Xcel Energy®

1414 West Hamilton Avenue
P.O. Box 8
Eau Claire, WI 54702-0008

January 30, 2018

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

Subject: **2017 Water Quality Monitoring Report – Articles 404 & 406**
Big Falls Hydro (P-2390-01) and Thornapple Hydro (P-2475)

Dear Secretary:

Enclosed is the 2017 Water Quality Monitoring Report for the Big Falls and Thornapple hydro projects. The report is filed pursuant to license articles 404 (Big Falls) and 406 (Thornapple). The results are summarized for the past five years and while there appears to be some variability in the parameters analyzed, for the most part, the results have been relatively consistent. Xcel Energy (licensee) has also confirmed that the water quality monitoring results for Turtle Flambeau Reservoir (P-2390-02) have been posted on the WDNR's website.

Licensee provided a copy of the report to the WDNR and USFWS for comment via e-mail on November 30, 2017. The WDNR responded that they had no comments. The USFWS did not provide comments. Agency correspondence is included in Appendix D of the report.

Should you have any questions regarding this report, feel free to contact Matthew Miller of this office at (715) 737-1353 or by e-mail at matthew.j.miller@xcelenergy.com.

Sincerely,

William Zawacki
Director, Hydro Plants

Enclosure: Water Quality Monitoring Report

c: Jeff Scheirer – WDNR (cover letter only – via e-mail)
Cheryl Laatsch – WDNR (cover letter only – via email)
Nick Utrup – USFWS (cover letter only – via e-mail)
Project Files

2017 Water Quality Monitoring Report for Big Falls Flowage (P-2390-01) and Thornapple Flowage (P-2475)

Northern States Power Company –WI

An Xcel Energy Company

November 2017

APPENDIX A

2017 Water Quality Lab Analysis For Big Falls and Thornapple Flowages

Minneapolis Testing Laboratory
1518 Chestnut Ave N
Minneapolis, MN 55043
Certification # MN-027-053-197
WI-999071150
Christine Keefe, Supervisor (612) 630-4506

Big Falls Hydro	Project Name/Location: Phosphorus	
1400 Western Ave		**Reported:**
Eau Claire WI, 54701	Project Manager: Matt J Miller	05/11/2017 07:51

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sample Qualifier	Laboratory ID	Matrix	Sampled	Received
Big Falls Flowage Surface		MCE0026-01	Water	04/24/2017 12:09	05/02/2017 13:23
Big Falls Flowage Bottom		MCE0026-02	Water	04/24/2017 12:18	05/02/2017 13:23

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Christine Keefe, Supervisor (612) 630-4506

Big Falls Hydro	Project Name/Location: Phosphorus	
1400 Western Ave		**Reported:**
Eau Claire WI, 54701	Project Manager: Matt J Miller	05/11/2017 07:51

Big Falls Flowage Surface

MCE0026-01 (Water) - Chain of Custody Number: 238396

Analyte	Result	LOD	LOQ	Units	Analyte Qualifier	Dilution	Batch	Prepared	Analyzed	Method	Analyst
Wet Chemistry											
Phosphate, Total as P	0.0247	0.00500	0.0160	mg/L		1	BCE0202	5/9/17 11:19	5/10/17 10:22	EPA 365.1	HRD

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Christine Keefe, Supervisor (612) 630-4506

Big Falls Hydro	Project Name/Location: Phosphorus	
1400 Western Ave		**Reported:**
Eau Claire WI, 54701	Project Manager: Matt J Miller	05/11/2017 07:51

Big Falls Flowage Bottom

MCE0026-02 (Water) - Chain of Custody Number: 238396

Analyte	Result	LOD	LOQ	Units	Analyte Qualifier	Dilution	Batch	Prepared	Analyzed	Method	Analyst
Wet Chemistry											
Phosphate, Total as P	0.0290	0.00500	0.0160	mg/L		1	BCE0202	5/9/17 11:19	5/10/17 10:23	EPA 365.1	HRD

Minneapolis Testing Laboratory
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Minneapolis, MN 55043
Certification # MN-027-053-197
WI-999071150
Christine Keefe, Supervisor (612) 630-4506

Thornapple Hydro	Project Name/Location: Phosphorus	
W 5506 Dam Road		**Reported:**
Glen Flora WI, 54563	Project Manager: Matt J Miller	05/11/2017 07:52

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sample Qualifier	Laboratory ID	Matrix	Sampled	Received
Thornapple Flowage Surface		MCE0025-01	Water	04/24/2017 14:12	05/02/2017 13:23
Thornapple Flowage Bottom		MCE0025-02	Water	04/24/2017 14:18	05/02/2017 13:23

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Minneapolis, MN 55043
Certification # MN-027-053-197
WI-999071150
Christine Keefe, Supervisor (612) 630-4506

Thornapple Hydro	Project Name/Location: Phosphorus	
W 5506 Dam Road		**Reported:**
Glen Flora WI, 54563	Project Manager: Matt J Miller	05/11/2017 07:52

Thornapple Flowage Surface

MCE0025-01 (Water) - Chain of Custody Number: 238396

Analyte	Result	LOD	LOQ	Units	Analyte Qualifier	Dilution	Batch	Prepared	Analyzed	Method	Analyst
Wet Chemistry											
Phosphate, Total as P	0.0182	0.00500	0.0160	mg/L		1	BCE0202	5/9/17 11:19	5/10/17 10:21	EPA 365.1	HRD

Minneapolis Testing Laboratory
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Minneapolis, MN 55043
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Christine Keefe, Supervisor (612) 630-4506

Thornapple Hydro	Project Name/Location: Phosphorus	
W 5506 Dam Road		**Reported:**
Glen Flora WI, 54563	Project Manager: Matt J Miller	05/11/2017 07:52

Thornapple Flowage Bottom

MCE0025-02 (Water) - Chain of Custody Number: 238396

Analyte	Result	LOD	LOQ	Units	Analyte Qualifier	Dilution	Batch	Prepared	Analyzed	Method	Analyst
Wet Chemistry											
Phosphate, Total as P	0.0285	0.00500	0.0160	mg/L		1	BCE0202	5/9/17 11:19	5/10/17 10:21	EPA 365.1	HRD

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
Ph: (715)-478-2777 Fax: (715)-478-3060

ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

NLS Project: 278352
NLS Customer: 96708
Phone: 715 737 1353

Client: **Xcel Energy**
Attn: Matt Miller
1414 W. Hamilton Ave
P.O. Box 8
Eau Claire, WI 54702

Project: **Big Falls-Thornapple**

Big Falls Flowage NLS ID: 985137
COC: 198992:1 Matrix: SW
Collected: 04/24/17 12:09 Received: 04/26/17

Parameter	Result	Units	Dilution	LOD	LOQ	Analyzed	Method	Lab
Chlorophyll, all species	See Attached					05/03/17	10200-H	721026460
Lab filtration for Chlorophyll	yes					04/26/17	NA	721026460

Thornapple Flowage NLS ID: 985138
COC: 198992:2 Matrix: SW
Collected: 04/24/17 14:12 Received: 04/26/17

Parameter	Result	Units	Dilution	LOD	LOQ	Analyzed	Method	Lab
Chlorophyll, all species	See Attached					05/03/17	10200-H	721026460
Lab filtration for Chlorophyll	yes					04/26/17	NA	721026460

Values in brackets represent results greater than or equal to the LOD but less than the LOQ and are within a region of "Less-Certain Quantitation". Results greater than or equal to the LOQ are considered to be in the region of "Certain Quantitation". LOD and/or LOQ tagged with an asterisk(*) are considered Reporting Limits. All LOD/LOQs adjusted to reflect dilution and/or solids content.
ND = Not Detected (< LOD) LOD = Limit of Detection LOQ = Limit of Quantitation NA = Not Applicable
DWB = Dry Weight Basis %DWB = (mg/kg DWB) / 10000 1000 ug/L = 1 mg/L
MCL = Maximum Contaminant Levels for Drinking Water Samples. Shaded results indicate >MCL.

Reviewed by:

Authorized by:
R. T. Krueger
President

Northern Lake Service, Inc.
Chlorophyll Results

Customer: Xcel Energy
Project: 278352
Big Falls-Thornapple

Sample	Description	CC a	Pheo a	TC a	TC b	TC c
985137	Big Falls Flowage	3.6	1.8	4.8	0.0*	0.57
985138	Thornapple Flowage	2.5	1.3	3.4	0.0082	0.58

CC a = Corrected Chlorophyll a
Pheo a = Pheophytin a
TC a = Trichromatic Chlorophyll a
TC b = Trichromatic Chlorophyll b
TC c = Trichromatic Chlorophyll c
Units = ug/L for Water, ug/cm_2 for periphyton samplers

*: The complex calculations used to differentiate the various chlorophyll species magnify error at low concentrations and sometimes produce negative values, which are reported as 0.0 on this report.

Minneapolis Testing Laboratory
1518 Chestnut Ave N
Minneapolis, MN 55043
Certification # MN-027-053-197
WI-999071150
Christine Keefe, Supervisor (612) 630-4506

Big Falls Hydro	Project Name/Location: Phosphorus	
1400 Western Ave		**Reported:**
Eau Claire WI, 54701	Project Manager: Matt J Miller	08/10/2017 13:51

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sample Qualifier	Laboratory ID	Matrix	Sampled	Received
Big Falls Flowage Surface	M_T	MCG0300-01	Water	07/24/2017 10:35	07/27/2017 13:18
Big Falls Flowage Bottom	M_T	MCG0300-02	Water	07/24/2017 10:42	07/27/2017 13:18

Minneapolis Testing Laboratory
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Minneapolis, MN 55043
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Christine Keefe, Supervisor (612) 630-4506

Big Falls Hydro	Project Name/Location: Phosphorus	
1400 Western Ave		**Reported:**
Eau Claire WI, 54701	Project Manager: Matt J Miller	08/10/2017 13:51

Big Falls Flowage Surface

MCG0300-01 (Water) - Chain of Custody Number: 238397

Analyte	Result	LOD	LOQ	Units	Analyte Qualifier	Dilution	Batch	Prepared	Analyzed	Method	Analyst
Wet Chemistry											
Phosphate, Total as P	0.0336	0.00500	0.0160	mg/L		1	BCH0025	8/1/17 12:43	8/7/17 13:49	EPA 365.1	HRD

Minneapolis Testing Laboratory
1518 Chestnut Ave N
Minneapolis, MN 55043
Certification # MN-027-053-197
WI-999071150
Christine Keefe, Supervisor (612) 630-4506

Big Falls Hydro	Project Name/Location: Phosphorus	
1400 Western Ave		**Reported:**
Eau Claire WI, 54701	Project Manager: Matt J Miller	08/10/2017 13:51

Big Falls Flowage Bottom

MCG0300-02 (Water) - Chain of Custody Number: 238397

Analyte	Result	LOD	LOQ	Units	Analyte Qualifier	Dilution	Batch	Prepared	Analyzed	Method	Analyst
Wet Chemistry											
Phosphate, Total as P	0.0459	0.00500	0.0160	mg/L		1	BCH0025	8/1/17 12:43	8/7/17 13:50	EPA 365.1	HRD

Minneapolis Testing Laboratory
1518 Chestnut Ave N
Minneapolis, MN 55043
Certification # MN-027-053-197
WI-999071150
Christine Keefe, Supervisor (612) 630-4506

Thornapple Hydro	Project Name/Location: Phosphorus	
W 5506 Dam Road		**Reported:**
Glen Flora WI, 54563	Project Manager: Matt J Miller	08/10/2017 13:53

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sample Qualifier	Laboratory ID	Matrix	Sampled	Received
Thornapple Flowage Surface	M_T	MCG0301-01	Water	07/24/2017 13:02	07/27/2017 13:18
Thornapple Flowage Bottom	M_T	MCG0301-02	Water	07/24/2017 13:07	07/27/2017 13:18

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Christine Keefe, Supervisor (612) 630-4506

Thornapple Hydro	Project Name/Location: Phosphorus	
W 5506 Dam Road		**Reported:**
Glen Flora WI, 54563	Project Manager: Matt J Miller	08/10/2017 13:53

Thornapple Flowage Surface

MCG0301-01 (Water) - Chain of Custody Number: 238397

Analyte	Result	LOD	LOQ	Units	Analyte Qualifier	Dilution	Batch	Prepared	Analyzed	Method	Analyst
Wet Chemistry											
Phosphate, Total as P	0.0264	0.00500	0.0160	mg/L		1	BCH0025	8/1/17 12:43	8/7/17 13:51	EPA 365.1	HRD

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WI-999071150
Christine Keefe, Supervisor (612) 630-4506

Thornapple Hydro	Project Name/Location: Phosphorus	
W 5506 Dam Road		**Reported:**
Glen Flora WI, 54563	Project Manager: Matt J Miller	08/10/2017 13:53

Thornapple Flowage Bottom

MCG0301-02 (Water) - Chain of Custody Number: 238397

Analyte	Result	LOD	LOQ	Units	Analyte Qualifier	Dilution	Batch	Prepared	Analyzed	Method	Analyst
Wet Chemistry											
Phosphate, Total as P	0.0360	0.00500	0.0160	mg/L		1	BCH0025	8/1/17 12:43	8/7/17 13:52	EPA 365.1	HRD

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
Ph: (715)-478-2777 Fax: (715)-478-3060

ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

NLS Project: 283861
NLS Customer: 96708
Phone: 715 737 1353

Client: **Xcel Energy**
Attn: Matt Miller
1414 W. Hamilton Ave
P.O. Box 8
Eau Claire, WI 54702

Project: Big Falls-Thornapple

Big Falls Flowage NLS ID: 1006952
COC: 226593:1 Matrix: SW
Collected: 07/24/17 10:35 Received: 07/27/17
Notes: Noncompliance: Sample(s) received at 11.7 degrees C, which is above WDNR protocol of 6 degrees C.

Parameter	Result	Units	Dilution	LOD	LOQ	Analyzed	Method	Lab
Chlorophyll, all species	See Attached					07/29/17	10200-H	721026460
Lab filtration for Chlorophyll	yes					07/28/17	NA	721026460

Thornapple Flowage NLS ID: 1006953
COC: 226593:2 Matrix: SW
Collected: 07/24/17 13:05 Received: 07/27/17
Notes: Noncompliance: Sample(s) received at 11.7 degrees C, which is above WDNR protocol of 6 degrees C.

Parameter	Result	Units	Dilution	LOD	LOQ	Analyzed	Method	Lab
Chlorophyll, all species	See Attached					07/29/17	10200-H	721026460
Lab filtration for Chlorophyll	yes					07/28/17	NA	721026460

Values in brackets represent results greater than or equal to the LOD but less than the LOQ and are within a region of "Less-Certain Quantitation". Results greater than or equal to the LOQ are considered to be in the region of "Certain Quantitation". LOD and/or LOQ tagged with an asterisk(*) are considered Reporting Limits. All LOD/LOQs adjusted to reflect dilution and/or solids content.
ND = Not Detected (< LOD) LOD = Limit of Detection LOQ = Limit of Quantitation NA = Not Applicable
DWB = Dry Weight Basis %DWB = (mg/kg DWB) / 10000 1000 ug/L = 1 mg/L
MCL = Maximum Contaminant Levels for Drinking Water Samples. Shaded results indicate >MCL.

Reviewed by:

Authorized by:
R. T. Krueger
President

Northern Lake Service, Inc.
Chlorophyll Results

Customer: Xcel Energy
Project: 283861
Big Falls-Thornapple

Sample	Description	CC a	Pheo a	TC a	TC b	TC c
1006952	Big Falls Flowage	1.6	1.7	2.6	0.79	1.1
1006953	Thornapple Flowage	1.3	0.53	1.7	0.65	0.9

CC a = Corrected Chlorophyll a
Pheo a = Pheophytin a
TC a = Trichromatic Chlorophyll a
TC b = Trichromatic Chlorophyll b
TC c = Trichromatic Chlorophyll c
Units = ug/L for Water, ug/cm_2 for periphyton samplers

*: The complex calculations used to differentiate the various chlorophyll species magnify error at low concentrations and sometimes produce negative values, which are reported as 0.0 on this report.

Minneapolis Testing Laboratory
1518 Chestnut Ave N
Minneapolis, MN 55043
Certification # MN-027-053-197
WI-999071150
Christine Keefe, Supervisor (612) 630-4506

Big Falls Hydro	Project Name/Location: Phosphorus	
1400 Western Ave		**Reported:**
Eau Claire WI, 54701	Project Manager: Matt J Miller	09/15/2017 07:48

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sample Qualifier	Laboratory ID	Matrix	Sampled	Received
Big Falls Flowage Surface	M_T	MCI0005-01	Water	08/29/2017 9:58	09/05/2017 7:00
Big Falls Flowage Bottom	M_T	MCI0005-02	Water	08/29/2017 10:02	09/05/2017 7:00

Minneapolis Testing Laboratory
1518 Chestnut Ave N
Minneapolis, MN 55043
Certification # MN-027-053-197
WI-999071150
Christine Keefe, Supervisor (612) 630-4506

Big Falls Hydro	Project Name/Location: Phosphorus	
1400 Western Ave		**Reported:**
Eau Claire WI, 54701	Project Manager: Matt J Miller	09/15/2017 07:48

Big Falls Flowage Surface

MCI0005-01 (Water) - Chain of Custody Number: 238397

Analyte	Result	LOD	LOQ	Units	Analyte Qualifier	Dilution	Batch	Prepared	Analyzed	Method	Analyst
Wet Chemistry											
Phosphate, Total as P	0.0235	0.00500	0.0160	mg/L		1	BCI0244	9/13/17 10:18	9/14/17 9:54	EPA 365.1	HRD

Minneapolis Testing Laboratory
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Minneapolis, MN 55043
Certification # MN-027-053-197
WI-999071150
Christine Keefe, Supervisor (612) 630-4506

Big Falls Hydro	Project Name/Location: Phosphorus	
1400 Western Ave		**Reported:**
Eau Claire WI, 54701	Project Manager: Matt J Miller	09/15/2017 07:48

Big Falls Flowage Bottom

MCI0005-02 (Water) - Chain of Custody Number: 238397

Analyte	Result	LOD	LOQ	Units	Analyte Qualifier	Dilution	Batch	Prepared	Analyzed	Method	Analyst
Wet Chemistry											
Phosphate, Total as P	0.0553	0.00500	0.0160	mg/L		1	BCI0244	9/13/17 10:18	9/14/17 9:55	EPA 365.1	HRD

Minneapolis Testing Laboratory
1518 Chestnut Ave N
Minneapolis, MN 55043
Certification # MN-027-053-197
WI-999071150
Christine Keefe, Supervisor (612) 630-4506

Thornapple Hydro	Project Name/Location: Phosphorus	
W 5506 Dam Road		**Reported:**
Glen Flora WI, 54563	Project Manager: Matt J Miller	09/15/2017 07:50

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sample Qualifier	Laboratory ID	Matrix	Sampled	Received
Thornapple Flowage Surface	M_T	MCI0006-01	Water	08/29/2017 11:38	09/05/2017 7:00
Thornapple Flowage Bottom	M_T	MCI0006-02	Water	08/29/2017 11:43	09/05/2017 7:00

Minneapolis Testing Laboratory
1518 Chestnut Ave N
Minneapolis, MN 55043
Certification # MN-027-053-197
WI-999071150
Christine Keefe, Supervisor (612) 630-4506

Thornapple Hydro	Project Name/Location: Phosphorus	
W 5506 Dam Road		**Reported:**
Glen Flora WI, 54563	Project Manager: Matt J Miller	09/15/2017 07:50

Thornapple Flowage Surface

MCI0006-01 (Water) - Chain of Custody Number: 238398

Analyte	Result	LOD	LOQ	Units	Analyte Qualifier	Dilution	Batch	Prepared	Analyzed	Method	Analyst
Wet Chemistry											
Phosphate, Total as P	0.0276	0.00500	0.0160	mg/L		1	BCI0244	9/13/17 10:18	9/14/17 9:56	EPA 365.1	HRD

Minneapolis Testing Laboratory
1518 Chestnut Ave N
Minneapolis, MN 55043
Certification # MN-027-053-197
WI-999071150
Christine Keefe, Supervisor (612) 630-4506

Thornapple Hydro	Project Name/Location: Phosphorus	
W 5506 Dam Road		**Reported:**
Glen Flora WI, 54563	Project Manager: Matt J Miller	09/15/2017 07:50

Thornapple Flowage Bottom

MCI0006-02 (Water) - Chain of Custody Number: 238398

Analyte	Result	LOD	LOQ	Units	Analyte Qualifier	Dilution	Batch	Prepared	Analyzed	Method	Analyst
Wet Chemistry											
Phosphate, Total as P	0.0291	0.00500	0.0160	mg/L		1	BCI0244	9/13/17 10:18	9/14/17 9:57	EPA 365.1	HRD

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
Ph: (715)-478-2777 Fax: (715)-478-3060

ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

NLS Project: 286261
NLS Customer: 96708
Phone: 715 737 1353

Client: **Xcel Energy**
Attn: Matt Miller
1414 W. Hamilton Ave
P.O. Box 8
Eau Claire, WI 54702

Project: **Big Falls-Thornapple**

Big Falls Flowage NLS ID: 1015087
COC: 227575:1 Matrix: SW
Collected: 08/29/17 09:58 Received: 08/31/17

Parameter	Result	Units	Dilution	LOD	LOQ	Analyzed	Method	Lab
Chlorophyll, all species	See Attached					09/13/17	10200-H	721026460
Lab filtration for Chlorophyll	yes					09/01/17	NA	721026460

Thornapple Flowage NLS ID: 1015088
COC: 227575:2 Matrix: SW
Collected: 08/29/17 11:38 Received: 08/31/17

Parameter	Result	Units	Dilution	LOD	LOQ	Analyzed	Method	Lab
Chlorophyll, all species	See Attached					09/13/17	10200-H	721026460
Lab filtration for Chlorophyll	yes					09/01/17	NA	721026460

Values in brackets represent results greater than or equal to the LOD but less than the LOQ and are within a region of "Less-Certain Quantitation". Results greater than or equal to the LOQ are considered to be in the region of "Certain Quantitation". LOD and/or LOQ tagged with an asterisk(*) are considered Reporting Limits. All LOD/LOQs adjusted to reflect dilution and/or solids content.
ND = Not Detected (< LOD) LOD = Limit of Detection LOQ = Limit of Quantitation NA = Not Applicable
DWB = Dry Weight Basis %DWB = (mg/kg DWB) / 10000 1000 ug/L = 1 mg/L
MCL = Maximum Contaminant Levels for Drinking Water Samples. Shaded results indicate >MCL.

Reviewed by:

Authorized by:
R. T. Krueger
President

Northern Lake Service, Inc.
Chlorophyll Results

Customer: Xcel Energy
Project: 286261
Big Falls-Thornapple

Sample	Description	CC a	Pheo a	TC a	TC b	TC c
1015087	Big Falls Flowage	3.1	0.46	3.5	0.23	0.56
1015088	Thornapple Flowage	1.1	0.75	1.6	0.19	0.2

CC a = Corrected Chlorophyll a
Pheo a = Pheophytin a
TC a = Trichromatic Chlorophyll a
TC b = Trichromatic Chlorophyll b
TC c = Trichromatic Chlorophyll c
Units = ug/L for Water, ug/cm_2 for periphyton samplers

*: The complex calculations used to differentiate the various chlorophyll species magnify error at low concentrations and sometimes produce negative values, which are reported as 0.0 on this report.

APPENDIX B

Summary Of Total Phosphorous And Chlorophyll A
Data For Big Falls And Thornapple Flowages
2013 - 2017

Summary of Water Quality Data for Big Falls and Thornapple Flowages (2013-2017)

	Big Falls Flowage			Thornapple Flowage		
	Surface	Surface	Bottom	Surface	Surface	Bottom
	Total Phosphorus	Chlorophyll-A (CCa)	Total Phosphorus	Total Phosphorus	Chlorophyll-A (CCa)	Total Phosphorus
Date	(mg/L P)	(ug/L)	(mg/L P)	(mg/L P)	(ug/L)	(mg/L P)
5/29/2013	<0.05	2.6	0.06	0.07	1.3	0.07
7/30/2013	<0.05	3.1	<0.05	<0.05	1.3	0.05
8/27/2013	<0.05	5.0	0.06	<0.05	18.0	0.05
7/22/2014*	0.04	5.0	0.05	0.04	1.9	0.05
8/27/2014	0.03	3.6	0.10	0.04	14.0	<0.01
4/28/2015	0.02	1.3	0.03	0.03	1.7	0.02
7/21/2015	0.04	6.8	0.05	0.03	0.6	0.03
8/26/2015	0.03	4.1	0.03	0.03	2.4	0.03
5/3/2016	0.02	1.9	0.02	0.02	2.1	0.02
7/19/2016	0.03	2.0	0.06	0.03	0.6	0.03
8/30/2016	0.02	4.7	0.03	0.03	1.3	0.03
4/24/2017	**0.02**	**3.6**	**0.03**	**0.02**	**2.5**	**0.03**
7/24/2017	**0.03**	**1.6**	**0.05**	**0.03**	**1.3**	**0.04**
8/29/2017	**0.02**	**3.1**	**0.06**	**0.03**	**1.1**	**0.03**
Average (Ice-out sample)	0.02	1.93	0.04	0.04	1.70	0.04
Average (July sample)	0.03	4.23	0.05	0.03	1.10	0.04
Average (August sample)	0.03	4.35	0.06	0.03	8.93	0.04

* No spring sampling conducted due to high river flows

APPENDIX C

Summary Of Dissolved Oxygen and Temperature Data for Big Falls Flowage and Thornapple Flowage 2013-2017

Dissolved Oxygen and Temperature Profiles for the Big Falls Flowage in 2013.

Date:	5/29/2013
Secchi Disk (ft.):	4.5
Depth of Bottom Sample (ft):	38
Weather Conditions:	mostly cloudy, light winds
Temperature (F):	59

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	15.3	9.22
2.0	15.3	9.17
4.0	15.2	9.13
6.0	15.2	9.13
8.0	15.2	9.10
10.0	15.2	9.10
12.0	15.2	9.07
14.0	15.2	9.07
16.0	15.2	9.07
18.0	15.2	9.07
20.0	15.2	9.06
22.0	15.2	9.06
24.0	15.2	9.05
26.0	15.2	9.05
28.0	15.2	9.04
30.0	15.2	9.04
32.0	15.2	9.04
34.0	15.2	9.03
36.0	15.2	9.01
38.0	Bottom	Bottom

Date:	7/30/2013
Secchi Disk (ft.):	4.0
Depth of Bottom Sample (ft):	36
Weather Conditions:	overcast, light winds
Temperature (F):	64

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	20.8	7.89
2.0	20.7	7.83
4.0	20.6	7.75
6.0	20.5	7.62
8.0	19.8	7.81
10.0	19.4	7.56
12.0	19.0	7.60
14.0	18.9	7.39
16.0	18.5	7.63
18.0	18.4	7.66
20.0	18.3	7.86
22.0	18.1	7.98
24.0	18.0	7.99
26.0	18.0	8.01
28.0	18.0	7.85
30.0	18.0	7.88
32.0	17.9	8.02
34.0	17.9	7.81
36.0	17.9	7.7
38.0	Bottom	Bottom

Date:	8/27/2013
Secchi Disk (ft.):	5.0
Depth of Bottom Sample:	38
Weather Conditions:	mostly cloudy, calm winds
Temperature (F):	65

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	26.0	7.35
2.0	26.0	7.31
4.0	25.9	7.27
6.0	25.9	7.23
8.0	25.9	7.22
10.0	25.8	7.25
12.0	25.7	7.22
14.0	25.7	7.26
16.0	25.7	7.30
18.0	25.4	7.10
20.0	25.2	7.00
22.0	24.8	6.94
24.0	24.7	6.77
26.0	24.6	6.68
28.0	24.5	6.54
30.0	24.4	6.29
32.0	23.9	5.69
34.0	23.8	5.40
36.0	23.3	4.0
38.0	Bottom	Bottom

Dissolved Oxygen and Temperature Profiles for the Big Falls Flowage in 2014.

Date: April 2014
Secchi Disk (ft.):
Depth of Bottom Sample (ft):
Weather Conditions:
Temperature (F):

Not Sampled Due To High River Flows

Date: 7/22/2014
Secchi Disk (ft.): 3.5
Depth of Bottom Sample (ft): 36
Weather Conditions: mostly cloudy, NW wind 10-15
Temperature (F): 75

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	24.9	7.75
2.0	24.8	7.74
4.0	24.7	7.71
6.0	24.7	7.69
8.0	24.7	7.68
10.0	24.7	7.68
12.0	24.6	7.65
14.0	24.6	7.65
16.0	24.6	7.64
18.0	24.5	7.60
20.0	24.4	7.62
22.0	24.3	7.61
24.0	24.0	7.31
26.0	23.7	7.22
28.0	23.5	7.19
30.0	23.5	7.17
32.0	23.4	7.04
34.0	23.1	6.93
36.0	22.9	6.73
38.0	Bottom	Bottom

Date: 8/27/2014
Secchi Disk (ft.): 5.0
Depth of Bottom Sample: 36
Weather Conditions: mostly sunny, light winds
Temperature (F): 68

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	24.1	7.43
2.0	24.1	7.41
4.0	24.1	7.43
6.0	24.0	7.36
8.0	24.0	7.32
10.0	23.9	7.13
12.0	23.8	7.15
14.0	23.8	7.15
16.0	23.8	7.17
18.0	23.8	7.16
20.0	23.8	7.15
22.0	23.7	6.91
24.0	23.6	6.80
26.0	23.5	6.59
28.0	23.3	6.38
30.0	23.0	6.13
32.0	22.9	6.00
34.0	22.9	5.90
36.0	21.7	4.97
38.0	Bottom	Bottom

Dissolved Oxygen and Temperature Profiles for the Big Falls Flowage in 2015.

Date: 4/28/2015
Secchi Disk (ft.): 4.0
Depth of Bottom Sample (ft): 34
Weather Conditions: sunny, winds calm
Temperature (F): 57

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	13.4	10.75
2.0	12.0	10.83
4.0	11.9	10.81
6.0	11.7	10.77
8.0	11.6	10.75
10.0	11.6	10.72
12.0	11.6	10.71
14.0	11.5	10.69
16.0	11.5	10.69
18.0	11.4	10.66
20.0	11.3	10.64
22.0	11.2	10.60
24.0	11.1	10.57
26.0	11.1	10.57
28.0	11.0	10.59
30.0	11.0	10.56
32.0	10.8	10.45
34.0	10.7	10.4
36.0	Bottom	Bottom

Date: 7/21/2015
Secchi Disk (ft.): 4.0
Depth of Bottom Sample (ft): 34
Weather Conditions: mostly sunny, NW winds @ 10
Temperature (F): 68

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	24.3	7.52
2.0	24.3	7.51
4.0	24.1	7.37
6.0	24.0	7.39
8.0	23.9	7.40
10.0	23.9	7.38
12.0	23.9	7.35
14.0	23.9	7.32
16.0	23.8	7.30
18.0	23.8	7.27
20.0	23.8	7.26
22.0	23.8	7.26
24.0	23.8	7.26
26.0	23.8	7.25
28.0	23.8	7.25
30.0	23.8	7.21
32.0	23.8	7.20
34.0	23.8	7.03
36.0	Bottom	Bottom

Date: 8/26/2015
Secchi Disk (ft.): 5.0
Depth of Bottom Sample: 36
Weather Conditions: mostly sunny, NW winds @ 5
Temperature (F): 60

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	18.1	7.84
2.0	18.0	7.82
4.0	17.7	7.81
6.0	17.6	7.83
8.0	17.0	8.24
10.0	16.6	8.40
12.0	16.6	8.42
14.0	16.4	8.42
16.0	16.3	8.47
18.0	16.3	8.47
20.0	16.3	8.51
22.0	16.3	8.52
24.0	16.3	8.54
26.0	16.2	8.57
28.0	16.1	8.55
30.0	16.1	8.59
32.0	16.0	8.56
34.0	16.0	8.58
36.0	16.0	8.55
38.0	Bottom	Bottom

Dissolved Oxygen and Temperature Profiles for the Big Falls Flowage in 2016.

Date:	5/3/2016
Secchi Disk (ft.):	4.5
Depth of Bottom Sample (ft):	35
Weather Conditions:	hazy sun, wind west @ 10
Temperature (F):	55

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	13.2	10.18
2	13.0	10.21
4	12.9	10.17
6	12.8	10.15
8	12.8	10.13
10	12.8	10.12
12	12.8	10.11
14	12.8	10.11
16	12.8	10.10
18	12.8	10.10
20	12.8	10.10
22	12.8	10.08
24	12.8	10.05
26	12.7	10.03
28	12.8	10.04
30	12.7	10.03
32	12.7	10.04
34	12.7	10.0
36	Bottom	Bottom

Date:	7/19/2016
Secchi Disk (ft.):	4.0
Depth of Bottom Sample (ft):	NA
Weather Conditions:	Sunny, calm wind
Temperature (F):	74

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface		

No sampling - DO meter malfunctioned

Date:	8/30/2016
Secchi Disk (ft.):	4.0
Depth of Bottom Sample:	34
Weather Conditions:	cloudy, calm wind
Temperature (F):	60

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	22.9	7.80
2	22.9	7.77
4	22.7	7.74
6	22.7	7.73
8	22.7	7.71
10	22.7	7.71
12	22.7	7.69
14	22.6	7.66
16	22.6	7.66
18	22.6	7.64
20	22.6	7.64
22	22.6	7.60
24	22.6	7.53
26	22.5	7.46
28	22.5	7.31
30	22.5	7.29
32	22.3	7.35
34	22.0	7.35
36	Bottom	Bottom

Dissolved Oxygen and Temperature Profiles for the Big Falls Flowage in 2017.

Date: 4/24/2017
Secchi Disk (ft.): 4.0
Depth of Bottom Sample (ft): 34
Weather Conditions: Overcast, south wind @ 15
Temperature (F): 55

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	11.6	11.09
2	11.4	11.06
4	11.3	11.05
6	11.3	11.02
8	11.3	11.00
10	11.3	10.98
12	11.3	10.98
14	11.2	10.97
16	11.2	10.96
18	11.2	10.95
20	11.2	10.95
22	11.2	10.94
24	11.2	10.94
26	11.2	10.93
28	11.1	10.92
30	11.1	10.90
32	11.1	10.89
34	11.1	10.87
36	Bottom	Bottom

Date: 7/24/2017
Secchi Disk (ft.): 4.0
Depth of Bottom Sample (ft): 36
Weather Conditions: Partly cloudy, light winds
Temperature (F): 62

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	24.5	6.27
2	24.1	6.23
4	24.1	6.23
6	24.1	6.25
8	24.1	6.26
10	24.0	6.26
12	24.0	6.26
14	24.0	6.25
16	24.0	6.24
18	23.9	6.25
20	23.9	6.27
22	23.8	6.26
24	23.7	6.28
26	23.7	6.28
28	23.7	6.25
30	23.7	6.27
32	23.7	6.25
34	23.7	6.22
36	23.7	6.13
38	Bottom	Bottom

Date: 8/29/2017
Secchi Disk (ft.): 5.0
Depth of Bottom Sample: 34
Weather Conditions: Overcast, calm winds
Temperature (F): 58

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	18.7	8.25
2	18.7	8.23
4	18.5	8.20
6	18.5	8.18
8	18.4	8.17
10	18.4	8.13
12	18.4	8.09
14	18.4	8.08
16	18.4	8.08
18	18.4	8.07
20	18.4	8.07
22	18.4	8.07
24	18.4	8.05
26	18.4	8.04
28	18.3	8.01
30	18.3	8.01
32	18.3	8.01
34	18.2	7.84
36	Bottom	Bottom

Dissolved Oxygen and Temperature Profiles for the Thornapple Flowage in 2013.

Date:	5/29/2013
Secchi Disk (ft.):	4.0
Depth of Bottom Sample (ft):	20
Weather Conditions:	mostly cloudy, light winds
Temperature (F):	62

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	15.7	8.95
2.0	15.2	8.95
4.0	15.2	8.96
6.0	15.2	8.94
8.0	15.2	8.94
10.0	15.2	8.95
12.0	15.2	8.94
14.0	15.2	8.94
16.0	15.2	8.93
18.0	15.2	8.92
20.0	15.2	8.92
22.0	Bottom	Bottom

Date:	7/30/2013
Secchi Disk (ft.):	5
Depth of Bottom Sample (ft):	19.5
Weather Conditions:	overcast, light winds
Temperature (F):	65

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	22.7	7.30
2.0	22.5	7.25
4.0	22.5	7.29
6.0	22.5	7.27
8.0	22.3	7.16
10.0	22.2	7.00
12.0	21.9	6.62
14.0	21.1	6.42
16.0	20.6	6.14
18.0	20.3	5.87
20.0	20.1	5.73
22.0	Bottom	Bottom

Date:	8/27/2013
Secchi Disk (ft.):	4.5
Depth of Bottom Sample (ft)	20
Weather Conditions:	partly sunny, light winds
Temperature (F):	88

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	26.2	8.32
2.0	26.0	8.34
4.0	25.1	7.36
6.0	24.8	7.23
8.0	24.7	7.08
10.0	24.7	6.94
12.0	24.5	6.68
14.0	24.3	6.69
16.0	23.9	6.59
18.0	23.7	6.23
20.0	23.7	6.18
22.0	Bottom	Bottom

Dissolved Oxygen and Temperature Profiles for the Thornapple Flowage in 2014.

Date:	April 2014
Secchi Disk (ft.):	4.0
Depth of Bottom Sample (ft):	20
Weather Conditions:	mostly cloudy, light winds
Temperature (F):	62

Not Sampled Due To High River Flows

Date:	7/22/2014
Secchi Disk (ft.):	3.5
Depth of Bottom Sample (ft):	20
Weather Conditions:	mostly cloudy, sw wind @ 10
Temperature (F):	79

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	25.4	6.90
2.0	25.1	6.86
4.0	24.8	6.84
6.0	24.7	6.80
8.0	24.1	6.72
10.0	24.0	6.69
12.0	24.0	6.67
14.0	24.0	6.65
16.0	23.9	6.63
18.0	23.9	6.60
20.0	23.9	6.59
22.0	Bottom	Bottom

Date:	8/27/2014
Secchi Disk (ft.):	5
Depth of Bottom Sample (ft)	20
Weather Conditions:	mostly sunny
Temperature (F):	74

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	23.9	7.81
2.0	23.1	7.83
4.0	22.8	7.41
6.0	22.8	7.42
8.0	22.7	7.41
10.0	22.3	7.07
12.0	22.2	6.90
14.0	22.2	6.77
16.0	22.1	6.67
18.0	21.8	6.58
20.0	21.8	6.59
22.0	Bottom	Bottom

Dissolved Oxygen and Temperature Profiles for the Thornapple Flowage in 2015.

Date:	4/28/2015
Secchi Disk (ft.):	4.0
Depth of Bottom Sample (ft):	18
Weather Conditions:	sunny, calm winds
Temperature (F):	63

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	13.8	10.52
2.0	10.9	10.41
4.0	10.6	10.42
6.0	10.3	10.31
8.0	10.3	10.28
10.0	10.0	10.14
12.0	9.9	10.09
14.0	9.9	10.11
16.0	9.9	10.10
18.0	9.9	10.08
20.0	Bottom	Bottom

Date:	7/21/2015
Secchi Disk (ft.):	5.5
Depth of Bottom Sample (ft):	20
Weather Conditions:	sunny, NW winds @ 10
Temperature (F):	78

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	24.3	6.77
2.0	23.8	6.69
4.0	23.8	6.66
6.0	23.4	6.61
8.0	22.9	6.55
10.0	22.8	6.52
12.0	22.8	6.48
14.0	22.8	6.48
16.0	22.7	6.47
18.0	22.7	6.46
20.0	22.7	6.44
22.0	Bottom	Bottom

Date:	8/26/2015
Secchi Disk (ft.):	6.0
Depth of Bottom Sample (ft)	18
Weather Conditions:	mostly sunny, NW winds @ 5
Temperature (F):	66

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	20.4	8.22
2.0	19.4	8.23
4.0	18.8	8.20
6.0	18.5	8.07
8.0	18.4	7.99
10.0	18.3	7.90
12.0	18.3	7.89
14.0	18.3	7.87
16.0	18.3	7.88
18.0	18.2	7.80
20.0	Bottom	Bottom

Dissolved Oxygen and Temperature Profiles for the Thornapple Flowage in 2016.

Date:	5/3/2016
Secchi Disk (ft.):	4.5
Depth of Bottom Sample (ft):	20
Weather Conditions:	overcast, wind west @ 15-20
Temperature (F):	65

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	11.0	10.65
2.0	10.9	10.58
4.0	10.8	10.59
6.0	10.8	10.59
8.0	10.5	10.60
10.0	10.5	10.63
12.0	10.5	10.61
14.0	10.4	10.59
16.0	10.4	10.58
18.0	10.4	10.59
20.0	10.4	10.57
22.0	Bottom	Bottom

Date:	7/19/2016
Secchi Disk (ft.):	4.5
Depth of Bottom Sample (ft):	NA
Weather Conditions:	mostly sunny, s wind @ 5-10
Temperature (F):	79

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)

No Sampling - DO meter malfunctioned

Date:	8/30/2016
Secchi Disk (ft.):	4.5
Depth of Bottom Sample (ft)	20
Weather Conditions:	partly sunny, light winds
Temperature (F):	80

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	24.3	6.99
2.0	23.9	6.88
4.0	23.6	6.85
6.0	23.4	6.77
8.0	23.4	6.76
10.0	23.3	6.72
12.0	23.2	6.66
14.0	23.2	6.66
16.0	23.2	6.65
18.0	23.2	6.64
20.0	23.2	6.57
22.0	Bottom	Bottom

Dissolved Oxygen and Temperature Profiles for the Thornapple Flowage in 2017.

Date: 4/24/2017
Secchi Disk (ft.): 4.0
Depth of Bottom Sample (ft): 20
Weather Conditions: Overcast, windy
Temperature (F): 60

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	10.1	11.15
2.0	10.1	11.05
4.0	10.1	10.95
6.0	10.0	10.97
8.0	10.0	10.94
10.0	10.0	10.97
12.0	10.0	10.95
14.0	10.0	10.90
16.0	10.0	10.95
18.0	10.0	10.90
20.0	10.0	10.9
22.0	Bottom	Bottom

Date: 7/24/2017
Secchi Disk (ft.): 5.0
Depth of Bottom Sample (ft): 20
Weather Conditions: Mostly sunny, light winds
Temperature (F): 72

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	24.5	6.82
2.0	23.4	6.84
4.0	23.1	6.83
6.0	23.0	6.80
8.0	22.9	6.79
10.0	22.9	6.79
12.0	22.9	6.77
14.0	22.9	6.76
16.0	22.9	6.73
18.0	22.9	6.72
20.0	22.9	6.69
22.0	Bottom	Bottom

Date: 8/29/2017
Secchi Disk (ft.): 6.0
Depth of Bottom Sample (ft) 18
Weather Conditions: Cloudy, light winds
Temperature (F): 62

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	21.6	7.59
2.0	21.3	7.47
4.0	21.2	7.42
6.0	21.1	7.39
8.0	21.1	7.35
10.0	21.0	7.33
12.0	21.0	7.30
14.0	21.0	7.24
16.0	21.0	7.23
18.0	20.9	7.21
20.0	Bottom	Bottom

APPENDIX D

Agency Correspondence

Xcel Energy®

1414 West Hamilton Avenue
P.O. Box 8
Eau Claire, WI 54702-0008

November 30, 2017

Cheryl Laatsch – Statewide FERC Coordinator
WI Dept. of Natural Resources
N7725 Hwy 28
Horicon, WI 53032

Nick Utrup
U.S. Fish and Wildlife Service
Wisconsin/Minnesota Ecological Services Field Office
4101 American Boulevard East
Bloomington, MN 55425

Subject: **2017 Water Quality Monitoring Report**
Big Falls (P-2390-01), Thornapple (P-2475) & Turtle-Flambeau (P-2390-02)

Dear Ms. Laatsch and Mr. Utrup:

Enclosed is the 2017 Water Quality Sampling Report for Big Falls and Thornapple flowages. The samples were taken in April, July and August from the deepest point of each reservoir immediately upstream of the boat restraining barrier. The report includes results for the past five years.

Annual water quality monitoring for the Turtle Flambeau Flowage is conducted by the Citizens Lake Monitoring Program and the results are published on the WDNR's website. The link is http://dnr.wi.gov/lakes/clmn/Stations.aspx?location=26. Should citizen monitoring be discontinued in the future, NSPW shall provide replacement services as stipulated in the 2008 Water Quality Certification for Big Falls Hydro.

Should you have any questions concerning this report, you may contact me at (715) 737-1353 or at matthew.j.miller@xcelenergy.com. Please provide any comments you may have by **December 30, 2017**.

Sincerely,

Matthew J. Miller
Hydro License Compliance Consultant

Enclosure

c: General Project Files

From: Laatsch, Cheryl - DNR
To: Miller, Matthew J
Subject: RE: 2017 Annual Water Quality Report
Date: Wednesday, January 24, 2018 11:18:50 AM

No comments. thanks

We are committed to service excellence.
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Cheryl Laatsch
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dnr.wi.gov

From: Miller, Matthew J [mailto:Matthew.J.Miller@xcelenergy.com]
Sent: Wednesday, January 24, 2018 8:53 AM
To: Laatsch, Cheryl - DNR <Cheryl.Laatsch@wisconsin.gov>; (Nick_Utrup@fws.gov) <Nick_Utrup@fws.gov>
Subject: RE: 2017 Annual Water Quality Report

I will be filing my report by the end of the week. The filing deadline is January 31.

From: Miller, Matthew J
Sent: Friday, January 19, 2018 1:15 PM
To: Laatsch, Cheryl - DNR; (Nick_Utrup@fws.gov)
Subject: RE: 2017 Annual Water Quality Report

Hello Cheryl and Nick,

Please let me know if you have any comments regarding our annual water quality report for Big Falls and Thornapple so I may file the report with FERC.

From: Miller, Matthew J
Sent: Thursday, November 30, 2017 1:02 PM
To: Laatsch, Cheryl - DNR; (Nick_Utrup@fws.gov)
Subject: 2017 Annual Water Quality Report

Hello Cheryl and Nick,

Attached for your review and comment is Xcel Energy's Annual Water Quality Report for Big Falls and Thornapple. Let me know if you would like a hard copy. I plan to file the report with FERC in early January.

Matthew Miller
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Hydro License Compliance Consultant
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