Report

2019 Water Quality Monitoring Data

for the

Crowley Hydroelectric Project

FERC Project #2473

Flambeau Hydro, LLC

North Fork of the Flambeau River, Price County, Wisconsin

Respectfully Submitted by:

Angie Stine



429 River Lane, P.O. Box 27 Amasa, Michigan 49903

Phone: 906-822-7889

Summary Flambeau (Crowley) Hydroelectric Project - FERC #2473

2019 marked the fifteenth year of water quality sampling under FERC approved "Water Quality Monitoring Plan Per License Article 406 for the Crowley Hydroelectric Project – FERC Project # 2473 – Flambeau Hydro, LLC. Monitoring was conducted on April 23, July 24, and August 14, 2019. This document contains all of the associated records for the 2019 monitoring along with summary figures and tables in four appendices: (1) Appendix A (Figures 1-4), (2) Appendix B (Tables 1-3), (3) Appendix C (sampling logs by date), and (4) Appendix D (laboratory reports and chains of custody).

A map of the Flambeau (Crowley) Hydroelectric Project is shown in Figure 1 indicating the water quality sampling location.

Monitoring results for 2019 are shown in Table 1. No unusual Temperature (Figure 2) or Dissolved Oxygen (Figure 3) readings were observed. The Secchi depths are shown in Figure 4.

In general, the weather (temperature and rainfall) during 2019 monitoring season appeared slightly warmer in May, June, and July, & August, with lower than normal precipitation in January, March, April, June, July and August, and normal to high precipitation in the months of October, December, February, May, and September (Table 2).

Ice-Out occurred between Agenda and Nine Mile Landing on the North Fork of the Flambeau River sometime during the week beginning April 18, 2019. The Ice-Out sampling event occurred on April 23, 2019. River flow, based on the Crowley Hydroelectric Project records was approximately 5617 cubic feet per second. Sampling occurred between 1256 and 1310. Samples were taken without incident. No unusual D.O. or Temperature readings were observed. Samples for laboratory analysis were delivered to White Water Associates, Inc. laboratory in Amasa, MI on April 24, 2019. White Water Associates, Inc. issued a laboratory report on May 21, 2019. No unusual levels of Chlorophyll *a*, True Color, or Total Phosphorus were noted in the laboratory reports.

River flow, based on Crowley Hydroelectric Project records, was approximately 947 cubic feet per second during the July 24, 2019 sampling event. Sampling occurred between 13:05 and 13:14. Samples were taken without incident. No unusual D.O. or Temperature readings were observed. Samples for laboratory analysis were delivered to White Water Associates, Inc. laboratory in Amasa, MI on July 25, 2019. White Water Associates, Inc. issued a laboratory report on August 27, 2019. No unusual levels of Chlorophyll *a*, True Color, or Total Phosphorus were noted in the laboratory reports.

River flow, based on Crowley Hydroelectric Project records, was approximately 885 cubic feet per second during the August 14, 2019 sampling event. Sampling occurred between 1445 and 1455. Samples were taken without incident. No unusual D.O. or Temperature readings were observed. Samples for laboratory analysis were delivered to White Water Associates, Inc. laboratory in Amasa, MI on August 15, 2019. White Water Associates, Inc. issued a laboratory report on September 13, 2019. No unusual levels of Chlorophyll *a*, True Color, or Total Phosphorus were noted in the laboratory reports.

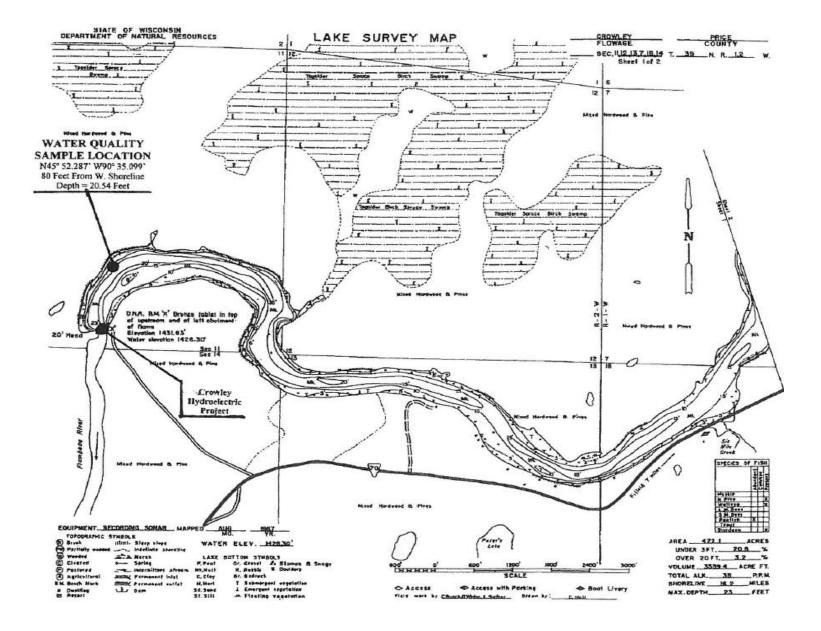
A summary of a comparison between the 2012 thru 2019 (Table 3) sampling results are as follows:

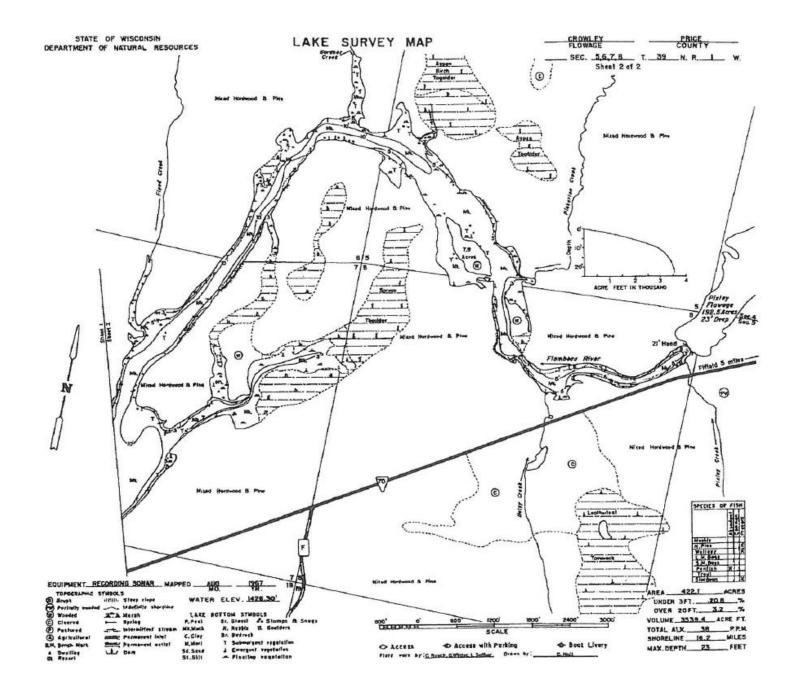
- 1. Water Clarity Secchi decreased Ice Out and August, increased July
- 2. Chlorophyll a –Increased Ice Out and July, Decreased August
- 3. Color Decreased July and August, and increase Ice Out
- 4. Total Phosphorus Increased Ice Out, decreased July and August
- 5. Overall, D.O. –Increased Ice Out, July & August
- 6. Water Temperatures Decreased Ice Out, increased July and August

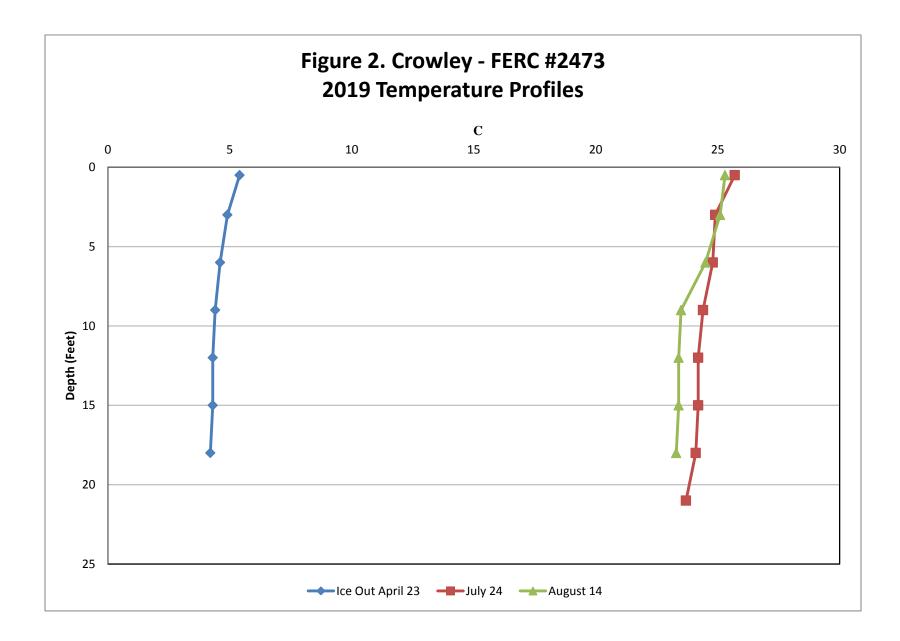
The next scheduled Water Quality Monitoring at the Crowley Hydroelectric Project is set to take place in 2020 beginning with the Ice-Out sampling event.

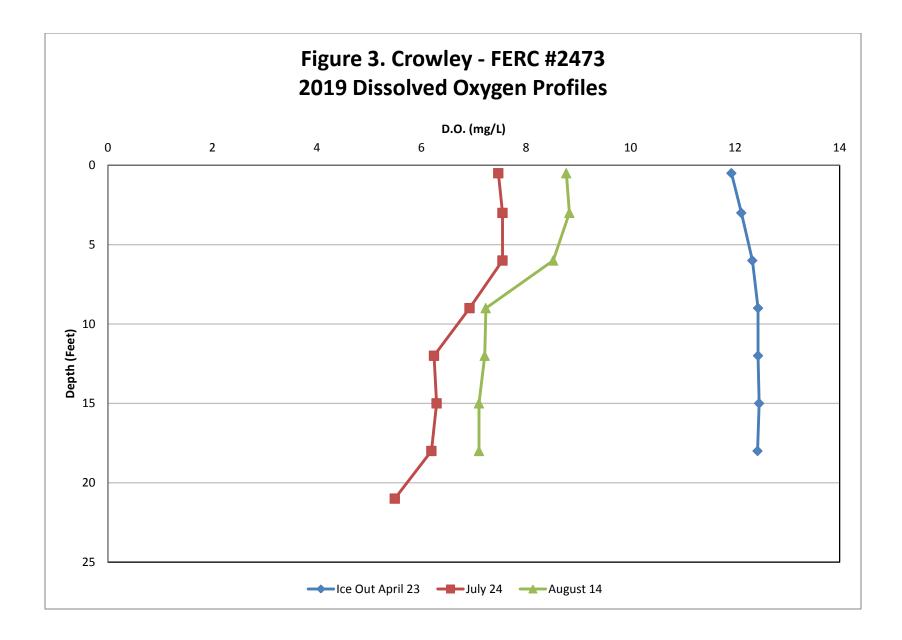
Appendix A – Crowley Hydroelectric Project Figures

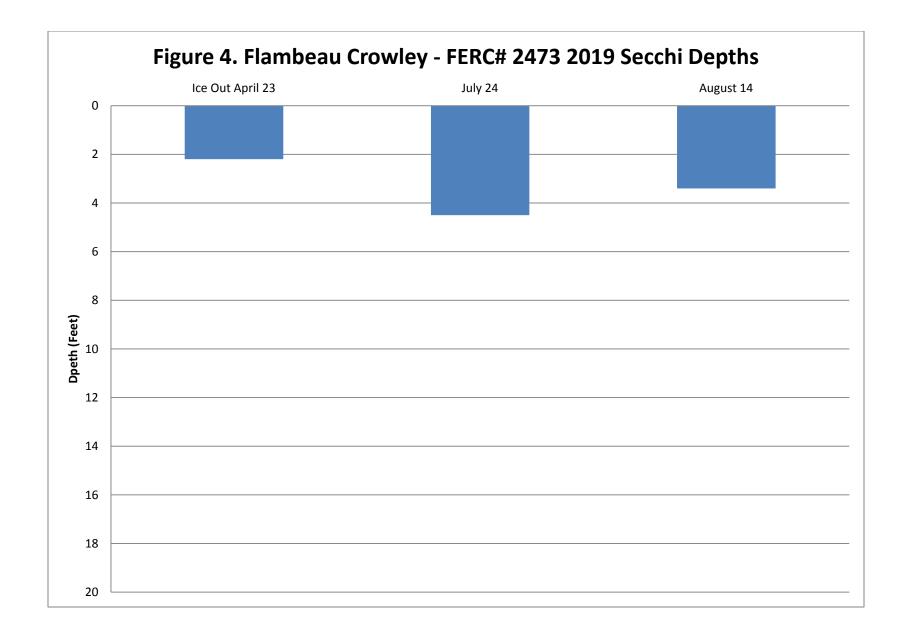
Figure 1. Crowley Hydroelectric Project Map











Appendix B – Crowley Hydroelectric Project Tables

	lce	Out April 2	3, 2019		July 24, 20)19	A	ugust 14,	2019
Project Flow (c.f.s)		5617			947			885	
Dissolved Oxygen	Time	D.O. (mg/L)	Water Temp. (°C)	Time	D.O. (mg/L)	Water Temp. (°C)	Time	D.O. (mg/L)	Water Temp. (°C)
0.5 feet below surface	13:00:49	11.93	5.4	13:08:36	7.47	25.7	14:45:40	8.77	253
3 feet below surface	13:01:42	12.19	4.9	13:09:21	7.55	24.9	14:46:07	8.83	25.1
6 feet below surface	13:02:17	12.33	4.6	13:09:48	7.55	24.8	14:47:12	8.52	24.5
9 feet below surface	13:03:18	12.44	4.4	13:10:40	6.92	24.4	14:48:05	7.23	23.5
12 feet below surface	13:03:57	12.44	4.3	13:11:30	6.24	24.2	14:48:39	7.21	23.4
15 feet below surface	13:06:30	12.46	4.3	13:12:03	6.29	24.2	14:49:04	7.10	23.4
18 feet below surface	13:08:24	12.43	4.2	13:12:23	6.19	24.1	14:49:31	7.10	23.3
21 feet below surface				13:13:49	5.49	23.7			
0.5 meter above bottom	13:10:06	12.39	4.2	13:14:57	5.06	23.74	14:50:34	7.01	23.3
Secchi Disk	Time	Depth (ft)		Time	Depth (ft)		Time	Depth (ft)	
Feet below surface	12:57	2.2		13:18	4.5		14:46	3.4	
Chlorophyll a	Time	μg/L		Time	μg/L	-	Time	μg/L	
3 feet below surface	13:04	2.70		13:10	15.00		14:49	11.00	
Color (True)	Time	C.P.U. Units	LOD	Time	C.P.U. Units	LOD	Time	C.P.U. Units	LOD
3 feet below surface	13:04	45.00	5*	13:10	25.00	5*	14:49	30.00	5*
Total Phosphorus	Time	mg/L	LOD	Time	mg/L	LOD	Time	mg/L	LOD
3 feet below surface	13:04	0.038	0.008*	13:10	0.032	0.008*	14:49	0.028	0.008*
3 feet above bottom	13:00	0.036	0.008*	13:14	0.040	0.008*	14:55	0.025	0.008*
*Considered Method Dete	ection Limit		1	11		1		1	1

Table 1. Crowley Hydroelectric Project – FERC Project # 2473: 2019 Water Quality Sampling Data

				Departure	Heating	Normal				
Month	Highest	Lowest	Average	From	Degree	Degree	Total	Total	Normal	% of Normal
	Temp.	Temp.	Temp.	Normal	Days	Days	Precip.	Snowfall	Precip.	Precipitation
October - 18	66	26	41.0	-2.2	738	678	4.67	1.5	2.85	72
November - 18	44	-7	23.2	-5.6	1247	1088	1.67	12.2	2.09	75
December - 18	44	-9	21.6	6.8	1338	1556	1.77	19.8	1.21	78
January – 19	40	-31	7.6	-2.6	1772	1699	0.80	10.4	0.96	70
February – 19	31	-19	10.6	-4.5	1515	1399	1.88	36.4	0.81	73
March – 19	58	-19	24.9	-1.0	1237	1210	1.19	6.7	1.49	64
April – 19	74	16	40.2	0.06	737	762	2.19	6.5	2.43	65
May – 19	82	28	49.3	-2.1	478	426	3.87	13.3	3.23	65
June – 19	87	40	61.7	1.6	126	179	4.10	0.00	4.23	64
July – 19	89	49	71.1	5.3	4	63	2.63	0.00	3.85	66
August – 19	87	46	66.1	1.8	44	86	2.51	0.00	3.70	66
September - 19	83	37	59.6	4.0	172	298	5.76	0.00	4.11	74

Table 2. 2018/19 Water Year Monthly Temperature and Precipitation for Park Falls, Wisconsin

Source: NOAA/Duluth, MN

Year	Month	Secchi	Chlorophyll a	Color (True)	Total	Total	Low D.O.	High D.O.	Low Water	High Water
		Depth			Phosphorus	Phosphorus			Temp.	Temp.
		Feet	μg/L	C.P.U. Units	Below Surface	Above	mg/L	mg/L	° C	° C
					mg/L	Bottom mg/L				
2012	April	3.30	1.70	120.00	0.041	*	9.30	10.37	8.80	11.80
2013	May	*	*	*	*	*	*	*	*	*
2014	June	3.50	1.70	150.00	0.031	0.029	6.61	6.97	19.00	21.90
2015	April	3.50	5.10	13.00	0.047	0.036	9.52	9.78	9.00	11.70
2016	March	3.60	0.41	40.00	0.030	0.030	11.35	11.61	2.90	3.70
2017	April	3.90	3.40	30.00	0.025	0.028	9.16	9.46	8.20	10.10
2019	May	4.00	5.20	40.00	0.036	0.032	7.65	8.10	14.5	14.8
	April	2.20	2.70	45.00	0.038	0.036	11.93	12.46	4.20	5.40
Minimum	March/April/May/June	2.20	0.41	13.00	0.025	0.028	6.61	6.97	2.90	3.70
Maximum	March/April/May/June	4.00	5.20	150.00	0.047	0.036	11.35	12.46	19.00	21.90
Average	March/April/May/June	3.43	2.89	62.57	0.035	0.032	9.36	9.82	9.51	11.34
	July	3.20	17.00	120.00	0.061	0.087	1.67	7.38	25.30	28.00
2012	July	3.00	5.50	150.00	0.046	0.045	3.83	5.65	24.60	25.20
2013	July	3.25	5.30	130.00	0.046	0.044	5.78	6.38	21.70	22.20
2014	July	4.00	4.60	80.00	0.032	0.034	6.09	6.47	22.80	22.50
2015	July	3.40	6.50	55.00	0.036	0.030	5.60	6.10	22.70	26.50
2016	July	4.00	8.30	35.00	0.033	0.033	5.42	7.36	23.10	26.00
2017	July	4.00	10.00	35.00	0.061	0.043	6.12	7.18	24.70	27.70
2019	July	4.50	15.00	25.00	0.032	0.040	5.06	7.55	23.70	25.70
Minimum	July	3.00	4.60	25.00	0.032	0.030	1.67	5.65	21.70	22.20
Maximum	July	4.50	17.00	150.00	0.061	0.087	6.12	7.55	25.30	28.00
Average	July	3.67	9.03	78.75	0.043	0.045	4.95	6.76	23.58	25.48
	August	3.00	17.00	80.00	0.043	0.042	5.22	9.27	23.70	25.30
2012	August	3.10	4.80	130.00	0.099	0.063	5.65	6.24	20.60	21.80
2013	August	1.30	6.90	100.00	0.047	0.051	5.11	5.65	22.80	24.30
2014	August	3.00	17.00	60.00	0.039	0.030	6.48	7.32	22.70	23.10
2015	August	4.20	15.00	40.00	0.030	0.030	3.57	8.07	23.30	25.70
2016	August	4.20	13.00	30.00	0.032	0.030	5.55	8.71	20.30	22.90
2017	August	4.30	10.00	45.00	0.033	0036	6.02	7.69	23.10	23.10
2019	August	3.40	11.00	30.00	0.028	0.025	7.01	8.83	23.30	25.30
Minimum	August	1.30	4.80	30.00	0.028	0.025	3.57	5.65	20.30	21.80
Maximum	August	4.30	17.00	130.00	0.099	0.063	7.01	9.27	23.70	25.70
Average	August	3.31	11.84	64.38	0.044	0.038	5.58	7.72	22.46	23.95

*no sample taken

Appendix C – Crowley Impoundment Project Sampling Logs

IMPOUNDMENT SAMPLING LOG Water Quality Study Location _____ Hydroelectric Project - FERC # 24 Date: 4.23-19 Pre-Sampling Data: HWL 1427.22 TWL 1409.5 CFS 5617 Sample Location: <u>N45° 51, 247</u> W 40° 35.° Performed by: SXV Time: 12,36 Barometer: 30,15 Air Temp: <u>H6</u>° (Wind Speed: <u>N8mol</u>) Sky Conditions: Precipitation within Last 24 Hours: D.O. Meter Calibration: Instrument Model Used: HQ40D Were the batteries changed?
Yes +No If yes, when were they changed: ____ Battery Status: 95 % Charge Calibration Method: Factory Sampling Depth Profile: Measured depth to bottom of impoundment: 18 Feet Secchi Depth (+ 0.1) Time 12. Feet

Tru	e Color
(3 feet below surfa	ce horizontal sampler)
Lab Sample I.D. # :	
Time: 13;04	

Total I	Phosphorus				
(3 feet below surf	ace horizontal sampler)				
Lab Sample I.D. # :	and the second				
Time , 3, 04	Preservative				
H ₂ SO ₄					

Total	Phosphorus			
(3 feet above bott	om horizontal sampler)			
Lab Sample I.D. # :				
Time 1300	Preservative			
Η ₂ SO ₄				

D	.O. and Te	mperature	Profile
Depth	Time	D.O.	Temperature
(Feet)		(mg/L)	- C
0.5			
below	13.00.49	1160	m c c
surface	15101197	1.75	514
3	13:01,42	12.19	49
6	13.02117	12.33	4.6
9	13.03.18	1244	4,4
12	13:13:57	10 44	43
15	12.06:20	12.46	4.3
18	13:08 24	12.42	4.2
X	1300	12. ges	
24	1.20		
0.5 above	12.1000	1) 95	
bottom	1 1/0 00	12.39	4.2
*10001			And the second sec

*If D.O. is below 5.0 mg/L notify agency and measure D.O. at 1.0 foot intervals if <5.0 mg/L.

Comments:



IMPOUNDMENT SAMPLING LOG Water Quality Study Location Hydroelectric Project – FERC # 💭 Date: 7-124-19 Pre-Sampling Data: HWL 14127.35 TWL 1406.8 CFS 9)[°] 35,094 Sample Location: Performed by: yun hunder Time Barometer: Air Temp: 80 or Wind Speed (SWW 5mp () Sky Conditions: (A 1) Precipitation within Last 24 Hours: D.O. Meter Calibration: Instrument Model Used: HQ40D Were the batteries changed?
 Yes 💢 No If yes, when were they changed: Battery Status: _% Charge Calibration Method: Factory Sampling Depth Profile: Measured depth to bottom of impoundment: 7 Feet Secchi Depth (± 0.1) Time Feet

Comments:

	Chloroph	yll a		
(3 feet belo	w surface h	orizot	ntal sampler)	
Lab Sample I.E	D. #:			
Time 13:10	Quantity (ml) Filtered			
•	1000		In Lab	
Preservative		MgC	O ₃	-

True Color	
(3 feet below surface horizontal sampler)	
Lab Sample I.D. # :	
Time:] 3; []	

Total	Phosphorus			
(3 feet below sur	face horizontal sampler)			
Lab Sample I.D. # :				
Time [3:10]	Preservative			
H ₂ SO ₄				

Total Pl	nosphorus
(3 feet above botto	m horizontal sampler)
Lab Sample I.D. # :	
Time 13:19-	Preservative
	H₂SO4

D.	O. and Te	mperature	Profile
Depth	Time	D.O.	Temperature
(Feet)		(mg/L)	• C • • •
0.5		-	2520
below	13:08:36	7.47	25,7°
surface	10.00		
3	13:09:21	1:55	24.9.
6	13:59.48	7.55	24.8
9	13:10:40	6.92	24,4
12	13:11:30	6.24	24 1
15	13: 12:03	6.29	24.2
18	3:12:33	6.19	24.1
21	19:13:14	5.49	23.7
24			
0.5 above	n.NV	r N	122
bottom	13;14:51	5,04	10,5

*If D.O. is below 5.0 mg/L notify agency and measure D.O. at 1.0 foot intervals if <5.0 mg/L.

Associates, Inc.

IMPOUNDMENT SAMPLING LOG	1
Water Quality Study Location Crowley	Lat
Hydroelectric Project – FERC # 2473	Tin
Date: 8-14-19	Pre
Pre-Sampling Data:	
HWL 427.21 TWL 1406.7 CFS 865	
Sample Location: 145 52 287 470 35.099	Lal Tir
Performed by: Angue Shore Fimme	
Angui Shore Frames Time: 11:15 Barometer: 30.09	La
Air Temp: 47 of Wind Speed: NEIOMOH	Tir
Sky Conditions: Sto Clands	[
Precipitation within Last 24 Hours:	La
D.O. Meter Calibration:	Ti
Instrument Model Used: HQ40D	
Were the batteries changed? 🗖 Yes 💆 No	
If yes, when were they changed:	
Battery Status: <u>70</u> % Charge	s
Calibration Method: Factory	
Sampling Depth Profile: Measured depth to bottom of impoundment: Feet	
Secchi Depth (± 0.1) Time ////////////////////////////////////	
Time 19,44 317 Feet	
Commonto	0.

	Chloroph	nyll a		
(3 feet below	v surface h	orizoi	ntal sampler)	
Lab Sample I.D	. #:			
Time /4:49	Quantity	(ml)	Filtered	
	1000	<u></u> ,	In Lab	
Preservative		MgC	O ₃	

True Color	
(3 feet below surface horizontal sampler)
Lab Sample I.D. # :	
Time: 1 7.49	

Tota	Il Phosphorus
(3 feet below su	rface horizontal sampler)
Lab Sample I.D. # :	
Time /4,2/9	Preservative
	H₂SO4

Tota	l Phosphorus
(3 feet above bo	ttom horizontal sampler)
Lab Sample I.D. # :	
Time /4:55	Preservative
	H ₂ SO ₄

D	.O. and Te	mperature	Profile
Depth	Time	D.O.	Temperature
(Feet)		(mg/L)	° C
0.5			
below	14:4540	8.77	25.3
surface	14 270	0.17	~ · J
3	14.46.07	8.83	25.1
6	14.47.12	852	24.5
9	14.48.05	8.23	23.5
12	14:48:39	201	23.4
15	14,49:04	310	22.9
18	14.49.31	7.10	23.3
21.	e ae		A State of S
24			
0.5 above	14:50:31	7.0/	222
bottom	11,50,01	7.01	23,3

*If D.O. is below 5.0 mg/L notify agency and measure D.O. at 1.0 foot intervals if <5.0 mg/L.

Comments:



Appendix D – Crowley Hydroelectric Project Lab Reports and Chains of Custody

Cover Page



429 River Lane • PO Box 27 Amasa, MI 49903 • Ph (906) 822-7889 • Fax -7977

Client: RWE			WWA Job #: 82125
Project:	Monitoring		
Date Received:	4/24/2019	Date Reported:	5/21/2019
Sample Number	Client Sample ID	Date Sampled	Sample Matrix
82125-001	Upper Flambeau Surface	04/23/19	Water
82125-002	Upper Flambeau Bottom	04/23/19	Water
82125-003	Lower Flambeau Surface	04/23/19	Water
82125-004	Lower Flambeau Bottom	04/23/19	Water
82125-005	Pixley Surface	04/23/19	Water
82125-006	Pixley Bottom	04/23/19	Water
82125-007	Crowley Surface	04/23/19	Water
82125-008	Crowley Bottom	04/23/19	Water

Cover Page..continued

ANALYTICAL REPORT



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Client: RWE

WWA Job #: 82125

Comments (if any):

Key to Laboratory Flags:

*: RPD exceeds limits.

- B: The analyte-was found in the associated blank as well as in the sample.
- J: The quantitation is an estimated value because the result is less than the sample quantitation limit but greater than the detection limit.
- M: A matrix effect was present.
- Q: Batch QC data associated with the analysis does not meet the stated objectives
- H: Indicates analytical holding time exceedance.
- U: The analyte was analyzed for, but not detected.
- P: A manual peak selection or manual integration was performed to correct an erroneous software selection.

ND = Not Detected, MDL = Method Detection Limit, MQL = Method Quantitation Limit ppm = mg/L (liquid) or mg/kg (solid), ppb = ug/L (liquid) or ug/kg (solid) For coliform, Negative = No coliform bacteria detected, Positive = Coliform bacteria detected

Sample Types: S = Solids, DW = Drinking water, D = Dissolved, T = Total, TC = TCLP extract, SP = SPLP extract

All samples were received intact and properly preserved unless otherwise noted. The results reported relate only to the samples tested. This report shall not be reproduced, except in full, without the written approval of this laboratory. The Chain of Custody is attached.

This report satisfies the requirements of your project but has not been prepared to comply with NELAP reporting requirements.

I certify that the data contained in this Final Report has been generated and reviewed in accordance with approved methods and White Water Associates Standard Operating Procedures. Exceptions, if any, are discussed in the accompanying sample narrative. Release of this Final Report is authorized by White Water Associates management, as is verified by the following signature.

Approved By:

WI DNR Lab Certification Number: 999971280 MI DEQ Certification Number: 9306 DoD-ELAP Accreditation Number: 65802 ISO/IEC 17025:2005 Accredited

ANALYTICAL REPORT



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Client: RWE					WWA Jo	b #: 82125			
Project:	Monitoring								
Date Received:	4/24/2019			Date Repo	orted: 5/21/2019				
		Sa	ample	Results					
Sample No. / ID / I	Description / Ma	atrix Result	Flags	Units	Date/Time	Method	MDL	MQL	Analys
82125-001 / Upper	r Flambeau Sur	face / Wate	r						
General Chemis	stry Parameters								
Chlorophyll a		2.9		mg/m3	4/25/2019 13:30	10200H	NA	NA	CA
Color		40		CU	4/24/2019 11:05	2120B	5	5	AH
Total Phosphorus	LL (t)	0.028	J	mg/L	5/15/2019 12:29	365.4	0.008	0.050	NK
82125-002 / Upper	r Flambeau Bot	tom / Water	•						
General Chemis	stry Parameters	l							
Total Phosphorus	LL (t)	0.026	J	mg/L	5/15/2019 12:31	365.4	0.008	0.050	NK
82125-003 / Lowe	r Flambeau Sur	face / Wate	r						
General Chemis	stry Parameters	ł							
Chlorophyll a		4.5		mg/m3	4/25/2019 13:30	10200H	NA	NA	CA
Color		55		CU	4/24/2019 11:05	2120B	5	5	AH
Total Phosphorus	LL (t)	0.036	J	mg/L	5/15/2019 12:32	365.4	0.008	0.050	NK
82125-004 / Lowe	r Flambeau Bot	tom / Wate	r						
General Chemis	stry Parameters	1							
Total Phosphorus	LL (t)	0.039	J	mg/L	5/15/2019 12:32	365.4	0.008	0.050	NK
82125-005 / Pixley	Surface / Wat	er							
General Chemi	stry Parameters	ł							
Chlorophyll a		2.5		mg/m3	4/25/2019 13:30	10200H	NA	NA	CA
Color		45		CU	4/24/2019 11:05	2120B	5	5	AH
Total Phosphorus	LT (+)	0.036	J	mg/L	5/15/2019 12:33	365.4	0 008	0.050	NK

ANALYTICAL REPORT



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Client: RWE					WWA Jo	ob #: 82125			
Project:	Monitoring				<u> </u>				
Date Received:	4/24/2019			Date Rep	orted: 5/21/2019				
·		Sa	ample	Results					
Sample No. / ID /	Description / Ma	trix Result	Flags	Units	Date/Time	Method	MDL	MQL	Analyst
82125-006 / Pixle	y Bottom / Wate	r							
General Chemi	stry Parameters								
Total Phosphorus	-	0.048	J	mg/L	5/15/2019 12:33	365.4	0.008	0.050	NK
82125-007 / Crow	vley Surface / W	ater							
General Chemi	stry Parameters								
Chlorophyll a	·	2.7		mg/m3	4/25/2019 13:30	10200H	NA	NA	CA
Color		45		CU	4/24/2019 11:05	2120B	5	5	AH
Total Phosphorus	LL (t)	0.038	J	mg/L	5/15/2019 12:34	365.4	0.008	0.050	NK
82125-008 / Crow	vley Bottom / Wa	ater							
General Chemi Total Phosphorus	stry Parameters LL (t)	0.036	J	mg/L	5/15/2019 12:35	365.4	0.008	0.050	NK



Courier/shipper:

Date logged in.: 4/24/2019 **Project No.:** 82125 Login person's initials: ER **Client:** RWE Number of coolers: 1 WWA

Project name: Monitoring

- \checkmark 1. Custody seals/original packing tape were intact (if applicable).
- \checkmark 2. Samples are in good condition, i.e. not broken or leaking.
- ✓. 3. Samples were received within holding times.
- \checkmark 4. Samples were received on ice (ice in direct contact with the samples).
- \square 5. Temperature of the samples was between 0-6°C. Temp.: -1

NOTE: Samples not between 0-6°C that are received at the laboratory on the day of sample collections do not require client notification.

- \checkmark 6. Samples matched the Chain of Custody (COC).
- \checkmark 7. Proper containers were used.
- ✓ 8. Samples were collected in White Water lab containers.
- ✓ 9. There is adequate sample volume for requested analyses and QC.
- 10. For water VOC samples, headspace is less than the size of a pea.
- 11. Samples are preserved to the proper pH. Sample bottles and preservation are ✓ noted in LIMS Sample Container Section.
- \checkmark 12. The COC is signed. (either Sampler or Relinquished by)
- 13. Sub-sampling (SS) is required. Bottles created are noted in sample containers section of log-in form.
- \checkmark 14. For Dissolved Analysis (when applicable), samples were filtered in the lab.
- \Box 15. For soil VOCs, methanol preserved samples were received.
- 16. For Soil VOCs, samples were preserved with methanol in the lab.
- 17. Client contact is necessary. Provide documentation below.

COMMENTS/CORRECTIVE ACTION

CLIENT RESPONSE

Note: If hold time, volume, and received on ice or temperature criteria are not met when required by the method, results may not be able to be used for regulatory purposes. Check with your reporting agency for more information.

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Cover Page



429 River Lane • PO Box 27 Amasa, MI 49903 • Ph (906) 822-7889 • Fax -7977

WWA Job #: 84252

Project:	Monitoring		
Date Received:	7/25/2019	Date Reported:	8/27/2019
Sample Number	Client Sample ID	Date Sampled	Sample Matrix
84252-001	Upper Flambeau Surface	07/24/19	Water
84252-002	Upper Flambeau Bottom	07/24/19	Water
84252-003	Lower Flambeau Surface	07/24/19	Water
84252-004	Lower Flambeau Bottom	07/24/19	Water
84252-005	Pixley Surface	07/24/19	Water
84252-006	Pixley Bottom	07/24/19	Water
84252-007	Crowley Surface	07/24/19	Water
84252-008	Crowley Bottom	07/24/19	Water

Cover Page..continued

ANALYTICAL REPORT



429 River Lane 🕯 PO Box 27 Amasa, Mi 49903 • Ph (906) 822-7889 • Fax -7977

Client: RWE

WWA Job #: 84252

Comments (if any):

Key to Laboratory Flags:

*: RPD/RSD exceeds limits.

B: The analyte was found in the associated blank as well as in the sample.

- J: The quantitation is an estimated value because the result is less than the sample quantitation limit but greater than the detection limit.
- M: A matrix effect was present.
- Q: Batch QC data associated with the analysis does not meet the stated objectives
- H: Indicates analytical holding time exceedance.
- P: A manual peak selection or manual integration was performed to correct an erroneous software selection.
- N: For reporting results that are non-target analytes, when requested by client for Mass Spec reporting.

T: Tentatively Identified Compound.

ND = Not Detected, MDL = Method Detection Limit, MQL = Method Quantitation Limit

ppm = mg/L (liquid) or mg/kg (solid), ppb = ug/L (liquid) or ug/kg (solid)

For coliform, Negative = No coliform bacteria detected, Positive = Coliform bacteria detected

Sample Types: S = Solids, DW = Drinking water, D = Dissolved, T = Total, TC = TCLP extract, SP = SPLP extract

All samples were received intact and properly preserved unless otherwise noted. The results reported relate only to the samples tested. This report shall not be reproduced, except in full, without the written approval of this laboratory. The Chain of Custody is attached.

This report satisfies the requirements of your project but has not been prepared to comply with NELAP reporting requirements.

I certify that the data contained in this Final Report has been generated and reviewed in accordance with approved methods and White Water Associates Standard Operating Procedures. Exceptions, if any, are discussed in the accompanying sample narrative. Release of this Final Report is authorized by White Water Associates management, as is verified by the following signature.

Approved By:

WI DNR Lab Certification Number: 999971280 MI EGLE Certification Number: 9306 DoD-ELAP Accreditation Number: 65802 ISO/IEC 17025:2005 Accredited

ANALYTICAL REPORT



429 River Lane • PO Box 27 Amasa, MI 49903 • Ph (906) 822-7889 • Fax -7977

Client: RWE				WWA Jo	b #: 84252			
Project: Mor	nitoring							
Date Received: 7/25	5/2019		Date Repor	eted: 8/27/2019				
	Sa	ample I	Results		· _			
Sample No. / ID / Descri	iption / Matrix Result	Flags	Units	Date/Time	Method	MDL	MQL	Analys
84252-001 / Upper Flam	nbeau Surface / Wate	r						
General Chemistry P	arameters							
Chlorophyll a	5.9		mg/m3	7/25/2019 15:20	10200H	NA	NA	CA
Color	25		CU	7/25/2019 13:00	2120B	5	5	GG
Total Phosphorus LL (t)	0.017	J	mg/L	8/20/2019 12:40	365.4	0.008	0.050	NK
84252-002 / Upper Flar	nbeau Bottom / Water	• .						
General Chemistry P	arameters							
Total Phosphorus LL (t)	0.016	J	mg/L	8/20/2019 12:49	365.4	0.008	0.050	NK
84252-003 / Lower Flan	mbeau Surface / Wate	r						
General Chemistry P	arameters							
Chlorophyll a	3.9		mg/m3	7/25/2019 15:20	10200H	NA	NA	CA
Color	20		CU	7/25/2019 13:00	2120B	5	5	GG
Total Phosphorus LL (t)	0.030	J	mg/L	8/20/2019 12:50	365.4	0.008	0.050	NK
84252-004 / Lower Flan	mbeau Bottom / Wate	r						
General Chemistry P	arameters			-				
Total Phosphorus LL (t)	0.026	J	mg/L	8/20/2019 12:50	365.4	0.008	0.050	NK
84252-005 / Pixley Surf	face / Water							
General Chemistry P	arameters							
Chlorophyll a	12		mg/m3	7/25/2019 15:20	10200H	NA	NA	CA
Color	25		CU	7/25/2019 13:00	2120B	5	5	GG
Total Phosphorus LL (t)	0,041	J	mg/L	8/20/2019 12:51	365.4	0 000	0.050	NK

ND = Not Detected, MDL = Method Detection Limit, MQL = Method Quantitation Limit, ppm = mg/L (liquid) or mg/kg (solid), ppb = ug/L (liquid) or ug/kg (solid)



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Client: RWE					WWA Jo	b #: 84252			
Project:	Monitoring					· · · · ·			
Date Received:	7/25/2019			Date Repe	orted: 8/27/2019				
		Sa	ample	Results					
Sample No. / ID /	Description / Ma	trix Result	Flags	Units	Date/Time	Method	MDL	MQL	Analyst
84252-006 / Pixle	y Bottom / Wate	r							
General Chemi	stry Parameters								
Total Phosphorus	•	0.034	J	mg/L	8/20/2019 12:52	365.4	0.008	0.050	NK
84252-007 / Crow	vley Surface / Wa	ater							
General Chemi	istry Parameters								
Chlorophyll a		15		mg/m3	7/25/2019 15:20	10200H	NA	NA	CA
Color		25		CU	7/25/2019 13:00	2120B	5	5	GG
Total Phosphorus	LL (t)	0.032	J	mg/L	8/20/2019 12:54	365.4	0.008	0.050	NK
84252-008 / Crov	vley Bottom / Wa	iter							
General Chemi	istry Parameters								
Total Phosphorus	•	0.040	J	mg/L	8/20/2019 12:54	365.4	0.008	0.050	NK

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		A	Login Checklist
		WHITE WAT Associates,	'ER
		ASSOCIATES,	INC.
Project No.:	84252	Date logged in.: 7/25/2019	Login person's initials: ER
Client:	RWE		Number of coolers: 1
Project name:	Monitoring	5	Courier/shipper: WWA
1. Custody	/ seals/origin	al packing tape were intact (if a	pplicable).
✓ 2. Samples	s are in good	l condition, i.e. not broken or lea	king.
✓ 3. Samples	s were receiv	ved within holding times.	NOTES on #4:
✓ 4. Sample	s were receiv	ved on ice (in direct contact with	the samples).
✓ 5. Temper	ature of the	samples was between 0-6°C. Ter	mp.: 0
	-	etween 0-6°C that are received a do not require client notification	• •
6. Sample	s matched th	e Chain of Custody (COC).	
✓ 7. Proper	containers v	vere used.	
8. Sample	s were collec	cted in White Water lab containe	ers.
✓ 9. There is	s adequate s	ample volume for requested ana	lyses and QC.
10. For wa	ater VOC sa	mples, headspace is less than the	e size of a pea.
^	~	rved to the proper pH. Sample b e Container Section.	ottles and preservation are
✓ 12. The C	OC is signed	l. (either Sampler or Relinquishe	ed by)
	ampling (SS) log-in form.) is required. Bottles created are	noted in sample containers
✓ 14. For Di	issolved Ana	llysis (when applicable), samples	were filtered in the lab.
15. For so	il VOCs, me	ethanol preserved samples were	received.
🗌 16. For Sc	oil VOCs, sa	mples were preserved with meth	anol in the lab.

□ 17. Client contact is necessary. Provide documentation below.

COMMENTS/CORRECTIVE ACTION

CLIENT RESPONSE

Note: If hold time, volume, and received on ice or temperature criteria are not met when required by the method, results may not be able to be used for regulatory purposes. Check with your reporting agency for more information.

	(VCUH 712019 Version 160504	5
nse):	84252	CHAIN-OF-CUSTODT RECORD	200		ב ש א	חאח		Г				ШТТ	ΈŴ	WHITE WATER		
CLIENT NAME / BILL TO		EMAIL ADDRESS						. <u>.</u>			AS	SOC	ASSOCIATES,	s, Inc.		
ADDRESS		TELEPHONE						1	429 River Amasa, N	429 River Lane, P.O. Box 27 Amasa, Michigan 49903	Box 27 103		Phone: (9 Web: whi	Phone: (906) 822-7889, Fax -7977 Web: white-water-associates.com	ax -7977 ates.com	
CITY STATE	ZIP	CONTRACT / PO / PROJECT	PROJECT	NAME / WSSN#	#NSSN#			ANAI	YSIS T	ANALYSIS TYPE REQUESTED (Attach list if neeeded)	ESTED	Attach li	t if need	_		
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SAMPLER NAME (print first/last name)		COUNTY OF LOCATION		PAGE	۔ ا	Indicat one p	Indicate if more than one page of COC records used	E.07				····			email mail	
ATURE			Cher upon bottle	Check off preservati upon arrival and indi bottles. WWA databu preservation details.	indicate for indicate 1 latabase or itails.	Check off preservatives for each bottle upon arrival and indicate total number of bottles. WWA database contains bottle preservation details.	te of te	6U1)	5			<u></u>		Unless otherv water report	Unless otherwise noted, drinking water report cooles are sent to	
		SAMPLE MATRIX		NTAINEF	S / PRE	CONTAINERS / PRESERVATIVES		Ł	pt					MDEQ ar	MDEQ and Health Dept.	
					·····	HOE		2./0	1]]	-0-77				REMARKS instructions p	REMARKS (Note any special instructions provided by client or	
Containers for each sample may DATE be combined on one line.		soil Sed. Sed.	lone Jther: _	HNO3 HSSO¢	HCI	HOßb sV\>AnΣ	oidT sV IN IstoT	10	7	7-7				conditions o WWA lab str residu	conditions of receipt noted by WWA lab staff. Also note any residual chlorine.)	
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Pixley Surface	12:30		\times				. <u>m</u>	X	$\frac{\times}{\times}$							
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Relinquished by:	Date: 7/24/19	Time: Received by:	I by:				Date:		Time:	Comme	I I its/Sam	le temp.	Comments/Sample temp. on receipt	_	Packing: Ice Cooler	
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Cover Page



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Client: RWE WWA Job #: 84707 **Project:** Monitoring 8/15/2019 Date Received: **Date Reported:** 9/13/2019 Sample Number **Client Sample ID** Date Sampled **Sample Matrix** 84707-001 08/14/19 Upper Flambeau Surface Water Upper Flambeau Bottom Water 84707-002 08/14/19 84707-003 Lower Flambeau Surface 08/14/19 Water 84707-004 Lower Flambeau Bottom 08/14/19 Water 84707-005 Pixley Surface Water 08/14/19 Pixley Bottom Water 84707-006 08/14/19 84707-007 Crowley Surface 08/14/19 Water 84707-008 Crowley Bottom 08/14/19 Water

Cover Page..continued



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Client: RWE

WWA Job #: 84707

Comments (if any):

Key to Laboratory Flags:

*: RPD/RSD exceeds limits.

- B: The analyte was found in the associated blank as well as in the sample.
- J: The quantitation is an estimated value because the result is less than the sample quantitation limit but greater than the detection limit.
- M: A matrix effect was present.
- Q: Batch QC data associated with the analysis does not meet the stated objectives
- H: Indicates analytical holding time exceedance.
- P: A manual peak selection or manual integration was performed to correct an erroneous software selection.
- N: For reporting results that are non-target analytes, when requested by client for Mass Spec reporting.
- T: Tentatively Identified Compound.

ND = Not Detected, MDL = Method Detection Limit, MQL = Method Quantitation Limit

ppm = mg/L (liquid) or mg/kg (solid), ppb = ug/L (liquid) or ug/kg (solid)

For coliform, Negative = No coliform bacteria detected, Positive = Coliform bacteria detected

Sample Types:

S = Solids, DW = Drinking water, D = Dissolved, T = Total, TC = TCLP extract, SP = SPLP extract

All samples were received intact and properly preserved unless otherwise noted. The results reported relate only to the samples tested. This report shall not be reproduced, except in full, without the written approval of this laboratory. The Chain of Custody is attached.

This report satisfies the requirements of your project but has not been prepared to comply with NELAP reporting requirements.

I certify that the data contained in this Final Report has been generated and reviewed in accordance with approved methods and White Water Associates Standard Operating Procedures. Exceptions, if any, are discussed in the accompanying sample narrative. Release of this Final Report is authorized by White Water Associates management, as is verified by the following signature.

Approved By:

WI DNR Lab Certification Number: 999971280 MI EGLE Certification Number: 9306 DoD-ELAP Accreditation Number: 65802 ISO/IEC 17025:2005 Accredited

ANALYTICAL REPORT



429 River Lane • PO Box 27 Amasa, MI 49903 • Ph (906) 822-7889 • Fax -7977

Client: RWE		1				b #: 84707			
Project:	Monitoring								
Date Received:	8/15/2019			Date Repo	orted: 9/13/2019				
		Sa	mple	Results					
Sample No. / ID / I	Description / Ma	atrix Result	Flags	Units	Date/Time	Method	MDL	MQL	Analys
84707-001 / Upper	r Flambeau Sur	face / Water	•						
General Chemis	stry Parameters								
Chlorophyll a	U III	18		mg/m3	8/22/2019 15:10	10200H	NA	NA	AH
Color		30		CU	8/15/2019 13:45	2120B	5	5	AH
Total Phosphorus	LL (t)	0.018	J	mg/L	8/20/2019 13:26	365.4	0.008	0.050	NK
84707-002 / Upper	r Flambeau Bot	tom / Water	•						
General Chemis	stry Parameters								
Total Phosphorus	LL (t)	0.017	J	mg/L	8/20/2019 13:28	365.4	0.008	0.050	NK
84707-003 / Lowe	r Flambeau Sur	face / Wate	r						
General Chemis	stry Parameters	1							
Chlorophyll a	-	6.9		mg/m3	8/22/2019 15:10	10200H	NA	NA	AH
Color		35		CU	8/15/2019 13:45	2120B	5	5	AH
Total Phosphorus	LL (t)	0.031	J	mg/L	8/20/2019 13:28	365.4	0.008	0.050	NK
84707-004 / Lowe	r Flambeau Bot	tom / Water	•						
General Chemis	stry Parameters	5							
Total Phosphorus	-	0.027	J	mg/L	8/20/2019 13:29	365.4	0.008	0.050	NK
84707-005 / Pixley	y Surface / Wat	er							
General Chemis	stry Parameters	ĥ							
Chlorophyll a		7.4		mg/m3	8/22/2019 15:10	10200H	NA	NA	AH
Color		40		CU	8/15/2019 13:45	2120B	5	5	AH
Total Phosphorus	TT (1)	0.025	J	mg/L	8/20/2019 13:29	365.4	0.000	0.050	NK

ND = Not Detected, MDL = Method Detection Limit, MQL = Method Quantitation Limit, ppm = mg/L (liquid) or mg/kg (solid), ppb = ug/L (liquid) or ug/kg (solid)

ANALYTICAL REPORT



429 River Lane • PO Box 27 Amasa, MI 49903 • Ph (906) 822-7889 • Fax -7977

Client: RWE					WWA Jo	ob #: 84707			
Project:	Monitoring				***********			<u>, , , , , , , , , , , , , , , , , , , </u>	
Date Received:	8/15/2019		-	Date Rep	orted: 9/13/2019				
		Sa	ample	Results					
Sample No. / ID /	Description / Ma	trix Result	Flags	Units	Date/Time	Method	MDL	MQL	Analyst
84707-006 / Pixle	y Bottom / Wate	r							
General Chemi	istry Parameters								
Total Phosphorus	-	0.025	J	mg/L	8/20/2019 13:30	365.4	0.008	0.050	NK
84707-007 / Crov	vley Surface / W	ater							
General Chemi	istry Parameters								
Chlorophyll a	·	11		mg/m3	8/22/2019 15:10	10200H	NA	NA	AH
Color		30		CU	8/15/2019 13:45	2120B	5	5	AH
Total Phosphorus	s LL (t)	0.028	J	mg/L	8/20/2019 13:30	365.4	0.008	0.050	NK
84707-008 / Crov	vley Bottom / Wa	ater							
General Chem	istry Parameters								
Total Phosphorus	s LL (t)	0.025	J	mg/L	8/20/2019 13:32	365.4	0.008	0.050	NK

			4.		Log	gin Checklist
			WHITE	E WATE Ates, In	R	
			ASSOCI	ATES, IN	C.	
Proj	ect No.:	84707	Date logged in.: 8/	15/2019	Login person's	initials: ER
Clie	nt:	RWE			Number of cool	lers: 1
Proj	ect name:	Monitoring			Courier/shippe	er: WWA
	1. Custody	seals/origina	d packing tape were	intact (if appl	icable).	
	2. Samples	are in good	condition, i.e. not bro	ken or leakin	g.	
	3. Samples	were receive	ed within holding tim	es.		NOTES on #4:
\checkmark	4. Samples	were receive	ed on ice (in direct co	ntact with the	samples).	
<	5. Tempera	ature of the s	amples was between	0-6°C. Temp.	: 1	
		-	tween 0-6°C that are o not require client n		ie laboratory on	the day
\checkmark	6. Samples	matched the	e Chain of Custody (C	COC).		
\checkmark	7. Proper c	containers w	ere used.			
\checkmark	8. Samples	were collect	ed in White Water la	b containers.		
✓	9. There is	adequate sa	mple volume for requ	lested analyse	s and QC.	
	10. For wa	ter VOC san	nples, headspace is le	ss than the siz	e of a pea.	
	-	~	ved to the proper pH. Container Section.	. Sample bottl	es and preserva	tion are
\checkmark	12. The CO	OC is signed.	(either Sampler or R	kelinquished b	y)	
		mpling (SS) i og-in form.	is required. Bottles ci	reated are not	ed in sample co	ntainers
\checkmark	14. For Dis	solved Anal	ysis (when applicable), samples we	re filtered in the	e lab.
	15. For soi	l VOCs, met	hanol preserved sam	ples were rece	eived.	
	16. For Soi	il VOCs, sam	ples were preserved	with methano	ol in the lab.	
	17. Client	contact is ne	cessary. Provide docu	imentation be	low.	
C	OMMENTS	S/CORRECT	TIVE ACTION			
	#3.19081	5 8:50ER co	lor received past hold	time		
C	LIENT RES	SPONSE				

Note: If hold time, volume, and received on ice or temperature criteria are not met when required by the method, results may not be able to be used for regulatory purposes. Check with your reporting agency for more information.

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