Appendix C:
Irasville Growth Center Stormwater Quality Monitoring

LAMOUREUX & DICKINSON
Consulting Engineers, Inc.
14 Morse Drive
Essex Junction, Vermont 05452
(802) 878-4450
Fax (802) 878-3135

Gail

25 July 2002

Ms. Dee Pierce, Executive Director
Mad River Valley Planning District
P.O. Box 471
Waitsfield, Vermont 05673

RE: Irasville Growth Center

Dear Dee,

The weather finally cooperated for us and the first round of stormwater runoff samplings were completed by Brian Tremback on May 14, 2002 at the locations designated in the Wetland Functional Evaluation Report dated December 2001.

Upon receiving the results from the stormwater runoff samplings, we have put together a summary analysis with the data for your information.

Please call if you have any questions.

Sincerely,

Gail Henderson-King

Gail Henderson-King, ASLA

Enclosure

cc: Bob White, ORW

P:\1998\98082\98082.02\DP.stormwatermonitoring.7.02.doc

LAMOUREUX & DICKINSON
Consulting Engineers, Inc.
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Irasville Growth Center
Stormwater Quality Monitoring

Introduction. Stormwater runoff samples were collected in Irasville on May 14, 2002 during a several day period of light to moderate rain. Sampling locations were as follows:

Sampling Location #1 (North Tributary): The small stream to the northeast of Mad River Canoe near the Waitsfield - Fayston town line. This is one of the tributaries to the small stream that flows across Irasville and empties into the Cinema Pond. This location is upstream of Irasville and provides a background sample.

Sampling Location #2 (South Tributary): A vegetated drainageway to the southwest of Mad River Canoe near the Waitsfield - Fayston town line. This is one of the tributaries to the small stream that flows across Irasville and empties into the Cinema Pond. This location is upstream of Irasville and provides a background sample.

Sampling Location #3 (Storm Sewer Outfall): The Mad River Green storm sewer outfall northeast of the Grand Union parking lot. This storm sewer receives runoff from the Grand Union parking lot and some of the adjacent roadways.

Sampling Location #4 (Main Stream): The small stream just above the culvert leading under Carroll Road and into Cinema Pond. This stream receives flow from the two tributaries at Locations #1 and 2, the stormwater outfall at Location #3, and includes runoff from most of Irasville west of Route 100.

Sampling Location #5 (Cinema Pond Outlet): The outlet of Cinema Pond. On the sampling date, a beaver pond near the outlet had nearly submerged the pipe making it impossible to collect a representative sample. The sample was taken near the outlet structure in the pond.

Sampling Location #6 (North Wetland): The small stream that drains a wetland area southeast of the shopping center on the east side of Route 100. Runoff from the shopping center sheets over the escarpment into the wetland.

Sampling Location #7 (South Wetland): The small stream that drains a wetland area south of the cemetery. The wetland receives some runoff from above the escarpment and from a condominium development to the south.

Results. Stormwater samples were analyzed by Endyne, Inc. in Williston, Vermont. A discussion of the results follows.

E. coli: Background levels of E. coli (Sampling Locations #1 and 2) were both 4 MPN/100 ml. Higher levels (95 MPN/100 ml) were detected in the storm sewer outfall (Sampling Location #3) and in the main stream near the inlet of the Cinema Pond (Sampling Location #4). A sample collected near the pond outlet (Sampling Location #5) showed an increase to 145 MPN/100 ml. Surface water collected from the channels that drain two wetland areas to the east of Route 100 into the Mad River had levels at 19 MPN/100 ml (Sampling Location #6) and 16 MPN/100 ml (Sampling Location #7).

Total Phosphorus: Six of samples showed very consistent phosphorus levels ranging from 0.020 to 0.026 mg/L. A sample collected at the storm sewer outfall (Sampling Location #3) had levels approximately twice the other samples, 0.054 mg/L.

Total Suspended Solids: The highest levels of suspended solids were observed from Sampling Location #1 (North Tributary – background sample) and from Sampling Locations #3, 4, and 5, the three locations. Values ranged from 13 to 17 mg/L. The lowest values were obtained from Sampling Locations #2, 6, and 7 and ranged from < 2 mg/L to 8 mg/L. These last three locations were from stormwater that had flowed through dense stands of wetland vegetation.

Analytical results for stormwater quality samples collected on May 14, 2002

Sampling Location	E. coli (MPN/100 ml)	Total Phosphorus (mg/L)	Total Susp. Solids (mg/L)	Temp. (EC)	Streamflow (ft/sec)
1	4	0.026	16	8	3.0
2	4	0.025	< 2	8	
3	95	0.054	17	10	
4	95	0.023	12	9	4.0
5	145	0.022	13	9	
6	19	0.020	6	10	
7	16	0.021	8	11	0.4
Duplicate	78	0.024	12		
(Location 4)					
Equipment	< 1	< 0.002	< 2		
Blank					

Attachments. a) Sampling location plan
b) Laboratory Report from Endyne, Inc.

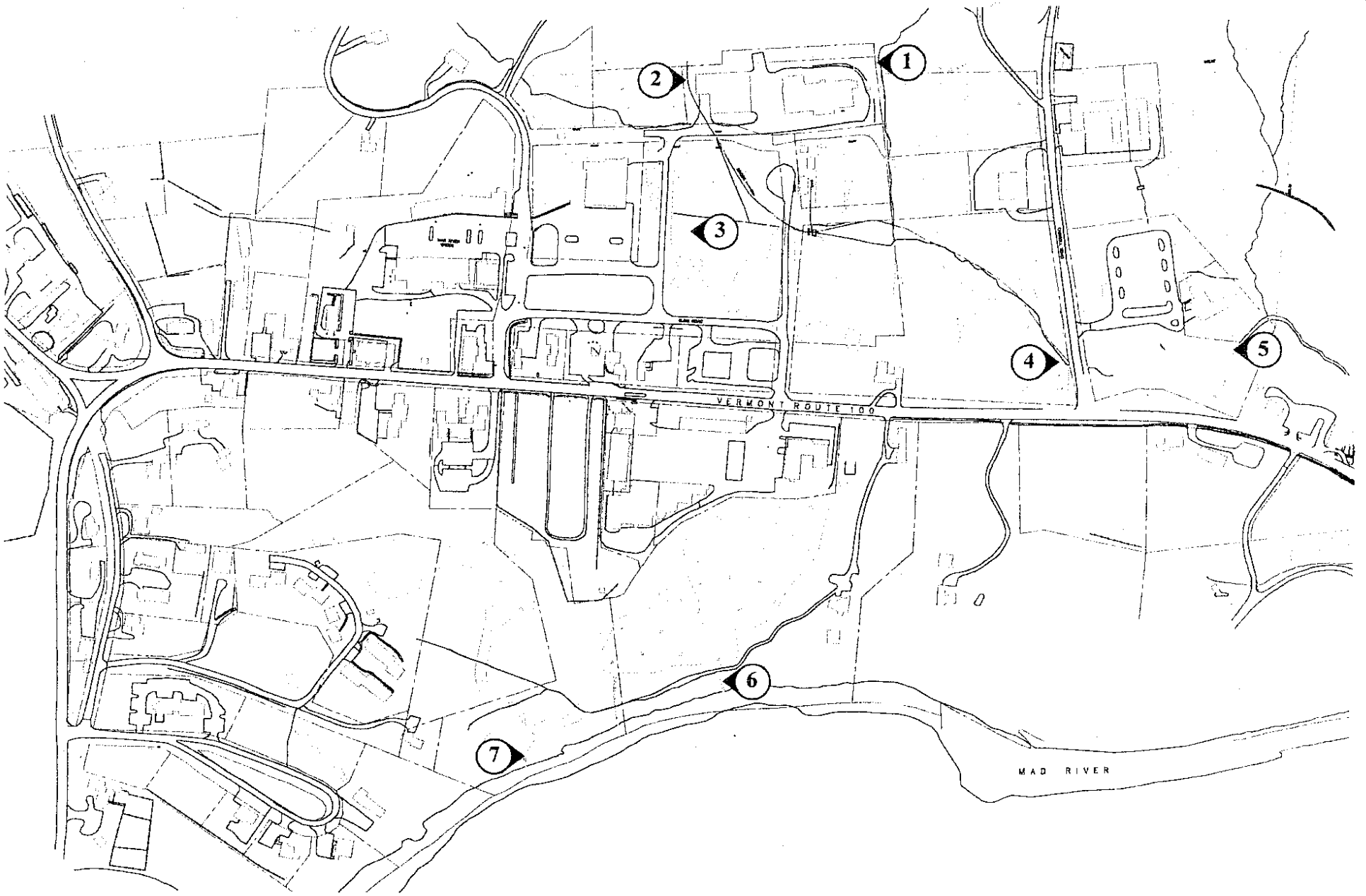

FIGURE 2. Stormwater runoff sampling locations in Irasville Growth Center.

ENDYNE, INC.

Laboratory Services

160 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

Larnoureax & Dickinson
14 Morse Dr.
Essex Jct., VT 05452
Attn: Brain Tremback

PROJECT: Irasville
ORDER ID: 17714
RECEIVE DATE: May 14, 2002
REPORT DATE: May 28, 2002

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Different groups of analyses may be reported under separate cover.

All samples were prepared and analyzed by requirements outlined in the referenced methods and within the specified holding times, unless otherwise specified.

All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced methods.

Blank contamination was not observed at levels affecting the analytical results.

Analytical method precision and accuracy was monitored by laboratory control standards which include matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits, unless otherwise noted.

Asterisk in results column indicates sample was reanalyzed past EPA method specified holding time.

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

Enclosures

ENDYNE, INC.

Laboratory Services

160 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

CLIENT: Lamoureax & Dickinson
PROJECT: Irasville
REPORT DATE: May 28, 2002

ORDER ID: 17714
DATE RECEIVED: May 14, 2002
SAMPLER: BT

Ref. Number: 192886 Site: 1 Date Sampled: May 14, 2002 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
E. coli	4.	MPN/100 ml	SM 9223B	5/14/02	503

Ref. Number: 192887 Site: 2 Date Sampled: May 14, 2002 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
Total Phosphorous	0.025	mg/L	EPA 365.1	5/17/02	444

Ref. Number: 192888 Site: 3 Date Sampled: May 14, 2002 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
Solids, Total Susp.	< 2.*	mg/L	EPA 160.2	5/22/02	425

Ref. Number: 192889 Site: 4 Date Sampled: May 14, 2002 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
E. coli	95.	MPN/100 ml	SM 9223B	5/14/02	503

Ref. Number: 192890 Site: 5 Date Sampled: May 14, 2002 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
Total Phosphorous	0.054	mg/L	EPA 365.1	5/17/02	444

Ref. Number: 192891 Site: 6 Date Sampled: May 14, 2002 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
Solids, Total Susp.	17.*	mg/L	EPA 160.2	5/22/02	425

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Ref. Number: 192892 Site: 7 Date Sampled: May 14, 2002 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
E. coli	4.	MPN/100 ml	SM 9223B	5/14/02	503

Ref. Number: 192893 Site: 8 Date Sampled: May 14, 2002 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
Total Phosphorous	0.026	mg/L	EPA 365.1	5/17/02	444

Ref. Number: 192894 Site: 9 Date Sampled: May 14, 2002 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
Solids, Total Susp.	16.*	mg/L	EPA 160.2	5/22/02	425

Ref. Number: 192895 Site: 10 Date Sampled: May 14, 2002 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
E. coli	95.	MPN/100 ml	SM 9223B	5/14/02	503

Ref. Number: 192896 Site: 11 Date Sampled: May 14, 2002 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
Total Phosphorous	0.023	mg/L	EPA 365.1	5/17/02	444

Ref. Number: 192897 Site: 12 Date Sampled: May 14, 2002 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
Solids, Total Susp.	12.*	mg/L	EPA 160.2	5/22/02	425

Ref. Number: 192898 Site: 13 Date Sampled: May 14, 2002 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
E. coli	78.	MPN/100 ml	SM 9223B	5/14/02	503

ENDYNE, INC.

Laboratory Services

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Ref. Number: 192899 Site: 14 Date Sampled: May 14, 2002 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
Total Phosphorous	0.024	mg/L	EPA 365.1	5/17/02	444

Ref. Number: 192900 Site: 15 Date Sampled: May 14, 2002 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
Solids, Total Susp.	12.*	mg/L	EPA 160.2	5/22/02	425

Ref. Number: 192901 Site: 16 Date Sampled: May 14, 2002 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
E. coli	145.	MPN/100 ml	SM 9223B	5/14/02	503

Ref. Number: 192902 Site: 17 Date Sampled: May 14, 2002 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
Total Phosphorous	0.022	mg/L	EPA 365.1	5/17/02	444

Ref. Number: 192903 Site: 18 Date Sampled: May 14, 2002 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
Solids, Total Susp.	13.*	mg/L	EPA 160.2	5/22/02	425

Ref. Number: 192904 Site: 19 Date Sampled: May 14, 2002 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
E. coli	< 1.	MPN/100 ml	SM 9223B	5/14/02	503

Ref. Number: 192905 Site: 20 Date Sampled: May 14, 2002 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
Total Phosphorous	< 0.002	mg/L	EPA 365.1	5/17/02	444

ENDYNE, INC.
Laboratory Services
160 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

Ref. Number: 192906 Site: 21 Date Sampled: May 14, 2002 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
Solids, Total Susp.	< 2.*	mg/L	EPA 160.2	5/22/02	425

Ref. Number: 192907 Site: 22 Date Sampled: May 14, 2002 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
E. coli	16.	MPN/100 ml	SM 9223B	5/14/02	503

Ref. Number: 192908 Site: 23 Date Sampled: May 14, 2002 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
Total Phosphorous	0.021	mg/L	EPA 365.1	5/17/02	444

Ref. Number: 192909 Site: 24 Date Sampled: May 14, 2002 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
Solids, Total Susp.	8.*	mg/L	EPA 160.2	5/22/02	425

Ref. Number: 192910 Site: 25 Date Sampled: May 14, 2002 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
E. coli	19.	MPN/100 ml	SM 9223B	5/14/02	503

Ref. Number: 192911 Site: 26 Date Sampled: May 14, 2002 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
Total Phosphorous	0.020	mg/L	EPA 365.1	5/17/02	444

Ref. Number: 192912 Site: 27 Date Sampled: May 14, 2002 Time: NI

Parameter	Result	Unit	Method	Analysis Date	Analyst
Solids, Total Susp.	6.*	mg/L	EPA 160.2	5/22/02	425

ENDYNE, INC.
160 James Brown Drive
Williston, Vermont 05495
(802) 879-4333

CHAIN-OF-CUSTODY-RECORD

37929

Special Reporting Instructions: _____

Project Name: Irasville	Reporting Address: Lamoureux + Dickinson, 14 Morse Dr, Essex Jct, VT 05452	Billing Address: -same-
Endyne Order ID: (Lab Use Only) 17714 (-O / -I / -S)	Company:	Sampler Name: Brian Trembeck
	Contact Name/Phone #: Brian Trembeck/ 802-878-4450	Phone #: 802-878-4450

Ref # (Lab Use Only)	Sample Identification	Matrix	GRAB	COMP	Date/Time	Sample Containers No.	Sample Containers Type/Size	Field Results/Remarks	Analysis Required	Sample Preservation	Rush
192886	1		X		5-14-02	1	4oz pl	SM9223B → ~~RCRA8 Metals~~			
887	2		X			1	glass		EPA 365.1		
888	3		X			1	16oz pl		EPA 160.2		
889	4		X			1	4oz pl	SM9223B			
890	5		X			1	glass		EPA 365.1		
891	6		X			1	16oz pl		EPA 160.2		
892	7		X			1	4oz pl	SM 9223B			
893	8		X			1	glass		EPA 365.1		
894	9		X			1	16oz pl		EPA 160.2		
895	10		X		↓	1	4oz p	SM 9223B			

Relinquished by:	Date/Time	Received by:	Date/Time	Received by:	Date/Time
Brian Trembeck	5/14/02 15:06	Florence	5/14/02 3:10		

New York State Project: Yes _____ No _____

Requested Analyses

1	pH	6	TKN	11	Total Solids	16	Sulfate	21	1664 TPH/FOG	26	8270 PAH
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	8015 GRO	27	PP13 Metals
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	8015 DRO	28	~~RCRA8 Metals~~
4	Nitrite N	9	BOD	14	Turbidity	19	8021B	24	8260/8260B	29	E. coli
5	Nitrate N	10	Alkalinity	15	Conductivity	20	8010/8020	25	8270 B/N or Acid	30	
31	Metals (As Is, Total, Diss.) Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Tl, V, Zn										
32	TCLP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides)					33					
34	Other										

LAB USE ONLY
Delivery: Client
Temp:
Comment:

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ENDYNE, INC.
160 James Brown Drive
Williston, Vermont 05495
(802) 879-4333

CHAIN-OF-CUSTODY-RECORD

37931

Special Reporting Instructions:

Project Name: Irasville	Reporting Address: Lamoureux & Dickinson, 14 Morse Dr, Essex Jct, VT 05452	Billing Address: -same-
Endyne Order ID: (Lab Use Only) 17714	Company:	Sampler Name: Brian Trembach
-O / -I / -S	Contact Name/Phone #: Brian Trembach/ 802-878-4450	Phone #: 802-878-4450

Ref # (Lab Use Only)	Sample Identification	Matrix	GRAB	COMP	Date/Time	Sample Containers No.	Sample Containers Type/Size	Field Results/Remarks	Analysis Required	Sample Preservation	Rush
896	11		X		5-14-02	1	glass		EPA 365.1		
897	12		X			1	16oz pl		EPA 160.2		
898	13		X			1	4oz pl	SM	9223B		
899	14		X			1	glass		EPA 365.1		
900	15		X			1	16oz pl		EPA 160.2		
901	16		X			1	4oz pl	SM	9223B		
902	17		X			1	glass		EPA 365.1		
903	18		X			1	16oz pl		EPA 160.2		
904	19		X			1	4oz pl	SM	9223B		
905	20		X		↓	1	glass		EPA 365.1		

Relinquished by:	Date/Time	Received by:	Date/Time	Received by:	Date/Time
Brian Trembach	5/14/02 15:06	Morucci	5/14/02 3:15		

New York State Project: Yes ____ No ____

Requested Analyses

1	pH	6	TKN	11	Total Solids	16	Sulfate	21	1664 TPH/FOG	26	8270 PAH
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	8015 GRO	27	PP13 Metals
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	8015 DRO	28	RCRA8 Metals
4	Nitrite N	9	BOD	14	Turbidity	19	8021B	24	8260/8260B	29	E. coli
5	Nitrate N	10	Alkalinity	15	Conductivity	20	8010/8020	25	8270 B/N or Acid	30	
31	Metals (As Is, Total, Diss.) Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Tl, V, Zn										
32	TCLP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides)					33					
34	Other										

LAB USE ONLY
Delivery: Client
Temp:
Comment:

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ENDYNE, INC.
160 James Brown Drive
Williston, Vermont 05495
(802) 879-4333

CHAIN-OF-CUSTODY-RECORD

37930

Special Reporting Instructions:

Project Name: Irasville	Reporting Address: Lamoureux + Dickinson 14 Horse Drive, Essex Jct, VT 05452	Billing Address: -same-
Endyne Order ID: (Lab Use Only) 17714	-O / -I / -S	Company: Contact Name/Phone #: Brian Trembacki/ 802-878-4450
		Sampler Name: Brian Trembacki Phone #: 802-878-4450

Ref # (Lab Use Only)	Sample Identification	Matrix	GRAB	COMP	Date/Time	Sample Containers No.	Sample Containers Type/Size	Field Results/Remarks	Analysis Required	Sample Preservation	Rush
906	21		X		5-14-02	1	160z pl		EPA 160.2		
907	22		X			1	40z pl		SM 9223B		
908	23		X			1	glass		EPA 365.1		
909	24		X			1	160z pl		EPA 160.2		
910	25		X			1	40z pl		SM 9223B		
911	26		X			1	glass		EPA 365.1		
912	27		X			1	160z pl		EPA 160.2		

Relinquished by:	Date/Time	Received by:	Date/Time	Received by:	Date/Time
Brian Trembacki	5-14-02 15:06	[illegible]	5/14/02 3:15		

New York State Project: Yes _____ No _____

Requested Analyses

1	pH	6	TKN	11	Total Solids	16	Sulfate	21	1664 TPH/FOG	26	8270 PAH
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	8015 GRO	27	PP13 Metals
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	8015 DRO	28	~~RCRA8~~ Metals
4	Nitrite N	9	BOD	14	Turbidity	19	8021B	24	8260/8260B	29	E. coli
5	Nitrate N	10	Alkalinity	15	Conductivity	20	8010/8020	25	8270 B/N or Acid	30	
31	Metals (As Is, Total, Diss.) Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Tl, V, Zn										
32	TCLP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides)					33					
34	Other										

LAB USE ONLY
Delivery:
Temp:
Comment:

(White, Yellow, Pink Copy - Laboratory / Goldenrod Copy - Client)