122%	91%	89%	98%	75%	-116%	94%	116%

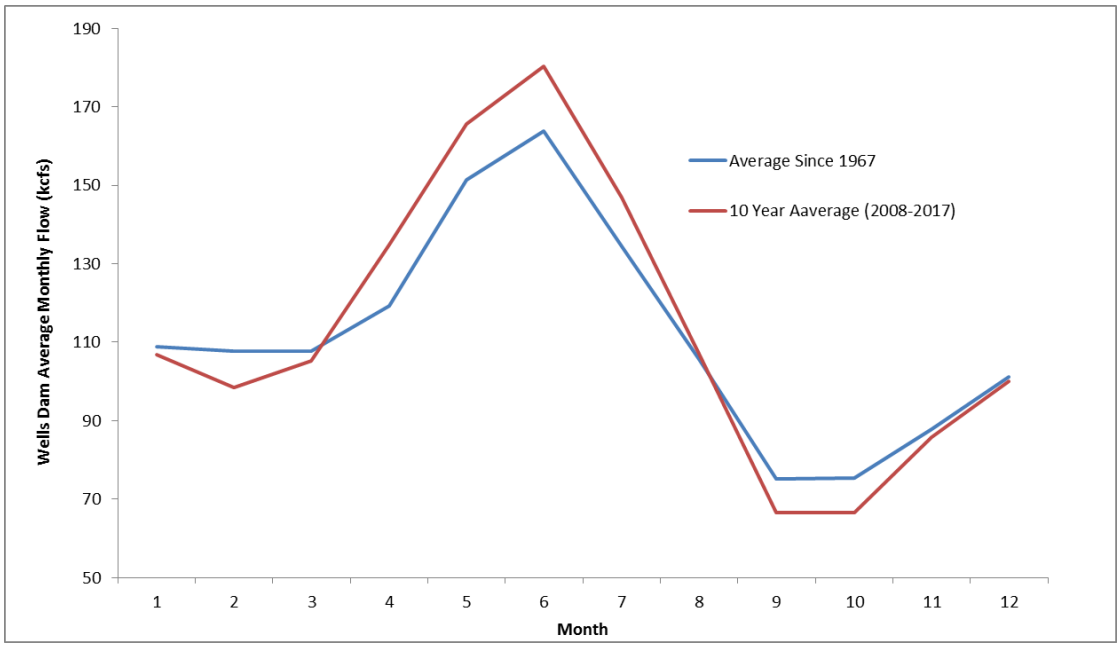

Figure 3. Historical and Ten Year Flow Average as Observed at Wells Dam.

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, Columbia River Treaty, the Hanford Reach Fall Chinook Protection Program and FERC regulatory and license requirements.

1.3.2 Spill Operations

1.3.2.1 General Operation

Douglas PUD receives discharges estimates from BPA for the immediately upstream project, Chief Joseph Dam, and these estimates include values for the next day and proceeding six days. Discharge estimates are used to inform inflow into the Wells Project. When inflow values are expected to exceed turbine discharge, or when the District has reason to believe that spill is likely, the District institutes minimum generation requirements on all participants (purchasers) of the Wells Project. Douglas PUD has the ability to put minimum generation requirements on the Wells Project directly, as well as enforce and control these requirements. Douglas PUD will generate to whatever minimum requirement(s) is/are on the Wells Project and without regard to the signals it receives from its participants, should those signals be less than the required minimum project generation. Finally, to aid in the minimization of TDG production at downstream projects, the District also sends its Wells Project discharge estimates to the immediately downstream project, Rocky Reach, operated by Chelan County PUD.

1.3.2.2 Spill for Fish

Wells Dam is a hydrocombine design (Figure 2) where the spillways are 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

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 originally fell into two seasons, Spring Bypass and Summer Bypass, but those two seasons are now merged into a single season. 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, with species composition verified by fyke netting. 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 at least 95% of both the spring and summer migrants. Up to thirteen million juvenile salmonids annually migrate downstream past Wells Dam.

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 projects.

The Wells Project is a run-of-the-river project with relatively small usable 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 hydraulic generating capacity 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 generating 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). Spill in excess of power demand provides benefit to migrating juvenile salmonids because fish passing through the spillways survive at a higher rate relative to fish passaging through a turbine. Turbulence in the tailrace generated by spill in excess of power demand increases tailrace velocities and reduces tailrace egress times. The reductions in tailrace egress time and increases in water turbulence and velocity is expected to reduce predation on juvenile salmonids attempting to migrate through the Wells Project.

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 by dam operators at other projects in the Columbia and Snake Rivers where gas levels are high and the spill is occurring past unloaded turbine units. A trade of power generation for spill is made between operators, providing power generation in the river with high TDG and trading that energy for an equivalent amount of spill from a project or river where TDG is well below standards. Historically, Douglas PUD 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 only accepting Gas Abatement Spill at Wells Dam when it can be demonstrated that it will not result in a violation of the WQS for TDG.

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 or debris. 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. 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 7Q10 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 consistently 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 - 2017 Spill Playbooks returned to concentrating spill over 40 kcfs through Spillway 7 rather than Spillway 5 since turbine unit 7 returned to service. Given the high level of compliance achieved with the 2015 and 2016 Spill Playbook, TDG adjusted criteria

and considering the anticipated incoming TDG conditions, no changes are proposed for the 2018 Spill Playbook.

1.3.3.2 Structural

No structural modifications to the spillways or bypass system were implemented (none were scheduled) during the 2017 fish passage season. Turbine unit 2 is currently undergoing complete reconstruction and is scheduled to return to service in March 2018. The timing and duration of the next turbine rebuild will be selected once unit 2 has been commissioned and returned to full commercial operation. This ongoing turbine rebuild project at Wells Dam has already been captured within prior GAP/BOP and will not require any additional changes in the 2018 Spill Playbook or GAP implementation. No other structural modifications are expected in 2018.

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 2017

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 very good in 2018 (Table 3). Considering flows about 7Q10 were observed in May and incoming TDG values were in violation March through June.

Table 3. 2017 TDG compliance summary.

	Compliance
Wells Tailrace 125% hourly standard	
Days out of compliance	17*
Fish passage season	153
DCPUD compliance	**89%**
Wells Tailrace 120% 12C-High standard	
Days out of compliance	39*
Fish passage season	153
DCPUD compliance	**75%**
Rocky Reach Forebay 115% 12C-High standard	
Days out of compliance	73*
Fish passage season	153
DCPUD compliance	**52%**
Wells Tailrace 110% (Non-fish passage season	

standard)	
Days out of compliance	13*
Fish passage season	213
DCPUD compliance	**94%**

*Incoming TDG was always above 110% and almost always above 115% as calculated as a 12C-High average. Many days during the non-bypass and bypass period showed Wells Dam Forebay TDG values even above 120% as calculated as a 12C-High average. Nevertheless, incoming conditions were not factored into compliance statistics above.

2.0 PROPOSED OPERATIONS AND ACTIVITIES

2.1 Operational Spill

Based on the Wells Project's improved TDG performance as a result of 2012-2017 operations implementing the Wells Project Spill Playbook, similar operating principles will be implemented for the 2018 juvenile fish passage season.

The 2018 Spill Playbook proposes to concentrate spill through Spillway 7. Concentrated spill through Spillway 7 was selected because spill through this bay was determined to produce the smallest increase in TDG per unit of water spilled. The turbine discharge from units 6 and 7 are also expected to reliably enhance the surface jet being spilled through Spillway 7. The 2018 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 7Q10 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

[1] Biannual maintenance is the regularly scheduled maintenance that each unit receives, and does not include the long-term outage of the ten generating units that are being completely rebuilt one at a time.

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 4). The 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 Project (JBS, adult fishways) 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 current Wells Project operating license) are the fisheries management plans for all other aquatic life designated uses.

Table 4. 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 through the Wells Project 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 results 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 5. Specific details regarding survival study design, implementation, analysis, and reporting are available in annual summary reports prepared and approved by the Wells HCP CC.

Table 5. Wells Hydroelectric Project Habitat Conservation Plan Species Phase Designations.

Species	Phase Designation
Yearling Chinook	Phase III[2] – Standard Achieved (22-Feb-05)
Steelhead	Phase III – Standard Achieved (22-Feb-05)

[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.

Species	Phase Designation
Sockeye	Phase III – Additional Juvenile Studies (22-Feb-05)
Subyearling Chinook	Phase III – Additional Juvenile Studies (22-Feb-05)
Coho	Phase III – Standard Achieved (16-Dec-15)

In 2018, 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 Wells 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 maintains relatively stable reservoir conditions that are beneficial to multiple designated uses (aquatic life, recreation, and aesthetics). Coordinated operations with upstream projects reduce spill at Wells Dam and thus reduce 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 monitoring and evaluation programs to monitor the occurrence of GBT on adult salmon collected in the Wells Dam and Wells Hatchery fishways. Upon collection of broodstock, 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 include 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 7Q10 persist for extended timeframes (more than one week), sampling effort will be reduced to 3 days per week. Any GBT monitoring results will be summarized in annual TDG reporting and provided to the Aquatic SWG during monthly calls.

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 2018 include:

1. Testing and modifying an adaptive Spill Playbook in and outside of fish passage season.
    - 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.
    - 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. Employ a new energy accounting Wells Project Database towards improved Project operations that might limit TDG production.
4. Monitor and record spill gate opening width through automation and SCADA towards using Project operation data to more closely understand TDG production at Wells Dam.

The employment of the new higher resolution Project operations database should better inform operations toward the improvement of TDG management. Operations and data parameters include spill gate openings, unit megawatt production, unit outages, 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

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optimization (e.g., spill gate availability, automation, potential utility of Spillways 1 and 11, restrictions to bypass removal, etc.).

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 data 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 to 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 measurements of TDG 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

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headed for the forebay of Wells Dam. In 2018, Douglas PUD will continue to monitor TDG at Washburn Island and the forebay and tailrace stations located around Wells Dam.

3.2 Quality Assurance

The broad purpose of a well-designed Quality Assurance Project Plan (QAPP) is to obtain 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 by February 28, 2019 will be for all GAP activities conducted in 2018) 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). Results will be shared with the Aquatic SWG, Ecology, and within water quality forums (see section 2.2.3).

4.0 CONCLUSIONS

Pending approval by Ecology, implementation of the measures identified within the 2018 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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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 (WDOE), 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 shall be operated continuously throughout the juvenile salmon outmigration (April 9 to August 19 for 2018). The standard Wells HCP operating criteria, as described in Section 4.3.1 of the Wells HCP, will apply to the 2018 operating season. The operating criteria requires the operation of at least one bypass bay 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 Spillway 2 (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.

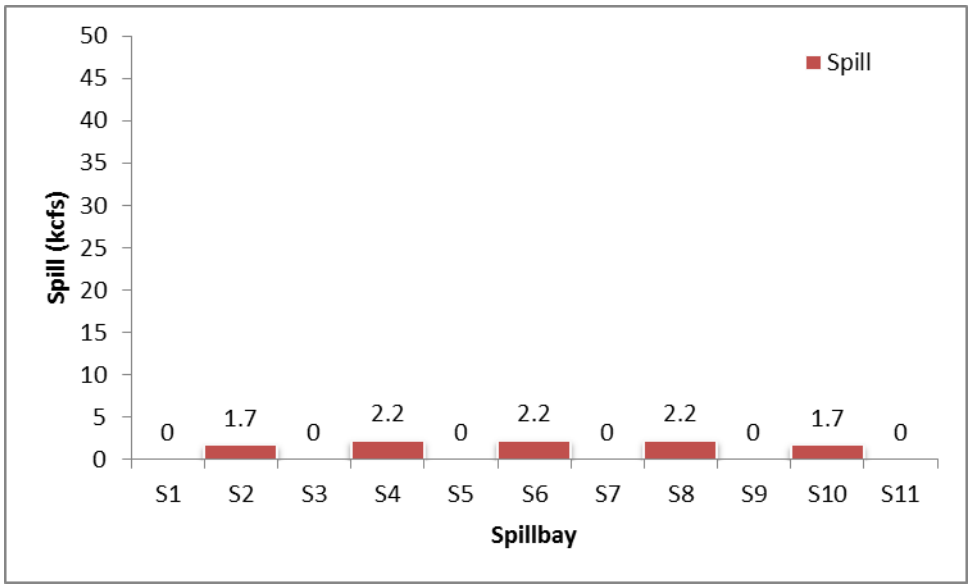

Figure 1. Operational configuration under no forced spill (JBS only).

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 turbine 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.

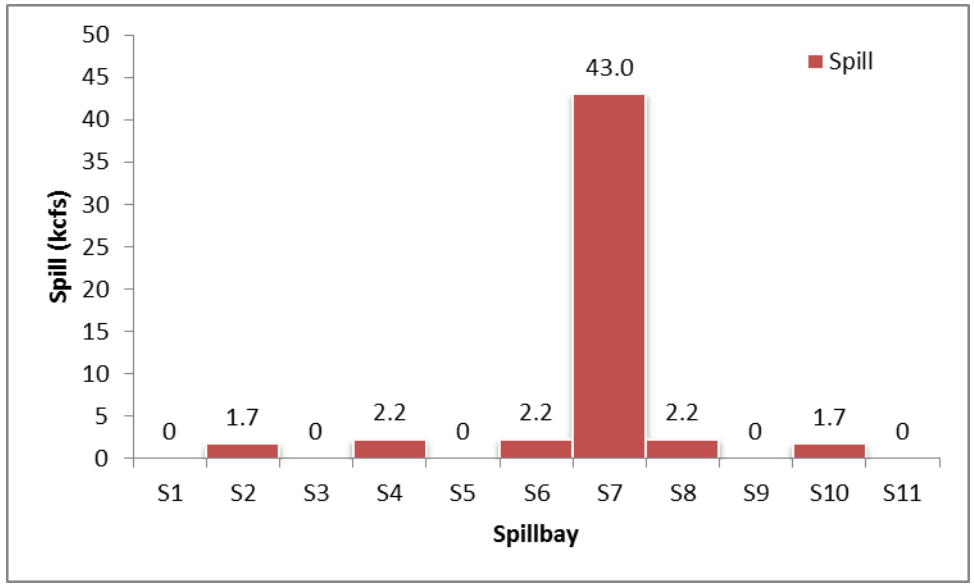

Figure 2. Operational configuration under spill ≤ 53.0 kcfs (including JBS).

II. JBS Barrier Removal Criteria

When either of the following occurs, remove the JBS barriers 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 barriers are 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*, additional spill can be allocated to *S7* until 43.0 kcfs is reached.

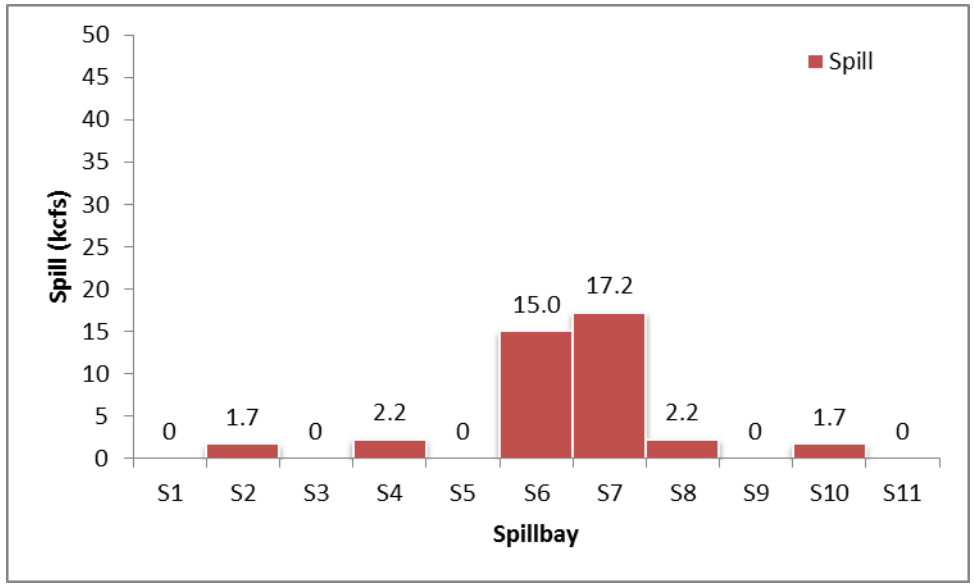

Figure 3. Operational configuration once spill reaches 30 kcfs in S7 and is expected to be above 40 kcfs for more than 8 hours (JBS removed from S6). Shift sufficient spill from S7 to maintain a minimum of 15 kcfs spill at S6.

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

If after removal of JBS barriers 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). 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).

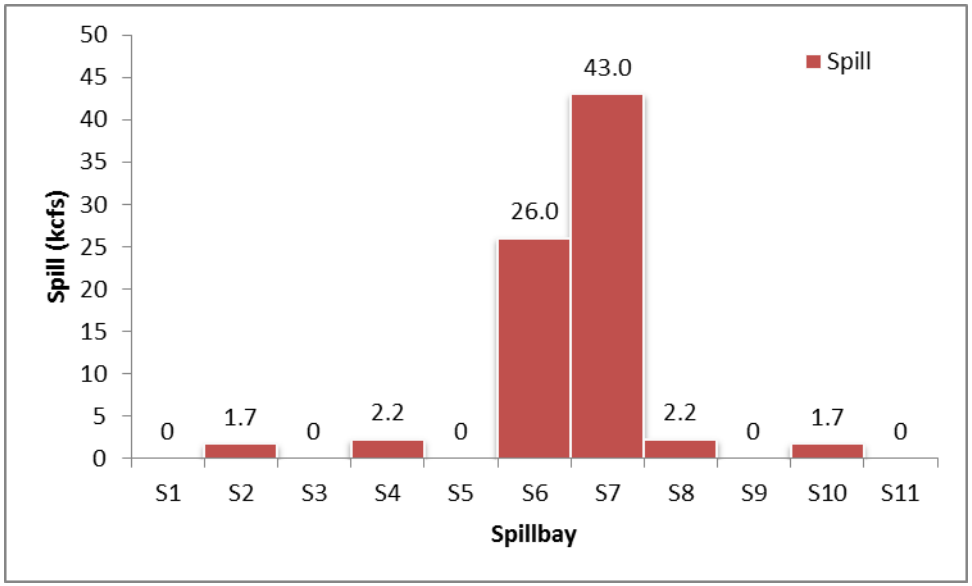

Figure 4. Operational configuration under forced spill > 53.0 kcfs (including JBS flow, with removal of JBS barriers in *S6*). In this instance spill has reached the 43.0 kcfs maximum in S7 and additional spill is being allocated to S6 (26.0 kcfs).

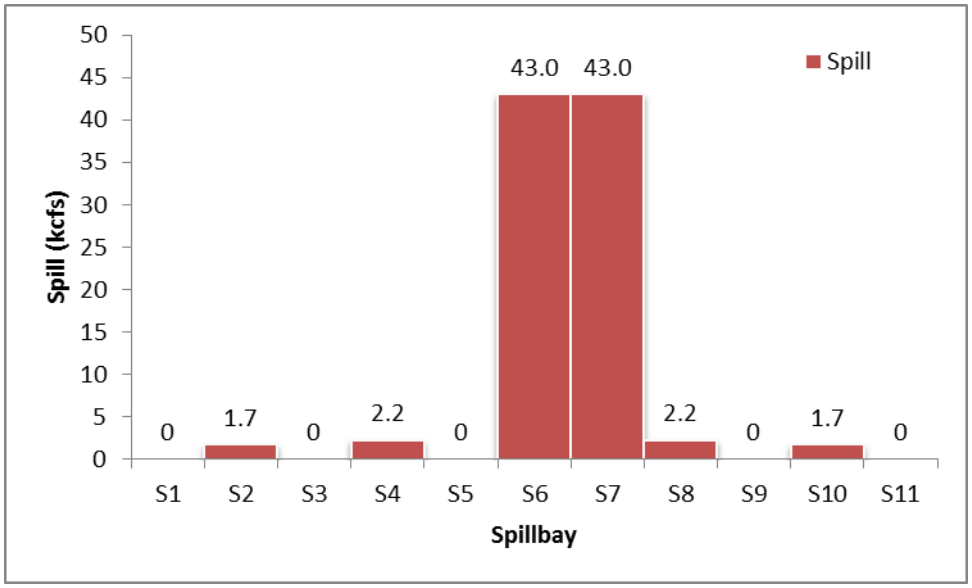

Figure 5. Operational configuration under forced spill > 53.0 kcfs (including JBS). In this instance (93.8 kcfs of spill), S6 has been fully allocated and 43.0 kcfs is now allocated through both *S7* and *S6*.

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 10.0 kcfs is needed to fully engage the submerged spillway lip below the ogee, some 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).

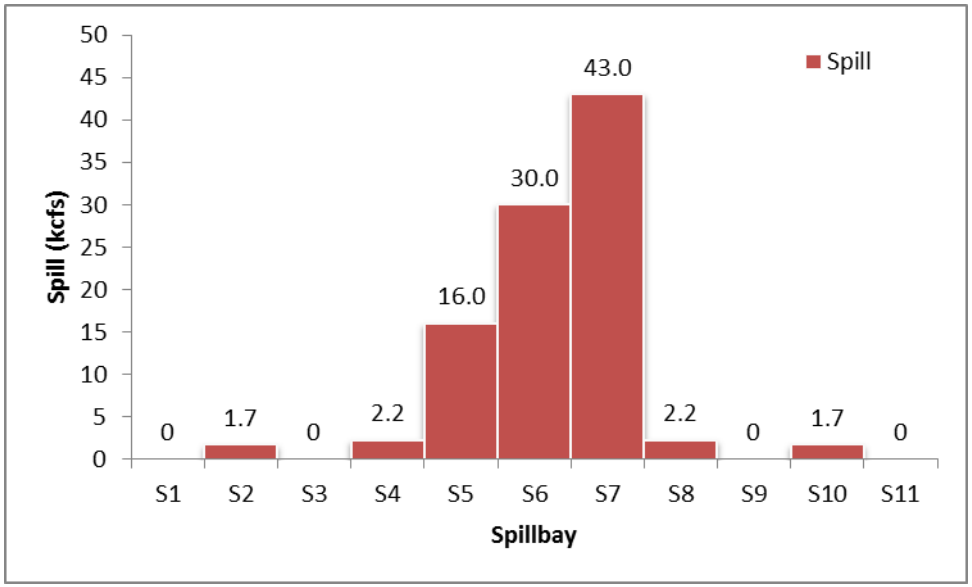

Figure 6. Operational configuration under forced spill > 96.0 kcfs. In this example (96.8 kcfs of total spill), spill from *S6* is relocated to *S5* to maintain concentrated flow and a minimum of 10 kcfs per spillway to engage the submerged spillway lip.

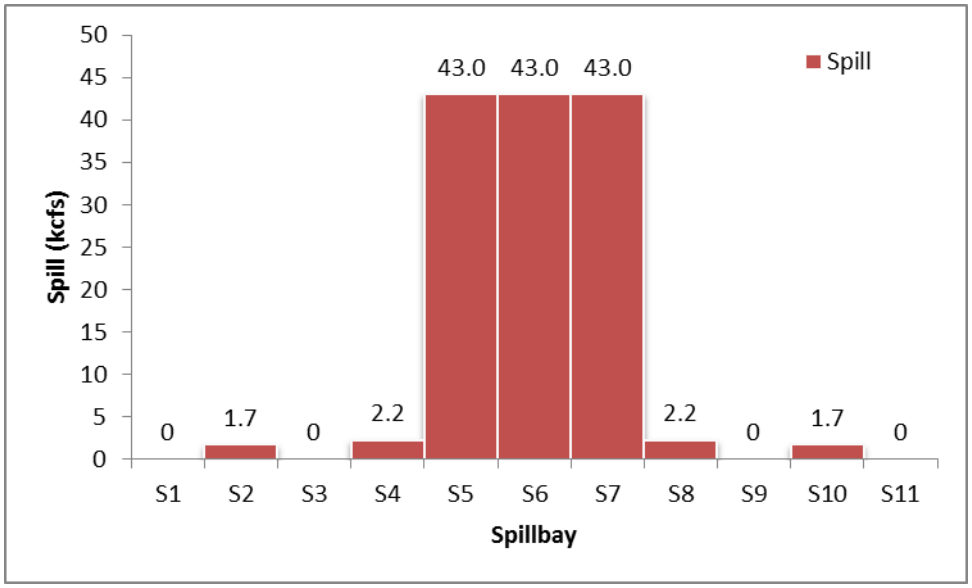

Figure 7. Operational configuration under forced spill > 96.0 kcfs (with removal of JBS barriers in *S6*). In this instance (136.8 kcfs of total spill), 43.0 kcfs is allocated through *S5*, *S6*, and *S7*.

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. Additionally, with a discharge forecast (Chief Joseph Dam discharge plus Okanogan and Methow rivers discharge) of greater than or equal to 240 kcfs, the JBS barriers will be removed from *S8* to fulfill the requirements of the FERC-approved Wells Emergency Action Plan for the availability of automatic gate-hoist capacity (see Table 1 of Appendix 2). Also, at this point, other 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 10.0 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 2 Wells Bypass Operating Plan

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Wells Hydroelectric Project

2018 Juvenile Fish Bypass Operating Plan

Approved 02 February, 2018

Operation of the Wells Dam juvenile bypass system throughout the 2018 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 2018 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 spillways 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 spill gate 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 2018 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 2018 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

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 Appendix 1 of the Gas Abatement Plan, above) to select such spill configurations, and would spill at least 10 kcfs through each 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 2018 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.

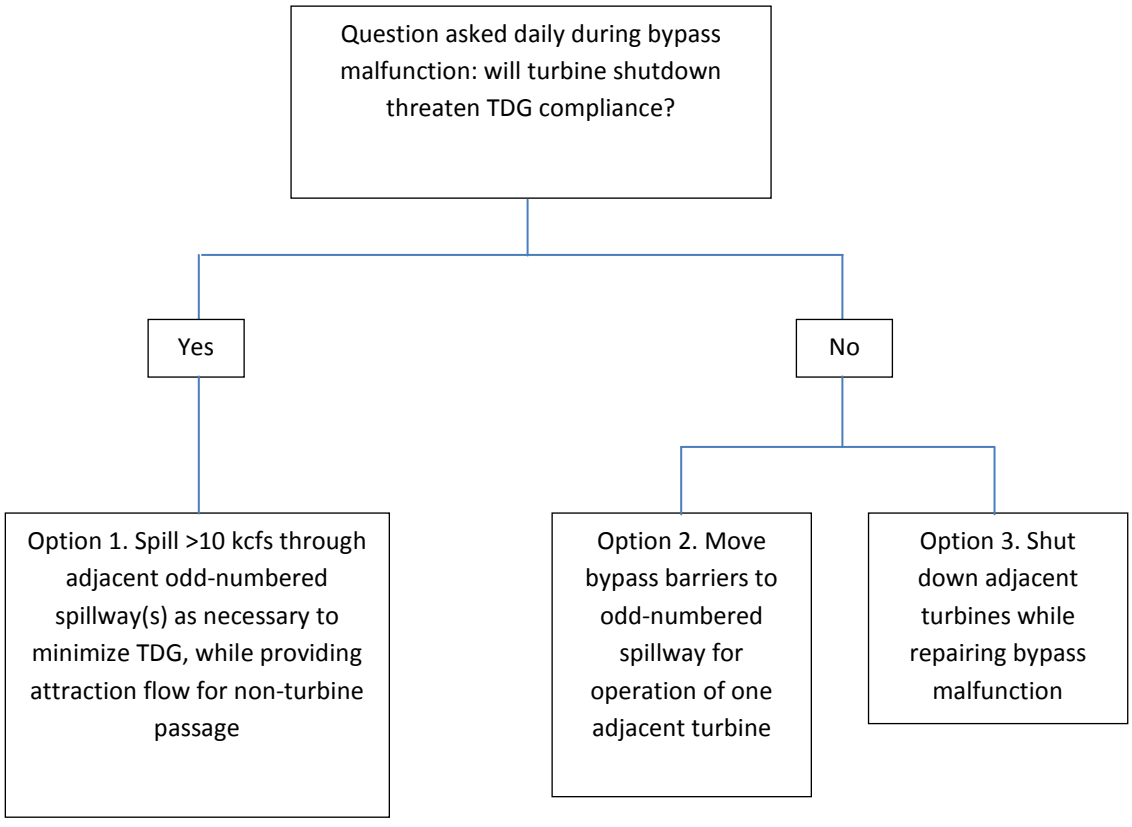

Figure 1. Evaluation flow chart for daily decisions regarding bypass, spill, and turbine operations during a bypass malfunction.

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APPENDIX B

HCP COORDINATING COMMITTEE PRE-FILING CONSULTATION RECORD FOR THE 2018 GAS ABATEMENT PLAN AND BYPASS OPERATING PLAN

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NOTICE TO HCP COORDINATING COMMITTEE TO REVIEW THE 2018 GAS ABATEMENT PLAN AND BYPASS OPERATING PLAN

20180222-5059 FERC PDF (Unofficial) 2/22/2018 12:25:59 PM

From: Kristi Geris
To: Keely Murdoch (murk@yakamafish-nsn.gov); Keller, Lance; "Craig, Jim"; Scott Carlon; Tom Kahler; Kirk Truscott; John Ferguson; Jackson, Chad S (DFW)
Cc: Andrew Gingerich; Chas Kyger
Subject: RE: Draft GAP/BOP for CC review - APPROVED
Date: Friday, February 02, 2018 9:26:19 AM

Thanks Keely and everyone! I'll have the record show that:

The Wells HCP Coordinating Committee representatives approved via email the 2018 Wells Dam Gas Abatement Plan and Bypass Operating Plan, as follows: USFWS approved on January 25, 2018; Douglas PUD, NMFS, WDFW, and the CCT approved on January 26, 2018; and the YN approved on February 2, 2018.

-kristi

Douglas PUD	Approved 1/26
NMFS	Approved 1/26
USFWS	Approved 1/25
WDFW	Approved 1/26
CCT	Approved 1/26
YN	Approved 2/2

Kristi Geris

ANCHOR QEA, LLC
kgeris@anchorqea.com
C 360.220.3988

From: Keely Murdoch [mailto:murk@yakamafish-nsn.gov]
Sent: Friday, February 2, 2018 8:29 AM
To: Kristi Geris <kgeris@anchorqea.com>
Subject: Re: FW: Draft GAP/BOP for CC review - EMAIL VOTE needed

YN Approves

From: Kristi Geris
Sent: Saturday, January 27, 2018 10:24 AM
To: Keely Murdoch (murk@yakamafish-nsn.gov) <murk@yakamafish-nsn.gov>
Cc: Keller, Lance <Lance.Keller@chelanpud.org>; 'Craig, Jim' <jim_l_craig@fws.gov>; Scott Carlon <scott.carlon@noaa.gov>; Tom Kahler (tomk@dcpud.org) <tomk@dcpud.org>; kirk.truscott@colvilletribes.com; John Ferguson <jferguson@anchorqea.com>; Jackson, Chad S (DFW) <Chad.Jackson@dfw.wa.gov>; Kristi Geris <kgeris@anchorqea.com>
Subject: RE: Draft GAP/BOP for CC review - EMAIL VOTE needed

Thanks Chad! -kristi

Douglas PUD	Approved 1/26
NMFS	Approved 1/26
USFWS	Approved 1/25
WDFW	Approved 1/26
CCT	Approved 1/26
YN	

*Wells HCP-CC: please submit your vote via email on the attached Draft 2018 Wells Dam GAP/BOP to me and Tom no later than Monday, February 12, 2018

Kristi Geris

ANCHOR QEA, LLC
kgeris@anchorqea.com
C 360.220.3988

From: Jackson, Chad S (DFW) [mailto:Chad.Jackson@dfw.wa.gov]
Sent: Friday, January 26, 2018 1:47 PM
To: Scott Carlon - NOAA Federal <scott.carlon@noaa.gov>; Kristi Geris <kgeris@anchorqea.com>
Cc: Jim Craig (jim_l_craig@fws.gov) <jim_l_craig@fws.gov>; John Ferguson <jferguson@anchorqea.com>; Keely Murdoch (murk@yakamafish-nsn.gov) <murk@yakamafish-nsn.gov>; kirk.truscott@colvilletribes.com; Tom Kahler (tkahler@dcpud.org) <tkahler@dcpud.org>; Keller, Lance <Lance.Keller@chelanpud.org>
Subject: RE: FW: Draft GAP/BOP for CC review - EMAIL VOTE needed

WDFW approves

From: Kristi Geris
Sent: Friday, January 26, 2018 1:44 PM
To: Jackson, Chad S (DFW) <Chad.Jackson@dfw.wa.gov>; Keely Murdoch (murk@yakamafish-nsn.gov) <murk@yakamafish-nsn.gov>
Cc: Keller, Lance <Lance.Keller@chelanpud.org>; 'Craig, Jim' <jim_l_craig@fws.gov>; Scott Carlon <scott.carlon@noaa.gov>; Tom Kahler (tomk@dcpud.org) <tomk@dcpud.org>; kirk.truscott@colvilletribes.com; Kristi Geris <kgeris@anchorqea.com>; John Ferguson <jferguson@anchorqea.com>
Subject: RE: Draft GAP/BOP for CC review - EMAIL VOTE needed

Thanks Scott, Tom, and Kirk! -kristi

Douglas PUD	Approved 1/26
NMFS	Approved 1/26

USFWS	Approved 1/25
WDFW	
CCT	Approved 1/26
YN	

*Wells HCP-CC: please submit your vote via email on the attached Draft 2018 Wells Dam GAP/BOP to me and Tom no later than Monday, February 12, 2018

Kristi Geris

ANCHOR QEA, LLC
kgeris@anchorqea.com
C 360.220.3988

-----Original Message-----
From: Kirk Truscott (FNW) [mailto:Kirk.Truscott@colvilletribes.com]
Sent: Friday, January 26, 2018 9:15 AM
To: Scott Carlon - NOAA Federal <scott.carlon@noaa.gov>; Kristi Geris <kgeris@anchorqea.com>
Cc: Jackson, Chad S (DFW) <Chad.Jackson@dfw.wa.gov>; Jim Craig (jim_l_craig@fws.gov) <jim_l_craig@fws.gov>; John Ferguson <jferguson@anchorqea.com>; Keely Murdoch (murk@yakamafish-nsn.gov) <murk@yakamafish-nsn.gov>; Tom Kahler (tkahler@dcpud.org) <tkahler@dcpud.org>; Keller, Lance <Lance.Keller@chelanpud.org>
Subject: RE: FW: Draft GAP/BOP for CC review - EMAIL VOTE needed

CCT approves.

Kirk

From: Tom Kahler [mailto:tomk@dcpud.org]
Sent: Friday, January 26, 2018 8:49 AM
To: Kristi Geris <kgeris@anchorqea.com>
Subject: RE: Draft GAP/BOP for CC review - EMAIL VOTE needed

Douglas approves

From: Scott Carlon - NOAA Federal [mailto:scott.carlon@noaa.gov]
Sent: Friday, January 26, 2018 8:44 AM
To: Kristi Geris <kgeris@anchorqea.com>
Cc: Jackson, Chad S (DFW) <Chad.Jackson@dfw.wa.gov>; Jim Craig (jim_l_craig@fws.gov) <jim_l_craig@fws.gov>; John Ferguson <jferguson@anchorqea.com>; Keely Murdoch (murk@yakamafish-nsn.gov) <murk@yakamafish-nsn.gov>; kirk.truscott@colvilletribes.com; Tom Kahler (tkahler@dcpud.org) <tkahler@dcpud.org>; Keller, Lance <Lance.Keller@chelanpud.org>
Subject: Re: FW: Draft GAP/BOP for CC review - EMAIL VOTE needed

NMFS approves.

From: Kristi Geris
Sent: Thursday, January 25, 2018 7:35 PM
To: Jackson, Chad S (DFW) <Chad.Jackson@dfw.wa.gov>; Jim Craig (jim_l_craig@fws.gov) <jim_l_craig@fws.gov>; John Ferguson <jferguson@anchorqea.com>; Keely Murdoch (murk@yakamafish-nsn.gov) <murk@yakamafish-nsn.gov>; kirk.truscott@colvilletribes.com; Scott Carlon <scott.carlon@noaa.gov>; 'Tom Kahler (tkahler@dcpud.org)' <tkahler@dcpud.org>; Kristi Geris <kgeris@anchorqea.com>
Cc: Keller, Lance <Lance.Keller@chelanpud.org>
Subject: RE: Draft GAP/BOP for CC review - EMAIL VOTE needed

Thanks Jim! -kristi

Douglas PUD	
NMFS	
USFWS	Approved 1/25
WDFW	
CCT	
YN	

*Wells HCP-CC: please submit your vote via email on the attached Draft 2018 Wells Dam GAP/BOP to me and Tom no later than Monday, February 12, 2018

Kristi Geris

ANCHOR QEA, LLC
kgeris@anchorqea.com
C 360.220.3988

From: Jim Craig [mailto:jim_l_craig@fws.gov]
Sent: Thursday, January 25, 2018 3:29 PM
To: Kristi Geris <kgeris@anchorqea.com>
Subject: Re: Draft GAP/BOP for CC review - EMAIL VOTE needed

USFWS submits a yes vote

Sent from my iPhone

From: Kristi Geris
Sent: Thursday, January 25, 2018 2:38 PM
To: Jackson, Chad S (DFW) <Chad.Jackson@dfw.wa.gov>; Jim Craig (jim_l_craig@fws.gov) <jim_l_craig@fws.gov>; John Ferguson <jferguson@anchorqea.com>; Keely Murdoch

(murk@yakamafish-nsn.gov) <murk@yakamafish-nsn.gov>; kirk.truscott@colvilletribes.com; Kristi Geris <kgeris@anchorqea.com>; Scott Carlon <scott.carlon@noaa.gov>; 'Tom Kahler (tkahler@dcpud.org)' <tkahler@dcpud.org>
Cc: Keller, Lance <Lance.Keller@chelanpud.org>
Subject: FW: Draft GAP/BOP for CC review - EMAIL VOTE needed

Hi Wells HCP-CC: please submit your vote via email on the attached Draft 2018 Wells Dam GAP/BOP to me and Tom no later than Monday, February 12, 2018. Thanks! -kristi

Douglas PUD	
NMFS	
USFWS	
WDFW	
CCT	
YN	

Kristi Geris

ANCHOR QEA, LLC
kgeris@anchorqea.com
C 360.220.3988

From: Kristi Geris
Sent: Tuesday, January 16, 2018 5:35 PM
To: Jackson, Chad S (DFW) <Chad.Jackson@dfw.wa.gov>; Jim Craig (jim_l_craig@fws.gov) <jim_l_craig@fws.gov>; John Ferguson <jferguson@anchorqea.com>; Keely Murdoch (murk@yakamafish-nsn.gov) <murk@yakamafish-nsn.gov>; Keller, Lance <Lance.Keller@chelanpud.org>; kirk.truscott@colvilletribes.com; Kristi Geris <kgeris@anchorqea.com>; Scott Carlon <scott.carlon@noaa.gov>; 'Tom Kahler (tkahler@dcpud.org)' <tkahler@dcpud.org>
Cc: Aaron Beavers <Aaron.Beavers@noaa.gov>; Alene.Underwood@chelanpud.org; Bill Tweit <tweitwmt@dfw.wa.gov>; Bob Rose <rosb@yakamafish-nsn.gov>; Casey Baldwin <Casey.Baldwin@colvilletribes.com>; Catherine Willard <Catherine.Willard@chelanpud.org>; Dale Bambrick <dale.bambrick@noaa.gov>; Gallaher, Becky <becky.gallaher@chelanpud.org>; jeff.smith@chelanpud.org; Justin Yeager <Justin.Yeager@noaa.gov>; 'Mary Mayo' <marym@dcpud.org>; Mike Tonseth (tonsemat@dfw.wa.gov) <tonsemat@dfw.wa.gov>; Ritchie Graves <ritchie.graves@noaa.gov>; Shane Bickford (sbickford@dcpud.org) <sbickford@dcpud.org>; Steve Hemstrom (steven.hemstrom@chelanpud.org) <steven.hemstrom@chelanpud.org>; Steve Parker <pars@yakamafish-nsn.gov>; Verhey, Patrick M (DFW) <Patrick.Verhey@dfw.wa.gov>; 'william_gale@fws.gov' <william_gale@fws.gov>; Andrew Gingerich (andrewg@dcpud.org) <andrewg@dcpud.org>
Subject: FW: Draft GAP/BOP for CC review

Hi HCP-CC: please see the email below from Tom and the attached Draft 2018 Wells Dam GAP/BOP,

which will be discussed during next week's CC 1/23 in-person meeting.

The attached plan is also available for download from the HCP Coordinating Committees Extranet Site, under: Draft Documents > All by Mtg Date > 1/23/2018 (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
C 360.220.3988

From: Tom Kahler [mailto:tomk@dcpud.org]
Sent: Tuesday, January 16, 2018 5:07 PM
To: Kristi Geris <kgeris@anchorqea.com>
Cc: John Ferguson <jferguson@anchorqea.com>; Shane Bickford <ShaneB@dcpud.org>; Andrew Gingerich <andrewg@dcpud.org>
Subject: Draft GAP/BOP for CC review

Hi Kristi,

Please distribute the attached draft to the CC for their review. We're always squeezed on this combined document since FERC required the combination in 2013, because we have to wait for year-end WQ data to finish the draft, then we have to get this through both the Aquatic SWG and CC, and finally to FERC by February 28. Andrew asked the Aquatic SWG for a completed review by February 12, and ideally the CC could match that. This is on the agenda for next week, where we'll discuss the BOP in particular.

Thanks,

Tom

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APPENDIX C

AQUATIC SETTLEMENT WORK GROUP PRE-FILING CONSULTATION RECORD FOR THE 2018 GAS ABATEMENT PLAN AND BYPASS OPERATING PLAN

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NOTICE TO AQUATIC SETTLEMENT WORK GROUP TO REVIEW THE TOTAL DISSOLVED GAS ABATEMENT PLAN 2017 ANNUAL REPORT AND THE 2018 GAS ABATEMENT PLAN AND BYPASS OPERATING PLAN

20180222-5059 FERC PDF (Unofficial) 2/22/2018 12:25:59 PM

From:	Kristi Geris
To:	Andrew Gingerich; Bob Rose; Chas Kyger; Donella Miller (mild@yakamafish-nsn.gov); Jason McLellan; John Ferguson; Kristi Geris; Mark Peterschmidt (mape461@ecy.wa.gov); Patrick Verhey (Patrick.Verhey@dfw.wa.gov); Ralph Lampman (lamr@yakamafish-nsn.gov); Sean Goudy (gous@yakamafish-nsn.gov); "Steve Lewis"; Zimmerman, Breean (ECY)
Cc:	Shane Bickford; Tom Kahler; Keith Hatch (Keith.Hatch@bia.gov); Chris Sheridan (csherida@blm.gov)
Subject:	FW: Draft 2017 Wells TDG GAP Report and Draft 2018 Wells GAP/BOP for ASWG review
Date:	Tuesday, January 16, 2018 5:00:35 PM
Attachments:	2018_01_16 Douglas - Draft 2018 Wells Dam GAP and BOP.DOC 2018_01_16 Douglas - Draft 2017 Wells Dam TDG GAP Annual Report.docx

Hi Aquatic SWG: please see the email below from Andrew and the attached Draft 2017 Wells Dam TDG GAP Report and Draft 2018 Wells Dam GAP/BOP, which are available for review with edits and comments due to Andrew no later than **COB Monday, February 12, 2018**.

The attached documents are also available for download from the Aquatic SWG Extranet Site, under: Documents > All by Mtg Date > 2/14/2018 (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
C 360.220.3988

From: Andrew Gingerich [mailto:andrewg@dcpud.org]
Sent: Tuesday, January 16, 2018 4:48 PM
To: Kristi Geris <kgeris@anchorqea.com>
Cc: 'Zimmerman, Breean (ECY)' <bzim461@ECY.WA.GOV>; Tom Kahler <tomk@dcpud.org>; John Ferguson <jferguson@anchorqea.com>; Shane Bickford <ShaneB@dcpud.org>; Chas Kyger <chask@dcpud.org>
Subject: TDG GAP Annual Report for 2017

Hi Kristi, as I promised the Aquatic SWG during our meeting at Wells Dam last week:

Please distribute to the technical reps within the Aquatic SWG. Please also make sure that we include BIA, and BLM on the cc list.

Every year at this time Douglas PUD provides two documents to the Aquatic SWG for review, comment, and eventual approval. The first summarizes TDG compliance during the previous year

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(2017). The second document discusses the methods that are expected to be used in order to provide safe and effective passage of juvenile salmonids, meet TDG standards under Chapter 173-201A-200 of the WAC, and operate Wells Dam safely (2018 Gas Abatement Plan and Bypass Operating Plan). The second of these two documents get reviewed concurrently with the HCP CC per our 401 Certification and FERC license requirements. Specifically, these two documents are:

1. 2017 Annual TDG (GAP) Report
2. 2018 Gas Abatement Plan and Bypass Operating Plan

The second document is also required in order to obtain an Ecology's approved TDG adjustment during the 2018 bypass season. This adjustment facilitates high survival of downstream migrating fish during peak downstream migration. Both documents are attached for committee review and consideration. Douglas PUD is hoping to receive comments no later than COB Feb 12th . That will give Douglas PUD a day to update/make changes before seeking approval from the Aquatic SWG at the February 14th, 2018 Aquatic SWG call. Both of these documents are due to the FERC by Feb 28th every year.

I appreciate the review and consideration. Please let me know if you have questions.

Respectfully,

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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WASHINGTON DEPARTMENT OF ECOLOGY APPROVAL OF THE 2018 TOTAL DISSOLVED GAS ABATEMENT PLAN

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
1250 W Alder St • Union Gap, WA 98903-0009 • (509) 575-2490

February 13, 2018

Andrew Gingerich
Douglas County Public Utility District No. 1
1151 Valley Mall Parkway
East Wenatchee, WA 98802

Re: Wells Hydroelectric Project No. 2149
2018 Total Dissolved Gas (TDG) Abatement Plan

Dear Mr. Gingerich:

The Washington State Department of Ecology (Ecology) has reviewed and **approves** the 2018 Gas Abatement Plan (GAP) submitted by Public Utility District (PUD) No. 1 of Douglas County for the Wells Hydropower project; FERC Project No. 2149. This plan was submitted in accordance with WAC 173-201A-200(1)(f)(ii)) and the Clean Water Act (CWA) 401 certification Section 6.7(2)(a).

Furthermore, Ecology grants PUD District No. 1 of Douglas County an adjustment to the 110% TDG standard for the purposes of 2018 Spill Season, as authorized under WAC 173-201A-200(1)(f)(ii), in order to facilitate the passage of Endangered Species Act (ESA) listed salmonids at the Project.

Thank you for your continued cooperation and compliance with the 401 requirements. Please let me know if you have any questions, I can be reached at (509) 575-2808.

Sincerely,

Breean Zimmerman

Breean Zimmerman
Hydropower Projects Manager
Water Quality Program

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FINAL AQUATIC SETTLEMENT WORK GROUP ACTION ITEMS SHOWING APPROVAL OF THE 2018 GAS ABATEMENT PLAN AND BYPASS OPERATING PLAN

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FINAL

Conference Call Action Items

Aquatic Settlement Work Group

To: Aquatic SWG Parties

Date: February 15, 2018

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

Re: Final Action Items of the February 14, 2018 Aquatic SWG Conference Call

Below is a summary of Action Items from the Aquatic Settlement Work Group (SWG) meeting that was held by conference call on Wednesday, February 14, 2018, from 10:00 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. Douglas PUD will develop a draft Statement of Agreement (SOA) describing how Douglas PUD will support Pacific Lamprey translocation efforts in future years (tentatively expected following finalization of the technical memorandum, *Temporary Fishway "Lamprey Operations": 2017 Pacific Lamprey Migration at Wells Dam*, and an acoustic telemetry Pacific Lamprey approach report being drafted by Douglas PUD in coordination with LGL Limited; Item VI-1).
2. Steve Lewis will contact Tim Culbertson (Secretary-Manager for Columbia Basin Hydropower) regarding how water managers coordinate and manage forced spill and total dissolved gas (TDG) at Mid-Columbia hydroelectric projects, outside of the former Mid-Columbia Hourly Coordination Agreement (Item VI-4).
3. Douglas PUD will discuss how forced spill and TDG are coordinated and managed at Wells Dam, outside of the former Mid-Columbia Hourly Coordination Agreement, during a future Aquatic SWG meeting (Item VI-4).
4. Douglas PUD will incorporate 2017 Pacific Lamprey run data into the *2017 Pacific Lamprey Management Plan Annual Report* (Item VI-6).
5. Ralph Lampman (Yakama Nation [YN]) will provide a summary of questions from the Wells Dam fishway tour on January 10, 2018, for discussion during the Aquatic SWG conference call on March 14, 2018 (Item VI-8). *(Note: Lampman provided these questions to Kristi Geris on February 14, 2018, which Geris distributed to the Aquatic SWG that same day.)*
6. The Aquatic SWG meeting on March 14, 2018, will be held by conference call (Item VII-3).

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FINAL

II. Summary of Decisions

1. Aquatic SWG members present approved the technical memorandum, *Temporary Fishway "Lamprey Operations": 2017 Pacific Lamprey Migration at Wells Dam* (Item VI-2).
2. Aquatic SWG members present approved the *Wells Hydroelectric Project Total Dissolved Gas Abatement Plan 2017 Annual Report*, with the YN abstaining (Item VI-3).
3. Aquatic SWG members present approved the *2018 Total Dissolved Gas Abatement Plan* and *Wells Bypass Operating Plan*, with the YN and U.S. Fish and Wildlife Service (USFWS) abstaining (Item VI-5).

III. Agreements

1. There were no agreements discussed during today's conference call.

IV. Review Items

1. The draft *2018 Aquatic Settlement Agreement and Workgroup Action Plan* was distributed to the Aquatic SWG by Kristi Geris on December 18, 2017. This document is currently under review (Item VI-7).

V. Documents Finalized

1. There are no documents that have been recently finalized.

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FINAL

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
Breean Zimmerman	Aquatic SWG Technical Representative	Washington State Department of Ecology
Steve Lewis	Aquatic SWG Technical Representative	U.S. Fish and Wildlife Service
Patrick Verhey	Aquatic SWG Technical Representative	Washington Department of Fish and Wildlife
Bob Rose	Aquatic SWG Technical Representative	Yakama Nation
Ralph Lampman	Technical Support	Yakama Nation
Tyler Beals	Technical Support	Yakama Nation