Grant County
PUBLIC UTILITY DISTRICT
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November 30, 2007

Mr. Michael Maher, Permit Review/Compliance Coordinator
Washington Department of Ecology Shorelands Program
Eastern Regional Office
N. 4601 Monroe
Spokane, WA 99205-1295

Re: **Summary of Turbidity Monitoring Associated with the Construction of the Wanapum Dam Future Unit Fish Bypass: Second Monthly Report of 2007**

Dear Michael,

Attached is the second monthly turbidity monitoring report of 2007 associated with in-water work and construction of the Wanapum Dam Future Unit Fish Bypass (WFUFB). This work includes replacement of previously excavated material from downstream of Future Units 12-13 to the base of the WFUFB for structural support, as well as the concrete repositioning component of this project (see your e-mail dated August 8, 2007). This monthly report summarizes turbidity monitoring related to this project and satisfies section C2 of Order 1951 issued February 14, 2005, and includes the time period from October 31 to November 23, 2007.

Please don't hesitate to contact me if you have any questions or comments (509-754-5088, Ext. 2468).

Sincerely,

Ross Hendrick
Limnologist

cc: Stephen Brown
Tom Dresser
Laurel Heacock
Darrell Pock
Dana Jeske
Keyfile

SUMMARY OF TURBIDITY MONITORING ASSOCIATED WITH THE CONSTRUCTION OF THE WANAPUM DAM FUTURE UNIT FISH BYPASS

SECOND MONTHLY REPORT OF 2007

By Ross Hendrick

Public Utility District No. 2 of Grant County
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November 2007

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1.0 Introduction

On September 29, 2004, Public Utility District No. 2 of Grant County (Grant PUD) applied for certification from the Washington State Department of Ecology (WDOE) under Section 401 of the Clean Water Act in connection with the construction of a top-spill unit in a vacant bay of the Future Units section of Wanapum Dam, part of the Priest Rapids Hydroelectric Project No. 2114 (Project). The Wanapum Dam Future Unit Fish Bypass (WFUFB) is being constructed consistent with the provisions of Reasonable and Prudent Alternative #3 of the Biological Opinion, issued by National Marine Fisheries Service for the Project on May 3, 2004 (NOAA 2004), and adopted by the Federal Energy Regulatory Commission on December 16, 2004.

On February 14, 2005, WDOE issued the 401 certification (Order 1951) with the condition that Grant PUD monitor turbidity levels during in-water excavation activities associated with the construction of the WFUFB, and report variances from the current state water quality standard for turbidity in the Columbia River. Grant PUD prepared and submitted a study plan on August 8, 2005 to WDOE outlining the proposed approach to monitor turbidity in accordance with the terms of the 401 certification. Grant PUD began turbidity monitoring in conjunction with the beginning of in-water excavation activities on September 20, 2005, which continued until in-water excavation activities ended on January 17, 2006. Turbidity monitoring results for these four months can be found in the fourth monthly report dated January 18, 2006.

Current state water quality standards provide that turbidity levels shall not be >5 Nephelometric Turbidity Units (NTU) over background turbidity when the background is 50 NTU or less (WAC 173-201A-200 (1)(e)). Construction of the WFUFB began on September 15 and in-water excavation commenced on September 20, 2005. Consistent with the study plan submitted to WDOE, and as required by section C2 of the WDOE 401 water quality certification, reports summarizing results from the first week and first four months of turbidity monitoring were submitted to WDOE on September 27, October 27, November 21, December 21, 2005, and January 18, 2006 respectively. In-water excavation activities ended in January 2006 and were resumed on October 1, 2007. The present report adds to the first monthly report of 2007 and summarizes the results of the second month of turbidity monitoring during 2007 (October 31 to November 23, 2007).

2.0 Objective

The primary objective of this turbidity monitoring evaluation was to assess turbidity levels downstream of in-water excavation activities associated with the construction of the WFUFB in the Wanapum Dam tailrace. This evaluation was designed to assess turbidity changes and to confirm that the in-water excavation did not materially increase turbidity levels above background turbidity levels upstream of the construction area (Wanapum forebay) according to current water quality standards (WAC 173-201A-200 (1)(e)).

3.0 Data Collection Methods

As stated in the WDOE 401 certification, section B3, a “temporary mixing zone is established within which the turbidity standard is waived” and this mixing zone “shall not exceed 500 ft downstream from the in-water construction.” Section C1 of the WDOE 401 certification requires Grant PUD to conduct “grab-sample monitoring” of turbidity upstream of the in-water

excavation to determine background turbidity and at the downstream end of the mixing zone to verify compliance with turbidity standards outside of the mixing zone. Consistent with the submitted study plan and as required by section C1 of the WDOE 401 certification, during the first day of construction grab-sample monitoring was conducted every four hours at the downstream end of the mixing zone, and then daily using pre-calibrated and certified HydroLab DataSonde 5A or 4A sensor instruments. An additional HydroLab sensor was placed at Grant PUD's fixed site water quality monitor (FSM) located in the Wanapum Dam forebay to represent the upstream background turbidity determination as described in section C1 of the WDOE 401 certification. Grant PUD FSMs are described in detail in Technical Appendix E-3.F (Duvall and Dresser 2003) of Grant PUD's Final License Application (2003).

Sensor maintenance, calibration, and quality assurance/quality controls (QA/QC) mirrored QA/QC methods for Grant PUD FSMs (Duvall and Dresser 2003). The range of the turbidity sensors is 0-100 NTU and the accuracy is ±1 NTU within that range, while the sensor resolution is 0.1 NTU (Hydro-Lab Corporation 2002). Sensor data was checked for erroneous or suspect values so that these data could be omitted from the dataset. Examples of suspect values include unexplained jumps in turbidity levels of more than 10 NTU followed by an immediate decrease back to previous levels. These unexplained jumps are likely due to large objects passing by the sensors, such as air bubbles, aquatic habitat, or other objects; and because they did not continue in an elevated state nor were they related to any sudden changes to flow or in-water excavation activities they were not considered to be a result of in-water excavation activities. There was no suspect or erroneous values recorded during the first month of monitoring in 2007. Three hourly values were deleted from the Wanapum forebay FSM database during the second month of monitoring due to unexplained jumps in the values greater than 10 NTU from the previous and subsequent values; these hourly values did not correspond to any changes of in-water work activities.

4.0 Results and Discussion

Results obtained from the Wanapum forebay FSM (upstream of the construction area and mixing zone) and downstream of the mixing zone during the first and second months of in-water excavation in 2007 are presented in Tables 1 and 2 and Figures 1 and 2.

4.1 Background Turbidity: Month 1 of 2007

During the first month of in-water excavation in 2007, the mean turbidity values recorded at the Wanapum forebay FSM ranged from 0.0–0.0 NTU while daily maximums also ranged from 0.0–0.0 NTU.

For comparison purposes, Juul (2003) determined the background turbidity for the entire Project area to be 6.7 NTU, based on 291 discrete values that were collected at Vernita Bridge (Priest Rapids Dam tailrace) between June 1978 and November 2001.

4.2 Background Turbidity: Month 2 of 2007

During the first month of in-water excavation in 2007, the mean turbidity values recorded at the Wanapum forebay FSM ranged from 1.6–4.2 NTU, while daily maximums that ranged from 1.8–6.1 NTU.

4.3 Turbidity Data Downstream of Mixing Zone: Month 1 of 2007

During the first month of in-water excavation in 2007, daily mean turbidity values from the turbidity sensor located downstream of the WFUFB mixing zone ranged from 0.0–0.9 NTU, while daily maximum turbidity values ranged from 0.0–5.4 NTU. The daily maximum value of 5.4, recorded at 08:30 hrs on 10/4, was 0.4 NTU above background turbidity recorded at the Wanapum forebay sensor (0.0 at 8:00 hrs on 10/4). Because this value was only 0.4 NTU above background and because subsequent hourly values were below 5.0 NTU, in-water excavation was not stopped.

4.4 Turbidity Data Downstream of Mixing Zone: Month 2 of 2007

During the second month of in-water excavation in 2007, daily mean turbidity values from the turbidity sensor located downstream of the WFUFB mixing zone ranged from 0.0–0.1.3 NTU, while daily maximum turbidity values ranged from 0.0–3.6 NTU.

Table 1 Daily summary data for turbidity monitoring associated with the Wanapum Dam Future Unit Fish Bypass construction and in-water excavation during the first month of monitoring. All values are in NTU.

	Mean		Maximum		Minimum		Standard Deviation	
Date	DMZ	WANF	DMZ	WANF	DMZ	WANF	DMZ	WANF
10/1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10/3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10/4	0.9	0.0	5.4	0.0	0.0	0.0	1.6	0.0
10/5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10/6	0.3	0.0	3.8	0.0	0.0	0.0	0.3	0.0
10/7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10/8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10/9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10/10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10/11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10/12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10/13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10/14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10/15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10/16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10/17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10/18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10/19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10/20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10/21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10/22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10/23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10/24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10/25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10/26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

10/27	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10/28	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10/29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10/30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Note: WANF = Wanapum forebay, DMZ = Downstream of mixing zone								

Table 2 Daily summary data for turbidity monitoring associated with the Wanapum Dam Future Unit Fish Bypass construction and in-water excavation during the second month of monitoring. All values are in NTU.

	Mean		Maximum		Minimum		Standard Deviation	
Date	DMZ	WANF	DMZ	WANF	DMZ	WANF	DMZ	WANF
10/31	0.0	1.6	0.0	1.8	0.0	1.4	0.0	0.1
11/1	0.8	1.9	1.3	2.4	0.6	1.4	0.2	0.2
11/2	0.0	1.6	0.0	1.8	0.0	1.5	0.0	0.1
11/3	0.0	1.8	0.0	2.1	0.0	1.6	0.0	0.1
11/4	1.0	1.6	1.2	1.9	0.4	1.4	0.1	0.1
11/5	1.1	1.7	1.3	2.1	1.0	1.5	0.1	0.2
11/6	0.0	1.7	0.0	2.9	0.0	1.3	0.0	0.4
11/7	0.0	2.9	0.0	4.9	0.0	1.6	0.0	1.4
11/8	0.0	4.2	0.0	4.6	0.0	3.9	0.0	0.2
11/9	0.0	4.1	0.0	4.3	0.0	3.9	0.0	0.1
11/10	0.0	4.2	0.0	6.1	0.0	3.9	0.0	0.4
11/11	0.0	4.0	0.0	4.2	0.0	3.8	0.0	0.1
11/12	0.0	4.1	0.0	4.7	0.0	3.8	0.0	0.2
11/13	0.0	4.2	0.0	4.5	0.0	3.8	0.0	0.2
11/14	0.0	3.8	0.0	4.1	0.0	3.6	0.0	0.1
11/15	0.0	3.9	0.0	4.4	0.0	3.7	0.0	0.1
11/16	0.1	3.8	1.4	4.1	0.0	3.7	0.3	0.1
11/17	0.1	3.8	1.3	4.5	0.0	3.6	0.3	0.2
11/18	0.0	3.8	0.2	4.7	0.0	3.6	0.1	0.2
11/19	0.3	3.7	0.0	3.9	0.0	3.6	0.0	0.1
11/20	1.3	3.7	3.6	3.9	0.0	3.6	0.7	0.1
11/21	0.0	3.8	0.0	4.1	0.0	3.6	0.0	0.1
11/22	0.0	3.7	0.0	4.0	0.0	3.4	0.0	0.1
11/23	0.0	3.7	0.0	3.7	0.0	3.7	0.0	0.1
Note: WANF = Wanapum forebay, DMZ = Downstream of mixing zone								

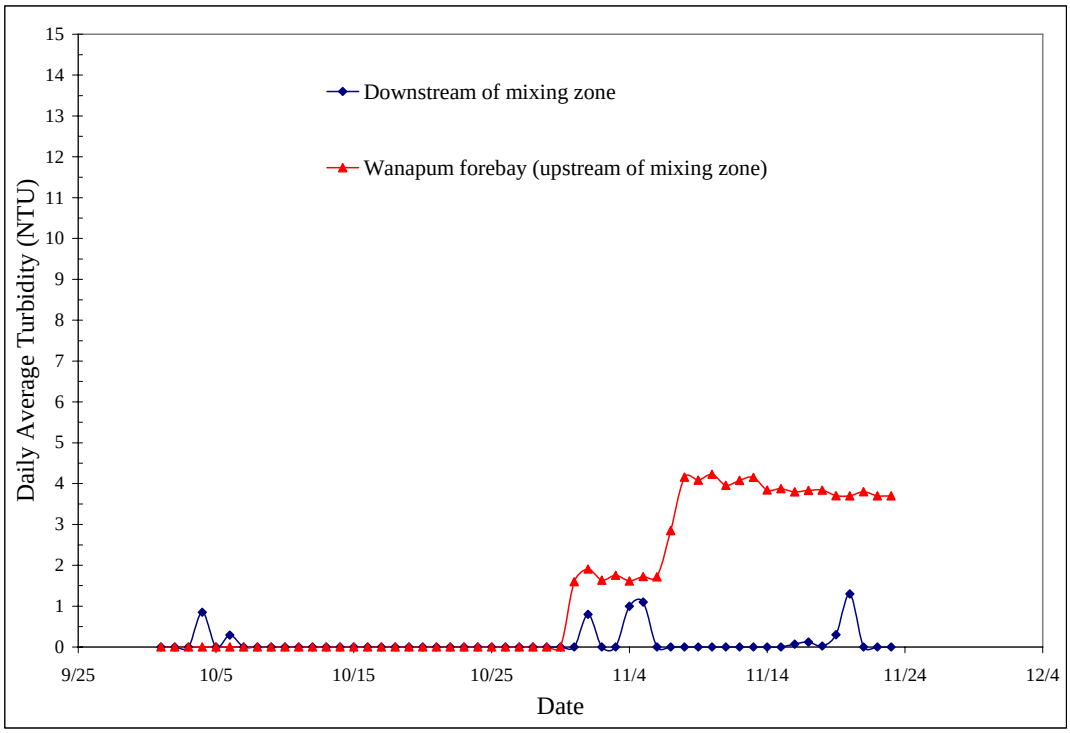

Figure 1 **Daily mean turbidity values from the Wanapum forebay and downstream of in-water excavation mixing zone. Priest Rapids Project, Mid-Columbia River, WA.**

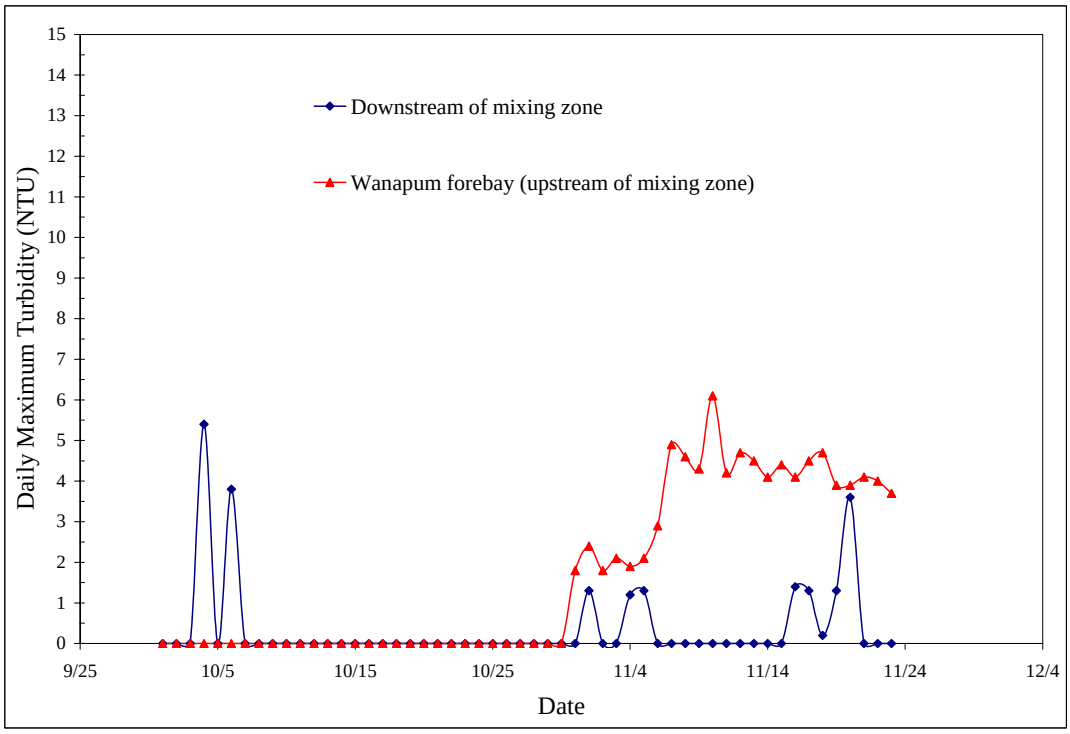

Figure 2 **Daily maximum turbidity values from the Wanapum forebay and downstream of in-water excavation mixing zone. Priest Rapids Project, Mid-Columbia River, WA.**

5.0 Conclusions

During the first and second months of in-water excavation conducted in 2007 associated with the construction of the WFUFB, turbidity levels were within WDOE water quality criteria, with the exception of one hourly value that was 0.4 NTU above upstream/background conditions during the first month. All other hourly turbidity values were below 5.0 NTU during these two months of monitoring. Grant PUD will continue to monitor turbidity levels upstream of the construction area to determine background turbidity values and downstream of the mixing zone to determine potential variances from water quality standards. Per section C2 of the WDOE 401 certification, if no variances from water quality standards are noted, Grant PUD will submit monthly monitoring reports to WDOE for the remainder of the term of in-water excavation activities.

LIST OF LITERATURE

Duvall, D., M. and T. J. Dresser, 2003. Fixed Site Water Quality Monitors, Maintenance and Calibration Procedures, and Quality Assurance Methods. Public Utility District No. 2 of Grant County, Ephrata, WA. Final License Application Technical Appendix E-3.F.

Hydro-Lab Corporation, 2002. DataSonde 4 and MiniSonde User's Manual, Revision G. Tech Note 204, Parameter Specifications.

Juul, S. T. J. 2003. An Assessment of Selected Water Quality Parameters for the Priest Rapids/Wanapum Dam Hydroelectric Project. Public Utility District No. 2 of Grant County, Ephrata, WA. Final License Application Technical Appendix E-3.B.

National Oceanic & Atmospheric Administration (NOAA) Fisheries Service, 2004. Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Consultation. Interim Protection Plan for Operation of the Priest Rapids Hydroelectric Project FERC Project No. 2114.

Public Utility District No. 2 of Grant County, WA. 2003. Priest Rapids Hydroelectric Project No. 2114. Final License Application, October 2003.