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Commissioners:
T. JAMES DAVIS
RONALD E. SKAGEN
MOLLY SIMPSON

General Manager:
WILLIAM C. DOBBINS

Public Utility District No. 1 of Douglas County

1151 Valley Mall Parkway · East Wenatchee , Washington 98802-4497 · 509/884-7191 FAX 509/884-0553 · www.douglaspud.org

Via Electronic Filing

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

February 24, 2015

Subject: 2014 Total Dissolved Gas Report – License Article 401(b)
Wells Hydroelectric Project No. 2149

Dear Secretary Bose:

Pursuant to Article 401(b) of the new license for the Wells Hydroelectric Project (Wells Project), the Public Utility District No. 1 of Douglas County (Douglas PUD) hereby submits the final Total Dissolved Gas Report (TDG Report) for calendar year 2014. Article 401(b) requires Douglas PUD to file an annual TDG Report with the Federal Energy Regulatory Commission (FERC) by February 28th during each year of the new license.

The final 2014 TDG Report is attached as Appendix A to this letter and was reviewed and approved by the Washington State Department of Ecology (Ecology) and all of the other parties to the Aquatic Settlement Agreement (ASA) including the 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 enclosed 2014 TDG Report is consistent with (1) the Water Quality Management Plan that is contained within the ASA, (2) Condition 6.7(2)(c)(iii) of Ecology's Clean Water Act section 401 Water Quality Certification (401 Certification), and (3) the National Marine Fisheries Service Endangered Species Act Incidental Take Statement (ITS) Reasonable and Prudent Measure No. 2 for the Wells Project. The pre-filing consultation record supporting the review and approval of the 2014 TDG Report can be found in Appendix B.

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If you have any questions or require further information regarding the enclosed report, please feel free to contact Andrew Gingerich at (509) 881-2323, andrewg@dcpud.org.

Sincerely,

Shane Bickford
Natural Resources Supervisor

Enclosure: 1) Appendix A – 2014 Total Dissolved Gas Report – Wells Project
2) Appendix B – Pre-filing consultation record for the 2014 TDG Report

Copy:
Mr. Charlie McKinney – Ecology, Yakima
Mr. Ritchie Graves – NMFS, Portland
Wells Aquatic Settlement Work Group
Mr. Tom Kahler – Douglas PUD
Mr. Andrew Gingerich – Douglas PUD

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APPENDIX A: 2014 TOTAL DISSOLVED GAS REPORT – WELLS PROJECT

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Wells Hydroelectric Project
Total Dissolved Gas Abatement Plan

2014 Annual Report

Public Utility District No. 1 of Douglas County
1151 Valley Mall Parkway
East Wenatchee, WA 98802-4331

Prepared for:

Washington Department of Ecology
15 W. Yakima Avenue, Suite 200
Yakima, WA 98902-3452

January 2015

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1 INTRODUCTION

The 2014 Wells Hydroelectric Project (Wells Project) Gas Abatement Plan (GAP) was approved by the Washington State Department of Ecology (Ecology) on February 14, 2014. The GAP and its associated measures represent a long-term strategy to achieve compliance with the Washington State Water Quality Standard (WQS) criteria for total dissolved gas (TDG) in the Columbia River at the Wells Project while continuing to provide safe passage for downstream migrating juvenile salmonids. This annual report concludes the 2014 monitoring season and describes the background, operations, and results of GAP implementation at the Wells Project in 2014. In addition, this report contains TDG performance for the Wells Project following the completion of the 2014 fish passage season, towards measuring TDG performance outside of the fish passage season. Data summarized in this report includes monitoring from January 1, 2014 to December 31, 2014.

1.1 Project Description

The Wells Project is owned and operated by Public Utility District No. 1 of Douglas County (Douglas PUD) and 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. The nearest town is Pateros, Washington, which is located approximately 8 miles upstream of 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 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. The hydrocombine is 1,130 feet long, 168 feet wide and has a top of dam elevation of 795 feet above mean sea level (msl). Upstream fish passage facilities are located on both sides of the hydrocombine.

The Methow and Okanogan rivers are tributaries of the Columbia River within the Wells Reservoir. The Wells Project boundary extends 1.5 miles up the Methow River and 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 msl.

1.2 Fixed Monitoring Site Locations

Fixed monitoring stations (FMS) for TDG are located above and below Wells Dam. The forebay station (WEL) is located midway across the deck of Wells Dam (47° 56’ 50.28” N, 119° 51’ 54.78” W). The tailrace station (WELW) is located on the left bank of the Columbia River 2.6 miles downstream of Wells Dam (47° 54’ 46.86” N, 119° 53’ 45.66” W). In the spring of 2014, Douglas PUD installed a third FMS at Washburn Island (WSBW; 48° 5' 17.15" N, 119°40' 33.82" W) approximately 7 miles downstream of Chief Joseph Dam. Hach® HYDROLAB MiniSonde instruments equipped with TDG and temperature

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probes are deployed approximately 15 feet below normal surface water elevation and are calibrated monthly. Data from the three stations are automatically transmitted by radio to Wells Dam, stored, and forwarded to the USACE and posted to the Douglas PUD public webpage (www.dcpud.org). Weather data are recorded by Global Water, Inc. instrumentation, including an electronic barometer located on the deck of Wells Dam at 810 feet elevation. All three FMS are geographically represented by yellow pins in Figure 1.

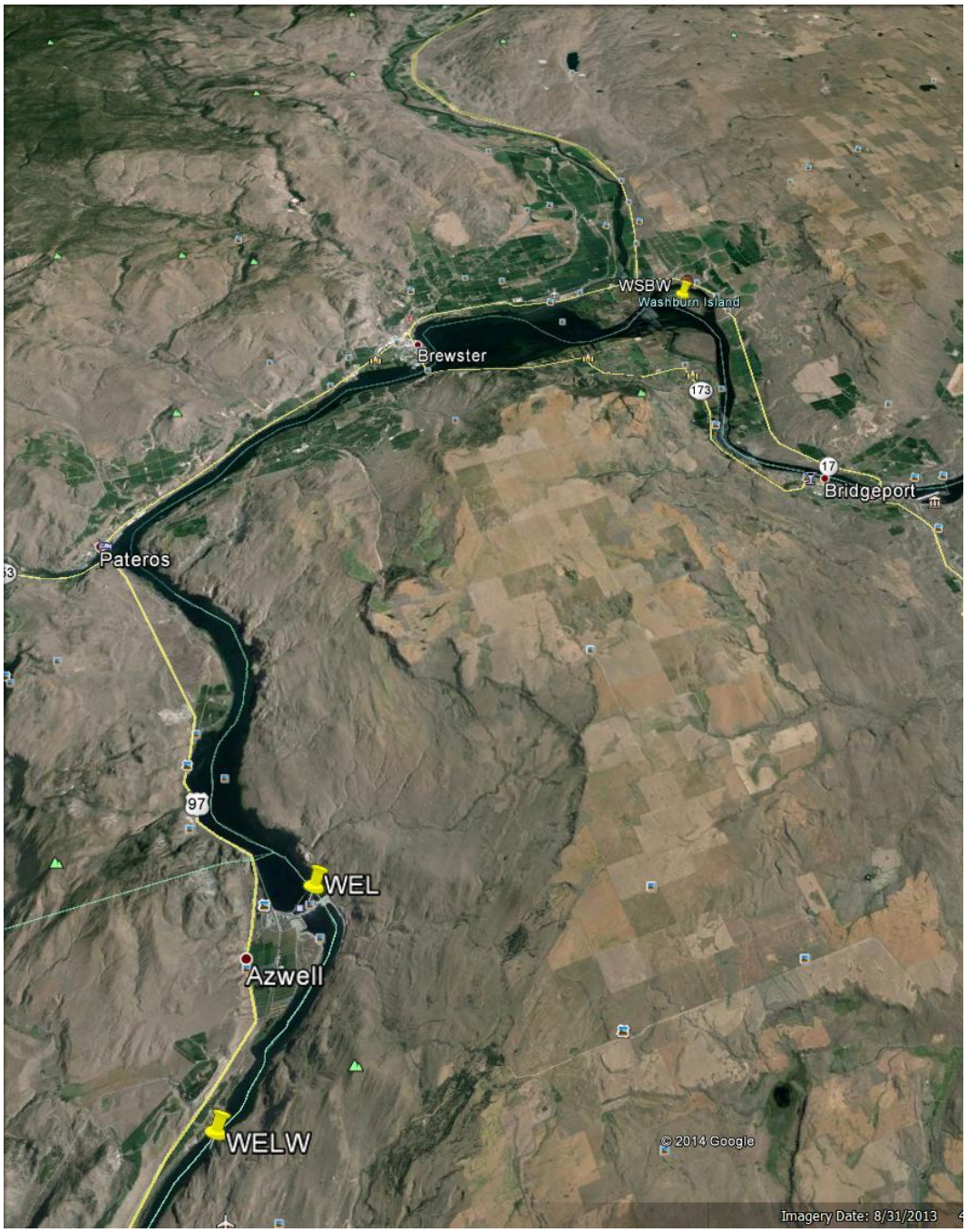

Figure 1. Google Earth Image depicting the location of the Wells Project and the three TDG fixed monitoring stations (yellow pins).

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1.3 Regulatory Framework

Washington Administrative Code (WAC) Chapter 173-201A identifies the WQS for surface waters in Washington State. Per the WQS, TDG measurements shall not exceed 110% saturation at any point of measurement in any state water body. The WQS provide for two exceptions to this rule: (1) for spill over dams to increase survival of downstream migrating juvenile salmon; and (2) during natural flood flows.

Ecology may approve an exemption to the 110% upper criterion for TDG saturation during the outmigration of juvenile salmon; provided that spill aids in the survival of migratory fish. The TDG exemption is considered by Ecology on a per-application basis and must be accompanied by an approved GAP and biological monitoring plan (WAC 173-201A-200(1) (f) (ii)). On the Columbia and Snake rivers, the TDG exception for fish passage has three standards during the fish passage season: (1) TDG shall not exceed 125% saturation in the tailrace of the project as measured in any one-hour period; (2) TDG shall not exceed 120% saturation in the tailrace of the project based on the average of the twelve highest consecutive hourly readings (12C-High); and, (3) TDG shall not exceed 115% saturation in the forebay of the next downstream project based on the average of the twelve highest consecutive hourly readings.

Natural flood flows are identified by periods in which river flow volume exceeds the highest seven consecutive day average observed during a ten-year period, called the 7Q-10 flow. The 7Q-10 flow for the Wells Project is 246,000 cubic feet per second (cfs), based on the hydrologic records from 1930 to 1998 and the USGS Bulletin 17B, “Guidelines for Determining Flood Flow Frequency” (Pickett et al. 2004). When river flow volume exceeds 7Q-10 flows, the WQS permits exceedances of the various TDG saturation standards.

1.4 2014 Gas Abatement Plan Approach

1.4.1 Operational

Based on the success of 2009 and 2010 operations associated with implementation of the Wells Project Spill Playbook (Spill Playbook), those operations were implemented again between 2011 and 2014 with minor modification as described below.

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. Additional recommendations for 2011-2014 operations, from a TDG management perspective, included:

1. Minimize spill.

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2. Forced Spill (≤ 53.0 kcfs). Switch the priority for forced spill less than 53 kcfs from spillbay 7 to spillbay 5. Units 4 and 5 should be operated to support spill from spillbay 5.

3. If spill exceeds 53 kcfs, or is predicted to exceed 40 kcfs for more than 8 hours, remove the Juvenile Bypass System (JBS) barriers in spillbay 6.

4. When spill exceeds 30 kcfs in spillbay 5 and JBS barriers have been removed in spillbay 6, shift at least 15.0 kcfs from spillbay 5 to spillbay 6 (i.e., 27.2 kcfs and 15.0 kcfs through spillbays 5 and 6, respectively). Support spill through spillbays 5 and 6 by operating units 4, 5 and 6.

5. Reinstall the JBS barriers if total spill is predicted to remain below 40 kcfs for more than four days.

Modifications were based on previous adaptive operational results, model predictions, and operational contingencies, including the prolonged rebuild of turbine unit 7 at Wells Dam.

1.4.2 Structural

No permanent structural modifications were proposed or conducted in the 2014 monitoring season. In 2014, Douglas PUD removed JBS barriers from Spillway 4 on May 22 and reinstalled them on June 9. The removal and reinstallation of the JBS barriers followed the requirements of the Federal Energy Regulatory Commission (FERC) approved Spill Playbook, Bypass Operating Plan and Wells Dam Emergency Action Plan (EAP).

1.4.3 Consultation

Douglas PUD will continue to direct all correspondence related to compliance with the TDG standards to the Hydropower Projects Manager, Department of Ecology, Central Region Office, Water Quality Program, 15 W. Yakima Avenue, Suite 200, Yakima, Washington 98902.

2 OPERATIONS

2.1 Description of Fish-Passage Season Flow

The 2014 Fish Passage Season started on April 9 (0:00 hrs) and ended at midnight on August 19th at Wells Dam. As required, TDG performance was monitored during this period and transmitted to the USACE, Northwest Division on a real-time basis (www.nwd-wc.usace.army.mil) and made available on Douglas PUD's public webpage (http://dcpud.org/wells-project/total-dissolved-gas-and-temperature-monitoring). Historical data continues to be available for download at both of these websites.

Data from 1969 to 2014 show that average monthly flows between April and August ranged from 51.9 (historic monthly minimum; Table 1) to 348.7 kcfs (historic monthly maximum; Table 1) at the Wells Project. During this time period, flows tend to be greater in June (mean 164.9 kcfs), and lowest in August (106.1). Flows at the run-of-river Wells Project are determined by upstream storage releases at

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the Grand Coulee Hydroelectric Project, with typically less than 10% of the total river flow provided by the two rivers that flow into the Columbia River within the Wells Project.

Table 1. Monthly average river discharge (kcfs) from the Wells Project, 1969-2014.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Average
2014	93.5	70.3	114.1	141.7	184.9	176.8	154.2	113	64	66.9	91	115.5	
Average since 1969	108.3	107	105.9	116.9	150.8	164.9	135.9	106.1	75.4	75.8	87.7	101.2	111.2
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	184.9	262.6	348.7	253.8	181.3	123	108.9	110	149	
2005-2014 (10 year Mean)	103.4	91.7	95.2	127.2	162.7	184.6	153	109.5	64.8	67.4	84.4	96	111.6

Columbia River flows at Wells Dam in 2014 were above average in all months of the fish passage season when compared to historic monthly flows and ranged between 7 - 23% greater than average flows (1969-2014; Figure 2; Table 2). The maximum hourly flow observed during the fish passage season was 257.2 kcfs on June 1. Three hours on June 1 (8:00 am, 9:00 am and the 10:00 am) had hourly averages above the 7Q-10 value at Wells Dam of 246 kcfs. High flows during this period also happened to coincide with a wildfire in Malaga, WA. The Malaga Fire damaged four separate wooden transmission lines resulting in reduced transmission capability and negatively impacting the ability of the Mid-Columbia projects to generate and then transmit power out of the region. Reduced generation (and more spill) at Wells Dam and other Mid-Columbia River generation facilities during this high flow period (See section 2.3 for more information), resulted in higher spill and higher TDG than would otherwise been observed absent the Malaga Fire.

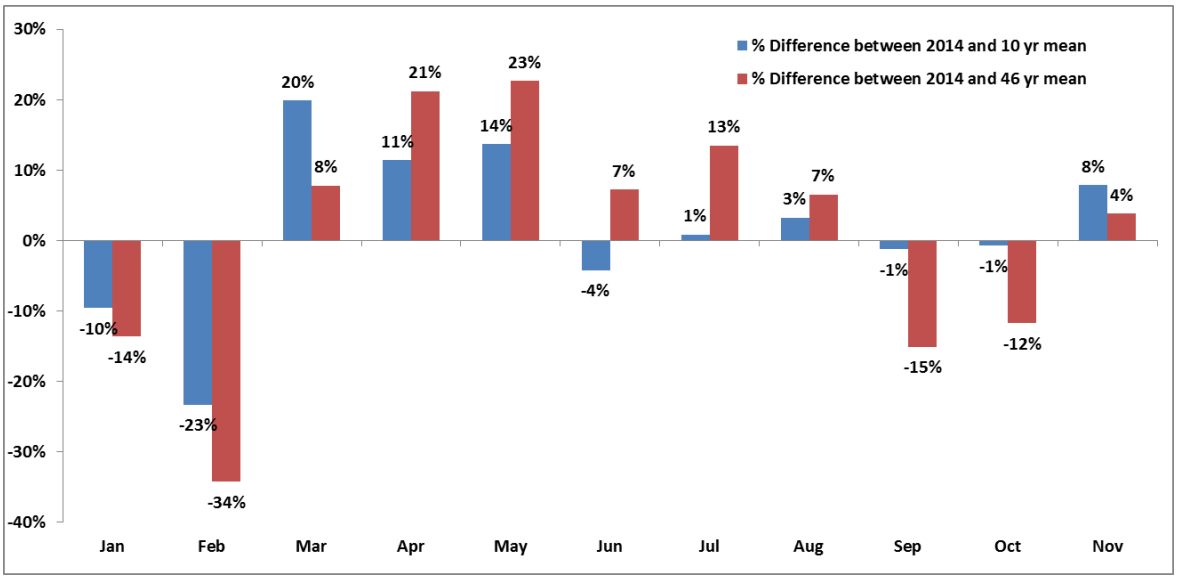

Figure 2. Percent change in 2014 monthly flows from averages.

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Table 2. Average monthly river flow volume (kcfs) at the Wells Project in 2013 compared to the previous historic average (1969-2013).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Average
2014	93.5	70.3	114.1	141.7	184.9	176.8	154.2	113	64	66.9	91	N/A	115.5
% Difference between 2014 and 10 yr mean	-10%	-23%	20%	11%	14%	-4%	1%	3%	-1%	-1%	8%		
% Difference between 2014 and 46 yr mean	-14%	-34%	8%	21%	23%	7%	13%	7%	-15%	-12%	4%		

2.2 Fish Spill Program

Wells Dam is a hydrocombine, where the spillbays are located directly above the turbine water passages. Research at Wells Dam in the mid-1980s demonstrated that a modest amount of spill could be used to effectively guide a high proportion of the downstream migrating juvenile salmon away from the turbines and into a surface oriented bypass system. A JBS was subsequently developed at Wells in the late 1980s. The Wells Dam JBS was engineered based on biological research and hydraulic modeling, and utilizes constricting flow barriers deployed in five of the eleven spillbays to effectively attract and safely guide fish through the project. The Wells Project JBS has since proven to be the most efficient system on the mainstem Columbia River, providing high levels of fish protection that has met approval of fisheries agencies and tribes (Skalski et al. 1996). The survival performance measures contained within the FERC approved Anadromous Fish Agreement and Habitat Conservation Plan (HCP) have been consistently exceeded, with a three-year survival average of 96.2% for juvenile steelhead and Chinook salmon (Bickford et al. 2001). The results from a fourth year of survival study at Wells Dam in 2010 (Bickford et al. 2011) confirmed past study results by documenting that survival through the entire Wells Project is in excess of 96.4% for juvenile spring migrating anadromous fish (see Section 3.1.2 below).

2.3 Fish Spill Quantities and Duration

The Wells Dam JBS uses up to 2,200 cfs of water for each of the five bypass/spillbay. Under normal conditions, the JBS will use roughly six to eight % of the total river flow for fish guidance. The increased spill has a small influence on TDG production (~0-2%) while providing a safe and highly effective, non-turbine passage route for over 92% of the spring and 96% of the summer migrating juvenile salmonids. The JBS was operated on a fixed schedule between April 12 and August 26 from 2003 to 2011. The HCP Coordinating Committee (HCP CC) retains annual operating oversight that includes the potential to operate the JBS as early as April 1 and as late as August 31 to ensure that 95% of the spring and summer migration of juvenile salmonids are provided a safe, non-turbine passage route over Wells Dam. In 2012, Douglas PUD evaluated past performance of the Wells Dam JBS operating dates relative to observed annual run timing (at the Rocky Reach Bypass) for both spring and summer migrants. With that data, a request was made to and granted by the HCP CC to revise operating dates in 2012 to start April 9 and end August 19. These dates were therefore used in 2012-2014 to operate fish passage spill for migrating juvenile salmonids.

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Spring time flows (April to May) at Wells Dam were much higher than average and historic flows. However, flows in June, July and August were only slight above average flows. Flows at Wells Dam were more similar to average and historic flow when compared to more recent years such as 2011 and 2012 when river volumes were much greater than average. The 2014 non-fish passage season (i.e., September through December) were on average less than historic average flows at Wells Dam. Large spill volumes from May through July are not uncharacteristic and are associated with winter snowpack melt or "freshet run-off" in the upper-Columbia River. Large spill volumes in April and May are atypical.

Spill volumes at Wells Dam in 2014 were highest in late May and early June and were associated with seasonal peak Project flows coupled with the reduced generation order issued to Douglas PUD by the Peak Reliability Coordinator (PEAK)[1] (Figure 3). On Wednesday, May 28, 2014 a large wildfire south of Wenatchee, Washington swept through a major transmission line corridor rendering four different wooden transmission lines inoperable including the Rocky Reach to Columbia 230 kV line, the Valhalla to Columbia #1 115 kV line, the Valhalla to Columbia #2 115 kV line, and the Hanna to Valhalla 115 kV line. These lines are used to transmit energy generated at various dams on the Mid-Columbia River including Douglas PUD's Wells Hydroelectric Project.

In response to the loss of these four transmission lines, Douglas PUD was ordered by PEAK to reduce generation at the Wells Project in order to ensure that the remaining (undamaged) transmission system continued to operate reliably and with a margin of safety should another unforeseen event develop in the Mid-Columbia region. Specifically, PEAK issued two operating directives to Douglas PUD. The first directive was issued on May 29th and the second directive was issued on May 30th. The net result of these two operating directives was a large reduction in the maximum generation capability of the Wells Project. The May 30th directive capped generation at the Wells Project to no more than 441 MW, which was a substantial reduction in generation capacity. Before receiving these two directives, Wells Project generation had averaged 720 MW.

The ordered reduction in generation at the Wells Project also occurred during the peak 2014 run-off period which resulted in a large increase in the volumes of water being spill at Wells Dam including a peak spill event in excess of 80 kcfs on May 30th and May 31st (Blue peak in Figure 3). The result of this emergency deviation from normal operating requirements was an increase in TDG levels measured downstream of Wells Dam and led to WQS exceedances.

The damaged wooden transmission system was restored in less than 5 days, allowing Douglas PUD to increase generation at Well Dam and greatly reduce spill volumes and associated TDG exceedances in the Wells Dam tailrace. During the time of the PEAK directive, Douglas PUD continued to implement all

[1] Peak Reliability (Peak) retains registration for, and fulfills the duties of, the Reliability Coordinator and the Interchange Authority, as defined by the North American Electric Reliability Corporation (NERC), and as delegated by the Western Electricity Coordinating Council (WECC), for its Reliability Coordinator Area in the Western Interconnection.

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measures from the 2014 GAP and measures that were relevant in Douglas PUD's EAP. PEAK directives such as the ones issued in late May of 2014 are rare and unforeseen events. The safe management of the Project and the implementation of the EAP and GAP are Douglas PUD's top priorities.

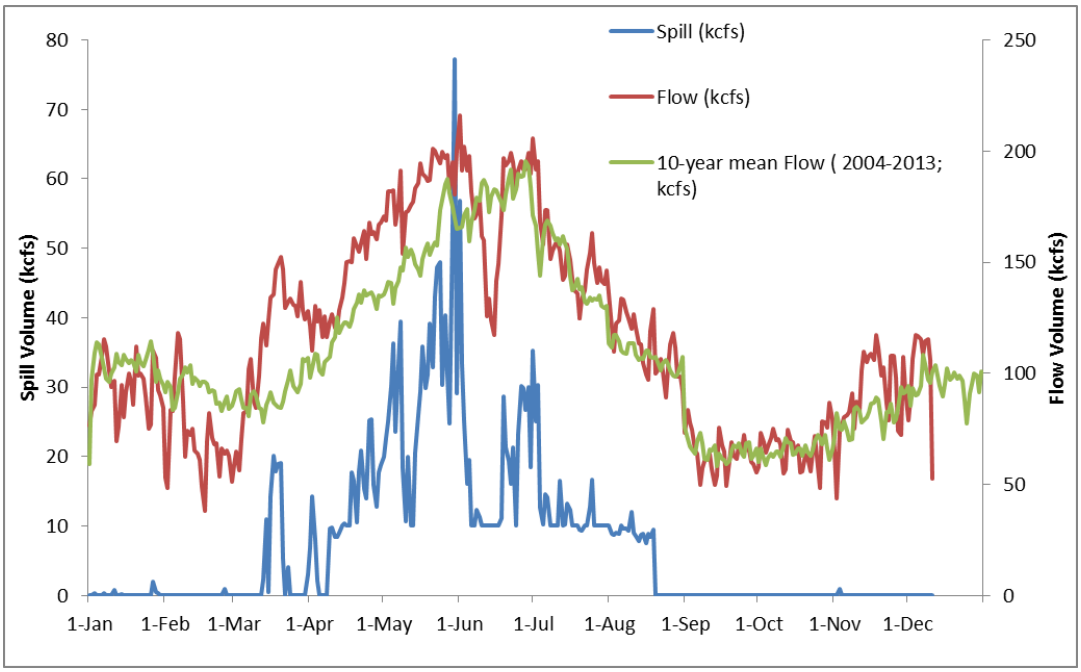

Figure 3. Historic and 2014 spill and flow profile at Wells Dam.

3 IMPLEMENTATION RESULTS

3.1 Fisheries Management

3.1.1 Fish Passage Efficiencies

No new fish passage efficiency studies were conducted at the Wells Project in 2014. However, three years of bypass efficiency studies have shown the Wells Dam JBS to be the most efficient juvenile salmonid collection system in the Columbia River with fish passage efficiencies up to 92% for spring migrants and up to 96% for summer migrants (comprised of steelhead, spring Chinook, and sockeye salmon, and summer/fall Chinook salmon, respectively; Skalski et al. 1996).

3.1.2 Survival Studies

No survival studies were conducted at the Wells Project in 2014.

In the spring of 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 required by the Wells HCP. Approximately 80,000 PIT-tagged yearling summer Chinook were released over a 30 day period in 15 replicates. Study results indicated that juvenile Chinook survival from the mouth of the Okanogan and Methow rivers averaged 96.4% over the 15 replicate releases of

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study fish, and confirms the results from the three previous years of study documenting that fish survival through the Wells Project continues to easily exceed the 93% Juvenile Project Survival Standard required by the HCP (Bickford et al., 2011).

3.2 Biological Monitoring

The 2014 Wells Project GAP includes the National Marine Fisheries Service (NMFS) recommendation to sample for Gas Bubble Trauma (GBT) in juvenile salmon when hourly tailrace TDG levels exceed 125% saturation (NMFS 2000).

In 2014, there were exceedances of the 125 % tailrace TDG standard on two days; May 30 and May 31. As discussed above, these exceedances were associated with orders from the PEAK to reduce load at Wells Dam following a wildfire in Malaga, WA. Per the requirements of the Ecology approved GAP, Douglas PUD biologist sampled juvenile fish for GBT at the Rocky Reach bypass sampler on May 31 and June 1 (the next day following observed exceedances). On both days, no sampled fish showed signs of GBT. In total, 72 subyearling Chinook, 11 sockeye, 10 yearling Chinook, two steelhead, and 10 Coho juveniles were examined for signs of GBT in unpaired fins and eyes of each fish. Examinations were conducted under a microscope while fish were anesthetized.

3.3 Water Quality Forums

Douglas PUD has actively participated in regional water quality forums with Ecology, WDFW, NMFS, Tribal Agencies, the US Fish and Wildlife Service, the USACE, and other Mid-Columbia PUDs (i.e., Grant and Chelan counties). Specific forums include the Trans-boundary Gas Group, Columbia Basin meetings with Ecology, and the Sovereign Technical Team Water Quality Work Group. These meetings allow for regional coordination for monitoring, measuring, and evaluating water quality in the Columbia Basin and support ongoing Upper Columbia Treaty review analyses that will provide a foundation for Treaty negotiations between Canada and the U.S. Douglas PUD will continue its involvement in water quality meetings for further coordination with other regional water quality managers.

3.4 Physical Monitoring

3.4.1 Overview

TDG monitoring at the Wells Project has occurred since 1984 when forebay stations were first established. TDG monitoring in the tailrace of Wells Dam began in 1997 by actively collecting data at four points across the width of the river. Based on these data, the location for a FMS was established in 1998. Subsequent analysis verified that both monitoring station locations are appropriate and representative of the river conditions, particularly during high flows (EES et al. 2007; Politano et al. 2009). TDG monitoring at the Wells Project currently occurs year round as required by Douglas PUD's Wells Project 401 Water Quality Certification (401 Certification). As required by Douglas PUD's Quality Assurance Project Plan for TDG, FMS sensors are serviced and calibrated at least once per month or sooner if calibration issues are observed on the devices.

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In 2013, an additional reservoir monitoring station was installed at Washburn Island (RM 537.5) to collect TDG data representative of water quality entering the Wells Project from Chief Joseph Dam. The current Chief Joseph Dam tailwater station (CHQW) minisonde TDG sensor is deployed along the right bank of the Columbia River, 0.75 miles downstream from the dam. The river right location of the U.S. Army Corps of Engineers TDG sensor precludes it from collecting bulk flow data, and instead the sensor monitors spillbay water disproportionally. Under some conditions, water coming from Chief Joseph Dam spillbays is of lower TDG concentration than the powerhouse. For example, when the forebay at Chief Joseph Dam has high concentrations of TDG (e.g. greater than 120 %) as a result of high spill volumes from Grand Coulee Dam and limited degassing through Rufus Woods Reservoir, water sent through the spillbays at Chief Joseph Dam may actually be stripped of gas via the spill deflectors. However, powerhouse flows are essentially identical to those in the forebay and can be missed by the CHQW sensor since powerhouse flows orient to river left. As a result of the CHQW location and the orientation of spill and powerhouse flows, bulk flows leaving the federal system and entering into the Wells Project are not accurately monitored. The Washburn Island location allows Douglas PUD and the Aquatic Settlement Work Group Parties to:

1) Better understand TDG degassing in the Wells Project and expected TDG saturation in the Wells forebay.

2) Assure data quality at the Wells forebay TDG sensor since Washburn Island TDG values should correlate predictably with Wells forebay TDG values. Based on the comparison of the sensors at these two locations, technicians can ensure reliable data collection by scheduling sensor servicing when data appears to be erroneous.

3) More accurately assess TDG production from the federal power system upstream of Wells Dam, which may support improved management towards minimizing TDG production in the Columbia River.

3.4.2 Data Evaluation and Analyses

Hourly TDG monitoring data were retrieved from the USACE, Northwest Division for three monitoring locations: the forebay of Wells Dam (WEL), tailrace of Wells Dam (WELW), and forebay of Rocky Reach Dam (RRH). The data were partitioned to include only readings obtained during the fish passage season (April 1 to August 131. Data were stratified by monitoring site, ascending date, and ascending time. The Ecology-approved 12C-High method was used to obtain TDG measurements for comparison to numeric criteria and evaluation of compliance.

3.5 TDG Compliance

Outside of the fish passage season the TDG criterion in the Wells tailrace is 110% (September 1 – March 31). Additionally, there were three compliance criteria for the 2014 fish passage exemption that must be met in association with operation at the Wells Project as described in the 2014 GAP:

1) Average TDG in the tailrace cannot exceed 125% for one hour or

2) 120% for 12 continuous hours (12C-High), and

3) TDG in the downstream Rocky Reach forebay cannot exceed 115% 12C-High.

These compliance criteria are waived when flows exceed the 7Q-10 value for the Wells Project (246 kcfs).

3.5.1 Non-Fish Passage Season Compliance (Wells Tailrace 110%)

Per the Douglas PUD FERC Operating License and 401 Certification, in August 2013 Douglas PUD started colleting TDG data during the non-fish passage season (January 1 to March 31and September 1to December 31). Non-spill flows at Wells Dam (through the turbine units and fishways) generate little to no additional dissolved gas. Spill outside the fish passage exemption period is uncommon.

In the preceding months (January to March) leading up the fish passage season, no hourly values above 110% were recorded in the Wells Dam tailrace. Following the completion of the fish passage season there were no hourly values above 110% recorded (September to December). As such, Douglas PUD was 100% compliant with the TDG standards outside the fish passage season.

3.5.2 Fish Passage Season Compliance

Wells Tailrace 125% hourly standard

The only exceedances of the 125% hourly tailrace criterion occurred on May 30 and 31. As discussed above, these two exceedances were associated with the Malaga, WA wildfire and resulting PEAK directives to reduce generation (and therefore increase spill) during the peak of the 2014 hydrograph. Overall, Douglas PUD was 98.6% compliant with the 125% tailrace TDG standard and would have been 100% compliant absent the directives from PEAK.

Wells Tailrace 120% 12C-High standard

During 2014, Wells Dam met the 120% 12C-High standard on all but five days (May 29-June 2). All of these exceedances were associated with the Malaga, WA wildfire and associated PEAK directives. On one of those days, 7Q10 flows were observed at the Wells Project and as such, Douglas PUD was 97.1% compliant with the standard and would have been 100% compliant absent the directives from PEAK.

Rocky Reach Forebay 115% 12C-High standard

The 12C-High TDG value in the Rocky Reach forebay exceeded 115% on 39 of 141 days (Table 3). On one of those days, 7Q10 flows were observed at Wells Dam. As such, compliance was 72.9% for the Rocky Reach Forebay 115% 12C-High standard. The 115% forebay compliance rate was additionally impacted on five of those exceedance days because of the Malaga wildfire and PEAK directives. In addition, Wells Dam received water already in excess of 115% on 21 of the 39 days that Douglas PUD was noncompliant in the Rocky Reach forebay (Figure 4). And finally, Wells Dam received water above 110% on 97 of the 141 fishpassage days (Figure 4). Incoming TDG produced at the federal hydro-system above Wells Dam

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was the single largest source for the elevated levels of TDG in the forebay of Wells and Rocky Reach dams. Post-season analysis indicate that had TDG in the Wells forebay been compliant with the state standards during the months of May, June and July, and the PEAK directives not been ordered, Wells Dam would have been 100% compliant with the 115% forebay standard.

3.5.3 Yearly TDG Compliance Summary

The following table summarizes TDG compliance at the Well Project for the entire 2014 season.

Table 3. 2014 TDG Compliance Summary.

	Compliance
Wells Tailrace 125% hourly standard	
Days out of compliance	2
Fish passage season	141
DCPUD compliance	**98.6%**
Wells Tailrace 120% 12C-High standard	
Days out of compliance	4
Fish passage season	140*
DCPUD compliance	**97.1%**
Rocky Reach Forebay 115% 12C-High standard	
Days out of compliance	38
Fish passage season	140*
DCPUD compliance	**72.9%**
Wells Tailrace 110% (Non-fish passage season standard)	
Days out of compliance	0
Fish passage season	232
DCPUD compliance	**100%**

*One day removed due to the observation of 7Q10 flows during more than one hourly event during that day (>246 kcfs).

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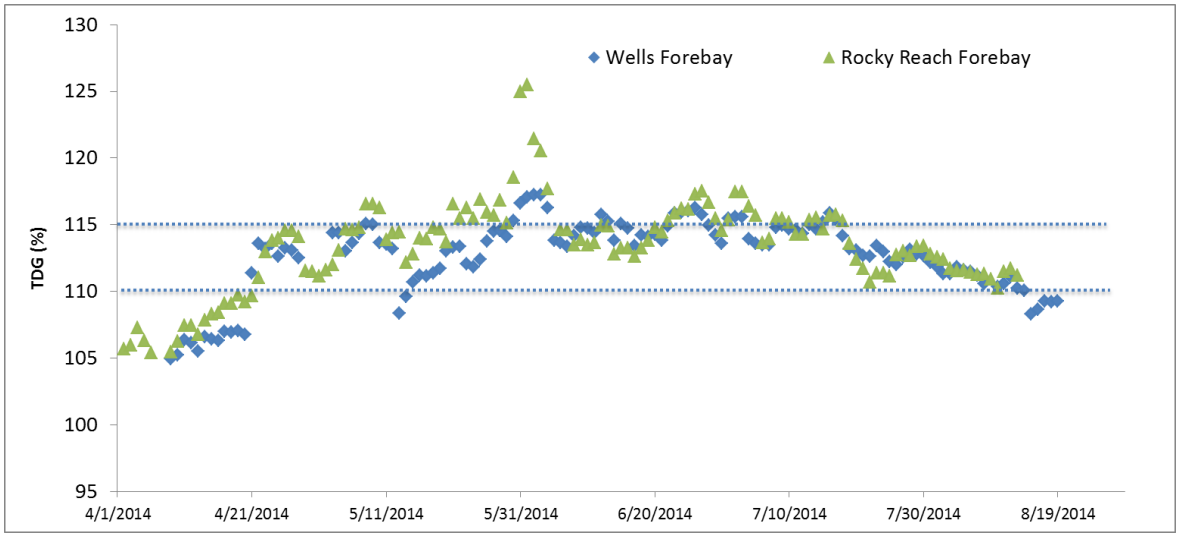

Figure 4. **12C-High values in the Wells Dam forebay and the Rocky Reach forebay during the 2014 fish passage season. Dotted lines represent the 110% and the 115% standards.**

4 DISCUSSION OF GAS ABATEMENT MEASURES

4.1 Water Quality Attainment Plan Activities

As required by the Wells Project 401 Certification, Douglas PUD developed a Water Quality Attainment Plan (WQAP). The WQAP was approved by Ecology and the FERC in 2013. The WQAP provides a detailed strategy for achieving compliance with the TDG state WQS within a required ten-year timeframe (i.e., compliance schedule). The compliance schedule outlines a step-wise approach toward meeting compliance with the TDG WQS. In 2014 (Year 1), the WQAP calls for continued adaptive management and implementation of the Spill Playbook, biological monitoring (i.e., GBT monitoring in biota, as needed), and the development of a TDG Reduction Alternatives Analysis.

In 2014, Douglas PUD developed a TDG Reduction Alternatives Analysis Report. The objective of this analysis was to conduct a comprehensive evaluation of any potential alternatives, both operational and structural, that may improve Project TDG management toward ultimately improving compliance with the TDG WQS criteria. All potential alternatives, both operational and structural, were evaluated in the context of cost and benefit beyond just TDG improvement to ensure that all elements (e.g., financial costs, generation and environmental impacts, of any particular reduction alternative were being considered. Elements included costs (both capital and operations and maintenance), environmental impacts (primarily aquatic resources), implications for public use, generation impacts, and maintenance of spillway design. To support the analysis, Douglas PUD worked with consultants and staff from various departments within the utility including engineering, generation, power sales, and environmental. The TDG Reduction Alternatives Analysis Report was provided to the Aquatic Settlement Workgroup and Ecology in November for review and approval.

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4.2 Operational

Flows at Wells Dam were above normal in 2014 during the fish passage season. Specifically flows outside of fish passage season were below 10-year and historic averages. Early fish passage season periods showed above average flows with later fish passage periods being higher as well but approaching normal flows. Wells Dam demonstrated high performance with nine out of ten turbine units available during this period, as the rebuild of unit 7 continued. Tailrace TDG WQS standards (125% Hourly and 120% 12C-high) were met during the fish passage season except for a short PEAK required load reduction that occurred in late May and early June. Had the directive not occurred Wells Dam would have been 100% compliant with this criterion. Rocky Reach forebay standards (115% 12C-high) were met during the majority of the fish passage season. Standards were not met when incoming TDG arriving at Wells Dam was already above 115% due to spill at the federal projects upstream of Wells Dam.

Since the completion of spill deflectors at Chief Joseph Dam in 2008, there has been a shift in federal spill operations to upstream facilities resulting in a significant increase in the amount of spill at Grand Coulee and Chief Joseph dams. This relatively recent increase in the amount of spill has resulted in a dramatic increase in the volume of water that is supersaturated with TDG entering the mid-Columbia system. The mass influx of supersaturated water has resulted in significantly higher TDG concentrations observed in the forebay of Wells Dam.

Douglas PUD implemented the Ecology approved GAP during the entire 2014 fish passage season utilizing the lessons learned during previous years of spill study at the Wells Project. The 2014 Spill Playbook was an important element in managing TDG at Wells Dam during the fish passage season.

4.3 Structural

No permanent structural modifications were proposed or conducted during the 2014 monitoring season. Removal of the JBS bypass barrier structures in spillway 4 was implemented consistent with the 2014 Spill Playbook and Wells Dam EAP.

5 CONCLUSIONS

With the operation of spill deflectors at Chief Joseph Dam in recent years and shifting spill operations by the USACE to this facility, there has been an increasing trend of flows with higher levels of TDG entering the Wells Project. FCRPS (Federal Columbia River Power System) spill priorities tested the ability of the Wells Project to comply with TDG exemption criteria; specifically those in the Rocky Reach forebay (115% 12C-High). In consideration of these conditions, Douglas PUD, through the implementation of its Spill Playbook, achieved high compliance with the TDG waiver standards. If Chief Joseph Dam (a project without fish passage) were required to abide by the Washington State Water Quality Standard criteria of

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110%, then the Wells Project would have complied with all of the WQS standard. Regardless of these observations, TDG performance at Wells Dam was very high. These results support the continued implementation of the Spill Playbook to manage TDG production through operational means, and suggests future operational performance should result in even higher rates of TDG standards compliance. Douglas PUD will put an emphasis on testing the Spill Playbook in years where ten units are available 95% of the time (normal reliability). The current turbine rebuild that provides only 9 out of 10 units to operate during the peak hydrograph reduces the amount of water that can be generated by approximately 20 kcfs and therefore makes compliance more challenging, since this water must be spilled.

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6 REFERENCES

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APPENDIX B – PRE-FILING CONSULTATION RECORD FOR THE 2014 TDG REPORT

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NOTICE TO THE AQUATIC SETTLEMENT WORK GROUP TO REVIEW THE 2014 TDG REPORT

Andrew Gingerich

From: Kristi Geris <kgeris@anchorqea.com>
Sent: Friday, January 09, 2015 5:30 PM
To: Andrew Gingerich; Bao Le; Bill Towey (bill.towey@colvilletribes.com); Bob Rose; 'Brad James'; 'Bret Nine'; 'Chad Jackson'; Charlie McKinney (cmck461@ecy.wa.gov); Chas Kyger; Chris Coffin (ccof461@ecy.wa.gov); Chris Sheridan; Donella Miller (mild@yakamafish-nsn.gov); Jason McLellan; Jeff Korth; 'Jessi Gonzales'; Keith Kirkendall (Keith.Kirkendall@noaa.gov); Kirk Truscott; Kristi Geris; Mary Mayo; Mike Schiewe; Pat Irle (pirl461@ecy.wa.gov); Patrick Verhey (Patrick.Verhey@dfw.wa.gov); Paul Ward (ward@yakama.com); Shane Bickford; 'Steve Lewis'; 'Steve Parker (parker@yakama.com)'
Subject: FW: 2014 TDG/GAP report
Attachments: 2015_01_09 Douglas - TDG Annual Report 2014 season Jan9 2015.doc

Hi Aquatic SWG: please see the email below from Andrew and the attached draft 2014 TDG/GAP Report. The attached draft report is available for review with comments due to Andrew by **Monday, February 9, 2015.**

The attached plan is also available for download from the Aquatic SWG Extranet site under: Documents > All by Mtg Date > 1/14/2015 (instructions below). Thanks! –kristi ☺

Instructions:

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

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

You should now be at the Aquatic SWG homepage.

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

Kristi Geris

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

From: Andrew Gingerich [mailto:andrewg@dcpud.org]
Sent: Friday, January 09, 2015 4:36 PM
To: Kristi Geris
Cc: McKinney, Charlie (ECY); Chris Coffin (ccof461@ecy.wa.gov) (ccof461@ecy.wa.gov)
Subject: 2014 TDG/GAP report

Kristi, please distribute to the Aquatic SWG.

Please note that this is not a duplicate email from earlier today. Attached is Douglas PUD's 2014 Gas Abatement Plan/TDG report. The document summarizes the flow year and TDG performance at Wells Dam during 2014. Pursuant to Douglas PUD's 401 Certification and FERC license the GAP report is due at the same time as the upcoming year's GAP plan.

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Like the 2015 GAP that was distributed earlier today, the 2014 GAP/TDG report is due to the FERC in Feb. 2015. As such, Douglas PUD is seeking a 30 day review on this document as well. Comments should be submitted prior to the 10th of Feb. We will seek approval on at the February 11th Aquatic SWG call.

Please let me know if you have questions. I will explain this document and the 2015 GAP sent earlier today at next week's Aquatic SWG call.

Thanks
Andrew
509-881-2323

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APPROVAL OF THE 2014 TDG REPORT FROM THE AQUATIC SETTLEMENT WORK GROUP

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Final Conference Call Action Items

Aquatic Settlement Work Group

To: Aquatic SWG Parties **Date**: February 12, 2015

From: Michael Schiewe, Chair (Anchor QEA, LLC)

Re: Final Action Items of the February 11, 2015 Aquatic SWG Conference Call

Below is a summary of Action Items from the Aquatic SWG meeting that was held by conference call on Wednesday, February 11, 2015, from 10:00 a.m. to 11:00 a.m. These action items include the following:

I. Summary of Action Items

1. Douglas PUD will provide comments received from the Washington Department of Ecology (Ecology) on the draft 2014 Wells Gas Abatement Plan (GAP)/Total Dissolved Gas (TDG) Report to Kristi Geris for distribution to the Aquatic SWG (Item VI-3). *(Note: Andrew Gingerich provided Ecology's approval of the draft plan to Geris following the meeting on February 11, 2015, which Geris distributed to the Aquatic SWG that same day.)*
2. Douglas PUD will provide comments received from Ecology on the draft 2015 Wells GAP/Bypass Operating Plan (BOP) to Kristi Geris for distribution to the Aquatic SWG (Item VI-4). *(Note: Andrew Gingerich provided Ecology's approval of the draft plan to Geris following the meeting on February 11, 2015, which Geris distributed to the Aquatic SWG that same day.)*
3. Aquatic SWG members will submit their approval, disapproval, or abstention on the draft Wells White Sturgeon Stocking Statement of Agreement (SOA) via email to Douglas PUD (with a copy to Kristi Geris) by Friday, February 20, 2015; the draft SOA for review was distributed to the Aquatic SWG by Kristi Geris on January 9, 2014 (Item VI-5). *(Note: the Washington Department of Fish and Wildlife [WDFW] provided a revised SOA for approval to Geris on February 12, 2015, which Geris distributed to the Aquatic SWG that same day.)*
4. The Colville Confederated Tribes (CCT), Douglas PUD, and John Ferguson (new Aquatic SWG Chair, effective May 2015) will discuss developing guidelines for hatchery rearing

juvenile sturgeon; the path forward will be considered during an Aquatic SWG meeting in summer 2015 (Item VI-6).

5. Douglas PUD will provide an updated spreadsheet with the latest Passive Integrated Transponder (PIT) Tag Information System (PTAGIS) detections of lamprey released by Douglas PUD in the Wells Reservoir to Kristi Geris for distribution to the Aquatic SWG (Item VI-7).
6. Douglas PUD will provide the draft 2015 Aquatic SWG Action Plan for review to Kristi Geris for distribution to the Aquatic SWG (Item VI-8). *(Note: Andrew Gingerich provided the draft plan to Geris following the meeting on February 11, 2015, which Geris distributed to the Aquatic SWG that same day.)*
7. Aquatic SWG members will submit edits and comments on the draft 2014 Aquatic Nuisance Species Management Plan (ANSMP) Annual Report to Chas Kyger by Wednesday, February 25, 2015; Douglas PUD will be requesting approval of the draft report during the next Aquatic SWG meeting on March 11, 2015 (Item VI-9).
8. Aquatic SWG members will submit edits and comments on the draft 2014 Resident Fish Study Report to Chas Kyger prior to the next Aquatic SWG meeting on March 11, 2015, when Douglas PUD will be requesting approval of the draft report (Item VI-10).

II. Summary of Decisions

1. The Aquatic SWG members present approved the 2014 Wells GAP/TDG Report (Item VI-2).
2. The Aquatic SWG members present approved the 2015 Wells GAP/ BOP (Item VI-3).

III. Agreements

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

IV. Review Items

1. Kristi Geris sent an email to the Aquatic SWG on February 12, 2015, notifying them that a revised draft Wells White Sturgeon Stocking SOA is available for review. Email votes on the revised draft SOA are due to Douglas PUD (with a copy to Geris) by Friday, February 20, 2015 (Item VI-5).
2. Kristi Geris sent an email to the Aquatic SWG on February 11, 2015, notifying them that the draft 2014 ANSMP Annual Report is available for review. Edits and comments on the draft report are due to Chas Kyger by Wednesday, February 25, 2015 (Item VI-9).
3. Kristi Geris sent an email to the Aquatic SWG on February 11, 2015, notifying them that the draft 2014 Resident Fish Study Report is available for review period. Edits and comments on the draft report are due to Chas Kyger prior to the next Aquatic SWG meeting on March 11, 2015 (Item VI-10).

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V. Documents Finalized

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

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Attachment A
List of Attendees

Name	Role	Organization
Mike Schiewe	Aquatic SWG Chair	Anchor QEA, LLC
John Ferguson	Aquatic SWG Chair (effective May 2015)	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
Jason McLellan	Aquatic SWG Technical Representative	Colville Confederated Tribes
Steve Lewis	Aquatic SWG Technical Representative	U.S. Fish and Wildlife Service
RD Nelle	Technical Support	U.S. Fish and Wildlife Service
Chad Jackson	Technical Support	Washington Department of Fish and Wildlife

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APPROVAL OF THE 2014 TDG REPORT FROM WASHINGTON DEPARTMENT OF ECOLOGY

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Andrew Gingerich

From: McKinney, Charlie (ECY) <cmck461@ECY.WA.GOV>
Sent: Wednesday, February 11, 2015 1:59 PM
To: Andrew Gingerich
Cc: Coffin, Chris (ECY)
Subject: Wells TDG Reports

February 11, 2015

To: Andrew Gingerich, Douglas PUD

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

The WA Department of Ecology (Ecology) has reviewed and approves the 2014 GAP and TDG report submitted by Douglas PUD for the Wells Project.
Ecology has also reviewed and approved the 2015 Gas Abatement Plan, Spill Play Book and Bypass Operating plan.

Ecology grants Douglas PUD an adjustment to the 110% TDG standard for the purposes of 2015 Spill Season, as authorized under WAC 173-201A-200(1)(f)(ii), in order to facilitate the passage of ESA listed salmonids at the Project.

Please let me know if you have any questions.

Charlie McKinney
Water Quality Section Manager
Central Region Office, Yakima
Washington Dept. of Ecology
509-457-7107

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Document Content(s)

Wells TDG Annual Report 2014 season 2-24-15.PDF.....1-36