Wisconsin Public Service Corporation
700 North Adams Street
Green Bay, WI 54301
www.wisconsinpublicservice.com

October 12, 2021

Ms. Cheryl Laatch
Wisconsin Department of Natural Resources
Office of Energy, Water Management Specialist
101 S. Webster St.
Madison, WI 53703

Dear Ms. Laatch:

Re: Peshtigo River Hydroelectric Projects – 2021 Water Quality Monitoring Report

Hydro	FERC Project No.	NATDAM No.	License Article
Caldron Falls	**2525**	**WI00759**	**409**
High Falls	**2595**	**WI00754**	**406**
Johnson Falls	**2522**	**WI00785**	**407**
Sandstone Rapids	**2546**	**WI00760**	**408**
Potato Rapids	**2560**	**WI00757**	**406**
Peshtigo	**2581**	**WI00756**	**405**

Pursuant to the water quality monitoring plans for the Wisconsin Public Service (WPS) Hydroelectric facilities along the Peshtigo River, WPS is submitting water quality monitoring data collected during the 2021 monitoring season for your review and comment.

Monitoring for dissolved oxygen (DO), temperature, and pH was conducted continuously on an hourly basis from June 1 through September 30. The water quality monitoring plan requirements at all facilities except Johnson Falls are as follows:

Ensure flow releases from the project, as measured immediately downstream from the dam and maintain the following standards, except when natural conditions prohibit attainment of the standards:

(1) Dissolved Oxygen concentrations shall not be less than 5.0 milligrams per liter (mg/L) (minus the precision of the monitoring equipment) for more than 24 hours per year;
(2) Water temperature shall not exceed 89 degrees Fahrenheit (°F), and;
(3) The pH shall be within the range of 6.0 to 9.0 standard units (s.u.), with no change greater than 0.5 units outside the natural seasonal maximum and minimum.

Natural conditions include inflows to the project less than the 95 percent exceedances flow.

At the Johnson Falls Hydroelectric Project, the water quality monitoring plan requirements are as follows:

Ensure flow releases from the project, as measured immediately downstream from the dam and maintain the following standards, except when natural conditions prohibit attainment of the standards:

(1) DO concentrations shall not be less than 6.0 milligrams per liter (mg/L) at any time or 7.0 mg/L during the spawning season (minus the precision of the monitoring equipment) for more than 24 hours per year;
(2) Water temperature shall not be altered from natural background to the extent that trout populations are adversely affected, and
(3) The pH shall be within the range of 6.0 to 9.0, with no change greater than 0.5 units outside the estimated natural seasonal maximum and minimum.

During the 2021 monitoring season, data was collected using portable water quality monitoring equipment manufactured by YSI, Inc. As described in the water quality monitoring plans for the projects, the instrumentation was cleaned and calibrated according to manufacturer specification every 14 days during the monitoring period. A post deployment calibration of the DO sensor was conducted to determine the extent of calibration drift. Raw data was adjusted assuming a linear degradation of calibration based upon a post calibration of the equipment. The water quality monitoring equipment used to monitor DO has an accuracy of +/- 0.1 mg/l, per the manufacturer. For compliance purposes, DO concentrations more than 0.1 mg/l below the applicable water quality standard are potential deviations. The following is a summary of the results for the 2021 monitoring season:

Caldron Falls Hydroelectric Project

Water quality monitoring at the Caldron Falls Hydroelectric project was conducted at the following locations:

- Upstream monitoring shall consist of bi-monthly DO, temperature, and pH profiles of the Caldron Falls Reservoir. Readings were taken at 0.5 meter intervals just above the dam near the powerhouse intake.
- Monitoring downstream of the Project shall occur approximately 770’ downstream of the powerhouse in a location that is unaffected by changes in water elevation due to fluctuations in release flow volumes (NW ¼ of NE ¼, T33N, R18E, Section 10, approximately at 88° 13’ 39.9”N, 45° 21’ 25.7”W).

Vertical profiles conducted near the powerhouse intake showed that the reservoir exhibited characteristics of stratification from mid-June through the end of August. Profile data from September 7, 2021 indicates the reservoir was no longer stratified.

No deviations from the DO, pH or temperature standards were observed at the downstream monitoring location. The lowest DO concentration observed during the monitoring season was 5.4 mg/l, pH values

ranged between 7.5 s.u. and 8.4 s.u., and water temperatures were less than 77°F. Please note that historical monitoring data indicated periods of low DO levels typically occur between July 15 and September 1. Therefore, in accordance with the Water Quality Monitoring Plan, on an annual basis WPS releases a minimum flow of 56 CFS out of a sluice gate to mitigate low DO concentrations downstream of the facility during the time period between July 15 and September 1. In 2021 WPS began releasing aeration flow through the sluice gate on July 15 and continued to release 56 cfs through a gate until October 1.

High Falls Hydroelectric Project

Water quality monitoring at the High Falls Hydroelectric project was conducted at the following locations:

- Upstream monitoring occurs on a five-year basis and is conducted with the same equipment utilized for the downstream monitoring of the Caldron Falls project.
- The downstream monitoring equipment shall be located on the High Falls Road Bridge near the middle of the river.

During the monitoring season, there were no deviations no deviations from the DO, pH or temperature water quality standards were observed at the upstream or downstream monitoring locations during the monitoring season. The lowest DO concentration observed during the monitoring season was 5.1 mg/l, pH values ranged between 7.3 s.u. and 8.1 s.u., and water temperatures were less than 78°F.

In response to decreasing DO levels downstream of the Project, WPS began releasing aeration flow through a spillway gate on July 23 and continued to provide aeration flow for the remainder of monitoring season except for a short period on August 6 from 09:50 to 13:15.

Johnson Falls Hydroelectric Project

Water quality monitoring at the Johnson Falls Hydroelectric project was conducted at the following locations:

- At the Johnson Falls Hydroelectric Project, upstream monitoring is conducted with the same equipment as the downstream monitor at High Falls.
- The downstream monitor at Johnson Falls is located in the tailrace, approximately 15 feet downstream of the powerhouse.

No deviations from the DO or pH water quality standards were observed during the monitoring season. The lowest DO concentration observed during the monitoring season was 6.0 mg/l and pH values ranged between 7.3 s.u. and 8.1 s.u.. At the time of the low DO readings, the facility was in run-of-river operation and DO concentrations of 8.1 mg/l were observed before and after the low reading. A review of plant operational data did not show any changes in operation or release flow rates that could have caused or contributed to the low reading.

A comparison of water temperatures between the upstream monitoring location (High Falls tailrace) and the Johnson Falls tailrace monitoring location shows the tailrace temperatures were equal to or slightly lower than the temperatures observed at the upstream monitoring location. This suggests the water temperature was not altered from the natural background to the extent that trout populations may have been adversely affected.

Sandstone Rapids Hydroelectric Project

Water quality monitoring at the Sandstone Rapids Hydroelectric project was conducted at the following locations:

- The upstream monitoring is conducted with the same equipment as the downstream monitor at Johnson Falls.
- The downstream monitor at Sandstone Rapids is located in the tailrace.

At the Sandstone monitoring location, no deviations from the DO, pH or temperature water quality standards were observed during the monitoring season. All DO readings were above 6.9 mg/l, pH values fluctuated between 7.7 s.u. and 8.2 s.u., and water temperatures did not exceed 77°F.

Potato Rapids Hydroelectric Project

Water quality monitoring at the Potato Rapids Hydroelectric project was conducted at the following locations:

- Upstream monitoring shall consist of bi-monthly DO, temperature, and pH profiles of the Potato Rapids Reservoir. Readings were taken at half (0.5) meter intervals just above the dam near the powerhouse intake.
- The downstream monitor is located in the tailrace below the dam

Profile data collected upstream of the powerhouse did not reveal stratification in the impoundment or potential deviations from the water quality standards. DO levels were above 7.0 mg/l at all depths and times. Downstream of the Potato Rapids powerhouse, no deviations from the DO, pH or temperature water quality standards were observed. All DO readings were above 5.8 mg/l, pH values fluctuated between 7.6 s.u. and 8.3 s.u., and water temperatures did not exceed 83°F.

At the tailrace monitoring location WPS did experience equipment failures that resulted in periods of missing data. A water quality monitor was deployed at the downstream location on May 26 and it suddenly stopped working on May 30. This resulted in a period of missing data from June 1 at 00:00 through June 2 and 12:00. The monitor was shipped to the manufacturer for evaluation and it was determined that a sensor on the sonde had failed which caused the sonde to malfunction and stop recording data. Prior to the equipment malfunction DO concentrations ranged between 9.3 mg/l and 9.8 mg/l, pH levels were between 7.8 and 7.9 s.u., and water temperatures were below 70°F. Monitoring data collected after the period of missing data indicated DO concentrations were above 8

mg/l, the water pH was fluctuating between 7.7 s.u. and 7.8 s.u., and water temperatures were less than 70°F. Therefore the monitoring data does not suggest there was a deviation from the applicable water quality standards during the period of missing data.

A second equipment malfunction occurred in September which resulted in intermittent periods of missing pH data between September 9 and September 22. All available pH data during this time period varied between 8.0 s.u. and 8.3 s.u.. No missing data or deviations from the DO and temperature standards were observed data during the time period of the intermittent missing pH data. Consequently, WPS does not believe there were any deviations from the pH water quality standards.

Peshtigo Hydroelectric Project

Water quality monitoring at the Peshtigo Hydroelectric project was conducted at the following locations:

- The upstream monitoring is conducted with the same equipment as the downstream monitor at Potato Rapids.
- The downstream monitor at Peshtigo Rapids is located in the tailrace.

No deviations from the DO, pH, or temperature water quality standards were observed during the 2021 monitoring season. All DO readings were above 5.4 mg/l, pH values fluctuated between 7.5 s.u. and 8.1 s.u., and water temperatures did not exceed 81°F.

Enclosed for your review are spreadsheets from each of the monitoring locations with the monitoring data for 2021 in tabular and graphical form. Please review the enclosed data and provide any comments you may have within 30 days of this letter. Should you have any questions or concerns, please do not hesitate to call me at (920) 433-1833.

Sincerely,

Mark Metcalf

Mark Metcalf
Environmental Consultant – Air & Water

Enc. 2021 Water quality monitoring data (20 spreadsheets)

cc: Mr. Mike Grisar
Mr. Bill Bosacki