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

January 30, 2015

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

Subject: **2014 Water Quality Monitoring Report**
Big Falls Hydro (P-2390-01) and Thornapple Hydro (P-2475)

Dear Secretary:

Enclosed is the 2014 Water Quality Monitoring Report for the Big Falls and Thornapple hydro projects. 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. Licensee also confirmed that the water quality monitoring results for Turtle Flambeau Reservoir (P-2390-02) have been posted on the WDNR's website.

The WDNR and USFWS were provided 25 days to submit comments on the report. Both agencies responded that they had no comment. The USFWS responded via e-mail while the WDNR responded by telephone call. Agency correspondence is included in Appendix D. Should you have any questions regarding this report, feel free to contact Matthew Miller of this office at (715) 737-1353 or by electronic mail at matthew.j.miller@xcelenergy.com.

Sincerely,

William Zawacki
Director, Hydro Plants

Enclosure: Water Quality Monitoring Report

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

2014 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

January 2015

APPENDIX A

2014 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 (806) 381-6485

Big Falls Hydro	Project Name/Location: Phosphorus	
1400 Western Ave		**Reported:**
Eau Claire WI, 54701	Project Manager: Matt J Miller	08/13/2014 06:47

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sample Qualifier	Laboratory ID	Matrix	Sampled	Received
Big Falls Flowage Surface		M4G0312-01	Water	07/22/2014 10:46	07/24/2014 7:00
Big Falls Flowage Bottom		M4G0312-02	Water	07/22/2014 10:44	07/24/2014 7:00

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Big Falls Hydro	Project Name/Location: Phosphorus	
1400 Western Ave		**Reported:**
Eau Claire WI, 54701	Project Manager: Matt J Miller	08/13/2014 06:47

Big Falls Flowage Surface

M4G0312-01 (Water) - Chain of Custody Number: 230738

Analyte	Result	Reporting Limit	Units	Analyte Qualifier	Dilution	Batch	Prepared	Analyzed	Method	Analyst
Wet Chemistry										
Phosphate, Total as P	0.0350	0.0100	mg/L		1	B4G0546	7/28/14 11:34	7/29/14 13:21	EPA 365.1	HRD

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Minneapolis, MN 55043
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Big Falls Hydro	Project Name/Location: Phosphorus	
1400 Western Ave		**Reported:**
Eau Claire WI, 54701	Project Manager: Matt J Miller	08/13/2014 06:47

Big Falls Flowage Bottom

M4G0312-02 (Water) - Chain of Custody Number: 230738

Analyte	Result	Reporting Limit	Units	Analyte Qualifier	Dilution	Batch	Prepared	Analyzed	Method	Analyst
Wet Chemistry										
Phosphate, Total as P	0.0470	0.0100	mg/L		1	B4G0546	7/28/14 11:34	7/29/14 13:22	EPA 365.1	HRD

Minneapolis Testing Laboratory
1518 Chestnut Ave N
Minneapolis, MN 55043
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Thornapple Hydro	Project Name/Location: Phosphorus	
W 5506 Dam Road		**Reported:**
Glen Flora WI, 54563	Project Manager: Matt J Miller	08/14/2014 07:32

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sample Qualifier	Laboratory ID	Matrix	Sampled	Received
Thornapple Flowage Surface		M4G0313-01	Water	07/22/2014 12:45	07/24/2014 7:00
Thornapple Flowage Bottom		M4G0313-02	Water	07/22/2014 12:49	07/24/2014 7:00

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Thornapple Hydro	Project Name/Location: Phosphorus	
W 5506 Dam Road		**Reported:**
Glen Flora WI, 54563	Project Manager: Matt J Miller	08/14/2014 07:32

Thornapple Flowage Surface

M4G0313-01 (Water) - Chain of Custody Number: 230738

Analyte	Result	Reporting Limit	Units	Analyte Qualifier	Dilution	Batch	Prepared	Analyzed	Method	Analyst
Wet Chemistry										
Phosphate, Total as P	0.0440	0.0100	mg/L		1	B4H0211	8/13/14 7:04	8/13/14 16:11	EPA 365.1	HRD

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Thornapple Hydro	Project Name/Location: Phosphorus	
W 5506 Dam Road		**Reported:**
Glen Flora WI, 54563	Project Manager: Matt J Miller	08/14/2014 07:32

Thornapple Flowage Bottom

M4G0313-02 (Water) - Chain of Custody Number: 230738

Analyte	Result	Reporting Limit	Units	Analyte Qualifier	Dilution	Batch	Prepared	Analyzed	Method	Analyst
Wet Chemistry										
Phosphate, Total as P	0.0460	0.0100	mg/L		1	B4H0211	8/13/14 7:04	8/13/14 16:13	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: 223501
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: 805159
COC: 143042:1 Matrix: SW
Collected: 07/22/14 10:43 Received: 07/24/14

Parameter	Result	Units	Dilution	LOD	LOQ	Analyzed	Method	Lab
Chlorophyll, all species	see attached					07/25/14	10200-H	721026460
Lab filtration for Chlorophyll	yes					07/24/14	NA	721026460

Thornapple Flowage NLS ID: 805160
COC: 143042:2 Matrix: SW
Collected: 07/22/14 12:44 Received: 07/24/14

Parameter	Result	Units	Dilution	LOD	LOQ	Analyzed	Method	Lab
Chlorophyll, all species	see attached					07/25/14	10200-H	721026460
Lab filtration for Chlorophyll	yes					07/24/14	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.

LOD = Limit of Detection LOQ = Limit of Quantitation ND = Not Detected (< LOD) 1000 ug/L = 1 mg/L
DWB = Dry Weight Basis NA = Not Applicable %DWB = (mg/kg DWB) / 10000
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: 223501
Big Falls-Thornapple

Sample	Description	CC a	Pheo a	TC a	TC b	TC c
805159	Big Falls Flowage	5	0.54	5.5	0.0*	0.37
805160	Thornapple Flowage	1.9	0.0*	1.9	0.14	0.11

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.

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Big Falls Hydro	Project Name/Location: Phosphorus	
1400 Western Ave		**Reported:**
Eau Claire WI, 54701	Project Manager: Matt J Miller	09/04/2014 13:39

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sample Qualifier	Laboratory ID	Matrix	Sampled	Received
Big Falls Flowage Surface		M4H0405-01	Water	08/27/2014 10:57	08/29/2014 8:15
Big Falls Flowage Bottom		M4H0405-02	Water	08/27/2014 11:03	08/29/2014 8:15

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Big Falls Hydro	Project Name/Location: Phosphorus	
1400 Western Ave		**Reported:**
Eau Claire WI, 54701	Project Manager: Matt J Miller	09/04/2014 13:39

Big Falls Flowage Surface

M4H0405-01 (Water) - Chain of Custody Number: 230739

Analyte	Result	Reporting Limit	Units	Analyte Qualifier	Dilution	Batch	Prepared	Analyzed	Method	Analyst
Wet Chemistry										
Phosphate, Total as P	0.0290	0.0100	mg/L		1	B4I0009	9/3/14 10:54	9/4/14 9:15	EPA 365.1	HRD

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Minneapolis, MN 55043
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WI-999071150
Christine Keefe, Supervisor (806) 381-6485

Big Falls Hydro	Project Name/Location: Phosphorus	
1400 Western Ave		**Reported:**
Eau Claire WI, 54701	Project Manager: Matt J Miller	09/04/2014 13:39

Big Falls Flowage Bottom

M4H0405-02 (Water) - Chain of Custody Number: 230739

Analyte	Result	Reporting Limit	Units	Analyte Qualifier	Dilution	Batch	Prepared	Analyzed	Method	Analyst
Wet Chemistry										
Phosphate, Total as P	0.0980	0.0100	mg/L		1	B4I0009	9/3/14 10:54	9/4/14 9:16	EPA 365.1	HRD

Minneapolis Testing Laboratory
1518 Chestnut Ave N
Minneapolis, MN 55043
Certification # MN-027-053-197
WI-999071150
Christine Keefe, Supervisor (806) 381-6485

Thornapple Hydro	Project Name/Location: Phosphorus	
W 5506 Dam Road		**Reported:**
Glen Flora WI, 54563	Project Manager: Matt J Miller	09/04/2014 13:41

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sample Qualifier	Laboratory ID	Matrix	Sampled	Received
Thornapple Flowage Surface		M4H0404-01	Water	08/27/2014 12:48	08/29/2014 8:15
Thornapple Flowage Bottom		M4H0404-02	Water	08/27/2014 12:52	08/29/2014 8:15

Minneapolis Testing Laboratory
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Minneapolis, MN 55043
Certification # MN-027-053-197
WI-999071150
Christine Keefe, Supervisor (806) 381-6485

Thornapple Hydro	Project Name/Location: Phosphorus	
W 5506 Dam Road		**Reported:**
Glen Flora WI, 54563	Project Manager: Matt J Miller	09/04/2014 13:41

Thornapple Flowage Surface

M4H0404-01 (Water) - Chain of Custody Number: 230739

Analyte	Result	Reporting Limit	Units	Analyte Qualifier	Dilution	Batch	Prepared	Analyzed	Method	Analyst
Wet Chemistry										
Phosphate, Total as P	0.0430	0.0100	mg/L		1	B4I0009	9/3/14 10:54	9/4/14 9:13	EPA 365.1	HRD

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Thornapple Hydro	Project Name/Location: Phosphorus	
W 5506 Dam Road		**Reported:**
Glen Flora WI, 54563	Project Manager: Matt J Miller	09/04/2014 13:41

Thornapple Flowage Bottom

M4H0404-02 (Water) - Chain of Custody Number: 230739

Analyte	Result	Reporting Limit	Units	Analyte Qualifier	Dilution	Batch	Prepared	Analyzed	Method	Analyst
Wet Chemistry										
Phosphate, Total as P	< 0.0100	0.0100	mg/L		1	B4I0009	9/3/14 10:54	9/4/14 9:14	EPA 365.1	HRD

APPENDIX B

Summary Of Total Phosphorous And Chlorophyll A Data For Big Falls And Thornapple Flowages 2010-2014

Summary of Water Quality Data for Big Falls and Thornapple Flowages (2010-2014)

	Big Falls Flowage			Thornapple Flowage		
Date	Surface Total Phosphorus (mg/L P)	Surface Chlorophyll-A (ug/L)	Bottom Total Phosphorus (mg/L P)	Surface Total Phosphorus (mg/L P)	Surface Chlorophyll-A (ug/L)	Bottom Total Phosphorus (mg/L P)
4/28/2010	0.025	4.2	0.048	0.029	7.2	0.016
7/27/2010	0.07	1.8	0.05	0.07	0.76	0.07
8/31/2010	0.05	3.8	0.06	0.01	0.69	0.06
4/29/2011*	NA	NA	NA	0.03	2.70	0.03
7/26/2011	0.04	7.3	0.06	0.05	5.40	0.04
8/24/2011	0.04	3.8	0.04	0.04	2.50	0.05
4/24/2012	0.03	6.9	0.04	0.03	2.30	0.03
7/23/2012	0.07	6.1	0.10	0.04	11.00	0.05
8/28/2012	0.02	3.3	0.04	0.03	8.60	0.03
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
7/22/12014**	**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**
Average (Ice-out sample)	0.03	4.57	0.05	0.04	3.38	0.04
Average (July sample)	0.05	4.66	0.07	0.05	4.07	0.05
Average (August sample)	0.04	3.90	0.06	0.03	8.76	0.05

* No spring sampling conducted at Big Falls as reservoir was drawndown for repairs to left embankment

** No spring sampling conducted due to high river flows

APPENDIX C

Summary Of Dissolved Oxygen And Temperature Data For Big Falls Flowage & Thornapple Flowage 2010-2014

Dissolved Oxygen and Temperature Profiles for the Big Falls Flowage in 2010.

Date: 4/28/2010
Secchi Disk (ft.): 5.0
Depth of Bottom Sample (ft): 36
Weather Conditions: mostly sunny, light winds
Temperature (F): 50

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	14.8	10.79
2.0	14.2	10.52
4.0	14.1	10.41
6.0	14.0	10.23
8.0	14.0	10.10
10.0	13.9	10.04
12.0	13.8	9.94
14.0	13.8	9.87
16.0	13.7	9.85
18.0	13.4	9.70
20.0	13.2	9.63
22.0	13.1	9.52
24.0	13.1	9.57
26.0	13.0	9.53
28.0	13.0	9.44
30.0	13.0	9.33
32.0	13.0	9.20
34.0	13.0	9.19
36.0	12.9	9.12
38.0	Bottom	Bottom

Date: 7/27/2010
Secchi Disk (ft.): 3.0
Depth of Bottom Sample (ft): 36
Weather Conditions: cloudy, S wind @ 7
Temperature (F): 75

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	24.7	6.44
2.0	24.7	6.29
4.0	24.6	6.35
6.0	24.6	6.26
8.0	24.6	6.49
10.0	24.6	6.34
12.0	24.6	6.27
14.0	24.6	6.34
16.0	24.6	6.26
18.0	24.4	6.21
20.0	24.4	6.22
22.0	24.4	6.20
24.0	24.2	6.21
26.0	24.1	6.17
28.0	23.9	6.13
30.0	23.8	6.06
32.0	23.6	6.02
34.0	23.5	5.95
36.0	23.4	5.7
38.0	Bottom	Bottom

Date: 8/31/2010
Secchi Disk (ft.): 3.0
Depth of Bottom Sample: 36
Weather Conditions: partly cloudy, S wind @ 10
Temperature (F): 79

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	24.2	6.70
2.0	24.2	6.68
4.0	24.2	6.68
6.0	24.2	6.67
8.0	24.2	6.66
10.0	24.2	6.66
12.0	24.2	6.66
14.0	24.2	6.66
16.0	24.1	6.63
18.0	24.0	6.60
20.0	24.0	6.59
22.0	24.0	6.60
24.0	24.0	6.60
26.0	24.0	6.58
28.0	24.0	6.60
30.0	24.0	6.59
32.0	23.9	6.59
34.0	23.9	6.55
36.0	23.8	6.34
38.0	Bottom	Bottom

Dissolved Oxygen and Temperature Profiles for the Big Falls Flowage in 2011.

Date:	4/29/2011
Secchi Disk (ft.):	
Depth of Bottom Sample (ft):	
Weather Conditions:	mostly sunny, light winds
Temperature (F):	

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

Not Sampled Due To Reservoir Drawdown

Date:	7/26/2011
Secchi Disk (ft.):	4.0
Depth of Bottom Sample (ft):	36
Weather Conditions:	mostly sunny, light winds
Temperature (F):	76

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	25.8	6.58
2.0	25.8	6.56
4.0	25.6	6.66
6.0	25.2	6.56
8.0	25.2	6.59
10.0	25.2	6.58
12.0	25.2	6.53
14.0	25.1	6.52
16.0	24.9	6.38
18.0	24.5	6.32
20.0	24.5	6.32
22.0	24.3	6.29
24.0	24.3	6.33
26.0	24.2	6.27
28.0	24.1	6.31
30.0	24.1	6.25
32.0	24.1	6.20
34.0	24.1	6.18
36.0	24.1	6.11
38.0	Bottom	Bottom

Date:	8/24/2011
Secchi Disk (ft.):	3.0
Depth of Bottom Sample:	36
Weather Conditions:	sunny, wind NW @ 10-15
Temperature (F):	72

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	22.3	7.51
2.0	22.3	7.52
4.0	22.3	7.53
6.0	22.2	7.54
8.0	22.1	7.60
10.0	22.0	7.59
12.0	21.9	7.46
14.0	21.8	7.45
16.0	21.7	7.52
18.0	21.6	7.49
20.0	21.6	7.55
22.0	21.6	7.52
24.0	21.5	7.55
26.0	21.5	7.53
28.0	21.5	7.56
30.0	21.5	7.58
32.0	21.5	7.57
34.0	21.5	7.56
36.0	21.5	7.52
38.0	Bottom	Bottom

Dissolved Oxygen and Temperature Profiles for the Big Falls Flowage in 2012.

Date:	4/24/2012
Secchi Disk (ft.):	4.0
Depth of Bottom Sample (ft):	32
Weather Conditions:	mostly sunny, light winds
Temperature (F):	58

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	11.9	10.90
2.0	11.7	10.94
4.0	11.2	10.91
6.0	11.2	10.91
8.0	11.1	10.88
10.0	11.1	10.87
12.0	11.1	10.85
14.0	11.0	10.83
16.0	11.0	10.81
18.0	11.0	10.81
20.0	11.0	10.77
22.0	11.0	10.73
24.0	11.0	10.72
26.0	11.0	10.72
28.0	11.0	10.72
30.0	11.0	10.72
32.0	11.0	10.71
34.0	*Low battery*	*Low battery*
36.0	*Low battery*	*Low battery*

Date:	7/23/2012
Secchi Disk (ft.):	4.0
Depth of Bottom Sample (ft):	34
Weather Conditions:	mostly sunny, NW wind @ 10
Temperature (F):	82

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	27.2	7.68
2.0	27.1	7.68
4.0	27.1	7.70
6.0	26.9	7.73
8.0	26.6	7.50
10.0	26.3	7.32
12.0	26.2	7.33
14.0	26.0	6.95
16.0	25.8	6.89
18.0	25.5	6.55
20.0	25.2	6.28
22.0	25.1	6.02
24.0	25.0	5.98
26.0	24.9	5.77
28.0	24.7	5.51
30.0	24.6	5.26
32.0	24.4	4.91
34.0	24.3	4.28
36.0	Bottom	Bottom

Date:	8/28/2012
Secchi Disk (ft.):	5.5
Depth of Bottom Sample:	34
Weather Conditions:	sunny, light winds
Temperature (F):	65

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	24.4	8.15
2.0	24.3	8.14
4.0	24.3	8.10
6.0	24.3	8.04
8.0	24.3	8.16
10.0	24.2	7.82
12.0	23.7	7.38
14.0	23.5	7.15
16.0	23.4	6.85
18.0	23.4	6.75
20.0	23.4	6.64
22.0	23.3	6.44
24.0	23.2	6.23
26.0	23.0	5.84
28.0	22.7	5.38
30.0	22.6	5.25
32.0	22.2	4.62
34.0	20.8	3.82
36.0	Bottom	Bottom

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	Date: 7/22/2014	Date: 8/27/2014
Secchi Disk (ft.):	Secchi Disk (ft.): 3.5	Secchi Disk (ft.): 5.0
Depth of Bottom Sample (ft):	Depth of Bottom Sample (ft): 36	Depth of Bottom Sample: 36
Weather Conditions:	Weather Conditions: mostly cloudy, NW wind 10-15	Weather Conditions: mostly sunny, light winds
Temperature (F):	Temperature (F): 75	Temperature (F): 68

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Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)	Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	24.9	7.75	Surface	24.1	7.43
2.0	24.8	7.74	2.0	24.1	7.41
4.0	24.7	7.71	4.0	24.1	7.43
6.0	24.7	7.69	6.0	24.0	7.36
8.0	24.7	7.68	8.0	24.0	7.32
10.0	24.7	7.68	10.0	23.9	7.13
12.0	24.6	7.65	12.0	23.8	7.15
14.0	24.6	7.65	14.0	23.8	7.15
16.0	24.6	7.64	16.0	23.8	7.17
18.0	24.5	7.60	18.0	23.8	7.16
20.0	24.4	7.62	20.0	23.8	7.15
22.0	24.3	7.61	22.0	23.7	6.91
24.0	24.0	7.31	24.0	23.6	6.80
26.0	23.7	7.22	26.0	23.5	6.59
28.0	23.5	7.19	28.0	23.3	6.38
30.0	23.5	7.17	30.0	23.0	6.13
32.0	23.4	7.04	32.0	22.9	6.00
34.0	23.1	6.93	34.0	22.9	5.90
36.0	22.9	6.73	36.0	21.7	4.97
38.0	Bottom	Bottom	38.0	Bottom	Bottom

Dissolved Oxygen and Temperature Profiles for the Thornapple Flowage in 2010.

Date:	4/28/2010
Secchi Disk (ft.):	5.0
Depth of Bottom Sample (ft):	20
Weather Conditions:	p. cloudy, S winds 5-10
Temperature (F):	59

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	13.8	11.90
2.0	13.7	11.74
4.0	12.6	11.83
6.0	12.4	11.70
8.0	12.3	12.02
10.0	12.2	12.01
12.0	11.8	10.50
14.0	11.5	10.63
16.0	11.2	10.44
18.0	11.2	10.37
20.0	11.2	10.25

Date:	7/27/2010
Secchi Disk (ft.):	3
Depth of Bottom Sample (ft):	20
Weather Conditions:	p. cloudy, S wind @ 5
Temperature (F):	84

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	25.4	4.46
2.0	25.0	4.44
4.0	24.6	4.37
6.0	24.5	4.38
8.0	24.5	4.37
10.0	24.5	4.30
12.0	24.3	4.23
14.0	24.3	4.23
16.0	24.2	4.35
18.0	24.2	4.37
20.0	24.2	4.3
22.0	Bottom	Bottom

Date:	8/31/2010
Secchi Disk (ft.):	3
Depth of Bottom Sample (ft)	20
Weather Conditions:	cloudy, S wind @ 10
Temperature (F):	81

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	23.0	5.82
2.0	22.8	5.75
4.0	22.8	5.74
6.0	22.7	5.71
8.0	22.6	5.71
10.0	22.6	5.71
12.0	22.6	5.71
14.0	22.6	5.71
16.0	22.6	5.70
18.0	22.6	5.70
20.0	22.6	5.7
22.0	Bottom	Bottom

Dissolved Oxygen and Temperature Profiles for the Thornapple Flowage in 2011.

Date:	4/29/2011
Secchi Disk (ft.):	3.5
Depth of Bottom Sample (ft):	22
Weather Conditions:	sunny, wind S @ 5-10
Temperature (F):	45

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	6.9	12.5
2.0	6.8	12.4
4.0	6.8	12.4
6.0	6.8	12.4
8.0	6.8	12.4
10.0	6.8	12.4
12.0	6.8	12.4
14.0	6.8	12.3
16.0	6.8	12.3
18.0	6.8	12.3
20.0	6.8	12.3
22.0	6.8	12.3
24.0	Bottom	Bottom

Date:	7/26/2011
Secchi Disk (ft.):	4.5
Depth of Bottom Sample (ft):	20
Weather Conditions:	sunny, light winds
Temperature (F):	80

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	26.4	6.56
2.0	26.3	6.54
4.0	25.9	6.54
6.0	25.6	6.47
8.0	25.7	6.46
10.0	25.5	6.45
12.0	25.4	6.41
14.0	24.6	6.14
16.0	24.2	5.76
18.0	24.2	5.68
20.0	23.7	5.00
22.0	Bottom	Bottom

Date:	8/24/2011
Secchi Disk (ft.):	3
Depth of Bottom Sample (ft)	20
Weather Conditions:	sunny, NW wind 15-20
Temperature (F):	78

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	23.7	6.52
2.0	23.7	6.50
4.0	23.0	6.36
6.0	22.7	6.26
8.0	22.7	6.23
10.0	22.6	6.16
12.0	22.5	6.08
14.0	22.3	5.94
16.0	22.1	5.73
18.0	22.0	5.60
20.0	22.0	5.60
22.0	Bottom	Bottom

Dissolved Oxygen and Temperature Profiles for the Thornapple Flowage in 2012.

Date:	4/24/2012
Secchi Disk (ft.):	4.0
Depth of Bottom Sample (ft):	20
Weather Conditions:	sunny, light NW winds
Temperature (F):	67

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	15.4	10.99
2.0	13.2	11.22
4.0	12.8	11.25
6.0	12.4	11.27
8.0	12.1	11.24
10.0	11.9	11.10
12.0	11.9	11.06
14.0	11.7	11.04
16.0	11.6	10.97
18.0	11.6	10.95
20.0	11.6	10.92
22.0	Bottom	Bottom

Date:	7/23/2012
Secchi Disk (ft.):	3.5
Depth of Bottom Sample (ft):	18
Weather Conditions:	sunny, winds W @ 5-10
Temperature (F):	85

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	30.6	8.45
2.0	28.3	7.66
4.0	27.4	7.03
6.0	26.8	6.30
8.0	26.5	6.04
10.0	26.3	5.70
12.0	25.6	4.99
14.0	25.2	4.88
16.0	24.6	4.08
18.0	24.2	3.08
20.0	Bottom	Bottom

Date:	8/28/2012
Secchi Disk (ft.):	5.5
Depth of Bottom Sample (ft)	18
Weather Conditions:	overcast, calm
Temperature (F):	78

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	23.6	8.37
2.0	23.3	7.98
4.0	23.7	7.83
6.0	23.1	7.72
8.0	23.1	7.84
10.0	23.1	7.68
12.0	23.0	7.16
14.0	22.8	6.57
16.0	22.6	6.22
18.0	22.0	3.31
20.0	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

APPENDIX D

Agency Correspondence

From:	Utrup, Nick
To:	Miller, Matthew J
Cc:	Laatsch, Cheryl - DNR
Subject:	Re: 2014 Water Quality Report for Big Falls (P-2390-01) & Thornapple Flowage (P-2475)
Date:	Monday, January 05, 2015 10:48:16 AM

Hi Matt,

I will not be providing comments on water quality reports. I will retain for my records.

Thanks,

Nick

Nick Utrup
U.S. Fish and Wildlife Service
Twin Cities Field Office
4101 American Boulevard East
Bloomington, MN 55425

Office: 612-725-3548 Ext. 2204
Cell: 952-567-9616
FAX: 612-725-3609
Email: Nick_Utrup@fws.gov

On Mon, Jan 5, 2015 at 10:20 AM, Miller, Matthew J <Matthew.J.Miller@xcelenergy.com> wrote:

> Hello Cheryl and Nick,
>
> Attached is a copy of the 2014 Water Quality Report for Big Falls and Thornapple along with corresponding cover letters. **Please provide any comments you may have by January 30**. The following changes were made to this year's report in order to reduce the size. First, the report includes monitoring data for the past 5 years. Previously, the report included data since monitoring began in 1998. Second, I've excluded the field data sheets. These sheets are kept on file at Xcel Energy and will be available to the resource agencies upon request. Please let me know if either of you require a hard copy of this report for your records.
>
> **Matthew Miller**
> **Xcel Energy | Responsible By Nature**
> **Hydro Licensing Specialist**
> 1414 W. Hamilton Ave., P.O. Box 8, Eau Claire, WI 54702
> **P:** 715.737-1353 **F**: 715.737.1077
> **E**: matthew.j.miller@xcelenergy.com
>
> **XCELENERGY.COM**