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2008 FEB -1 P 4: 25

FEDERAL ENERGY
REGULATORY COMMISSION

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

January 29, 2008

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

P-2390-005
P-2475-066

**Subject: Water Quality Monitoring Results For The Big Falls and Thornapple Flowages – Articles 404 (Water Quality Monitoring Plan).
Big Falls Hydroelectric Project (FERC Project No. 2390) and Thornapple Hydroelectric Project (FERC Project No. 2475)**

Dear Secretary Bose:

Enclosed is an original and eight copies of the water quality monitoring results obtained from the above-mentioned projects in 2007 as directed by the Federal Energy Regulatory Commission's (Commission) license orders. The license orders require Northern States Power Company – Wisconsin (d.b.a. Xcel Energy) to perform water quality sampling on the two flowages after ice-out, in mid-July, and mid-August to monitor long-term changes in water quality.

Also included is a summary of the data that has been collected since 1998, the first year of the required water quality sampling. The data collected in 2007 is consistent to the sampling performed in earlier years and all parameters are well within the normal ranges expected for natural environments.

The sampling results were filed with the Wisconsin Department of Natural Resources (WDNR) on December 18, 2007 and they were allowed 30 days to provide comments (*see attached letter*). The WDNR did not provide any comments by letter or electronic mail.

If you have any questions in regards to the monitoring results or to this filing, please feel free to contact me by telephone at (715) 839-1353 or by electronic mail at robert.w.olson@xcelenergy.com.

Very truly yours,

Robert W. Olson
Superintendent, Hydro Operations

Attachment: Water quality monitoring results

c: Mr. Jeff Scheirer (Wisconsin DNR)

H:\references\bigfalls\correspondence\01292008FERCletter.doc

Agency Correspondence



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

December 18, 2007

Mr. Jeff Scheirer
Wisconsin DNR
875 South 4th Avenue
Park Falls, WI 54552

Subject: Results of the 2007 Water Quality Monitoring Performed On The Big Falls and Thornapple Flowages Pursuant To Article 404 of the Big Falls License (FERC Project No. 2390) and Article 406 of the Thornapple License (FERC Project No. 2475).

Dear Mr. Scheirer:

Enclosed are the results of the water quality sampling effort that Northern States Power Company – Wisconsin (d.b.a. Xcel Energy) personnel conducted during the 2007 field season on the Big Falls and Thornapple Flowages. The samples were taken after ice-out and during July and August, in the deepest point of the reservoirs, immediately upstream from the boat restraining barriers. In the late-August sampling effort, I experienced problems with the YSI dissolved oxygen/temperature instrument, which did not allow me to collect a profile. The instrument was not repaired until late-October.

I have summarized all of the water quality data for the two sites that we have collected since sampling began in 1998. While there appears to be some variability in some of the parameters analyzed, for the most part, the results have been relatively consistent. The data collected in 2007 is consistent with data from the previous years' sampling.

Please provide me with any comments that you might have concerning the sampling results by January 18, 2008 so that I can transmit the water quality data and any comments that you might have to the Federal Energy Regulatory Commission by the end of January. You can provide your response either by telephone call, e-mail, or written letter. If you have any questions concerning the water quality sampling or the results provided to you, please feel free to give me a call at (715) 839-1353.

Sincerely,

A handwritten signature in black ink that reads 'Robert W. Olson'.

Robert W. Olson
Hydro License Compliance Consultant

Enclosure: Water quality monitoring results

**Summary Of 2007 Water Quality Data
For The Big Falls And Thornapple Flowages**



Minneapolis Testing Laboratory Report

1518 Chestnut Avenue N
Minneapolis, MN 55403

Phone: (612)630-4439

Fax: (612) 630-4367

Contact: Tom Leverentz

Lab Certification MN ID: 027-053-197

Lab Certification WI ID:999071150

Report To: ERAD-WI
Hydro Regulatory-WI

Attention: Leroy Wilder
Rob Olson

Work Request # BFTA0407
Date of Report 5/21/2007

Sample Description: BOTTOM
Location: BIG FALLS FLOWAGE
Customer Sample I.D.:

LabWorks I.D. EF82686
Laboratory I.D.: 122.18
Collection Date: 4/30/2007
Date Submitted: 5/2/2007

Constituent	Result	Units	Detection Limit	Analytical Method	Analysis Start Date
Total Phosphorus	0.067	mg/L P	0.001	EPA 365.3	5/10/2007

Comments related to sample number EF82686:



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Contact: Tom Leverentz

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Lab Certification WI ID:999071150

Report To: ERAD-WI
Hydro Regulatory-WI

Attention: Leroy Wilder
Rob Olson

Work Request # BFTA0407
Date of Report 5/21/2007

Sample Description: SURFACE
Location: BIG FALLS FLOWAGE
Customer Sample I.D.:

LabWorks I.D. EF82687
Laboratory I.D.: 122.19
Collection Date: 4/30/2007
Date Submitted: 5/2/2007

Constituent	Result	Units	Detection Limit	Analytical Method	Analysis Start Date
Chlorophyll-a	1.95	ug/L	0.041	SM 19th 10200 H	5/7/2007
Send Chlorophyll A	Completed				5/3/2007
Total Phosphorus	0.028	mg/L P	0.001	EPA 365.3	5/10/2007

Comments related to sample number EF82687:



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Contact: Tom Leverentz

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Lab Certification WI ID:999071150

Report To: ERAD- WI
Hydro Regulatory-WI

Attention: Leroy Wilder
Rob Olson

Work Request # BFTA0407
Date of Report 5/21/2007

Sample Description: BOTTOM
Location: THORNAPPLE FLOWAGE
Customer Sample I.D.:

LabWorks I.D. EF82688
Laboratory I.D.: 122.20
Collection Date: 4/30/2007
Date Submitted: 5/2/2007

Constituent	Result	Units	Detection Limit	Analytical Method	Analysis Start Date
Total Phosphorus	0.033	mg/L P	0.001	EPA 365.3	5/10/2007

Comments related to sample number EF82688:



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Contact: Tom Leverentz

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Lab Certification WI ID:999071150

Report To: ERAD-WI
Hydro Regulatory-WI

Attention: Leroy Wilder
Rob Olson

Work Request # BFTA0407
Date of Report 5/21/2007

Sample Description: SURFACE
Location: THORNAPPLE FLOWAGE
Customer Sample I.D.:

LabWorks I.D. EF82689
Laboratory I.D.: 122.21
Collection Date: 4/30/2007
Date Submitted: 5/2/2007

Constituent	Result	Units	Detection Limit	Analytical Method	Analysis Start Date
Chlorophyll-a	4.50	ug/L	0.041	SM 19th 10200 H	5/7/2007
Send Chlorophyll A	Completed				5/3/2007
Total Phosphorus	0.039	mg/L P	0.001	EPA 365.3	5/10/2007

Comments related to sample number EF82689:



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Contact: Tom Leverentz

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Lab Certification WI ID:999071150

I certify that this analysis report was prepared under my direction or supervision under a system designed to assure that qualified personnel analyzed the submitted samples. All protocols for analysis were followed as required by Minnesota Rules and the Applicable Management Plan.

Christine M. Keefe

Christine M. Keefe
System Chemist
612-630-4506



Minneapolis Testing Laboratory Report

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Phone: (612)630-4439

Fax: (612) 630-4367

Contact: Tom Leverentz

Lab Certification MN ID: 027-053-197

Lab Certification WI ID:999071150

Report To: ERAD-WI
Hydro Regulatory-WI

Attention: Leroy Wilder
Rob Olson

Work Request # WSRW0807
Date of Report 8/21/2007

Sample Description: BOTTOM
Location: BIG FALLS FLOWAGE
Customer Sample I.D.:

LabWorks I.D. EF90700
Laboratory I.D.: 135.05
Collection Date: 7/31/2007
Date Submitted: 8/6/2007

Constituent	Result	Units	Detection Limit	Analytical Method	Analysis Start Date
Total Phosphorus	0.043	mg/L P	0.001	EPA 365.3	8/15/2007

Comments related to sample number EF90700:



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Phone: (612)630-4439

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Contact: Tom Leverenz

Lab Certification MN ID: 027-053-197

Lab Certification WI ID:999071150

Report To: ERAD-WI
Hydro Regulatory-WI

Attention: Leroy Wilder
Rob Olson

Work Request # WSRW0807
Date of Report 8/21/2007

Sample Description: SURFACE
Location: BIG FALLS FLOWAGE
Customer Sample I.D.:

LabWorks I.D. EF90699
Laboratory I.D.: 135.04
Collection Date: 7/31/2007
Date Submitted: 8/6/2007

Constituent	Result	Units	Detection Limit	Analytical Method	Analysis Start Date
Chlorophyll-a	4.81	ug/L	0.041	SM 19th 10200 H	8/6/2007
Send Chlorophyll A	Completed				8/2/2007
Total Phosphorus	0.029	mg/L P	0.001	EPA 365.3	8/15/2007

Comments related to sample number EF90699:



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Contact: Tom Leverenz

Lab Certification MN ID: 027-053-197

Lab Certification WI ID:999071150

Report To: ERAD- WI
Hydro Regulatory-WI

Attention: Leroy Wilder
Rob Olson

Work Request # WSRW0807
Date of Report 8/21/2007

Sample Description: BOTTOM
Location: THORNAPPLE FLOWAGE
Customer Sample I.D.:

LabWorks I.D. EF90698
Laboratory I.D.: 135.03
Collection Date: 7/31/2007
Date Submitted: 8/6/2007

Constituent	Result	Units	Detection Limit	Analytical Method	Analysis Start Date
Total Phosphorus	0.032	mg/L P	0.001	EPA 365.3	8/15/2007

Comments related to sample number EF90698:



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Contact: Tom Leverenz

Lab Certification MN ID: 027-053-197

Lab Certification WI ID:999071150

Report To: ERAD-WI
Hydro Regulatory-WI

Attention: Leroy Wilder
Rob Olson

Work Request # WSRW0807
Date of Report 8/21/2007

Sample Description: SURFACE
Location: THORNAPPLE FLOWAGE
Customer Sample I.D.:

LabWorks I.D. EF90697
Laboratory I.D.: 135.02
Collection Date: 7/31/2007
Date Submitted: 8/6/2007

Constituent	Result	Units	Detection Limit	Analytical Method	Analysis Start Date
Chlorophyll-a	3.35	ug/L	0.041	SM 19th 10200 H	8/6/2007
Send Chlorophyll A	Completed				8/2/2007
Total Phosphorus	0.037	mg/L P	0.001	EPA 365.3	8/15/2007

Comments related to sample number EF90697:



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Phone: (612)630-4439

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Contact: Tom Leverenz

Lab Certification MN ID: 027-053-197

Lab Certification WI ID:999071150

I certify that this analysis report was prepared under my direction or supervision under a system designed to assure that qualified personnel analyzed the submitted samples. All protocols for analysis were followed as required by Minnesota Rules and the Applicable Management Plan.

Christine M. Keefe

Christine M. Keefe
System Chemist
612-630-4506



Minneapolis Testing Laboratory Report

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Fax: (612) 630-4367

Contact: Tom Leverentz

Lab Certification MN ID: 027-053-197

Lab Certification WI ID:999071150

Report To: ERAD-WI
Hydro Regulatory-WI

Attention: Leroy Wilder
Rob Olson

Work Request # WIRV0807
Date of Report 9/21/2007

Sample Description: BOTTOM
Location: BIG FALLS FLOWAGE
Customer Sample I.D.:

LabWorks I.D. EF93362
Laboratory I.D.:
Collection Date: 8/29/2007
Date Submitted: 8/31/2007

Constituent	Result	Units	Detection Limit	Analytical Method	Analysis Start Date
Total Phosphorus	0.027	mg/L P	0.001	EPA 365.3	9/13/2007

Comments related to sample number EF93362:



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Phone: (612)630-4439

Fax: (612) 630-4367

Contact: Tom Leverenz

Lab Certification MN ID: 027-053-197

Lab Certification WI ID:999071150

Report To: ERAD-WI
Hydro Regulatory-WI

Attention: Leroy Wilder
Rob Olson

Work Request # WIRV0807
Date of Report 9/21/2007

Sample Description: SURFACE
Location: BIG FALLS FLOWAGE
Customer Sample I.D.:

LabWorks I.D. EF93363
Laboratory I.D.:
Collection Date: 8/29/2007
Date Submitted: 8/31/2007

Constituent	Result	Units	Detection Limit	Analytical Method	Analysis Start Date
Chlorophyll-a	4.45	ug/L	0.041	SM 19th 10200 H	8/31/2007
Send Chlorophyll A	Completed				8/31/2007
Total Phosphorus	0.052	mg/L P	0.001	EPA 365.3	9/13/2007

Comments related to sample number EF93363:



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Fax: (612) 630-4367

Contact: Tom Leverentz

Lab Certification MN ID: 027-053-197

Lab Certification WI ID:999071150

Report To: ERAD- WI
Hydro Regulatory-WI

Attention: Leroy Wilder
Rob Olson

Work Request # WIRV0807
Date of Report 9/21/2007

Sample Description: BOTTOM
Location: THORNAPPLE FLOWAGE
Customer Sample I.D.:

LabWorks I.D. EF93360
Laboratory I.D.:
Collection Date: 8/29/2007
Date Submitted: 8/31/2007

Constituent	Result	Units	Detection Limit	Analytical Method	Analysis Start Date
Total Phosphorus	0.033	mg/L P	0.001	EPA 365.3	9/13/2007

Comments related to sample number EF93360:



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Fax: (612) 630-4367

Contact: Tom Leverenz

Lab Certification MN ID: 027-053-197

Lab Certification WI ID:999071150

Report To: ERAD-WI
Hydro Regulatory-WI

Attention: Leroy Wilder
Rob Olson

Work Request # WIRV0807
Date of Report 9/21/2007

Sample Description: SURFACE
Location: THORNAPPLE FLOWAGE
Customer Sample I.D.:

LabWorks I.D. EF93361
Laboratory I.D.:
Collection Date: 8/29/2007
Date Submitted: 8/31/2007

Constituent	Result	Units	Detection Limit	Analytical Method	Analysis Start Date
Chlorophyll-a	2.93	ug/L	0.041	SM 19th 10200 H	8/31/2007
Send Chlorophyll A	Completed				8/31/2007
Total Phosphorus	0.049	mg/L P	0.001	EPA 365.3	9/13/2007

Comments related to sample number EF93361:



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Minneapolis, MN 55403

Phone: (612)630-4439

Fax: (612) 630-4367

Contact: Tom Leverenz

Lab Certification MN ID: 027-053-197

Lab Certification WI ID:999071150

I certify that this analysis report was prepared under my direction or supervision under a system designed to assure that qualified personnel analyzed the submitted samples. All protocols for analysis were followed as required by Minnesota Rules and the Applicable Management Plan.

Christine M. Keefe

Christine M. Keefe
System Chemist
612-630-4506

Water Quality Sampling - Big Falls Flowage

Date: 4/30/07

Temperature: 60°F

Weather Conditions: Partly Cloudy, light wind @ ~5mph

Depth of Bottom Sample: 36 ft.

Secchi Disk Reading: 4 ft.

Dissolved Oxygen and Temperature Profile

Surface	15.8	9.40
2	15.8	9.59
4	15.7	9.74
6	15.5	9.82
8	15.4	9.76
10	15.4	9.74
12	15.4	9.66
14	15.3	9.54
16	15.2	9.47
18	15.2	9.39
20	15.2	9.35
22	15.2	9.33
24	15.2	9.28
26	15.2	9.23
28	15.2	9.08
30	15.2	9.05
32	14.8	8.99
34	13.9	8.85
36	12.9	8.75
38	Bottom	—
40		
42		
44		
46		

Remarks:

* Sample was taken at third buoy from west end of the boat restraining barrier (36 feet)

* No navigational hazards were noted in lower portion of reservoir

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* Checked eagle nest and one adult eagle was observed in nest - one adult was observed flying over reservoir as well.

Water Quality Sampling - Big Falls Flowage

Date: 7/31/07

Temperature: 80°F

Weather Conditions: Mostly Sunny, South wind @ 5mph

Depth of Bottom Sample: 1AM

Secchi Disk Reading: 7 ft.

Dissolved Oxygen and Temperature Profile

Surface	28.1	7.43
2	27.8	7.46
4	27.4	7.41
6	27.3	7.30
8	27.2	7.28
10	27.1	6.82
12	27.0	6.68
14	26.9	6.47
16	26.8	6.26
18	26.8	6.08
20	26.6	5.45
22	26.4	5.18
24	26.3	5.15
26	26.0	4.85
28	25.8	4.78
30	25.5	4.27
32	25.4	4.00
34	24.0	0.43
36	Bottom	Bottom
38		
40		
42		
44		
46		

Remarks: * No eagle activity at the rest site
 * No navigational hazards noted in lower portion of flowage
 * Low flow on the Flambeau @ Big Falls (<500 cfs)

Water Quality Sampling - Big Falls Flowage

Date: 8/29/07

Temperature: 70°F

Weather Conditions: Mostly Sunny, N wind @ 10 mph

Depth of Bottom Sample: 12M

Secchi Disk Reading: 6 Ft.

Dissolved Oxygen and Temperature Profile

Surface		
2		
4		
6		
8		
10		
12		
14		
16		
18		
20		
22		
24		
26		
28		
30		
32		
34		
36		
38		
40		
42		
44		
46		

* A temperature and DO profile was not obtained due to mechanical problems with the meter. Water samples were taken at the third buoy from the west end of the boat restraining barrier. This is the last sampling event of 2007

* no navigational hazards noted near dam.

Remarks: * Checked the reservoir for purple loosestrife and none was found.

* There were four vehicle/boat trailers at the boat landing, which was likely due to the Dargland drawdown.

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* The eagle nest site was surveyed - no eagles at nest site although a native eagle was spotted nearby

Water Quality Sampling - Thornapple Flowage

Date: 4/30/07

Temperature: 65°F

Weather Conditions: Cloudy, S wind @ ~10mph

Depth of Bottom Sample: 6M

Secchi Disk Reading: 5ft.

Dissolved Oxygen and Temperature Profile

Surface	15.3	11.26
2	14.7	11.27
4	14.4	11.33
6	14.3	11.32
8	14.3	11.28
10	14.1	11.28
12	14.0	11.20
14	13.9	11.13
16	13.8	10.90
18	13.1	10.43
20	Bottom	—
22		
24		
26		
28		
30		
32		
34		
36		
38		
40		
42		
44		
46		

Remarks:

* Sample was taken at the third buoy from the west end of the boat restraining barrier (18 ft)

* No navigational hazards were noted in lower portion of reservoir

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* Eagle nest was checked and one adult eagle was observed on the nest

Water Quality Sampling - Thornapple Flowage

Date: 7/31/07
 Temperature: 85°F, Sunny
 Weather Conditions: South wind @ 5 mph
 Depth of Bottom Sample: 18 ft.
 Secchi Disk Reading: 5 ft.

Dissolved Oxygen and Temperature Profile

Surface	27.1	8.50
2	26.7	8.31
4	25.9	7.54
6	25.8	7.35
8	25.8	7.27
10	25.7	7.22
12	25.7	7.04
14	25.5	6.81
16	25.5	6.79
18	25.1	6.27
20	24.7	5.78
22	Bottom	Bottom
24		
26		
28		
30		
32		
34		
36		
38		
40		
42		
44		
46		

Remarks: * one young of year eagle was noted at the eagle nest
 * No navigational hazards noted
 * slight algal bloom was present near dam
 * There has been ample river flow due to the 30 ft. draw down of the Duryland Flowage upstream

Water Quality Sampling - Thornapple Flowage

Date: 8/29/07

Temperature: 75°F

Weather Conditions: Mostly Sunny, N wind @ ~10 mph

Depth of Bottom Sample: 6M

Secchi Disk Reading: 5ft.

Dissolved Oxygen and Temperature Profile

Surface		
2		
4		
6		
8		
10		
12		
14		
16		
18		
20		
22		
24		
26		
28		
30		
32		
34		
36		
38		
40		
42		
44		
46		

* A temperature and DO profile was not obtained due to mechanical problems with the meter. Water samples were taken at the third buoy from the west end of the boat restraining barrier. This is the last sampling event of 2007.

Remarks: * The reservoir was surveyed for purple loosestrife - results were similar to past years results and locations
 * No eagles were observed near the nest site or on the reservoir.

**Summary Of Total Phosphorus And Chlorophyll A
Data For The Big Falls And Thornapple Flowages, 1998-2007**

Summary of Water Quality Data for the Big Falls and Thornapple Flowages (1998 - 2007).

Date	Big Falls Flowage			Thornapple Flowage		
	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)
4/22/1998	0.037	5.9	0.04	0.034	0.8	0.032
7/27/1998	0.04	2.0	0.05	0.03	7.0	0.04
8/25/1998	0.04	24.0	0.07	0.04	8.0	0.05
4/26/1999	0.04	0.5	0.13	0.04	0.5	0.05
7/23/1999	0.05	10.0	0.10	0.04	5.2	0.06
8/20/1999	0.04	7.6	0.06	0.07	0.6	0.10
4/14/2000	0.03	5.0	0.04	0.04	2.0	0.04
7/26/2000	0.05	5.0	0.12	0.05	3.9	0.07
8/25/2000	0.04	4.8	0.06	0.04	0.5	0.05
5/7/2001	0.04	0.6	0.05	0.04	1.3	0.05
7/24/2001	0.04	4.3	0.06	0.04	1.4	0.05
8/22/2001	0.04	2.2	0.06	0.04	4.8	0.04
5/13/2002	0.03	1.6	0.03	0.03	1.6	0.03
7/24/2002	0.04	1.6	0.06	0.05	0.5	0.05
8/28/2002	0.04	1.7	0.04	0.03	1.5	0.04
5/12/2003	0.03	0.7	0.03	0.04	0.5	0.04
7/28/2003	0.06	9.4	0.05	0.06	5.0	0.05
8/13/2003	0.03	5.9	0.06	0.07	10.7	0.06
5/5/2004	0.053	1.55	0.031	0.035	1.80	0.036
7/28/2004	0.037	3.10	0.084	0.050	4.60	0.049
8/25/2004	0.024	3.35	0.042	0.029	4.10	0.027
4/19/2005	0.050	0.50	0.057	0.055	0.70	0.051
7/25/2005	0.031	0.60	0.044	0.031	1.50	0.045
8/31/2005	0.020	1.50	0.092	0.029	2.75	0.030
4/26/2006	0.023	0.94	0.035	0.026	2.35	0.024
7/24/2006	0.029	0.50	0.099	0.035	4.03	0.041
8/23/2006	0.048	1.50	0.035	0.050	2.11	0.040
4/30/2007	0.028	1.95	0.067	0.039	4.50	0.033
7/31/2007	0.029	4.81	0.043	0.037	3.35	0.032
8/29/2007	0.052	4.45	0.027	0.049	2.93	0.033
Average (Ice-out sample)	0.04	1.92	0.05	0.04	1.61	0.04
Average (July sample)	0.04	4.13	0.07	0.04	3.65	0.05
Average (August sample)	0.04	5.70	0.05	0.04	3.80	0.05

**Summary Of Dissolved Oxygen And Temperature
Data For The Big Falls Flowage, 1998-2007**

Dissolved Oxygen and Temperature Profiles for the Big Falls Flowage in 1998.

Date: 4/22/1998
 Secchi Disk (ft.): 4
 Depth of Bottom Sample: 11 meters
 Weather Conditions: sunny, calm, 50 F

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	10.5	10.8
1.0	10.5	10.7
2.0	10.0	10.7
3.0	10.0	10.6
4.0	10.0	10.6
5.0	10.0	10.6
6.0	10.0	10.6
7.0	10.0	10.6
8.0	10.0	10.6
9.0	10.0	10.6
10.0	10.0	10.6

Date: 7/27/1998
 Secchi Disk (ft.): 4
 Depth of Bottom Sample: 33 ft.
 Weather Conditions: sunny, calm, 75 F

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	23.5	8.6
2.0	23.5	8.6
4.0	23.5	8.6
6.0	23.5	8.6
8.0	22.5	7.8
10.0	22.0	7.4
12.0	22.0	7.3
14.0	22.0	7.3
16.0	22.0	7.3
18.0	22.0	7.3
20.0	22.0	7.2
22.0	22.0	7.2
24.0	22.0	7.1
26.0	22.0	7.0
28.0	21.5	6.8
30.0	21.5	6.6
32.0	21.5	6.2

Date: 8/23/1998
 Secchi Disk (ft.): 3
 Depth of Bottom Sample: 35 ft.
 Weather Conditions: sunny, light wind, 85 F

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	23.0	9.2
2.0	22.0	9.2
4.0	22.0	9.0
6.0	22.0	8.6
8.0	22.0	8.3
10.0	22.0	7.9
12.0	21.5	7.7
14.0	21.5	7.6
16.0	21.5	7.4
18.0	21.5	7.2
20.0	21.5	6.7
22.0	21.0	6.3
24.0	21.0	6.3
26.0	21.0	6.1
28.0	21.0	5.9
30.0	21.0	5.8
32.0	21.0	5.7
34.0	20.5	5.4

Dissolved Oxygen and Temperature Profiles for the Big Falls Flowage in 1999.

Date: 4/26/1999
 Secchi Disk (ft.): 4
 Depth of Bottom Sample: 36 ft.
 Weather Conditions: sunny, N wind, 23 C

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	11.0	11.6
2.0	11.0	11.5
4.0	10.5	11.2
6.0	10.5	11.2
8.0	10.5	11.0
10.0	10.0	11.0
12.0	10.0	11.0
14.0	10.0	11.0
16.0	10.0	11.0
18.0	9.5	11.0
20.0	9.0	11.0
22.0	9.0	11.0
24.0	9.0	11.0
26.0	8.0	10.8
28.0	8.0	10.8
30.0	7.5	9.4
32.0	7.5	1.5
34.0	7.0	1.2

Date: 7/23/1999
 Secchi Disk (ft.): 4.5
 Depth of Bottom Sample: 45 ft.
 Weather Conditions: sunny, SW wind, 80 F

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	26.8	7.21
2.0	26.4	7.06
4.0	26.2	6.82
6.0	26.0	6.78
8.0	25.8	6.66
10.0	25.8	6.62
12.0	25.8	6.57
14.0	25.8	6.56
16.0	25.7	6.35
18.0	25.6	6.33
20.0	25.2	6.24
22.0	25.1	6.13
24.0	24.8	5.84
26.0	24.7	5.74
28.0	24.7	5.74
30.0	24.5	5.71
32.0	24.5	5.71
34.0	24.5	5.71
36.0	24.4	5.33
38.0	24.3	5.16
40.0	24.3	5.02

Date: 8/19/1999
 Secchi Disk (ft.): 3.5
 Depth of Bottom Sample: 46 ft.
 Weather Conditions: cldy, light wind, 70 F

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	20.9	7.2
2.0	20.8	7.2
4.0	20.7	7.1
6.0	20.5	7.0
8.0	20.4	7.0
10.0	20.4	7.0
12.0	20.4	7.0
14.0	20.4	7.1
16.0	20.1	7.1
18.0	20.1	7.1
20.0	20.0	7.1
22.0	20.0	7.1
24.0	20.0	7.1
26.0	20.0	7.1
28.0	19.9	7.2
30.0	19.9	7.2
32.0	19.9	7.2
34.0	19.9	7.2
36.0	19.9	7.1
38.0	19.9	7.1
40.0	19.9	7.1
42.0	19.9	7.1

Dissolved Oxygen and Temperature Profiles for the Big Falls Flowage in 2000.

Date: 4/12/2000
 Secchi Disk (ft.): 5.5
 Depth of Bottom Sample: 46 ft.
 Weather Conditions: sunny, E wind, 40 F

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	7.2	11.3
2.0	7.0	11.4
4.0	6.7	11.5
6.0	6.6	11.7
8.0	6.5	11.6
10.0	6.5	11.6
12.0	6.5	11.6
14.0	6.4	11.7
16.0	6.4	11.2
18.0	6.4	11.3
20.0	6.4	11.2
22.0	6.4	11.1
24.0	6.4	11.2
26.0	6.4	11.2
28.0	6.4	11.2
30.0	6.4	11.1
32.0	6.4	10.9
34.0	6.4	10.9
36.0	6.4	10.9
38.0	6.4	10.8
40.0	6.4	10.8

Date: 7/26/2000
 Secchi Disk (ft.): 4.5
 Depth of Bottom Sample: 37 ft.
 Weather Conditions: cloudy, S wind, 75 F

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	22.9	7.38
2.0	22.8	7.36
4.0	22.8	7.36
6.0	22.8	7.36
8.0	22.7	7.35
10.0	22.7	7.35
12.0	22.7	7.33
14.0	22.7	7.31
16.0	22.7	7.30
18.0	22.7	7.23
20.0	22.7	7.18
22.0	22.7	7.17
24.0	22.6	7.16
26.0	22.6	7.15
28.0	22.6	7.14
30.0	22.6	7.14
32.0	22.6	7.12
34.0	22.6	7.10
36.0	22.4	6.91
38.0	22.2	1.89

Date: 8/22/2000
 Secchi Disk (ft.): 4
 Depth of Bottom Sample: 33 ft.
 Weather Conditions: sunny, 75 F

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	21.1	7.84
2.0	20.4	7.82
4.0	20.3	7.96
6.0	20.3	7.97
8.0	20.3	7.98
10.0	20.2	7.95
12.0	20.2	7.95
14.0	20.2	7.91
16.0	20.0	7.99
18.0	19.8	7.92
20.0	19.7	7.91
22.0	19.6	7.91
24.0	19.6	7.91
26.0	19.6	7.94
28.0	19.6	7.94
30.0	19.6	7.94
32.0	19.6	7.94
34.0	19.6	7.92
36.0	19.6	7.92
38.0	19.6	7.89

Dissolved Oxygen and Temperature Profiles for the Big Falls Flowage in 2001.

Date: 5/7/2001
 Secchi Disk (ft.): 4
 Depth of Bottom Sample: 12.5 m
 Weather Conditions: prtly cloudy, W wind, 19C

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	14.6	9.5
2.0	14.5	9.4
4.0	14.2	9.4
6.0	14.1	9.4
8.0	14.0	9.4
10.0	14.0	9.4
12.0	14.0	9.4
14.0	14.0	9.4
16.0	14.0	9.3
18.0	14.0	9.3
20.0	14.0	9.3
22.0	14.0	9.3
24.0	14.0	9.2
26.0	14.0	9.2
28.0	14.0	9.2
30.0	14.0	9.2
32.0	14.0	9.2
34.0	14.0	9.2
36.0	14.0	9.2
38.0	14.0	9.1

Date: 7/24/2001
 Secchi Disk (ft.): 4.5
 Depth of Bottom Sample: 11.5 m
 Weather Conditions: ptly cloudy, 78 F

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	27.0	7.10
2.0	27.0	7.00
4.0	26.9	6.90
6.0	26.3	6.50
8.0	26.2	7.10
10.0	26.1	6.70
12.0	26.1	6.20
14.0	26.1	5.80
16.0	26.0	5.40
18.0	25.9	5.50
20.0	25.9	5.80
22.0	25.9	5.90
24.0	25.9	6.00
26.0	25.9	6.00
28.0	25.8	6.00
30.0	25.8	5.50
32.0	25.7	5.20
34.0	25.6	5.00
36.0	25.6	3.60
38.0	25.5	3.10

Date: 8/22/2001
 Secchi Disk (ft.): 5.5
 Depth of Bottom Sample: 11.5 m
 Weather Conditions: cloudy, 75 F

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	22.5	8.0
2.0	22.4	7.8
4.0	22.4	7.8
6.0	22.3	7.7
8.0	22.3	7.7
10.0	22.3	7.7
12.0	22.3	7.7
14.0	22.3	7.6
16.0	22.2	7.6
18.0	22.2	7.5
20.0	22.1	7.3
22.0	22.0	7.2
24.0	21.9	7.2
26.0	21.8	7.1
28.0	21.8	7.0
30.0	21.7	7.0
32.0	21.2	6.7
34.0	21.1	6.6
36.0	21.0	6.6
38.0	20.9	6.4

Dissolved Oxygen and Temperature Profiles for the Big Falls Flowage in 2002.

Date: 5/13/2002
 Secchi Disk (ft.): 4
 Depth of Bottom Sample: 6.5 m
 Weather Conditions: cloudy, NW wind, 50F

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	7.9	11.4
2.0	7.8	11.5
4.0	7.8	11.5
6.0	7.8	11.5
8.0	7.8	11.5
10.0	7.8	11.5
12.0	7.8	11.5
14.0	7.8	11.5
16.0	7.8	11.5
18.0	7.8	11.5
20.0	7.8	11.5
22.0	7.8	11.4
24.0	7.8	11.4

Could not sample earlier due to excessively high river flows

Date: 7/24/2002
 Secchi Disk (ft.): 5
 Depth of Bottom Sample: 11.5 m
 Weather Conditions: pty cloudy, 70 F

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	24.8	7.3
2.0	24.8	7.3
4.0	24.7	7.2
6.0	24.6	7.2
8.0	24.5	7.2
10.0	24.4	7.1
12.0	24.4	7.1
14.0	24.4	7.1
16.0	24.4	7.1
18.0	24.4	7.1
20.0	24.4	7.1
22.0	24.3	7.1
24.0	24.3	7.1
26.0	24.3	7.1
28.0	24.3	7.1
30.0	24.3	7.1
32.0	24.3	7.0
34.0	24.3	7.0
36.0	24.3	7.0

Date: 8/28/2002
 Secchi Disk (ft.): 4.75
 Depth of Bottom Sample: 37 ft.
 Weather Conditions: cloudy, 75 F

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	23.8	7.4
2.0	23.3	7.5
4.0	23.1	7.5
6.0	23.1	7.5
8.0	23.0	7.5
10.0	22.9	7.4
12.0	22.8	7.3
14.0	22.8	7.3
16.0	22.8	7.3
18.0	22.8	7.3
20.0	22.8	7.3
22.0	22.8	7.3
24.0	22.7	7.3
26.0	22.7	7.2
28.0	22.6	7.1
30.0	22.4	6.9
32.0	22.3	6.9
34.0	22.3	6.8
36.0	22.2	6.6
38.0	22.1	6.1

Dissolved Oxygen and Temperature Profiles for the Big Falls Flowage in 2003.

Date: 5/19/2003
 Secchi Disk (ft.): 4.5
 Depth of Bottom Sample: 37 ft.
 Weather Conditions: cloudy, S wind, 65 F

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	16.1	8.50
2.0	16.1	8.61
4.0	16.1	8.73
6.0	16.1	8.68
8.0	16.1	8.68
10.0	16.1	8.68
12.0	16.1	8.66
14.0	16.1	8.65
16.0	16.1	8.65
18.0	16.1	8.68
20.0	16.1	8.63
22.0	16.1	8.65
24.0	16.1	8.65
26.0	16.1	8.66
28.0	16.1	8.66
30.0	16.1	8.65
32.0	16.1	8.67
34.0	16.1	8.67
36.0	16.1	8.67
38.0	16.1	8.63

Date: 7/28/2003
 Secchi Disk (ft.): 6
 Depth of Bottom Sample: 11.5 m
 Weather Conditions: clear, calm, 70 F

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	26.3	7.83
2.0	25.8	7.82
4.0	25.2	7.58
6.0	25.0	7.42
8.0	25.0	7.35
10.0	24.9	7.28
12.0	24.8	7.06
14.0	24.8	6.91
16.0	24.7	6.91
18.0	24.6	6.88
20.0	24.5	6.78
22.0	24.4	6.70
24.0	24.3	6.62
26.0	24.2	6.44
28.0	23.7	6.12
30.0	23.1	5.67
32.0	22.8	5.44
34.0	22.6	4.95
36.0	21.9	4.45
38.0	21.3	3.95

Date: 8/13/2003
 Secchi Disk (ft.): 6
 Depth of Bottom Sample: 11 m
 Weather Conditions: sunny, calm, 80 F

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	25.9	8.30
2.0	25.6	8.33
4.0	25.0	8.39
6.0	24.8	7.96
8.0	24.6	7.19
10.0	24.4	6.86
12.0	24.3	6.71
14.0	24.2	6.58
16.0	24.1	6.44
18.0	23.9	6.16
20.0	23.9	6.03
22.0	23.8	6.23
24.0	23.8	6.20
26.0	23.7	5.83
28.0	23.5	5.81
30.0	23.5	5.78
32.0	23.5	5.75
34.0	23.4	5.18
36.0	22.9	3.55

Could not sample earlier due to excessively high river flows

Dissolved Oxygen and Temperature Profiles for the Big Falls Flowage in 2004.

Date: 5/5/2004
 Secchi Disk (ft.): 5.5
 Depth of Bottom Sample: 11.5 m
 Weather Conditions: cloudy, S wind, 50 F

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	12.4	10.1
2.0	12.4	10.4
4.0	12.4	10.4
6.0	12.4	10.2
8.0	12.3	10.3
10.0	12.2	10.4
12.0	12.1	10.4
14.0	12.1	10.6
16.0	12.1	10.6
18.0	12.0	10.6
20.0	11.9	10.5
22.0	11.8	10.3
24.0	11.7	10.3
26.0	11.6	10.3
28.0	11.6	10.3
30.0	11.6	10.2
32.0	11.6	10.2
34.0	11.6	10.2
36.0	11.5	10.2
38.0	11.3	10.1
40.0	11.3	9.7

Date: 7/28/2004
 Secchi Disk (ft.): 6.5
 Depth of Bottom Sample: 12 m
 Weather Conditions: clear, S wind, 75 F

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	24.2	7.4
2.0	24.2	8.0
4.0	24.1	8.1
6.0	24.0	8.1
8.0	24.0	7.6
10.0	23.9	7.1
12.0	23.9	6.4
14.0	23.7	6.1
16.0	23.5	6.0
18.0	23.3	5.7
20.0	23.1	5.6
22.0	23.0	5.3
24.0	22.8	5.1
26.0	22.7	4.9
28.0	22.5	4.1
30.0	22.4	4.4
32.0	22.2	4.2
34.0	22.0	3.9
36.0	21.7	3.2
38.0	20.4	1.1

Date: 8/25/2004
 Secchi Disk (ft.): 6.5
 Depth of Bottom Sample: 37 ft.
 Weather Conditions: cloudy, 75 F

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	21.2	8.9
2.0	21.2	8.9
4.0	19.8	8.8
6.0	19.7	8.8
8.0	19.6	8.7
10.0	19.6	8.7
12.0	19.6	8.6
14.0	19.6	8.5
16.0	19.6	8.4
18.0	19.5	8.3
20.0	19.4	8.4
22.0	19.2	8.3
24.0	19.2	8.2
26.0	19.0	8.2
28.0	18.8	7.8
30.0	18.7	7.8
32.0	18.4	7.4
34.0	18.2	7.2
36.0	17.9	5.4
38.0	17.6	4.4

Could not sample earlier due to excessively high river flows

Dissolved Oxygen and Temperature Profiles for the Big Falls Flowage in 2005.

Date: 4/19/2005
 Secchi Disk (ft.): 5.5
 Depth of Bottom Sample: 11 m
 Weather Conditions: prtly cldy, S wind, 70 F

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	15.4	10.1
2.0	15.2	10.2
4.0	14.9	10.2
6.0	14.8	10.2
8.0	14.8	10.2
10.0	14.8	10.2
12.0	14.8	10.2
14.0	14.8	10.2
16.0	14.8	10.2
18.0	14.7	10.1
20.0	14.6	10.1
22.0	14.7	9.8
24.0	14.8	9.9
26.0	14.7	10.0
28.0	14.7	10.0
30.0	14.7	10.0
32.0	14.6	10.0
34.0	14.6	10.0
36.0	14.6	10.0
38.0	14.5	9.9
40.0	14.3	9.6

Date: 7/25/2005
 Secchi Disk (ft.): 4
 Depth of Bottom Sample: 12.5 m
 Weather Conditions: cloudy, S wind, 75 F

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	26.5	6.3
2.0	26.4	6.2
4.0	26.2	6.0
6.0	26.1	5.9
8.0	26.1	5.9
10.0	26.0	5.7
12.0	25.9	5.9
14.0	25.7	5.6
16.0	25.5	5.3
18.0	25.4	5.0
20.0	25.2	5.2
22.0	25.1	5.0
24.0	25.1	5.0
26.0	25.1	5.1
28.0	25.1	5.2
30.0	25.0	5.5
32.0	24.9	5.3
34.0	24.9	5.1
36.0	24.8	4.2
38.0	22.4	0.2

Date: 8/31/2005
 Secchi Disk (ft.): 7
 Depth of Bottom Sample: 37 ft.
 Weather Conditions: Mstly sny, 65 F

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	21.6	8.2
2.0	21.5	8.2
4.0	21.3	8.3
6.0	21.2	8.1
8.0	21.1	8.0
10.0	21.1	8.0
12.0	21.0	8.0
14.0	21.0	8.0
16.0	21.0	8.0
18.0	20.9	8.0
20.0	20.9	7.9
22.0	20.9	7.7
24.0	20.8	7.5
26.0	20.8	7.4
28.0	20.6	6.9
30.0	20.5	6.7
32.0	20.5	6.6
34.0	20.5	6.5
36.0	20.5	6.4
38.0	20.5	2.3

Dissolved Oxygen and Temperature Profiles for the Big Falls Flowage in 2006.

Date: 4/26/2006
 Secchi Disk (ft.): 4
 Depth of Bottom Sample: 13 m
 Weather Conditions: sunny, west wind @ 10 mph

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	12.4	9.9
2.0	12.1	10.0
4.0	12.0	10.0
6.0	12.0	10.0
8.0	11.9	10.0
10.0	11.3	10.0
12.0	11.2	10.2
14.0	11.2	10.2
16.0	11.2	10.2
18.0	11.1	10.1
20.0	11.1	10.0
22.0	11.1	9.8
24.0	11.1	9.8
26.0	11.0	9.9
28.0	11.0	9.9
30.0	11.0	9.9
32.0	11.0	9.9
34.0	11.0	9.9
36.0	11.0	9.9
38.0	11.0	9.9
40.0	Bottom	Bottom

Date: 7/24/2006
 Secchi Disk (ft.): 6
 Depth of Bottom Sample: 15 m
 Weather Conditions: Prtly cloudy, south wind at 10 mph

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	25.9	7.6
2.0	25.4	7.5
4.0	25.2	7.3
6.0	25.1	7.2
8.0	25.0	6.9
10.0	24.9	6.8
12.0	24.8	6.4
14.0	24.7	6.1
16.0	24.5	5.8
18.0	24.5	5.6
20.0	24.2	6.1
22.0	24.0	6.4
24.0	24.0	6.4
26.0	23.9	6.3
28.0	23.8	6.3
30.0	23.8	6.2
32.0	23.8	5.9
34.0	23.7	5.5
36.0	21.8	0.6
38.0	Bottom	Bottom
40.0	Bottom	Bottom

Date: 8/23/2006
 Secchi Disk (ft.): 5
 Depth of Bottom Sample: 38 ft.
 Weather Conditions: Cloudy, south wind @ 5 mph

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	23.3	8.3
2.0	23.3	8.3
4.0	23.1	8.2
6.0	23.1	8.1
8.0	23.1	8.1
10.0	23.1	8.1
12.0	23.1	8.0
14.0	23.0	7.9
16.0	22.9	7.5
18.0	22.8	7.1
20.0	22.7	7.0
22.0	22.7	7.0
24.0	22.5	6.8
26.0	22.3	6.3
28.0	22.2	6.0
30.0	22.1	5.8
32.0	22.1	5.8
34.0	22.0	5.6
36.0	22.0	5.3
38.0	22.0	5.1
40.0	Bottom	Bottom

Dissolved Oxygen and Temperature Profiles for the Big Falls Flowage in 2007.

Date: 4/30/2007
 Secchi Disk (ft.): 4
 Depth of Bottom Sample: 12 m
 Weather Conditions: Prtly cloudy, light wind

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	15.8	9.40
2.0	15.8	9.59
4.0	15.7	9.74
6.0	15.5	9.82
8.0	15.4	9.76
10.0	15.4	9.74
12.0	15.4	9.66
14.0	15.3	9.54
16.0	15.2	9.47
18.0	15.2	9.39
20.0	15.2	9.35
22.0	15.2	9.33
24.0	15.2	9.28
26.0	15.2	9.23
28.0	15.2	9.08
30.0	15.2	9.05
32.0	14.8	8.99
34.0	13.9	8.85
36.0	12.9	8.75
38.0	Bottom	Bottom
40.0		

Date: 7/31/2007
 Secchi Disk (ft.): 7
 Depth of Bottom Sample: 12 m
 Weather Conditions: Mostly sunny, south wind at 5 mph

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface	28.1	7.43
2.0	27.8	7.46
4.0	27.4	7.41
6.0	27.3	7.30
8.0	27.2	7.28
10.0	27.1	6.82
12.0	27.0	6.68
14.0	26.9	6.47
16.0	26.8	6.26
18.0	26.8	6.08
20.0	26.6	5.45
22.0	26.4	5.18
24.0	26.3	5.15
26.0	26.0	4.85
28.0	25.8	4.78
30.0	25.5	4.27
32.0	25.4	4.00
34.0	24.0	0.43
36.0	Bottom	Bottom
38.0		
40.0		

Date: 8/29/2007
 Secchi Disk (ft.): 6
 Depth of Bottom Sample: 12 m
 Weather Conditions: Mostly sunny
 N wind @ 10 mph

Depth (ft.)	Temperature (celsius)	Dissolved Oxygen (mg/l)
Surface		
2.0		
4.0		
6.0		
8.0		
10.0		
12.0		
14.0		
16.0		
18.0		
20.0		
22.0		
24.0		
26.0		
28.0		
30.0		
32.0		
34.0		
36.0		
38.0		
40.0		

DO/Temperature profile was not taken due to equipment problems

**Summary Of Dissolved Oxygen And Temperature
Data For The Thornapple Flowage, 1998-2007**

Dissolved Oxygen and Temperature Profiles for the Thornapple Flowage in 1998.

Date: 4/22/1998				Date: 7/27/1998				Date: 8/23/1998			
Secchi Disk (ft.): 6				Secchi Disk (ft.): 5				Secchi Disk (ft.): 3.5			
Depth of Bottom Sample: 8 meters				Depth of Bottom Sample: 19 ft.				Depth of Bottom Sample: 19			
Weather Conditions: sunny, calm, 55 F				Weather Conditions: sunny, calm, 70 F				Weather Conditions: sunny, light wind, 90 F			
Dissolved				Dissolved				Dissolved			
Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)		Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)		Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)	
Surface	11.0	10.5		Surface	24.0	8.9		Surface	22.5	9.3	
1.0	10.5	10.5		2.0	24.0	8.8		2.0	22.5	9.1	
2.0	10.0	10.5		4.0	24.0	8.7		4.0	22.0	8.5	
3.0	10.0	10.4		6.0	23.0	8.3		6.0	22.0	8.1	
4.0	10.0	10.2		8.0	22.5	7.8		8.0	21.5	7.4	
5.0	10.0	10.2		10.0	22.5	7.4		10.0	21.5	7.3	
6.0	10.0	10.2		12.0	22.5	6.9		12.0	21.5	7.3	
7.0	9.5	10.2		14.0	22.0	6.5		14.0	21.5	7.2	
8.0	9.5	10.2		16.0	22.0	6.3		16.0	21.5	7.1	
9.0	9.5	10.2		18.0	22.0	5.9		18.0	20.5	5.8	
10.0	9.5	10.2									

Dissolved Oxygen and Temperature Profiles for the Thornapple Flowage in 1999.

Date: 4/26/1999				Date: 7/23/1999				Date: 8/19/1999			
Secchi Disk (ft.): 4				Secchi Disk (ft.): 6.5				Secchi Disk (ft.): 4.5			
Depth of Bottom Sample: 22.5 ft.				Depth of Bottom Sample: 23 ft.				Depth of Bottom Sample: 22			
Weather Conditions: sunny, N wind, 23 C				Weather Conditions: sunny, SW wind, 85 F				Weather Conditions: cloudy, calm, 70 F			
Dissolved				Dissolved				Dissolved			
Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)		Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)		Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)	
Surface	12.0	11.4		Surface	27.0	6.32		Surface	21.1	6.9	
2.0	11.5	11.2		2.0	25.6	6.24		2.0	20.6	6.5	
4.0	11.5	11.2		4.0	25.1	5.99		4.0	20.5	6.4	
6.0	11.0	11.2		6.0	24.9	5.85		6.0	20.4	6.3	
8.0	10.5	11.0		8.0	24.8	5.83		8.0	20.3	6.3	
10.0	10.5	10.9		10.0	24.8	5.82		10.0	20.3	6.3	
12.0	10.5	10.9		12.0	24.7	5.78		12.0	20.4	6.3	
14.0	10.0	10.9		14.0	24.7	5.72		14.0	20.3	6.2	
16.0	9.5	10.9		16.0	24.7	5.67		16.0	20.3	6.2	
18.0	8.5	9.8		18.0	24.7	5.63		18.0	20.3	6.2	
20.0	8.5	8.6		20.0	24.7	5.62		20.0	20.3	6.2	
				22.0	24.7	5.58					

Dissolved Oxygen and Temperature Profiles for the Thornapple Flowage in 2000.

Date: 4/12/2000				Date: 7/26/2000				Date: 8/22/2000			
Secchi Disk (ft.): 5				Secchi Disk (ft.): 4				Secchi Disk (ft.): 5.5			
Depth of Bottom Sample: 23 ft.				Depth of Bottom Sample: 19.5 ft.				Depth of Bottom Sample: 17 ft.			
Weather Conditions: sunny, NE wind, 45F				Weather Conditions: cloudy, S wind, 80 F				Weather Conditions: cloudy, 78 F			
Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)	Dissolved	Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)	Dissolved	Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)	Dissolved
Surface	7.8	11.7		Surface	23.6	6.80		Surface	23.1	6.99	
2.0	7.3	11.5		2.0	23.3	6.80		2.0	22.5	7.05	
4.0	6.5	11.3		4.0	22.9	6.81		4.0	22.3	7.03	
6.0	6.2	11.2		6.0	22.8	6.79		6.0	21.8	7.03	
8.0	6.1	11.3		8.0	22.8	6.69		8.0	21.7	6.94	
10.0	6.1	11.4		10.0	22.8	6.74		10.0	21.6	6.89	
12.0	6.1	11.4		12.0	22.8	6.73		12.0	21.6	6.87	
14.0	6.1	11.6		14.0	22.7	6.69		14.0	21.6	6.87	
16.0	6.1	11.5		16.0	22.7	6.59		16.0	21.6	6.79	
18.0	6.1	11.4		18.0	22.7	6.56		18.0	21.6	6.72	
20.0	6.1	11.4		20.0	22.7	6.56		20.0	21.4	6.38	
				22.0	22.7	6.40					
				24.0	22.6	1.8					
				26.0	22.6	<1					

Dissolved Oxygen and Temperature Profiles for the Thornapple Flowage in 2001.

Date: 5/7/2001				Date: 7/24/2001				Date: 8/22/2001			
Secchi Disk (ft.): 4				Secchi Disk (ft.): 4.5				Secchi Disk (ft.): 5.5			
Depth of Bottom Sample: 6 m				Depth of Bottom Sample: 5 m				Depth of Bottom Sample: 17 ft.			
Weather Conditions: cloudy, W wind, 15 C				Weather Conditions: partly cloudy, 75 F				Weather Conditions: cloudy, 78 F			
Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)	Dissolved	Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)	Dissolved	Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)	Dissolved
Surface	14.5	8.9		Surface	25.7	6.20		Surface	27.4	8.4	
2.0	14.5	8.9		2.0	25.5	6.20		2.0	25.5	8.5	
4.0	14.4	9.0		4.0	25.2	6.40		4.0	24.3	8.5	
6.0	14.4	9.0		6.0	25.1	6.40		6.0	23.8	8.1	
8.0	14.4	9.0		8.0	25.0	9.80		8.0	23.3	7.8	
10.0	14.4	9.0		10.0	25.0	7.20		10.0	23.1	7.0	
12.0	14.4	9.0		12.0	25.0	5.60		12.0	22.9	6.7	
14.0	14.3	9.0		14.0	25.0	5.40		14.0	22.8	7.1	
16.0	14.3	8.9		16.0	24.9	5.40		16.0	22.5	6.0	
18.0	14.3	8.9		18.0	24.4	4.60		18.0	22.4	5.9	
20.0	14.3	8.1		20.0	24.0	4.10		20.0	22.3	5.8	
								22.0	22.3	5.5	

Dissolved Oxygen and Temperature Profiles for the Thornapple Flowage in 2002.

Date: 5/13/2002				Date: 7/24/2002				Date: 8/28/2002			
Secchi Disk (ft.): 4				Secchi Disk (ft.): 4.5				Secchi Disk (ft.): 5			
Depth of Bottom Sample: 5.5 m				Depth of Bottom Sample: 5.5 m				Depth of Bottom Sample: 17 ft.			
Weather Conditions: cloudy, W wind, 52 F				Weather Conditions: partly cloudy, 75 F				Weather Conditions: cloudy, 70 F			
Dissolved				Dissolved				Dissolved			
Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)		Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)		Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)	
Surface	8.7	12.6		Surface	25.2	6.1		Surface	22.5	7.5	
2.0	8.6	12.6		2.0	25.1	6.1		2.0	22.5	7.6	
4.0	8.6	12.6		4.0	24.9	5.9		4.0	22.5	7.6	
6.0	8.6	12.6		6.0	24.6	5.9		6.0	22.5	7.5	
8.0	8.6	12.6		8.0	24.5	5.8		8.0	22.4	7.4	
10.0	8.6	12.6		10.0	24.4	5.7		10.0	22.4	7.4	
12.0	8.6	12.6		12.0	24.4	5.6		12.0	22.4	7.4	
14.0	8.6	12.6		14.0	24.4	5.7		14.0	22.4	7.4	
16.0	8.6	12.6		16.0	24.4	5.7		16.0	22.4	7.4	
18.0	8.6	12.5		18.0	24.4	5.7		18.0	22.3	7.3	
20.0	8.6	12.1									

Could not sample earlier due to high river flows

Dissolved Oxygen and Temperature Profiles for the Thornapple Flowage in 2003.

Date: 5/19/2003				Date: 7/28/2003				Date: 8/13/2003			
Secchi Disk (ft.): 4.5				Secchi Disk (ft.): 6.5				Secchi Disk (ft.): 5			
Depth of Bottom Sample: 19 ft.				Depth of Bottom Sample: 6 m				Depth of Bottom Sample: 6 m			
Weather Conditions: cloudy, S wind, 65 F				Weather Conditions: clear, calm, 70 F				Weather Conditions: clear, calm, 75 F			
Dissolved				Dissolved				Dissolved			
Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)		Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)		Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)	
Surface	13.8	9.72		Surface	24.5	6.73		Surface	24.5	8.73	
2.0	13.7	9.75		2.0	24.4	7.00		2.0	24.3	8.78	
4.0	13.7	9.77		4.0	24.3	6.97		4.0	24.2	8.68	
6.0	13.7	9.77		6.0	24.3	6.89		6.0	24.0	8.00	
8.0	13.7	9.71		8.0	24.3	6.79		8.0	23.7	7.55	
10.0	13.7	9.71		10.0	24.3	6.79		10.0	23.4	5.95	
12.0	13.7	9.72		12.0	24.0	6.29		12.0	23.4	5.79	
14.0	13.7	9.69		14.0	22.9	5.43		14.0	23.2	6.03	
16.0	13.7	9.69		16.0	22.6	5.18		16.0	23.0	4.68	
18.0	13.7	9.67		18.0	22.3	4.71		18.0	22.5	2.62	
20.0	13.7	9.67		20.0	21.9	3.75		20.0	22.1	1.34	

Could not sample earlier due to high river flows

Dissolved Oxygen and Temperature Profiles for the Thornapple Flowage in 2004.

Date: 5/5/2004				Date: 7/28/2004				Date: 8/25/2004															
Secchi Disk (ft.): 5				Secchi Disk (ft.): 5				Secchi Disk (ft.): 5.5															
Depth of Bottom Sample: 6 m				Depth of Bottom Sample: 19.5 ft				Depth of Bottom Sample: 6 m															
Weather Conditions: cloudy, S wind, 60 F				Weather Conditions: partly sunny, 75 F				Weather Conditions: overcast, 70 F															
Dissolved								Dissolved								Dissolved							
Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)		Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)		Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)		Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)									
Surface	10.0	10.1		Surface	23.2	7.6		Surface	20.4	9.4		Surface	20.4	9.4									
2.0	10.0	10.3		2.0	23.2	7.6		2.0	20.3	9.2		2.0	20.3	9.2									
4.0	10.0	10.4		4.0	22.6	7.1		4.0	20.2	9.0		4.0	20.2	9.0									
6.0	10.0	10.6		6.0	22.1	6.5		6.0	20.1	8.8		6.0	20.1	8.8									
8.0	10.0	10.6		8.0	21.9	6.2		8.0	19.9	8.4		8.0	19.9	8.4									
10.0	9.9	10.6		10.0	21.9	6.2		10.0	19.8	8.4		10.0	19.8	8.4									
12.0	9.9	10.6		12.0	21.8	6.2		12.0	19.5	8.0		12.0	19.5	8.0									
14.0	9.9	10.6		14.0	21.3	5.8		14.0	19.4	7.9		14.0	19.4	7.9									
16.0	9.8	10.6		16.0	21.1	6.2		16.0	19.4	7.9		16.0	19.4	7.9									
18.0	9.8	10.6		18.0	20.4	2.4		18.0	19.3	7.7		18.0	19.3	7.7									
20.0	9.8	10.3		20.0	19.2	0.9		20.0	18.6	5.9		20.0	18.6	5.9									

Could not sample earlier due to high river flows

Dissolved Oxygen and Temperature Profiles for the Thornapple Flowage in 2005.

Date: 4/19/2005				Date: 7/25/2005				Date: 8/31/2005															
Secchi Disk (ft.): 5				Secchi Disk (ft.): 4				Secchi Disk (ft.): 5.5															
Depth of Bottom Sample: 6 m				Depth of Bottom Sample: 6 m				Depth of Bottom Sample: 6 m															
Weather Conditions: cloudy, S wind, 70 F				Weather Conditions: Cldy, S wind, 82 F				Weather Conditions: Sunny, S wind, 70 F															
Dissolved								Dissolved								Dissolved							
Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)		Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)		Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)		Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)									
Surface	10.2	10.7		Surface	25.4	7.4		Surface	22.4	8.1		Surface	22.4	8.1									
2.0	10.2	10.7		2.0	25.0	7.0		2.0	21.9	7.9		2.0	21.9	7.9									
4.0	10.1	10.8		4.0	24.7	6.7		4.0	21.5	7.7		4.0	21.5	7.7									
6.0	10.1	10.8		6.0	24.5	6.4		6.0	21.4	7.4		6.0	21.4	7.4									
8.0	10.1	10.8		8.0	24.4	6.0		8.0	21.3	7.4		8.0	21.3	7.4									
10.0	10.0	10.8		10.0	23.8	5.2		10.0	21.3	7.4		10.0	21.3	7.4									
12.0	9.9	10.8		12.0	23.5	5.3		12.0	21.3	7.3		12.0	21.3	7.3									
14.0	9.8	10.8		14.0	23.3	4.8		14.0	21.2	7.3		14.0	21.2	7.3									
16.0	9.8	10.8		16.0	23.2	4.6		16.0	21.2	7.2		16.0	21.2	7.2									
18.0	9.8	10.8		18.0	22.3	0.8		18.0	21.2	7.2		18.0	21.2	7.2									
20.0	9.8	10.8		20.0				20.0	21.2	7.1		20.0	21.2	7.1									

Dissolved Oxygen and Temperature Profiles for the Thornapple Flowage in 2006.

Date: 4/26/2006				Date: 7/24/2006				Date: 8/23/2006			
Secchi Disk (ft.): 4				Secchi Disk (ft.): 6				Secchi Disk (ft.): 4			
Depth of Bottom Sample: 6 m				Depth of Bottom Sample: 5 m				Depth of Bottom Sample: 6 m			
Weather Conditions: sunny, W wind @15 mph				Weather Conditions: Mostly sunny, S wind@10mph				Weather Conditions: Cloudy, S wind@5 mph			
		Dissolved				Dissolved				Dissolved	
Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)		Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)		Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)	
Surface	13.9	10.1		Surface	25.1	7.6		Surface	24.3	9.6	
2.0	13.9	10.2		2.0	24.6	7.4		2.0	24.1	9.4	
4.0	13.7	10.2		4.0	24.3	7.2		4.0	23.6	8.6	
6.0	13.3	10.1		6.0	24.0	6.8		6.0	23.3	7.9	
8.0	13.0	10.0		8.0	23.8	6.7		8.0	23.3	7.8	
10.0	12.4	9.9		10.0	23.6	6.4		10.0	23.2	7.6	
12.0	12.3	9.8		12.0	23.5	6.2		12.0	23.2	7.4	
14.0	12.3	9.7		14.0	22.8	5.0		14.0	23.1	7.0	
16.0	12.3	9.7		16.0	19.7	0.3		16.0	23.0	6.7	
18.0	12.3	9.7		18.0	Bottom	Bottom		18.0	22.9	5.6	
20.0	12.3	9.5						20.0	Bottom	Bottom	
22.0	Bottom	Bottom									

Dissolved Oxygen and Temperature Profiles for the Thornapple Flowage in 2007.

Date: 4/30/2007				Date: 7/31/2007				Date: 8/29/2007			
Secchi Disk (ft.): 5				Secchi Disk (ft.): 5				Secchi Disk (ft.): 5			
Depth of Bottom Sample: 6 m				Depth of Bottom Sample: 6 m				Depth of Bottom Sample: 6 m			
Weather Conditions: cldy, S wind @10 mph				Weather Conditions: Sunny, S wind@5mph				Weather Conditions: Mostly sry, S wind@5 mph			
		Dissolved				Dissolved				Dissolved	
Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)		Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)		Depth (ft.)	Temperature (celsius)	Oxygen (mg/l)	
Surface	15.3	11.26		Surface	27.1	8.50		Surface			
2.0	14.7	11.27		2.0	26.7	8.31		2.0			
4.0	14.4	11.33		4.0	25.9	7.54		4.0			
6.0	14.3	11.32		6.0	25.8	7.35		6.0			
8.0	14.3	11.28		8.0	25.8	7.27		8.0			
10.0	14.1	11.28		10.0	25.7	7.22		10.0			
12.0	14.0	11.20		12.0	25.7	7.04		12.0			
14.0	13.9	11.13		14.0	25.5	6.81		14.0			
16.0	13.8	10.90		16.0	25.5	6.79		16.0			
18.0	13.1	10.43		18.0	25.1	6.27		18.0			
20.0	Bottom	Bottom		20.0	24.7	5.78		20.0			
22.0				22.0	Bottom	Bottom		22.0			

DO/T temperatures profiles were not taken due to equipment malfunction