

Submitted via Water Quality Permitting Portal – Permit Submittals application

November 20, 2023

Keith Primm - Water Quality Permit Coordinator
Department of Ecology - Central Regional Office
1250 West Alder Street
Union Gap, WA 98903

**RE: Priest Rapids Dam National Pollutant Discharge Elimination System Permit No. WA0991029
(S11): Flow and Temperature Monitoring Plan**

Dear Mr. Primm:

Please find enclosed Grant County Public Utility District's Flow and Temperature Monitoring Plan, consistent with Section S11 of the National Pollutant Discharge Elimination System Permit for Priest Rapids Dam.

If you have any questions, please contact me at 509-793-1468 or rhendr1@gcpud.org.

Respectfully,

Ross Hendrick
Senior Manager – Environmental Affairs

CC: Mr. Damon Roberts – Ecology CRO
Mr. Erik Van Doren – Ecology CRO

Flow and Temperature Monitoring Plan

Priest Rapids Dam – Permit No. WA0991029

By
Public Utility District No. 2 of Grant County
P.O Box 878
Ephrata, WA 98823

November 2023

Table of Contents

1.0	Introduction.....	1
2.0	Outfall Monitoring.....	2
2.1	Cooling Water Discharges	2
2.1.1	Flow	2
2.1.2	Temperature	4
2.1.3	Cooling Water Discharge Reporting.....	5
2.2	Left and Right Bank Sump Discharges.....	5
2.2.1	Flow	5
2.2.2	Temperature	7
2.2.3	Left and Right Bank Sump Reporting	7
3.0	Preventative Maintenance.....	7
	Literature Cited	8

List of Figures

Figure 1	Priest Rapids Dam Upgraded Units Cooling Water Flow Instruments. The Meriam 1226 bellows differential pressure indicators are on the left, while the Rosemount 1151 pressure transducer is on the right.	3
Figure 2	Priest Rapids Dam Units Awaiting Upgrades Cooling Water Flow Instruments. The older Barton 211 differential pressure units are on the left, while the Rosemount 1151 pressure transducer is on the right.	3
Figure 3	An RTD/Thermowell mounted on unit 9 (PR003) at Priest Rapids Dam to monitor cooling water discharge temperatures. A Rosemount 214c resistance temperature detector (RTD) are installed inside a Rosemount 114c thermowell mounted on the cooling water discharge pipe.	4
Figure 4	Example of an original equipment manufacturer operation pump curve calculation used to determine discharge rates for the station sump pumps at Priest Rapids Dam Left Bank (Station) Sump.	5
Figure 5	Example of the data used to calculate discharge values for each sump at Priest Rapids Dam based off pump runtime hours, various elevations, and the original equipment manufacturer pump curves.....	6

List of Abbreviations

CWA	Clean Water Act
FERC	Federal Energy Regulatory Commission
Grant PUD	Public Utility District No. 2 of Grant County, Washington
NPDES	National Pollutant Discharge Elimination System
WDOE	Washington Department of Ecology
WQC	water quality certification

1.0 Introduction

Public Utility District No. 2 of Grant County, Washington (Grant PUD) owns and operates the Priest Rapids Hydroelectric Project (Project). The Project is licensed as Project No. 2114 by the Federal Energy Regulatory Commission (FERC) and includes the Wanapum and Priest Rapids developments. A Clean Water Act (CWA) Section 401 water quality certification (WQC) for the operation of the Project was issued by the Washington Department of Ecology (WDOE) on April 3, 2007 (WDOE 2007), amended on March 6, 2008, and effective on issuance of the FERC license to operate the Project in April of 2008 (FERC 2008).

In May of 2019, Grant PUD requested coverage under the National Pollutant Discharge Elimination System (NPDES) permit for both Wanapum and Priest Rapids dams to address potential discharges of pollutants, including potential discharges from drainage sumps, unwatering sumps, drains, turbines, wicket gate bearings and other potential lubricant contact points, and discharges of the cooling water systems. Grant PUD received a NPDES permit from the WDOE for Priest Rapids Dam in July of 2022, with an effective date of September 1, 2022 (WDOE 2022).

Section 11 of the NPDES permit specifies a flow and temperature monitoring plan (plan) be developed to ensure compliance with the heat load limits at the facility. Included within this plan are details on the continuous monitoring for temperature at each outfall and flows at each cooling water discharge location. Additionally, the plan outlines outfall specific flow monitoring methods and calculations used to generate flows discharged from the sumps.

The plan provides details on the following:

- For each cooling water discharge outfall (PR002 – PR011)
 - Flow monitoring device location and information
 - Continuous temperature monitoring location and device information
 - Data collection/reporting
- For each sump outfall (Priest Rapids Right-Bank Station Sump (PR001), Left-Bank Station Sump (PR012), and Left-Bank Pumphouse Sump (PR013))
 - Flow calculation information
 - Continuous temperature monitoring location and device information
 - Data collection/reporting
- Preventative Maintenance
 - Additional details on the preventative maintenance measures in place for the instruments outlined in this plan are included in Grant PUD's *Operation and Maintenance Manual* (O&M manual; Grant PUD 2023) as submitted for the Priest Rapids Dam NPDES permit.

2.0 Outfall Monitoring

The following sections describe the information associated with the devices, or the description of the calculations used to monitor/report flow and temperature for the outfalls at Priest Rapids Dam.

2.1 Cooling Water Discharges

Non-contact river water is the primary source used to cool the ten generating units within Priest Rapids Dam. The sections below detail information related to monitoring of flow and temperature at Priest Rapids Dam's cooling water discharge locations (P002 – P011).

2.1.1 Flow

Each of the ten generating units at Priest Rapids Dam have a series of pressure transmitters that measure flow rates from three cooling water sources.

Flow rates for each source are measured using Barton orifice plates with a combination of a Meriam 1226 bellows differential pressure indicators on upgraded units (one for thrust bearing and one for turbine guide bearing cooling water) and a Rosemount 1151 pressure transmitters (for the generator cooling water). The combined flow rates from these three transducers make up the total discharge from each non-contract cooling water source. This flow monitoring system is found on the upgraded unit at outfalls PR003, PR005, PR009 and PR010. Figure 1 below illustrates the pressure transmitter instruments installed at Priest Rapids Dam at the outfalls listed above.

Units that are awaiting upgrade have an older Barton 211 differential pressure units for the thrust bearing and turbine guide bearing cooling water flow rates. These older units have the same Rosemount 1151 pressure transmitters as the upgraded units (for the generator cooling water). This flow monitoring system is found on the units awaiting upgrades at outfalls PR002, PR004, PR006 – PR008, and PR011. Figure 2 below displays the pressure transmitter instruments installed at Priest Rapids Dam at the outfalls listed above.

See the O&M manual (Grant PUD 2023) for additional information related to the Barton orifice plate, Meriam 1226, Barton 211, and Rosemount 1151 pressure transmitters.



Figure 1 Priest Rapids Dam Upgraded Units Cooling Water Flow Instruments. The Meriam 1226 bellows differential pressure indicators are on the left, while the Rosemount 1151 pressure transducer is on the right.



Figure 2 Priest Rapids Dam Units Awaiting Upgrades Cooling Water Flow Instruments. The older Barton 211 differential pressure units are on the left, while the Rosemount 1151 pressure transducer is on the right.

2.1.2 Temperature

The cooling water discharge temperatures are monitored using a Rosemount 214c resistance temperature detector (RTD) that are installed inside a Rosemount 114c thermowell mounted on the cooling water discharge outfall piping. Figure 3 below shows the RTD/thermowell mounted on the cooling water discharge pipe at Priest Rapids Dam Unit 9 (PR003). The identical water temperature monitoring system is used at the remaining generating units at Priest Rapids Dam. See the O&M manual for additional information related to the Rosemount 214c RTDs and Rosemount 114c thermowells.



Figure 3 An RTD/Thermowell mounted on unit 9 (PR003) at Priest Rapids Dam to monitor cooling water discharge temperatures. A Rosemount 214c resistance temperature detector (RTD) is installed inside a Rosemount 114c thermowell mounted on the cooling water discharge pipe.

2.1.3 Cooling Water Discharge Reporting

The continually monitored data for the cooling water discharge locations are stored/captured within the Ovation™ Enterprise Data Solutions (EDS) for Priest Rapids Dam. The EDS allows Grant PUD to store the continuously monitored data and to generate a report for review and incorporation into the Priest Rapids Dam monthly discharge monitoring reports (DMRs) to satisfy Section 3A of the NPDES permit.

2.2 Left and Right Bank Sump Discharges

Each section below details information related to the calculations/monitoring for flow and temperature at the left and right bank sumps at Priest Rapids Dam (PR001, PR012 and PR013).

2.2.1 Flow

The discharge rates for each sump are calculated using a combination of the pump runtime data, the original equipment manufacturer (OEM) pump curves, and various elevations. The net head of the sump pumps are determined from the elevation data (sump vs. tailrace elevation = net head) and used to calculate the discharge rate from the OEM pump curve. Figure 4 below demonstrates an example of an OEM pump curve used for the discharge calculation, while Figure 5, on the following page, details the calculations worksheet used to determine discharge rates from each sump during a specified timeframe at Priest Rapids Dam.

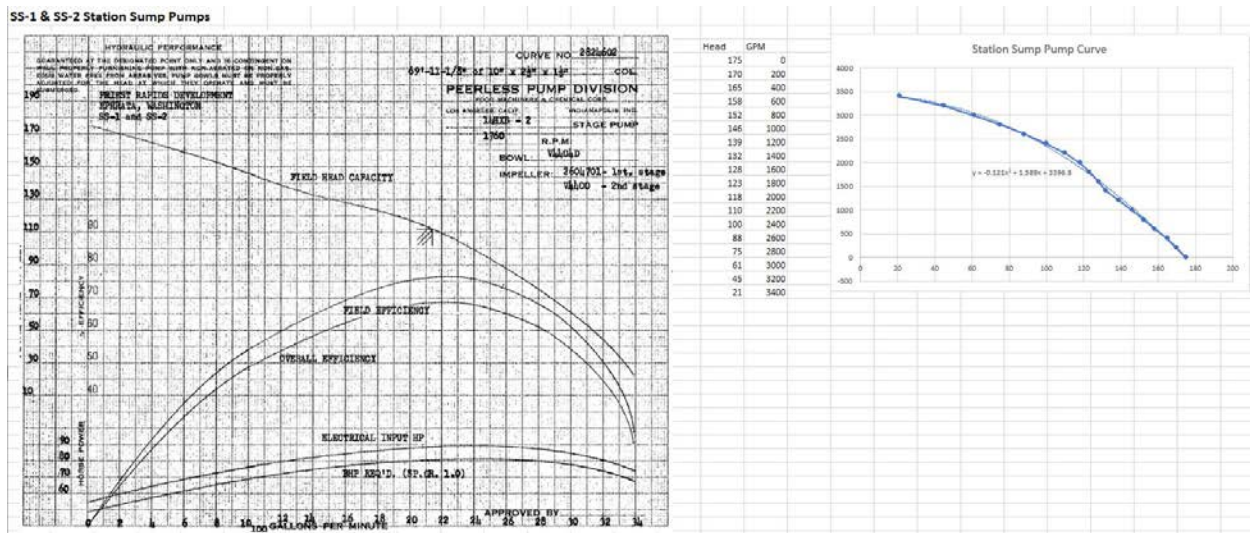


Figure 4 Example of an original equipment manufacturer operation pump curve calculation used to determine discharge rates for the station sump pumps at Priest Rapids Dam Left Bank (Station) Sump.

2.2.2 Temperature

Currently, the water temperatures at the Priest Rapids Dam sumps are collected via grab sample using a Traceable® Platinum High-Accuracy Thermometer with a stainless-steel probe (Model #6410). For additional information on the sampling or the sampling instrument see Appendix B of the O&M manual (Grant PUD 2023).

On or before September 1, 2024, the continuous monitoring deadline, each sumps water temperatures will be monitored using a Novalynx 270-WQEXC temperature sensor that will be submerged in the sump at the same approximate elevation as the suction elevation for the sump pumps. See the O&M manual for additional information related to the Novalynx 270-WQEXC temperature sensor.

2.2.3 Left and Right Bank Sump Reporting

In the short term, and prior to the installation of the continuous monitoring system for flow and temperature (in place prior to September 1, 2024), Grant PUD will use a combination of vibration sensing hour meters and pump elevation data to calculate the flow from each sump. Temperature will be collected via grab sample for each sump. These values are captured into a spreadsheet and included in the monthly DMRs for each outfall.

By or before the continuous monitoring deadline (September 1, 2024) the flow and temperature data from the left and right bank sumps will be stored/captured within the EDS for Priest Rapids Dam. Continually monitored data for the sumps will include the following information:

- Sump Pump Runtime Data (minutes)
- Tailwater Elevation (ft.)
- Sump Water Elevation (ft.)
- Sump Water Temperature (°C)

The EDS allows Grant PUD to store the continuously monitored data and to generate a report for review and incorporation into the Priest Rapids Dam monthly discharge monitoring reports (DMRs) to satisfy Section 3A of the NPDES permit.

3.0 Preventative Maintenance

Additional details on the preventative maintenance measures in place for the instruments outlined in this plan are included in Grant PUD's O&M manual (Grant PUD 2023) as submitted for the Priest Rapids Dam NPDES permit.

Literature Cited

FERC (Federal Energy Regulatory Commission). 2008. Order Issuing New License for Public Utility District No. 2 of Grant County, 123 FERC ¶ 61,049, Washington D.C.

Grant PUD. 2023. Operation and Maintenance Manual. Submittal for the Priest Rapids Dam National Pollutant Discharge Elimination System Permit No. WA0991029. December 1, 2023.

WDOE (Washington Department of Ecology). 2007. Section 401 Water Quality Certification Terms and Conditions for the Priest Rapids Hydroelectric Project, FERC Project No. 2114, Spokane, Washington.

WDOE. 2022. National Pollutant Discharge Elimination System Waste Discharge Permit No. WA0991029. September 1, 2022. Issued to the Public Utility District No. 2 of Grant County, WA for operation of Priest Rapids Dam.