



Upper Peninsula Power Company

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November 4, 2013

FERC Project No. 02506

NATDAM No. MI00167

Ms. Kimberly D. Bose, Secretary
The Federal Energy Regulatory Commission
888 First Street NE
Washington, DC 20426

Dear Secretary Bose:

2013 Water Quality Monitoring Report – Escanaba Dam 4

As per the Order Approving Modifications to Dissolved Oxygen Monitoring Plan under Article 415, dated March 9, 2005, Upper Peninsula Power Company (UPPCO) is pleased to submit water quality monitoring data collected below Escanaba River Hydroelectric Project Dam 4 for the 2013 monitoring year for your review and comment.

Dissolved oxygen concentration and water temperature of the Escanaba River is monitored approximately 600' downstream of the powerhouse from July 1st through August 31st. The dissolved oxygen standard downstream of Dam No. 4 (Boney Falls) is 7 mg/L. Currently there is no temperature standard. As described in the License and the water quality monitoring plan, UPPCO is monitoring dissolved oxygen on a real-time basis to ensure that stream flows downstream of Dam No. 4, as measured immediately downstream, maintain a DO concentration of 7.0 mg/l when 1) river discharges are greater than or equal to the 95th percent exceedance flow (i.e., 95 percent of historical flow rates are equal to or above a certain flow value) and 2) when the facility is not augmenting flow.

Monitoring data was collected at one-hour intervals continuously during the months of July and August. As described in the monitoring plan, the water quality monitoring equipment was cleaned and calibrated weekly during the month of July and at least bi-weekly in August. The calibration information was used to determine calibration drift that occurred since the previous calibration event. Please note that the water quality monitoring equipment has an accuracy of +/- 0.1 mg/l, per the manufacturer. In the event that the meter calibration had drifted by more than 0.1 mg/l between calibration events, the raw monitoring data is corrected assuming a linear degradation of calibration. Therefore, dissolved oxygen concentrations less than 6.9 mg/l are potential deviations from the water quality standard.

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There are no deviations from the dissolved oxygen water quality standard to note. On July 15th, the water quality monitor malfunctioned which resulted in non-representative dissolved oxygen readings to be recorded. The cause of the erroneous readings was a loose membrane on the dissolved oxygen sensor. As a result of the malfunction, non-representative DO readings were recorded between July 15th at 17:00 and July 16th at 12:00 when the monitor was repaired. At the time of the malfunction the Boney Falls reservoir was drawn down to an elevation below the spillway elevation. Consequently UPPCO was not able to release aeration flow to mitigate low DO levels when the malfunction occurred. However; when the non-representative DO readings were observed operators increased the release from the powerhouse in an effort to mitigate the low DO readings. On July 19th there were seven hourly readings of 6.9 mg/l. The likely cause of the lower dissolved oxygen readings was warm water temperatures. During the week of July 15th, air temperatures were in the 80's to low 90's. Water temperatures also increased with daily maximum temperatures above 80°F from July 15th through July 19th.

During the 2013 monitoring season the reservoir above Escanaba Dam 4 was drawn down season to support an embankment improvement project. The draw down was initiated on May 28th. The normal summertime midpoint elevation for the reservoir is 906'. For the past few years, the reservoir has been maintained approximately 4.67' below the midpoint while UPPCO investigated seepage through the impoundment embankments. This year, UPPCO drew down the reservoir to a target elevation of 891.7' to 892.3' to support the embankment improvement project. Note that the elevation of the spillway is 893.2'. Consequently, UPPCO primarily released water through the powerhouse during the monitoring season. Water was released through the spillway and powerhouse on July 1st through July 5th and July 26th through August 12th due to high river flow.

River flow as measured at the United States Geological Service (USGS) monitoring station in Cornell, MI (Station ID 04059000) was above the 95th percentile exceedance flow every day during the monitoring season. Flow augmentation was conducted for brief periods on August 21st, 22nd, and 28th. Flow augmentation is conducted in an attempt to mitigate warm water temperatures in the Escanaba River downstream of the powerhouse to protect the fishery under certain conditions. Under normal operation, when flow augmentation is conducted the volume of water released from the facility is increased to 150% of the river flow as measured at the USGS gauge in Cornell from 11:00 EST until 18:00 EST, and then reduced to 75% of the flow rate measured at the Cornell gauge when augmentation was initiated to refill the reservoir. As the reservoir was drawn down for embankment repair, the volume of water released through the units and the duration of the augmentation events was significantly restricted due to low water levels in the reservoir.

UPPCO provided the 2013 water quality monitoring data to the Michigan Department of Natural Resources (MDNR), Michigan Department of Environmental Quality (MDEQ), and the U.S. Fish and Wildlife Service (FWS) by e-mail on September 4th for review and comment. The agencies did not respond with comments on the 2013 water quality monitoring report for Escanaba Dam 4. A copy of correspondence with the resource agencies during the monitoring season can be found in the attached report.

Ms. Kimberly Bose, Secretary

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Should you have any questions or concerns with this submittal, please do not hesitate to call Mr. Mark Metcalf at (920) 433-1833.

Sincerely,



Terry P. Jensky

Vice President – Generation Assets

Wisconsin Public Service Corporation

MWM

Enc: 2013 Water Quality Monitoring Report

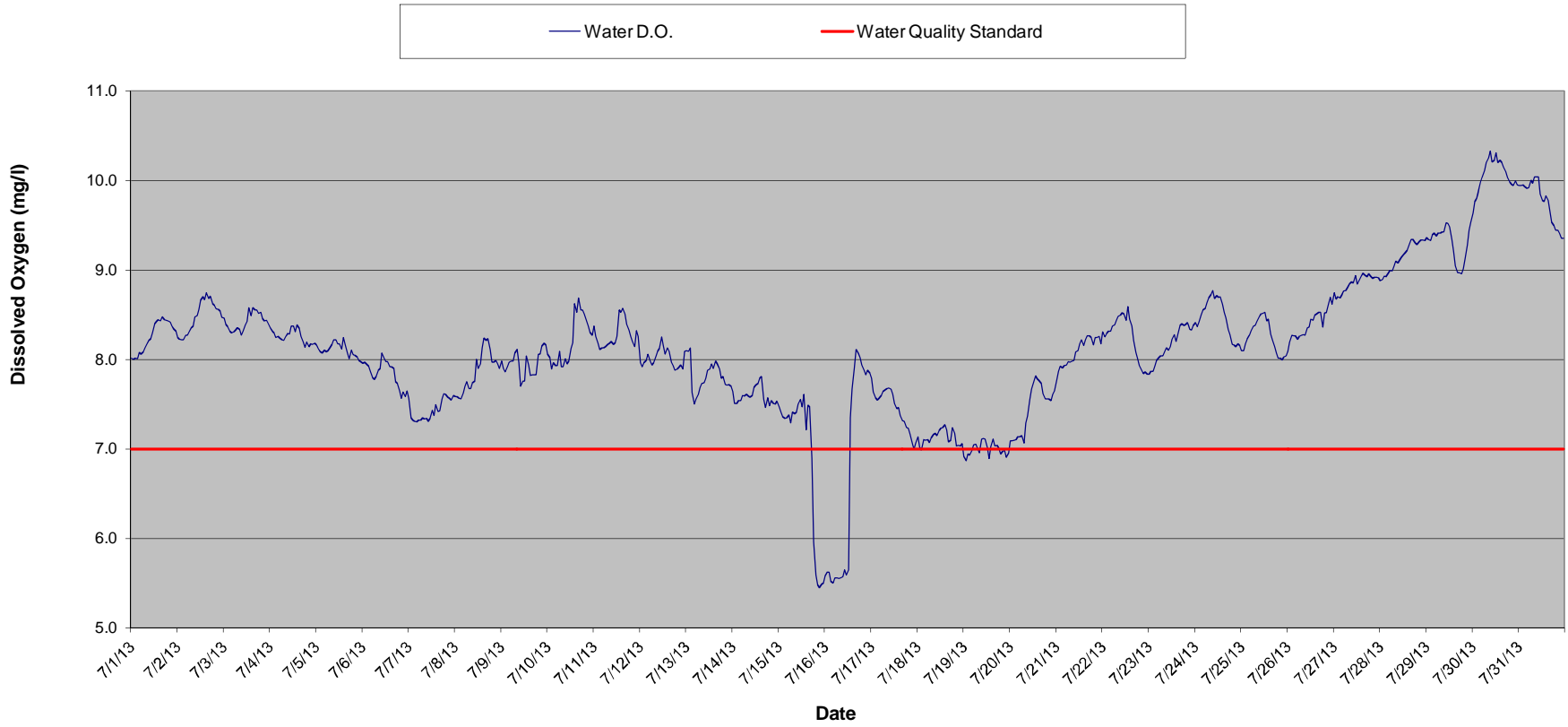
cc:	Mr. Gil Snyder, WPSC - D2	Mr. Robert Meyers, UPPCO - UISC
	Mr. Shawn Puzen, IBS - D2	Ms. Dianna Klemans - MDEQ
	Ms. Joan Johaneck, WPSC - D2	Mr. Gary Kohlhepp - MDEQ
	Mr. Burr Fisher - FWS	Mr. Koren Carpenter - MDEQ
	Mr. John Myers, IBS - D2	Mr. Kyle Kruger - MDNR
	Mr. Keith Moyle, UPPCO - UISC	Mr. John Zygaj, FERC - CRO
	Mr. Virgil Schlorke, UPPCO - UISC	Ms. Patricia Grant - FERC

UPPER PENINSULA POWER CORPORATION - ESCANABA DAM 4

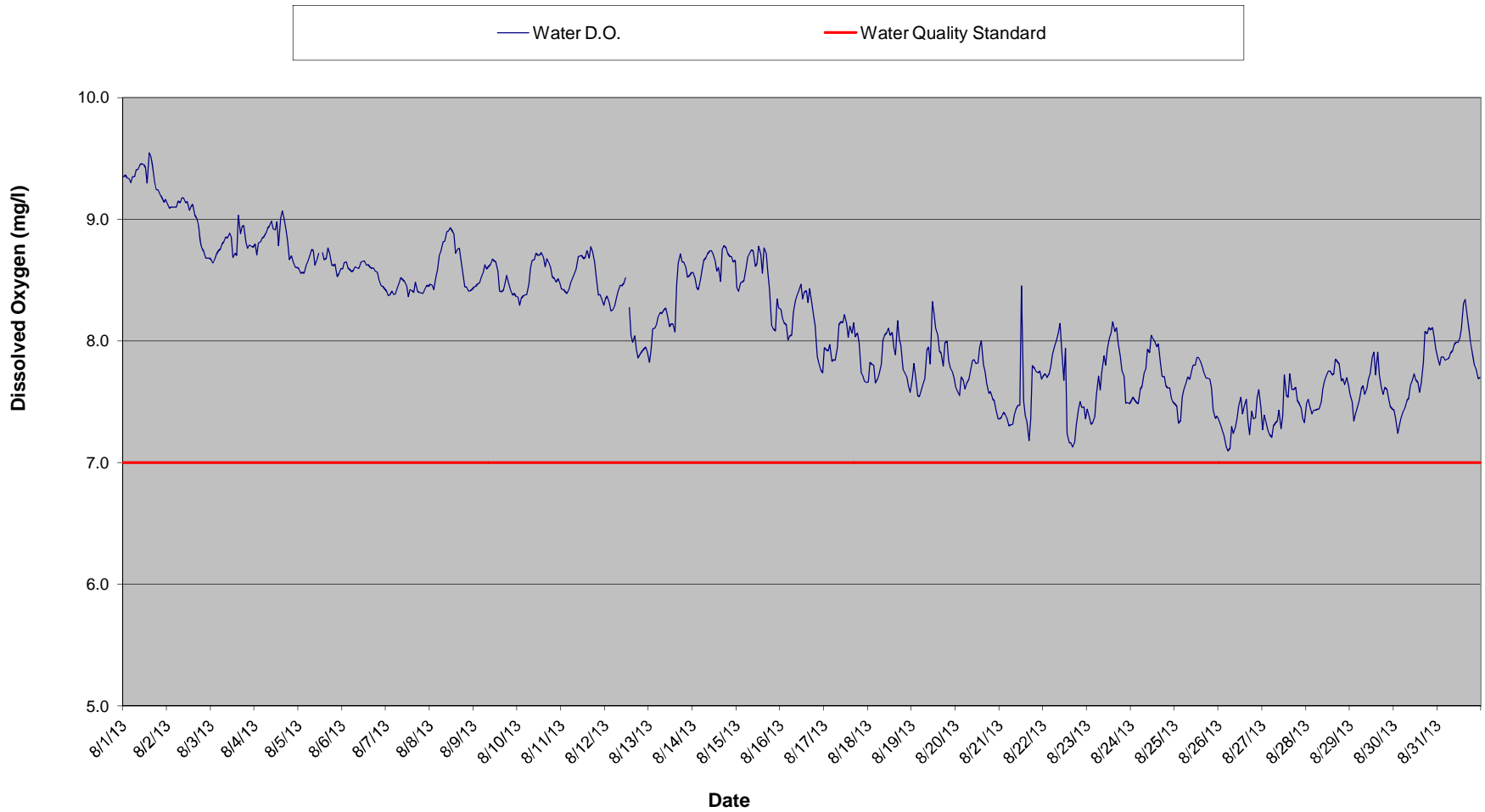
2013 Water Quality Monitoring Report

FERC Project No. 2506

Escanaba Dam 4 Dissolved Oxygen Summary - July 2013



Escanaba Dam 4 Dissolved Oxygen Summary - August 2013



Escanaba Dam 4 - July 2013 Dissolved Oxygen Monitoring Data

Time HHMMSS	07/01/13	07/02/13	07/03/13	07/04/13	07/05/13	07/06/13	07/07/13	07/08/13	07/09/13	07/10/13	07/11/13	07/12/13	07/13/13	07/14/13	07/15/13	07/16/13
0	8.0	8.2	8.5	8.4	8.2	8.0	7.6	7.6	8.0	8.1	8.4	8.0	8.1	7.6	7.5	5.6
10000	8.0	8.2	8.4	8.3	8.1	8.0	7.3	7.6	7.9	8.0	8.3	7.9	8.1	7.5	7.4	5.6
20000	8.0	8.2	8.4	8.3	8.1	8.0	7.3	7.6	7.9	7.9	8.2	8.0	8.1	7.5	7.4	5.6
30000	8.0	8.2	8.3	8.2	8.1	7.9	7.3	7.6	7.9	8.0	8.1	8.0	7.6	7.5	7.3	5.5
40000	8.1	8.3	8.3	8.3	8.1	7.9	7.3	7.6	8.0	7.9	8.1	8.1	7.5	7.5	7.4	5.5
50000	8.1	8.3	8.3	8.2	8.1	7.8	7.3	7.7	8.0	7.9	8.1	8.0	7.6	7.6	7.4	5.6
60000	8.1	8.3	8.3	8.2	8.1	7.8	7.3	7.8	8.0	8.1	8.1	7.9	7.6	7.6	7.3	5.6
70000	8.1	8.4	8.4	8.2	8.1	7.8	7.3	7.7	8.1	7.9	8.2	8.0	7.7	7.6	7.4	5.6
80000	8.2	8.4	8.3	8.3	8.2	7.9	7.3	7.7	8.1	7.9	8.2	8.0	7.7	7.6	7.4	5.6
90000	8.2	8.5	8.3	8.3	8.2	7.9	7.3	7.7	8.0	8.0	8.2	8.1	7.7	7.6	7.4	5.6
100000	8.2	8.5	8.3	8.3	8.2	8.1	7.3	7.8	7.7	8.0	8.2	8.1	7.8	7.6	7.5	5.7
110000	8.3	8.6	8.4	8.4	8.2	8.0	7.3	8.0	7.8	8.0	8.2	8.3	7.9	7.7	7.6	5.6
120000	8.4	8.7	8.4	8.4	8.2	8.0	7.4	7.9	7.8	8.1	8.3	8.2	7.9	7.7	7.5	5.7
130000	8.4	8.7	8.6	8.3	8.1	8.0	7.4	8.0	8.0	8.2	8.6	8.1	8.0	7.7	7.6	7.3
140000	8.4	8.7	8.5	8.4	8.2	7.9	7.5	8.1	7.9	8.6	8.5	8.1	7.9	7.8	7.2	7.7
150000	8.4	8.7	8.6	8.3	8.2	7.9	7.4	8.2	7.8	8.5	8.6	8.1	8.0	7.8	7.5	7.9
160000	8.5	8.7	8.6	8.3	8.1	7.9	7.4	8.2	7.8	8.7	8.5	8.0	8.0	7.6	7.5	8.1
170000	8.4	8.7	8.6	8.2	8.0	7.7	7.6	8.2	7.8	8.6	8.4	7.9	7.9	7.5	6.9	8.1
180000	8.4	8.6	8.5	8.1	8.1	7.7	7.6	8.1	7.8	8.6	8.3	7.9	7.8	7.6	6.0	8.0
190000	8.4	8.6	8.5	8.2	8.1	7.7	7.6	8.0	8.1	8.5	8.3	7.9	7.8	7.5	5.6	7.9
200000	8.4	8.6	8.5	8.1	8.0	7.6	7.6	8.0	8.1	8.4	8.2	7.9	7.7	7.5	5.5	7.9
210000	8.4	8.6	8.4	8.2	8.0	7.6	7.6	8.0	8.2	8.4	8.1	7.9	7.7	7.5	5.5	7.8
220000	8.3	8.5	8.4	8.2	8.0	7.6	7.5	8.0	8.2	8.3	8.3	7.9	7.7	7.5	5.5	7.9
230000	8.3	8.5	8.4	8.2	8.0	7.6	7.6	7.9	8.2	8.3	8.3	8.1	7.7	7.5	5.5	7.8
Daily Max	8.5	8.7	8.6	8.4	8.2	8.1	7.6	8.2	8.2	8.7	8.6	8.3	8.1	7.8	7.6	8.1
Daily Min	8.0	8.2	8.3	8.1	8.0	7.6	7.3	7.6	7.7	7.9	8.1	7.9	7.5	7.5	5.5	5.5
Average	8.3	8.5	8.4	8.3	8.1	7.8	7.4	7.9	8.0	8.2	8.3	8.0	7.8	7.6	6.9	6.6

License Minimum Dissolved Oxygen: 7.0 mg/l

Equipment malfunction - Data not representative of actual conditions.

Escanaba Dam 4 - July 2013 Dissolved Oxygen Monitoring Data

Time HHMMSS	07/17/13	07/18/13	07/19/13	07/20/13	07/21/13	07/22/13	07/23/13	07/24/13	07/25/13	07/26/13	07/27/13	07/28/13	07/29/13	07/30/13	07/31/13
0	7.8	7.1	6.9	7.1	7.8	8.3	7.8	8.4	8.1	8.1	8.7	8.9	9.4	9.6	9.9
10000	7.6	7.0	6.9	7.1	7.9	8.3	7.9	8.4	8.1	8.2	8.7	8.9	9.3	9.8	9.9
20000	7.6	7.0	6.9	7.1	7.9	8.3	7.9	8.4	8.2	8.3	8.7	8.9	9.3	9.8	10.0
30000	7.5	7.1	6.9	7.1	7.9	8.3	7.9	8.5	8.2	8.3	8.7	8.9	9.4	9.9	9.9
40000	7.6	7.1	7.0	7.1	7.9	8.3	8.0	8.6	8.3	8.3	8.7	9.0	9.4	10.0	9.9
50000	7.6	7.1	7.0	7.1	7.9	8.4	8.0	8.6	8.3	8.2	8.8	9.0	9.4	10.0	9.9
60000	7.6	7.1	7.1	7.1	8.0	8.4	8.0	8.6	8.4	8.3	8.8	9.0	9.4	10.1	10.0
70000	7.7	7.1	7.0	7.1	8.0	8.4	8.0	8.7	8.4	8.3	8.8	9.0	9.4	10.2	10.0
80000	7.7	7.2	7.0	7.3	8.0	8.5	8.1	8.7	8.4	8.3	8.8	9.1	9.4	10.3	10.0
90000	7.7	7.2	7.1	7.4	8.0	8.5	8.1	8.8	8.5	8.3	8.9	9.1	9.4	10.3	10.0
100000	7.7	7.1	7.1	7.5	8.1	8.5	8.1	8.7	8.5	8.4	8.9	9.1	9.5	10.2	10.0
110000	7.6	7.2	7.1	7.7	8.1	8.5	8.1	8.7	8.5	8.4	8.9	9.1	9.5	10.2	9.8
120000	7.5	7.2	7.0	7.7	8.2	8.4	8.2	8.7	8.5	8.5	8.8	9.2	9.5	10.3	9.8
130000	7.5	7.2	6.9	7.8	8.2	8.6	8.3	8.7	8.4	8.4	8.9	9.2	9.3	10.2	9.8
140000	7.5	7.3	7.0	7.8	8.2	8.5	8.2	8.6	8.4	8.5	8.9	9.2	9.2	10.2	9.8
150000	7.4	7.2	7.1	7.8	8.2	8.4	8.3	8.5	8.3	8.5	9.0	9.3	9.0	10.2	9.8
160000	7.3	7.1	7.0	7.7	8.3	8.2	8.4	8.5	8.2	8.5	8.9	9.3	9.0	10.1	9.7
170000	7.3	7.1	7.0	7.6	8.3	8.1	8.4	8.3	8.1	8.5	8.9	9.3	9.0	10.1	9.5
180000	7.2	7.2	7.0	7.6	8.2	8.0	8.4	8.3	8.1	8.4	9.0	9.3	9.0	10.0	9.5
190000	7.2	7.2	6.9	7.6	8.2	7.9	8.4	8.2	8.0	8.5	8.9	9.3	9.0	10.0	9.4
200000	7.2	7.0	7.0	7.6	8.2	7.9	8.4	8.2	8.0	8.5	8.9	9.3	9.1	10.0	9.4
210000	7.1	7.0	7.0	7.5	8.2	7.8	8.3	8.1	8.0	8.6	8.9	9.3	9.3	9.9	9.4
220000	7.0	7.0	6.9	7.6	8.3	7.9	8.3	8.2	8.0	8.7	8.9	9.3	9.4	10.0	9.4
230000	7.1	7.1	7.0	7.6	8.2	7.8	8.4	8.2	8.0	8.6	8.9	9.3	9.5	10.0	9.4
Daily Max	7.8	7.3	7.1	7.8	8.3	8.6	8.4	8.8	8.5	8.7	9.0	9.3	9.5	10.3	10.0
Daily Min	7.0	7.0	6.9	7.1	7.8	7.8	7.8	8.1	8.0	8.1	8.7	8.9	9.0	9.6	9.4
Average	7.5	7.1	7.0	7.4	8.1	8.3	8.2	8.5	8.3	8.4	8.8	9.1	9.3	10.1	9.8

Escanaba Dam 4 - August 2013 Dissolved Oxygen Monitoring Data

Time	8/1/2013	8/2/2013	8/3/2013	8/4/2013	8/5/2013	8/6/2013	8/7/2013	8/8/2013	8/9/2013	8/10/2013	8/11/2013	8/12/2013	8/13/2013	8/14/2013	8/15/2013	8/16/2013	8/17/2013
0	9.4	9.1	8.7	8.8	8.6	8.6	8.4	8.5	8.4	8.4	8.4	8.3	7.8	8.6	8.4	8.3	7.9
10000	9.4	9.1	8.6	8.7	8.6	8.6	8.4	8.5	8.4	8.3	8.4	8.4	7.9	8.5	8.4	8.2	7.9
20000	9.3	9.1	8.7	8.8	8.6	8.6	8.4	8.4	8.5	8.3	8.4	8.3	8.1	8.4	8.5	8.1	7.9
30000	9.3	9.1	8.7	8.8	8.6	8.6	8.4	8.5	8.5	8.4	8.4	8.2	8.1	8.4	8.5	8.1	8.0
40000	9.3	9.1	8.7	8.8	8.6	8.6	8.4	8.6	8.5	8.4	8.4	8.3	8.1	8.5	8.5	8.0	7.8
50000	9.3	9.1	8.8	8.9	8.7	8.6	8.4	8.7	8.6	8.4	8.5	8.3	8.2	8.6	8.6	8.0	7.8
60000	9.3	9.1	8.8	8.9	8.7	8.6	8.4	8.7	8.6	8.5	8.5	8.3	8.2	8.7	8.7	8.1	7.8
70000	9.4	9.1	8.8	8.9	8.8	8.6	8.5	8.8	8.6	8.6	8.6	8.4	8.2	8.7	8.7	8.2	7.9
80000	9.4	9.2	8.9	8.9	8.7	8.6	8.5	8.8	8.6	8.7	8.6	8.5	8.3	8.7	8.7	8.3	8.1
90000	9.4	9.2	8.8	9.0	8.6	8.6	8.5	8.9	8.6	8.7	8.7	8.5	8.3	8.7	8.7	8.4	8.2
100000	9.5	9.1	8.9	8.9	8.7	8.6	8.5	8.9	8.7	8.7	8.7	8.5	8.2	8.7	8.6	8.4	8.2
110000	9.4	9.1	8.9	8.9	8.7	8.7	8.5	8.9	8.7	8.7	8.7	8.5	8.1	8.7	8.6	8.5	8.2
120000	9.4	9.1	8.7	9.0	8.7	8.7	8.4	8.9	8.7	8.7	8.7	8.3	8.1	8.7	8.8	8.3	8.1
130000	9.3	9.1	8.7	8.8	8.7	8.6	8.4	8.9	8.6	8.7	8.7	8.3	8.1	8.6	8.7	8.4	8.0
140000	9.5	9.1	8.7	9.0	8.7	8.6	8.4	8.7	8.4	8.7	8.7	8.0	8.1	8.6	8.6	8.4	8.1
150000	9.5	9.0	9.0	9.1	8.7	8.6	8.4	8.8	8.4	8.6	8.7	8.0	8.5	8.5	8.8	8.3	8.1
160000	9.4	9.0	8.9	9.0	8.8	8.6	8.5	8.8	8.4	8.7	8.8	8.0	8.6	8.8	8.7	8.4	8.1
170000	9.3	9.0	8.9	8.9	8.7	8.6	8.4	8.7	8.5	8.6	8.7	7.9	8.7	8.8	8.6	8.3	8.0
180000	9.2	8.8	8.9	8.8	8.6	8.6	8.4	8.5	8.5	8.6	8.7	7.9	8.6	8.8	8.4	8.2	8.1
190000	9.2	8.8	8.8	8.7	8.6	8.6	8.4	8.4	8.5	8.5	8.5	7.9	8.6	8.7	8.1	8.1	8.0
200000	9.2	8.7	8.8	8.7	8.6	8.5	8.4	8.4	8.4	8.5	8.4	7.9	8.6	8.7	8.1	7.9	7.7
210000	9.2	8.7	8.8	8.6	8.5	8.5	8.4	8.4	8.4	8.5	8.4	7.9	8.5	8.7	8.1	7.8	7.7
220000	9.1	8.7	8.8	8.6	8.6	8.4	8.5	8.4	8.4	8.5	8.3	7.9	8.5	8.6	8.3	7.8	7.7
230000	9.2	8.7	8.8	8.6	8.6	8.4	8.5	8.4	8.4	8.5	8.3	7.9	8.6	8.7	8.3	7.7	7.7
Daily Max	9.5	9.2	9.0	9.1	8.8	8.7	8.5	8.9	8.7	8.7	8.8	8.5	8.7	8.8	8.8	8.5	8.2
Daily Min	9.1	8.7	8.6	8.6	8.5	8.4	8.4	8.4	8.4	8.3	8.3	7.9	7.8	8.4	8.1	7.7	7.7
Average	9.3	9.0	8.8	8.8	8.6	8.6	8.4	8.7	8.5	8.5	8.5	8.2	8.3	8.6	8.5	8.2	8.0

License Minimum Dissolved Oxygen: 7.0 mg/l

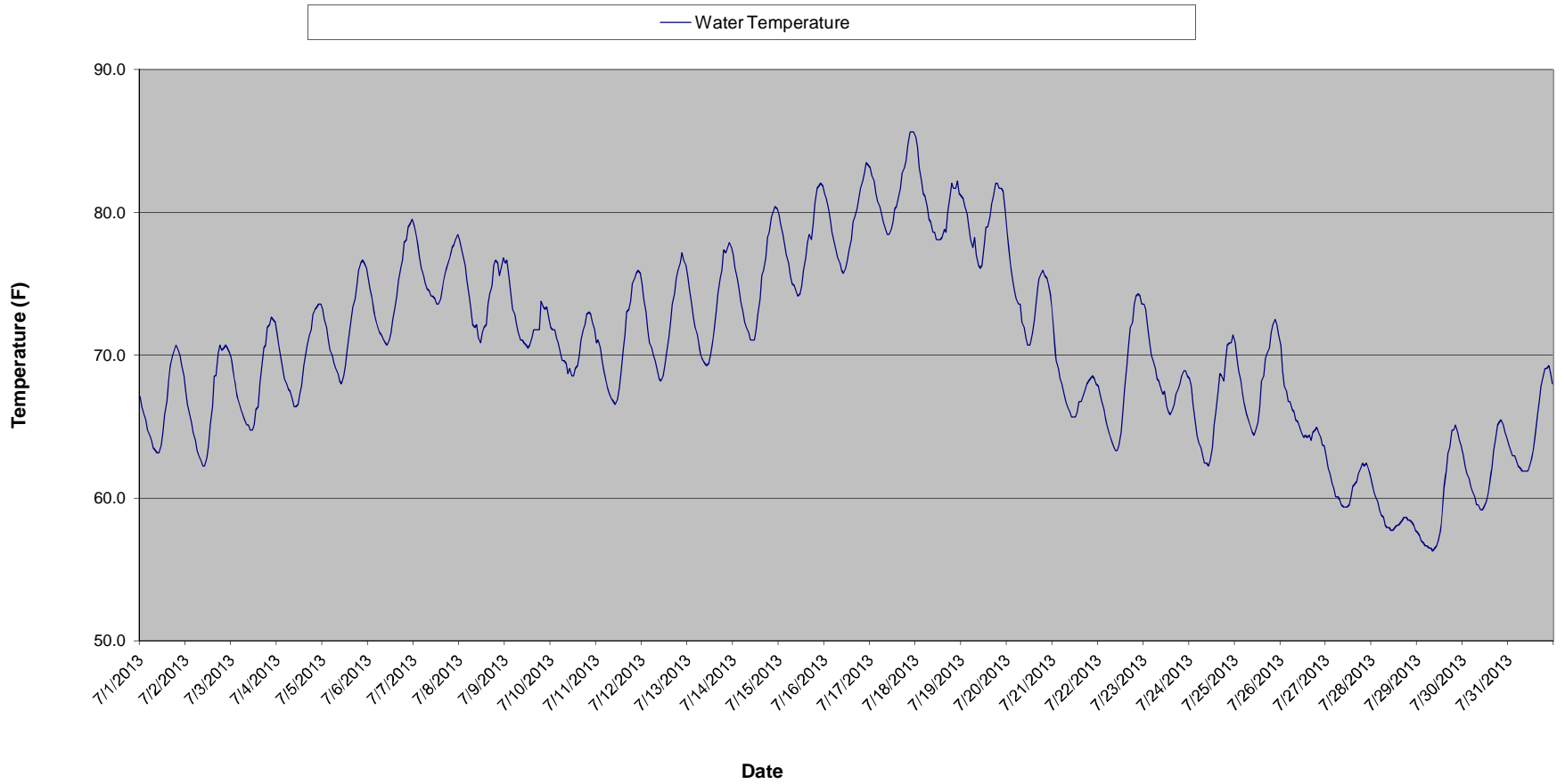
Missing data due to equipment maintenance

Escanaba Dam 4 - August 2013 Dissolved Oxygen Monitoring Data

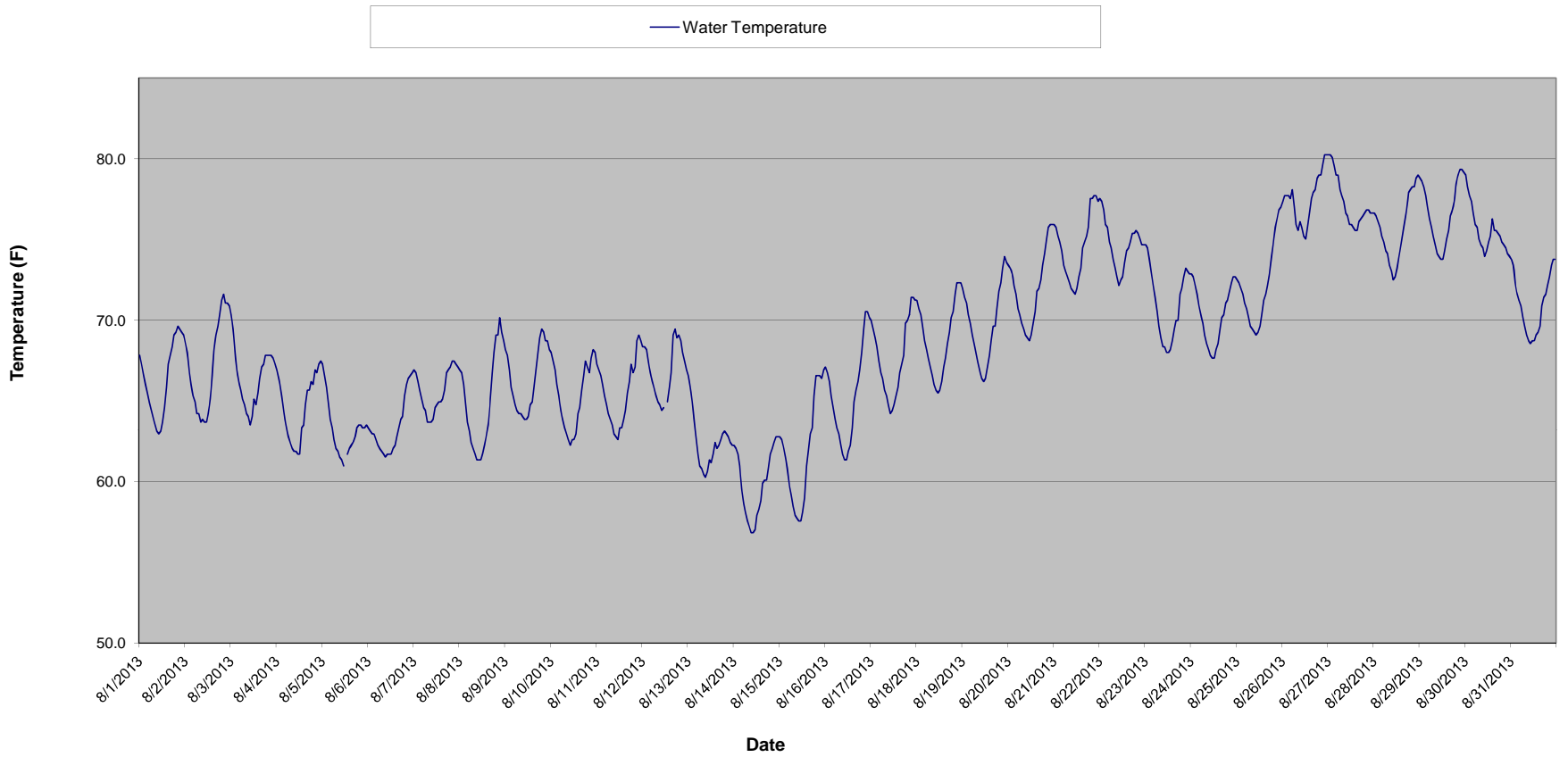
Time	8/18/2013	8/19/2013	8/20/2013	8/21/2013	8/22/2013	8/23/2013	8/24/2013	8/25/2013	8/26/2013	8/27/2013	8/28/2013	8/29/2013	8/30/2013	8/31/2013
0	7.7	7.7	7.6	7.4	7.7	7.4	7.5	7.5	7.4	7.3	7.5	7.6	7.4	7.9
10000	7.8	7.8	7.6	7.4	7.7	7.4	7.5	7.5	7.3	7.4	7.5	7.5	7.4	7.8
20000	7.8	7.7	7.5	7.4	7.7	7.3	7.5	7.3	7.3	7.3	7.5	7.3	7.2	7.9
30000	7.8	7.5	7.7	7.4	7.7	7.3	7.5	7.3	7.2	7.3	7.4	7.4	7.3	7.9
40000	7.7	7.5	7.7	7.4	7.8	7.4	7.5	7.5	7.1	7.2	7.4	7.5	7.4	7.8
50000	7.7	7.6	7.6	7.3	7.9	7.6	7.6	7.6	7.1	7.2	7.4	7.5	7.4	7.9
60000	7.7	7.6	7.6	7.3	8.0	7.7	7.6	7.7	7.1	7.3	7.4	7.6	7.5	7.9
70000	7.8	7.7	7.7	7.3	8.0	7.6	7.7	7.7	7.3	7.3	7.4	7.6	7.5	7.9
80000	8.0	7.9	7.8	7.4	8.1	7.7	7.8	7.7	7.2	7.3	7.5	7.6	7.5	7.9
90000	8.0	7.9	7.8	7.4	8.1	7.9	7.9	7.7	7.3	7.4	7.6	7.6	7.6	8.0
100000	8.1	7.8	7.8	7.5	7.9	7.8	7.9	7.8	7.4	7.3	7.7	7.7	7.7	8.0
110000	8.1	8.3	7.8	7.5	7.7	7.9	8.0	7.8	7.5	7.4	7.7	7.7	7.7	8.0
120000	8.0	8.2	7.8	8.5	7.9	8.0	8.0	7.9	7.5	7.7	7.8	7.9	7.7	8.0
130000	8.1	8.1	8.0	7.5	7.2	8.1	8.0	7.9	7.4	7.6	7.8	7.9	7.7	8.1
140000	7.9	8.0	8.0	7.4	7.2	8.2	8.0	7.8	7.5	7.5	7.7	7.7	7.6	8.3
150000	7.9	7.9	7.8	7.3	7.2	8.1	8.0	7.8	7.5	7.7	7.7	7.9	7.7	8.3
160000	8.2	7.9	7.7	7.2	7.1	8.1	7.8	7.7	7.3	7.6	7.9	7.7	7.8	8.2
170000	8.0	7.8	7.6	7.4	7.2	8.0	7.7	7.7	7.2	7.6	7.8	7.6	8.1	8.1
180000	8.0	8.0	7.6	7.8	7.3	7.9	7.7	7.7	7.4	7.6	7.8	7.6	8.1	8.0
190000	7.8	8.0	7.6	7.8	7.4	7.8	7.6	7.7	7.4	7.5	7.7	7.6	8.1	7.9
200000	7.7	7.8	7.5	7.7	7.5	7.7	7.6	7.6	7.4	7.5	7.7	7.6	8.1	7.8
210000	7.7	7.8	7.5	7.7	7.5	7.5	7.6	7.4	7.5	7.5	7.6	7.5	8.1	7.8
220000	7.6	7.7	7.4	7.8	7.5	7.5	7.5	7.4	7.6	7.4	7.7	7.5	8.0	7.7
230000	7.6	7.7	7.4	7.7	7.4	7.5	7.5	7.4	7.5	7.3	7.6	7.4	7.9	7.7
Daily Max	8.2	8.3	8.0	8.5	8.1	8.2	8.0	7.9	7.6	7.7	7.9	7.9	8.1	8.3
Daily Min	7.6	7.5	7.4	7.2	7.1	7.3	7.5	7.3	7.1	7.2	7.4	7.3	7.2	7.7
Average	7.9	7.8	7.7	7.5	7.6	7.7	7.7	7.6	7.3	7.4	7.6	7.6	7.7	7.9

 Flow Augmentation period.

Escanaba Dam 4 Water Temperature - July 2013



Escanaba Dam 4 Water Temperature - August 2013



Escanaba Dam 4 - July 2013 Temperature Monitoring Data

HHMMSS	07/01/13	07/02/13	07/03/13	07/04/13	07/05/13	07/06/13	07/07/13	07/08/13	07/09/13	07/10/13	07/11/13	07/12/13	07/13/13	07/14/13	07/15/13	07/16/13
0	67.1	67.5	69.8	71.6	73.2	75.4	79.2	78.1	76.5	72.0	70.9	75.0	75.6	77.0	79.9	81.3
10000	66.4	66.6	68.9	70.7	72.5	74.7	78.6	77.5	76.6	71.8	71.1	73.9	74.7	76.1	79.2	81.0
20000	65.8	65.8	68.0	69.8	72.0	73.9	77.7	76.8	75.4	71.8	70.5	73.0	73.6	75.4	78.4	80.2
30000	65.5	65.3	67.1	69.1	71.1	73.0	76.8	76.3	74.3	71.2	69.6	71.8	72.7	74.7	77.7	79.5
40000	64.8	64.6	66.7	68.4	70.3	72.5	76.1	75.2	73.2	70.9	68.9	70.9	72.0	73.8	77.0	78.6
50000	64.4	64.0	66.2	68.0	70.0	72.0	75.6	74.1	72.9	70.2	68.2	70.5	71.4	73.0	76.5	77.9
60000	64.0	63.3	65.8	67.6	69.4	71.6	75.0	73.2	72.1	69.6	67.6	70.0	70.7	72.3	75.6	77.4
70000	63.5	63.0	65.5	67.5	69.1	71.4	74.7	72.1	71.6	69.6	67.3	69.6	70.0	72.0	75.0	76.8
80000	63.3	62.6	65.1	66.9	68.7	71.1	74.5	72.0	71.1	69.4	66.9	68.9	69.6	71.6	74.8	76.5
90000	63.1	62.2	65.1	66.4	68.2	70.9	74.1	72.1	71.1	68.7	66.7	68.4	69.4	71.1	74.5	75.9
100000	63.1	62.2	64.8	66.4	68.0	70.7	74.1	71.2	70.9	69.1	66.6	68.2	69.3	71.1	74.1	75.7
110000	63.7	62.8	64.8	66.6	68.5	71.1	73.9	70.9	70.7	68.5	66.9	68.5	69.4	71.1	74.3	76.1
120000	64.6	63.7	65.1	67.3	69.3	71.6	73.6	71.6	70.5	68.5	67.6	69.3	70.0	71.8	74.8	76.6
130000	65.8	65.1	66.2	67.8	70.3	72.5	73.6	72.0	70.7	69.1	68.7	70.2	70.7	72.9	75.9	77.4
140000	66.7	66.4	66.4	69.3	71.6	73.4	73.9	72.1	71.2	69.3	70.3	71.2	72.0	73.9	76.8	78.1
150000	68.2	68.5	68.0	70.0	72.5	74.1	74.7	73.6	71.8	70.0	71.4	72.3	73.0	75.6	77.9	79.3
160000	69.3	68.5	69.1	70.7	73.4	75.2	75.4	74.3	71.8	71.1	73.0	73.6	74.3	75.9	78.4	79.7
170000	70.0	70.2	70.5	71.4	73.9	76.1	76.1	74.8	71.8	71.8	73.2	74.3	75.4	76.8	78.1	80.2
180000	70.3	70.7	70.7	71.8	74.8	76.6	76.5	76.3	71.8	72.1	73.8	75.4	75.9	78.3	79.2	81.0
190000	70.7	70.3	72.0	72.9	75.9	77.9	76.8	76.6	73.8	72.9	75.0	75.9	77.4	78.6	80.6	81.7
200000	70.3	70.5	72.1	73.2	76.5	78.1	77.5	76.5	73.4	73.0	75.4	76.5	77.2	79.7	81.7	82.2
210000	70.0	70.7	72.7	73.4	76.6	79.0	77.7	75.6	73.2	72.9	75.7	77.2	77.5	80.1	81.9	82.8
220000	69.3	70.5	72.5	73.6	76.5	79.2	78.1	76.1	73.4	72.3	75.9	76.6	77.9	80.4	82.0	83.5
230000	68.5	70.2	72.3	73.6	76.1	79.5	78.4	76.8	72.5	71.8	75.7	76.3	77.5	80.2	81.9	83.3
Daily Max	70.7	70.7	72.7	73.6	76.6	79.5	79.2	78.1	76.6	73.0	75.9	77.2	77.9	80.4	82.0	83.5
Daily Min	63.1	62.2	64.8	66.4	68.0	70.7	73.6	70.9	70.5	68.5	66.6	68.2	69.3	71.1	74.1	75.7
Average	66.6	66.5	68.1	69.7	72.0	74.2	75.9	74.4	72.6	70.7	70.7	72.4	73.2	75.1	77.8	79.3
Monthly average temp (F):				70.5												

Escanaba Dam 4 - July 2013 Temperature Monitoring Data

HHMMSS	07/17/13	07/18/13	07/19/13	07/20/13	07/21/13	07/22/13	07/23/13	07/24/13	07/25/13	07/26/13	07/27/13	07/28/13	07/29/13	07/30/13	07/31/13
0	83.1	85.3	81.1	78.6	72.5	67.8	73.6	68.4	70.9	70.7	62.8	61.0	57.6	63.0	63.7
10000	82.6	84.6	81.0	77.5	71.1	67.3	73.2	67.8	69.8	68.9	62.1	60.4	57.4	62.2	63.3
20000	82.2	83.1	80.4	76.3	69.6	66.7	72.1	66.6	68.9	67.8	61.7	60.1	57.0	61.7	63.0
30000	81.3	82.2	79.9	75.2	69.1	66.2	70.9	65.3	68.2	67.5	61.0	59.7	56.8	61.3	63.0
40000	80.8	81.3	79.0	74.5	68.4	65.5	70.0	64.4	67.3	66.7	60.6	59.2	56.7	60.8	62.6
50000	80.4	81.1	78.1	73.9	68.0	64.9	69.6	63.9	66.6	66.7	60.1	58.8	56.7	60.4	62.2
60000	79.9	80.4	77.5	73.6	67.3	64.4	69.1	63.5	65.8	66.2	60.1	58.6	56.5	60.1	62.1
70000	79.3	79.5	78.3	73.6	66.7	64.0	68.4	63.0	65.5	66.0	59.9	58.1	56.5	59.5	61.9
80000	78.8	79.3	77.0	72.3	66.4	63.7	68.2	62.4	65.1	65.5	59.5	57.9	56.3	59.5	61.9
90000	78.4	78.6	76.3	72.0	66.0	63.3	67.6	62.4	64.6	65.3	59.4	57.9	56.5	59.2	61.9
100000	78.4	78.6	76.1	71.2	65.7	63.3	67.3	62.2	64.4	64.9	59.4	57.7	56.7	59.2	61.9
110000	78.8	78.1	76.3	70.7	65.7	63.7	67.5	62.6	64.8	64.6	59.4	57.7	57.0	59.4	62.2
120000	79.3	78.1	77.7	70.7	65.7	64.6	66.4	63.5	65.3	64.2	59.5	57.9	57.7	59.7	62.8
130000	80.2	78.1	79.0	71.2	66.0	66.0	66.0	65.1	66.4	64.4	60.1	58.1	59.2	60.3	63.5
140000	80.4	78.3	79.0	72.0	66.7	67.6	65.8	66.0	68.2	64.2	60.8	58.1	60.6	61.0	64.4
150000	81.1	78.8	79.7	73.2	66.7	69.3	66.2	67.5	68.5	64.4	61.0	58.3	61.9	62.1	65.8
160000	81.7	78.6	80.6	74.5	67.1	70.7	66.6	68.7	69.8	64.0	61.2	58.5	63.1	63.3	66.7
170000	82.8	80.1	81.1	75.4	67.5	72.0	67.3	68.5	70.2	64.6	61.7	58.6	63.5	64.0	67.8
180000	83.1	81.1	82.0	75.7	68.0	72.3	67.6	68.2	70.5	64.8	62.1	58.6	64.8	65.1	68.5
190000	83.7	82.0	82.0	75.9	68.2	73.6	68.0	69.6	71.6	64.9	62.4	58.5	64.8	65.3	69.1
200000	84.7	81.7	81.7	75.6	68.4	74.1	68.5	70.7	72.1	64.6	62.2	58.5	65.1	65.5	69.1
210000	85.6	81.7	81.7	75.4	68.5	74.3	68.9	70.9	72.5	64.2	62.4	58.3	64.6	65.1	69.3
220000	85.6	82.2	81.5	74.8	68.4	74.1	68.9	70.9	72.1	63.7	62.1	58.1	64.0	64.6	68.7
230000	85.6	81.3	80.4	74.3	68.0	73.6	68.5	71.4	71.4	63.7	61.7	57.7	63.7	64.2	68.0
Daily Max	85.6	85.3	82.0	78.6	72.5	74.3	73.6	71.4	72.5	70.7	62.8	61.0	65.1	65.5	69.3
Daily Min	78.4	78.1	76.1	70.7	65.7	63.3	65.8	62.2	64.4	63.7	59.4	57.7	56.3	59.2	61.9
Average	81.6	80.6	79.5	74.1	67.7	68.0	68.6	66.4	68.4	65.5	61.0	58.6	59.8	61.9	64.7


Escanaba Dam 4 - August 2013 Temperature Monitoring Data

Time HHMMSS	8/1/2013	8/2/2013	8/3/2013	8/4/2013	8/5/2013	8/6/2013	8/7/2013	8/8/2013	8/9/2013	8/10/2013	8/11/2013	8/12/2013	8/13/2013	8/14/2013	8/15/2013	8/16/2013
0	67.8	68.5	70.3	66.9	67.3	63.3	66.9	66.9	68.2	68.0	67.3	68.4	66.6	62.2	62.8	67.1
10000	67.3	68.0	69.4	66.4	66.6	63.1	66.7	66.7	67.8	67.5	66.9	68.4	65.8	62.1	62.6	66.7
20000	66.6	66.7	68.0	65.7	65.8	63.0	66.2	66.0	66.9	66.9	66.6	68.2	64.9	61.7	62.1	66.2
30000	66.0	66.0	66.9	64.9	64.9	63.0	65.7	64.9	65.8	66.0	66.0	67.5	63.9	61.0	61.5	65.3
40000	65.5	65.3	66.2	64.0	63.9	62.6	65.1	63.7	65.3	65.3	65.3	66.7	62.8	59.5	60.8	64.6
50000	64.9	64.9	65.7	63.3	63.3	62.2	64.6	63.1	64.8	64.4	64.8	66.2	61.7	58.6	59.7	63.9
60000	64.4	64.2	65.1	62.8	62.6	62.1	64.4	62.4	64.4	63.9	64.2	65.8	61.0	58.1	59.2	63.3
70000	64.0	64.2	64.8	62.4	62.1	61.9	63.7	62.1	64.2	63.3	63.9	65.3	60.8	57.6	58.5	63.0
80000	63.5	63.7	64.2	62.1	61.9	61.7	63.7	61.7	64.2	63.0	63.5	64.9	60.4	57.2	57.9	62.2
90000	63.1	63.9	64.0	61.9	61.5	61.5	63.7	61.3	64.0	62.6	63.0	64.8	60.3	56.8	57.7	61.7
100000	63.0	63.7	63.5	61.9	61.3	61.7	63.9	61.3	63.9	62.2	62.8	64.4	60.6	56.8	57.6	61.3
110000	63.1	63.7	64.0	61.7	61.0	61.7	64.6	61.3	63.9	62.6	62.6	64.6	61.3	57.0	57.6	61.3
120000	63.7	64.2	65.1	61.7		61.7	64.8	61.7	64.0	62.6	63.3		61.2	57.9	58.1	61.9
130000	64.6	65.1	64.8	63.3	61.7	62.1	64.9	62.2	64.8	63.0	63.3	64.9	61.7	58.3	59.0	62.2
140000	65.8	66.6	65.5	63.5	62.1	62.2	64.9	63.0	64.9	64.2	63.9	65.8	62.4	58.8	61.0	63.3
150000	67.3	68.2	66.4	64.8	62.2	62.8	65.1	63.5	65.8	64.6	64.4	66.7	62.1	59.9	61.9	64.9
160000	67.8	69.1	67.1	65.7	62.4	63.3	65.7	65.1	66.9	65.7	65.5	69.1	62.2	60.1	63.0	65.7
170000	68.4	69.6	67.3	65.7	62.8	63.9	66.7	66.7	68.0	66.6	66.2	69.4	62.6	60.1	63.3	66.2
180000	69.1	70.3	67.8	66.2	63.3	64.0	66.9	68.0	68.9	67.5	67.3	68.9	63.0	60.8	65.3	66.9
190000	69.3	71.2	67.8	66.0	63.5	65.3	67.1	69.1	69.4	67.1	66.7	69.1	63.1	61.7	66.6	68.0
200000	69.6	71.6	67.8	66.9	63.5	66.0	67.5	69.1	69.3	66.7	67.1	68.7	63.0	62.1	66.6	69.4
210000	69.4	71.1	67.8	66.7	63.3	66.4	67.5	70.2	68.7	67.6	68.7	68.0	62.8	62.4	66.6	70.5
220000	69.3	71.1	67.6	67.3	63.3	66.6	67.3	69.3	68.7	68.2	69.1	67.5	62.4	62.8	66.4	70.5
230000	69.1	70.9	67.3	67.5	63.5	66.7	67.1	68.7	68.2	68.0	68.7	66.9	62.2	62.8	66.9	70.2
Daily Max	69.6	71.6	70.3	67.5	67.3	66.7	67.5	70.2	69.4	68.2	69.1	69.4	66.6	62.8	66.9	70.5
Daily Min	63.0	63.7	63.5	61.7	61.0	61.5	63.7	61.3	63.9	62.2	62.6	64.4	60.3	56.8	57.6	61.3
Average	66.4	67.2	66.4	64.6	63.2	63.3	65.6	64.9	66.3	65.3	65.5	67.0	62.5	59.8	61.8	65.3

Monthly average temp (F): 68.6 ██████████ Missing data due to equipment maintenance.

Escanaba Dam 4 - August 2013 Temperature Monitoring Data

Time	8/17/2013	8/18/2013	8/19/2013	8/20/2013	8/21/2013	8/22/2013	8/23/2013	8/24/2013	8/25/2013	8/26/2013	8/27/2013	8/28/2013	8/29/2013	8/30/2013	8/31/2013
0	70.0	71.2	72.0	73.4	75.9	77.5	74.7	72.9	72.5	77.4	80.2	76.6	78.8	79.0	73.8
10000	69.4	70.7	71.4	73.2	75.7	77.4	74.5	72.7	72.3	77.7	80.2	76.5	78.6	78.3	73.4
20000	68.9	70.3	71.1	72.9	75.2	76.8	73.8	72.1	72.0	77.7	80.1	76.1	78.3	77.7	72.3
30000	68.4	69.6	70.3	72.1	74.8	75.9	72.9	71.6	71.6	77.7	79.5	75.7	77.7	77.4	71.6
40000	67.5	68.7	69.8	71.6	74.3	75.7	72.1	70.9	71.1	77.5	79.0	75.2	77.0	76.6	71.2
50000	66.7	68.2	69.1	70.7	73.4	74.8	71.4	70.3	70.7	78.1	79.0	74.8	76.3	75.9	70.9
60000	66.4	67.6	68.5	70.3	73.0	74.5	70.5	69.8	70.2	77.0	78.1	74.3	75.7	75.7	70.2
70000	65.7	67.1	68.0	69.8	72.7	73.8	69.6	69.1	69.6	75.9	77.7	74.1	75.2	75.0	69.6
80000	65.3	66.6	67.3	69.4	72.3	73.2	68.9	68.5	69.4	75.6	77.4	73.4	74.7	74.7	69.1
90000	64.8	66.0	66.9	69.1	72.0	72.7	68.4	68.2	69.3	76.1	76.6	73.0	74.1	74.5	68.7
100000	64.2	65.7	66.4	68.9	71.8	72.1	68.4	67.8	69.1	75.7	76.5	72.5	73.9	73.9	68.5
110000	64.4	65.5	66.2	68.7	71.6	72.5	68.0	67.6	69.3	75.2	75.9	72.7	73.8	74.3	68.7
120000	64.8	65.7	66.4	69.1	72.0	72.7	68.0	67.6	69.6	75.0	75.9	73.2	73.8	74.8	68.7
130000	65.3	66.2	67.1	69.8	72.7	73.6	68.2	68.2	70.3	75.7	75.7	73.9	74.3	75.2	69.1
140000	65.8	67.1	67.8	70.5	73.2	74.3	68.7	68.5	71.2	76.6	75.6	74.7	75.0	76.3	69.3
150000	66.7	67.6	68.7	71.8	74.5	74.5	69.4	69.4	71.6	77.5	75.6	75.4	75.6	75.6	69.6
160000	67.3	68.5	69.6	72.0	74.8	74.8	70.0	70.2	72.1	77.9	76.1	76.1	76.5	75.6	70.9
170000	67.8	69.3	69.6	72.5	75.2	75.4	70.0	70.3	72.9	78.1	76.3	76.8	76.8	75.4	71.4
180000	69.8	70.2	70.7	73.4	75.7	75.4	71.6	71.1	73.9	78.8	76.5	77.9	77.4	75.2	71.6
190000	70.0	70.5	71.8	74.1	77.5	75.6	72.0	71.2	74.7	79.0	76.6	78.1	78.4	74.8	72.1
200000	70.3	71.6	72.3	75.0	77.5	75.4	72.7	71.8	75.7	79.0	76.8	78.3	79.0	74.7	72.7
210000	71.4	72.3	73.2	75.7	77.7	75.0	73.2	72.3	76.3	79.7	76.8	78.3	79.3	74.5	73.4
220000	71.4	72.3	73.9	75.9	77.7	74.7	73.0	72.7	76.8	80.2	76.6	78.8	79.3	74.1	73.8
230000	71.2	72.3	73.6	75.9	77.4	74.7	72.9	72.7	77.0	80.2	76.6	79.0	79.2	73.9	73.8
Daily Max	71.4	72.3	73.9	75.9	77.7	77.5	74.7	72.9	77.0	80.2	80.2	79.0	79.3	79.0	73.8
Daily Min	64.2	65.5	66.2	68.7	71.6	72.1	68.0	67.6	69.1	75.0	75.6	72.5	73.8	73.9	68.5
Average	67.6	68.8	69.7	71.9	74.5	74.7	70.9	70.3	72.1	77.5	77.3	75.6	76.6	75.5	71.0

 Flow Augmentation Period.

2013 Escanaba River Flow Data from USGS Monitoring Station 04059000 in Cornell, MI

Date	Daily Mean Discharge @ Cornell (cfs)	95th percentile exceedance flow (cfs)	Date	Daily Mean Discharge @ Cornell (cfs)	95th percentile exceedance flow (cfs)
7/1/2013	1520	210	8/1/2013	823	157
7/2/2013	1140	186	8/2/2013	710	180
7/3/2013	808	197	8/3/2013	612	170
7/4/2013	619	203	8/4/2013	556	169
7/5/2013	573	203	8/5/2013	496	157
7/6/2013	455	216	8/6/2013	494	166
7/7/2013	425	226	8/7/2013	527	167
7/8/2013	614	206	8/8/2013	514	161
7/9/2013	528	235	8/9/2013	489	174
7/10/2013	601	207	8/10/2013	450	182
7/11/2013	580	203	8/11/2013	405	168
7/12/2013	498	206	8/12/2013	377	188
7/13/2013	433	192	8/13/2013	358	177
7/14/2013	384	178	8/14/2013	336	167
7/15/2013	353	197	8/15/2013	308	187
7/16/2013	312	199	8/16/2013	292	176
7/17/2013	296	180	8/17/2013	274	182
7/18/2013	359	168	8/18/2013	260	173
7/19/2013	539	170	8/19/2013	258	166
7/20/2013	744	172	8/20/2013	242	178
7/21/2013	749	166	8/21/2013	238	183
7/22/2013	666	189	8/22/2013	226	186
7/23/2013	555	188	8/23/2013	219	180
7/24/2013	485	171	8/24/2013	212	166
7/25/2013	448	162	8/25/2013	209	169
7/26/2013	1210	174	8/26/2013	214	174
7/27/2013	1670	185	8/27/2013	268	177
7/28/2013	1750	202	8/28/2013	281	179
7/29/2013	1650	181	8/29/2013	278	167
7/30/2013	1340	181	8/30/2013	253	177
7/31/2013	1060	171	8/31/2013	248	185

DOCUMENTATION OF AGENCY CONSULTATION

Upper Peninsula Power Corporation – Escanaba Dam 4 Hydroelectric Project

The following table is a list of the dates of letters or correspondence regarding potential deviations from Water Quality Standards observed at Escanaba Dam 4 during the 2013 water quality monitoring period.

Date of Notice to MDEQ, MDNR and US Fish and Wildlife	Date of Notice to FERC
July 16, 2013	July 22, 2013
July 25, 2013	July 31, 2013

The annual water quality monitoring report was submitted to the resource agencies for review and comment on September 4, 2013.

Metcalf, Mark W

From: Metcalf, Mark W
Sent: Tuesday, July 16, 2013 4:09 PM
To: 'Burr Fisher '; 'Kruger, Kyle'; 'Koetje, Mitch (DEQ)'; Kohlhepp, Gary (DEQ); Klemans, Diana (DEQ); Carpenter, Koren
Cc: Meyers, Robert J; Schlorke, Virgil E; Puzen, Shawn C
Subject: Water Quality Monitoring - Escanaba Dam 4
Attachments: Dam 4 data thru 0716.pdf

Good afternoon,

Pursuant to Article 415 of the Project License and the water quality monitoring plan for Escanaba Dam 4, UPPCO is monitoring dissolved oxygen and temperature in the Escanaba River downstream of the Dam #4 powerhouse. As described in the License and the water quality monitoring plan, UPPCO is monitoring dissolved oxygen on a real-time basis to ensure that stream flows downstream of Dam No. 4, as measured immediately downstream, maintain a DO concentration of 7.0 mg/l when 1) river discharges are greater than or equal to the 95th percent exceedance flow and 2) when the facility is not augmenting flow. Data is collected at one-hour intervals continuously during the months of July and August. Please note that the water quality monitoring equipment has an accuracy of +/- 0.1 mg/l, per the manufacturer. Per the monitoring plan, UPPCO is correcting the dissolved oxygen monitoring data for calibration drift assuming a linear degradation of meter accuracy. Therefore, readings below 6.9 mg/l are potential deviations from the water quality standard. There is no water quality standard for temperature at the project.

On July 15th, the water quality monitor malfunctioned between 16:00 and 17:00 EDT which resulted in non-representative dissolved oxygen readings to be recorded. Please see the attached data. Temperature data was not affected by the malfunction. The cause of the erroneous readings was a loose membrane on the dissolved oxygen sensor. The issue was corrected today (7/16) at 12:00 EDT. As a result of the malfunction, DO readings below the water quality standard were recorded. The lowest DO reading recorded was 5.5 mg/l. UPPCO is certain the values are not representative of actual conditions. At the time the DO monitor was repaired and recalibrated today, the DO meter was reading 5.7 mg/l while the actual DO concentration of the river at the monitoring location – as measured with a calibrated, hand held meter – was 7.3 mg/l.

Please note that the Boney Falls reservoir is currently drawn down to support work on the embankments. As a result, the water level in the reservoir is below the spillway elevation and UPPCO is not able to release aeration flow to mitigate low DO levels. However, when the low DO readings were observed on the 15th, operators increased the release from the powerhouse in an effort to mitigate the low DO readings.

Please feel free to contact me if you have questions on the monitoring data.

Thanks,
Mark

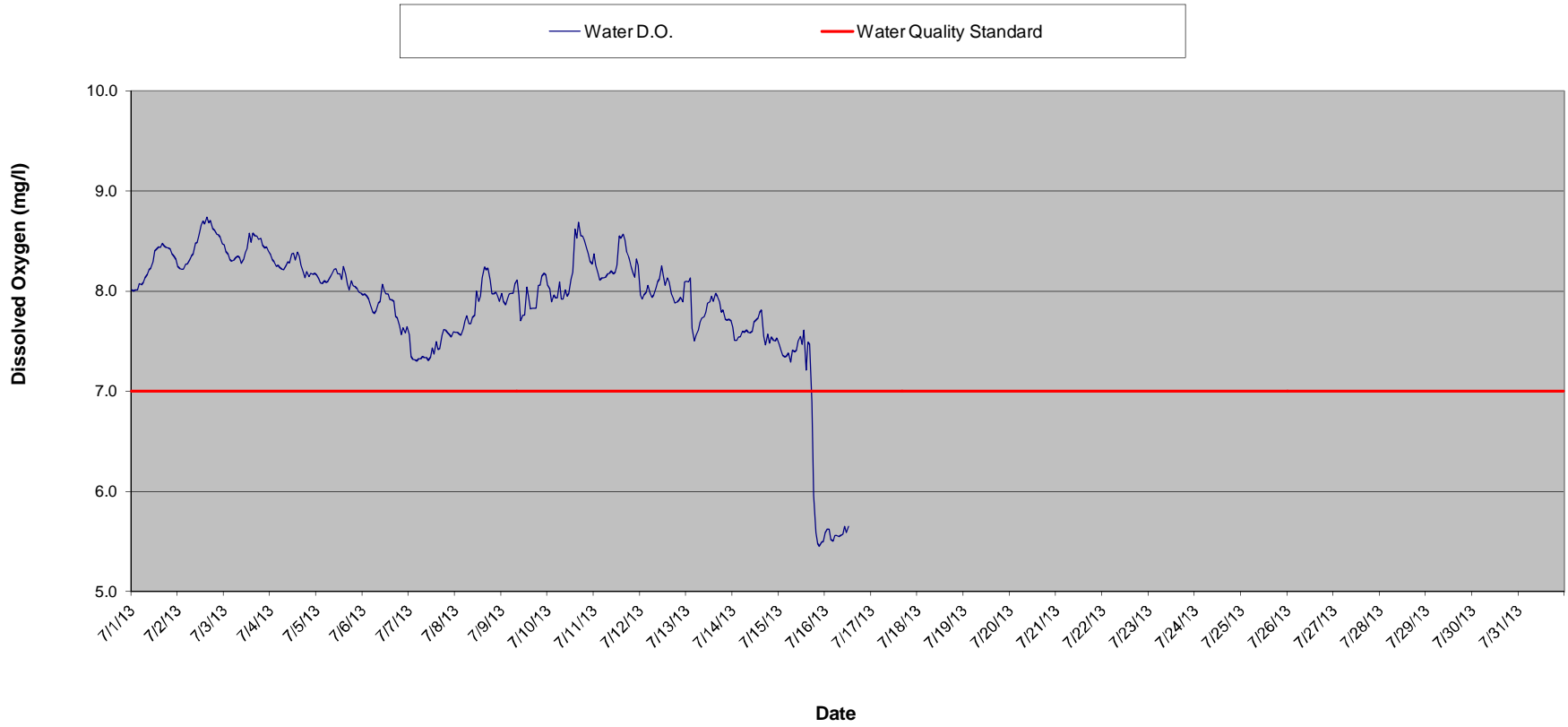
Mark Metcalf**Environmental Consultant - Air & Water | Integry's Business Support, LLC**

920-433-1833 (Green Bay)

920-617-6046 (De Pere)

920-606-8432 *cell*920-433-4916 *fax*mwmetcalf@integrysgroup.com

Escanaba Dam 4 Dissolved Oxygen Summary - July 2013



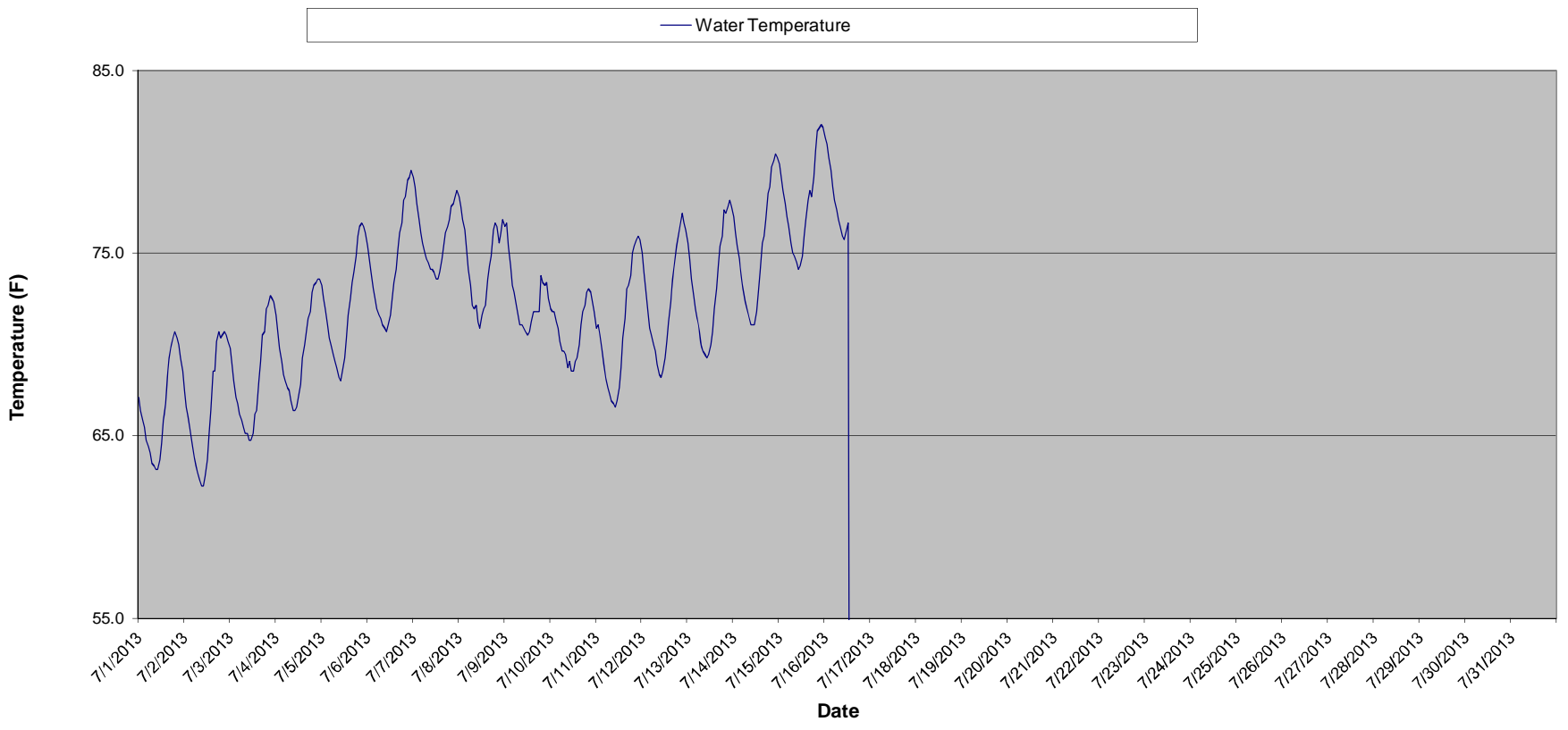
Escanaba Dam 4 - July 2013 Dissolved Oxygen Monitoring Data

Time HHMMSS	07/01/13	07/02/13	07/03/13	07/04/13	07/05/13	07/06/13	07/07/13	07/08/13	07/09/13	07/10/13	07/11/13	07/12/13	07/13/13	07/14/13	07/15/13	07/16/13
0	8.0	8.2	8.5	8.4	8.2	8.0	7.6	7.6	8.0	8.1	8.4	8.0	8.1	7.6	7.5	5.6
10000	8.0	8.2	8.4	8.3	8.1	8.0	7.3	7.6	7.9	8.0	8.3	7.9	8.1	7.5	7.4	5.6
20000	8.0	8.2	8.4	8.3	8.1	8.0	7.3	7.6	7.9	7.9	8.2	8.0	8.1	7.5	7.4	5.6
30000	8.0	8.2	8.3	8.2	8.1	7.9	7.3	7.6	7.9	8.0	8.1	8.0	7.6	7.5	7.3	5.5
40000	8.1	8.3	8.3	8.3	8.1	7.9	7.3	7.6	8.0	7.9	8.1	8.1	7.5	7.5	7.4	5.5
50000	8.1	8.3	8.3	8.2	8.1	7.8	7.3	7.7	8.0	7.9	8.1	8.0	7.6	7.6	7.4	5.6
60000	8.1	8.3	8.3	8.2	8.1	7.8	7.3	7.8	8.0	8.1	8.1	7.9	7.6	7.6	7.3	5.6
70000	8.1	8.4	8.4	8.2	8.1	7.8	7.3	7.7	8.1	7.9	8.2	8.0	7.7	7.6	7.4	5.6
80000	8.2	8.4	8.3	8.3	8.2	7.9	7.3	7.7	8.1	7.9	8.2	8.0	7.7	7.6	7.4	5.6
90000	8.2	8.5	8.3	8.3	8.2	7.9	7.3	7.7	8.0	8.0	8.2	8.1	7.7	7.6	7.4	5.6
100000	8.2	8.5	8.3	8.3	8.2	8.1	7.3	7.8	7.7	8.0	8.2	8.1	7.8	7.6	7.5	5.7
110000	8.3	8.6	8.4	8.4	8.2	8.0	7.3	8.0	7.8	8.0	8.2	8.3	7.9	7.7	7.6	5.6
120000	8.4	8.7	8.4	8.4	8.2	8.0	7.4	7.9	7.8	8.1	8.3	8.2	7.9	7.7	7.5	5.7
130000	8.4	8.7	8.6	8.3	8.1	8.0	7.4	8.0	8.0	8.2	8.6	8.1	8.0	7.7	7.6	0.0
140000	8.4	8.7	8.5	8.4	8.2	7.9	7.5	8.1	7.9	8.6	8.5	8.1	7.9	7.8	7.2	0.0
150000	8.4	8.7	8.6	8.3	8.2	7.9	7.4	8.2	7.8	8.5	8.6	8.1	8.0	7.8	7.5	0.0
160000	8.5	8.7	8.6	8.3	8.1	7.9	7.4	8.2	7.8	8.7	8.5	8.0	8.0	7.6	7.5	0.0
170000	8.4	8.7	8.6	8.2	8.0	7.7	7.6	8.2	7.8	8.6	8.4	7.9	7.9	7.5	6.9	0.0
180000	8.4	8.6	8.5	8.1	8.1	7.7	7.6	8.1	7.8	8.6	8.3	7.9	7.8	7.6	6.0	0.0
190000	8.4	8.6	8.5	8.2	8.1	7.7	7.6	8.0	8.1	8.5	8.3	7.9	7.8	7.5	5.6	0.0
200000	8.4	8.6	8.5	8.1	8.0	7.6	7.6	8.0	8.1	8.4	8.2	7.9	7.7	7.5	5.5	0.0
210000	8.4	8.6	8.4	8.2	8.0	7.6	7.6	8.0	8.2	8.4	8.1	7.9	7.7	7.5	5.5	0.0
220000	8.3	8.5	8.4	8.2	8.0	7.6	7.5	8.0	8.2	8.3	8.3	7.9	7.7	7.5	5.5	0.0
230000	8.3	8.5	8.4	8.2	8.0	7.6	7.6	7.9	8.2	8.3	8.3	8.1	7.7	7.5	5.5	0.0
Daily Max	8.5	8.7	8.6	8.4	8.2	8.1	7.6	8.2	8.2	8.7	8.6	8.3	8.1	7.8	7.6	5.7
Daily Min	8.0	8.2	8.3	8.1	8.0	7.6	7.3	7.6	7.7	7.9	8.1	7.9	7.5	7.5	5.5	0.0
Average	8.3	8.5	8.4	8.3	8.1	7.8	7.4	7.9	8.0	8.2	8.3	8.0	7.8	7.6	6.9	3.0

License Minimum Dissolved Oxygen: 7.0 mg/l

Equipment malfunction - Data not representative of actual conditions.

Escanaba Dam 4 Water Temperature - July 2013



Escanaba Dam 4 - July 2013 Temperature Monitoring Data

HHMMSS	07/01/13	07/02/13	07/03/13	07/04/13	07/05/13	07/06/13	07/07/13	07/08/13	07/09/13	07/10/13	07/11/13	07/12/13	07/13/13	07/14/13	07/15/13	07/16/13
0	67.1	67.5	69.8	71.6	73.2	75.4	79.2	78.1	76.5	72.0	70.9	75.0	75.6	77.0	79.9	81.3
10000	66.4	66.6	68.9	70.7	72.5	74.7	78.6	77.5	76.6	71.8	71.1	73.9	74.7	76.1	79.2	81.0
20000	65.8	65.8	68.0	69.8	72.0	73.9	77.7	76.8	75.4	71.8	70.5	73.0	73.6	75.4	78.4	80.2
30000	65.5	65.3	67.1	69.1	71.1	73.0	76.8	76.3	74.3	71.2	69.6	71.8	72.7	74.7	77.7	79.5
40000	64.8	64.6	66.7	68.4	70.3	72.5	76.1	75.2	73.2	70.9	68.9	70.9	72.0	73.8	77.0	78.6
50000	64.4	64.0	66.2	68.0	70.0	72.0	75.6	74.1	72.9	70.2	68.2	70.5	71.4	73.0	76.5	77.9
60000	64.0	63.3	65.8	67.6	69.4	71.6	75.0	73.2	72.1	69.6	67.6	70.0	70.7	72.3	75.6	77.4
70000	63.5	63.0	65.5	67.5	69.1	71.4	74.7	72.1	71.6	69.6	67.3	69.6	70.0	72.0	75.0	76.8
80000	63.3	62.6	65.1	66.9	68.7	71.1	74.5	72.0	71.1	69.4	66.9	68.9	69.6	71.6	74.8	76.5
90000	63.1	62.2	65.1	66.4	68.2	70.9	74.1	72.1	71.1	68.7	66.7	68.4	69.4	71.1	74.5	75.9
100000	63.1	62.2	64.8	66.4	68.0	70.7	74.1	71.2	70.9	69.1	66.6	68.2	69.3	71.1	74.1	75.7
110000	63.7	62.8	64.8	66.6	68.5	71.1	73.9	70.9	70.7	68.5	66.9	68.5	69.4	71.1	74.3	76.1
120000	64.6	63.7	65.1	67.3	69.3	71.6	73.6	71.6	70.5	68.5	67.6	69.3	70.0	71.8	74.8	76.6
130000	65.8	65.1	66.2	67.8	70.3	72.5	73.6	72.0	70.7	69.1	68.7	70.2	70.7	72.9	75.9	32.0
140000	66.7	66.4	66.4	69.3	71.6	73.4	73.9	72.1	71.2	69.3	70.3	71.2	72.0	73.9	76.8	32.0
150000	68.2	68.5	68.0	70.0	72.5	74.1	74.7	73.6	71.8	70.0	71.4	72.3	73.0	75.6	77.9	32.0
160000	69.3	68.5	69.1	70.7	73.4	75.2	75.4	74.3	71.8	71.1	73.0	73.6	74.3	75.9	78.4	32.0
170000	70.0	70.2	70.5	71.4	73.9	76.1	76.1	74.8	71.8	71.8	73.2	74.3	75.4	76.8	78.1	32.0
180000	70.3	70.7	70.7	71.8	74.8	76.6	76.5	76.3	71.8	72.1	73.8	75.4	75.9	78.3	79.2	32.0
190000	70.7	70.3	72.0	72.9	75.9	77.9	76.8	76.6	73.8	72.9	75.0	75.9	77.4	78.6	80.6	32.0
200000	70.3	70.5	72.1	73.2	76.5	78.1	77.5	76.5	73.4	73.0	75.4	76.5	77.2	79.7	81.7	32.0
210000	70.0	70.7	72.7	73.4	76.6	79.0	77.7	75.6	73.2	72.9	75.7	77.2	77.5	80.1	81.9	32.0
220000	69.3	70.5	72.5	73.6	76.5	79.2	78.1	76.1	73.4	72.3	75.9	76.6	77.9	80.4	82.0	32.0
230000	68.5	70.2	72.3	73.6	76.1	79.5	78.4	76.8	72.5	71.8	75.7	76.3	77.5	80.2	81.9	32.0
Daily Max	70.7	70.7	72.7	73.6	76.6	79.5	79.2	78.1	76.6	73.0	75.9	77.2	77.9	80.4	82.0	81.3
Daily Min	63.1	62.2	64.8	66.4	68.0	70.7	73.6	70.9	70.5	68.5	66.6	68.2	69.3	71.1	74.1	32.0
Average	66.6	66.5	68.1	69.7	72.0	74.2	75.9	74.4	72.6	70.7	70.7	72.4	73.2	75.1	77.8	56.9
Monthly average temp (F):				52.2												

Metcalf, Mark W

From: Metcalf, Mark W
Sent: Thursday, July 25, 2013 8:58 AM
To: 'Burr Fisher '; 'Kruger, Kyle'; 'Koetje, Mitch (DEQ)'; 'Kohlhepp, Gary (DEQ)'; 'Klemans, Diana (DEQ)'; 'Carpenter, Koren'
Cc: Meyers, Robert J; Schlorke, Virgil E; Puzen, Shawn C; Nuthals, James D
Subject: RE: Water Quality Monitoring - Escanaba Dam 4
Attachments: Dam 4 WQ data 07 2013.pdf

Good morning,

Pursuant to Article 415 of the Project License and the water quality monitoring plan for Escanaba Dam 4, UPPCO is monitoring dissolved oxygen and temperature in the Escanaba River downstream of the Dam #4 powerhouse. As described in the License and the water quality monitoring plan, UPPCO is monitoring dissolved oxygen on a real-time basis to ensure that stream flows downstream of Dam No. 4, as measured immediately downstream, maintain a DO concentration of 7.0 mg/l when 1) river discharges are greater than or equal to the 95th percent exceedance flow and 2) when the facility is not augmenting flow. Data is collected at one-hour intervals continuously during the months of July and August. Please note that the water quality monitoring equipment has an accuracy of +/- 0.1 mg/l, per the manufacturer. Per the monitoring plan, UPPCO is correcting the dissolved oxygen monitoring data for calibration drift assuming a linear degradation of meter accuracy. Therefore, readings below 6.9 mg/l are potential deviations from the water quality standard. There is no water quality standard for temperature at the project.

Monitoring data collected between July 16th and July 22nd has been reviewed and corrected for calibration drift. There are no potential deviations from water quality standards to note. After correcting the data, there are 7 hourly readings of 6.9 mg/l, all of which occurred on July 19th. The likely cause of the lower dissolved oxygen readings is warm water temperatures. During the week of July 15th, air temperatures were in the 80's to low 90's. Water temperatures also increased with daily maximum temperatures above 80°F from the 15th through the 19th. The daily average water temperature on the 19th was 79.5°F, with a daily maximum temperature of 82°F. Dissolved oxygen and temperature data collected through July 22nd is attached for your review.

Please note that the Boney Falls reservoir is currently drawn down to support work on the embankments. As a result, the water level in the reservoir is below the spillway elevation and UPPCO is not able to release aeration flow to mitigate low DO levels. Additionally, less cold water is available to be released downstream of the facility to mitigate higher water temperatures.

Please feel free to contact me if you have questions on the monitoring data.

Thanks,
Mark

Mark Metcalf

Environmental Consultant - Air & Water | Integrys Business Support, LLC

920-433-1833 (Green Bay)

920-617-6046 (De Pere)

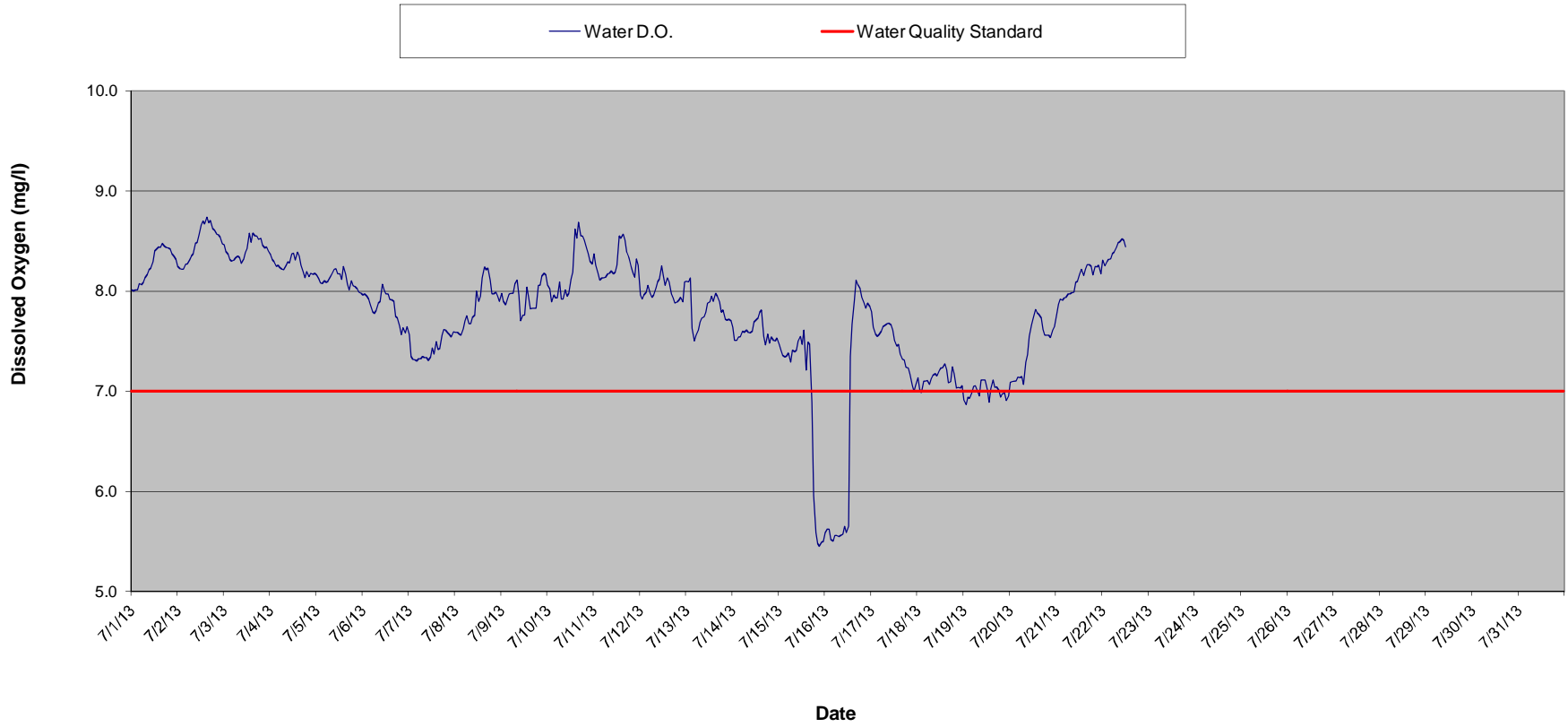
920-606-8432 *cell*

920-433-4916 *fax*

mwmetcalf@integrysgroup.com

www.integrysgroup.com

Escanaba Dam 4 Dissolved Oxygen Summary - July 2013



Escanaba Dam 4 - July 2013 Dissolved Oxygen Monitoring Data

Time HHMMSS	07/01/13	07/02/13	07/03/13	07/04/13	07/05/13	07/06/13	07/07/13	07/08/13	07/09/13	07/10/13	07/11/13	07/12/13	07/13/13	07/14/13	07/15/13	07/16/13
0	8.0	8.2	8.5	8.4	8.2	8.0	7.6	7.6	8.0	8.1	8.4	8.0	8.1	7.6	7.5	5.6
10000	8.0	8.2	8.4	8.3	8.1	8.0	7.3	7.6	7.9	8.0	8.3	7.9	8.1	7.5	7.4	5.6
20000	8.0	8.2	8.4	8.3	8.1	8.0	7.3	7.6	7.9	7.9	8.2	8.0	8.1	7.5	7.4	5.6
30000	8.0	8.2	8.3	8.2	8.1	7.9	7.3	7.6	7.9	8.0	8.1	8.0	7.6	7.5	7.3	5.5
40000	8.1	8.3	8.3	8.3	8.1	7.9	7.3	7.6	8.0	7.9	8.1	8.1	7.5	7.5	7.4	5.5
50000	8.1	8.3	8.3	8.2	8.1	7.8	7.3	7.7	8.0	7.9	8.1	8.0	7.6	7.6	7.4	5.6
60000	8.1	8.3	8.3	8.2	8.1	7.8	7.3	7.8	8.0	8.1	8.1	7.9	7.6	7.6	7.3	5.6
70000	8.1	8.4	8.4	8.2	8.1	7.8	7.3	7.7	8.1	7.9	8.2	8.0	7.7	7.6	7.4	5.6
80000	8.2	8.4	8.3	8.3	8.2	7.9	7.3	7.7	8.1	7.9	8.2	8.0	7.7	7.6	7.4	5.6
90000	8.2	8.5	8.3	8.3	8.2	7.9	7.3	7.7	8.0	8.0	8.2	8.1	7.7	7.6	7.4	5.6
100000	8.2	8.5	8.3	8.3	8.2	8.1	7.3	7.8	7.7	8.0	8.2	8.1	7.8	7.6	7.5	5.7
110000	8.3	8.6	8.4	8.4	8.2	8.0	7.3	8.0	7.8	8.0	8.2	8.3	7.9	7.7	7.6	5.6
120000	8.4	8.7	8.4	8.4	8.2	8.0	7.4	7.9	7.8	8.1	8.3	8.2	7.9	7.7	7.5	5.7
130000	8.4	8.7	8.6	8.3	8.1	8.0	7.4	8.0	8.0	8.2	8.6	8.1	8.0	7.7	7.6	7.3
140000	8.4	8.7	8.5	8.4	8.2	7.9	7.5	8.1	7.9	8.6	8.5	8.1	7.9	7.8	7.2	7.7
150000	8.4	8.7	8.6	8.3	8.2	7.9	7.4	8.2	7.8	8.5	8.6	8.1	8.0	7.8	7.5	7.9
160000	8.5	8.7	8.6	8.3	8.1	7.9	7.4	8.2	7.8	8.7	8.5	8.0	8.0	7.6	7.5	8.1
170000	8.4	8.7	8.6	8.2	8.0	7.7	7.6	8.2	7.8	8.6	8.4	7.9	7.9	7.5	6.9	8.1
180000	8.4	8.6	8.5	8.1	8.1	7.7	7.6	8.1	7.8	8.6	8.3	7.9	7.8	7.6	6.0	8.0
190000	8.4	8.6	8.5	8.2	8.1	7.7	7.6	8.0	8.1	8.5	8.3	7.9	7.8	7.5	5.6	7.9
200000	8.4	8.6	8.5	8.1	8.0	7.6	7.6	8.0	8.1	8.4	8.2	7.9	7.7	7.5	5.5	7.9
210000	8.4	8.6	8.4	8.2	8.0	7.6	7.6	8.0	8.2	8.4	8.1	7.9	7.7	7.5	5.5	7.8
220000	8.3	8.5	8.4	8.2	8.0	7.6	7.5	8.0	8.2	8.3	8.3	7.9	7.7	7.5	5.5	7.9
230000	8.3	8.5	8.4	8.2	8.0	7.6	7.6	7.9	8.2	8.3	8.3	8.1	7.7	7.5	5.5	7.8
Daily Max	8.5	8.7	8.6	8.4	8.2	8.1	7.6	8.2	8.2	8.7	8.6	8.3	8.1	7.8	7.6	8.1
Daily Min	8.0	8.2	8.3	8.1	8.0	7.6	7.3	7.6	7.7	7.9	8.1	7.9	7.5	7.5	5.5	5.5
Average	8.3	8.5	8.4	8.3	8.1	7.8	7.4	7.9	8.0	8.2	8.3	8.0	7.8	7.6	6.9	6.6

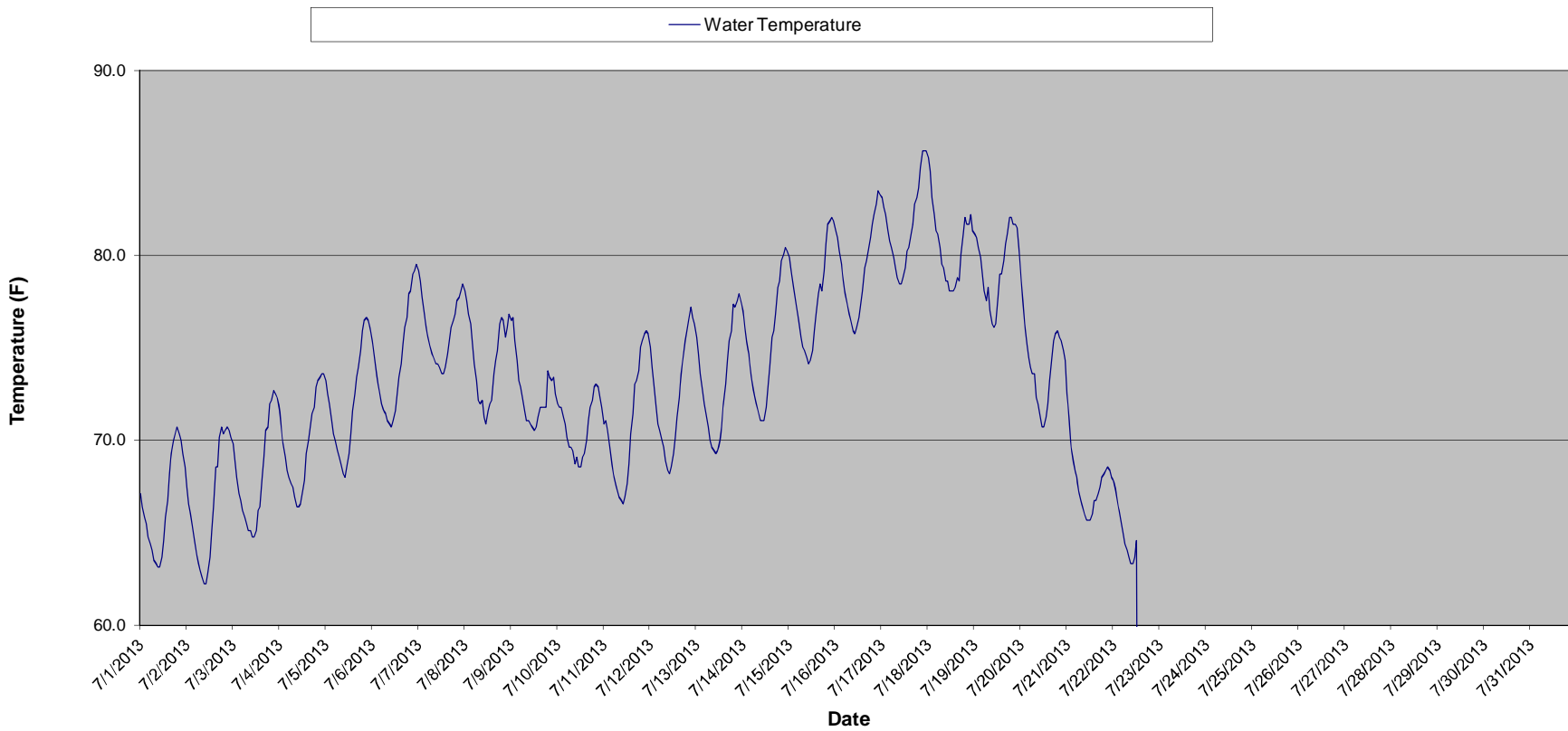
License Minimum Dissolved Oxygen: 7.0 mg/l

Equipment malfunction - Data not representative of actual conditions.

Escanaba Dam 4 - July 2013 Dissolved Oxygen Monitoring Data

Time HHMMSS	07/17/13	07/18/13	07/19/13	07/20/13	07/21/13	07/22/13	07/23/13	07/24/13	07/25/13	07/26/13	07/27/13	07/28/13	07/29/13	07/30/13	07/31/13
0	7.8	7.1	6.9	7.1	7.8	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10000	7.6	7.0	6.9	7.1	7.9	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20000	7.6	7.0	6.9	7.1	7.9	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30000	7.5	7.1	6.9	7.1	7.9	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40000	7.6	7.1	7.0	7.1	7.9	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50000	7.6	7.1	7.0	7.1	7.9	8.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60000	7.6	7.1	7.1	7.1	8.0	8.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
70000	7.7	7.1	7.0	7.1	8.0	8.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
80000	7.7	7.2	7.0	7.3	8.0	8.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
90000	7.7	7.2	7.1	7.4	8.0	8.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100000	7.7	7.1	7.1	7.5	8.1	8.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
110000	7.6	7.2	7.1	7.7	8.1	8.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
120000	7.5	7.2	7.0	7.7	8.2	8.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
130000	7.5	7.2	6.9	7.8	8.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
140000	7.5	7.3	7.0	7.8	8.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
150000	7.4	7.2	7.1	7.8	8.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
160000	7.3	7.1	7.0	7.7	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
170000	7.3	7.1	7.0	7.6	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
180000	7.2	7.2	7.0	7.6	8.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
190000	7.2	7.2	6.9	7.6	8.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
200000	7.2	7.0	7.0	7.6	8.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
210000	7.1	7.0	7.0	7.5	8.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
220000	7.0	7.0	6.9	7.6	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
230000	7.1	7.1	7.0	7.6	8.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Daily Max	7.8	7.3	7.1	7.8	8.3	8.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Daily Min	7.0	7.0	6.9	7.1	7.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Average	7.5	7.1	7.0	7.4	8.1	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Escanaba Dam 4 Water Temperature - July 2013



Escanaba Dam 4 - July 2013 Temperature Monitoring Data

HHMMSS	07/01/13	07/02/13	07/03/13	07/04/13	07/05/13	07/06/13	07/07/13	07/08/13	07/09/13	07/10/13	07/11/13	07/12/13	07/13/13	07/14/13	07/15/13	07/16/13
0	67.1	67.5	69.8	71.6	73.2	75.4	79.2	78.1	76.5	72.0	70.9	75.0	75.6	77.0	79.9	81.3
10000	66.4	66.6	68.9	70.7	72.5	74.7	78.6	77.5	76.6	71.8	71.1	73.9	74.7	76.1	79.2	81.0
20000	65.8	65.8	68.0	69.8	72.0	73.9	77.7	76.8	75.4	71.8	70.5	73.0	73.6	75.4	78.4	80.2
30000	65.5	65.3	67.1	69.1	71.1	73.0	76.8	76.3	74.3	71.2	69.6	71.8	72.7	74.7	77.7	79.5
40000	64.8	64.6	66.7	68.4	70.3	72.5	76.1	75.2	73.2	70.9	68.9	70.9	72.0	73.8	77.0	78.6
50000	64.4	64.0	66.2	68.0	70.0	72.0	75.6	74.1	72.9	70.2	68.2	70.5	71.4	73.0	76.5	77.9
60000	64.0	63.3	65.8	67.6	69.4	71.6	75.0	73.2	72.1	69.6	67.6	70.0	70.7	72.3	75.6	77.4
70000	63.5	63.0	65.5	67.5	69.1	71.4	74.7	72.1	71.6	69.6	67.3	69.6	70.0	72.0	75.0	76.8
80000	63.3	62.6	65.1	66.9	68.7	71.1	74.5	72.0	71.1	69.4	66.9	68.9	69.6	71.6	74.8	76.5
90000	63.1	62.2	65.1	66.4	68.2	70.9	74.1	72.1	71.1	68.7	66.7	68.4	69.4	71.1	74.5	75.9
100000	63.1	62.2	64.8	66.4	68.0	70.7	74.1	71.2	70.9	69.1	66.6	68.2	69.3	71.1	74.1	75.7
110000	63.7	62.8	64.8	66.6	68.5	71.1	73.9	70.9	70.7	68.5	66.9	68.5	69.4	71.1	74.3	76.1
120000	64.6	63.7	65.1	67.3	69.3	71.6	73.6	71.6	70.5	68.5	67.6	69.3	70.0	71.8	74.8	76.6
130000	65.8	65.1	66.2	67.8	70.3	72.5	73.6	72.0	70.7	69.1	68.7	70.2	70.7	72.9	75.9	77.4
140000	66.7	66.4	66.4	69.3	71.6	73.4	73.9	72.1	71.2	69.3	70.3	71.2	72.0	73.9	76.8	78.1
150000	68.2	68.5	68.0	70.0	72.5	74.1	74.7	73.6	71.8	70.0	71.4	72.3	73.0	75.6	77.9	79.3
160000	69.3	68.5	69.1	70.7	73.4	75.2	75.4	74.3	71.8	71.1	73.0	73.6	74.3	75.9	78.4	79.7
170000	70.0	70.2	70.5	71.4	73.9	76.1	76.1	74.8	71.8	71.8	73.2	74.3	75.4	76.8	78.1	80.2
180000	70.3	70.7	70.7	71.8	74.8	76.6	76.5	76.3	71.8	72.1	73.8	75.4	75.9	78.3	79.2	81.0
190000	70.7	70.3	72.0	72.9	75.9	77.9	76.8	76.6	73.8	72.9	75.0	75.9	77.4	78.6	80.6	81.7
200000	70.3	70.5	72.1	73.2	76.5	78.1	77.5	76.5	73.4	73.0	75.4	76.5	77.2	79.7	81.7	82.2
210000	70.0	70.7	72.7	73.4	76.6	79.0	77.7	75.6	73.2	72.9	75.7	77.2	77.5	80.1	81.9	82.8
220000	69.3	70.5	72.5	73.6	76.5	79.2	78.1	76.1	73.4	72.3	75.9	76.6	77.9	80.4	82.0	83.5
230000	68.5	70.2	72.3	73.6	76.1	79.5	78.4	76.8	72.5	71.8	75.7	76.3	77.5	80.2	81.9	83.3
Daily Max	70.7	70.7	72.7	73.6	76.6	79.5	79.2	78.1	76.6	73.0	75.9	77.2	77.9	80.4	82.0	83.5
Daily Min	63.1	62.2	64.8	66.4	68.0	70.7	73.6	70.9	70.5	68.5	66.6	68.2	69.3	71.1	74.1	75.7
Average	66.6	66.5	68.1	69.7	72.0	74.2	75.9	74.4	72.6	70.7	70.7	72.4	73.2	75.1	77.8	79.3

Monthly average temp (F): 60.7

Escanaba Dam 4 - July 2013 Temperature Monitoring Data

HHMMSS	07/17/13	07/18/13	07/19/13	07/20/13	07/21/13	07/22/13	07/23/13	07/24/13	07/25/13	07/26/13	07/27/13	07/28/13	07/29/13	07/30/13	07/31/13
0	83.1	85.3	81.1	78.6	72.5	67.8	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
10000	82.6	84.6	81.0	77.5	71.1	67.3	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
20000	82.2	83.1	80.4	76.3	69.6	66.7	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
30000	81.3	82.2	79.9	75.2	69.1	66.2	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
40000	80.8	81.3	79.0	74.5	68.4	65.5	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
50000	80.4	81.1	78.1	73.9	68.0	64.9	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
60000	79.9	80.4	77.5	73.6	67.3	64.4	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
70000	79.3	79.5	78.3	73.6	66.7	64.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
80000	78.8	79.3	77.0	72.3	66.4	63.7	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
90000	78.4	78.6	76.3	72.0	66.0	63.3	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
100000	78.4	78.6	76.1	71.2	65.7	63.3	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
110000	78.8	78.1	76.3	70.7	65.7	63.7	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
120000	79.3	78.1	77.7	70.7	65.7	64.6	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
130000	80.2	78.1	79.0	71.2	66.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
140000	80.4	78.3	79.0	72.0	66.7	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
150000	81.1	78.8	79.7	73.2	66.7	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
160000	81.7	78.6	80.6	74.5	67.1	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
170000	82.8	80.1	81.1	75.4	67.5	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
180000	83.1	81.1	82.0	75.7	68.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
190000	83.7	82.0	82.0	75.9	68.2	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
200000	84.7	81.7	81.7	75.6	68.4	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
210000	85.6	81.7	81.7	75.4	68.5	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
220000	85.6	82.2	81.5	74.8	68.4	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
230000	85.6	81.3	80.4	74.3	68.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
Daily Max	85.6	85.3	82.0	78.6	72.5	67.8	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
Daily Min	78.4	78.1	76.1	70.7	65.7	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
Average	81.6	80.6	79.5	74.1	67.7	49.9	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0

Metcalfe, Mark W

From: Metcalf, Mark W
Sent: Wednesday, September 04, 2013 2:55 PM
To: 'Burr Fisher '; 'Kruger, Kyle'
Cc: 'Klemans, Diana (DEQ)'; 'Koetje, Mitch (DEQ)'; 'Kohlhepp, Gary (DEQ)'; 'Carpenter, Koren'; Meyers, Robert J; Schlorke, Virgil E; Puzen, Shawn C
Subject: Escanaba Dam 4 - annual water quality monitoring report
Attachments: 20130904 Esc D4 report.pdf; Dam 4 Temp Summary 2013.xlsx; Dam 4 DO Summary 2013.xlsx

Good afternoon,

Pursuant to the water quality monitoring plan for Escanaba Dam #4, attached for your review and comment is the 2013 water quality monitoring report. Please review the enclosed report and monitoring data and make any comments you may have as soon as possible, but within 30 days of this letter. If you have any questions, feel free to contact me.

Thank you,
Mark

Mark Metcalf

Environmental Consultant - Air & Water | Integrys Business Support, LLC

920-433-1833 (Green Bay)

920-617-6046 (De Pere)

920-606-8432 *cell*

920-433-4916 *fax*

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Providing support for Integrys Energy Group, Integrys Energy Services, Michigan Gas Utilities, Minnesota Energy Resources, North Shore Gas, Peoples Gas, Trillium CNG, Upper Peninsula Power Company and Wisconsin Public Service.



Upper Peninsula Power Company

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September 4, 2013

FERC Project No. 2506

Mr. Kyle Kruger
Michigan Department of Natural Resources
191 S. Mt. Tom Road
Mio, MI 48647

Mr. Burr Fisher
U.S. Fish & Wildlife Service
2651 Coolidge Road, Suite 101
East Lansing, MI 48823

Dear Mr. Kruger and Mr. Fisher:

2013 Water Quality Monitoring Report – Escanaba Dam 4

As per the Order Approving Modifications to Dissolved Oxygen Monitoring Plan under Article 415, dated March 9, 2005, Upper Peninsula Power Company (UPPCO) is pleased to submit water quality monitoring data collected below Escanaba River Hydroelectric Project Dam 4 for the 2013 monitoring year for your review and comment.

The dissolved oxygen standard downstream of Dam No. 4 (Boney Falls) is 7 mg/L. Currently there is no temperature standard. Dissolved oxygen concentration and water temperature of the Escanaba River is monitored approximately 600' downstream of the powerhouse from July 1st through August 31st. As described in the License and the water quality monitoring plan, UPPCO is monitoring dissolved oxygen on a real-time basis to ensure that stream flows downstream of Dam No. 4, as measured immediately downstream, maintain a DO concentration of 7.0 mg/l when 1) river discharges are greater than or equal to the 95th percent exceedance flow (i.e., 95 percent of historical flow rates are equal to or above a certain flow value) and 2) when the facility is not augmenting flow.

Monitoring data was collected at one-hour intervals continuously during the months of July and August. As described in the monitoring plan, the water quality monitoring equipment was cleaned and calibrated weekly during the month of July and at least bi-weekly in August. The calibration information was used to determine

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calibration drift that occurred since the previous calibration event. Please note that the water quality monitoring equipment has an accuracy of +/- 0.1 mg/l, per the manufacturer. In the event that the meter calibration had drifted by more than 0.1 mg/l between calibration events, the raw monitoring data is corrected assuming a linear degradation of calibration. Therefore, dissolved oxygen concentrations less than 6.9 mg/l are potential deviations from the water quality standard.

There are no deviations from the dissolved oxygen water quality standard to note. On July 15th, the water quality monitor malfunctioned which resulted in non-representative dissolved oxygen readings to be recorded. The cause of the erroneous readings was a loose membrane on the dissolved oxygen sensor. As a result of the malfunction, non-representative DO readings were recorded between July 15th at 17:00 and July 16th at 12:00 when the monitor was repaired. At the time of the malfunction the Boney Falls reservoir was drawn down to a water level below the spillway elevation. Consequently UPPCO was not able to release aeration flow to mitigate low DO levels. However, when the low DO readings were observed on the 15th, operators increased the release from the powerhouse in an effort to mitigate the low DO readings. On July 19th there were seven hourly readings of 6.9 mg/l. The likely cause of the lower dissolved oxygen readings was warm water temperatures. During the week of July 15th, air temperatures were in the 80's to low 90's. Water temperatures also increased with daily maximum temperatures above 80°F from the 15th through the 19th.

During the 2013 monitoring season the reservoir above Escanaba Dam 4 was drawn down season to support an embankment improvement project. The draw down was initiated on May 28th. The normal summertime midpoint elevation for the reservoir is 906'. For the past few years, the reservoir has been maintained approximately 4.67' below the midpoint while UPPCO investigated seepage through the impoundment embankments. This year, UPPCO drew down the reservoir to a target elevation of 891.7' to 892.3' to support an embankment improvement project. Note that the elevation of the spillway is 893.2'. Consequently, UPPCO primarily released water through the powerhouse during the monitoring season. Water was released through the spillway and powerhouse on July 1st through July 5th and July 26th through August 12th due to high river flow.

River flow as measured at the United States Geological Service (USGS) monitoring station in Cornell, MI (Station ID 04059000) was above the 95th percentile exceedance flow every day during the monitoring season. Flow augmentation was conducted for two brief periods on August 21st and 22nd. Flow augmentation is conducted in an attempt to mitigate warm water temperatures in the Escanaba River downstream of the powerhouse to protect the fishery under certain conditions. Under normal operation, when flow augmentation is conducted the volume of water released from the facility is increased to 150% of the river flow as measured at the USGS gauge in Cornell from 11:00 EST until 18:00 EST, and then reduced to 75% of the flow rate measured at the Cornell gauge when augmentation was initiated to refill the reservoir. As the reservoir was drawn down for required maintenance, augmentation was limited in the amount of flow released through the units and the duration of the augmentation.

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Attached for your review and comment is the dissolved oxygen and temperature data collected downstream of Escanaba Dam 4 and river flow data collected at the USGS gauging station. Periods of flow augmentation, missing or non-representative data are highlighted in the attached monitoring data spreadsheets. Please review the enclosed data and make any comments you may have as soon as possible, but 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,

A handwritten signature in black ink that reads "Mark Metcalf". The signature is written in a cursive, slightly slanted style.

Mark W. Metcalf
Environmental Consultant – Air & Water
Integrays Business Support, LLC

Attach: 2013 Escanaba Dam 4 Water Quality Monitoring Data

cc: Ms. Diana Klemans - MDEQ
Mr. Mitch Koetje - MDEQ
Mr. Gary Kohlhepp – MDEQ
Ms. Koren Carpenter - MDEQ
Mr. Robert Meyers, UPPCO - UISC
Mr. Virgil Schlorke, UPPCO- UISC
Mr. Shawn Puzen, IBS - D2

**Response to Comments from the Resource Agencies on the
2013 Escanaba Dam 4 Water Quality Monitoring Report**

The Michigan Department of Natural Resources, Michigan Department of Environmental Quality, and U.S. Fish & Wildlife Service did not respond with comments on the 2013 water quality monitoring report for Escanaba Dam 4.

Document Content(s)

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