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Appendix 3.7-7

USGS Correspondence Regarding $Q_{7,2}$ $Q_{7,10}$ Estimates

DEC 14 1984

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14.15.5.03



United States Department of the Interior

GEOLOGICAL SURVEY

CMC-186: SW, GW

Water Resources Division
1815 University Avenue
Madison, Wisconsin 53705-4096
608/262-2488 (FTS 262-2488)

December 13, 1984

Mr. Dale Simon
Department of Natural Resources
P. O. Box 7921
Madison, WI 53707

Dear Dale:

Enclosed is a table of preliminary estimates for the Q_{7,2}, Q_{7,10} and part of the duration table for streams in the Crandon Project Area. The measurements made by DNR in mid-November plot close enough to the correlation lines that no changes in the estimates would be justified at this time.

The three measurements I have for Hoffman Creek near the spring do not define a good relationship with the Wolf River. Because Hoffman Creek discharge is dominated by a single spring, it is possible that it will never correlate well. The range of the relationship so far suggests that Q_{7,2} might be between 0.1 and 0.3 ft³/s. The Q_{7,10} is probably less than 0.2 ft³/s. Memories of local residents might be useful in determining if the flow has ever been zero.

Sincerely,

Bill Krug

William Krug
Hydrologist

Enc.

cc: Robert Sonntag

3.7-7-1

MAIN HRD
Sub SW
Sub SW
Keywords LOW FLOWS

The following table is a preliminary estimate of the duration table for selected stations near the Crandon Project. All of these estimates are based on correlation of measured discharge at the sites with concurrent discharge for the Wolf River at Langlade. Only stations 04074538 and 04074549 have sufficient discharge measurements for a good correlation. The other correlations are based on very few good base flow measurements. These data must be considered provisional and subject to revision as more data are collected.

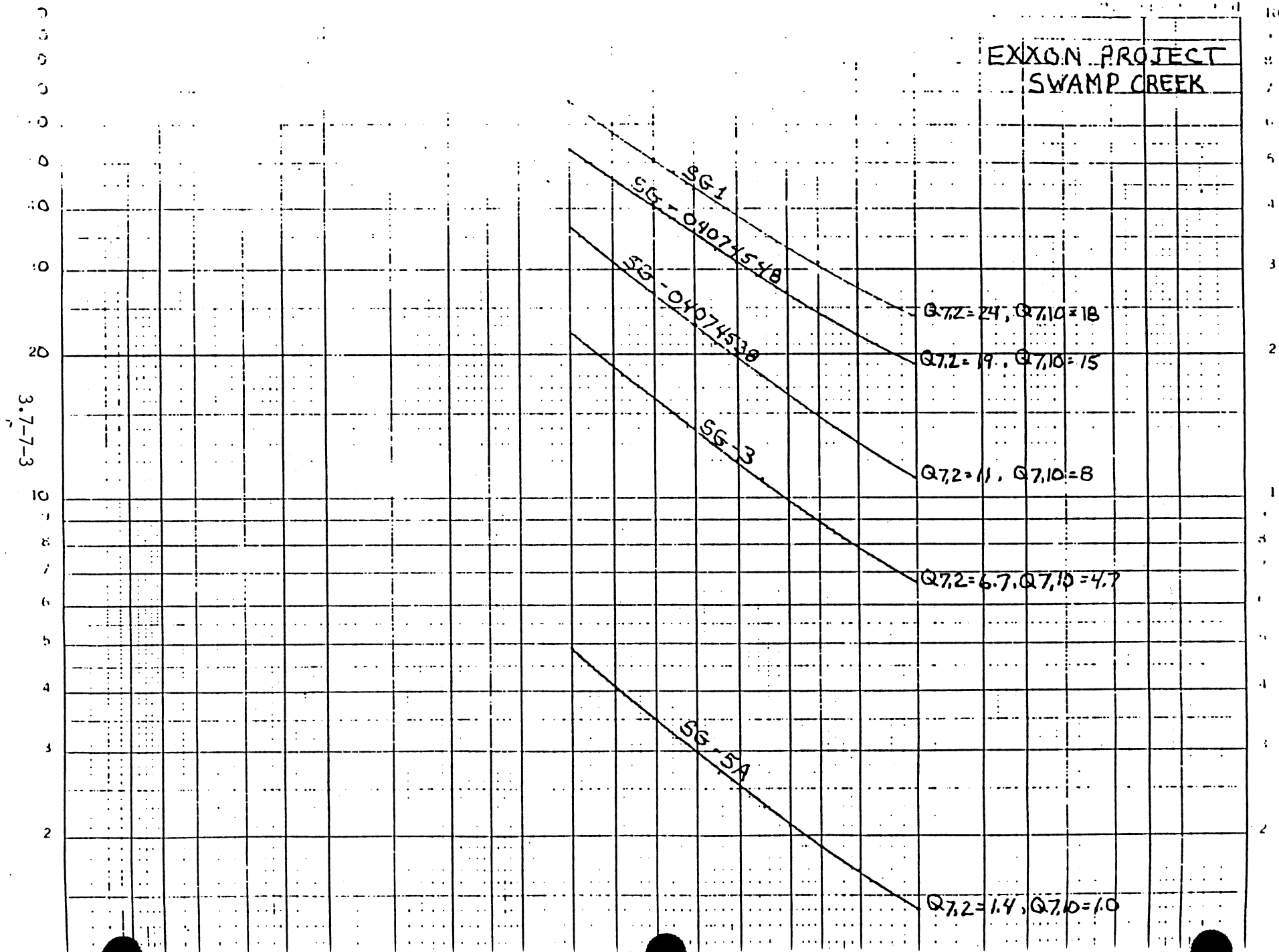
The correlation at SG-4 was especially poor. The presence of a large lake just upstream from this site may make good correlation impossible.

The estimates for Q7,2 and Q7,10 are based on the same correlations. An independent check on these estimates was made by computing Q7,2 and Q7,10 using equations (3) and (4) from "Low-Flow Characteristics of Streams in the Menominee-Oconto-Peshigo River Basin, Wisconsin" by B.K. Holmstrom, USGS Water Resources Investigations Open-File Report 80-749. Streamflow measurements made by USGS personnel on or about October 2, 1984 were used in these equations, together with the concurrent flow of the Wolf River at Langlade. These estimates were generally within 10-25% of the estimates obtained by correlation.

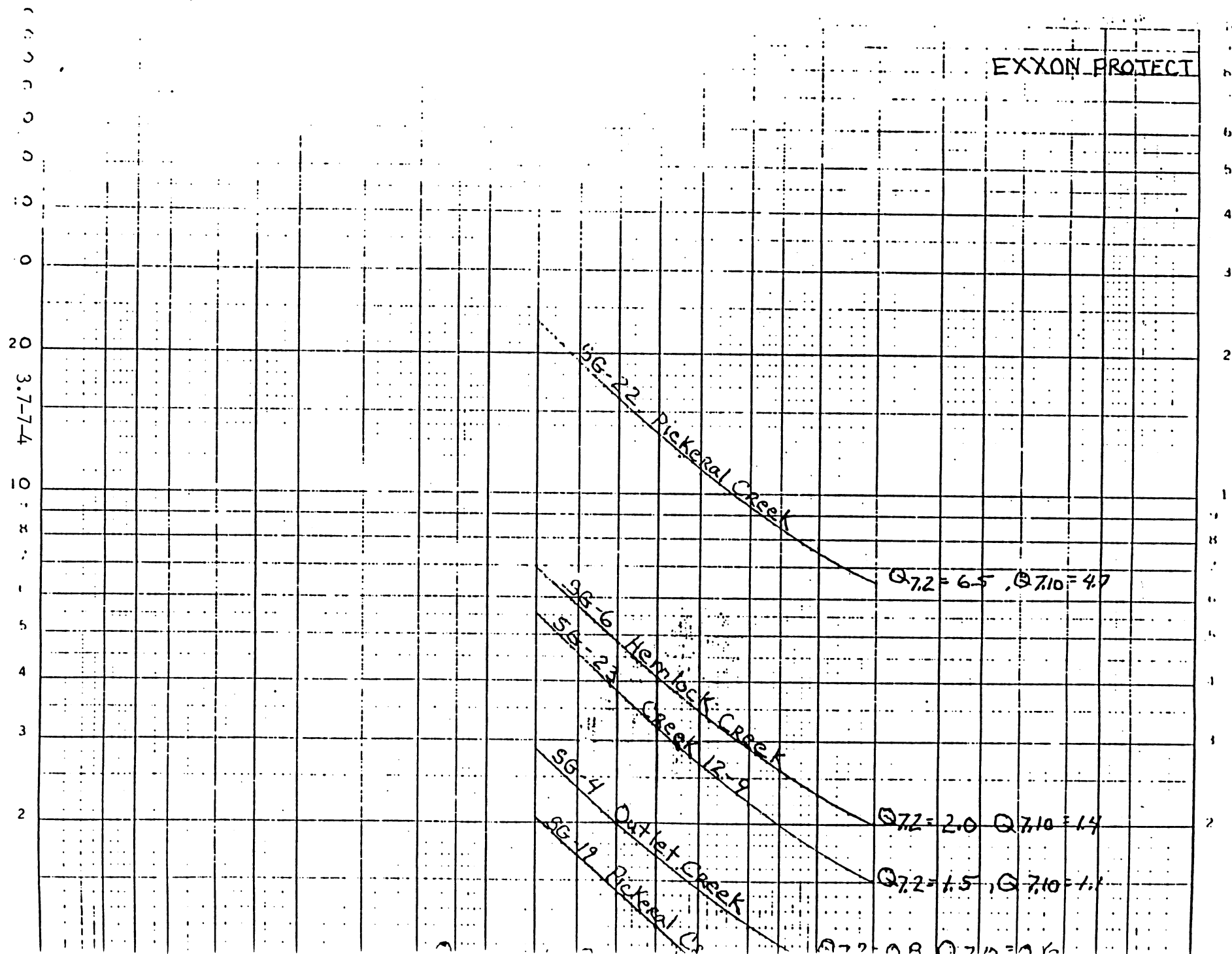
STATION	PERCENT OF TIME FLOW IS ABOVE:											BASE FLOW		Drainage Area mile ²
	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	Q7,2	Q7,10		
SG-1	51.	48.	44.	41.	39.	36.	33.	31.	28.	24.	24.	19.	76.5	
SG-3	16.	15.	14.	13.	12.	11.	9.7	8.8	7.8	6.7	6.7	4.7	39.2	
SG-4	2.0	1.8	1.7	1.6	1.4	1.3	1.2	1.1	1.0	0.8	0.8	0.6	13.6	
SG-5A	3.5	3.2	3.0	2.7	2.5	2.3	2.1	1.9	1.7	1.4	1.4	1.0	15	
SG-6	4.8	4.4	4.0	3.8	3.5	3.2	2.9	2.6	2.3	2.0	2.0	1.4	3.5	
SG-8	(INTERMITTENT STREAM--LOWEST FLOWS ARE ZERO, EVEN 50% IS VERY SMALL)												1	
SG-19	1.4	1.3	1.2	1.1	1.0	1.0	0.9	0.8	0.7	0.6	0.6	0.4	246	
SG-22	16.	15.	13.	12.	11.	10.	9.6	8.6	7.7	6.5	6.5	4.7	14.3	
SG-23	3.8	3.4	3.2	2.9	2.7	2.5	2.2	2.1	1.8	1.5	1.5	1.1	6	
SG-B	(INTERMITTENT STREAM--LOWEST FLOWS ARE ZERO, EVEN 50% IS VERY SMALL)												1	
04074538	27.	25.	23.	21.	20.	18.	17.	15.	13.	11.	11.	8.0	46.2	
04074548	41.	38.	36.	33.	31.	29.	27.	25.	22.	19.	19.	15.	56.7	

The ratios between flows at the various sites are nearly constant for all durations in this table. This is a consequence of the correlation analysis with limited data. Most of the correlation lines were drawn parallel to each other when there was insufficient data to indicate a different slope. More data may allow the determination of different slopes for correlation lines, and thus cause the ratios between flows at the various sites to change with discharge.

Contours plotted by Dale Sanner 12/15/64



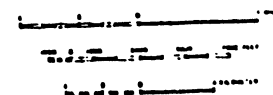
Graphs plotted by Dale Simon WDNR



- (1) Label Space
- (2) Input Data
- (3) Output Data

- [illegible]

1990



LOCATION OF
SURFACE WATER GAGING STATIONS
IN THE ENVIRONMENTAL STUDY AREA

TABLE 2.4-1

STREAM AND LAKE GAGING STATIONS
IN THE ENVIRONMENTAL STUDY AREA

<u>GAGING STATION</u>	<u>LOCATION/NAME</u>
<u>Swamp Creek Drainage Basin</u>	
SG 1	Swamp Creek at County K
SG 2	Swamp Creek above Highway 55
SG 3	Swamp Creek at Swampy Lane
SG 4	Outlet Creek at Keith Siding Road
SG 5A	Swamp Creek at Keith Siding Road
SG 5B	Swamp Creek at Railroad Bridge
SG 6	Hemlock Creek at Berry Lane
SG 10	Oak Lake Outflow immediately SW of Oak Lake
LG 11	Oak Lake
LG 14	Rice Lake
LG 24	Ground Hemlock Lake
SG E	Hoffman's Creek
SG F	Oak Lake Outflow at Sand Lake Road
<u>Pickereel Creek Drainage Basin</u>	
LG 7	Little Sand Lake
SG 8	Creek 12-9 immediately S of Little Sand Lake
LG 9	Rolling Stone Lake
LG 12	Duck Lake
LG 13	Deep Hole Lake
LG 15	Skunk Lake
SG 19	Pickereel Creek NW of Rolling Stone Lake
SG 22	Pickereel Creek at East Shore Road
SG 23	Creek 12-9 NW of Rolling Stone Lake
LG 25	Walsh Lake
LG 26	St. Johns Lake
SG A	Tributary to Little Sand Lake
SG B	Duck Lake Outflow at Sand Lake Road
SG C	Tributary to Deep Hole Lake
SG D	Tributary to Deep Hole Lake
<u>Continuous Gaging Stations</u>	
USGS at Hwy 55*	Swamp Creek at Highway 55
USGS at County M*	Swamp Creek at County M

*Located in Swamp Creek Drainage Basin.

Appendix 3.7-8

Surface Water Chemistry Data Base for Samples Collected Between 1993 and 1997

- **Surface Water Chemistry Data**
- **Statistical Summary of Surface Water Chemistry Data**

Surface Water Chemistry Data

STATION	PARAMETER	Units	Nov-93	Dec-93	Jan-94	Feb-94	Mar-94	Apr-94	Apr-94	May-94	Jun-94	Jul-94
SG-02	pH (Field)	S.U.						6.92		7.32	6.62	6.46
SG-02	pH, Lab	S.U.						(PHT)		(PHT)	(PHT)	(PHT)
SG-02	Conductivity (Field)	umhos						191		170	181.3	259
SG-02	Conductivity, Lab	umhos						191		177	176	210
SG-02	Temperature (Field)	Degrees C						1.9		7.4	15.1	19.2
SG-02	Temperature (Field-DO Meter)	Degrees C						1.8		8	15	19
SG-02	Dissolved Oxygen (Field)	%						12.4		9.4	7.8	6.3
SG-02	Fecal Coliform	MPN									1.00	
SG-02	Alkalinity	mg/L						90.0		74.6	85.0	99.0
SG-02	Alkalinity, Bicarbonate	mg/L						90.0		74.6	85.0	99.0
SG-02	Alkalinity, Carbonate	mg/L						0		0	0	0
SG-02	Alkalinity, Hydroxide	mg/L						0		0	0	0
SG-02	Hardness	mg/L						90.8		84.8	88.7	110
SG-02	Total Dissolved Solids	mg/L						113		90.0	96.0	131
SG-02	Total Suspended Solids	mg/L						5.00		5.00	9.00	10.0
SG-02	Biological Oxygen Demand	mg/L						8.00		5.00	3.00	3.00
SG-02	Chemical Oxygen Demand	mg/L						10.0		18.0	25.0	27.0
SG-02	Chemical Oxygen Demand, Low Level	mg/L										
SG-02	Ammonia	mg/L						0.100		0.100	0.112	0.100
SG-02	Nitrate	mg/L						0.690		0.705	0.500	0.500
SG-02	Nitrogen, Total Kjeldahl	mg/L						0.200		0.504	0.336	0.588
SG-02	Chloride	mg/L						3		3	3	2
SG-02	Fluoride	mg/L						0.100		0.830	0.100	0.100
SG-02	Sulfate	mg/L						5.46		6.00	4.00	4.70
SG-02	Cyanide, total	ug/L						20		20	20	20
SG-02	Oil & Grease	mg/L						1.56		1.06	1.13	1.03
SG-02	Turbidity, Lab	NTU						0.900		3.60	2.20	5.10
SG-02	Cations	Meq/L						2.08		1.93	1.92	2.29
SG-02	Anions	Meq/L						1.68		1.49	1.55	1.78
SG-02	Cation and Anion Balance	%						10.5		13.0	10.7	12.5
SG-02	Boron, total	mg/L						0.099		0.100	0.100	0.100
SG-02	Calcium, total	mg/L						22.0		20.1	20.4	25.4
SG-02	Arsenic, total	mg/L						0.005		0.005	0.005	0.005
SG-02	Barium, total	mg/L						0.011		0.010	0.014	0.014
SG-02	Iron, dissolved	mg/L						0.100		0.100	0.168	0.217
SG-02	Iron, total	mg/L						0.251		0.212	0.439	0.413
SG-02	Manganese, dissolved	mg/L						0.014		0.010	0.010	0.031
SG-02	Manganese, total	mg/L						0.040		0.037	0.088	0.142
SG-02	Molybdenum, total	mg/L						0.020		0.020	0.020	0.020
SG-02	Selenium, total	mg/L						0.005		0.005	0.005	0.005
SG-02	Silver, total	mg/L						0.01		0.010	0.010	0.010
SG-02	Chromium, total	mg/L						0.020		0.020	0.020	0.020
SG-02	Chromium, total (Low Level)	ug/L						0.390		0.470	0.79	0.45
SG-02	Beryllium, total	mg/L						0.005		0.005	0.005	0.005
SG-02	Thallium, total	mg/L						0.005		0.005	0.005	0.005
SG-02	Nickel, total	mg/L						0.030		0.030	0.030	0.030
SG-02	Antimony, total	mg/L						0.005		0.005	0.005	0.005
SG-02	Magnesium, total	mg/L						10.4		9.89	9.80	11.3
SG-02	Phosphorus, dissolved	mg/L						0.050		0.016	0.017	0.021
SG-02	Phosphorus, total	mg/L						0.050		0.027	0.036	0.046
SG-02	Potassium, total	mg/L						0.740		0.850	0.600	0.600
SG-02	Sodium, total	mg/L						2.43		2.19	2.21	2.18
SG-02	Sodium Absorption Ratio	std						0.107		0.100	0.101	0.090
SG-02	Aluminum, total	ug/L						26.3		25.8	60.6	52.5
SG-02	Cadmium, total	ug/L						0.006		0.007	0.011	0.051
SG-02	Copper, total	ug/L						0.365		0.483	0.417	0.771
SG-02	Lead, total	ug/L						0.084		0.113	0.227	0.210
SG-02	Mercury, total	ng/L						2		2	4.66	2.78
SG-02	Zinc, total	ug/L						1.09		1.04	1.74	3.36

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
SG-02	pH (Field)	S.U.	7.02	7.87		7.08	7.36	7.70	7.09	7.89	7.51	
SG-02	pH, Lab	S.U.	(PHT)	7.6		7.2	7.3	7.3	7.1	7.0	7.2	
SG-02	Conductivity (Field)	umhos	199	201		160.8	190.6	190	213	239	158.7	
SG-02	Conductivity, Lab	umhos	202									
SG-02	Temperature (Field)	Degrees C	13.8	12.3		8.3	4.8	0.4		0.2	5.7	
SG-02	Temperature (Field-DO Meter)	Degrees C	13	12		8.5	4.0	0.5	0.25	0.25	5.5	
SG-02	Dissolved Oxygen (Field)	%	8.6	8.2		9.3	11.0	12.75	10.8	13.2	9.4	
SG-02	Fecal Coliform	MPN										
SG-02	Alkalinity	mg/L	99.4	100		80	95	110	120	120	70	
SG-02	Alkalinity, Bicarbonate	mg/L	99.4	100		80	95	110	120	120	70	
SG-02	Alkalinity, Carbonate	mg/L	0	5		5	5	5	5	5	5	
SG-02	Alkalinity, Hydroxide	mg/L	0	5		5						
SG-02	Hardness	mg/L	110	120		110	100	110	130	120	78	
SG-02	Total Dissolved Solids	mg/L	117	150		94	190	170	180	160	130	
SG-02	Total Suspended Solids	mg/L	5.00			5	5	5	5	5	5	
SG-02	Biological Oxygen Demand	mg/L	7.00	2		3	3	3	3	3	3	
SG-02	Chemical Oxygen Demand	mg/L	23.0									
SG-02	Chemical Oxygen Demand, Low Level	mg/L		20		23	16	13	10	15	23	
SG-02	Ammonia	mg/L	0.100	0.1		0.1	0.1	0.1		0.1	0.2	
SG-02	Nitrate	mg/L	0.720	0.5		0.50	0.50	0.50	0.50	0.50	0.50	
SG-02	Nitrogen, Total Kjeldahl	mg/L	0.308	0.7		0.8	0.7	0.5	0.4	0.4	0.4	
SG-02	Chloride	mg/L	2	2		3	2	3	3	3	3	
SG-02	Fluoride	mg/L	0.100	0.1		0.1	0.1	0.1	0.1	0.1	0.1	
SG-02	Sulfate	mg/L	11.0			13	9.7	7.3	8.0	4.9	5.0	
SG-02	Cyanide, total	ug/L	20	20		20		20	20	20	20	
SG-02	Oil & Grease	mg/L	1.01	1		4.6	6.6	4.6	4.6	4.6	4.6	
SG-02	Turbidity, Lab	NTU	3.30	1.7		2.6	1.7	1.8	1.3	1.5	1.8	
SG-02	Cations	Meq/L	2.14	2.110		1.857	1.97	2.12	2.74	2.74	1.72	
SG-02	Anions	Meq/L	1.93	1.695		1.667	1.82	2.04	2.21	2.16	1.34	
SG-02	Cation and Anion Balance	%	5.26	10.89		5.40	3.97	1.89	10.58	11.83	12.48	
SG-02	Boron, total	mg/L	0.100	0.20		0.10	0.10	0.10	0.10	0.10	0.10	
SG-02	Calcium, total	mg/L	22.3	22		19	21	22	29	29	18	
SG-02	Arsenic, total	mg/L	0.005	0.005		0.005	0.006	0.005	0.005	0.005	0.005	
SG-02	Barium, total	mg/L	0.012	0.011		0.010	0.010	0.010	0.012	0.011	0.010	
SG-02	Iron, dissolved	mg/L	0.121	0.16		0.24	0.16	0.27	0.12	0.072	0.16	
SG-02	Iron, total	mg/L	0.341	0.31		0.37	0.34	0.30	0.29	0.25	0.37	
SG-02	Manganese, dissolved	mg/L	0.010	0.010		0.018	0.010	0.010	0.034	0.010	0.010	
SG-02	Manganese, total	mg/L	0.062	0.050		0.037	0.054	0.042	0.049	0.048	0.057	
SG-02	Molybdenum, total	mg/L	0.020	0.020		0.020	0.020	0.020	0.020	0.020	0.020	
SG-02	Selenium, total	mg/L	0.005	0.005		0.005	0.006	0.005	0.005	0.005	0.005	
SG-02	Silver, total	mg/L	0.010	0.010		0.010	0.010	0.010	0.010	0.010	0.010	
SG-02	Chromium, total	mg/L	0.020									
SG-02	Chromium, total (Low Level)	ug/L	0.51	0.558		0.74	0.50	0.36	0.379	0.487	0.297	
SG-02	Beryllium, total	mg/L	0.005	0.010		0.010	0.010	0.010	0.010	0.010	0.010	
SG-02	Thallium, total	mg/L	0.005	0.005		0.005	0.005	0.005	0.005	0.005	0.005	
SG-02	Nickel, total	mg/L	0.030	0.030		0.030	0.030	0.030	0.030	0.030	0.030	
SG-02	Antimony, total	mg/L	0.005	0.005		0.005	0.005	0.005	0.005	0.005	0.005	
SG-02	Magnesium, total	mg/L	11.3	11		9.6	10	11	14	14	8.5	
SG-02	Phosphorus, dissolved	mg/L	0.016	0.05		0.05	0.05	0.05	0.05	0.05	0.05	
SG-02	Phosphorus, total	mg/L	0.025	0.05		0.05	0.05	0.05	0.05	0.05	0.05	
SG-02	Potassium, total	mg/L	0.600	1.0		1.0	1.0	1.0	1.0	1.0	1.1	
SG-02	Sodium, total	mg/L	2.29	2.1		2.2	2.2	2.3	2.9	2.7	2.1	
SG-02	Sodium Absorption Ratio	std	0.099	0.091		0.103	0.099	0.10	0.11	0.10	0.10	
SG-02	Aluminum, total	ug/L	22.1	25.3		54.7	28.8	26.9	29.6	26.1	36.7	
SG-02	Cadmium, total	ug/L	0.006	0.006		0.0039	0.006	0.006	0.003	0.003	0.004	
SG-02	Copper, total	ug/L	0.325	0.154		6.99	0.289	0.161	0.661	0.232	0.577	
SG-02	Lead, total	ug/L	0.146	0.0812		0.195	0.075	0.053	0.093	0.076	0.129	
SG-02	Mercury, total	ng/L	2.10	0.982		3.75	1.6	1.2	1.48	1.14	3.27	
SG-02	Zinc, total	ug/L	3.47	0.763		1.87	1.91	1.22	0.747	0.898	0.798	

STATION	PARAMETER	Units	Nov-93	Dec-93	Jan-94	Feb-94	Mar-94	Apr-94	Apr-94	May-94	Jun-94	Jul-94
SG-03	pH (Field)	S.U.						7.69		7.22	6.93	7.44
SG-03	pH, Lab	S.U.						(PHT)		(PHT)	(PHT)	(PHT)
SG-03	Conductivity (Field)	umhos						194		197	180	256
SG-03	Conductivity, Lab	umhos						191		178	185	214
SG-03	Temperature (Field)	Degrees C						7.0		9.3	15.9	19.3
SG-03	Temperature (Field-DO Meter)	Degrees C								10	16	20
SG-03	Dissolved Oxygen (Field)	%						8.1		9.8	8.2	7.5
SG-03	Alkalinity	mg/L						92.0		90.0	94.0	102
SG-03	Alkalinity, Bicarbonate	mg/L						92.0		90.0	94.0	102
SG-03	Alkalinity, Carbonate	mg/L						0		0	0	0
SG-03	Alkalinity, Hydroxide	mg/L						0		0	0	0
SG-03	Hardness	mg/L						91.0		87.8	92.1	108
SG-03	Total Dissolved Solids	mg/L						106		68.0	93.0	138
SG-03	Total Suspended Solids	mg/L						5.00		5.00	6.00	5.00
SG-03	Biological Oxygen Demand	mg/L						5.00		4.00	3.00	3.00
SG-03	Chemical Oxygen Demand	mg/L						12.0		16.0	23.0	15.0
SG-03	Chemical Oxygen Demand, Low Level	mg/L										
SG-03	Ammonia	mg/L						0.100		0.100	0.280	0.100
SG-03	Nitrate	mg/L						0.500		0.500	0.500	0.500
SG-03	Nitrogen, Total Kjeldahl	mg/L						0.616		0.252	0.392	0.616
SG-03	Chloride	mg/L						3		3	3	2
SG-03	Fluoride	mg/L						0.100		0.621	0.100	0.100
SG-03	Sulfate	mg/L						4.83		5.00	4.00	4.90
SG-03	Cyanide, total	ug/L						20		20	20	20
SG-03	Oil & Grease	mg/L						1.50		1.02	1.15	1.01
SG-03	Turbidity, Lab	NTU						(PHT)		2.10	0.650	2.30
SG-03	Cations	Meq/L						2.06		2.04	2.05	2.37
SG-03	Anions	Meq/L						1.69		1.70	1.70	1.84
SG-03	Cation and Anion Balance	%						9.88		9.19	9.15	12.6
SG-03	Boron, total	mg/L						0.100		0.100	0.100	0.100
SG-03	Calcium, total	mg/L						21.9		21.1	21.8	26.1
SG-03	Arsenic, total	mg/L						0.005		0.005	0.005	0.005
SG-03	Barium, total	mg/L						0.011		0.012	0.013	0.012
SG-03	Iron, dissolved	mg/L						0.100		0.101	0.163	0.216
SG-03	Iron, total	mg/L						0.286		0.228	0.354	0.379
SG-03	Manganese, dissolved	mg/L						0.010		0.010	0.010	0.010
SG-03	Manganese, total	mg/L						0.064		0.047	0.076	0.075
SG-03	Molybdenum, total	mg/L						0.020		0.020	0.020	0.020
SG-03	Selenium, total	mg/L						0.005		0.005	0.005	0.005
SG-03	Silver, total	mg/L						0.010		0.010	0.010	0.010
SG-03	Chromium, total	mg/L						0.020		0.020	0.020	0.020
SG-03	Chromium, total (Low Level)	ug/L						0.470		0.310	0.45	0.37
SG-03	Beryllium, total	mg/L						0.005		0.005	0.005	0.005
SG-03	Thallium, total	mg/L						0.005		0.005	0.005	0.005
SG-03	Nickel, total	mg/L						0.030		0.030	0.030	0.030
SG-03	Antimony, total	mg/L						0.005		0.005	0.005	0.005
SG-03	Magnesium, total	mg/L						10.3		10.6	10.4	11.8
SG-03	Phosphorus, dissolved	mg/L						0.050		0.012	0.014	0.014
SG-03	Phosphorus, total	mg/L						0.050		0.026	0.029	0.035
SG-03	Potassium, total	mg/L						0.710		0.650	0.600	0.600
SG-03	Sodium, total	mg/L						2.41		2.32	2.36	2.18
SG-03	Sodium Absorption Ratio	std						0.106		0.103	0.104	0.089
SG-03	Aluminum, total	ug/L						24.1		17.6	28.4	22.1
SG-03	Cadmium, total	ug/L						0.006		0.004	0.007	0.024
SG-03	Copper, total	ug/L						0.463		0.370	0.331	0.514
SG-03	Lead, total	ug/L						0.208		0.097	0.146	0.141
SG-03	Mercury, total	ng/L						2		2	2.06	2.20
SG-03	Zinc, total	ug/L						1.31		1.55	1.22	2.36

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
SG-03	pH (Field)	S.U.	7.26	7.90		7.17	7.96	7.83	7.21		7.52	
SG-03	pH, Lab	S.U.	(PHT)	7.4		7.3	7.5	7.4	7.1		7.3	
SG-03	Conductivity (Field)	umhos	194	198		175	189.0	258	262		177.8	
SG-03	Conductivity, Lab	umhos	204									
SG-03	Temperature (Field)	Degrees C	14.7	14.1		9.1	5.2	1.0	0.6		3.2	
SG-03	Temperature (Field-DO Meter)	Degrees C	15	14		9.5	5.0	1.0	0.25		3.0	
SG-03	Dissolved Oxygen (Field)	%	8.4	9.1		10.0	12.0	11.75	8.4		12.0	
SG-03	Alkalinity	mg/L	101	100		85	96	91	130		75	
SG-03	Alkalinity, Bicarbonate	mg/L	101	100		85	96	91	130		75	
SG-03	Alkalinity, Carbonate	mg/L	0	5		5	5	5	5		5	
SG-03	Alkalinity, Hydroxide	mg/L	0	5		5						
SG-03	Hardness	mg/L	106	120		100	100	110	5		86	
SG-03	Total Dissolved Solids	mg/L	130	140		88	190	180	140		97	
SG-03	Total Suspended Solids	mg/L	5.00			5	5	6	7		5	
SG-03	Biological Oxygen Demand	mg/L	7.00	2		3	3	3	3		12	
SG-03	Chemical Oxygen Demand	mg/L	22.0									
SG-03	Chemical Oxygen Demand, Low Level	mg/L		20		21	10	13	11		23	
SG-03	Ammonia	mg/L	0.100	0.1		0.1	0.1	0.1			0.1	
SG-03	Nitrate	mg/L	0.500	0.5		0.50	0.50	0.50	0.50		0.50	
SG-03	Nitrogen, Total Kjeldahl	mg/L	0.280	0.6		0.4	0.6	0.3	0.5		0.5	
SG-03	Chloride	mg/L	2	1		3	2	3	3		3	
SG-03	Fluoride	mg/L	0.100	0.1		0.1	0.1	0.1	0.1		0.1	
SG-03	Sulfate	mg/L	11.0			12	9.0	6.6	7.2		5.4	
SG-03	Cyanide, total	ug/L	20	20		20		20	20		20	
SG-03	Oil & Grease	mg/L	1.02	1		4.6	4.6	4.6	4.6		4.6	
SG-03	Turbidity, Lab	NTU	1.10	1.0		1.7	1.2	1.3	0.9		1.6	
SG-03	Cations	Meq/L	2.20	2.106		1.946	1.98	2.12	2.79		1.72	
SG-03	Anions	Meq/L	1.94	1.667		1.728	1.82	1.71	2.37		1.34	
SG-03	Cation and Anion Balance	%	6.28	11.64		5.93	4.42	10.48	8.28		12.36	
SG-03	Boron, total	mg/L	0.100	0.20		0.10	0.10	0.10	0.10		0.10	
SG-03	Calcium, total	mg/L	23.1	22		20	21	22	30		18	
SG-03	Arsenic, total	mg/L	0.005	0.005		0.005	0.005	0.005	0.005		0.005	
SG-03	Barium, total	mg/L	0.012	0.011		0.011	0.010	0.010	0.012		0.052	
SG-03	Iron, dissolved	mg/L	0.140	0.12		0.21	0.073	0.19	0.13		0.14	
SG-03	Iron, total	mg/L	0.320	0.30		0.33	0.29	0.30	0.33		0.32	
SG-03	Manganese, dissolved	mg/L	0.010	0.010		0.017	0.010	0.016	0.047		0.010	
SG-03	Manganese, total	mg/L	0.040	0.050		0.037	0.065	0.070	0.072		0.057	
SG-03	Molybdenum, total	mg/L	0.020	0.020		0.020	0.020	0.020	0.020		0.020	
SG-03	Selenium, total	mg/L	0.005	0.005		0.005	0.005	0.005	0.005		0.005	
SG-03	Silver, total	mg/L	0.010	0.010		0.010	0.010	0.010	0.010		0.010	
SG-03	Chromium, total	mg/L	0.020									
SG-03	Chromium, total (Low Level)	ug/L	0.34	0.713		0.30	0.32	0.38	0.373		0.451	
SG-03	Beryllium, total	mg/L	0.005	0.010		0.010	0.010	0.010	0.010		0.010	
SG-03	Thallium, total	mg/L	0.005	0.005		0.005	0.005	0.005	0.005		0.005	
SG-03	Nickel, total	mg/L	0.030	0.030		0.030	0.030	0.030	0.030		0.030	
SG-03	Antimony, total	mg/L	0.005	0.005		0.005	0.005	0.005	0.005		0.005	
SG-03	Magnesium, total	mg/L	11.6	11		10	10	11	14		8.6	
SG-03	Phosphorus, dissolved	mg/L	0.011	0.05		0.05	0.05	0.05	0.05		0.05	
SG-03	Phosphorus, total	mg/L	0.009	0.05		0.05	0.05	0.05	0.05		0.05	
SG-03	Potassium, total	mg/L	0.600	1.0		1.0	1.0	1.0	1.0		1.0	
SG-03	Sodium, total	mg/L	2.22	2.0		2.4	2.2	2.2	2.8		2.2	
SG-03	Sodium Absorption Ratio	std	0.094	0.087		0.109	0.099	0.10	0.11		0.11	
SG-03	Aluminum, total	ug/L	11.9	49.9		34.4	18.7	27.0	21.5		43.6	
SG-03	Cadmium, total	ug/L	0.006	0.006		0.0039	0.006	0.006	0.003		0.007	
SG-03	Copper, total	ug/L	0.515	0.211		1.48	0.154	0.167	0.411		0.564	
SG-03	Lead, total	ug/L	0.088	0.121		0.0877	0.053	0.071	0.080		0.126	
SG-03	Mercury, total	ng/L	1.95	1.89		1.85	0.9	1.1	1.06		3.36	
SG-03	Zinc, total	ug/L	5.38	1.15		1.29	4.58	1.04	0.827		1.11	

STATION	PARAMETER	Units	Nov-93	Dec-93	Jan-94	Feb-94	Mar-94	Apr-94	Apr-94	May-94	Jun-94	Jul-94
SG-04	pH (Field)	S.U.						6.68				7.07
SG-04	pH, Lab	S.U.						(PHT)				(PHT)
SG-04	Conductivity (Field)	umhos						181				186
SG-04	Conductivity, Lab	umhos						206				204
SG-04	Temperature (Field)	Degrees C						5.8				20.6
SG-04	Temperature (Field-DO Meter)	Degrees C						3.4				20
SG-04	Dissolved Oxygen (Field)	%						9.3				8.0
SG-04	Alkalinity	mg/L						91.0				96.0
SG-04	Alkalinity, Bicarbonate	mg/L						91.0				96.0
SG-04	Alkalinity, Carbonate	mg/L						0				0
SG-04	Alkalinity, Hydroxide	mg/L						0				0
SG-04	Hardness	mg/L						92.4				97.0
SG-04	Total Dissolved Solids	mg/L						106				117
SG-04	Total Suspended Solids	mg/L						5.00				8.00
SG-04	Biological Oxygen Demand	mg/L						7.00				3.00
SG-04	Chemical Oxygen Demand	mg/L						10.0				14.0
SG-04	Chemical Oxygen Demand, Low Level	mg/L										
SG-04	Ammonia	mg/L						0.100				0.100
SG-04	Nitrate	mg/L						(PHT)				0.500
SG-04	Nitrogen, Total Kjeldahl	mg/L						0.392				0.386
SG-04	Chloride	mg/L						5				5
SG-04	Fluoride	mg/L						0.100				0.100
SG-04	Sulfate	mg/L						5.29				5.70
SG-04	Cyanide, total	ug/L						20				20
SG-04	Oil & Grease	mg/L						1.70				1.03
SG-04	Turbidity, Lab	NTU						(PHT)				3.20
SG-04	Cations	Meq/L						2.16				2.16
SG-04	Anions	Meq/L						1.75				1.84
SG-04	Cation and Anion Balance	%						10.4				7.97
SG-04	Boron, total	mg/L						0.099				0.100
SG-04	Calcium, total	mg/L						22.2				23.0
SG-04	Arsenic, total	mg/L						0.005				0.005
SG-04	Barium, total	mg/L						0.014				0.012
SG-04	Iron, dissolved	mg/L						0.100				0.100
SG-04	Iron, total	mg/L						0.210				0.274
SG-04	Manganese, dissolved	mg/L						0.010				0.010
SG-04	Manganese, total	mg/L						0.019				0.054
SG-04	Molybdenum, total	mg/L						0.020				0.020
SG-04	Selenium, total	mg/L						0.005				0.005
SG-04	Silver, total	mg/L						0.01				0.010
SG-04	Chromium, total	mg/L						0.020				0.020
SG-04	Beryllium, total	mg/L						0.005				0.005
SG-04	Thallium, total	mg/L						0.005				0.005
SG-04	Nickel, total	mg/L						0.030				0.030
SG-04	Antimony, total	mg/L						0.005				0.005
SG-04	Magnesium, total	mg/L						10.6				10.2
SG-04	Phosphorus, dissolved	mg/L						0.050				0.004
SG-04	Phosphorus, total	mg/L						0.050				0.018
SG-04	Potassium, total	mg/L						0.790				0.810
SG-04	Sodium, total	mg/L						3.63				3.52
SG-04	Sodium Absorption Ratio	std						0.159				0.154
SG-04	Aluminum, total	ug/L						200				200
SG-04	Cadmium, total	ug/L						5				5
SG-04	Copper, total	ug/L						30				30
SG-04	Lead, total	ug/L						50				50
SG-04	Mercury, total	ng/L						200				300
SG-04	Zinc, total	ug/L						20				20

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
SG-04	pH (Field)	S.U.				8.03						
SG-04	pH, Lab	S.U.				7.7						
SG-04	Conductivity (Field)	umhos				193.8						
SG-04	Conductivity, Lab	umhos										
SG-04	Temperature (Field)	Degrees C				13.1						
SG-04	Temperature (Field-DO Meter)	Degrees C				13.0						
SG-04	Dissolved Oxygen (Field)	%				10.3						
SG-04	Alkalinity	mg/L				90						
SG-04	Alkalinity, Bicarbonate	mg/L				90						
SG-04	Alkalinity, Carbonate	mg/L				5						
SG-04	Alkalinity, Hydroxide	mg/L				5						
SG-04	Hardness	mg/L				110						
SG-04	Total Dissolved Solids	mg/L				88						
SG-04	Total Suspended Solids	mg/L				5						
SG-04	Biological Oxygen Demand	mg/L				3						
SG-04	Chemical Oxygen Demand	mg/L										
SG-04	Chemical Oxygen Demand, Low Level	mg/L				20						
SG-04	Ammonia	mg/L				0.1						
SG-04	Nitrate	mg/L				0.50						
SG-04	Nitrogen, Total Kjeldahl	mg/L				0.5						
SG-04	Chloride	mg/L				5						
SG-04	Fluoride	mg/L				0.1						
SG-04	Sulfate	mg/L				9.1						
SG-04	Cyanide, total	ug/L				20						
SG-04	Oil & Grease	mg/L				4.6						
SG-04	Turbidity, Lab	NTU				1.7						
SG-04	Cations	Meq/L				2.041						
SG-04	Anions	Meq/L				1.806						
SG-04	Cation and Anion Balance	%				6.12						
SG-04	Boron, total	mg/L				0.10						
SG-04	Calcium, total	mg/L				21						
SG-04	Arsenic, total	mg/L				0.005						
SG-04	Barium, total	mg/L				0.011						
SG-04	Iron, dissolved	mg/L				0.050						
SG-04	Iron, total	mg/L				0.093						
SG-04	Manganese, dissolved	mg/L				0.010						
SG-04	Manganese, total	mg/L				0.018						
SG-04	Molybdenum, total	mg/L				0.020						
SG-04	Selenium, total	mg/L				0.005						
SG-04	Silver, total	mg/L				0.010						
SG-04	Chromium, total	mg/L				0.0050						
SG-04	Beryllium, total	mg/L				0.010						
SG-04	Thallium, total	mg/L				0.005						
SG-04	Nickel, total	mg/L				0.030						
SG-04	Antimony, total	mg/L				0.005						
SG-04	Magnesium, total	mg/L				10						
SG-04	Phosphorus, dissolved	mg/L				0.05						
SG-04	Phosphorus, total	mg/L				0.05						
SG-04	Potassium, total	mg/L				1.0						
SG-04	Sodium, total	mg/L				3.4						
SG-04	Sodium Absorption Ratio	etd				0.153						
SG-04	Aluminum, total	ug/L				50						
SG-04	Cadmium, total	ug/L				5						
SG-04	Copper, total	ug/L				30						
SG-04	Lead, total	ug/L				50						
SG-04	Mercury, total	ng/L				200						
SG-04	Zinc, total	ug/L				20						

STATION	PARAMETER	Units	Nov-93	Dec-93	Jan-94	Feb-94	Mar-94	Apr-94	Apr-94	May-94	Jun-94	Jul-94
SG-05A	pH (Field)	S.U.						7.32				7.11
SG-05A	pH, Lab	S.U.						(PHT)				(PHT)
SG-05A	Conductivity (Field)	umhos						195				208
SG-05A	Conductivity, Lab	umhos						199				247
SG-05A	Temperature (Field)	Degrees C						2.3				19.3
SG-05A	Temperature (Field-DO Meter)	Degrees C										19
SG-05A	Dissolved Oxygen (Field)	%						8.9				4.8
SG-05A	Alkalinity	mg/L						100				122
SG-05A	Alkalinity, Bicarbonate	mg/L						100				122
SG-05A	Alkalinity, Carbonate	mg/L						0				0
SG-05A	Alkalinity, Hydroxide	mg/L						0				0
SG-05A	Hardness	mg/L						101				129
SG-05A	Total Dissolved Solids	mg/L						97.0				149
SG-05A	Total Suspended Solids	mg/L						△ 5.00			△ 5.00	
SG-05A	Biological Oxygen Demand	mg/L						5.00			△ 3.00	
SG-05A	Chemical Oxygen Demand	mg/L						△ 10.0				12.0
SG-05A	Chemical Oxygen Demand, Low Level	mg/L										
SG-05A	Ammonia	mg/L						△ 0.100			△ 0.100	
SG-05A	Nitrate	mg/L						(PHT)			△ 0.500	
SG-05A	Nitrogen, Total Kjeldahl	mg/L						0.476				0.392
SG-05A	Chloride	mg/L						2				1
SG-05A	Fluoride	mg/L						△ 0.100			△ 0.100	
SG-05A	Sulfate	mg/L						△ 1.00				5.30
SG-05A	Cyanide, total	ug/L						△ 20			△ 20	
SG-05A	Oil & Grease	mg/L						△ 1.55			△ 1.04	
SG-05A	Turbidity, Lab	NTU						(PHT)				1.10
SG-05A	Cations	Meq/L						2.20				2.66
SG-05A	Anions	Meq/L						1.69				2.15
SG-05A	Cation and Anion Balance	%						13.2				10.5
SG-05A	Boron, total	mg/L						△ 0.100			△ 0.100	
SG-05A	Calcium, total	mg/L						23.9				29.7
SG-05A	Arsenic, total	mg/L						△ 0.005			△ 0.005	
SG-05A	Barium, total	mg/L						△ 0.010				0.017
SG-05A	Iron, dissolved	mg/L						0.173				0.111
SG-05A	Iron, total	mg/L						0.173				0.274
SG-05A	Manganese, dissolved	mg/L						0.028				0.015
SG-05A	Manganese, total	mg/L						0.104				0.114
SG-05A	Molybdenum, total	mg/L						△ 0.020			△ 0.020	
SG-05A	Selenium, total	mg/L						△ 0.005			△ 0.005	
SG-05A	Silver, total	mg/L						△ 0.010			△ 0.010	
SG-05A	Chromium, total	mg/L						△ 0.020			△ 0.020	
SG-05A	Beryllium, total	mg/L						△ 0.005			△ 0.005	
SG-05A	Thallium, total	mg/L						△ 0.005			△ 0.005	
SG-05A	Nickel, total	mg/L						△ 0.030			△ 0.030	
SG-05A	Antimony, total	mg/L						△ 0.005			△ 0.005	
SG-05A	Magnesium, total	mg/L						11.1				13.3
SG-05A	Phosphorus, dissolved	mg/L						△ 0.050				0.018
SG-05A	Phosphorus, total	mg/L						△ 0.050				0.037
SG-05A	Potassium, total	mg/L						0.800			△ 0.600	
SG-05A	Sodium, total	mg/L						1.70				1.83
SG-05A	Sodium Absorption Ratio	std						0.072				0.070
SG-05A	Aluminum, total	ug/L						△ 200			△ 200	
SG-05A	Cadmium, total	ug/L						△ 5			△ 5	
SG-05A	Copper, total	ug/L						△ 30			△ 30	
SG-05A	Lead, total	ug/L						△ 50			△ 50	
SG-05A	Mercury, total	ng/L						△ 200			△ 200	
SG-05A	Zinc, total	ug/L						△ 20			△ 20	

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
SG-05A	pH (Field)	S.U.				7.06						
SG-05A	pH, Lab	S.U.				7.0						
SG-05A	Conductivity (Field)	umhos				183						
SG-05A	Conductivity, Lab	umhos										
SG-05A	Temperature (Field)	Degrees C				7.6						
SG-05A	Temperature (Field-DO Meter)	Degrees C				8.0						
SG-05A	Dissolved Oxygen (Field)	%				8.0						
SG-05A	Alkalinity	mg/L				94						
SG-05A	Alkalinity, Bicarbonate	mg/L				94						
SG-05A	Alkalinity, Carbonate	mg/L				5						
SG-05A	Alkalinity, Hydroxide	mg/L				5						
SG-05A	Hardness	mg/L				110						
SG-05A	Total Dissolved Solids	mg/L				110						
SG-05A	Total Suspended Solids	mg/L				5						
SG-05A	Biological Oxygen Demand	mg/L				3						
SG-05A	Chemical Oxygen Demand	mg/L										
SG-05A	Chemical Oxygen Demand, Low Level	mg/L				23						
SG-05A	Ammonia	mg/L				0.1						
SG-05A	Nitrate	mg/L				0.50						
SG-05A	Nitrogen, Total Kjeldahl	mg/L				0.4						
SG-05A	Chloride	mg/L				2						
SG-05A	Fluoride	mg/L				0.1						
SG-05A	Sulfate	mg/L				14						
SG-05A	Cyanide, total	ug/L				20						
SG-05A	Oil & Grease	mg/L				6.2						
SG-05A	Turbidity, Lab	NTU				0.8						
SG-05A	Cations	Meq/L				2.102						
SG-05A	Anions	Meq/L				1.889						
SG-05A	Cation and Anion Balance	%				5.33						
SG-05A	Boron, total	mg/L				0.10						
SG-05A	Calcium, total	mg/L				22						
SG-05A	Arsenic, total	mg/L				0.005						
SG-05A	Barium, total	mg/L				0.010						
SG-05A	Iron, dissolved	mg/L				0.14						
SG-05A	Iron, total	mg/L				0.23						
SG-05A	Manganese, dissolved	mg/L				0.027						
SG-05A	Manganese, total	mg/L				0.067						
SG-05A	Molybdenum, total	mg/L				0.020						
SG-05A	Selenium, total	mg/L				0.005						
SG-05A	Silver, total	mg/L				0.010						
SG-05A	Chromium, total	mg/L				0.0050						
SG-05A	Beryllium, total	mg/L				0.010						
SG-05A	Thallium, total	mg/L				0.005						
SG-05A	Nickel, total	mg/L				0.030						
SG-05A	Antimony, total	mg/L				0.005						
SG-05A	Magnesium, total	mg/L				11						
SG-05A	Phosphorus, dissolved	mg/L				0.05						
SG-05A	Phosphorus, total	mg/L				0.05						
SG-05A	Potassium, total	mg/L				1.0						
SG-05A	Sodium, total	mg/L				1.8						
SG-05A	Sodium Absorption Ratio	std				0.078						
SG-05A	Aluminum, total	ug/L				50						
SG-05A	Cadmium, total	ug/L				5						
SG-05A	Copper, total	ug/L				30						
SG-05A	Lead, total	ug/L				50						
SG-05A	Mercury, total	ng/L				200						
SG-05A	Zinc, total	ug/L				20						

STATION	PARAMETER	Units	Nov-93	Dec-93	Jan-94	Feb-94	Mar-94	Apr-94	Apr-94	May-94	Jun-94	Jul-94
SG-06	pH (Field)	S.U.						7.31		8.03	6.83	7.49
SG-06	pH, Lab	S.U.						(PHT)		(PHT)	(PHT)	(PHT)
SG-06	Conductivity (Field)	umhos						171		186	193	210
SG-06	Conductivity, Lab	umhos						191		204	188	210
SG-06	Temperature (Field)	Degrees C						2.2		13.7	18.7	22.5
SG-06	Temperature (Field-DO Meter)	Degrees C								13	21	23
SG-06	Dissolved Oxygen (Field)	%						10.2		8.4	6.2	5.8
SG-06	Alkalinity	mg/L						98.0		106	92.0	109
SG-06	Alkalinity, Bicarbonate	mg/L						98.0		106	92.0	109
SG-06	Alkalinity, Carbonate	mg/L						0		0	0	0
SG-06	Alkalinity, Hydroxide	mg/L						0		0	0	0
SG-06	Hardness	mg/L						97.8		87.0	95.0	99.5
SG-06	Total Dissolved Solids	mg/L						93.0		97.0	95.0	130
SG-06	Total Suspended Solids	mg/L						6.00		5.00	5.00	5.00
SG-06	Biological Oxygen Demand	mg/L						5.00		7.00	3.00	3.00
SG-06	Chemical Oxygen Demand	mg/L						14.0		16.0	22.0	15.0
SG-06	Chemical Oxygen Demand, Low Level	mg/L										
SG-06	Ammonia	mg/L						0.100		0.100	0.168	0.100
SG-06	Nitrate	mg/L						(PHT)		(PHT)	0.500	0.500
SG-06	Nitrogen, Total Kjeldahl	mg/L						0.392		0.616	0.336	0.616
SG-06	Chloride	mg/L						1		1	1	1
SG-06	Fluoride	mg/L						0.100		0.619	0.100	0.100
SG-06	Sulfate	mg/L						4.46		4.00	4.00	5.90
SG-06	Cyanide, total	ug/L						20		20	20	20
SG-06	Oil & Grease	mg/L						1.50		1.07	1.08	1.02
SG-06	Turbidity, Lab	NTU						(PHT)		(PHT)	1.30	0.850
SG-06	Cations	Meq/L						2.12		9.02	2.02	2.23
SG-06	Anions	Meq/L						1.74		1.89	1.63	1.94
SG-06	Cation and Anion Balance	%						9.96		9.02	10.8	6.80
SG-06	Boron, total	mg/L						0.100		0.100	0.100	0.100
SG-06	Calcium, total	mg/L						23.8		24.4	21.7	23.2
SG-06	Arsenic, total	mg/L						0.005		0.005	0.005	0.005
SG-06	Barium, total	mg/L						0.010		0.010	0.010	0.010
SG-06	Iron, dissolved	mg/L						0.138		0.100	0.108	0.100
SG-06	Iron, total	mg/L						0.187		0.123	0.160	0.141
SG-06	Manganese, dissolved	mg/L						0.109		0.010	0.010	0.011
SG-06	Manganese, total	mg/L						0.126		0.021	0.061	0.026
SG-06	Molybdenum, total	mg/L						0.020		0.020	0.020	0.020
SG-06	Selenium, total	mg/L						0.005		0.005	0.005	0.005
SG-06	Silver, total	mg/L						0.010		0.010	0.010	0.010
SG-06	Chromium, total	mg/L						0.020		0.020	0.020	0.020
SG-06	Chromium, total (Low Level)	ug/L						0.470		0.470	0.56	0.45
SG-06	Beryllium, total	mg/L						0.005		0.005	0.005	0.005
SG-06	Thallium, total	mg/L						0.005		0.005	0.005	0.005
SG-06	Nickel, total	mg/L						0.030		0.030	0.030	0.030
SG-06	Antimony, total	mg/L						0.005		0.005	0.005	0.005
SG-06	Magnesium, total	mg/L						10.3		11.7	10.5	11.9
SG-06	Phosphorus, dissolved	mg/L						0.050		0.012	0.011	0.011
SG-06	Phosphorus, total	mg/L						0.050		0.048	0.029	0.020
SG-06	Potassium, total	mg/L						0.740		0.630	0.600	0.640
SG-06	Sodium, total	mg/L						1.56		1.64	1.64	1.71
SG-06	Sodium Absorption Ratio	std						0.067		0.068	0.072	0.072
SG-06	Aluminum, total	ug/L						20.5		16.4	25.0	8.80
SG-06	Cadmium, total	ug/L						0.006		0.003	0.004	0.003
SG-06	Copper, total	ug/L						0.187		0.415	0.293	0.154
SG-06	Lead, total	ug/L						0.122		0.076	0.132	0.060
SG-06	Mercury, total	ng/L						2		2	2.76	1.27
SG-06	Zinc, total	ug/L						1.23		1.04	1.56	1.07

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
SG-06	pH (Field)	S.U.	7.62	7.81		7.17	8.05	7.47	7.81	7.76	7.17	
SG-06	pH, Lab	S.U.	(PHT)	8.1		7.1	7.6	7.6	7.9	7.4	7.2	
SG-06	Conductivity (Field)	umhos	97.8	178		141.4	211	206	227	248	145.9	
SG-06	Conductivity, Lab	umhos	191									
SG-06	Temperature (Field)	Degrees C	17.8	19.3		10.0	6.7	1.3	1.0	0.5	3.5	
SG-06	Temperature (Field-DO Meter)	Degrees C	17	19		10.0	6.75	1.5	0.5	0.75	3.0	
SG-06	Dissolved Oxygen (Field)	%	7.0	9.0		8.0	10.25	13.6	14.5	8.5	10.6	
SG-06	Alkalinity	mg/L	92.2	93		76	110	110	130	130	77	
SG-06	Alkalinity, Bicarbonate	mg/L	92.2	93		76	110	110	130	130	77	
SG-06	Alkalinity, Carbonate	mg/L	0	≤ 5		≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	
SG-06	Alkalinity, Hydroxide	mg/L	0	≤ 5		≤ 5						
SG-06	Hardness	mg/L	100	100		110	≤ 5	110	130	130	100	
SG-06	Total Dissolved Solids	mg/L	116	120		97	160	190	150	180	90	
SG-06	Total Suspended Solids	mg/L	≤ 5.00			≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	
SG-06	Biological Oxygen Demand	mg/L	≤ 3.00	≤ 2		≤ 3	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3	
SG-06	Chemical Oxygen Demand	mg/L	21.0									
SG-06	Chemical Oxygen Demand, Low Level	mg/L		≤ 20		33	≤ 10	≤ 10	≤ 10	≤ 10	18	
SG-06	Ammonia	mg/L	≤ 0.100	≤ 0.1		≤ 0.1	≤ 0.1	≤ 0.1		0.1	0.1	
SG-06	Nitrate	mg/L	≤ 0.500	≤ 0.5		≤ 0.50	≤ 0.50	≤ 0.50	≤ 0.50	≤ 0.50	≤ 0.50	
SG-06	Nitrogen, Total Kjeldahl	mg/L	0.168	0.6		0.6	0.6	1.3	0.4	0.4	0.4	
SG-06	Chloride	mg/L	1	≤ 1		2	≤ 1	≤ 1	1	≤ 1	≤ 1	
SG-06	Fluoride	mg/L	≤ 0.100	≤ 0.1		≤ 0.1	0.1	≤ 0.1	0.1	≤ 0.1	≤ 0.1	
SG-06	Sulfate	mg/L	10.0			16	7.7	6.7	7.2	5.4	5.1	
SG-06	Cyanide, total	ug/L	≤ 20	≤ 20		≤ 20	≤ 20	≤ 20	≤ 20	≤ 20	≤ 20	
SG-06	Oil & Grease	mg/L	≤ 1.02	≤ 1		≤ 4.6	≤ 4.6	≤ 4.6	≤ 4.6	≤ 4.6	≤ 4.6	
SG-06	Turbidity, Lab	NTU	0.950	≤ 0.5		1.7	3.3	2.6	1.8	≤ 0.5	1.5	
SG-06	Cations	Meq/L	2.05	1.939		1.741	2.13	2.33	2.89	2.45	1.65	
SG-06	Anions	Meq/L	1.75	1.524		1.635	1.96	1.94	2.31	2.24	1.37	
SG-06	Cation and Anion Balance	%	7.92	11.97		3.14	3.96	9.15	11.24	4.46	9.47	
SG-06	Boron, total	mg/L	≤ 0.100	≤ 0.20		≤ 0.10	≤ 0.10	≤ 0.10	≤ 0.10	≤ 0.10	≤ 0.10	
SG-06	Calcium, total	mg/L	20.1	19		18	23	25	31	27	18	
SG-06	Arsenic, total	mg/L	≤ 0.005	≤ 0.005		≤ 0.005	≤ 0.005	≤ 0.005	≤ 0.005	≤ 0.005	≤ 0.005	
SG-06	Barium, total	mg/L	≤ 0.010	≤ 0.010		≤ 0.010	≤ 0.010	≤ 0.010	≤ 0.010	≤ 0.010	0.058	
SG-06	Iron, dissolved	mg/L	≤ 0.100	0.050		0.23	≤ 0.050	≤ 0.050	≤ 0.050	≤ 0.050	0.085	
SG-06	Iron, total	mg/L	0.110	0.094		0.30	0.21	0.056	≤ 0.050	0.031	0.14	
SG-06	Manganese, dissolved	mg/L	≤ 0.010	≤ 0.010		0.017	≤ 0.010	≤ 0.010	0.017	≤ 0.010	0.010	
SG-06	Manganese, total	mg/L	0.016	≤ 0.010		0.018	0.018	0.012	≤ 0.010	≤ 0.010	0.040	
SG-06	Molybdenum, total	mg/L	≤ 0.020	≤ 0.020		≤ 0.020	≤ 0.020	≤ 0.020	≤ 0.020	≤ 0.020	0.020	
SG-06	Selenium, total	mg/L	≤ 0.005	≤ 0.005		≤ 0.005	≤ 0.005	≤ 0.005	≤ 0.005	≤ 0.005	≤ 0.005	
SG-06	Silver, total	mg/L	≤ 0.010	≤ 0.010		≤ 0.010	≤ 0.010	≤ 0.010	≤ 0.010	≤ 0.010	0.010	
SG-06	Chromium, total	mg/L	≤ 0.020									
SG-06	Chromium, total (Low Level)	ug/L	0.51	0.418		≤ 0.30	0.30	0.41	0.255	0.436	0.359	
SG-06	Beryllium, total	mg/L	≤ 0.005	≤ 0.010		≤ 0.010	≤ 0.010	≤ 0.010	≤ 0.010	≤ 0.010	≤ 0.010	
SG-06	Thallium, total	mg/L	≤ 0.005	≤ 0.005		≤ 0.005	≤ 0.005	≤ 0.005	≤ 0.005	≤ 0.005	≤ 0.005	
SG-06	Nickel, total	mg/L	≤ 0.030	≤ 0.030		≤ 0.030	≤ 0.030	≤ 0.030	≤ 0.030	≤ 0.030	0.030	
SG-06	Antimony, total	mg/L	≤ 0.005	≤ 0.005		≤ 0.005	≤ 0.005	≤ 0.005	≤ 0.005	≤ 0.005	≤ 0.005	
SG-06	Magnesium, total	mg/L	11.8	11		9.2	11	12	15	12	8.2	
SG-06	Phosphorus, dissolved	mg/L	0.005	≤ 0.05		≤ 0.05	≤ 0.05	≤ 0.05	≤ 0.05	≤ 0.05	≤ 0.05	
SG-06	Phosphorus, total	mg/L	0.015	0.017		≤ 0.05	≤ 0.05	≤ 0.05	≤ 0.05	≤ 0.05	≤ 0.05	
SG-06	Potassium, total	mg/L	≤ 0.600	≤ 1.0		≤ 1.0	≤ 1.0	≤ 1.0	≤ 1.0	1.6	1.0	
SG-06	Sodium, total	mg/L	1.82	1.6		1.5	1.7	1.9	2.2	1.8	1.4	
SG-06	Sodium Absorption Ratio	std	0.080	0.072		0.072	0.073	0.08	0.08	0.07	0.07	
SG-06	Aluminum, total	ug/L	8.3	26.3		58.2	19.9	17.2	6.98	3.36	33.8	
SG-06	Cadmium, total	ug/L	≤ 0.006	≤ 0.006		0.0079	≤ 0.006	≤ 0.006	0.003	≤ 0.003	0.007	
SG-06	Copper, total	ug/L	0.299	0.190		0.118	0.101	0.110	0.241	0.214	0.430	
SG-06	Lead, total	ug/L	0.066	0.0879		0.159	0.084	0.057	0.030	0.023	0.084	
SG-06	Mercury, total	ng/L	0.80	1.31		2.73	0.7	2.0	0.69	0.50	3.12	
SG-06	Zinc, total	ug/L	3.12	0.986		1.85	3.94	1.09	0.640	2.69	1.09	

STATION	PARAMETER	Units	Nov-93	Dec-93	Jan-94	Feb-94	Mar-94	Apr-94	Apr-94	May-94	Jun-94	Jul-94
SG-19	pH (Field)	S.U.						7.14		6.56	6.37	7.56
SG-19	pH, Lab	S.U.						(PHT)		(PHT)	(PHT)	(PHT)
SG-19	Conductivity (Field)	umhos						197		126	94	202
SG-19	Conductivity, Lab	umhos						194		121	88.9	182
SG-19	Temperature (Field)	Degrees C						1.1		6.4	10.5	13.7
SG-19	Temperature (Field-DO Meter)	Degrees C						1.0		6.5	10	13
SG-19	Dissolved Oxygen (Field)	%						10.2		9.3	9.5	9.0
SG-19	Alkalinity	mg/L						96.0		58.2	41.8	92.0
SG-19	Alkalinity, Bicarbonate	mg/L						96.0		58.2	41.8	92.0
SG-19	Alkalinity, Carbonate	mg/L						0		0	0	0
SG-19	Alkalinity, Hydroxide	mg/L						0		0	0	0
SG-19	Hardness	mg/L						97.4		62.6	54.2	97.0
SG-19	Total Dissolved Solids	mg/L						117		58.0	74.0	118
SG-19	Total Suspended Solids	mg/L						6.00		5.00	19.0	5.00
SG-19	Biological Oxygen Demand	mg/L						9.00		6.00	3.00	3.00
SG-19	Chemical Oxygen Demand	mg/L						23.0		31.0	45.0	25.0
SG-19	Chemical Oxygen Demand, Low Level	mg/L										
SG-19	Ammonia	mg/L						0.100		0.100	0.112	0.100
SG-19	Nitrate	mg/L						0.675		(PHT)	0.709	0.719
SG-19	Nitrogen, Total Kjeldahl	mg/L						0.308		0.280	0.420	0.200
SG-19	Chloride	mg/L						1		1	1	1
SG-19	Fluoride	mg/L						0.100		0.469	0.100	0.100
SG-19	Sulfate	mg/L						5.15		6.00	5.00	7.10
SG-19	Cyanide, total	ug/L						20		20	20	20
SG-19	Oil & Grease	mg/L						1.52		1.02	1.08	1.01
SG-19	Turbidity, Lab	NTU						0.950		(PHT)	2.70	1.70
SG-19	Cations	Meq/L						2.14		1.32	1.03	2.10
SG-19	Anions	Meq/L						1.73		1.15	0.834	1.70
SG-19	Cation and Anion Balance	%						10.4		6.88	10.5	10.6
SG-19	Boron, total	mg/L						0.100		0.100	0.100	0.100
SG-19	Calcium, total	mg/L						22.4		13.4	10.7	23.3
SG-19	Arsenic, total	mg/L						0.005		0.005	0.005	0.005
SG-19	Barium, total	mg/L						0.014		0.012	0.010	0.016
SG-19	Iron, dissolved	mg/L						0.151		0.177	0.167	1.38
SG-19	Iron, total	mg/L						0.342		0.228	0.333	0.869
SG-19	Manganese, dissolved	mg/L						0.014		0.010	0.010	0.010
SG-19	Manganese, total	mg/L						0.046		0.013	0.022	0.044
SG-19	Molybdenum, total	mg/L						0.020		0.020	0.020	0.020
SG-19	Selenium, total	mg/L						0.005		0.005	0.005	0.005
SG-19	Silver, total	mg/L						0.010		0.010	0.010	0.010
SG-19	Chromium, total	mg/L						0.020		0.020	0.020	0.020
SG-19	Chromium, total (Low Level)	ug/L						0.700		0.470	0.45	0.74
SG-19	Beryllium, total	mg/L						0.005		0.005	0.005	0.005
SG-19	Thallium, total	mg/L						0.005		0.005	0.005	0.005
SG-19	Nickel, total	mg/L						0.030		0.030	0.030	0.030
SG-19	Antimony, total	mg/L						0.005		0.005	0.005	0.005
SG-19	Magnesium, total	mg/L						11.1		7.26	5.38	10.4
SG-19	Phosphorus, dissolved	mg/L						0.050		0.023	0.029	0.033
SG-19	Phosphorus, total	mg/L						0.050		0.027	0.055	0.054
SG-19	Potassium, total	mg/L						0.640		0.600	0.600	0.600
SG-19	Sodium, total	mg/L						2.07		1.33	1.22	1.96
SG-19	Sodium Absorption Ratio	std						0.089		0.073	0.076	0.085
SG-19	Aluminum, total	ug/L						14.4		23.2	39.4	14.0
SG-19	Cadmium, total	ug/L						0.006		0.005	0.007	0.005
SG-19	Copper, total	ug/L						0.365		0.273	0.200	0.201
SG-19	Lead, total	ug/L						0.084		0.106	0.142	0.076
SG-19	Mercury, total	ng/L						2		3	4.96	2.17
SG-19	Zinc, total	ug/L						1.31		1.38	1.56	1.43

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
SG-19	pH (Field)	S.U.	7.72	7.04		7.50	7.84			8.13	7.45	
SG-19	pH, Lab	S.U.	(PHT)	7.3		6.7	7.3	7.2		7.4	6.9	
SG-19	Conductivity (Field)	umhos	146	146.2		109.7	149.3			241	153.8	
SG-19	Conductivity, Lab	umhos	144									
SG-19	Temperature (Field)	Degrees C	12.2	14.8		8.6	3.7			1.9	5.5	
SG-19	Temperature (Field-DO Meter)	Degrees C	13	13		9.5	4.0			2.5	1.75	
SG-19	Dissolved Oxygen (Field)	%	9.2	8.3		8.1	11.6			13.4	11.0	
SG-19	Alkalinity	mg/L	71.2	70		49	77	71		120	44	
SG-19	Alkalinity, Bicarbonate	mg/L	71.2	70		49	77	71		120	44	
SG-19	Alkalinity, Carbonate	mg/L	0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	
SG-19	Alkalinity, Hydroxide	mg/L	0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	
SG-19	Hardness	mg/L	102	86		69	84	76		120	46	
SG-19	Total Dissolved Solids	mg/L	120	130		92	150	150		190	110	
SG-19	Total Suspended Solids	mg/L	< 5.00			< 5	< 5	10		5	17	
SG-19	Biological Oxygen Demand	mg/L	7.00	< 2		< 3	< 3	< 3		< 3	5	
SG-19	Chemical Oxygen Demand	mg/L	37.0									
SG-19	Chemical Oxygen Demand, Low Level	mg/L		50		69	21	26		< 10	53	
SG-19	Ammonia	mg/L	< 0.100	< 0.1		0.1	< 0.1	0.2		< 0.1	0.1	
SG-19	Nitrate	mg/L	(PHT)	< 0.5		< 0.50	< 0.50	< 0.50		< 0.50	< 0.50	
SG-19	Nitrogen, Total Kjeldahl	mg/L	0.560	0.8		0.7	0.6	0.7		0.3	0.7	
SG-19	Chloride	mg/L	1	1		2	1	1		< 1	2	
SG-19	Fluoride	mg/L	< 0.100	< 0.1		< 0.1	0.1	< 0.1		< 0.1	< 0.1	
SG-19	Sulfate	mg/L	17.0			28	15	11		7.1	8.5	
SG-19	Cyanide, total	ug/L	< 20	< 20		< 20	< 20	< 20		< 20	< 20	
SG-19	Oil & Grease	mg/L	< 1.01	< 1		12	< 4.6	< 4.6		< 4.6	< 4.6	
SG-19	Turbidity, Lab	NTU	3.00	< 0.5		9.9	1.7	2.3		1.0	4.5	
SG-19	Cations	Meq/L	1.74	1.526		1.347	1.63	1.46		2.34	1.18	
SG-19	Anions	Meq/L	1.56	0.029		0.640	0.341	1.42		2.12	0.95	
SG-19	Cation and Anion Balance	%	5.37	96.30		35.58	65.35	1.18		5.03	10.44	
SG-19	Boron, total	mg/L	< 0.100	< 0.20		< 0.10	< 0.10	< 0.10		< 0.10	< 0.10	
SG-19	Calcium, total	mg/L	18.9	16		14	17	15		25	12	
SG-19	Arsenic, total	mg/L	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	
SG-19	Barium, total	mg/L	0.013	0.011		0.013	0.010	< 0.010		0.012	0.036	
SG-19	Iron, dissolved	mg/L	0.141	0.20		0.50	0.35	0.22		< 0.050	0.16	
SG-19	Iron, total	mg/L	0.399	0.29		0.77	0.54	0.46		0.11	0.36	
SG-19	Manganese, dissolved	mg/L	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	
SG-19	Manganese, total	mg/L	0.052	0.025		0.037	0.054	0.061		0.017	0.10	
SG-19	Molybdenum, total	mg/L	< 0.020	< 0.020		< 0.020	< 0.020	< 0.020		< 0.020	< 0.020	
SG-19	Selenium, total	mg/L	< 0.005	< 0.005		< 0.005	0.006	< 0.005		< 0.005	< 0.005	
SG-19	Silver, total	mg/L	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	
SG-19	Chromium, total	mg/L	< 0.020									
SG-19	Chromium, total (Low Level)	ug/L	0.51	0.358		< 0.30	1.24	0.54		0.718	0.483	
SG-19	Beryllium, total	mg/L	< 0.005	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	
SG-19	Thallium, total	mg/L	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	
SG-19	Nickel, total	mg/L	< 0.030	< 0.030		< 0.030	< 0.030	< 0.030		< 0.030	< 0.030	
SG-19	Antimony, total	mg/L	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	
SG-19	Magnesium, total	mg/L	8.78	8.0		7.2	8.6	7.6		12	6.1	
SG-19	Phosphorus, dissolved	mg/L	0.030	< 0.05		< 0.05	< 0.05	< 0.05		< 0.05	< 0.05	
SG-19	Phosphorus, total	mg/L	0.057	< 0.05		< 0.05	< 0.05	< 0.05		< 0.05	< 0.05	
SG-19	Potassium, total	mg/L	< 0.600	< 1.0		< 1.0	< 1.0	< 1.0		< 1.0	< 1.0	
SG-19	Sodium, total	mg/L	1.72	1.6		1.3	1.7	1.6		2.1	1.3	
SG-19	Sodium Absorption Ratio	std	0.082	0.082		0.070	0.084	0.08		0.09	0.08	
SG-19	Aluminum, total	ug/L	38.0	32.1		68.4	61.1	32.6		9.12	49.9	
SG-19	Cadmium, total	ug/L	0.014	< 0.006		0.0131	0.008	< 0.006		0.004	< 0.003	
SG-19	Copper, total	ug/L	0.406	0.613		0.102	0.431	0.093		0.247	0.313	
SG-19	Lead, total	ug/L	0.315	0.155		0.221	0.199	0.127		0.073	0.140	
SG-19	Mercury, total	ng/L	5.60	3.27		4.99	2.3	2.4		0.81	7.95	
SG-19	Zinc, total	ug/L	5.90	2.89		4.90	6.56	1.47		0.710	2.44	

Crandon Surface Water Summary
Updated : 12/16/98

STATION	PARAMETER	Units	Dec-97
SG-1914	pH (Field)	S.U.	
SG-1914	pH, Lab	S.U.	7.7
SG-1914	Conductivity (Field)	umhos	
SG-1914	Conductivity, Lab	umhos	
SG-1914	Temperature (Field)	Degrees C	
SG-1914	Temperature (Field-DO Meter)	Degrees C	
SG-1914	Dissolved Oxygen (Field)	%	
SG-1914	Alkalinity	mg/L	190
SG-1914	Alkalinity, Bicarbonate	mg/L	230
SG-1914	Alkalinity, Carbonate	mg/L	< 1.4
SG-1914	Alkalinity, Hydroxide	mg/L	
SG-1914	Hardness	mg/L	86
SG-1914	Total Dissolved Solids	mg/L	140
SG-1914	Total Suspended Solids	mg/L	< 1
SG-1914	Biological Oxygen Demand	mg/L	< 3
SG-1914	Chemical Oxygen Demand	mg/L	22
SG-1914	Chemical Oxygen Demand, Lo	mg/L	
SG-1914	Color	CPU	50
SG-1914	TVS	% DWB	7.8
SG-1914	Ammonia	mg/L	0.073
SG-1914	Nitrate	mg/L	
SG-1914	Nitrate + Nitrite	mg/L	0.063
SG-1914	Nitrogen, Total Kjeldahl	mg/L	0.20
SG-1914	Chloride	mg/L	2.3
SG-1914	Fluoride	mg/L	0.055
SG-1914	Sulfate	mg/L	8.3
SG-1914	Cyanide, total	mg/L	< 0.0046
SG-1914	Oil & Grease	mg/L	< 7.6
SG-1914	Turbidity, Lab	NTU	0.99
SG-1914	Cations	Meq/L	
SG-1914	Anions	Meq/L	
SG-1914	Cation and Anion Balance	%	
SG-1914	Boron, total	mg/L	< 0.018
SG-1914	Calcium, total	mg/L	19
SG-1914	Arsenic, total	mg/L	< 0.0018
SG-1914	Barium, total	mg/L	0.008
SG-1914	Iron, dissolved	mg/L	
SG-1914	Iron, total	mg/L	0.061
SG-1914	Manganese, dissolved	mg/L	
SG-1914	Manganese, total	mg/L	0.0036
SG-1914	Molybdenum, total	mg/L	< 0.0082
SG-1914	Selenium, total	mg/L	< 0.0016
SG-1914	Silver, total	mg/L	0.0044
SG-1914	Chromium, total	ug/L	0.8
SG-1914	Chromium III	ug/L	0.15
SG-1914	Chromium VI	ug/L	0.65
SG-1914	Beryllium, total	mg/L	
SG-1914	Thallium, total	mg/L	
SG-1914	Nickel, total	mg/L	
SG-1914	Antimony, total	mg/L	
SG-1914	Magnesium, total	mg/L	
SG-1914	Phosphorus, dissolved	mg/L	
SG-1914	Phosphorus, total	mg/L	0.03
SG-1914	Potassium, total	mg/L	
SG-1914	Sodium, total	mg/L	
SG-1914	Sodium Absorption Ratio	std	
SG-1914	Aluminum, total	ug/L	14
SG-1914	Cadmium, total	ug/L	< 0.03
SG-1914	Copper, total	ug/L	0.088
SG-1914	Lead, total	ug/L	0.023
SG-1914	Mercury, total	ug/L	0.0013
SG-1914	Zinc, total	ug/L	0.82

Crandon Surface Water Summary
Updated : 12/16/98

STATION	PARAMETER	Units	Dec-97
SG1914-02	pH (Field)	S.U.	
SG1914-02	pH, Lab	S.U.	7.7
SG1914-02	Conductivity (Field)	umhos	
SG1914-02	Conductivity, Lab	umhos	
SG1914-02	Temperature (Field)	Degrees C	
SG1914-02	Temperature (Field-DO Meter)	Degrees C	
SG1914-02	Dissolved Oxygen (Field)	%	
SG1914-02	Alkalinity	mg/L	97
SG1914-02	Alkalinity, Bicarbonate	mg/L	120
SG1914-02	Alkalinity, Carbonate	mg/L	< 1.4
SG1914-02	Alkalinity, Hydroxide	mg/L	
SG1914-02	Hardness	mg/L	85
SG1914-02	Total Dissolved Solids	mg/L	140
SG1914-02	Total Suspended Solids	mg/L	< 1
SG1914-02	Biological Oxygen Demand	mg/L	< 3
SG1914-02	Chemical Oxygen Demand	mg/L	18
SG1914-02	Chemical Oxygen Demand, Lo	mg/L	
SG1914-02	Color	CPU	40
SG1914-02	TVS	% DWB	7
SG1914-02	Ammonia	mg/L	0.15
SG1914-02	Nitrate	mg/L	
SG1914-02	Nitrate + Nitrite	mg/L	0.14
SG1914-02	Nitrogen, Total Kjeldahl	mg/L	0.17
SG1914-02	Chloride	mg/L	< 0.56
SG1914-02	Fluoride	mg/L	0.054
SG1914-02	Sulfate	mg/L	8.5
SG1914-02	Cyanide, total	mg/L	< 0.0046
SG1914-02	Oil & Grease	mg/L	< 7.8
SG1914-02	Turbidity, Lab	NTU	0.84
SG1914-02	Cations	Meq/L	
SG1914-02	Anions	Meq/L	
SG1914-02	Cation and Anion Balance	%	
SG1914-02	Boron, total	mg/L	< 0.018
SG1914-02	Calcium, total	mg/L	19
SG1914-02	Arsenic, total	mg/L	< 0.0018
SG1914-02	Barium, total	mg/L	0.0077
SG1914-02	Iron, dissolved	mg/L	
SG1914-02	Iron, total	mg/L	0.06
SG1914-02	Manganese, dissolved	mg/L	
SG1914-02	Manganese, total	mg/L	0.0031
SG1914-02	Molybdenum, total	mg/L	< 0.0082
SG1914-02	Selenium, total	mg/L	< 0.0016
SG1914-02	Silver, total	mg/L	0.003
SG1914-02	Chromium, total	ug/L	0.51
SG1914-02	Chromium III	ug/L	0.055
SG1914-02	Chromium VI	ug/L	0.45
SG1914-02	Beryllium, total	mg/L	
SG1914-02	Thallium, total	mg/L	
SG1914-02	Nickel, total	mg/L	
SG1914-02	Antimony, total	mg/L	
SG1914-02	Magnesium, total	mg/L	
SG1914-02	Phosphorus, dissolved	mg/L	
SG1914-02	Phosphorus, total	mg/L	0.02
SG1914-02	Potassium, total	mg/L	
SG1914-02	Sodium, total	mg/L	
SG1914-02	Sodium Absorption Ratio	std	
SG1914-02	Aluminum, total	ug/L	10
SG1914-02	Cadmium, total	ug/L	< 0.03
SG1914-02	Copper, total	ug/L	0.078
SG1914-02	Lead, total	ug/L	< 0.02
SG1914-02	Mercury, total	ug/L	0.0012
SG1914-02	Zinc, total	ug/L	0.82

Crandon Surface Water Summary
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STATION	PARAMETER	Units	Dec-97
SG-19B	pH (Field)	S.U.	
SG-19B	pH, Lab	S.U.	7.1
SG-19B	Conductivity (Field)	umhos	
SG-19B	Conductivity, Lab	umhos	
SG-19B	Temperature (Field)	Degrees C	
SG-19B	Temperature (Field-DO Meter)	Degrees C	
SG-19B	Dissolved Oxygen (Field)	%	
SG-19B	Alkalinity	mg/L	120
SG-19B	Alkalinity, Bicarbonate	mg/L	150
SG-19B	Alkalinity, Carbonate	mg/L	< 1.4
SG-19B	Alkalinity, Hydroxide	mg/L	
SG-19B	Hardness	mg/L	100
SG-19B	Total Dissolved Solids	mg/L	170
SG-19B	Total Suspended Solids	mg/L	< 1.0
SG-19B	Biological Oxygen Demand	mg/L	5.0
SG-19B	Chemical Oxygen Demand	mg/L	10
SG-19B	Chemical Oxygen Demand, Lo	mg/L	
SG-19B	Color	CPU	60
SG-19B	TVS	% DWB	10
SG-19B	Ammonia	mg/L	0.087
SG-19B	Nitrate	mg/L	
SG-19B	Nitrate + Nitrite	mg/L	< 0.031
SG-19B	Nitrogen, Total Kjeldahl	mg/L	0.24
SG-19B	Chloride	mg/L	< 0.56
SG-19B	Fluoride	mg/L	0.066
SG-19B	Sulfate	mg/L	9.3
SG-19B	Cyanide, total	mg/L	< 0.0046
SG-19B	Oil & Grease	mg/L	< 8.1
SG-19B	Turbidity, Lab	NTU	2.6
SG-19B	Cations	Meq/L	
SG-19B	Anions	Meq/L	
SG-19B	Cation and Anion Balance	%	
SG-19B	Boron, total	mg/L	< 0.018
SG-19B	Calcium, total	mg/L	25
SG-19B	Arsenic, total	mg/L	< 0.0018
SG-19B	Barium, total	mg/L	0.011
SG-19B	Iron, dissolved	mg/L	
SG-19B	Iron, total	mg/L	1.1
SG-19B	Manganese, dissolved	mg/L	
SG-19B	Manganese, total	mg/L	0.076
SG-19B	Molybdenum, total	mg/L	< 0.0082
SG-19B	Selenium, total	mg/L	< 0.0016
SG-19B	Silver, total	mg/L	0.0036
SG-19B	Chromium, total	ug/L	0.59
SG-19B	Chromium III	ug/L	0.21
SG-19B	Chromium VI	ug/L	0.38
SG-19B	Beryllium, total	mg/L	
SG-19B	Thallium, total	mg/L	
SG-19B	Nickel, total	mg/L	
SG-19B	Antimony, total	mg/L	
SG-19B	Magnesium, total	mg/L	
SG-19B	Phosphorus, dissolved	mg/L	
SG-19B	Phosphorus, total	mg/L	0.030
SG-19B	Potassium, total	mg/L	
SG-19B	Sodium, total	mg/L	
SG-19B	Sodium Absorption Ratio	std	
SG-19B	Aluminum, total	ug/L	30
SG-19B	Cadmium, total	ug/L	< 0.030
SG-19B	Copper, total	ug/L	0.063
SG-19B	Lead, total	ug/L	0.061
SG-19B	Mercury, total	ug/L	0.0013
SG-19B	Zinc, total	ug/L	0.59

STATION	PARAMETER	Units	Nov-93	Dec-93	Jan-94	Feb-94	Mar-94	Apr-94	Apr-94	May-94	Jun-94	Jul-94
SG-30	pH (Field)	S.U.						7.16		7.83	7.48	7.51
SG-30	pH, Lab	S.U.						(PHT)		(PHT)	(PHT)	(PHT)
SG-30	Conductivity (Field)	umhos						226		182	129	218
SG-30	Conductivity, Lab	umhos						230		194	200	234
SG-30	Temperature (Field)	Degrees C						4.4		16.4	23.0	24.2
SG-30	Temperature (Field-DO Meter)	Degrees C						2.4		16	22	24
SG-30	Dissolved Oxygen (Field)	%						12.0		8.2	6.3	7.8
SG-30	Alkalinity	mg/L						130		95.0	102	128
SG-30	Alkalinity, Bicarbonate	mg/L						130		95.0	102	128
SG-30	Alkalinity, Carbonate	mg/L						0		4.80	< 0	0
SG-30	Alkalinity, Hydroxide	mg/L						0		0	< 0	0
SG-30	Hardness	mg/L						121		102	102	139
SG-30	Total Dissolved Solids	mg/L						142		104	144	151
SG-30	Total Suspended Solids	mg/L						< 5.00		< 5.00	9.00	13.0
SG-30	Biological Oxygen Demand	mg/L						10.0		6.00	< 3.00	< 3.00
SG-30	Chemical Oxygen Demand	mg/L						17.0		28.0	36.0	28.0
SG-30	Chemical Oxygen Demand, Low Level	mg/L										
SG-30	Ammonia	mg/L						< 0.100		< 0.100	0.122	< 0.100
SG-30	Nitrate	mg/L						< 0.500		(PHT)	< 0.500	< 0.500
SG-30	Nitrogen, Total Kjeldahl	mg/L						0.336		0.560	0.504	0.812
SG-30	Chloride	mg/L						1		1	1	1
SG-30	Fluoride	mg/L						< 0.100		0.621	< 0.100	< 0.100
SG-30	Sulfate	mg/L						6.69		7.00	6.00	6.90
SG-30	Cyanide, total	ug/L						< 20		< 20	< 20	< 20
SG-30	Oil & Grease	mg/L						< 1.92		< 1.33	< 1.03	< 1.01
SG-30	Turbidity, Lab	NTU						0.500		(PHT)	0.950	9.50
SG-30	Cations	Meq/L						2.75		2.18	2.20	2.91
SG-30	Anions	Meq/L						2.30		1.93	1.83	2.27
SG-30	Cation and Anion Balance	%						8.87		6.06	9.19	12.2
SG-30	Boron, total	mg/L						< 0.100		< 0.100	< 0.100	< 0.100
SG-30	Calcium, total	mg/L						30.2		23.7	24.2	33.6
SG-30	Arsenic, total	mg/L						< 0.005		< 0.005	< 0.005	< 0.005
SG-30	Barium, total	mg/L						< 0.010		< 0.010	0.011	0.011
SG-30	Iron, dissolved	mg/L						< 0.100		< 0.100	0.101	< 0.100
SG-30	Iron, total	mg/L						< 0.100		0.104	< 0.100	< 0.100
SG-30	Manganese, dissolved	mg/L						< 0.010		< 0.010	< 0.010	< 0.010
SG-30	Manganese, total	mg/L						0.021		0.019	0.019	0.021
SG-30	Molybdenum, total	mg/L						< 0.020		< 0.020	< 0.020	< 0.020
SG-30	Selenium, total	mg/L						< 0.005		< 0.005	< 0.005	< 0.005
SG-30	Silver, total	mg/L						< 0.010		< 0.010	< 0.010	< 0.010
SG-30	Chromium, total	mg/L						< 0.020		< 0.020	< 0.020	< 0.020
SG-30	Chromium, total (Low Level)	ug/L						0.860		0.780	1.01	0.67
SG-30	Beryllium, total	mg/L						< 0.005		< 0.005	< 0.005	< 0.005
SG-30	Thallium, total	mg/L						< 0.005		< 0.005	< 0.005	< 0.005
SG-30	Nickel, total	mg/L						< 0.030		< 0.030	< 0.030	< 0.030
SG-30	Antimony, total	mg/L						< 0.005		< 0.005	< 0.005	< 0.005
SG-30	Magnesium, total	mg/L						13.8		11.2	11.1	13.9
SG-30	Phosphorus, dissolved	mg/L						< 0.050		0.018	0.033	0.058
SG-30	Phosphorus, total	mg/L						< 0.050		0.036	0.045	0.098
SG-30	Potassium, total	mg/L						0.610		< 0.600	< 0.600	< 0.600
SG-30	Sodium, total	mg/L						2.23		1.66	1.79	1.99
SG-30	Sodium Absorption Ratio	std						0.084		0.070	0.076	0.073
SG-30	Aluminum, total	ug/L						25.8		107	85.5	82.3
SG-30	Cadmium, total	ug/L						< 0.006		0.014	0.023	0.024
SG-30	Copper, total	ug/L						1.13		0.463	0.475	0.392
SG-30	Lead, total	ug/L						0.113		0.191	0.296	0.465
SG-30	Mercury, total	ng/L						1		3	3.86	3.4
SG-30	Zinc, total	ug/L						2.32		2.59	2.35	7.35

(PHT) : Past Hold Time

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
SG-30	pH (Field)	S.U.	7.94	7.17		7.57	7.28	7.53	7.62	7.98	7.94	
SG-30	pH, Lab	S.U.	(PHT)	8.0		7.2	7.6	7.1	7.4	7.3	7.1	
SG-30	Conductivity (Field)	unihos	236	272		207	236	284	307	274	209	
SG-30	Conductivity, Lab	unihos	235									
SG-30	Temperature (Field)	Degrees C	17.1	20.6		10.0	4.2	2.7	0.5	2.7	5.9	
SG-30	Temperature (Field-DO Meter)	Degrees C	18	20		10.5	4.5	2.0	0.5	2.25	3.5	
SG-30	Dissolved Oxygen (Field)	%	9.4	8.7		9.2	10.85	9.0	5.1	10.8	13.1	
SG-30	Alkalinity	mg/L	116	120		91	120	120	150	140	84	
SG-30	Alkalinity, Bicarbonate	mg/L	116	120		91	120	120	150	140	84	
SG-30	Alkalinity, Carbonate	mg/L	0	< 5		< 5	< 5	< 5	< 5	< 5	< 5	
SG-30	Alkalinity, Hydroxide	mg/L	0	< 5		< 5						
SG-30	Hardness	mg/L	128	130		100	130	120	160	140	94	
SG-30	Total Dissolved Solids	mg/L	147	150		110	200	180	140	170	160	
SG-30	Total Suspended Solids	mg/L	6.00			< 5	< 5	< 5	7.0	5	< 5	
SG-30	Biological Oxygen Demand	mg/L	7.00	< 2		< 3	< 3	< 3	< 3	< 3	5	
SG-30	Chemical Oxygen Demand	mg/L	20.0									
SG-30	Chemical Oxygen Demand, Low Level	mg/L		22		33	< 10	10	10	< 10	32	
SG-30	Ammonia	mg/L	< 0.100	< 0.1		< 0.1	0.1	0.2		< 0.1	0.1	
SG-30	Nitrate	mg/L	(PHT)	< 0.5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
SG-30	Nitrogen, Total Kjeldahl	mg/L	0.448	0.6		0.6	0.5	0.8	0.3	0.4	0.7	
SG-30	Chloride	mg/L	< 1	< 1		1	< 1	< 1	< 1	< 1	1	
SG-30	Fluoride	mg/L	< 0.100	< 0.1		< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	
SG-30	Sulfate	mg/L	12.0			19	12	10	8.7	6.5	7.6	
SG-30	Cyanide, total	ug/L	< 20	< 20		< 20	< 20	< 20	< 20	< 20	< 20	
SG-30	Oil & Grease	mg/L	< 1.03	< 1		6.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	
SG-30	Turbidity, Lab	NTU	3.20	< 0.5		1.6	0.7	0.62	0.7	< 0.5	2.1	
SG-30	Cations	Meq/L	2.58	2.484		2.198	9.82	2.52	3.19	3.14	1.92	
SG-30	Anions	Meq/L	2.19	0.000		1.853	0.251	2.18	2.64	2.43	1.57	
SG-30	Cation and Anion Balance	%	8.14	99.95		8.50	95.02	7.43	9.48	12.79	10.29	
SG-30	Boron, total	mg/L	< 0.100	< 0.20		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	
SG-30	Calcium, total	mg/L	28.4	28		24	27	27	35	34	21	
SG-30	Arsenic, total	mg/L	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
SG-30	Barium, total	mg/L	0.010	0.010		0.013	< 0.010	< 0.010	< 0.010	< 0.010	0.20	
SG-30	Iron, dissolved	mg/L	< 0.100	< 0.050		0.38	0.35	0.094	< 0.050	< 0.050	0.11	
SG-30	Iron, total	mg/L	< 0.100	< 0.28		0.30	0.12	0.11	0.052	< 0.050	0.19	
SG-30	Manganese, dissolved	mg/L	< 0.010	< 0.010		0.010	< 0.010	0.014	0.012	< 0.010	0.013	
SG-30	Manganese, total	mg/L	0.011	0.017		0.018	0.018	0.031	0.029	0.016	0.057	
SG-30	Molybdenum, total	mg/L	< 0.020	< 0.020		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	
SG-30	Selenium, total	mg/L	< 0.005	< 0.005		< 0.005	< 0.005	0.008	0.005	< 0.005	< 0.005	
SG-30	Silver, total	mg/L	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	
SG-30	Chromium, total	mg/L	< 0.020									
SG-30	Chromium, total (Low Level)	ug/L	0.76	0.944		< 0.30	0.52	0.46	0.519	0.524	0.821	
SG-30	Beryllium, total	mg/L	< 0.005	< 0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	
SG-30	Thallium, total	mg/L	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
SG-30	Nickel, total	mg/L	< 0.030	< 0.030		< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	
SG-30	Antimony, total	mg/L	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
SG-30	Magnesium, total	mg/L	13.1	12		11	102	13	16	16	9.6	
SG-30	Phosphorus, dissolved	mg/L	0.033	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.06	
SG-30	Phosphorus, total	mg/L	0.059	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	0.05	0.10	
SG-30	Potassium, total	mg/L	< 0.600	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	1.1	< 1.0	
SG-30	Sodium, total	mg/L	1.91	2.3		1.8	2.0	2.2	2.6	2.4	1.6	
SG-30	Sodium Absorption Ratio	std	0.074	0.092		0.076	0.039	0.09	0.09	0.08	0.07	
SG-30	Aluminum, total	ug/L	38.9	106		182	71.9	57.7	41.4	7.71	133	
SG-30	Cadmium, total	ug/L	0.006	0.00658		0.0135	0.010	< 0.006	0.007	0.004	0.007	
SG-30	Copper, total	ug/L	0.421	0.231		0.319	0.352	0.621	0.296	0.229	0.493	
SG-30	Lead, total	ug/L	0.280	0.245		0.235	0.158	0.171	0.162	0.037	0.069	
SG-30	Mercury, total	ng/L	2.33	2.42		2.78	0.8	1.2	1.34	0.99	5.58	
SG-30	Zinc, total	ug/L	5.60	1.93		3.80	2.20	1.61	1.31	0.817	3.85	

STATION	PARAMETER	Units	Nov-93	Dec-93	Jan-94	Feb-94	Mar-94	Apr-94	Apr-94	May-94	Jun-94	Jul-94
SG-AB	pH (Field)	S. U.		7.71	7.35	6.87	7.58	7.34	7.33	7.45	7.09	7.27
SG-AB	pH, Lab	S. U.		(PHT)	(PHT)	(PHT)	(PHT)	(PHT)	(PHT)	(PHT)	(PHT)	(PHT)
SG-AB	Conductivity (Field)	umhos		198	275	255	215	168	151	171	186	199
SG-AB	Conductivity, Lab	umhos		225	251	257	209	202	158	186	176	218
SG-AB	Temperature (Field)	Degrees C		1.1	0.6	0	2.0	2.0	9.9	15.5	20.6	20.8
SG-AB	Temperature (Field-DO Meter)	Degrees C						1.9	9	15.5	21	21
SG-AB	Dissolved Oxygen (Field)	%		8.9	3.2	3.15	6.1	11.1	9.2	9.4	6.2	7.2
SG-AB	Fecal Coliform	MPN									1.00	
SG-AB	Alkalinity	mg/L		113	124	122	103	96.0	72.6	85.6	80.0	102
SG-AB	Alkalinity, Bicarbonate	mg/L		113	124	122	103	96.0	72.6	85.6	80.0	102
SG-AB	Alkalinity, Carbonate	mg/L		5.00	5.00	0	0	0	0	0	0	0
SG-AB	Alkalinity, Hydroxide	mg/L				0	0	0	0	0	0	0
SG-AB	Hardness	mg/L		113	129	124	110	96.0	65.0	78.2	82.8	108
SG-AB	Total Dissolved Solids	mg/L		122	144	153	129	111	79.0	82.0	105	118
SG-AB	Total Suspended Solids	mg/L		5.00	5.00	5.00	5.00	5.00	12.0	5.00	5.00	5.00
SG-AB	Biological Oxygen Demand	mg/L		1.00	3.00	6.00	5.00	8.00	8.00	6.00	5.00	3.00
SG-AB	Chemical Oxygen Demand	mg/L		20.0	20.0	20.0	10.0	23.0	29.0	16.0	25.0	25.0
SG-AB	Chemical Oxygen Demand, Low Level	mg/L										
SG-AB	Ammonia	mg/L		0.100	0.570	0.459	0.112	0.112	0.112	0.100	0.100	0.100
SG-AB	Nitrate	mg/L		(PHT)	(PHT)	(PHT)	(PHT)	0.774	0.731	(PHT)	(PHT)	0.793
SG-AB	Nitrogen, Total Kjeldahl	mg/L		0.756	3.30	4.48	0.560	0.936	0.672	0.364	0.308	0.364
SG-AB	Chloride	mg/L		3	3	3	3	3	3	4	3	3
SG-AB	Fluoride	mg/L		0.100	0.100	0.100	0.100	0.100	0.100	0.526	0.100	0.100
SG-AB	Sulfate	mg/L		5.21	5.91	6.37	5.67	5.69	4.77	6.00		5.80
SG-AB	Cyanide, total	ug/L		20	20	20	20	20	20	20	20	
SG-AB	Oil & Grease	mg/L		1.00	1.01	1.02	1.00	1.53	1.11	1.07	1.01	1.01
SG-AB	Turbidity, Lab	NTU		(PHT)	1.40	1.31	(PHT)	2.93	7.00	(PHT)	(PHT)	0.900
SG-AB	Cations	Meq/L		2.39	2.54	2.72	2.18	2.14	1.62	1.67	1.91	2.32
SG-AB	Anions	Meq/L		2.07	2.27	2.23	1.90	1.80	1.38	1.67		1.90
SG-AB	Cation and Anion Balance	%		7.17	5.62	9.84	6.83	8.69	7.82	10.7		9.95
SG-AB	Boron, total	mg/L		0.100	0.100	0.100	0.100	0.099	0.100	0.100	0.100	0.100
SG-AB	Calcium, total	mg/L		25.7	26.9	29.0	23.3	22.6	16.6	21.1	19.8	25.0
SG-AB	Arsenic, total	mg/L		0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
SG-AB	Barium, total	mg/L		0.010	0.012	0.011	0.010	0.01	0.010	0.010	0.012	0.013
SG-AB	Iron, dissolved	mg/L		0.213	0.092	0.091	0.089	0.100	0.141	0.100	0.266	0.216
SG-AB	Iron, total	mg/L		0.239	0.252	0.222	0.241	0.254	0.508	0.327	0.401	0.292
SG-AB	Manganese, dissolved	mg/L		0.031	0.050	0.051	0.039	0.010	0.010	0.010	0.010	0.023
SG-AB	Manganese, total	mg/L		0.034	0.076	0.077	0.057	0.039	0.088	0.070	0.098	0.050
SG-AB	Molybdenum, total	mg/L		0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020
SG-AB	Selenium, total	mg/L		0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
SG-AB	Silver, total	mg/L		0.010	0.010	0.010	0.010	0.01	0.010	0.010	0.010	0.010
SG-AB	Chromium, total	mg/L		0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020
SG-AB	Chromium, total (Low Level)	ug/L						0.620	0.470	0.450	0.68	0.30
SG-AB	Beryllium, total	mg/L		0.001	0.001	0.001	0.005	0.005	0.005	0.005	0.005	0.005
SG-AB	Thallium, total	mg/L		0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
SG-AB	Nickel, total	mg/L		0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030
SG-AB	Antimony, total	mg/L		0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
SG-AB	Magnesium, total	mg/L		11.8	13.0	13.6	10.8	10.8	7.68	10.8	10.0	11.9
SG-AB	Phosphorus, dissolved	mg/L		0.050	0.050	0.050	0.050	0.050	0.050	0.012		0.025
SG-AB	Phosphorus, total	mg/L		0.050	0.050	0.050	0.050	0.050	0.050	0.038		0.039
SG-AB	Potassium, total	mg/L		1.00	1.00	0.840	0.970	0.690	1.10	0.810	0.600	0.600
SG-AB	Sodium, total	mg/L		3.09	2.96	2.90	2.46	2.46	2.91	2.48	2.34	2.19
SG-AB	Sodium Absorption Ratio	std		0.127	0.117	0.111	0.106	0.107	0.148	0.109	0.107	0.090
SG-AB	Aluminum, total	ug/L		16.9	19.5	8.04	13.1	22.3	77.1	21.1	13.9	9.26
SG-AB	Cadmium, total	ug/L		0.011	0.011	0.004	0.004	0.006	0.006	0.006	0.003	0.008
SG-AB	Copper, total	ug/L		0.147	0.135	0.151	0.177	0.261	0.450	0.451	0.233	0.292
SG-AB	Lead, total	ug/L		0.095	0.081	0.077	0.110	0.159	0.374	0.164	0.204	0.111
SG-AB	Mercury, total	ng/L		2	1	0.9	1	1	4	2	4.37	1.55
SG-AB	Zinc, total	ug/L		0.740	0.740	0.910	0.110	1.31	2.18	1.21	1.22	1.36

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
SG-AB	pH (Field)	S.U.	7.09	7.28	7.03	7.60						
SG-AB	pH, Lab	S.U.	(PHT)	7.7	6.8	7.1						
SG-AB	Conductivity (Field)	umhos	212	208	219	180.9						
SG-AB	Conductivity, Lab	umhos	212									
SG-AB	Temperature (Field)	Degrees C	18.8	16.9	19.9	9.6						
SG-AB	Temperature (Field-DO Meter)	Degrees C	19	17	20	10.0						
SG-AB	Dissolved Oxygen (Field)	%	9.0	10.2	7.2	8.0						
SG-AB	Fecal Coliform	MPN										
SG-AB	Alkalinity	mg/L	103	110	59	79						
SG-AB	Alkalinity, Bicarbonate	mg/L	103	110	59	79						
SG-AB	Alkalinity, Carbonate	mg/L	0	5	5	5						
SG-AB	Alkalinity, Hydroxide	mg/L	0	5	5	5						
SG-AB	Hardness	mg/L	120	120		91						
SG-AB	Total Dissolved Solids	mg/L	125	140	120	100						
SG-AB	Total Suspended Solids	mg/L	5.00		5	5						
SG-AB	Biological Oxygen Demand	mg/L	5.00	2	3	3						
SG-AB	Chemical Oxygen Demand	mg/L	15.0									
SG-AB	Chemical Oxygen Demand, Low Level	mg/L		20	48	23						
SG-AB	Ammonia	mg/L	0.100	0.1	0.2	0.1						
SG-AB	Nitrate	mg/L	(PHT)	0.5	0.042	0.50						
SG-AB	Nitrogen, Total Kjeldahl	mg/L	0.252	0.6	0.7	0.6						
SG-AB	Chloride	mg/L	3	3	2	4						
SG-AB	Fluoride	mg/L	0.100	0.1	0.1	0.1						
SG-AB	Sulfate	mg/L	10.0		18	11						
SG-AB	Cyanide, total	ug/L	20	20	10	20						
SG-AB	Oil & Grease	mg/L	1.03	6.5	5.7	4.6						
SG-AB	Turbidity, Lab	NTU	0.850	0.5		1.0						
SG-AB	Cations	Meq/L	2.34	2.244	1.419	1.934						
SG-AB	Anions	Meq/L	2.00	0.085	1.399	1.640						
SG-AB	Cation and Anion Balance	%	7.95	92.73	0.73	8.22						
SG-AB	Boron, total	mg/L	0.100	0.20	0.20	0.10						
SG-AB	Calcium, total	mg/L	24.6	23	15	20						
SG-AB	Arsenic, total	mg/L	0.005	0.005	0.005	0.005						
SG-AB	Barium, total	mg/L	0.013	0.011	0.012	0.010						
SG-AB	Iron, dissolved	mg/L	0.100	0.077	0.24	0.22						
SG-AB	Iron, total	mg/L	0.174	0.16	0.36	0.30						
SG-AB	Manganese, dissolved	mg/L	0.010	0.010	0.010	0.023						
SG-AB	Manganese, total	mg/L	0.025	0.025	0.050	0.040						
SG-AB	Molybdenum, total	mg/L	0.020	0.020	0.020	0.020						
SG-AB	Selenium, total	mg/L	0.005	0.005	0.005	0.005						
SG-AB	Silver, total	mg/L	0.010	0.010	0.010	0.010						
SG-AB	Chromium, total	mg/L	0.020									
SG-AB	Chromium, total (Low Level)	ug/L	0.34	0.817	0.672	0.45						
SG-AB	Beryllium, total	mg/L	0.005	0.010	0.010	0.010						
SG-AB	Thallium, total	mg/L	0.005	0.005	0.005	0.005						
SG-AB	Nickel, total	mg/L	0.030	0.030	0.030	0.030						
SG-AB	Antimony, total	mg/L	0.005	0.005	0.005	0.005						
SG-AB	Magnesium, total	mg/L	12.2	12	7.0	9.8						
SG-AB	Phosphorus, dissolved	mg/L	0.012	0.05	0.05	0.05						
SG-AB	Phosphorus, total	mg/L	0.024	0.022	0.05	0.05						
SG-AB	Potassium, total	mg/L	0.600	1.0	1.0	1.0						
SG-AB	Sodium, total	mg/L	2.49	2.5	1.6	2.4						
SG-AB	Sodium Absorption Ratio	std	0.102	0.105	0.086	0.110						
SG-AB	Aluminum, total	ug/L	4.5	9.26	49.6	17.6						
SG-AB	Cadmium, total	ug/L	0.006	0.006	0.006	0.0042						
SG-AB	Copper, total	ug/L	0.466	0.177	1.21	2.91						
SG-AB	Lead, total	ug/L	0.060	0.0524	0.139	0.154						
SG-AB	Mercury, total	ng/L	1.06	0.922	4.28	1.95						
SG-AB	Zinc, total	ug/L	1.74	0.547	2.17	1.77						

STATION	PARAMETER	Units	Nov-93	Dec-93	Jan-94	Feb-94	Mar-94	Apr-94	Apr-94	May-94	Jun-94	Jul-94
SG-CC	pH (Field)	S. U.	7.09	7.64		7.58	6.61	6.82	7.34	6.82	6.95	5.96
SG-CC	pH, Lab	S. U.	(PHT)	(PHT)		(PHT)	(PHT)	(PHT)	(PHT)	(PHT)	(PHT)	(PHT)
SG-CC	Conductivity (Field)	umhos	158.9	175		213	207	160	111	129	121	135.8
SG-CC	Conductivity, Lab	umhos	158	160		213	205	165	125	125	121	152
SG-CC	Temperature (Field)	Degrees C	0.3	0.9		0	2.3	2.1	9.9	11.3	17.9	20.0
SG-CC	Temperature (Field-DO Meter)	Degrees C							10	13	18	20
SG-CC	Dissolved Oxygen (Field)	%	6.6	10.8		2.8	7.3	10.9	9.9	9.2	6.2	7.0
SG-CC	Alkalinity	mg/L	77.0	72.0		97.0	96.2	76.0	55.0	54.6	56.0	76.0
SG-CC	Alkalinity, Bicarbonate	mg/L	77.0	72.0		97.0	96.2	76.0	55.0	54.6	56.0	76.0
SG-CC	Alkalinity, Carbonate	mg/L	Δ 5.00	Δ 5.00		0	0	0	0	0	Δ 0	0
SG-CC	Alkalinity, Hydroxide	mg/L				0	0	0	0	0	Δ 0	0
SG-CC	Hardness	mg/L	83.3	81.6		104	102	77.0	59.0	52.2	59.0	86.2
SG-CC	Total Dissolved Solids	mg/L	97.0	84.0		122	125	77.0	71.0	75.0	73.0	100
SG-CC	Total Suspended Solids	mg/L	Δ 5.00	Δ 5.00		Δ 5.00	Δ 5.00	5.00	5.00	5.00	7.00	6.00
SG-CC	Biological Oxygen Demand	mg/L	2.00	2.00		8.00	5.00	8.00	5.00	8.00	Δ 3.00	Δ 3.00
SG-CC	Chemical Oxygen Demand	mg/L	29.0	21.0		22.0	17.0	17.0	24.0	19.0	26.0	32.0
SG-CC	Chemical Oxygen Demand, Low Level	mg/L										
SG-CC	Ammonia	mg/L	1.47	0.493			0.112	Δ 0.100	Δ 0.100	Δ 0.100	0.112	Δ 0.100
SG-CC	Nitrate	mg/L	(PHT)	(PHT)		(PHT)	(PHT)	Δ 0.500	(PHT)	(PHT)	(PHT)	(PHT)
SG-CC	Nitrogen, Total Kjeldahl	mg/L	2.58	0.616		1.62	0.392	0.308	0.952	0.756	0.504	0.392
SG-CC	Chloride	mg/L	3	3		3	3	3	3	3	3	3
SG-CC	Fluoride	mg/L	Δ 0.100	Δ 0.100		Δ 0.100	Δ 0.100	Δ 0.100	Δ 0.100	0.535	Δ 0.100	Δ 0.100
SG-CC	Sulfate	mg/L	4.45	4.12		5.22	5.77	4.99	4.61	6.00		6.00
SG-CC	Cyanide, total	ug/L	Δ 20	Δ 20		Δ 20	Δ 20	Δ 20	Δ 20	Δ 20	Δ 20	Δ 20
SG-CC	Oil & Grease	mg/L	Δ 1.01	Δ 1.00		Δ 1.00	Δ 1.00	Δ 1.00	Δ 1.34	Δ 1.05	Δ 1.03	Δ 1.03
SG-CC	Turbidity, Lab	NTU	(PHT)	(PHT)		(PHT)	(PHT)	2.00	(PHT)	(PHT)	(PHT)	(PHT)
SG-CC	Cations	Meq/L	1.75	1.79		2.27	2.08	1.75	1.23	1.34	1.26	1.62
SG-CC	Anions	Meq/L	1.45	1.36		1.79	1.80	1.43	1.08	1.14		1.46
SG-CC	Cation and Anion Balance	%	9.32	13.8		11.7	7.38	10.0	6.32	8.30		5.29
SG-CC	Boron, total	mg/L	0.112	Δ 0.100		Δ 0.100	Δ 0.100	Δ 0.100	Δ 0.100	Δ 0.100	Δ 0.100	0.105
SG-CC	Calcium, total	mg/L	18.8	19.0		24.9	22.2	18.9	12.6	13.8	13.1	17.8
SG-CC	Arsenic, total	mg/L	Δ 0.005	Δ 0.005		Δ 0.005	Δ 0.005	Δ 0.005	Δ 0.005	Δ 0.005	Δ 0.005	Δ 0.005
SG-CC	Barium, total	mg/L	0.011	0.010		0.014	0.012	Δ 0.010	0.010	0.010	0.011	0.013
SG-CC	Iron, dissolved	mg/L	0.226	0.417		0.290	0.274	Δ 0.100	0.300	0.146	0.260	0.324
SG-CC	Iron, total	mg/L	0.358	0.457		0.502	0.509	0.432	0.553	0.383	0.542	0.482
SG-CC	Manganese, dissolved	mg/L	0.023	0.047		0.097	0.101	0.076	0.010	0.010	0.010	0.019
SG-CC	Manganese, total	mg/L	0.035	0.051		0.132	0.139	0.063	0.048	0.046	0.096	0.079
SG-CC	Molybdenum, total	mg/L	Δ 0.020	Δ 0.020		Δ 0.020	Δ 0.020	Δ 0.020	Δ 0.020	Δ 0.020	Δ 0.020	Δ 0.020
SG-CC	Selenium, total	mg/L	Δ 0.005	Δ 0.005		Δ 0.005	Δ 0.005	Δ 0.005	Δ 0.005	Δ 0.005	Δ 0.005	Δ 0.005
SG-CC	Silver, total	mg/L	Δ 0.010	Δ 0.010		Δ 0.010	Δ 0.010	Δ 0.010	Δ 0.010	Δ 0.010	Δ 0.010	Δ 0.010
SG-CC	Chromium, total	mg/L	Δ 0.020	Δ 0.020		Δ 0.020	Δ 0.020	Δ 0.020	Δ 0.020	Δ 0.020	Δ 0.020	Δ 0.020
SG-CC	Chromium, total (Low Level)	ug/L						0.470	0.470	0.900	0.56	0.52
SG-CC	Beryllium, total	mg/L	Δ 0.001	Δ 0.001		Δ 0.001	Δ 0.005	Δ 0.005	Δ 0.005	Δ 0.005	Δ 0.005	Δ 0.005
SG-CC	Thallium, total	mg/L	Δ 0.005	Δ 0.005		Δ 0.005	Δ 0.005	Δ 0.005	Δ 0.005	Δ 0.005	Δ 0.005	Δ 0.005
SG-CC	Nickel, total	mg/L	Δ 0.030	Δ 0.030		Δ 0.030	Δ 0.030	Δ 0.030	Δ 0.030	Δ 0.030	Δ 0.030	Δ 0.030
SG-CC	Antimony, total	mg/L	Δ 0.005	Δ 0.005		Δ 0.005	Δ 0.005	Δ 0.005	Δ 0.005	Δ 0.005	Δ 0.005	Δ 0.005
SG-CC	Magnesium, total	mg/L	8.49	8.44		10.8	10.1	8.37	5.86	6.72	6.40	7.93
SG-CC	Phosphorus, dissolved	mg/L	Δ 0.050	Δ 0.050		Δ 0.050	Δ 0.050	Δ 0.050	Δ 0.050	0.008		0.022
SG-CC	Phosphorus, total	mg/L	Δ 0.050	Δ 0.050		Δ 0.050	Δ 0.050	Δ 0.050	Δ 0.050	0.031		0.038
SG-CC	Potassium, total	mg/L	Δ 1.00	1.20		0.820	0.940	0.890	0.910	0.750	Δ 0.600	Δ 0.600
SG-CC	Sodium, total	mg/L	2.57	2.68		2.68	2.73	2.20	2.19	1.91	1.91	1.83
SG-CC	Sodium Absorption Ratio	std	0.124	0.129		0.113	0.121	0.106	0.128	0.105	0.108	0.091
SG-CC	Aluminum, total	ug/L	20.8	35.6		20.4	24.9	35.8	32.0	24.1	44.9	40.2
SG-CC	Cadmium, total	ug/L	0.032	0.014		0.017	0.005	0.006	Δ 0.006	0.005	0.010	0.005
SG-CC	Copper, total	ug/L	0.236	0.246		0.391	0.217	0.340	0.350	0.507	0.390	0.363
SG-CC	Lead, total	ug/L	0.149	0.255		0.136	0.142	0.211	0.240	0.164	0.271	0.235
SG-CC	Mercury, total	ng/L	2	2		1	2	2	2	2	3.69	2.02
SG-CC	Zinc, total	ug/L	1.04	1.18		1.57	1.11	1.60	1.12	1.47	1.56	1.43

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
SG-CC	pH (Field)	S.U.	7.57	7.03	6.97	6.75						
SG-CC	pH, Lab	S.U.	(PHT)	7.6	6.5	6.8						
SG-CC	Conductivity (Field)	umhos	151	148.8	178	113.4						
SG-CC	Conductivity, Lab	umhos	156									
SG-CC	Temperature (Field)	Degrees C	19.4	15.2	18.9	10.9						
SG-CC	Temperature (Field-DO Meter)	Degrees C	19	15	19	11.0						
SG-CC	Dissolved Oxygen (Field)	%	6.9	8.6	7.6	7.0						
SG-CC	Alkalinity	mg/L	73.1	76	40	49						
SG-CC	Alkalinity, Bicarbonate	mg/L	73.1	76	40	49						
SG-CC	Alkalinity, Carbonate	mg/L	0	5	5	5						
SG-CC	Alkalinity, Hydroxide	mg/L	0	5	5	5						
SG-CC	Hardness	mg/L	80.0	82		66						
SG-CC	Total Dissolved Solids	mg/L	94.0	120	110	6.0						
SG-CC	Total Suspended Solids	mg/L	5.00		5	5						
SG-CC	Biological Oxygen Demand	mg/L	5.00	2	3	3						
SG-CC	Chemical Oxygen Demand	mg/L	22.0									
SG-CC	Chemical Oxygen Demand, Low Level	mg/L		23	58	41						
SG-CC	Ammonia	mg/L	0.100	0.1	0.2	0.1						
SG-CC	Nitrate	mg/L	(PHT)	0.5	0.042	0.50						
SG-CC	Nitrogen, Total Kjeldahl	mg/L	0.420	0.8	0.2	0.9						
SG-CC	Chloride	mg/L	2	2	2	2						
SG-CC	Fluoride	mg/L	0.100	0.1	0.1	0.1						
SG-CC	Sulfate	mg/L	11.0		24	19						
SG-CC	Cyanide, total	ug/L	20	20	10	20						
SG-CC	Oil & Grease	mg/L	1.01	1	4.6	8.9						
SG-CC	Turbidity, Lab	NTU	(PHT)	1.6		2.8						
SG-CC	Cations	Meq/L	1.69	1.618	0.968	1.173						
SG-CC	Anions	Meq/L	1.50	1.302	1.212	0.454						
SG-CC	Cation and Anion Balance	%	5.67	10.82	-11.21	44.20						
SG-CC	Boron, total	mg/L	0.100	0.20	0.20	0.10						
SG-CC	Calcium, total	mg/L	17.7	17	10	12						
SG-CC	Arsenic, total	mg/L	0.005	0.005	0.005	0.005						
SG-CC	Barium, total	mg/L	0.013	0.011	0.011	0.010						
SG-CC	Iron, dissolved	mg/L	0.214	0.11	0.41	0.66						
SG-CC	Iron, total	mg/L	0.478	0.37	0.66	0.78						
SG-CC	Manganese, dissolved	mg/L	0.015	0.010	0.010	0.030						
SG-CC	Manganese, total	mg/L	0.078	0.050	0.050	0.059						
SG-CC	Molybdenum, total	mg/L	0.020	0.020	0.020	0.020						
SG-CC	Selenium, total	mg/L	0.005	0.005	0.005	0.005						
SG-CC	Silver, total	mg/L	0.010	0.010	0.010	0.010						
SG-CC	Chromium, total	mg/L	0.020									
SG-CC	Chromium, total (Low Level)	ug/L	0.34	0.565	0.612	0.30						
SG-CC	Beryllium, total	mg/L	0.005	0.010	0.010	0.010						
SG-CC	Thallium, total	mg/L	0.005	0.005	0.005	0.005						
SG-CC	Nickel, total	mg/L	0.030	0.030	0.030	0.030						
SG-CC	Antimony, total	mg/L	0.005	0.005	0.005	0.005						
SG-CC	Magnesium, total	mg/L	8.67	8.3	4.7	5.8						
SG-CC	Phosphorus, dissolved	mg/L	0.020	0.05	0.05	0.05						
SG-CC	Phosphorus, total	mg/L	0.046	0.025	0.05	0.05						
SG-CC	Potassium, total	mg/L	0.600	1.0	1.0	1.0						
SG-CC	Sodium, total	mg/L	2.07	2.0	1.4	1.7						
SG-CC	Sodium Absorption Ratio	std	0.101	0.099	0.092	0.101						
SG-CC	Aluminum, total	ug/L	34.0	44.5	92.3	98.4						
SG-CC	Cadmium, total	ug/L	0.006	0.006	0.0237	0.0039						
SG-CC	Copper, total	ug/L	0.597	0.163	1.10	0.663						
SG-CC	Lead, total	ug/L	0.231	0.131	0.557	0.360						
SG-CC	Mercury, total	ng/L	2.56	1.67	7.18	4.07						
SG-CC	Zinc, total	ug/L	1.56	0.969	5.15	6.48						

STATION	PARAMETER	Units	Nov-93	Dec-93	Jan-94	Feb-94	Mar-94	Apr-94	Apr-94	May-94	Jun-94	Jul-94
SG-E	pH (Field)	S.U.						7.06		7.86	6.70	7.44
SG-E	pH, Lab	S.U.						(PHT)		(PHT)	(PHT)	(PHT)
SG-E	Conductivity (Field)	umhos						253		269	246	237
SG-E	Conductivity, Lab	umhos						274		272	259	274
SG-E	Temperature (Field)	Degrees C						5.8		12.7	16.7	20.6
SG-E	Temperature (Field-DO Meter)	Degrees C						6.0		13	16	20
SG-E	Dissolved Oxygen (Field)	%						10.2		9.1	7.8	5.5
SG-E	Alkalinity	mg/L						144		138	129	138
SG-E	Alkalinity, Bicarbonate	mg/L						144		138	129	138
SG-E	Alkalinity, Carbonate	mg/L						0		0	0	0
SG-E	Alkalinity, Hydroxide	mg/L						0		0	0	0
SG-E	Hardness	mg/L						137		129	138	135
SG-E	Total Dissolved Solids	mg/L						155		121	141	160
SG-E	Total Suspended Solids	mg/L						< 5.00		< 5.00	< 5.00	< 5.00
SG-E	Biological Oxygen Demand	mg/L						9.00		5.00	< 3.00	< 3.00
SG-E	Chemical Oxygen Demand	mg/L						< 10.0		< 10.0	< 10.0	< 10.0
SG-E	Chemical Oxygen Demand, Low Level	mg/L										
SG-E	Ammonia	mg/L						< 1.00		< 0.100	< 0.100	< 0.100
SG-E	Nitrate	mg/L						0.763		(PHT)	0.714	0.706
SG-E	Nitrogen, Total Kjeldahl	mg/L						< 0.200		0.224	0.308	0.252
SG-E	Chloride	mg/L						2		2	2	2
SG-E	Fluoride	mg/L						< 0.100		0.763	< 0.100	< 0.100
SG-E	Sulfate	mg/L						6.88		7.00	9.00	7.00
SG-E	Cyanide, total	ug/L						< 20		< 20	< 20	< 20
SG-E	Oil & Grease	mg/L						< 1.79		< 1.03	< 1.01	< 1.02
SG-E	Turbidity, Lab	NTU						0.900		0.900	1.42	0.900
SG-E	Cations	Meq/L						3.07		2.98	2.76	3.09
SG-E	Anions	Meq/L						2.57		2.52	2.40	2.47
SG-E	Cation and Anion Balance	%						8.92		8.41	7.04	11.0
SG-E	Boron, total	mg/L						< 0.099		< 0.100	< 0.100	< 0.100
SG-E	Calcium, total	mg/L						33.0		31.0	29.2	34.1
SG-E	Arsenic, total	mg/L						< 0.005		< 0.005	< 0.005	< 0.005
SG-E	Barium, total	mg/L						< 0.01		< 0.010	< 0.010	< 0.010
SG-E	Iron, dissolved	mg/L						< 0.100		< 0.100	< 0.100	< 0.100
SG-E	Iron, total	mg/L						< 0.099		< 0.100	< 0.100	< 0.100
SG-E	Manganese, dissolved	mg/L						< 0.010		< 0.010	< 0.010	< 0.010
SG-E	Manganese, total	mg/L						< 0.01		< 0.010	< 0.012	< 0.012
SG-E	Molybdenum, total	mg/L						< 0.020		< 0.020	< 0.020	< 0.020
SG-E	Selenium, total	mg/L						< 0.005		< 0.005	< 0.005	< 0.005
SG-E	Silver, total	mg/L						< 0.01		< 0.010	< 0.010	< 0.010
SG-E	Chromium, total	mg/L						< 0.020		< 0.020	< 0.020	< 0.020
SG-E	Chromium, total (Low Level)	ug/L						1.48		1.17	1.92	1.56
SG-E	Beryllium, total	mg/L						< 0.005		< 0.005	< 0.005	< 0.005
SG-E	Thallium, total	mg/L						< 0.005		< 0.005	< 0.005	< 0.005
SG-E	Nickel, total	mg/L						< 0.030		< 0.030	< 0.030	< 0.030
SG-E	Antimony, total	mg/L						< 0.005		< 0.005	< 0.005	< 0.005
SG-E	Magnesium, total	mg/L						16.0		16.0	14.6	15.4
SG-E	Phosphorus, dissolved	mg/L						< 0.050		0.017	0.009	0.006
SG-E	Phosphorus, total	mg/L						< 0.050		0.019	0.030	0.018
SG-E	Potassium, total	mg/L						< 0.600		0.700	< 0.600	0.670
SG-E	Sodium, total	mg/L						2.52		2.27	2.31	2.32
SG-E	Sodium Absorption Ratio	std						0.090		0.083	0.087	0.083
SG-E	Aluminum, total	ug/L						36.3		37.1	25.2	14.9
SG-E	Cadmium, total	ug/L						< 0.006		0.004	0.004	0.014
SG-E	Copper, total	ug/L						0.273		0.297	0.273	0.352
SG-E	Lead, total	ug/L						0.095		0.097	0.104	0.074
SG-E	Mercury, total	ug/L						0.9		2	2.93	1.49
SG-E	Zinc, total	ug/L						0.870		0.860	1.56	1.36

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
SG-E	pH (Field)	S.U.	6.92	7.04		7.58	7.82	7.05	7.48	7.37	7.61	
SG-E	pH, Lab	S.U.	(PHT)	7.7		7.4	7.6	7.3	7.3	7.3	7.4	
SG-E	Conductivity (Field)	umhos	271	241		263	286	297	227	291	270	
SG-E	Conductivity, Lab	umhos	286									
SG-E	Temperature (Field)	Degrees C	14.6	11.5		8.7	6.8	4.1	4.2	4.4	4.8	
SG-E	Temperature (Field-DO Meter)	Degrees C	14.0	12		9.0	7.0	4.0		4.25	4.75	
SG-E	Dissolved Oxygen (Field)	%	9.3	9.1		9.5	9.9	10.8		6.5	8.65	
SG-E	Alkalinity	mg/L	138	140		140	140	140	150	140	140	
SG-E	Alkalinity, Bicarbonate	mg/L	138	140		140	140	140	150	140	140	
SG-E	Alkalinity, Carbonate	mg/L	0	5		5	5	5	5	5	5	
SG-E	Alkalinity, Hydroxide	mg/L	0	5		5						
SG-E	Hardness	mg/L	148	150		150	150	150	150	150	140	
SG-E	Total Dissolved Solids	mg/L	163	170		110	170	230	170	210	160	
SG-E	Total Suspended Solids	mg/L	5.00			5	5	5	5	5	5	
SG-E	Biological Oxygen Demand	mg/L	3.00	2		3	3	3	3	3	3	
SG-E	Chemical Oxygen Demand	mg/L	10.0									
SG-E	Chemical Oxygen Demand, Low Level	mg/L		20		20	10	10	10	10	10	
SG-E	Ammonia	mg/L	0.100	0.1		0.1	0.1	0.1		0.1	0.1	
SG-E	Nitrate	mg/L	0.741	0.5		0.50	0.50	0.50	0.50	0.50	0.50	
SG-E	Nitrogen, Total Kjeldahl	mg/L	0.200	0.3		0.3	0.3	0.5	0.3	0.4	0.3	
SG-E	Chloride	mg/L	2	1		1	2	2	2	2	2	
SG-E	Fluoride	mg/L	0.100	0.1		0.1	0.1	0.1	0.1	0.1	0.1	
SG-E	Sulfate	mg/L	11.0			11	8.5	7.8	9.2	7.2	6.9	
SG-E	Cyanide, total	ug/L	20	20		20	20	20	20	20	20	
SG-E	Oil & Grease	mg/L	1.00	1		14	4.6	4.6	4.6	4.6	4.6	
SG-E	Turbidity, Lab	NTU	0.900	0.5		1.0	0.5	0.6	0.5	0.5	1.3	
SG-E	Cations	Meq/L	3.08	2.900		3.038	3.02	3.04	3.34	2.91	3.07	
SG-E	Anions	Meq/L	2.55	2.323		2.555	0.370	2.52	2.71	2.50	2.49	
SG-E	Cation and Anion Balance	%	9.45	11.05		8.63	78.17	9.45	10.33	7.45	10.36	
SG-E	Boron, total	mg/L	0.100	0.20		0.10	0.10	0.10	0.10	0.10	0.10	
SG-E	Calcium, total	mg/L	32.9	31		32	32	32	36	31	33	
SG-E	Arsenic, total	mg/L	0.005	0.005		0.005	0.005	0.005	0.005	0.005	0.005	
SG-E	Barium, total	mg/L	0.010	0.010		0.010	0.010	0.010	0.010	0.010	0.010	
SG-E	Iron, dissolved	mg/L	0.227	0.050		0.050	0.058	0.050	0.050	0.050	0.050	
SG-E	Iron, total	mg/L	0.100	0.087		0.050	0.050	0.050	0.050	0.050	0.050	
SG-E	Manganese, dissolved	mg/L	0.010	0.010		0.010	0.010	0.010	0.010	0.010	0.010	
SG-E	Manganese, total	mg/L	0.010	0.010		0.010	0.010	0.016	0.010	0.010	0.010	
SG-E	Molybdenum, total	mg/L	0.020	0.020		0.020	0.020	0.020	0.020	0.020	0.020	
SG-E	Selenium, total	mg/L	0.005	0.005		0.005	0.005	0.005	0.005	0.005	0.005	
SG-E	Silver, total	mg/L	0.010	0.010		0.010	0.010	0.010	0.010	0.010	0.010	
SG-E	Chromium, total	mg/L	0.020									
SG-E	Chromium, total (Low Level)	ug/L	1.35	1.52		0.30	1.47	1.22	0.901	0.739	1.01	
SG-E	Beryllium, total	mg/L	0.005	0.010		0.010	0.010	0.010	0.010	0.010	0.010	
SG-E	Thallium, total	mg/L	0.005	0.005		0.005	0.005	0.005	0.005	0.005	0.005	
SG-E	Nickel, total	mg/L	0.030	0.030		0.030	0.030	0.030	0.030	0.030	0.030	
SG-E	Antimony, total	mg/L	0.005	0.005		0.005	0.005	0.005	0.005	0.005	0.005	
SG-E	Magnesium, total	mg/L	16.0	15		16	16	16	17	15	16	
SG-E	Phosphorus, dissolved	mg/L	0.010	0.05		0.05	0.05	0.05	0.05	0.05	0.05	
SG-E	Phosphorus, total	mg/L	0.019	0.05		0.05	0.05	0.05	0.05	0.05	0.05	
SG-E	Potassium, total	mg/L	0.790	1.0		1.0	1.0	1.0	1.0	1.1	1.0	
SG-E	Sodium, total	mg/L	2.41	2.3		2.4	2.4	2.5	2.7	2.3	2.5	
SG-E	Sodium Absorption Ratio	std	0.086	0.085		0.087	0.086	0.09	0.09	0.08	0.09	
SG-E	Aluminum, total	ug/L	12.5	29.0		31.1	73.3	19.9	10.7	10.7	40.5	
SG-E	Cadmium, total	ug/L	0.006	0.006		0.0039	0.006	0.006	0.003	0.003	0.003	
SG-E	Copper, total	ug/L	0.252	0.148		0.193	0.649	0.107	0.311	0.157	0.382	
SG-E	Lead, total	ug/L	0.090	0.0703		0.057	0.192	0.039	0.039	0.022	0.062	
SG-E	Mercury, total	ng/L	0.86	0.877		1.19	0.6	0.7	0.68	0.54	1.36	
SG-E	Zinc, total	ug/L	0.95	1.19		6.66	3.36	0.95	0.754	0.571	0.892	

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
SG-HC	pH (Field)	S.U.					6.54					
SG-HC	pH, Lab	S.U.					6.3					
SG-HC	Conductivity (Field)	umhos					34.7					
SG-HC	Temperature (Field)	Degrees C					4.8					
SG-HC	Temperature (Field-DO Meter)	Degrees C					4.8					
SG-HC	Dissolved Oxygen (Field)	%					12.7					
SG-HC	Ammonia	mg/L					0.2					
SG-HC	Chloride	mg/L					3					
SG-HC	Cyanide, total	ug/L					△ 20					
SG-HC	Arsenic, total	mg/L					△ 0.005					
SG-HC	Selenium, total	mg/L					△ 0.005					
SG-HC	Silver, total	mg/L					△ 0.010					
SG-HC	Chromium, total	mg/L					△ 0.0050					
SG-HC	Beryllium, total	mg/L					△ 0.010					
SG-HC	Thallium, total	mg/L					△ 0.005					
SG-HC	Nickel, total	mg/L					△ 0.030					
SG-HC	Antimony, total	mg/L					△ 0.005					
SG-HC	Aluminum, total	ug/L					△ 50					
SG-HC	Cadmium, total	ug/L					△ 5					
SG-HC	Copper, total	ug/L					△ 30					
SG-HC	Lead, total	ug/L					△ 50					
SG-HC	Mercury, total	ng/L					△ 200					
SG-HC	Zinc, total	ug/L					△ 20					

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
SG-MC	pH (Field)	S. U.					7.24					
SG-MC	pH, Lab	S. U.					7.0					
SG-MC	Conductivity (Field)	umhos					61.6					
SG-MC	Temperature (Field)	Degrees C					3.9					
SG-MC	Temperature (Field-DO Meter)	Degrees C					3.5					
SG-MC	Dissolved Oxygen (Field)	%					11.8					
SG-MC	Ammonia	mg/L					0.2					
SG-MC	Chloride	mg/L					4					
SG-MC	Cyanide, total	ug/L					20					
SG-MC	Arsenic, total	mg/L					0.006					
SG-MC	Selenium, total	mg/L					0.005					
SG-MC	Silver, total	mg/L					0.010					
SG-MC	Chromium, total	mg/L					0.0050					
SG-MC	Beryllium, total	mg/L					0.010					
SG-MC	Thallium, total	mg/L					0.005					
SG-MC	Nickel, total	mg/L					0.030					
SG-MC	Antimony, total	mg/L					0.005					
SG-MC	Aluminum, total	ug/L					160					
SG-MC	Cadmium, total	ug/L					5					
SG-MC	Copper, total	ug/L					30					
SG-MC	Lead, total	ug/L					50					
SG-MC	Mercury, total	ng/L					200					
SG-MC	Zinc, total	ug/L					20					

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
SG-NC	pH (Field)	S.U.					5.94					
SG-NC	pH, Lab	S.U.					6.1					
SG-NC	Conductivity (Field)	umhos					32.5					
SG-NC	Temperature (Field)	Degrees C					3.9					
SG-NC	Temperature (Field-DO Meter)	Degrees C					4.0					
SG-NC	Dissolved Oxygen (Field)	%					11.25					
SG-NC	Ammonia	mg/L					0.2					
SG-NC	Chloride	mg/L					4					
SG-NC	Cyanide, total	ug/L					< 20					
SG-NC	Arsenic, total	mg/L					0.006					
SG-NC	Selenium, total	mg/L					< 0.005					
SG-NC	Silver, total	mg/L					< 0.010					
SG-NC	Chromium, total	mg/L					< 0.0050					
SG-NC	Beryllium, total	mg/L					< 0.010					
SG-NC	Thallium, total	mg/L					< 0.005					
SG-NC	Nickel, total	mg/L					< 0.030					
SG-NC	Antimony, total	mg/L					< 0.005					
SG-NC	Aluminum, total	ug/L					150					
SG-NC	Cadmium, total	ug/L					< 5					
SG-NC	Copper, total	ug/L					< 30					
SG-NC	Lead, total	ug/L					< 50					
SG-NC	Mercury, total	ng/L					< 200					
SG-NC	Zinc, total	ug/L					< 20					

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
SG-PR	pH (Field)	S.U.					7.13					
SG-PR	pH, Lab	S.U.					6.7					
SG-PR	Conductivity (Field)	umhos					44.4					
SG-PR	Temperature (Field)	Degrees C					5.8					
SG-PR	Temperature (Field-DO Meter)	Degrees C					5.25					
SG-PR	Dissolved Oxygen (Field)	%					12.6					
SG-PR	Ammonia	mg/L					0.2					
SG-PR	Chloride	mg/L					4					
SG-PR	Cyanide, total	ug/L					< 20					
SG-PR	Arsenic, total	mg/L					< 0.005					
SG-PR	Selenium, total	mg/L					0.006					
SG-PR	Silver, total	mg/L					< 0.010					
SG-PR	Chromium, total	mg/L					< 0.0050					
SG-PR	Beryllium, total	mg/L					< 0.010					
SG-PR	Thallium, total	mg/L					< 0.005					
SG-PR	Nickel, total	mg/L					< 0.030					
SG-PR	Antimony, total	mg/L					< 0.005					
SG-PR	Aluminum, total	ug/L					110					
SG-PR	Cadmium, total	ug/L					< 5					
SG-PR	Copper, total	ug/L					< 30					
SG-PR	Lead, total	ug/L					< 50					
SG-PR	Mercury, total	ng/L					< 200					
SG-PR	Zinc, total	ug/L					20					

STATION	PARAMETER	Units	Nov-93	Dec-93	Jan-94	Feb-94	Mar-94	Apr-94	Apr-94	May-94	Jun-94	Jul-94
SG-V	pH (Field)	S.U.	6.67	7.56	7.28	7.55	7.26	7.18	7.11	7.05	6.69	7.03
SG-V	pH, Lab	S.U.	(PHT)	(PHT)	(PHT)	(PHT)	(PHT)	(PHT)	(PHT)	(PHT)	(PHT)	(PHT)
SG-V	Conductivity (Field)	umhos	207	198	229	262	201	178	106	171	184	182
SG-V	Conductivity, Lab	umhos	207	204	238	248	211	176	124	161	154	205
SG-V	Temperature (Field)	Degrees C	0.7	0.6	0.8	0	2.0	2.1	8.3	13	18.5	20.2
SG-V	Temperature (Field-DO Meter)	Degrees C						2.1	8	12.0	18	20
SG-V	Dissolved Oxygen (Field)	%	6.4	8.4	3.3	2.8	6.0	10.6	9.2	8.9	6.3	7.1
SG-V	Fecal Coliform	MPN									1.00	
SG-V	Alkalinity	mg/L	100	94.0	117	122	103	82.0	55.0	75.2	72.0	98.0
SG-V	Alkalinity, Bicarbonate	mg/L	100	94.0	117	122	103	82.0	55.0	75.2	72.0	98.0
SG-V	Alkalinity, Carbonate	mg/L	5.00	5.00	5.00	0	0	0	0	0	0	0
SG-V	Alkalinity, Hydroxide	mg/L				0	0	0	0	0	0	0
SG-V	Hardness	mg/L	113	105	122	126	110	84.6	61.0	76.0	69.5	106
SG-V	Total Dissolved Solids	mg/L	127	154	102	153	125	98.0	94.0	79.0	100	119
SG-V	Total Suspended Solids	mg/L	5.00	5.00	8.00	5.00	5.00	8.00	5.00	5.00	8.00	7.00
SG-V	Biological Oxygen Demand	mg/L	1.00	1.00	3.00	6.00	8.00	6.00	7.00	4.00	5.00	3.00
SG-V	Chemical Oxygen Demand	mg/L	20.0	21.0	20.0	20.0	18.0	17.0	28.0	23.0	34.0	29.0
SG-V	Chemical Oxygen Demand, Low Level	mg/L										
SG-V	Ammonia	mg/L	0.446	0.482	0.392		0.179	0.100	0.157	0.100	0.100	0.100
SG-V	Nitrate	mg/L	(PHT)	(PHT)	(PHT)	(PHT)	(PHT)	0.500	0.728	(PHT)	(PHT)	(PHT)
SG-V	Nitrogen, Total Kjeldahl	mg/L	0.560	0.560	0.980	1.82	0.392	0.476	8.54	0.308	0.420	0.420
SG-V	Chloride	mg/L	4	3	3	3	3	3	3	3	3	3
SG-V	Fluoride	mg/L	0.100	0.100	0.100	0.100	0.100	0.100	0.454	0.497	0.100	0.100
SG-V	Sulfate	mg/L	5.15	4.75	5.47	5.70	5.73	5.10	4.15	6.00		6.00
SG-V	Cyanide, total	ug/L	20	20	20	20	20	20	20	20	20	20
SG-V	Oil & Grease	mg/L	1.02	1.00	1.02	1.01	1.00	1.52	1.53	1.03	1.05	1.01
SG-V	Turbidity, Lab	NTU	(PHT)	(PHT)	(PHT)	(PHT)	(PHT)	2.10	3.30	(PHT)	(PHT)	(PHT)
SG-V	Cations	Meq/L	2.32	2.19	2.43	2.70	2.26	1.92	1.23	1.48	1.67	2.20
SG-V	Anions	Meq/L	1.86	1.74	2.14	2.21	1.90	1.54	1.10	1.48		1.83
SG-V	Cation and Anion Balance	%	11.0	11.6	6.52	10.0	8.50	11.3	5.66	7.85		9.18
SG-V	Boron, total	mg/L	0.123	0.106	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
SG-V	Calcium, total	mg/L	25.2	23.9	25.4	29.7	24.4	20.7	12.6	17.8	17.3	23.8
SG-V	Arsenic, total	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
SG-V	Berilium, total	mg/L	0.011	0.010	0.012	0.014	0.011	0.010	0.010	0.010	0.011	0.014
SG-V	Iron, dissolved	mg/L	0.167	0.356	0.152	0.176	0.150	0.227	0.446	0.170	0.351	0.346
SG-V	Iron, total	mg/L	0.296	0.389	0.392	0.410	0.412	0.409	0.716	0.450	0.674	0.540
SG-V	Manganese, dissolved	mg/L	0.026	0.041	0.064	0.071	0.052	0.024	0.010	0.010	0.010	0.022
SG-V	Manganese, total	mg/L	0.038	0.045	0.092	0.117	0.084	0.057	0.037	0.061	0.080	0.078
SG-V	Molybdenum, total	mg/L	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020
SG-V	Selenium, total	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
SG-V	Silver, total	mg/L	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
SG-V	Chromium, total	mg/L	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020
SG-V	Chromium, total (Low Level)	ug/L						0.470	0.470	0.900	0.90	0.59
SG-V	Beryllium, total	mg/L	0.001	0.001	0.001	0.001	0.005	0.005	0.005	0.005	0.005	0.005
SG-V	Thallium, total	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
SG-V	Nickel, total	mg/L	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030
SG-V	Antimony, total	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
SG-V	Magnesium, total	mg/L	11.4	10.6	12.6	13.1	11.0	9.42	5.90	8.98	8.72	11.2
SG-V	Phosphorus, dissolved	mg/L	0.063	0.050	0.050	0.050	0.050	0.050	0.050	0.013		0.022
SG-V	Phosphorus, total	mg/L	1.11	0.050	0.050	0.050	0.050	0.050	0.059	0.036		0.043
SG-V	Potassium, total	mg/L	1.00	1.00	1.00	0.960	1.00	0.850	0.960	0.620	0.600	0.600
SG-V	Sodium, total	mg/L	2.91	2.90	2.96	2.76	2.54	2.21	2.04	2.09	2.12	2.10
SG-V	Sodium Absorption Ratio	std	0.121	0.124	0.120	0.106	0.107	0.101	0.119	0.101	0.104	0.089
SG-V	Aluminum, total	ug/L	18.3	37.7	19.7	27.7	23.9	56.1	40.3	33.0	36.5	56.4
SG-V	Cadmium, total	ug/L	0.024	0.011	0.013	0.008	0.005	0.006	0.006	0.005	0.005	0.07
SG-V	Copper, total	ug/L	0.222	0.180	0.179	0.199	0.204	0.550	0.360	0.318	0.291	0.363
SG-V	Lead, total	ug/L	0.126	0.198	0.145	0.138	0.160	0.298	0.309	0.156	0.206	0.193
SG-V	Mercury, total	ng/L	2	2	1	1	2	2	4	2	2.48	2.41
SG-V	Zinc, total	ug/L	0.890	1.04	1.04	1.05	1.70	1.67	1.96	1.35	1.48	3.21

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
SG-V	pH (Field)	S.U.	7.37	7.02	6.84	7.08						
SG-V	pH, Lab	S.U.	(PHT)	7.7	6.6	7.0						
SG-V	Conductivity (Field)	umhos	192	194	169	158.7						
SG-V	Conductivity, Lab	umhos	197									
SG-V	Temperature (Field)	Degrees C	18.8	16.0	19.8	9.2						
SG-V	Temperature (Field-DO Meter)	Degrees C	18	16	20	9.5						
SG-V	Dissolved Oxygen (Field)	%	8.0	9.5	7.6	8.1						
SG-V	Fecal Coliform	MPN										
SG-V	Alkalinity	mg/L	94.0	99	35	71						
SG-V	Alkalinity, Bicarbonate	mg/L	94.0	99	35	71						
SG-V	Alkalinity, Carbonate	mg/L	0	5	5	5						
SG-V	Alkalinity, Hydroxide	mg/L	0	5	5	5						
SG-V	Hardness	mg/L	114	140		90						
SG-V	Total Dissolved Solids	mg/L	112	140	120	92						
SG-V	Total Suspended Solids	mg/L	5.00		5	5						
SG-V	Biological Oxygen Demand	mg/L	7.00	2	9.0	3						
SG-V	Chemical Oxygen Demand	mg/L	18.0									
SG-V	Chemical Oxygen Demand, Low Level	mg/L		20	61	36						
SG-V	Ammonia	mg/L	0.100	0.1	0.1	0.1						
SG-V	Nitrate	mg/L	(PHT)	0.5	0.042	0.50						
SG-V	Nitrogen, Total Kjeldahl	mg/L	0.448	0.6	0.9	0.7						
SG-V	Chloride	mg/L	3	3	2	3						
SG-V	Fluoride	mg/L	0.100	0.1	0.1	0.1						
SG-V	Sulfate	mg/L	10.0		26	16						
SG-V	Cyanide, total	ug/L	20	20	10	20						
SG-V	Oil & Grease	mg/L	1.02	5.6	4.6	13						
SG-V	Turbidity, Lab	NTU	1.80	0.5		1.5						
SG-V	Cations	Meq/L	2.13	2.066	0.964	1.717						
SG-V	Anions	Meq/L	1.83	1.707	1.172	1.584						
SG-V	Cation and Anion Balance	%	7.46	9.51	-9.72	4.03						
SG-V	Boron, total	mg/L	0.100	0.20	0.20	0.10						
SG-V	Calcium, total	mg/L	22.0	21	10	18						
SG-V	Arsenic, total	mg/L	0.005	0.005	0.005	0.005						
SG-V	Barium, total	mg/L	0.014	0.011	0.011	0.010						
SG-V	Iron, dissolved	mg/L	0.137	0.13	0.53	0.64						
SG-V	Iron, total	mg/L	0.367	0.26	0.74	0.83						
SG-V	Manganese, dissolved	mg/L	0.010	0.010	0.010	0.031						
SG-V	Manganese, total	mg/L	0.047	0.025	0.025	0.053						
SG-V	Molybdenum, total	mg/L	0.020	0.020	0.020	0.020						
SG-V	Selenium, total	mg/L	0.005	0.005	0.005	0.005						
SG-V	Silver, total	mg/L	0.010	0.010	0.010	0.010						
SG-V	Chromium, total	mg/L	0.020									
SG-V	Chromium, total (Low Level)	ug/L	0.42	0.617	0.726	0.30						
SG-V	Beryllium, total	mg/L	0.005	0.010	0.010	0.010						
SG-V	Thallium, total	mg/L	0.005	0.005	0.005	0.005						
SG-V	Nickel, total	mg/L	0.030	0.030	0.030	0.030						
SG-V	Antimony, total	mg/L	0.005	0.005	0.005	0.005						
SG-V	Magnesium, total	mg/L	11.2	11	4.7	8.6						
SG-V	Phosphorus, dissolved	mg/L	0.015	0.05	0.05	0.05						
SG-V	Phosphorus, total	mg/L	0.031	0.019	0.05	0.05						
SG-V	Potassium, total	mg/L	0.600	1.0	1.0	1.0						
SG-V	Sodium, total	mg/L	2.30	2.2	1.3	2.1						
SG-V	Sodium Absorption Ratio	std	0.099	0.097	0.085	0.102						
SG-V	Aluminum, total	ug/L	23.7	24.9	99.5	64.6						
SG-V	Cadmium, total	ug/L	0.006	0.006	0.0126	0.0039						
SG-V	Copper, total	ug/L	0.532	0.304	0.486	1.55						
SG-V	Lead, total	ug/L	0.174	0.0925	0.316	0.188						
SG-V	Mercury, total	ng/L	1.52	1.15	7.16	3.32						
SG-V	Zinc, total	ug/L	2.69	0.795	3.67	2.31						

STATION	PARAMETER	Units	Nov-93	Dec-93	Jan-94	Feb-94	Mar-94	Apr-94	Apr-94	May-94	Jun-94	Jul-94
SG-Y	pH (Field)	S.U.	7.40	7.50	10.87		7.28	6.84	7.72	6.47	6.74	6.44
SG-Y	pH, Lab	S.U.	(PHT)	(PHT)	(PHT)		(PHT)	(PHT)	(PHT)	(PHT)	(PHT)	(PHT)
SG-Y	Conductivity (Field)	umhos	139.7	171	137		191	155	118	136	92	138
SG-Y	Conductivity, Lab	umhos	122	127	144		188	157	113	97.1	100	104
SG-Y	Temperature (Field)	Degrees C	1.3	1.7	1.1		5.0	4.5	9.5	11.8	18.8	21.9
SG-Y	Temperature (Field-DO Meter)	Degrees C							10	11.7	18	22
SG-Y	Dissolved Oxygen (Field)	%	8.4	9.3	9.5		6.9	11.4	9.8	10.3	6.2	6.6
SG-Y	Alkalinity	mg/L	54.0	56.0	64.0		88.3	74.0	52.4	42.4	41.0	48.0
SG-Y	Alkalinity, Bicarbonate	mg/L	54.0	56.0	64.0		88.3	74.0	52.4	42.4	41.0	48.0
SG-Y	Alkalinity, Carbonate	mg/L	5.00	5.00	5.00		0	0	0	0	0	0
SG-Y	Alkalinity, Hydroxide	mg/L					0	0	0	0	0	0
SG-Y	Hardness	mg/L	64.3	72.9	72.7		93.2	72.0	54.0	39.6	38.8	50.1
SG-Y	Total Dissolved Solids	mg/L	74.0	82.0	113		135	101	90.0	57.0	62.0	69.0
SG-Y	Total Suspended Solids	mg/L	5.00	5.00	5.00		5.00	5.00	5.00	5.00	5.00	5.00
SG-Y	Biological Oxygen Demand	mg/L	2.00	1.00	3.00		9.00	8.00	6.00	6.00	3.00	3.00
SG-Y	Chemical Oxygen Demand	mg/L	32.0	31.0	33.0		20.0	21.0	21.0	24.0	30.0	36.0
SG-Y	Chemical Oxygen Demand, Low Level	mg/L										
SG-Y	Ammonia	mg/L	0.672	0.112	0.810		0.100	0.100	0.100	0.100	0.190	0.100
SG-Y	Nitrate	mg/L	(PHT)	(PHT)	(PHT)		(PHT)	0.500	0.500	(PHT)	(PHT)	(PHT)
SG-Y	Nitrogen, Total Kjeldahl	mg/L	7.00	0.532	1.76		0.504	0.756	0.448	0.784	0.588	0.616
SG-Y	Chloride	mg/L	3	2	3		3	3	3	3	2	2
SG-Y	Fluoride	mg/L	0.100	0.100	0.100		0.100	0.100	0.100	0.477	0.100	0.100
SG-Y	Sulfate	mg/L	3.61	3.47	3.94		5.61	4.83	4.19	5.00		5.10
SG-Y	Cyanide, total	ug/L	20	20	20		20	20	20	20	20	20
SG-Y	Oil & Grease	mg/L	1.01	1.00	1.01		1.00	0.850	1.20	1.09	1.15	1.06
SG-Y	Turbidity, Lab	NTU	(PHT)	(PHT)	(PHT)		(PHT)	1.70	4.10	(PHT)	(PHT)	(PHT)
SG-Y	Cations	Meq/L	1.34	1.36	1.48		1.95	1.67	1.15	0.895	1.05	1.12
SG-Y	Anions	Meq/L	1.04	1.07	1.22		1.66	1.39	1.02	0.895		0.957
SG-Y	Cation and Anion Balance	%	12.7	11.9	9.77		8.02	8.99	6.10	7.22		7.67
SG-Y	Boron, total	mg/L	0.126	0.100	0.100		0.100	1.00	0.100	0.100	0.100	0.100
SG-Y	Calcium, total	mg/L	14.4	14.8	15.6		21.1	18.0	12.0	10.5	10.7	12.3
SG-Y	Arsenic, total	mg/L	0.005	0.005	0.005		0.005	0.005	0.005	0.005	0.005	0.005
SG-Y	Barium, total	mg/L	0.011	0.010	0.012		0.014	0.012	0.010	0.010	0.010	0.010
SG-Y	Iron, dissolved	mg/L	0.273	0.404	0.304		0.392	0.243	0.196	0.141	0.188	0.261
SG-Y	Iron, total	mg/L	0.377	0.391	0.420		0.579	0.397	0.360	0.321	0.341	0.379
SG-Y	Manganese, dissolved	mg/L	0.020	0.037	0.075		0.182	0.017	0.010	0.010	0.010	0.010
SG-Y	Manganese, total	mg/L	0.030	0.038	0.079		0.219	0.070	0.053	0.026	0.065	0.060
SG-Y	Molybdenum, total	mg/L	0.020	0.020	0.020		0.020	0.020	0.020	0.020	0.020	0.020
SG-Y	Selenium, total	mg/L	0.005	0.005	0.005		0.005	0.005	0.005	0.005	0.005	0.005
SG-Y	Silver, total	mg/L	0.010	0.010	0.010		0.010	0.010	0.010	0.010	0.010	0.010
SG-Y	Chromium, total	mg/L	0.020	0.020	0.020		0.020	0.020	0.020	0.020	0.020	0.020
SG-Y	Chromium, total (Low Level)	ug/L					0.390	0.390	0.680	0.45	0.45	
SG-Y	Beryllium, total	mg/L	0.001	0.001	0.001		0.005	0.005	0.005	0.005	0.005	0.005
SG-Y	Thallium, total	mg/L	0.005	0.005	0.005		0.005	0.005	0.005	0.005	0.005	0.005
SG-Y	Nickel, total	mg/L	0.030	0.030	0.030		0.030	0.030	0.030	0.030	0.030	0.030
SG-Y	Antimony, total	mg/L	0.005	0.005	0.005		0.005	0.005	0.005	0.005	0.005	0.005
SG-Y	Magnesium, total	mg/L	6.31	6.34	7.24		9.19	7.91	5.36	5.04	5.02	5.26
SG-Y	Phosphorus, dissolved	mg/L	0.175	0.050	0.050		0.050	0.050	0.050	0.009		0.016
SG-Y	Phosphorus, total	mg/L	0.767	0.050	0.050		0.050	0.050	0.050	0.031		0.047
SG-Y	Potassium, total	mg/L	1.00	1.00	1.00		0.880	0.880	0.840	0.900	0.810	0.600
SG-Y	Sodium, total	mg/L	2.43	2.31	2.43		2.64	2.24	2.07	1.68	1.81	1.59
SG-Y	Sodium Absorption Ratio	std	0.134	0.127	0.127		0.121	0.111	0.125	0.107	0.114	0.096
SG-Y	Aluminum, total	ug/L	21.8	30.2	57.6		17.0	13.4	17.4	23.5	19.6	15.2
SG-Y	Cadmium, total	ug/L	0.032	0.039	0.010		0.006	0.009	0.006	0.003	0.004	0.003
SG-Y	Copper, total	ug/L	0.360	4.09	0.137		0.250	0.242	0.280	0.646	0.389	0.374
SG-Y	Lead, total	ug/L	0.166	0.225	0.098		0.141	0.130	0.179	0.160	0.212	0.236
SG-Y	Mercury, total	ng/L	2	2	2		2	1	2	2	2.19	2.48
SG-Y	Zinc, total	ug/L	1.26	2.44	1.41		1.57	1.45	1.23	1.30	1.04	1.29

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
SG-Y	pH (Field)	S.U.	7.01	7.01	7.13	7.16						
SG-Y	pH, Lab	S.U.	(PHT)	7.6	6.9	6.9						
SG-Y	Conductivity (Field)	unhos	113	110.5	197	95.3						
SG-Y	Conductivity, Lab	unhos	111									
SG-Y	Temperature (Field)	Degrees C	20.3	17.3	19.9	12.2						
SG-Y	Temperature (Field-DO Meter)	Degrees C	20.5	17	20	12.5						
SG-Y	Dissolved Oxygen (Field)	%	8.6	8.7	7.8	8.1						
SG-Y	Alkalinity	mg/L	52.0	54	51	41						
SG-Y	Alkalinity, Bicarbonate	mg/L	52.0	54	51	41						
SG-Y	Alkalinity, Carbonate	mg/L	0	5	5	5						
SG-Y	Alkalinity, Hydroxide	mg/L	0	5	5	5						
SG-Y	Hardness	mg/L	62.0	64		48						
SG-Y	Total Dissolved Solids	mg/L	77.0	98	110	50						
SG-Y	Total Suspended Solids	mg/L	5.00		5	5						
SG-Y	Biological Oxygen Demand	mg/L	7.00	2	3	3						
SG-Y	Chemical Oxygen Demand	mg/L	28.0									
SG-Y	Chemical Oxygen Demand, Low Level	mg/L		30	35	46						
SG-Y	Ammonia	mg/L	0.100	0.1	0.2	0.2						
SG-Y	Nitrate	mg/L	(PHT)	0.5	0.042	0.50						
SG-Y	Nitrogen, Total Kjeldahl	mg/L	0.560	1.0	0.7	0.9						
SG-Y	Chloride	mg/L	2	2	2	4						
SG-Y	Fluoride	mg/L	0.100	0.1	0.1	0.1						
SG-Y	Sulfate	mg/L	10.0		12	21						
SG-Y	Cyanide, total	ug/L	20	20	10							
SG-Y	Oil & Grease	mg/L	1.01	6.2	4.6	7.6						
SG-Y	Turbidity, Lab	NTU	(PHT)	2.5		3.3						
SG-Y	Cations	Meq/L	1.21	1.171	1.150	0.986						
SG-Y	Anions	Meq/L	1.11	0.941	1.142	0.552						
SG-Y	Cation and Anion Balance	%	4.06	10.85	0.32	28.25						
SG-Y	Boron, total	mg/L	0.100	0.20	0.20	0.10						
SG-Y	Calcium, total	mg/L	12.7	12	12	10						
SG-Y	Arsenic, total	mg/L	0.005	0.005	0.005	0.005						
SG-Y	Barium, total	mg/L	0.013	0.010	0.012	0.014						
SG-Y	Iron, dissolved	mg/L	0.188	0.062	0.11	0.64						
SG-Y	Iron, total	mg/L	0.362	0.27	0.30	0.82						
SG-Y	Manganese, dissolved	mg/L	0.010	0.010	0.010	0.059						
SG-Y	Manganese, total	mg/L	0.094	0.050	0.059	0.090						
SG-Y	Molybdenum, total	mg/L	0.020	0.020	0.020	0.020						
SG-Y	Selenium, total	mg/L	0.005	0.005	0.005	0.005						
SG-Y	Silver, total	mg/L	0.010	0.010	0.010	0.010						
SG-Y	Chromium, total	mg/L	0.020									
SG-Y	Chromium, total (Low Level)	ug/L	0.34	0.515	0.495	0.30						
SG-Y	Beryllium, total	mg/L	0.005	0.010	0.010	0.010						
SG-Y	Thallium, total	mg/L	0.005	0.005	0.005	0.005						
SG-Y	Nickel, total	mg/L	0.030	0.030	0.030	0.030						
SG-Y	Antimony, total	mg/L	0.005	0.005	0.005	0.005						
SG-Y	Magnesium, total	mg/L	6.00	6.0	5.8	4.8						
SG-Y	Phosphorus, dissolved	mg/L	0.020	0.05	0.05	0.05						
SG-Y	Phosphorus, total	mg/L	0.045	0.034	0.05	0.05						
SG-Y	Potassium, total	mg/L	0.600	1.0	1.0	1.0						
SG-Y	Sodium, total	mg/L	1.86	1.8	1.7	1.6						
SG-Y	Sodium Absorption Ratio	std	0.108	0.106	0.101	0.104						
SG-Y	Aluminum, total	ug/L	17.6	26.1	40.0	60.7						
SG-Y	Cadmium, total	ug/L	0.006	0.006	0.006	0.0043						
SG-Y	Copper, total	ug/L	0.598	0.270	0.454	0.389						
SG-Y	Lead, total	ug/L	0.307	0.198	0.2	0.256						
SG-Y	Mercury, total	ng/L	3.60	1.33	2.39	4.55						
SG-Y	Zinc, total	ug/L	3.73	1.84	1.65	2.62						

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
WR-HR-01	pH (Field)	S.U.										7.80
WR-HR-01	pH, Lab	S.U.										6.8
WR-HR-01	Conductivity (Field)	umhos										86.8
WR-HR-01	Temperature (Field)	Degrees C										3.7
WR-HR-01	Temperature (Field-DO Meter)	Degrees C										4.75
WR-HR-01	Dissolved Oxygen (Field)	%										13.0
WR-HR-01	Alkalinity	mg/L										31
WR-HR-01	Alkalinity, Bicarbonate	mg/L										31
WR-HR-01	Alkalinity, Carbonate	mg/L										5
WR-HR-01	Hardness	mg/L										34
WR-HR-01	Total Dissolved Solids	mg/L										78
WR-HR-01	Total Suspended Solids	mg/L										5
WR-HR-01	Biological Oxygen Demand	mg/L										3
WR-HR-01	Chemical Oxygen Demand, Low Level	mg/L										25
WR-HR-01	Ammonia	mg/L										0.2
WR-HR-01	Nitrate	mg/L										0.50
WR-HR-01	Nitrogen, Total Kjeldahl	mg/L										0.5
WR-HR-01	Chloride	mg/L										6
WR-HR-01	Fluoride	mg/L										0.1
WR-HR-01	Sulfate	mg/L										5.3
WR-HR-01	Cyanide, total	ug/L										20
WR-HR-01	Oil & Grease	mg/L										4.6
WR-HR-01	Turbidity, Lab	NTU										3.7
WR-HR-01	Cations	Meq/L										0.92
WR-HR-01	Anions	Meq/L										0.79
WR-HR-01	Cation and Anion Balance	%										7.57
WR-HR-01	Boron, total	mg/L										0.10
WR-HR-01	Calcium, total	mg/L										8.9
WR-HR-01	Arsenic, total	mg/L										0.005
WR-HR-01	Barium, total	mg/L										0.010
WR-HR-01	Iron, dissolved	mg/L										0.45
WR-HR-01	Iron, total	mg/L										0.77
WR-HR-01	Manganese, dissolved	mg/L										0.042
WR-HR-01	Manganese, total	mg/L										0.054
WR-HR-01	Molybdenum, total	mg/L										0.020
WR-HR-01	Selenium, total	mg/L										0.005
WR-HR-01	Silver, total	mg/L										0.010
WR-HR-01	Chromium, total	mg/L										0.005
WR-HR-01	Beryllium, total	mg/L										0.010
WR-HR-01	Thallium, total	mg/L										0.005
WR-HR-01	Nickel, total	mg/L										0.030
WR-HR-01	Antimony, total	mg/L										0.005
WR-HR-01	Magnesium, total	mg/L										2.9
WR-HR-01	Phosphorus, dissolved	mg/L										0.05
WR-HR-01	Phosphorus, total	mg/L										0.053
WR-HR-01	Potassium, total	mg/L										1.5
WR-HR-01	Sodium, total	mg/L										4.5
WR-HR-01	Sodium Absorption Ratio	std										0.34
WR-HR-01	Aluminum, total	ug/L										50
WR-HR-01	Copper, total	ug/L										30
WR-HR-01	Lead, total	ug/L										50
WR-HR-01	Mercury, total	ng/L										200
WR-HR-01	Zinc, total	ug/L										20

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
WR-HR-02	pH (Field)	S.U.										7.71
WR-HR-02	pH, Lab	S.U.										6.8
WR-HR-02	Conductivity (Field)	umhos										87.5
WR-HR-02	Temperature (Field)	Degrees C										3.6
WR-HR-02	Temperature (Field-DO Meter)	Degrees C										4.75
WR-HR-02	Dissolved Oxygen (Field)	%										13.0
WR-HR-02	Alkalinity	mg/L										30
WR-HR-02	Alkalinity, Bicarbonate	mg/L										30
WR-HR-02	Alkalinity, Carbonate	mg/L									<	5
WR-HR-02	Hardness	mg/L										35
WR-HR-02	Total Dissolved Solids	mg/L										94
WR-HR-02	Total Suspended Solids	mg/L									<	5
WR-HR-02	Biological Oxygen Demand	mg/L									<	3
WR-HR-02	Chemical Oxygen Demand, Low Level	mg/L										20
WR-HR-02	Ammonia	mg/L										0.1
WR-HR-02	Nitrate	mg/L									<	0.50
WR-HR-02	Nitrogen, Total Kjeldahl	mg/L										0.5
WR-HR-02	Chloride	mg/L										6
WR-HR-02	Fluoride	mg/L									<	0.1
WR-HR-02	Sulfate	mg/L										5.3
WR-HR-02	Cyanide, total	ug/L									<	20
WR-HR-02	Oil & Grease	mg/L									<	4.6
WR-HR-02	Turbidity, Lab	NTU										3.8
WR-HR-02	Cations	Meq/L										0.90
WR-HR-02	Anions	Meq/L										0.77
WR-HR-02	Cation and Anion Balance	%										7.67
WR-HR-02	Boron, total	mg/L									<	0.10
WR-HR-02	Calcium, total	mg/L										8.9
WR-HR-02	Arsenic, total	mg/L									<	0.005
WR-HR-02	Barium, total	mg/L									<	0.010
WR-HR-02	Iron, dissolved	mg/L										0.45
WR-HR-02	Iron, total	mg/L										0.75
WR-HR-02	Manganese, dissolved	mg/L										0.042
WR-HR-02	Manganese, total	mg/L										0.064
WR-HR-02	Molybdenum, total	mg/L									<	0.020
WR-HR-02	Selenium, total	mg/L									<	0.005
WR-HR-02	Silver, total	mg/L									<	0.010
WR-HR-02	Chromium, total	mg/L									<	0.005
WR-HR-02	Beryllium, total	mg/L									<	0.010
WR-HR-02	Thallium, total	mg/L									<	0.005
WR-HR-02	Nickel, total	mg/L									<	0.030
WR-HR-02	Antimony, total	mg/L									<	0.005
WR-HR-02	Magnesium, total	mg/L										2.9
WR-HR-02	Phosphorus, dissolved	mg/L									<	0.05
WR-HR-02	Phosphorus, total	mg/L										0.06
WR-HR-02	Potassium, total	mg/L										1.5
WR-HR-02	Sodium, total	mg/L										4.1
WR-HR-02	Sodium Absorption Ratio	std										0.31
WR-HR-02	Aluminum, total	ug/L									<	50
WR-HR-02	Copper, total	ug/L									<	30
WR-HR-02	Lead, total	ug/L									<	50
WR-HR-02	Mercury, total	ng/L									<	200
WR-HR-02	Zinc, total	ug/L									<	20

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
SG-WR-3	pH (Field)	S.U.					7.28					
SG-WR-3	pH, Lab	S.U.					7.0					
SG-WR-3	Conductivity (Field)	umhos					80.1					
SG-WR-3	Temperature (Field)	Degrees C					4.8					
SG-WR-3	Temperature (Field-DO Meter)	Degrees C					4.75					
SG-WR-3	Dissolved Oxygen (Field)	%					14.05					
SG-WR-3	Ammonia	mg/L					0.2					
SG-WR-3	Chloride	mg/L					2					
SG-WR-3	Cyanide, total	ug/L					< 20					
SG-WR-3	Arsenic, total	mg/L					< 0.005					
SG-WR-3	Selenium, total	mg/L					< 0.005					
SG-WR-3	Silver, total	mg/L					< 0.010					
SG-WR-3	Chromium, total	mg/L					< 0.0050					
SG-WR-3	Beryllium, total	mg/L					< 0.010					
SG-WR-3	Thallium, total	mg/L					< 0.005					
SG-WR-3	Nickel, total	mg/L					< 0.030					
SG-WR-3	Antimony, total	mg/L					< 0.005					
SG-WR-3	Aluminum, total	ug/L					< 50					
SG-WR-3	Cadmium, total	ug/L					< 5					
SG-WR-3	Copper, total	ug/L					< 30					
SG-WR-3	Lead, total	ug/L					< 50					
SG-WR-3	Mercury, total	ng/L					< 200					
SG-WR-3	Zinc, total	ug/L					< 20					

STATION	PARAMETER	Units	Nov-93	Dec-93	Jan-94	Feb-94	Mar-94	Apr-94	Apr-94	May-94	Jun-94	Jul-94
LG-07	pH (Field)	S.U.							6.29	5.42	5.86	6.75
LG-07	pH (Field)-02'	S.U.										
LG-07	pH (Field)-07'	S.U.										
LG-07	pH (Field)-10'	S.U.										
LG-07	pH, Lab	S.U.							(PHT)	(PHT)		(PHT)
LG-07	Conductivity (Field)	umhos							39	24	16	12.58
LG-07	Conductivity (Field)-02'	umhos										
LG-07	Conductivity (Field)-07'	umhos										
LG-07	Conductivity (Field)-10'	umhos										
LG-07	Conductivity, Lab	umhos							17.4	17.0	17.0	17.7
LG-07	Temperature (Field)	Degrees C							8.3	13.3	18.4	25.3
LG-07	Temperature (Field)-02'	Degrees C										
LG-07	Temperature (Field)-07'	Degrees C										
LG-07	Temperature (Field)-10'	Degrees C										
LG-07	Temperature (Field-DO Meter)	Degrees C							8.0		18	
LG-07	Temperature (Field-DO Meter)-01'	Degrees C										
LG-07	Temperature (Field-DO Meter)-02'	Degrees C										
LG-07	Temperature (Field-DO Meter)-03'	Degrees C										
LG-07	Temperature (Field-DO Meter)-04'	Degrees C										
LG-07	Temperature (Field-DO Meter)-05'	Degrees C										
LG-07	Temperature (Field-DO Meter)-06'	Degrees C										
LG-07	Temperature (Field-DO Meter)-07'	Degrees C										
LG-07	Temperature (Field-DO Meter)-08'	Degrees C										
LG-07	Temperature (Field-DO Meter)-09'	Degrees C										
LG-07	Temperature (Field-DO Meter)-10'	Degrees C										
LG-07	Temperature (Field-DO Meter)-11'	Degrees C										
LG-07	Temperature (Field-DO Meter)-12'	Degrees C										
LG-07	Temperature (Field-DO Meter)-13'	Degrees C										
LG-07	Temperature (Field-DO Meter)-13.5'	Degrees C										
LG-07	Temperature (Field-DO Meter)-14'	Degrees C										
LG-07	Temperature (Field-DO Meter)-15'	Degrees C										
LG-07	Temperature (Field-DO Meter)-16'	Degrees C										
LG-07	Temperature (Field-DO Meter)-17'	Degrees C										
LG-07	Temperature (Field-DO Meter)-18'	Degrees C										
LG-07	Dissolved Oxygen (Field)	%									8.2	6.2
LG-07	Dissolved Oxygen (Field)-Surface	%							9.5			
LG-07	Dissolved Oxygen (Field)-01'	%										
LG-07	Dissolved Oxygen (Field)-02'	%										
LG-07	Dissolved Oxygen (Field)-03'	%										
LG-07	Dissolved Oxygen (Field)-04'	%										
LG-07	Dissolved Oxygen (Field)-05'	%										
LG-07	Dissolved Oxygen (Field)-06'	%										
LG-07	Dissolved Oxygen (Field)-07'	%										
LG-07	Dissolved Oxygen (Field)-08'	%										
LG-07	Dissolved Oxygen (Field)-09'	%										
LG-07	Dissolved Oxygen (Field)-10'	%										
LG-07	Dissolved Oxygen (Field)-11'	%										
LG-07	Dissolved Oxygen (Field)-12'	%										
LG-07	Dissolved Oxygen (Field)-13'	%										
LG-07	Dissolved Oxygen (Field)-13.5'	%										
LG-07	Dissolved Oxygen (Field)-14'	%										
LG-07	Dissolved Oxygen (Field)-15'	%										
LG-07	Dissolved Oxygen (Field)-16'	%										
LG-07	Dissolved Oxygen (Field)-17'	%										
LG-07	Dissolved Oxygen (Field)-18'	%										
LG-07	Dissolved Oxygen (Field)-Bottom	%							7.8			
LG-07	Alkalinity	mg/L							20.0	20.0	34.6	2.80
LG-07	Alkalinity, Bicarbonate	mg/L							20.0	20.0	34.6	2.80
LG-07	Alkalinity, Carbonate	mg/L							0	0	0	0
LG-07	Alkalinity, Hydroxide	mg/L							0	0	0	0
LG-07	Hardness	mg/L							5.00	5.00	8.32	5.97
LG-07	Total Dissolved Solids	mg/L							25.0	5.00	29.0	33.0
LG-07	Total Suspended Solids	mg/L							5.00	5.00	5.00	5.00
LG-07	Biological Oxygen Demand	mg/L							7.00	4.00	3.00	3.00
LG-07	Chemical Oxygen Demand	mg/L							12.0	27.0	19.0	20.0
LG-07	Chemical Oxygen Demand, Low Level	mg/L										
LG-07	Ammonia	mg/L							0.100	0.100	0.100	0.100
LG-07	Nitrate	mg/L							0.500	0.500	0.500	0.500
LG-07	Nitrogen, Total Kjeldahl	mg/L							0.336	0.200	0.308	0.252
LG-07	Chloride	mg/L							1	1	1	1
LG-07	Fluoride	mg/L							0.100	0.218	0.100	0.100
LG-07	Sulfate	mg/L							3.80	4.00	5.00	4.40
LG-07	Cyanide, total	ug/L							20	20	20	20
LG-07	Oil & Grease	mg/L							1.00	1.05	1.02	1.12
LG-07	Turbidity, Lab	NTU							2.00	0.770	0.492	1.90
LG-07	Cations	Meq/L							0.146	0.066	0.058	0.079
LG-07	Anions	Meq/L							0.079	0.121	0.742	0.168
LG-07	Cation and Anion Balance	%							29.8	-30	-90	-40

(PHT) : Past Hold Time

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
LG-07	pH (Field)	S.U.	6.48	6.37		6.56	6.62		6.24			
LG-07	pH (Field)-02'	S.U.									5.76	
LG-07	pH (Field)-07'	S.U.								5.49		
LG-07	pH (Field)-10'	S.U.									5.86	
LG-07	pH, Lab	S.U.	(PHT)	5.6		5.1	4.9		4.9	5.2	5.05	
LG-07	Conductivity (Field)	umhos	12.58	18		16.98	18.87		47			
LG-07	Conductivity (Field)-02'	umhos									34.6	
LG-07	Conductivity (Field)-07'	umhos								36.9		
LG-07	Conductivity (Field)-10'	umhos									58.6	
LG-07	Conductivity, Lab	umhos	17.6									
LG-07	Temperature (Field)	Degrees C	20.8	18.2		12.3	6.4		1.1			
LG-07	Temperature (Field)-02'	Degrees C									4.9	
LG-07	Temperature (Field)-07'	Degrees C								3.8		
LG-07	Temperature (Field)-10'	Degrees C									4.9	
LG-07	Temperature (Field-DO Meter)	Degrees C	21.0	18		12.5	6.5		1.75	0.75	0.25	
LG-07	Temperature (Field-DO Meter)-01'	Degrees C		18		12.5	6.5		1.75	1.0	0.5	
LG-07	Temperature (Field-DO Meter)-02'	Degrees C		18		12.5	6.5		4.0	1.0	4.0	
LG-07	Temperature (Field-DO Meter)-03'	Degrees C	20.5	18		12.5	6.5		4.5	3.0	4.5	
LG-07	Temperature (Field-DO Meter)-04'	Degrees C		18		12.5	6.5		4.5	4.0	4.5	
LG-07	Temperature (Field-DO Meter)-05'	Degrees C		18		12.5	6.5		4.5	4.0	4.5	
LG-07	Temperature (Field-DO Meter)-06'	Degrees C	20.0	18		12.5	6.5		4.5	4.0	4.5	
LG-07	Temperature (Field-DO Meter)-07'	Degrees C		18		12.5	6.5		4.5	4.0	4.5	
LG-07	Temperature (Field-DO Meter)-08'	Degrees C		18		12.5	6.5		4.5	4.0	4.5	
LG-07	Temperature (Field-DO Meter)-09'	Degrees C	19.5	18		12.5	6.5		4.5	4.0	4.5	
LG-07	Temperature (Field-DO Meter)-10'	Degrees C		18		12.5	6.5		4.5	4.25	4.5	
LG-07	Temperature (Field-DO Meter)-11'	Degrees C		18		12.5	6.5		4.5	4.25	4.5	
LG-07	Temperature (Field-DO Meter)-12'	Degrees C	19.0	18		12.5	6.5		4.5	4.5		
LG-07	Temperature (Field-DO Meter)-13'	Degrees C		18		12.5			4.5			
LG-07	Temperature (Field-DO Meter)-13.5'	Degrees C								4.75		
LG-07	Temperature (Field-DO Meter)-14'	Degrees C		18		12.5			4.5			
LG-07	Temperature (Field-DO Meter)-15'	Degrees C	19.0	18		12.5			4.5			
LG-07	Temperature (Field-DO Meter)-16'	Degrees C							4.5			
LG-07	Temperature (Field-DO Meter)-17'	Degrees C							4.5			
LG-07	Temperature (Field-DO Meter)-18'	Degrees C	19.0						4.5			
LG-07	Dissolved Oxygen (Field)	%	8.4	9.0		9.1	12.3			14.75	9.8	
LG-07	Dissolved Oxygen (Field)-Surface	%										
LG-07	Dissolved Oxygen (Field)-01'	%		9.0		9.0	12.3			14.5	9.15	
LG-07	Dissolved Oxygen (Field)-02'	%		9.0		9.0	12.3		12.0	14.4	5.55	
LG-07	Dissolved Oxygen (Field)-03'	%	8.4	9.0		9.0	12.3		11.8	7.3	5.2	
LG-07	Dissolved Oxygen (Field)-04'	%		9.0		9.0	12.3		10.8	5.8	5.1	
LG-07	Dissolved Oxygen (Field)-05'	%		9.0		9.0	12.3		10.8	5.4	5.0	
LG-07	Dissolved Oxygen (Field)-06'	%	8.2	9.0		9.0	12.3		10.8	5.1	5.0	
LG-07	Dissolved Oxygen (Field)-07'	%		9.0		9.0	12.3		10.7	5.0	5.0	
LG-07	Dissolved Oxygen (Field)-08'	%		9.0		9.0	12.3		10.6	4.75	5.0	
LG-07	Dissolved Oxygen (Field)-09'	%	8.2	9.0		9.0	12.3		10.6	4.75	5.0	
LG-07	Dissolved Oxygen (Field)-10'	%		9.0		8.9	12.3		10.6	4.7	4.95	
LG-07	Dissolved Oxygen (Field)-11'	%		9.0		9.0	12.3		10.6	4.7	4.1	
LG-07	Dissolved Oxygen (Field)-12'	%	8.0	8.8		9.0	12.3		10.6	4.7		
LG-07	Dissolved Oxygen (Field)-13'	%		8.8		9.0			10.6			
LG-07	Dissolved Oxygen (Field)-13.5'	%								0.5		
LG-07	Dissolved Oxygen (Field)-14'	%		8.6		8.8			10.6			
LG-07	Dissolved Oxygen (Field)-15'	%	8.0	5.2		7.0			10.6			
LG-07	Dissolved Oxygen (Field)-16'	%							10.6			
LG-07	Dissolved Oxygen (Field)-17'	%							10.5			
LG-07	Dissolved Oxygen (Field)-18'	%	8.0						10.5			
LG-07	Dissolved Oxygen (Field)-Bottom	%										
LG-07	Alkalinity	mg/L	2.80	≤ 5		≤ 5	≤ 5		≤ 5	≤ 5	≤ 5	
LG-07	Alkalinity, Bicarbonate	mg/L	2.80	≤ 5		≤ 5	≤ 5		≤ 5	≤ 5	≤ 5	
LG-07	Alkalinity, Carbonate	mg/L	0	≤ 5		≤ 5	≤ 5		≤ 5	≤ 5	≤ 5	
LG-07	Alkalinity, Hydroxide	mg/L	0	≤ 5		≤ 5						
LG-07	Hardness	mg/L	≤ 5.00	6.0		≤ 5	≤ 5		6	7	5.5	
LG-07	Total Dissolved Solids	mg/L	31.0	42		6.0	51		28	41	30	
LG-07	Total Suspended Solids	mg/L	≤ 5.00			≤ 5	5		≤ 5	≤ 5	≤ 5	
LG-07	Biological Oxygen Demand	mg/L	≤ 3.00	≤ 2		≤ 3	3		≤ 3	≤ 3	≤ 3	
LG-07	Chemical Oxygen Demand	mg/L	10.0									
LG-07	Chemical Oxygen Demand, Low Level	mg/L		≤ 20		≤ 20	10		26	21	14.5	
LG-07	Ammonia	mg/L	≤ 0.100	≤ 0.1		0.1	≤ 0.1		≤ 0.1	0.1	0.1	
LG-07	Nitrate	mg/L	0.718	≤ 0.5		≤ 0.50	≤ 0.50		≤ 0.50	≤ 0.50	≤ 0.5	
LG-07	Nitrogen, Total Kjeldahl	mg/L	0.280	0.5		0.6	1.7		0.6	0.6	0.3	
LG-07	Chloride	mg/L	1	≤ 1		≤ 1	≤ 1		≤ 1	≤ 1	≤ 1	
LG-07	Fluoride	mg/L	≤ 0.100	≤ 0.10		≤ 0.1	≤ 0.1		≤ 0.1	≤ 0.1	≤ 0.1	
LG-07	Sulfate	mg/L	6.00			5.7	5.9		7.8	5.7	3.05	
LG-07	Cyanide, total	ug/L	≤ 20	≤ 20		≤ 20	≤ 20		≤ 20	≤ 20	≤ 20	
LG-07	Oil & Grease	mg/L	≤ 1.12	≤ 1		≤ 4.6	≤ 4.6		≤ 4.6	≤ 4.6	≤ 4.6	
LG-07	Turbidity, Lab	NTU	0.950	≤ 0.5		0.8	0.7		0.6	0.6	≤ 0.5	
LG-07	Cations	Meq/L	0.119	0.078		0.081	0.060		0.16	0.20	0.1	
LG-07	Anions	Meq/L	0.212	0.133		0.119	0.123		0.16	0.12	0.06	
LG-07	Cation and Anion Balance	%	-30	-26.13		-19.11	-34.54		0.12	26.04	16.38	

STATION	PARAMETER	Units	Nov-93	Dec-93	Jan-94	Feb-94	Mar-94	Apr-94	Apr-94	May-94	Jun-94	Jul-94
LG-07	Boron, total	mg/L							△ 0.100	△ 0.100	△ 0.100	△ 0.100
LG-07	Calcium, total	mg/L							1.33	1.33	1.17	1.27
LG-07	Arsenic, total	mg/L							△ 0.005	△ 0.005	△ 0.005	△ 0.005
LG-07	Barium, total	mg/L							△ 0.010	△ 0.010	△ 0.010	△ 0.010
LG-07	Iron, dissolved	mg/L							△ 0.100	△ 0.100	△ 0.100	△ 0.100
LG-07	Iron, total	mg/L							△ 0.100	△ 0.100	△ 0.100	△ 0.100
LG-07	Manganese, dissolved	mg/L							0.010	0.024	0.011	0.012
LG-07	Manganese, total	mg/L							0.012	△ 0.010	0.015	0.014
LG-07	Molybdenum, total	mg/L							△ 0.020	△ 0.020	△ 0.020	△ 0.020
LG-07	Selenium, total	mg/L							△ 0.005	△ 0.005	△ 0.005	△ 0.005
LG-07	Silver, total	mg/L							△ 0.010	△ 0.010	△ 0.010	△ 0.010
LG-07	Chromium, total	mg/L							△ 0.020	△ 0.020	△ 0.020	△ 0.020
LG-07	Chromium, total (Low Level)	ug/L							0.310	0.34	0.45	0.22
LG-07	Beryllium, total	mg/L							△ 0.005	△ 0.005	△ 0.005	△ 0.005
LG-07	Thallium, total	mg/L							△ 0.005	△ 0.005	△ 0.005	△ 0.005
LG-07	Nickel, total	mg/L							△ 0.030	△ 0.030	△ 0.030	△ 0.030
LG-07	Antimony, total	mg/L							△ 0.005	△ 0.005	△ 0.005	△ 0.005
LG-07	Magnesium, total	mg/L							△ 0.500	△ 0.500	△ 0.500	△ 0.500
LG-07	Phosphorus, dissolved	mg/L							△ 0.050	0.007	0.006	△ 0.004
LG-07	Phosphorus, total	mg/L							△ 0.050	0.013	0.011	0.014
LG-07	Potassium, total	mg/L							0.700	△ 0.600	△ 0.600	0.600
LG-07	Sodium, total	mg/L							1.43	△ 1.00	△ 1.00	△ 1.00
LG-07	Sodium Absorption Ratio	std							0.341	0	0	0
LG-07	Aluminum, total	ug/L							65.5	68.2	59.3	40.3
LG-07	Cadmium, total	ug/L							0.053	0.055	0.065	0.058
LG-07	Copper, total	ug/L							0.683	0.660	0.468	0.510
LG-07	Lead, total	ug/L							0.266	0.222	0.265	0.274
LG-07	Mercury, total	ng/L							2	2	1.69	1.77
LG-07	Zinc, total	ug/L							11.5	11.2	12.3	10.8

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
LG-07	Boron, total	mg/L	< 0.100	< 0.20		< 0.10	< 0.10		< 0.10	< 0.10	< 0.1	
LG-07	Calcium, total	mg/L	1.18	1.2		1.3	1.2		1.8	2.2	1.35	
LG-07	Arsenic, total	mg/L	< 0.005	< 0.005		< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	
LG-07	Barium, total	mg/L	< 0.010	< 0.010		< 0.010	< 0.010		< 0.010	0.010	0.2185	
LG-07	Iron, dissolved	mg/L	< 0.100	< 0.050		< 0.050	0.058		< 0.050	0.056	0.062	
LG-07	Iron, total	mg/L	< 0.100	0.046		0.095	0.061		0.066	0.080	0.1135	
LG-07	Manganese, dissolved	mg/L	< 0.010	< 0.010		0.013	< 0.010		0.014	0.016	0.025	
LG-07	Manganese, total	mg/L	< 0.010	< 0.010		0.015	< 0.010		< 0.010	0.026	0.037	
LG-07	Molybdenum, total	mg/L	< 0.020	< 0.020		< 0.020	< 0.020		< 0.020	< 0.020	< 0.02	
LG-07	Selenium, total	mg/L	< 0.005	< 0.005		< 0.006	< 0.005		< 0.005	< 0.005	< 0.005	
LG-07	Silver, total	mg/L	< 0.010	< 0.010		< 0.010	< 0.010		< 0.010	< 0.010	< 0.01	
LG-07	Chromium, total	mg/L	< 0.020									
LG-07	Chromium, total (Low Level)	ug/L	0.25	< 0.30		< 0.30	0.44		0.205	0.281	0.162	
LG-07	Beryllium, total	mg/L	< 0.005	< 0.010		< 0.010	< 0.010		< 0.010	< 0.010	< 0.01	
LG-07	Thallium, total	mg/L	< 0.005	< 0.005		< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	
LG-07	Nickel, total	mg/L	< 0.030	< 0.030		< 0.030	< 0.030		< 0.030	< 0.030	< 0.03	
LG-07	Antimony, total	mg/L	< 0.005	< 0.005		< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	
LG-07	Magnesium, total	mg/L	0.524	< 0.50		< 0.50	< 0.50		0.68	0.90	0.52	
LG-07	Phosphorus, dissolved	mg/L	0.004	< 0.05		< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	
LG-07	Phosphorus, total	mg/L	0.010	< 0.05		< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	
LG-07	Potassium, total	mg/L	0.650	< 1.0		< 1.0	< 1.0		< 1.0	< 1.0	< 1	
LG-07	Sodium, total	mg/L	< 1.00	< 1.0		< 1.0	< 1.0		< 1.0	< 1.0	< 1	
LG-07	Sodium Absorption Ratio	std	0	0		0.000	0		0	0	0	
LG-07	Aluminum, total	ug/L	33.5	36.2		65.7	122		108	111	83.9	
LG-07	Cadmium, total	ug/L	0.048	0.0304		0.0422	0.034		0.065	0.071	0.07	
LG-07	Copper, total	ug/L	0.585	0.345		0.468	0.355		0.975	0.719	0.556	
LG-07	Lead, total	ug/L	0.445	0.196		0.399	0.219		0.369	0.267	0.404	
LG-07	Mercury, total	ng/L	1.73	1.96		2.24	1.8		2.27	1.94	1.94	
LG-07	Zinc, total	ug/L	9.03	8.17		21.7	13.8		10.2	10.2	7.94	

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
LG-07-02'	pH, Lab	S.U.									4.9	
LG-07-02'	Alkalinity	mg/L									< 5	
LG-07-02'	Alkalinity, Bicarbonate	mg/L									< 5	
LG-07-02'	Alkalinity, Carbonate	mg/L									< 5	
LG-07-02'	Hardness	mg/L									< 5	
LG-07-02'	Total Dissolved Solids	mg/L									22	
LG-07-02'	Total Suspended Solids	mg/L									< 5	
LG-07-02'	Biological Oxygen Demand	mg/L									< 3	
LG-07-02'	Chemical Oxygen Demand, Low Level	mg/L									13	
LG-07-02'	Ammonia	mg/L									0.1	
LG-07-02'	Nitrate	mg/L									< 0.50	
LG-07-02'	Nitrogen, Total Kjeldahl	mg/L									< 0.2	
LG-07-02'	Chloride	mg/L									< 1	
LG-07-02'	Fluoride	mg/L									< 0.1	
LG-07-02'	Sulfate	mg/L									3.0	
LG-07-02'	Cyanide, total	ug/L									< 20	
LG-07-02'	Oil & Grease	mg/L									< 4.6	
LG-07-02'	Turbidity, Lab	NTU									< 0.5	
LG-07-02'	Cations	Meq/L									0.05	
LG-07-02'	Anions	Meq/L									0.06	
LG-07-02'	Cation and Anion Balance	%									-6.45	
LG-07-02'	Boron, total	mg/L									< 0.10	
LG-07-02'	Calcium, total	mg/L									1.1	
LG-07-02'	Arsenic, total	mg/L									< 0.005	
LG-07-02'	Barium, total	mg/L									0.40	
LG-07-02'	Iron, dissolved	mg/L									< 0.050	
LG-07-02'	Iron, total	mg/L									0.077	
LG-07-02'	Manganese, dissolved	mg/L									0.019	
LG-07-02'	Manganese, total	mg/L									0.032	
LG-07-02'	Molybdenum, total	mg/L									< 0.020	
LG-07-02'	Selenium, total	mg/L									< 0.005	
LG-07-02'	Silver, total	mg/L									< 0.010	
LG-07-02' (C)	Chromium, total (Low Level)	ug/L									0.162	
LG-07-02'	Beryllium, total	mg/L									< 0.010	
LG-07-02'	Thallium, total	mg/L									< 0.005	
LG-07-02'	Nickel, total	mg/L									< 0.030	
LG-07-02'	Antimony, total	mg/L									< 0.005	
LG-07-02'	Magnesium, total	mg/L									< 0.50	
LG-07-02'	Phosphorus, dissolved	mg/L									< 0.05	
LG-07-02'	Phosphorus, total	mg/L									< 0.05	
LG-07-02'	Potassium, total	mg/L									< 1.0	
LG-07-02'	Sodium, total	mg/L									< 1.0	
LG-07-02'	Sodium Absorption Ratio	std									0	
LG-07-02' (C)	Aluminum, total	ug/L									83.9	
LG-07-02' (C)	Cadmium, total	ug/L									0.070	
LG-07-02' (C)	Copper, total	ug/L									0.556	
LG-07-02' (C)	Lead, total	ug/L									0.404	
LG-07-02' (C)	Mercury, total	ng/L									1.94	
LG-07-02' (C)	Zinc, total	ug/L									7.94	

(C) Sample Composited With LG-07-10'

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
LG-07-10'	pH, Lab	S.U.									5.2	
LG-07-10'	Alkalinity	mg/L									5	
LG-07-10'	Alkalinity, Bicarbonate	mg/L									5	
LG-07-10'	Alkalinity, Carbonate	mg/L									5	
LG-07-10'	Hardness	mg/L									6	
LG-07-10'	Total Dissolved Solids	mg/L									38	
LG-07-10'	Total Suspended Solids	mg/L									5	
LG-07-10'	Biological Oxygen Demand	mg/L									3	
LG-07-10'	Chemical Oxygen Demand, Low Level	mg/L									16	
LG-07-10'	Ammonia	mg/L									0.1	
LG-07-10'	Nitrate	mg/L									0.50	
LG-07-10'	Nitrogen, Total Kjeldahl	mg/L									0.4	
LG-07-10'	Chloride	mg/L									1	
LG-07-10'	Fluoride	mg/L									0.1	
LG-07-10'	Sulfate	mg/L									3.1	
LG-07-10'	Cyanide, total	ug/L									20	
LG-07-10'	Oil & Grease	mg/L									4.6	
LG-07-10'	Turbidity, Lab	NTU									0.5	
LG-07-10'	Cations	Meq/L									0.15	
LG-07-10'	Anions	Meq/L									0.06	
LG-07-10'	Cation and Anion Balance	%									39.21	
LG-07-10'	Boron, total	mg/L									0.10	
LG-07-10'	Calcium, total	mg/L									1.6	
LG-07-10'	Arsenic, total	mg/L									0.005	
LG-07-10'	Barium, total	mg/L									0.037	
LG-07-10'	Iron, dissolved	mg/L									0.074	
LG-07-10'	Iron, total	mg/L									0.15	
LG-07-10'	Manganese, dissolved	mg/L									0.031	
LG-07-10'	Manganese, total	mg/L									0.042	
LG-07-10'	Molybdenum, total	mg/L									0.020	
LG-07-10'	Selenium, total	mg/L									0.005	
LG-07-10'	Silver, total	mg/L									0.010	
LG-07-10' (C)	Chromium, total (Low Level)	ug/L									0.162	
LG-07-10'	Beryllium, total	mg/L									0.010	
LG-07-10'	Thallium, total	mg/L									0.005	
LG-07-10'	Nickel, total	mg/L									0.030	
LG-07-10'	Antimony, total	mg/L									0.005	
LG-07-10'	Magnesium, total	mg/L									0.54	
LG-07-10'	Phosphorus, dissolved	mg/L									0.05	
LG-07-10'	Phosphorus, total	mg/L									0.05	
LG-07-10'	Potassium, total	mg/L									1.0	
LG-07-10'	Sodium, total	mg/L									1.0	
LG-07-10'	Sodium Absorption Ratio	std									0	
LG-07-10' (C)	Aluminum, total	ug/L									83.9	
LG-07-10' (C)	Cadmium, total	ug/L									0.070	
LG-07-10' (C)	Copper, total	ug/L									0.556	
LG-07-10' (C)	Lead, total	ug/L									0.404	
LG-07-10' (C)	Mercury, total	ng/L									1.94	
LG-07-10' (C)	Zinc, total	ug/L									7.94	

(C) Sample Compositied With LG-07-02'

STATION	PARAMETER	Units	Nov-93	Dec-93	Jan-94	Feb-94	Mar-94	Apr-94	Apr-94	May-94	Jun-94	Jul-94
LG-09	pH (Field)	S.U.							7.82			7.94
LG-09	pH, Lab	S.U.							(PHT)			(PHT)
LG-09	Conductivity (Field)	umhos							182			17.4
LG-09	Conductivity, Lab	umhos							174			142
LG-09	Temperature (Field)	Degrees C							8.0			23.3
LG-09	Temperature (Field-DO Meter)	Degrees C							8.0			23
LG-09	Temperature (Field-DO Meter)-01'	Degrees C										
LG-09	Temperature (Field-DO Meter)-02'	Degrees C										
LG-09	Temperature (Field-DO Meter)-03'	Degrees C										
LG-09	Temperature (Field-DO Meter)-04'	Degrees C										
LG-09	Temperature (Field-DO Meter)-05'	Degrees C										
LG-09	Temperature (Field-DO Meter)-06'	Degrees C										
LG-09	Temperature (Field-DO Meter)-07'	Degrees C										
LG-09	Temperature (Field-DO Meter)-08'	Degrees C										
LG-09	Temperature (Field-DO Meter)-09'	Degrees C										
LG-09	Temperature (Field-DO Meter)-10'	Degrees C										
LG-09	Dissolved Oxygen (Field)	%										6.2
LG-09	Dissolved Oxygen (Field)-Surface	%							8.5			
LG-09	Dissolved Oxygen (Field)-01'	%										
LG-09	Dissolved Oxygen (Field)-02'	%										
LG-09	Dissolved Oxygen (Field)-03'	%										
LG-09	Dissolved Oxygen (Field)-04'	%										
LG-09	Dissolved Oxygen (Field)-05'	%										
LG-09	Dissolved Oxygen (Field)-06'	%										
LG-09	Dissolved Oxygen (Field)-07'	%										
LG-09	Dissolved Oxygen (Field)-08'	%										
LG-09	Dissolved Oxygen (Field)-09'	%										
LG-09	Dissolved Oxygen (Field)-10'	%										
LG-09	Dissolved Oxygen (Field)-Bottom	%							8.0			
LG-09	Alkalinity	mg/L							87.4			78.0
LG-09	Alkalinity, Bicarbonate	mg/L							87.4			78.0
LG-09	Alkalinity, Carbonate	mg/L							0			0
LG-09	Alkalinity, Hydroxide	mg/L							0			0
LG-09	Hardness	mg/L							82.0			68.4
LG-09	Total Dissolved Solids	mg/L							94.0			105
LG-09	Total Suspended Solids	mg/L							5.00			5.00
LG-09	Biological Oxygen Demand	mg/L							8.00			3.00
LG-09	Chemical Oxygen Demand	mg/L							15.0			23.0
LG-09	Chemical Oxygen Demand, Low Level	mg/L										
LG-09	Ammonia	mg/L							0.100			0.100
LG-09	Nitrate	mg/L							0.500			0.500
LG-09	Nitrogen, Total Kjeldahl	mg/L							0.252			0.280
LG-09	Chloride	mg/L							1			1
LG-09	Fluoride	mg/L							0.100			0.100
LG-09	Sulfate	mg/L							4.06			5.10
LG-09	Cyanide, total	ug/L							20			20
LG-09	Oil & Grease	mg/L							1.02			1.04
LG-09	Turbidity, Lab	NTU							1.50			0.600
LG-09	Cations	Meq/L							1.80			1.75
LG-09	Anions	Meq/L							1.52			1.42
LG-09	Cation and Anion Balance	%							8.57			10.3
LG-09	Boron, total	mg/L							0.100			0.100
LG-09	Calcium, total	mg/L							19.4			18.0
LG-09	Arsenic, total	mg/L							0.005			0.005
LG-09	Barium, total	mg/L							0.010			0.010
LG-09	Iron, dissolved	mg/L							0.100			0.100
LG-09	Iron, total	mg/L							0.100			0.129
LG-09	Manganese, dissolved	mg/L							0.010			0.010
LG-09	Manganese, total	mg/L							0.010			0.015
LG-09	Molybdenum, total	mg/L							0.020			0.020
LG-09	Selenium, total	mg/L							0.005			0.005
LG-09	Silver, total	mg/L							0.010			0.010
LG-09	Chromium, total	mg/L							0.020			0.020
LG-09	Beryllium, total	mg/L							0.005			0.005
LG-09	Thallium, total	mg/L							0.005			0.005
LG-09	Nickel, total	mg/L							0.030			0.030
LG-09	Antimony, total	mg/L							0.005			0.005
LG-09	Magnesium, total	mg/L							9.10			9.52
LG-09	Phosphorus, dissolved	mg/L							0.050			0.012
LG-09	Phosphorus, total	mg/L							0.417			0.019
LG-09	Potassium, total	mg/L							0.600			0.600
LG-09	Sodium, total	mg/L							1.96			1.63
LG-09	Sodium Absorption Ratio	std							0.092			0.077
LG-09	Aluminum, total	ug/L							314			200
LG-09	Cadmium, total	ug/L							5			5
LG-09	Copper, total	ug/L							30			30
LG-09	Lead, total	ug/L							50			50
LG-09	Mercury, total	ng/L							200			300

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
LG-09	pH (Field)	S.U.				7.36						
LG-09	pH, Lab	S.U.				7.6						
LG-09	Conductivity (Field)	umhos				162.5						
LG-09	Conductivity, Lab	umhos										
LG-09	Temperature (Field)	Degrees C				11.1						
LG-09	Temperature (Field-DO Meter)	Degrees C				11.5						
LG-09	Temperature (Field-DO Meter)-01'	Degrees C				11.75						
LG-09	Temperature (Field-DO Meter)-02'	Degrees C				11.75						
LG-09	Temperature (Field-DO Meter)-03'	Degrees C				11.75						
LG-09	Temperature (Field-DO Meter)-04'	Degrees C				11.75						
LG-09	Temperature (Field-DO Meter)-05'	Degrees C				11.75						
LG-09	Temperature (Field-DO Meter)-06'	Degrees C				11.75						
LG-09	Temperature (Field-DO Meter)-07'	Degrees C				11.75						
LG-09	Temperature (Field-DO Meter)-08'	Degrees C				11.75						
LG-09	Temperature (Field-DO Meter)-09'	Degrees C				11.75						
LG-09	Temperature (Field-DO Meter)-10'	Degrees C				12.0						
LG-09	Dissolved Oxygen (Field)	%				8.5						
LG-09	Dissolved Oxygen (Field)-Surface	%										
LG-09	Dissolved Oxygen (Field)-01'	%				8.5						
LG-09	Dissolved Oxygen (Field)-02'	%				8.4						
LG-09	Dissolved Oxygen (Field)-03'	%				8.4						
LG-09	Dissolved Oxygen (Field)-04'	%				8.4						
LG-09	Dissolved Oxygen (Field)-05'	%				8.4						
LG-09	Dissolved Oxygen (Field)-06'	%				8.4						
LG-09	Dissolved Oxygen (Field)-07'	%				8.4						
LG-09	Dissolved Oxygen (Field)-08'	%				8.4						
LG-09	Dissolved Oxygen (Field)-09'	%				8.4						
LG-09	Dissolved Oxygen (Field)-10'	%				4.8						
LG-09	Dissolved Oxygen (Field)-Bottom	%										
LG-09	Alkalinity	mg/L				77						
LG-09	Alkalinity, Bicarbonate	mg/L				77						
LG-09	Alkalinity, Carbonate	mg/L				5						
LG-09	Alkalinity, Hydroxide	mg/L				5						
LG-09	Hardness	mg/L				80						
LG-09	Total Dissolved Solids	mg/L				92						
LG-09	Total Suspended Solids	mg/L				5						
LG-09	Biological Oxygen Demand	mg/L				3						
LG-09	Chemical Oxygen Demand	mg/L										
LG-09	Chemical Oxygen Demand, Low Level	mg/L				28						
LG-09	Ammonia	mg/L				0.1						
LG-09	Nitrate	mg/L				0.50						
LG-09	Nitrogen, Total Kjeldahl	mg/L				0.8						
LG-09	Chloride	mg/L				1						
LG-09	Fluoride	mg/L				0.1						
LG-09	Sulfate	mg/L				11						
LG-09	Cyanide, total	ug/L				20						
LG-09	Oil & Grease	mg/L				4.6						
LG-09	Turbidity, Lab	NTU				1.2						
LG-09	Cations	Meq/L				1.776						
LG-09	Anions	Meq/L				1.520						
LG-09	Cation and Anion Balance	%				7.78						
LG-09	Boron, total	mg/L				0.10						
LG-09	Calcium, total	mg/L				18						
LG-09	Arsenic, total	mg/L				0.005						
LG-09	Barium, total	mg/L				0.012						
LG-09	Iron, dissolved	mg/L				0.086						
LG-09	Iron, total	mg/L				0.12						
LG-09	Manganese, dissolved	mg/L				0.010						
LG-09	Manganese, total	mg/L				0.017						
LG-09	Molybdenum, total	mg/L				0.020						
LG-09	Selenium, total	mg/L				0.005						
LG-09	Silver, total	mg/L				0.010						
LG-09	Chromium, total	mg/L				0.0050						
LG-09	Beryllium, total	mg/L				0.010						
LG-09	Thallium, total	mg/L				0.005						
LG-09	Nickel, total	mg/L				0.030						
LG-09	Antimony, total	mg/L				0.005						
LG-09	Magnesium, total	mg/L				9.6						
LG-09	Phosphorus, dissolved	mg/L				0.05						
LG-09	Phosphorus, total	mg/L				0.05						
LG-09	Potassium, total	mg/L				1.0						
LG-09	Sodium, total	mg/L				1.6						
LG-09	Sodium Absorption Ratio	std				0.076						
LG-09	Aluminum, total	ug/L				50						
LG-09	Cadmium, total	ug/L				5						
LG-09	Copper, total	ug/L				30						
LG-09	Lead, total	ug/L				50						
LG-09	Mercury, total	ng/L				200						

STATION	PARAMETER	Units	Nov-93	Dec-93	Jan-94	Feb-94	Mar-94	Apr-94	Apr-94	May-94	Jun-94	Jul-94
LG-09	Zinc, total	ug/L							< 20			< 20

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
LG-09	Zinc, total	ug/L				< 20						

STATION	PARAMETER	Units	Nov-93	Dec-93	Jan-94	Feb-94	Mar-94	Apr-94	Apr-94	May-94	Jun-94	Jul-94
LG-11	pH (Field)	S.U.							5.34	6.36	6.22	6.76
LG-11	pH (Field)-05'	S.U.										
LG-11	pH (Field)-10'	S.U.										
LG-11	pH (Field)-30'	S.U.										
LG-11	pH (Field)-33'	S.U.										
LG-11	pH, Lab	S.U.										
LG-11	Conductivity (Field)	umhos							(PHT)	(PHT)	(PHT)	(PHT)
LG-11	Conductivity (Field)-05'	umhos							17	25	27	22
LG-11	Conductivity (Field)-10'	umhos										
LG-11	Conductivity (Field)-30'	umhos										
LG-11	Conductivity (Field)-33'	umhos										
LG-11	Conductivity, Lab	umhos										
LG-11	Temperature (Field)	Degrees C							19.6	21.0	18.9	20.3
LG-11	Temperature (Field)-05'	Degrees C							7.7	12.8	18.7	22.9
LG-11	Temperature (Field)-10'	Degrees C										
LG-11	Temperature (Field)-30'	Degrees C										
LG-11	Temperature (Field)-33'	Degrees C										
LG-11	Temperature (Field-DO Meter)	Degrees C										
LG-11	Temperature (Field-DO Meter)-01'	Degrees C							8.0	13	17	
LG-11	Temperature (Field-DO Meter)-02'	Degrees C										
LG-11	Temperature (Field-DO Meter)-03'	Degrees C										
LG-11	Temperature (Field-DO Meter)-04'	Degrees C										
LG-11	Temperature (Field-DO Meter)-05'	Degrees C										
LG-11	Temperature (Field-DO Meter)-06'	Degrees C										
LG-11	Temperature (Field-DO Meter)-07'	Degrees C										
LG-11	Temperature (Field-DO Meter)-08'	Degrees C										
LG-11	Temperature (Field-DO Meter)-09'	Degrees C										
LG-11	Temperature (Field-DO Meter)-10'	Degrees C										
LG-11	Temperature (Field-DO Meter)-11'	Degrees C										
LG-11	Temperature (Field-DO Meter)-12'	Degrees C										
LG-11	Temperature (Field-DO Meter)-13'	Degrees C										
LG-11	Temperature (Field-DO Meter)-14'	Degrees C										
LG-11	Temperature (Field-DO Meter)-15'	Degrees C										
LG-11	Temperature (Field-DO Meter)-16'	Degrees C										
LG-11	Temperature (Field-DO Meter)-17'	Degrees C										
LG-11	Temperature (Field-DO Meter)-18'	Degrees C										
LG-11	Temperature (Field-DO Meter)-19'	Degrees C										
LG-11	Temperature (Field-DO Meter)-20'	Degrees C										
LG-11	Temperature (Field-DO Meter)-21'	Degrees C										
LG-11	Temperature (Field-DO Meter)-22'	Degrees C										
LG-11	Temperature (Field-DO Meter)-23'	Degrees C										
LG-11	Temperature (Field-DO Meter)-24'	Degrees C										
LG-11	Temperature (Field-DO Meter)-25'	Degrees C										
LG-11	Temperature (Field-DO Meter)-26'	Degrees C										
LG-11	Temperature (Field-DO Meter)-27'	Degrees C										
LG-11	Temperature (Field-DO Meter)-28'	Degrees C										
LG-11	Temperature (Field-DO Meter)-29'	Degrees C										
LG-11	Temperature (Field-DO Meter)-30'	Degrees C										
LG-11	Temperature (Field-DO Meter)-31'	Degrees C										
LG-11	Temperature (Field-DO Meter)-32'	Degrees C										
LG-11	Temperature (Field-DO Meter)-33'	Degrees C										
LG-11	Temperature (Field-DO Meter)-34'	Degrees C										
LG-11	Temperature (Field-DO Meter)-35'	Degrees C										
LG-11	Temperature (Field-DO Meter)-36'	Degrees C										
LG-11	Temperature (Field-DO Meter)-37'	Degrees C										
LG-11	Temperature (Field-DO Meter)-38'	Degrees C										
LG-11	Dissolved Oxygen (Field)	%										
LG-11	Dissolved Oxygen (Field)-Surface	%								8.2	8.6	
LG-11	Dissolved Oxygen (Field)-01'	%							9.5			
LG-11	Dissolved Oxygen (Field)-02'	%										
LG-11	Dissolved Oxygen (Field)-03'	%										
LG-11	Dissolved Oxygen (Field)-04'	%										
LG-11	Dissolved Oxygen (Field)-05'	%										
LG-11	Dissolved Oxygen (Field)-06'	%										
LG-11	Dissolved Oxygen (Field)-07'	%										
LG-11	Dissolved Oxygen (Field)-08'	%										
LG-11	Dissolved Oxygen (Field)-09'	%										
LG-11	Dissolved Oxygen (Field)-10'	%										
LG-11	Dissolved Oxygen (Field)-11'	%										
LG-11	Dissolved Oxygen (Field)-12'	%										
LG-11	Dissolved Oxygen (Field)-13'	%										
LG-11	Dissolved Oxygen (Field)-14'	%										
LG-11	Dissolved Oxygen (Field)-15'	%										
LG-11	Dissolved Oxygen (Field)-16'	%										
LG-11	Dissolved Oxygen (Field)-17'	%										
LG-11	Dissolved Oxygen (Field)-18'	%										
LG-11	Dissolved Oxygen (Field)-19'	%										
LG-11	Dissolved Oxygen (Field)-20'	%										

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
LG-11	pH (Field)	S.U.	6.47	6.41		5.69	6.74		6.58			
LG-11	pH (Field)-05'	S.U.									6.06	
LG-11	pH (Field)-10'	S.U.								6.08		
LG-11	pH (Field)-30'	S.U.								5.90		
LG-11	pH (Field)-33'	S.U.									5.39	
LG-11	pH, Lab	S.U.	(PHT)	5.6		6.2	5.8		5.5	5.25	5.3	
LG-11	Conductivity (Field)	umhos	26	21.1		18.86	19.4		19.8			
LG-11	Conductivity (Field)-05'	umhos									74.3	
LG-11	Conductivity (Field)-10'	umhos								26.3		
LG-11	Conductivity (Field)-30'	umhos								63.2		
LG-11	Conductivity (Field)-33'	umhos									29.6	
LG-11	Conductivity, Lab	umhos	19.3									
LG-11	Temperature (Field)	Degrees C	19.9	18.2		13.6	5.8		0.1			
LG-11	Temperature (Field)-05'	Degrees C									11.2	
LG-11	Temperature (Field)-10'	Degrees C								5.8		
LG-11	Temperature (Field)-30'	Degrees C								4.2		
LG-11	Temperature (Field)-33'	Degrees C									10.2	
LG-11	Temperature (Field-DO Meter)	Degrees C	20.0	18		14	7.0		2.0	0.5	3.0	
LG-11	Temperature (Field-DO Meter)-01'	Degrees C		18		14	7.0		3.25	1.0	3.0	
LG-11	Temperature (Field-DO Meter)-02'	Degrees C		18		14	7.0		3.75	2.0	4.25	
LG-11	Temperature (Field-DO Meter)-03'	Degrees C	20.0	18		14	7.0		4.0	3.5	4.25	
LG-11	Temperature (Field-DO Meter)-04'	Degrees C		18		14	7.0		4.0	4.0	4.25	
LG-11	Temperature (Field-DO Meter)-05'	Degrees C		18		14	7.0		4.0	4.0	4.5	
LG-11	Temperature (Field-DO Meter)-06'	Degrees C	20.5	18		14	7.0		4.0	4.0	4.75	
LG-11	Temperature (Field-DO Meter)-07'	Degrees C		18		14	7.0		4.0	4.0	4.75	
LG-11	Temperature (Field-DO Meter)-08'	Degrees C		18		14	7.0		4.0	4.25	4.75	
LG-11	Temperature (Field-DO Meter)-09'	Degrees C	20.5	18		14	7.0		4.0	4.25	4.75	
LG-11	Temperature (Field-DO Meter)-10'	Degrees C		18		14	7.0		4.0	4.25	4.75	
LG-11	Temperature (Field-DO Meter)-11'	Degrees C		18		14	7.0		4.0	4.25	4.75	
LG-11	Temperature (Field-DO Meter)-12'	Degrees C	20.5	18		14	7.0		4.0	4.5	4.75	
LG-11	Temperature (Field-DO Meter)-13'	Degrees C		18		14	7.0		4.0	4.5	4.75	
LG-11	Temperature (Field-DO Meter)-14'	Degrees C		18		14	7.0		4.0	4.5	4.75	
LG-11	Temperature (Field-DO Meter)-15'	Degrees C	20.5	18		14	7.0		4.0	4.5	4.75	
LG-11	Temperature (Field-DO Meter)-16'	Degrees C		18		14	7.0		4.0	4.5	4.75	
LG-11	Temperature (Field-DO Meter)-17'	Degrees C		18		14	7.0		4.0	4.5	4.75	
LG-11	Temperature (Field-DO Meter)-18'	Degrees C	20.0	18		14	7.0		4.0	4.5	4.75	
LG-11	Temperature (Field-DO Meter)-19'	Degrees C		18		14	7.0		4.0	4.5	4.75	
LG-11	Temperature (Field-DO Meter)-20'	Degrees C		18		14	7.0		4.0	4.5	4.75	
LG-11	Temperature (Field-DO Meter)-21'	Degrees C	17.0	18		14	7.0		4.0	4.5	4.75	
LG-11	Temperature (Field-DO Meter)-22'	Degrees C		17		14	7.0		4.0	4.5	4.75	
LG-11	Temperature (Field-DO Meter)-23'	Degrees C		16		14	7.0		4.0	4.5	4.75	
LG-11	Temperature (Field-DO Meter)-24'	Degrees C	17.0	15		14	7.0		4.25	4.5	4.75	
LG-11	Temperature (Field-DO Meter)-25'	Degrees C		14		14	7.0		4.25	4.5	4.75	
LG-11	Temperature (Field-DO Meter)-26'	Degrees C		13		14	7.0		4.5	4.75	4.95	
LG-11	Temperature (Field-DO Meter)-27'	Degrees C	13.0	11		14	7.0		4.5	4.75	4.75	
LG-11	Temperature (Field-DO Meter)-28'	Degrees C		11		13.75	7.0		4.5	4.75	5.0	
LG-11	Temperature (Field-DO Meter)-29'	Degrees C		11		13.75	7.0		4.5	4.75	5.0	
LG-11	Temperature (Field-DO Meter)-30'	Degrees C	10.0	11		13.75	7.0		4.5	4.75	5.0	
LG-11	Temperature (Field-DO Meter)-31'	Degrees C		10		13.75			4.5	4.75	5.0	
LG-11	Temperature (Field-DO Meter)-32'	Degrees C		10		13.75			4.75	4.75	5.0	
LG-11	Temperature (Field-DO Meter)-33'	Degrees C	10.0	10		12			4.75	4.75	5.0	
LG-11	Temperature (Field-DO Meter)-34'	Degrees C		10						4.75	5.0	
LG-11	Temperature (Field-DO Meter)-35'	Degrees C		10							5.0	
LG-11	Temperature (Field-DO Meter)-36'	Degrees C		10							5.0	
LG-11	Temperature (Field-DO Meter)-37'	Degrees C									5.0	
LG-11	Temperature (Field-DO Meter)-38'	Degrees C									5.0	
LG-11	Dissolved Oxygen (Field)	%	9.2	9.2		9.4	11.4		0.5	12.0	9.0	
LG-11	Dissolved Oxygen (Field)-Surface	%										
LG-11	Dissolved Oxygen (Field)-01'	%		9.2		9.4	11.3		0.5	11.6	8.75	
LG-11	Dissolved Oxygen (Field)-02'	%		9.2		9.4	11.25		0.5	10.8	10.0	
LG-11	Dissolved Oxygen (Field)-03'	%	9.0	9.2		9.4	11.2		0.5	7.3	10.4	
LG-11	Dissolved Oxygen (Field)-04'	%		9.2		9.4	11.2		14.8	6.8	10.25	
LG-11	Dissolved Oxygen (Field)-05'	%		9.2		9.4	11.2		14.6	6.8	10.15	
LG-11	Dissolved Oxygen (Field)-06'	%	9.0	9.2		9.4	11.2		14.6	6.7	10.1	
LG-11	Dissolved Oxygen (Field)-07'	%		9.2		9.4	11.2		14.4	6.7	10.1	
LG-11	Dissolved Oxygen (Field)-08'	%		9.2		9.4	11.2		13.8	6.6	10.05	
LG-11	Dissolved Oxygen (Field)-09'	%	9.0	9.2		9.4	11.2		13.9	6.5	10.1	
LG-11	Dissolved Oxygen (Field)-10'	%		9.2		9.4	11.2		13.6	6.3	10.1	
LG-11	Dissolved Oxygen (Field)-11'	%		9.1		9.4	11.2		13.3	6.2	10.5	
LG-11	Dissolved Oxygen (Field)-12'	%	9.0	9.1		9.4	11.2		13.1	6.1	10.1	
LG-11	Dissolved Oxygen (Field)-13'	%		9.1		9.4	11.2		10.4	5.9	10.1	
LG-11	Dissolved Oxygen (Field)-14'	%		9.1		9.4	11.2		10.3	5.6	10.1	
LG-11	Dissolved Oxygen (Field)-15'	%	8.6	9.1		9.4	11.2		10.4	5.4	10.1	
LG-11	Dissolved Oxygen (Field)-16'	%		9.1		9.3	11.2		10.3	5.4	10.1	
LG-11	Dissolved Oxygen (Field)-17'	%		9.0		9.3	11.2		10.4	5.1	10.25	
LG-11	Dissolved Oxygen (Field)-18'	%	8.8	8.9		9.3	11.2		10.2	4.9	10.2	
LG-11	Dissolved Oxygen (Field)-19'	%		8.6		9.2	11.2		9.3	4.9	10.3	
LG-11	Dissolved Oxygen (Field)-20'	%		8.6		9.2	11.2		9.1	4.9	10.3	

STATION	PARAMETER	Units	Nov-93	Dec-93	Jan-94	Feb-94	Mar-94	Apr-94	Apr-94	May-94	Jun-94	Jul-94
LG-11	Dissolved Oxygen (Field)-21'	%										
LG-11	Dissolved Oxygen (Field)-22'	%										
LG-11	Dissolved Oxygen (Field)-23'	%										
LG-11	Dissolved Oxygen (Field)-24'	%										
LG-11	Dissolved Oxygen (Field)-25'	%										
LG-11	Dissolved Oxygen (Field)-26'	%										
LG-11	Dissolved Oxygen (Field)-27'	%										
LG-11	Dissolved Oxygen (Field)-28'	%										
LG-11	Dissolved Oxygen (Field)-29'	%										
LG-11	Dissolved Oxygen (Field)-30'	%										
LG-11	Dissolved Oxygen (Field)-31'	%										
LG-11	Dissolved Oxygen (Field)-32'	%										
LG-11	Dissolved Oxygen (Field)-33'	%										
LG-11	Dissolved Oxygen (Field)-34'	%										
LG-11	Dissolved Oxygen (Field)-35'	%										
LG-11	Dissolved Oxygen (Field)-36'	%										
LG-11	Dissolved Oxygen (Field)-37'	%										
LG-11	Dissolved Oxygen (Field)-38'	%										
LG-11	Dissolved Oxygen (Field)-Bottom	%						9.0				
LG-11	Alkalinity	mg/L						20.0	20.0	2.80	4.50	
LG-11	Alkalinity, Bicarbonate	mg/L						20.0	20.0	2.80	4.50	
LG-11	Alkalinity, Carbonate	mg/L						0	0	0	0	
LG-11	Alkalinity, Hydroxide	mg/L						0	0	0	0	
LG-11	Hardness	mg/L						5.00	5.00	8.71	10.0	
LG-11	Total Dissolved Solids	mg/L						17.0	5.00	5.00	22.0	
LG-11	Total Suspended Solids	mg/L						5.00	5.00	5.00	5.00	
LG-11	Biological Oxygen Demand	mg/L						10.0	6.00	3.00	3.00	
LG-11	Chemical Oxygen Demand	mg/L						11.0	16.0	13.0	11.0	
LG-11	Chemical Oxygen Demand, Low Level	mg/L										
LG-11	Ammonia	mg/L						0.100	0.100	0.100	0.100	
LG-11	Nitrate	mg/L						(PHT)	5.00	0.500	0.500	
LG-11	Nitrogen, Total Kjeldahl	mg/L						0.252	0.200	0.308	0.250	
LG-11	Chloride	mg/L						1	1	1	1	
LG-11	Fluoride	mg/L						0.100	0.246	0.100	0.100	
LG-11	Sulfate	mg/L						9.01	5.00	6.00	4.70	
LG-11	Cyanide, total	ug/L						20	20	20	20	
LG-11	Oil & Grease	mg/L						1.00	1.12	1.00	1.05	
LG-11	Turbidity, Lab	NTU						0.210	1.40	1.20	0.750	
LG-11	Cations	Meq/L						0.123	0.142	0.119	0.147	
LG-11	Anions	Meq/L						0.188	0.150	0.201	0.202	
LG-11	Cation and Anion Balance	%						-20	-3	-30	-20	
LG-11	Boron, total	mg/L						0.100	0.100	0.100	0.124	
LG-11	Calcium, total	mg/L						1.58	1.59	1.51	1.61	
LG-11	Arsenic, total	mg/L						0.005	0.005	0.005	0.005	
LG-11	Barium, total	mg/L						0.010	0.010	0.010	0.010	
LG-11	Iron, dissolved	mg/L						0.100	0.100	0.100	0.100	
LG-11	Iron, total	mg/L						0.100	0.100	0.100	0.100	
LG-11	Manganese, dissolved	mg/L						0.010	0.010	0.010	0.010	
LG-11	Manganese, total	mg/L						0.010	0.010	0.010	0.022	
LG-11	Molybdenum, total	mg/L						0.020	0.020	0.020	0.020	
LG-11	Selenium, total	mg/L						0.005	0.005	0.005	0.005	
LG-11	Silver, total	mg/L						0.010	0.010	0.010	0.010	
LG-11	Chromium, total	mg/L						0.020	0.020	0.020	0.020	
LG-11	Chromium, total (Low Level)	ug/L						0.310	0.310	0.45	0.30	
LG-11	Beryllium, total	mg/L						0.005	0.005	0.005	0.005	
LG-11	Thallium, total	mg/L						0.005	0.005	0.005	0.005	
LG-11	Nickel, total	mg/L						0.030	0.030	0.030	0.030	
LG-11	Antimony, total	mg/L						0.005	0.005	0.005	0.005	
LG-11	Magnesium, total	mg/L						0.540	0.561	0.536	0.564	
LG-11	Phosphorus, dissolved	mg/L						0.050	0.004	0.004	0.004	
LG-11	Phosphorus, total	mg/L						0.050	0.019	0.014	0.013	
LG-11	Potassium, total	mg/L						0.600	0.630	0.600	0.800	
LG-11	Sodium, total	mg/L						1.00	1.00	1.00	1.00	
LG-11	Sodium Absorption Ratio	std						0	0	0	0	
LG-11	Aluminum, total	ug/L						17.5	23.2	17.9	15.5	
LG-11	Cadmium, total	ug/L						0.017	0.025	0.015	0.015	
LG-11	Copper, total	ug/L						0.386	0.539	0.303	0.347	
LG-11	Lead, total	ug/L						0.139	0.096	0.113	0.091	
LG-11	Mercury, total	ng/L						0.9	1	2.35	1.02	
LG-11	Zinc, total	ug/L						4.65	4.32	3.30	4.78	

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
LG-11	Dissolved Oxygen (Field)-21'	%	8.2	8.4		9.2	11.2		9.4	4.8	10.3	
LG-11	Dissolved Oxygen (Field)-22'	%		8.2		9.2	11.2		9.6	4.4	10.0	
LG-11	Dissolved Oxygen (Field)-23'	%		5.0		9.2	11.2		9.5	3.5	9.75	
LG-11	Dissolved Oxygen (Field)-24'	%	8.4	1.6		9.2	11.2		9.0	2.8	9.25	
LG-11	Dissolved Oxygen (Field)-25'	%		0.8		9.1	11.2		8.8	2.5	5.4	
LG-11	Dissolved Oxygen (Field)-26'	%		0.3		8.7	11.2		8.0	1.1	3.95	
LG-11	Dissolved Oxygen (Field)-27'	%	2.4	0.1		8.6	11.2		7.2	0.5	3.3	
LG-11	Dissolved Oxygen (Field)-28'	%		0.1		8.5	11.2		6.4	0.4	1.85	
LG-11	Dissolved Oxygen (Field)-29'	%		0.1		8.4	11.1		6.4	0.2	1.2	
LG-11	Dissolved Oxygen (Field)-30'	%	0.2	0.1		8.4	10.6		4.7	0.2	1.0	
LG-11	Dissolved Oxygen (Field)-31'	%		0.1		8.2			2.7	0.2	0.7	
LG-11	Dissolved Oxygen (Field)-32'	%		0.1		8.2			2.8	0.2	0.5	
LG-11	Dissolved Oxygen (Field)-33'	%	0.2	0.0		1.0			1.5	0.2	0.5	
LG-11	Dissolved Oxygen (Field)-34'	%		0.0						0.2	0.4	
LG-11	Dissolved Oxygen (Field)-35'	%		0.0							0.4	
LG-11	Dissolved Oxygen (Field)-36'	%		0.0							0.4	
LG-11	Dissolved Oxygen (Field)-37'	%									0.2	
LG-11	Dissolved Oxygen (Field)-38'	%									0.2	
LG-11	Dissolved Oxygen (Field)-Bottom	%										
LG-11	Alkalinity	mg/L	3.60	5		5	5		5	5	5	
LG-11	Alkalinity, Bicarbonate	mg/L	3.60	5		5	5		5	5	5	
LG-11	Alkalinity, Carbonate	mg/L	0	5		5	5		5	5	5	
LG-11	Alkalinity, Hydroxide	mg/L	0	5		5						
LG-11	Hardness	mg/L	6.60	8.0		8.0	6		6	7.5	6	
LG-11	Total Dissolved Solids	mg/L	13.0	27		44	34		24	42.5	19.5	
LG-11	Total Suspended Solids	mg/L	5.00			7	5		5	5	5	
LG-11	Biological Oxygen Demand	mg/L	3.00	2		3	3		3	3	3	
LG-11	Chemical Oxygen Demand	mg/L	10.0									
LG-11	Chemical Oxygen Demand, Low Level	mg/L		20		20	10		51	15.5	13	
LG-11	Ammonia	mg/L	0.100	0.1		0.1	0.1		0.1	0.15	0.15	
LG-11	Nitrate	mg/L	0.713	0.5		0.50	0.50		0.50	0.50	0.50	
LG-11	Nitrogen, Total Kjeldahl	mg/L	0.308	0.6		0.4	0.7		0.5	0.55	0.45	
LG-11	Chloride	mg/L	1	1		1	1		1	1	1	
LG-11	Fluoride	mg/L	0.100	0.10		0.1	0.1		0.1	0.1	0.1	
LG-11	Sulfate	mg/L	6.00			4.0	3.6		4.3	4.6	4.6	
LG-11	Cyanide, total	ug/L	20	20		20	20		20	20	20	
LG-11	Oil & Grease	mg/L	1.03	6.0		4.9	4.6		4.6	4.6	4.6	
LG-11	Turbidity, Lab	NTU	0.750	2.4		1.1	1.3		0.8	0.65	0.6	
LG-11	Cations	Meq/L	0.138	0.171		0.142	0.138		0.16		0.17	
LG-11	Anions	Meq/L	0.226	0.135		0.084	0.075		0.09		0.10	
LG-11	Cation and Anion Balance	%	-20	11.64		25.97	29.31		26.88		27.81	
LG-11	Boron, total	mg/L	0.100	0.20		0.10	0.10		0.10	0.10	0.10	
LG-11	Calcium, total	mg/L	1.51	2.1		1.5	1.5		1.7	2.4	1.9	
LG-11	Arsenic, total	mg/L	0.005	0.005		0.005	0.005		0.005	0.005	0.0055	
LG-11	Barium, total	mg/L	0.010	0.010		0.010	0.010		0.010	0.010	0.065	
LG-11	Iron, dissolved	mg/L	0.100	0.050		0.050	0.055		0.050	0.050	0.085	
LG-11	Iron, total	mg/L	0.100	0.49		0.050	0.073		0.050	0.069	0.105	
LG-11	Manganese, dissolved	mg/L	0.010	0.086		0.010	0.010		0.010	0.024	0.342	
LG-11	Manganese, total	mg/L	0.010	0.12		0.020	0.013		0.010	0.040	0.041	
LG-11	Molybdenum, total	mg/L	0.020	0.020		0.020	0.020		0.020	0.020	0.020	
LG-11	Selenium, total	mg/L	0.005	0.005		0.005	0.005		0.005	0.005	0.005	
LG-11	Silver, total	mg/L	0.010	0.010		0.010	0.010		0.010	0.010	0.010	
LG-11	Chromium, total	mg/L	0.020									
LG-11	Chromium, total (Low Level)	ug/L	0.34	0.30		0.30	0.18		0.131	0.192		
LG-11	Beryllium, total	mg/L	0.005	0.010		0.010	0.010		0.010	0.010	0.010	
LG-11	Thallium, total	mg/L	0.005	0.005		0.005	0.005		0.005	0.005	0.005	
LG-11	Nickel, total	mg/L	0.030	0.030		0.030	0.030		0.030	0.030	0.030	
LG-11	Antimony, total	mg/L	0.005	0.005		0.005	0.005		0.005	0.005	0.005	
LG-11	Magnesium, total	mg/L	0.546	0.55		0.56	0.52		0.59	0.89	0.65	
LG-11	Phosphorus, dissolved	mg/L	0.004	0.05		0.05	0.05		0.05	0.05	0.05	
LG-11	Phosphorus, total	mg/L	0.010	0.05		0.05	0.05		0.05	0.05	0.05	
LG-11	Potassium, total	mg/L	0.710	1.0		1.0	1.0		1.0	1.4	1.0	
LG-11	Sodium, total	mg/L	1.00	1.0		1.0	1.0		1.0	1.0	1.0	
LG-11	Sodium Absorption Ratio	std	0	0		0.000	0		0		0	
LG-11	Aluminum, total	ug/L	11.7	31.4		17.8	18.1		20.4	27.2	19.8	
LG-11	Cadmium, total	ug/L	0.006	0.0155		0.0166	0.008		0.012	0.004	0.017	
LG-11	Copper, total	ug/L	0.764	0.330		0.287	0.306		0.544	0.305	0.438	
LG-11	Lead, total	ug/L	0.077	0.248		0.109	0.158		0.262	0.127	0.140	
LG-11	Mercury, total	ug/L	1.09	1.86		0.839	1.0		1.47	1.15	1.15	
LG-11	Zinc, total	ug/L	3.30	2.76		2.77	2.62		2.38	2.41	2.33	

STATION	PARAMETER	Unit	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
LG-11-05'	pH, Lab	S.U.									5.1	
LG-11-05'	Alkalinity	mg/L								^	5	
LG-11-05'	Alkalinity, Bicarbonate	mg/L								^	5	
LG-11-05'	Alkalinity, Carbonate	mg/L								^	5	
LG-11-05'	Hardness	mg/L									6	
LG-11-05'	Total Dissolved Solids	mg/L									28	
LG-11-05'	Total Suspended Solids	mg/L								^	5	
LG-11-05'	Biological Oxygen Demand	mg/L								^	3	
LG-11-05'	Chemical Oxygen Demand, Low Level	mg/L									13	
LG-11-05'	Ammonia	mg/L									0.2	
LG-11-05'	Nitrate	mg/L								^	0.50	
LG-11-05'	Nitrogen, Total Kjeldahl	mg/L									0.4	
LG-11-05'	Chloride	mg/L								^	1	
LG-11-05'	Fluoride	mg/L								^	0.1	
LG-11-05'	Sulfate	mg/L									4.6	
LG-11-05'	Cyanide, total	ug/L								^	20	
LG-11-05'	Oil & Grease	mg/L								^	4.6	
LG-11-05'	Turbidity, Lab	NTU									0.6	
LG-11-05'	Cations	Meq/L									0.16	
LG-11-05'	Anions	Meq/L									0.10	
LG-11-05'	Cation and Anion Balance	%									25.20	
LG-11-05'	Boron, total	mg/L								^	0.10	
LG-11-05'	Calcium, total	mg/L									1.8	
LG-11-05'	Arsenic, total	mg/L									0.006	
LG-11-05'	Barium, total	mg/L								^	0.010	
LG-11-05'	Iron, dissolved	mg/L									0.050	
LG-11-05'	Iron, total	mg/L								^	0.050	
LG-11-05'	Manganese, dissolved	mg/L									0.014	
LG-11-05'	Manganese, total	mg/L									0.025	
LG-11-05'	Molybdenum, total	mg/L								^	0.020	
LG-11-05'	Selenium, total	mg/L								^	0.005	
LG-11-05'	Silver, total	mg/L								^	0.010	
LG-11-05'	Chromium, total (Low Level)	ug/L									0.132	
LG-11-05'	Beryllium, total	mg/L								^	0.010	
LG-11-05'	Thallium, total	mg/L								^	0.005	
LG-11-05'	Nickel, total	mg/L								^	0.030	
LG-11-05'	Antimony, total	mg/L								^	0.005	
LG-11-05'	Magnesium, total	mg/L									0.63	
LG-11-05'	Phosphorus, dissolved	mg/L								^	0.05	
LG-11-05'	Phosphorus, total	mg/L								^	0.05	
LG-11-05'	Potassium, total	mg/L								^	1.0	
LG-11-05'	Sodium, total	mg/L								^	1.0	
LG-11-05'	Sodium Absorption Ratio	std									0	
LG-11-05' (C)	Aluminum, total	ug/L									19.8	
LG-11-05' (C)	Cadmium, total	ug/L									0.017	
LG-11-05' (C)	Copper, total	ug/L									0.438	
LG-11-05' (C)	Lead, total	ug/L									0.140	
LG-11-05' (C)	Mercury, total	ng/L									1.15	
LG-11-05' (C)	Zinc, total	ug/L									2.33	

(C) Sample Compositied With LG-11-33'

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
LG-11-10'	pH, Lab	S.U.								5.2		
LG-11-10'	Alkalinity	mg/L								5		
LG-11-10'	Alkalinity, Bicarbonate	mg/L								5		
LG-11-10'	Alkalinity, Carbonate	mg/L							^	5		
LG-11-10'	Hardness	mg/L								8		
LG-11-10'	Total Dissolved Solids	mg/L								46		
LG-11-10'	Total Suspended Solids	mg/L							^	5		
LG-11-10'	Biological Oxygen Demand	mg/L							^	3		
LG-11-10'	Chemical Oxygen Demand, Low Level	mg/L								17		
LG-11-10'	Ammonia	mg/L							^	0.1		
LG-11-10'	Nitrate	mg/L							^	0.50		
LG-11-10'	Nitrogen, Total Kjeldahl	mg/L								0.5		
LG-11-10'	Chloride	mg/L							^	1		
LG-11-10'	Fluoride	mg/L							^	0.1		
LG-11-10'	Sulfate	mg/L								4.5		
LG-11-10'	Cyanide, total	ug/L							^	20		
LG-11-10'	Oil & Grease	mg/L							^	4.6		
LG-11-10'	Turbidity, Lab	NTU								0.7		
LG-11-10'	Phosphorus, dissolved	mg/L							^	0.05		
LG-11-10'	Phosphorus, total	mg/L							^	0.05		
LG-11-10'	Potassium, total	mg/L								1.5		

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
LG-11-30'	pH, Lab	S.U.								5.3		
LG-11-30'	Alkalinity	mg/L								5		
LG-11-30'	Alkalinity, Bicarbonate	mg/L								5		
LG-11-30'	Alkalinity, Carbonate	mg/L								5		
LG-11-30'	Hardness	mg/L								7		
LG-11-30'	Total Dissolved Solids	mg/L								39		
LG-11-30'	Total Suspended Solids	mg/L								5		
LG-11-30'	Biological Oxygen Demand	mg/L								3		
LG-11-30'	Chemical Oxygen Demand, Low Level	mg/L								14		
LG-11-30'	Ammonia	mg/L								0.2		
LG-11-30'	Nitrate	mg/L								0.50		
LG-11-30'	Nitrogen, Total Kjeldahl	mg/L								0.6		
LG-11-30'	Chloride	mg/L								1		
LG-11-30'	Fluoride	mg/L								0.1		
LG-11-30'	Sulfate	mg/L								4.7		
LG-11-30'	Cyanide, total	ug/L								20		
LG-11-30'	Oil & Grease	mg/L								4.6		
LG-11-30'	Turbidity, Lab	NTU								0.6		
LG-11-30'	Phosphorus, dissolved	mg/L								0.05		
LG-11-30'	Phosphorus, total	mg/L								0.05		
LG-11-30'	Potassium, total	mg/L								1.3		

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
LG-11-33'	pH, Lab	S.U.									5.5	
LG-11-33'	Alkalinity	mg/L								^	5	
LG-11-33'	Alkalinity, Bicarbonate	mg/L								^	5	
LG-11-33'	Alkalinity, Carbonate	mg/L								^	5	
LG-11-33'	Hardness	mg/L									6	
LG-11-33'	Total Dissolved Solids	mg/L									11	
LG-11-33'	Total Suspended Solids	mg/L								^	5	
LG-11-33'	Biological Oxygen Demand	mg/L								^	3	
LG-11-33'	Chemical Oxygen Demand, Low Level	mg/L									13	
LG-11-33'	Ammonia	mg/L								^	0.1	
LG-11-33'	Nitrate	mg/L								^	0.50	
LG-11-33'	Nitrogen, Total Kjeldahl	mg/L									0.5	
LG-11-33'	Chloride	mg/L								^	1	
LG-11-33'	Fluoride	mg/L								^	0.1	
LG-11-33'	Sulfate	mg/L									4.6	
LG-11-33'	Cyanide, total	ug/L								^	20	
LG-11-33'	Oil & Grease	mg/L								^	4.6	
LG-11-33'	Turbidity, Lab	NTU									0.6	
LG-11-33'	Cations	Meq/L									0.18	
LG-11-33'	Anions	Meq/L									0.10	
LG-11-33'	Cation and Anion Balance	%									30.41	
LG-11-33'	Boron, total	mg/L								^	0.10	
LG-11-33'	Calcium, total	mg/L									2.0	
LG-11-33'	Arsenic, total	mg/L								^	0.005	
LG-11-33'	Barium, total	mg/L									0.12	
LG-11-33'	Iron, dissolved	mg/L									0.12	
LG-11-33'	Iron, total	mg/L									0.16	
LG-11-33'	Manganese, dissolved	mg/L									0.67	
LG-11-33'	Manganese, total	mg/L									0.057	
LG-11-33'	Molybdenum, total	mg/L								^	0.020	
LG-11-33'	Selenium, total	mg/L								^	0.005	
LG-11-33'	Silver, total	mg/L								^	0.010	
LG-11-33'	Beryllium, total	mg/L								^	0.010	
LG-11-33'	Thallium, total	mg/L								^	0.005	
LG-11-33'	Nickel, total	mg/L								^	0.030	
LG-11-33'	Antimony, total	mg/L								^	0.005	
LG-11-33'	Magnesium, total	mg/L									0.67	
LG-11-33'	Phosphorus, dissolved	mg/L								^	0.05	
LG-11-33'	Phosphorus, total	mg/L								^	0.05	
LG-11-33'	Potassium, total	mg/L								^	1.0	
LG-11-33'	Sodium, total	mg/L								^	1.0	
LG-11-33'	Sodium Absorption Ratio	std									0	
LG-11-33' (C)	Aluminum, total	ug/L									19.8	
LG-11-33' (C)	Cadmium, total	ug/L									0.017	
LG-11-33' (C)	Copper, total	ug/L									0.438	
LG-11-33' (C)	Lead, total	ug/L									0.140	
LG-11-33' (C)	Mercury, total	ng/L									1.15	
LG-11-33' (C)	Zinc, total	ug/L									2.33	

(C) Sample Compositied With LG-11-05'

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94.2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
LG-11-Composite	Boron, total	mg/L								< 0.10		
LG-11-Composite	Calcium, total	mg/L								2.4		
LG-11-Composite	Arsenic, total	mg/L								< 0.005		
LG-11-Composite	Barium, total	mg/L								< 0.010		
LG-11-Composite	Iron, dissolved	mg/L								< 0.050		
LG-11-Composite	Iron, total	mg/L								0.069		
LG-11-Composite	Manganese, dissolved	mg/L								0.024		
LG-11-Composite	Manganese, total	mg/L								0.040		
LG-11-Composite	Molybdenum, total	mg/L								< 0.020		
LG-11-Composite	Selenium, total	mg/L								< 0.005		
LG-11-Composite	Silver, total	mg/L								< 0.010		
LG-11-Composite	Chromium, total (Low Level)	ug/L								0.192		
LG-11-Composite	Beryllium, total	mg/L								< 0.010		
LG-11-Composite	Thallium, total	mg/L								< 0.005		
LG-11-Composite	Nickel, total	mg/L								< 0.030		
LG-11-Composite	Antimony, total	mg/L								< 0.005		
LG-11-Composite	Magnesium, total	mg/L								0.89		
LG-11-Composite	Potassium, total	mg/L								1.2		
LG-11-Composite	Sodium, total	mg/L								< 1.0		
LG-11-Composite	Aluminum, total	ug/L								27.2		
LG-11-Composite	Cadmium, total	ug/L								0.004		
LG-11-Composite	Copper, total	ug/L								0.305		
LG-11-Composite	Lead, total	ug/L								0.127		
LG-11-Composite	Mercury, total	ng/L								1.15		
LG-11-Composite	Zinc, total	ug/L								2.41		

Feb-95	Mar-95	Apr-95	STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
5.2	5.1		LG-11-E	pH, Lab	S.U.	5.1	5.2	5.15	5.15
5	5		LG-11-E	Alkalinity	mg/L	5	5	5	2.5
5	5		LG-11-E	Alkalinity, Bicarbonate	mg/L	5	5	5	2.5
5	5		LG-11-E	Alkalinity, Carbonate	mg/L	5	5	5	0
8	6		LG-11-E	Hardness	mg/L	6	8	7	7
46	28		LG-11-E	Total Dissolved Solids	mg/L	28	46	37	37
5	5		LG-11-E	Total Suspended Solids	mg/L	5	5	5	0
3	3		LG-11-E	Biological Oxygen Demand	mg/L	3	3	3	0
17	13		LG-11-E	Chemical Oxygen Demand, Low Level	mg/L	13	17	15	15
0.1	0.2		LG-11-E	Ammonia	mg/L	0.1	0.2	0.15	0.1
0.50	0.50		LG-11-E	Nitrate	mg/L	0.5	0.5	0.5	0
0.5	0.4		LG-11-E	Nitrogen, Total Kjeldahl	mg/L	0.4	0.5	0.45	0.45
1	1		LG-11-E	Chloride	mg/L	1	1	1	0
0.1	0.1		LG-11-E	Fluoride	mg/L	0.1	0.1	0.1	0
4.5	4.6		LG-11-E	Sulfate	mg/L	4.5	4.6	4.55	4.55
20	20		LG-11-E	Cyanide, total	ug/L	20	20	20	0
4.6	4.6		LG-11-E	Oil & Grease	mg/L	4.6	4.6	4.6	0
0.7	0.6		LG-11-E	Turbidity, Lab	NTU	0.6	0.7	0.65	0.65
0.05	0.05		LG-11-E	Phosphorus, dissolved	mg/L	0.05	0.05	0.05	0
0.05	0.05		LG-11-E	Phosphorus, total	mg/L	0.05	0.05	0.05	0
1.5	1.0		LG-11-E	Potassium, total	mg/L	1	1.5	1.25	0.75

Jan-95	Feb-95	Mar-95	Apr-95	STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
5.3	5.5			LG-11-H	pH, Lab	S.U.	5.3	5.5	5.4	5.4
5	< 5			LG-11-H	Alkalinity	mg/L	5	5	5	2.5
5	< 5			LG-11-H	Alkalinity, Bicarbonate	mg/L	5	5	5	2.5
< 5	< 5			LG-11-H	Alkalinity, Carbonate	mg/L	5	5	5	0
7	6			LG-11-H	Hardness	mg/L	6	7	6.5	6.5
39	11			LG-11-H	Total Dissolved Solids	mg/L	11	39	25	25
< 5	< 5			LG-11-H	Total Suspended Solids	mg/L	5	5	5	0
< 3	< 3			LG-11-H	Biological Oxygen Demand	mg/L	3	3	3	0
14	13			LG-11-H	Chemical Oxygen Demand, Low Level	mg/L	13	14	13.5	13.5
0.2	< 0.1			LG-11-H	Ammonia	mg/L	0.1	0.2	0.15	0.1
< 0.50	< 0.50			LG-11-H	Nitrate	mg/L	0.5	0.5	0.5	0
0.6	0.5			LG-11-H	Nitrogen, Total Kjeldahl	mg/L	0.5	0.6	0.55	0.55
< 1	< 1			LG-11-H	Chloride	mg/L	1	1	1	0
< 0.1	< 0.1			LG-11-H	Fluoride	mg/L	0.1	0.1	0.1	0
4.7	4.6			LG-11-H	Sulfate	mg/L	4.6	4.7	4.65	4.65
< 20	< 20			LG-11-H	Cyanide, total	ug/L	20	20	20	0
< 4.6	< 4.6			LG-11-H	Oil & Grease	mg/L	4.6	4.6	4.6	0
0.6	0.6			LG-11-H	Turbidity, Lab	NTU	0.6	0.6	0.6	0.6
< 0.05	< 0.05			LG-11-H	Phosphorus, dissolved	mg/L	0.05	0.05	0.05	0
< 0.05	< 0.05			LG-11-H	Phosphorus, total	mg/L	0.05	0.05	0.05	0
1.3	< 1.0			LG-11-H	Potassium, total	mg/L	1	1.3	1.15	0.65

STATION	PARAMETER	Units	Nov-93	Dec-93	Jan-94	Feb-94	Mar-94	Apr-94	Apr-94	May-94	Jun-94	Jul-94
LG-12	pH (Field)	S.U.							4.91	4.93	4.96	5.73
LG-12	pH (Field)-02'	S.U.										
LG-12	pH (Field)-05'	S.U.										
LG-12	pH, Lab	S.U.							(PHT)	(PHT)	(PHT)	(PHT)
LG-12	Conductivity (Field)	umhos							16	13	14.3	17
LG-12	Conductivity (Field)-02'	umhos										
LG-12	Conductivity (Field)-05'	umhos										
LG-12	Conductivity, Lab	umhos							15.6	16.0	15.1	16.2
LG-12	Temperature (Field)	Degrees C							9.3	14.6	20.0	25.3
LG-12	Temperature (Field)-02'	Degrees C										
LG-12	Temperature (Field)-05'	Degrees C										
LG-12	Temperature (Field-DO Meter)	Degrees C							9.8		20	
LG-12	Temperature (Field-DO Meter)-01'	Degrees C										
LG-12	Temperature (Field-DO Meter)-02'	Degrees C										
LG-12	Temperature (Field-DO Meter)-03'	Degrees C										
LG-12	Temperature (Field-DO Meter)-04'	Degrees C										
LG-12	Temperature (Field-DO Meter)-05'	Degrees C										
LG-12	Temperature (Field-DO Meter)-06'	Degrees C										
LG-12	Temperature (Field-DO Meter)-07'	Degrees C										
LG-12	Temperature (Field-DO Meter)-08'	Degrees C										
LG-12	Temperature (Field-DO Meter)-09'	Degrees C										
LG-12	Dissolved Oxygen (Field)	%									6.4	
LG-12	Dissolved Oxygen (Field)-Surface	%							8.5			
LG-12	Dissolved Oxygen (Field)-01'	%										
LG-12	Dissolved Oxygen (Field)-02'	%										
LG-12	Dissolved Oxygen (Field)-03'	%										
LG-12	Dissolved Oxygen (Field)-04'	%										
LG-12	Dissolved Oxygen (Field)-05'	%										
LG-12	Dissolved Oxygen (Field)-06'	%										
LG-12	Dissolved Oxygen (Field)-07'	%										
LG-12	Dissolved Oxygen (Field)-08'	%										
LG-12	Dissolved Oxygen (Field)-09'	%										
LG-12	Dissolved Oxygen (Field)-Bottom	%							8.2			
LG-12	Alkalinity	mg/L							20.0	20.0	3.60	3.70
LG-12	Alkalinity, Bicarbonate	mg/L							20.0	20.0	3.60	3.70
LG-12	Alkalinity, Carbonate	mg/L							0	0	0	0
LG-12	Alkalinity, Hydroxide	mg/L							0	0	0	0
LG-12	Hardness	mg/L							5.00	5.00	7.92	6.00
LG-12	Total Dissolved Solids	mg/L							23.0	18.0	8.00	33.0
LG-12	Total Suspended Solids	mg/L							5.00	5.00	5.00	5.00
LG-12	Biological Oxygen Demand	mg/L							10.0	7.00	7.00	3.00
LG-12	Chemical Oxygen Demand	mg/L							32.0	34.0	30.0	21.0
LG-12	Chemical Oxygen Demand, Low Level	mg/L										
LG-12	Ammonia	mg/L							0.100	0.100	0.100	0.672
LG-12	Nitrate	mg/L							(PHT)	0.500	(PHT)	(PHT)
LG-12	Nitrogen, Total Kjeldahl	mg/L							0.644	0.504	0.420	0.644
LG-12	Chloride	mg/L							1	1	1	1
LG-12	Fluoride	mg/L							0.100	0.223	0.100	0.100
LG-12	Sulfate	mg/L							2.35	4.00	6.00	4.50
LG-12	Cyanide, total	ug/L							20	20	20	20
LG-12	Oil & Grease	mg/L							1.00	1.18	1.11	1.03
LG-12	Turbidity, Lab	NTU							(PHT)	1.20	1.10	1.30
LG-12	Cations	Meq/L							0.065	0.065	0.058	0.120
LG-12	Anions	Meq/L							0.049	0.124	0.211	0.182
LG-12	Cation and Anion Balance	%							14.0	-30	-60	-20
LG-12	Boron, total	mg/L							0.100	0.100	0.100	0.144
LG-12	Calcium, total	mg/L							1.30	1.30	1.16	1.17
LG-12	Arsenic, total	mg/L							0.005	0.005	0.005	0.005
LG-12	Barium, total	mg/L							0.010	0.010	0.010	0.010
LG-12	Iron, dissolved	mg/L							0.100	0.117	0.134	0.140
LG-12	Iron, total	mg/L							0.134	0.124	0.116	0.118
LG-12	Manganese, dissolved	mg/L							0.026	0.023	0.030	0.030
LG-12	Manganese, total	mg/L							0.027	0.024	0.033	0.027
LG-12	Molybdenum, total	mg/L							0.020	0.020	0.020	0.020
LG-12	Selenium, total	mg/L							0.005	0.005	0.005	0.005
LG-12	Silver, total	mg/L							0.010	0.010	0.010	0.010
LG-12	Chromium, total	mg/L							0.020	0.020	0.020	0.020
LG-12	Chromium, total (Low Level)	ug/L							0.310	0.450	0.45	0.30
LG-12	Beryllium, total	mg/L							0.005	0.005	0.005	0.005
LG-12	Thallium, total	mg/L							0.005	0.005	0.005	0.005
LG-12	Nickel, total	mg/L							0.030	0.030	0.030	0.030
LG-12	Antimony, total	mg/L							0.005	0.005	0.005	0.005
LG-12	Magnesium, total	mg/L							0.500	0.500	0.500	0.500
LG-12	Phosphorus, dissolved	mg/L							0.050	0.014	0.004	0.011
LG-12	Phosphorus, total	mg/L							0.050	0.026	0.026	0.028
LG-12	Potassium, total	mg/L							0.600	0.600	0.600	0.790
LG-12	Sodium, total	mg/L							1.00	1.00	1.00	1.00
LG-12	Sodium Absorption Ratio	std							0	0	0	0

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
LG-12	pH (Field)	S.U.	5.74	6.37		5.7	6.08		6.13			
LG-12	pH (Field)-02'	S.U.									5.74	
LG-12	pH (Field)-05'	S.U.								4.93	5.82	
LG-12	pH, Lab	S.U.	(PHT)	5.4		5.4	5.2		4.7	4.9	4.95	
LG-12	Conductivity (Field)	umhos	20.1	18.2		16.94	18.49		38.7			
LG-12	Conductivity (Field)-02'	umhos									18.73	
LG-12	Conductivity (Field)-05'	umhos								67.1	197.7	
LG-12	Conductivity, Lab	umhos	15.4									
LG-12	Temperature (Field)	Degrees C	19.2	18.9		11.8	5.6		2.4			
LG-12	Temperature (Field)-02'	Degrees C									5.1	
LG-12	Temperature (Field)-05'	Degrees C								2.3	5.6	
LG-12	Temperature (Field-DO Meter)	Degrees C	19.0	18		12.0	5.5			0.75	1.0	
LG-12	Temperature (Field-DO Meter)-01'	Degrees C		18		12.0	5.5		2.5	0.75	2.0	
LG-12	Temperature (Field-DO Meter)-02'	Degrees C		18		12.0	5.5		3.75	1	4.0	
LG-12	Temperature (Field-DO Meter)-03'	Degrees C	19.0	17		12.0	5.0		4.0	3.0	4.25	
LG-12	Temperature (Field-DO Meter)-04'	Degrees C		17		12.0	5.0		4.0	4.0	4.75	
LG-12	Temperature (Field-DO Meter)-05'	Degrees C		17		12.0	5.0		4.0	4.25	4.75	
LG-12	Temperature (Field-DO Meter)-06'	Degrees C	19.0	17		12.0	5.0		4.0	4.25	5.0	
LG-12	Temperature (Field-DO Meter)-07'	Degrees C		17		12.0	5.0		4.0	4.25	5.0	
LG-12	Temperature (Field-DO Meter)-08'	Degrees C		17		11.75	5.0		4.0	4.5	5.0	
LG-12	Temperature (Field-DO Meter)-09'	Degrees C	19.0									
LG-12	Dissolved Oxygen (Field)	%	8.2	8.3		8.4	11.4			13.6	8.7	
LG-12	Dissolved Oxygen (Field)-Surface	%										
LG-12	Dissolved Oxygen (Field)-01'	%		8.3		8.3	11.3		10.0	13.6	9.0	
LG-12	Dissolved Oxygen (Field)-02'	%		8.1		8.3	11.1		8.2	13.2	8.3	
LG-12	Dissolved Oxygen (Field)-03'	%	8.0	8.0		8.3	11.1		8.1	6.5	7.6	
LG-12	Dissolved Oxygen (Field)-04'	%		8.0		8.3	11.1		7.9	3.0	6.2	
LG-12	Dissolved Oxygen (Field)-05'	%		7.6		8.3	11.0		7.8	2.6	5.9	
LG-12	Dissolved Oxygen (Field)-06'	%	7.8	7.4		8.3	11.0		7.6	2.3	5.3	
LG-12	Dissolved Oxygen (Field)-07'	%		6.6		8.2	11.0		7.6	1.8	4.5	
LG-12	Dissolved Oxygen (Field)-08'	%		2.8		7.2	10.9		3.4	0.2	2.2	
LG-12	Dissolved Oxygen (Field)-09'	%	6.0									
LG-12	Dissolved Oxygen (Field)-Bottom	%										
LG-12	Alkalinity	mg/L	3.00	≤ 5		≤ 5	≤ 5		≤ 5	≤ 5	≤ 5	
LG-12	Alkalinity, Bicarbonate	mg/L	3.00	≤ 20		≤ 5	≤ 5		≤ 5	≤ 5	≤ 5	
LG-12	Alkalinity, Carbonate	mg/L	0	≤ 5		≤ 5	≤ 5		≤ 5	≤ 5	≤ 5	
LG-12	Alkalinity, Hydroxide	mg/L	0	≤ 5		≤ 5						
LG-12	Hardness	mg/L	6.00	6.0		12	7		10	10	7.5	
LG-12	Total Dissolved Solids	mg/L	17.0	30		31	54		32	37	32	
LG-12	Total Suspended Solids	mg/L	≤ 5.00			≤ 5	≤ 5		≤ 5	≤ 5	≤ 5	
LG-12	Biological Oxygen Demand	mg/L	≤ 3.00	≤ 2		≤ 3	≤ 3		≤ 3	≤ 3	≤ 3	
LG-12	Chemical Oxygen Demand	mg/L	36.0									
LG-12	Chemical Oxygen Demand, Low Level	mg/L		33		21	24		43	53	25	
LG-12	Ammonia	mg/L	≤ 0.100	≤ 0.1		≤ 0.1	≤ 0.1		≤ 0.1	0.1	0.1	
LG-12	Nitrate	mg/L (PHT)		≤ 0.5		≤ 0.50	≤ 0.50		≤ 0.50	≤ 0.50	≤ 0.5	
LG-12	Nitrogen, Total Kjeldahl	mg/L	0.560	0.7		0.7	0.8		0.8	1.0	0.4	
LG-12	Chloride	mg/L	≤ 1	≤ 1		≤ 1	≤ 1		≤ 1	≤ 1	≤ 1	
LG-12	Fluoride	mg/L	≤ 0.100	≤ 0.10		≤ 0.1	≤ 0.1		≤ 0.1	≤ 0.1	≤ 0.1	
LG-12	Sulfate	mg/L	10.0			10	9.8		9.5	6.4	3	
LG-12	Cyanide, total	ug/L	≤ 20	≤ 20		≤ 20	≤ 20		≤ 20	≤ 20	≤ 20	
LG-12	Oil & Grease	mg/L	≤ 1.04	≤ 1		≤ 4.6	≤ 4.6		≤ 4.6	≤ 4.6	≤ 4.6	
LG-12	Turbidity, Lab	NTU	1.80	≤ 0.5		0.7	0.6		1.1	2.4	0.75	
LG-12	Cations	Meq/L	0.082	0.073		0.118	0.113		0.17	0.17	0.115	
LG-12	Anions	Meq/L	0.297	0.169		0.209	0.205		0.20	0.13	0.065	
LG-12	Cation and Anion Balance	%	-60	-39.41		-27.58	-28.80		-8.20	11.26	31.3	
LG-12	Boron, total	mg/L	≤ 0.100	≤ 0.20		≤ 0.10	≤ 0.10		≤ 0.10	≤ 0.10	≤ 0.1	
LG-12	Calcium, total	mg/L	1.20	1.1		1.4	1.6		2.6	2.3	1.65	
LG-12	Arsenic, total	mg/L	≤ 0.005	≤ 0.005		≤ 0.005	≤ 0.005		≤ 0.005	≤ 0.005	≤ 0.005	
LG-12	Barium, total	mg/L	≤ 0.010	≤ 0.010		≤ 0.010	≤ 0.010		0.013	0.020	≤ 0.01	
LG-12	Iron, dissolved	mg/L	0.110	0.082		0.10	0.092		0.15	0.12	0.1195	
LG-12	Iron, total	mg/L	0.148	0.10		0.11	0.14		0.17	0.13	0.135	
LG-12	Manganese, dissolved	mg/L	0.017	0.014		0.013	≤ 0.010		0.022	≤ 0.010	0.0245	
LG-12	Manganese, total	mg/L	0.017	≤ 0.010		0.014	0.011		0.026	0.026	0.04	
LG-12	Molybdenum, total	mg/L	≤ 0.020	≤ 0.020		≤ 0.020	≤ 0.020		≤ 0.020	≤ 0.020	≤ 0.02	
LG-12	Selenium, total	mg/L	≤ 0.005	≤ 0.005		≤ 0.005	0.006		≤ 0.005	≤ 0.005	≤ 0.005	
LG-12	Silver, total	mg/L	≤ 0.010	≤ 0.010		≤ 0.010	≤ 0.010		≤ 0.010	≤ 0.010	≤ 0.01	
LG-12	Chromium, total	mg/L	≤ 0.020									
LG-12	Chromium, total (Low Level)	ug/L	0.51	0.459		≤ 0.30	0.34		0.342	0.313	0.285	
LG-12	Beryllium, total	mg/L	≤ 0.005	≤ 0.010		≤ 0.010	≤ 0.010		≤ 0.010	≤ 0.010	≤ 0.01	
LG-12	Thallium, total	mg/L	≤ 0.005	≤ 0.005		≤ 0.005	≤ 0.005		≤ 0.005	≤ 0.005	≤ 0.005	
LG-12	Nickel, total	mg/L	≤ 0.030	≤ 0.030		≤ 0.030	≤ 0.030		≤ 0.030	≤ 0.030	≤ 0.03	
LG-12	Antimony, total	mg/L	≤ 0.005	≤ 0.005		≤ 0.005	≤ 0.005		≤ 0.005	≤ 0.005	≤ 0.005	
LG-12	Magnesium, total	mg/L	≤ 0.500	≤ 0.50		≤ 0.50	≤ 0.50		0.74	0.65	0.515	
LG-12	Phosphorus, dissolved	mg/L	0.015	≤ 0.05		≤ 0.05	≤ 0.05		≤ 0.05	≤ 0.05	≤ 0.05	
LG-12	Phosphorus, total	mg/L	0.024	≤ 0.05		≤ 0.05	≤ 0.05		≤ 0.05	≤ 0.05	≤ 0.05	
LG-12	Potassium, total	mg/L	0.870	≤ 1.0		1.9	≤ 1.0		1.0	≤ 1.0	≤ 1	
LG-12	Sodium, total	mg/L	≤ 1.00	≤ 1.0		≤ 1.0	≤ 1.0		≤ 1.0	≤ 1.0	≤ 1	
LG-12	Sodium Absorption Ratio	std	0	0		0.000	0		0	0	0	

STATION	PARAMETER	Units	Nov-93	Dec-93	Jan-94	Feb-94	Mar-94	Apr-94	Apr-94	May-94	Jun-94	Jul-94
LG-12	Aluminum, total	ug/L							62.9	104	84.6	70.4
LG-12	Cadmium, total	ug/L							0.013	0.026	0.029	0.023
LG-12	Copper, total	ug/L							0.447	0.603	0.495	0.505
LG-12	Lead, total	ug/L							0.720	1.05	0.952	0.897
LG-12	Mercury, total	ng/L							3	3	3.95	3.79
LG-12	Zinc, total	ug/L							5.23	5.01	6.87	5.93

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
LG-12	Aluminum, total	ug/L	62.3	70.2		76.6	85.5		130	154	110	
LG-12	Cadmium, total	ug/L	0.006	0.0177		0.0134	0.006		0.021	0.032	0.039	
LG-12	Copper, total	ug/L	3.49	0.463		0.675	0.839		0.879	0.831	0.696	
LG-12	Lead, total	ug/L	0.493	0.651		0.667	0.413		2.18	1.87	1.07	
LG-12	Mercury, total	ng/L	2.82	2.97		2.44	2.3		3.67	3.37	2.78	
LG-12	Zinc, total	ug/L	6.42	4.68		5.41	6.14		7.89	10.1	6.79	

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
LG-12-02'	pH, Lab	S. U.									4.8	
LG-12-02'	Alkalinity	mg/L								^	5	
LG-12-02'	Alkalinity, Bicarbonate	mg/L								^	5	
LG-12-02'	Alkalinity, Carbonate	mg/L								^	5	
LG-12-02'	Hardness	mg/L									8	
LG-12-02'	Total Dissolved Solids	mg/L									11	
LG-12-02'	Total Suspended Solids	mg/L								^	5	
LG-12-02'	Biological Oxygen Demand	mg/L								^	3	
LG-12-02'	Chemical Oxygen Demand, Low Level	mg/L									17	
LG-12-02'	Ammonia	mg/L									0.1	
LG-12-02'	Nitrate	mg/L								^	0.50	
LG-12-02'	Nitrogen, Total Kjeldahl	mg/L									0.3	
LG-12-02'	Chloride	mg/L								^	1	
LG-12-02'	Fluoride	mg/L								^	0.1	
LG-12-02'	Sulfate	mg/L									1.8	
LG-12-02'	Cyanide, total	ug/L								^	20	
LG-12-02'	Oil & Grease	mg/L								^	4.6	
LG-12-02'	Turbidity, Lab	NTU									0.6	
LG-12-02'	Cations	Meq/L									0.09	
LG-12-02'	Anions	Meq/L									0.04	
LG-12-02'	Cation and Anion Balance	%									40.03	
LG-12-02'	Boron, total	mg/L								^	0.10	
LG-12-02'	Calcium, total	mg/L									1.4	
LG-12-02'	Arsenic, total	mg/L								^	0.005	
LG-12-02'	Barium, total	mg/L								^	0.010	
LG-12-02'	Iron, dissolved	mg/L									0.059	
LG-12-02'	Iron, total	mg/L									0.11	
LG-12-02'	Manganese, dissolved	mg/L									0.014	
LG-12-02'	Manganese, total	mg/L									0.034	
LG-12-02'	Molybdenum, total	mg/L								^	0.020	
LG-12-02'	Selenium, total	mg/L								^	0.005	
LG-12-02'	Silver, total	mg/L								^	0.010	
LG-12-02' (C)	Chromium, total (Low Level)	ug/L									0.285	
LG-12-02'	Beryllium, total	mg/L								^	0.010	
LG-12-02'	Thallium, total	mg/L								^	0.005	
LG-12-02'	Nickel, total	mg/L								^	0.030	
LG-12-02'	Antimony, total	mg/L								^	0.005	
LG-12-02'	Magnesium, total	mg/L								^	0.50	
LG-12-02'	Phosphorus, dissolved	mg/L								^	0.05	
LG-12-02'	Phosphorus, total	mg/L								^	0.05	
LG-12-02'	Potassium, total	mg/L								^	1.0	
LG-12-02'	Sodium, total	mg/L								^	1.0	
LG-12-02'	Sodium Absorption Ratio	std									0	
LG-12-02' (C)	Aluminum, total	ug/L									110	
LG-12-02' (C)	Cadmium, total	ug/L									0.039	
LG-12-02' (C)	Copper, total	ug/L									0.696	
LG-12-02' (C)	Lead, total	ug/L									1.07	
LG-12-02' (C)	Mercury, total	ng/L									2.78	
LG-12-02' (C)	Zinc, total	ug/L									6.79	

(C) Sample Compositied With LG-12-05'

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
LG-12-05'	pH, Lab	S.U.									5.1	
LG-12-05'	Alkalinity	mg/L								<	5	
LG-12-05'	Alkalinity, Bicarbonate	mg/L								<	5	
LG-12-05'	Alkalinity, Carbonate	mg/L								<	5	
LG-12-05'	Hardness	mg/L									7	
LG-12-05'	Total Dissolved Solids	mg/L									53	
LG-12-05'	Total Suspended Solids	mg/L								<	5	
LG-12-05'	Biological Oxygen Demand	mg/L								<	3	
LG-12-05'	Chemical Oxygen Demand, Low Level	mg/L									33	
LG-12-05'	Ammonia	mg/L								<	0.1	
LG-12-05'	Nitrate	mg/L								<	0.50	
LG-12-05'	Nitrogen, Total Kjeldahl	mg/L									0.5	
LG-12-05'	Chloride	mg/L								<	1	
LG-12-05'	Fluoride	mg/L								<	0.1	
LG-12-05'	Sulfate	mg/L									4.2	
LG-12-05'	Cyanide, total	ug/L								<	20	
LG-12-05'	Oil & Grease	mg/L								<	4.6	
LG-12-05'	Turbidity, Lab	NTU									0.9	
LG-12-05'	Cations	Meq/L									0.14	
LG-12-05'	Anions	Meq/L									0.09	
LG-12-05'	Cation and Anion Balance	%									22.57	
LG-12-05'	Boron, total	mg/L								<	0.10	
LG-12-05'	Calcium, total	mg/L									1.9	
LG-12-05'	Arsenic, total	mg/L								<	0.005	
LG-12-05'	Barium, total	mg/L								<	0.010	
LG-12-05'	Iron, dissolved	mg/L									0.18	
LG-12-05'	Iron, total	mg/L									0.16	
LG-12-05'	Manganese, dissolved	mg/L									0.035	
LG-12-05'	Manganese, total	mg/L									0.046	
LG-12-05'	Molybdenum, total	mg/L								<	0.020	
LG-12-05'	Selenium, total	mg/L								<	0.005	
LG-12-05'	Silver, total	mg/L								<	0.010	
LG-12-05' (C)	Chromium, total (Low Level)	ug/L									0.285	
LG-12-05'	Beryllium, total	mg/L								<	0.010	
LG-12-05'	Thallium, total	mg/L								<	0.005	
LG-12-05'	Nickel, total	mg/L								<	0.030	
LG-12-05'	Antimony, total	mg/L								<	0.005	
LG-12-05'	Magnesium, total	mg/L									0.53	
LG-12-05'	Phosphorus, dissolved	mg/L								<	0.05	
LG-12-05'	Phosphorus, total	mg/L								<	0.05	
LG-12-05'	Potassium, total	mg/L								<	1.0	
LG-12-05'	Sodium, total	mg/L								<	1.0	
LG-12-05'	Sodium Absorption Ratio	std									0	
LG-12-05' (C)	Aluminum, total	ug/L									110	
LG-12-05' (C)	Cadmium, total	ug/L									0.039	
LG-12-05' (C)	Copper, total	ug/L									0.696	
LG-12-05' (C)	Lead, total	ug/L									1.07	
LG-12-05' (C)	Mercury, total	ng/L									2.78	
LG-12-05' (C)	Zinc, total	ug/L									6.79	

(C) Sample Composited With LG-12-02'

STATION	PARAMETER	Units	Nov-93	Dec-93	Jan-94	Feb-94	Mar-94	Apr-94	Apr-94	May-94	Jun-94	Jul-94
LG-13	pH (Field)	S.U.							5.87	5.48	5.31	5.72
LG-13	pH (Field)-02'	S.U.										
LG-13	pH (Field)-06'	S.U.										
LG-13	pH (Field)-07'	S.U.										
LG-13	pH, Lab	S.U.							(PHT)	(PHT)	(PHT)	(PHT)
LG-13	Conductivity (Field)	umhos							27	30	35	23
LG-13	Conductivity (Field)-02'	umhos										
LG-13	Conductivity (Field)-06'	umhos										
LG-13	Conductivity (Field)-07'	umhos										
LG-13	Conductivity, Lab	umhos							19.6	20.0	20.0	22.0
LG-13	Temperature (Field)	Degrees C							10.3	13.6	20.3	24.6
LG-13	Temperature (Field)-02'	Degrees C										
LG-13	Temperature (Field)-06'	Degrees C										
LG-13	Temperature (Field)-07'	Degrees C										
LG-13	Temperature (Field-DO Meter)	Degrees C							10.5		20	
LG-13	Temperature (Field-DO Meter)-01'	Degrees C										
LG-13	Temperature (Field-DO Meter)-02'	Degrees C										
LG-13	Temperature (Field-DO Meter)-03'	Degrees C										
LG-13	Temperature (Field-DO Meter)-04'	Degrees C										
LG-13	Temperature (Field-DO Meter)-05'	Degrees C										
LG-13	Temperature (Field-DO Meter)-06'	Degrees C										
LG-13	Temperature (Field-DO Meter)-07'	Degrees C										
LG-13	Temperature (Field-DO Meter)-08'	Degrees C										
LG-13	Temperature (Field-DO Meter)-09'	Degrees C										
LG-13	Temperature (Field-DO Meter)-10'	Degrees C										
LG-13	Temperature (Field-DO Meter)-10.5'	Degrees C										
LG-13	Dissolved Oxygen (Field)	%									8.2	
LG-13	Dissolved Oxygen (Field)-Surface	%							8.4			
LG-13	Dissolved Oxygen (Field)-01'	%										
LG-13	Dissolved Oxygen (Field)-02'	%										
LG-13	Dissolved Oxygen (Field)-03'	%										
LG-13	Dissolved Oxygen (Field)-04'	%										
LG-13	Dissolved Oxygen (Field)-05'	%										
LG-13	Dissolved Oxygen (Field)-06'	%										
LG-13	Dissolved Oxygen (Field)-07'	%										
LG-13	Dissolved Oxygen (Field)-08'	%										
LG-13	Dissolved Oxygen (Field)-09'	%										
LG-13	Dissolved Oxygen (Field)-10'	%										
LG-13	Dissolved Oxygen (Field)-10.5'	%										
LG-13	Dissolved Oxygen (Field)-Bottom	%							8.4			
LG-13	Alkalinity	mg/L							20.0	20.0	4.40	4.30
LG-13	Alkalinity, Bicarbonate	mg/L							20.0	20.0	4.40	4.30
LG-13	Alkalinity, Carbonate	mg/L							0	0	0	0
LG-13	Alkalinity, Hydroxide	mg/L							0	0	0	0
LG-13	Hardness	mg/L							5.00	5.00	10.3	7.00
LG-13	Total Dissolved Solids	mg/L							15.0	25.0	25.0	33.0
LG-13	Total Suspended Solids	mg/L							5.00	5.00	5.00	5.00
LG-13	Biological Oxygen Demand	mg/L							6.00	4.00	3.00	3.00
LG-13	Chemical Oxygen Demand	mg/L							20.0	29.0	29.0	20.0
LG-13	Chemical Oxygen Demand, Low Level	mg/L										
LG-13	Ammonia	mg/L							0.100	0.100	0.100	0.336
LG-13	Nitrate	mg/L							(PHT)	0.500	0.500	(PHT)
LG-13	Nitrogen, Total Kjeldahl	mg/L							0.700	0.476	2.16	0.700
LG-13	Chloride	mg/L							1	1	1	1
LG-13	Fluoride	mg/L							0.100	0.204	0.100	0.100
LG-13	Sulfate	mg/L							3.94	6.00	7.00	5.70
LG-13	Cyanide, total	ug/L							20	20		20
LG-13	Oil & Grease	mg/L							1.02	1.12	1.10	1.02
LG-13	Turbidity, Lab	NTU							1.50	2.00	2.98	2.00
LG-13	Cations	Meq/L							0.128	0.137	0.123	0.138
LG-13	Anions	Meq/L							0.082	0.164	0.279	0.189
LG-13	Cation and Anion Balance	%							21.8	-9	-40	-20
LG-13	Boron, total	mg/L							0.100	0.100	0.100	0.100
LG-13	Calcium, total	mg/L							1.69	1.80	1.53	1.76
LG-13	Arsenic, total	mg/L							0.005	0.005	0.005	0.005
LG-13	Barium, total	mg/L							0.013	0.015	0.011	0.012
LG-13	Iron, dissolved	mg/L							0.100	0.138	0.117	0.109
LG-13	Iron, total	mg/L							0.146	0.174	0.149	0.180
LG-13	Manganese, dissolved	mg/L							0.018	0.020	0.032	0.026
LG-13	Manganese, total	mg/L							0.020	0.023	0.037	0.032
LG-13	Molybdenum, total	mg/L							0.020	0.020	0.020	0.020
LG-13	Selenium, total	mg/L							0.005	0.005	0.005	0.005
LG-13	Silver, total	mg/L							0.010	0.010	0.010	0.010
LG-13	Chromium, total	mg/L							0.020	0.020	0.020	0.020
LG-13	Chromium, total (Low Level)	ug/L							0.270	0.56	0.45	0.45
LG-13	Beryllium, total	mg/L							0.005	0.005	0.005	0.005
LG-13	Thallium, total	mg/L							0.005	0.005	0.005	0.005
LG-13	Nickel, total	mg/L							0.030	0.030	0.030	0.030

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
LG-13	pH (Field)	S.U.	5.69	6.63		6.62	6.05		6.22			
LG-13	pH (Field)-02'	S.U.									6.58	
LG-13	pH (Field)-06'	S.U.								5.84		
LG-13	pH (Field)-07'	S.U.									6.11	
LG-13	pH, Lab	S.U.	(PHT)	5.8		5.7	5.5		5.5	5.3	5.75	
LG-13	Conductivity (Field)	umhos	24.1	21.5		20.9	28.4		40.2			
LG-13	Conductivity (Field)-02'	umhos									57.8	
LG-13	Conductivity (Field)-06'	umhos								137.3		
LG-13	Conductivity (Field)-07'	umhos									65.7	
LG-13	Conductivity, Lab	umhos	20.4									
LG-13	Temperature (Field)	Degrees C	19.3	18.2		11.3	5.9		2.8			
LG-13	Temperature (Field)-02'	Degrees C									4.5	
LG-13	Temperature (Field)-06'	Degrees C								4.2		
LG-13	Temperature (Field)-07'	Degrees C									4.8	
LG-13	Temperature (Field-DO Meter)	Degrees C	19.0	18		11.5	6.0		1.5	0.75	0.75	
LG-13	Temperature (Field-DO Meter)-01'	Degrees C		18		11.5	6.0		4.0	0.75	1.75	
LG-13	Temperature (Field-DO Meter)-02'	Degrees C		18		11.5	6.0		4.0	1.5	4.25	
LG-13	Temperature (Field-DO Meter)-03'	Degrees C	19.0	18		11.5	6.0		4.25	2.5	4.5	
LG-13	Temperature (Field-DO Meter)-04'	Degrees C		18		11.5	6.0		4.25	4.25	4.5	
LG-13	Temperature (Field-DO Meter)-05'	Degrees C		18		11.5	6.0		4.25	4.25	5.0	
LG-13	Temperature (Field-DO Meter)-06'	Degrees C	19.0	18		11.0	6.0		4.5	4.25	5.0	
LG-13	Temperature (Field-DO Meter)-07'	Degrees C		18		11.0	6.0		4.5	4.25	5.0	
LG-13	Temperature (Field-DO Meter)-08'	Degrees C		17		11.0	6.0		4.50	5.0		
LG-13	Temperature (Field-DO Meter)-09'	Degrees C	19.0	17					4.50	5.0		
LG-13	Temperature (Field-DO Meter)-10'	Degrees C		17						5.0		
LG-13	Temperature (Field-DO Meter)-10.5'	Degrees C								4.5		
LG-13	Dissolved Oxygen (Field)	%	8.2	9.4		9.6	11.3		10.8	12.8	12.8	
LG-13	Dissolved Oxygen (Field)-Surface	%										
LG-13	Dissolved Oxygen (Field)-01'	%		9.4		9.6	11.3		8.6	13.0		
LG-13	Dissolved Oxygen (Field)-02'	%		9.4		9.5	11.3		8.2	10.6	14.4	
LG-13	Dissolved Oxygen (Field)-03'	%	8.0	9.4		9.5	11.3		8.2	5.6	14.25	
LG-13	Dissolved Oxygen (Field)-04'	%		9.2		9.5	11.25		8.2	2.6	11.9	
LG-13	Dissolved Oxygen (Field)-05'	%		9.2		9.5	11.2		8.3	2.25	8.25	
LG-13	Dissolved Oxygen (Field)-06'	%	7.8	9.2		9.5	11.2		8.2	2.20	5.3	
LG-13	Dissolved Oxygen (Field)-07'	%		9.2		9.5	11.2		0.8	2.0	3.95	
LG-13	Dissolved Oxygen (Field)-08'	%		9.2		9.3	11.2			1.7	3.7	
LG-13	Dissolved Oxygen (Field)-09'	%	6.0	9.0						1.2	2.9	
LG-13	Dissolved Oxygen (Field)-10'	%		2.2							0.8	
LG-13	Dissolved Oxygen (Field)-10.5'	%								0.3		
LG-13	Dissolved Oxygen (Field)-Bottom	%										
LG-13	Alkalinity	mg/L	< 2.00	< 5		< 5	< 5		< 5	5	5	
LG-13	Alkalinity, Bicarbonate	mg/L	< 2.00	< 5		< 5	< 5		< 5	5	5	
LG-13	Alkalinity, Carbonate	mg/L	0	< 5		< 5	< 5		< 5	< 5	< 5	
LG-13	Alkalinity, Hydroxide	mg/L	0	< 5		< 5						
LG-13	Hardness	mg/L	7.90	6.0		10	8		12	12	12.5	
LG-13	Total Dissolved Solids	mg/L	24.0	44		34	78		44	76	44	
LG-13	Total Suspended Solids	mg/L	< 5.00			< 5	< 5		< 5	< 5	< 5	
LG-13	Biological Oxygen Demand	mg/L	< 3.00	< 2		< 3	< 3		< 3	< 3	5	
LG-13	Chemical Oxygen Demand	mg/L	15.0									
LG-13	Chemical Oxygen Demand, Low Level	mg/L		28		23	26		33	41	30	
LG-13	Ammonia	mg/L	< 0.100	< 0.1		< 0.1	< 0.1		< 0.1	0.1	0.1	
LG-13	Nitrate	mg/L	0.714	< 0.5		< 0.50	< 0.50		< 0.50	< 0.50	< 0.5	
LG-13	Nitrogen, Total Kjeldahl	mg/L	0.336	0.7		0.6	1.0		0.7	0.9	0.6	
LG-13	Chloride	mg/L	< 1	< 1		< 1	< 1		< 1	< 1	< 1	
LG-13	Fluoride	mg/L	< 0.100	< 0.10		< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	
LG-13	Sulfate	mg/L	10.0			9.5	11		12	9.0	4.75	
LG-13	Cyanide, total	ug/L	< 20	< 20		< 20	< 20		< 20	< 20	< 20	
LG-13	Oil & Grease	mg/L	< 1.01	< 1		< 4.6	< 4.6		8.3	< 4.6	< 4.6	
LG-13	Turbidity, Lab	NTU	1.30	1.4		1.1	0.9		0.9	1.5	1	
LG-13	Cations	Meq/L	0.152	0.133		0.165	0.151		0.23	0.27	0.265	
LG-13	Anions	Meq/L	0.246	0.183		0.023	0.229		0.25	0.27	0.14	
LG-13	Cation and Anion Balance	%	-20	-15.73		75.33	-20.65		-3.65	-0.65	30.27	
LG-13	Boron, total	mg/L	< 0.100	< 0.20		< 0.10	< 0.10		< 0.10	< 0.10	0.15	
LG-13	Calcium, total	mg/L	1.82	1.8		2.0	2.1		3.0	3.2	2.45	
LG-13	Arsenic, total	mg/L	< 0.005	< 0.005		< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	
LG-13	Barium, total	mg/L	0.012	0.015		0.016	0.016		0.022	0.060	0.165	
LG-13	Iron, dissolved	mg/L	< 0.100	0.068		0.13	0.24		0.15	0.15	0.13	
LG-13	Iron, total	mg/L	0.163	0.15		0.17	0.41		0.22	0.17	0.25	
LG-13	Manganese, dissolved	mg/L	0.023	0.019		0.021	0.018		0.025	0.030	0.0285	
LG-13	Manganese, total	mg/L	0.025	0.020		0.020	0.018		0.025	0.026	0.075	
LG-13	Molybdenum, total	mg/L	< 0.020	< 0.020		< 0.020	< 0.020		< 0.020	< 0.020	< 0.02	
LG-13	Selenium, total	mg/L	< 0.005	< 0.005		< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	
LG-13	Silver, total	mg/L	< 0.010	< 0.010		< 0.010	< 0.010		< 0.010	< 0.010	< 0.01	
LG-13	Chromium, total	mg/L	< 0.020									
LG-13	Chromium, total (Low Level)	ug/L	0.42	0.460		< 0.30	0.28		0.302	0.615	0.321	
LG-13	Beryllium, total	mg/L	< 0.005	< 0.010		< 0.010	< 0.010		< 0.010	< 0.010	< 0.01	
LG-13	Thallium, total	mg/L	< 0.005	< 0.005		< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	
LG-13	Nickel, total	mg/L	< 0.030	< 0.030		< 0.030	< 0.030		< 0.030	< 0.030	0.07	

STATION	PARAMETER	Units	Nov-93	Dec-93	Jan-94	Feb-94	Mar-94	Apr-94	Apr-94	May-94	Jun-94	Jul-94
LG-13	Antimony, total	mg/L							< 0.005	< 0.005	< 0.005	< 0.005
LG-13	Magnesium, total	mg/L							0.529	0.574	0.567	0.608
LG-13	Phosphorus, dissolved	mg/L							< 0.050	0.009	0.012	0.010
LG-13	Phosphorus, total	mg/L							0.097	0.028	0.025	0.033
LG-13	Potassium, total	mg/L							< 0.600	< 0.600	< 0.600	< 0.600
LG-13	Sodium, total	mg/L							< 1.00	< 1.00	< 1.00	< 1.00
LG-13	Sodium Absorption Ratio	std							0	0	0	0
LG-13	Aluminum, total	ug/L							104	130	135	117
LG-13	Cadmium, total	ug/L							0.017	0.031	0.033	0.020
LG-13	Copper, total	ug/L							0.493	0.724	0.506	0.638
LG-13	Lead, total	ug/L							0.586	0.655	0.648	0.823
LG-13	Mercury, total	ng/L							3	3	2.73	2.80
LG-13	Zinc, total	ug/L							6.03	6.91	8.34	7.00

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
LG-13	Antimony, total	mg/L	< 0.005	< 0.005		< 0.005	< 0.005		< 0.005	< 0.005	0.017	
LG-13	Magnesium, total	mg/L	0.557	0.53		0.60	0.56		0.80	0.85	1.6	
LG-13	Phosphorus, dissolved	mg/L	0.012	< 0.05		< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	
LG-13	Phosphorus, total	mg/L	0.026	< 0.05		< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	
LG-13	Potassium, total	mg/L	0.620	< 1.0		< 1.0	< 1.0		< 1.0	1.5	< 1	
LG-13	Sodium, total	mg/L	< 1.00	< 1.0		< 1.0	< 1.0		< 1.0	< 1.0	< 1	
LG-13	Sodium Absorption Ratio	std	0	0		0.000	0		0	0	0	
LG-13	Aluminum, total	ug/L	90.4	96.0		138	170		199	248	177	
LG-13	Cadmium, total	ug/L	0.015	0.0144		0.0220	0.009		0.028	0.027	0.151	
LG-13	Copper, total	ug/L	0.717	0.599		0.768	0.607		1.06	0.732	1.07	
LG-13	Lead, total	ug/L	0.687	0.689		0.622	0.421		0.973	1.13	1.62	
LG-13	Mercury, total	ng/L	2.39	2.50		2.70	2.4		3.01	2.97	2.57	
LG-13	Zinc, total	ug/L	7.46	6.22		14.9	8.67		7.78	10.5	8.26	

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
LG-13-02'	pH, Lab	S.U.									5.7	
LG-13-02'	Alkalinity	mg/L								^ 5		
LG-13-02'	Alkalinity, Bicarbonate	mg/L								^ 5		
LG-13-02'	Alkalinity, Carbonate	mg/L								^ 5		
LG-13-02'	Hardness	mg/L								8		
LG-13-02'	Total Dissolved Solids	mg/L								46		
LG-13-02'	Total Suspended Solids	mg/L								^ 5		
LG-13-02'	Biological Oxygen Demand	mg/L								5		
LG-13-02'	Chemical Oxygen Demand, Low Level	mg/L								28		
LG-13-02'	Ammonia	mg/L								0.1		
LG-13-02'	Nitrate	mg/L								^ 0.50		
LG-13-02'	Nitrogen, Total Kjeldahl	mg/L								0.5		
LG-13-02'	Chloride	mg/L								^ 1		
LG-13-02'	Fluoride	mg/L								^ 0.1		
LG-13-02'	Sulfate	mg/L								4.6		
LG-13-02'	Cyanide, total	ug/L								^ 20		
LG-13-02'	Oil & Grease	mg/L								^ 4.6		
LG-13-02'	Turbidity, Lab	NTU								1.0		
LG-13-02'	Cations	Meq/L								0.17		
LG-13-02'	Anions	Meq/L								0.10		
LG-13-02'	Cation and Anion Balance	%								27.69		
LG-13-02'	Boron, total	mg/L								^ 0.10		
LG-13-02'	Calcium, total	mg/L								2.4		
LG-13-02'	Arsenic, total	mg/L								^ 0.005		
LG-13-02'	Barium, total	mg/L								0.22		
LG-13-02'	Iron, dissolved	mg/L								0.10		
LG-13-02'	Iron, total	mg/L								0.21		
LG-13-02'	Manganese, dissolved	mg/L								0.025		
LG-13-02'	Manganese, total	mg/L								0.040		
LG-13-02'	Molybdenum, total	mg/L								^ 0.020		
LG-13-02'	Selenium, total	mg/L								^ 0.005		
LG-13-02'	Silver, total	mg/L								^ 0.010		
LG-13-02' (C)	Chromium, total (Low Level)	ug/L								0.321		
LG-13-02'	Beryllium, total	mg/L								^ 0.010		
LG-13-02'	Thallium, total	mg/L								^ 0.005		
LG-13-02'	Nickel, total	mg/L								^ 0.030		
LG-13-02'	Antimony, total	mg/L								^ 0.005		
LG-13-02'	Magnesium, total	mg/L								0.60		
LG-13-02'	Phosphorus, dissolved	mg/L								^ 0.05		
LG-13-02'	Phosphorus, total	mg/L								^ 0.05		
LG-13-02'	Potassium, total	mg/L								^ 1.0		
LG-13-02'	Sodium, total	mg/L								^ 1.0		
LG-13-02'	Sodium Absorption Ratio	std								0		
LG-13-02' (C)	Aluminum, total	ug/L								177		
LG-13-02' (C)	Cadmium, total	ug/L								0.151		
LG-13-02' (C)	Copper, total	ug/L								1.07		
LG-13-02' (C)	Lead, total	ug/L								1.62		
LG-13-02' (C)	Mercury, total	ng/L								2.57		
LG-13-02' (C)	Zinc, total	ug/L								8.26		

(C) Sample Compositied With LG-13-07'

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
LG-13-07'	pH, Lab	S.U.									5.8	
LG-13-07'	Alkalinity	mg/L									5	
LG-13-07'	Alkalinity, Bicarbonate	mg/L									5	
LG-13-07'	Alkalinity, Carbonate	mg/L								^	5	
LG-13-07'	Hardness	mg/L									17	
LG-13-07'	Total Dissolved Solids	mg/L									42	
LG-13-07'	Total Suspended Solids	mg/L								^	5	
LG-13-07'	Biological Oxygen Demand	mg/L									5	
LG-13-07'	Chemical Oxygen Demand, Low Level	mg/L									32	
LG-13-07'	Ammonia	mg/L									0.1	
LG-13-07'	Nitrate	mg/L								^	0.50	
LG-13-07'	Nitrogen, Total Kjeldahl	mg/L									0.7	
LG-13-07'	Chloride	mg/L								^	1	
LG-13-07'	Fluoride	mg/L								^	0.1	
LG-13-07'	Sulfate	mg/L									4.9	
LG-13-07'	Cyanide, total	ug/L								^	20	
LG-13-07'	Oil & Grease	mg/L								^	4.6	
LG-13-07'	Turbidity, Lab	NTU									1.0	
LG-13-07'	Cations	Meq/L									0.36	
LG-13-07'	Anions	Meq/L									0.18	
LG-13-07'	Cation and Anion Balance	%									32.85	
LG-13-07'	Boron, total	mg/L									0.20	
LG-13-07'	Calcium, total	mg/L									2.5	
LG-13-07'	Arsenic, total	mg/L								^	0.005	
LG-13-07'	Barium, total	mg/L									0.11	
LG-13-07'	Iron, dissolved	mg/L									0.16	
LG-13-07'	Iron, total	mg/L									0.29	
LG-13-07'	Manganese, dissolved	mg/L									0.032	
LG-13-07'	Manganese, total	mg/L									0.11	
LG-13-07'	Molybdenum, total	mg/L								^	0.020	
LG-13-07'	Selenium, total	mg/L								^	0.005	
LG-13-07'	Silver, total	mg/L								^	0.010	
LG-13-07' (C)	Chromium, total (Low Level)	ug/L								^	0.321	
LG-13-07'	Beryllium, total	mg/L								^	0.010	
LG-13-07'	Thallium, total	mg/L								^	0.005	
LG-13-07'	Nickel, total	mg/L									0.11	
LG-13-07'	Antimony, total	mg/L									0.029	
LG-13-07'	Magnesium, total	mg/L									2.6	
LG-13-07'	Phosphorus, dissolved	mg/L								^	0.05	
LG-13-07'	Phosphorus, total	mg/L								^	0.05	
LG-13-07'	Potassium, total	mg/L								^	1.0	
LG-13-07'	Sodium, total	mg/L								^	1.0	
LG-13-07'	Sodium Absorption Ratio	std									0	
LG-13-07' (C)	Aluminum, total	ug/L									177	
LG-13-07' (C)	Cadmium, total	ug/L									0.151	
LG-13-07' (C)	Copper, total	ug/L									1.07	
LG-13-07' (C)	Lead, total	ug/L									1.62	
LG-13-07' (C)	Mercury, total	mg/L									2.57	
LG-13-07' (C)	Zinc, total	ug/L									8.26	

(C) Sample Composited With LG-13-02'

STATION	PARAMETER	Units	Nov-93	Dec-93	Jan-94	Feb-94	Mar-94	Apr-94	Apr-94	May-94	Jun-94	Jul-94
LG-15	pH (Field)	S.U.						5.17	5.17	5.63	5.12	
LG-15	pH, Lab	S.U.						(PHT)	(PHT)	(PHT)	(PHT)	
LG-15	Conductivity (Field)	umhos						14	14	13	11	
LG-15	Conductivity, Lab	umhos						16.2	14.0	11.9	10.7	
LG-15	Temperature (Field)	Degrees C						9.0	15.7	21.7	24.1	
LG-15	Temperature (Field-DO Meter)	Degrees C						10.0	15	17.5		
LG-15	Temperature (Field-DO Meter)-03'	Degrees C										
LG-15	Dissolved Oxygen (Field)	%						8.0	6.2	3.2	3.8	
LG-15	Dissolved Oxygen (Field)-03'	%										
LG-15	Alkalinity	mg/L						△ 20.0	△ 20.0	6.40	6.40	
LG-15	Alkalinity, Bicarbonate	mg/L						△ 20.0	△ 20.0	6.40	6.40	
LG-15	Alkalinity, Carbonate	mg/L						0	0	△ 0	0	
LG-15	Alkalinity, Hydroxide	mg/L						0	0	△ 0	0	
LG-15	Hardness	mg/L						△ 5.00	△ 5.00	11.1	8.00	
LG-15	Total Dissolved Solids	mg/L						15.0	22.0	27.0	41.0	
LG-15	Total Suspended Solids	mg/L						△ 5.00	△ 5.00	△ 5.00	△ 5.00	
LG-15	Biological Oxygen Demand	mg/L						9.00	6.00	7.00	△ 3.00	
LG-15	Chemical Oxygen Demand	mg/L						35.0	35.0	50.0	38.0	
LG-15	Chemical Oxygen Demand, Low Level	mg/L										
LG-15	Ammonia	mg/L						△ 0.100	△ 0.100	0.134	0.336	
LG-15	Nitrate	mg/L						(PHT)	△ 0.500	(PHT)	△ 0.500	
LG-15	Nitrogen, Total Kjeldahl	mg/L						1.04	0.784	1.54	0.980	
LG-15	Chloride	mg/L						△ 1	△ 1	△ 1	△ 1	
LG-15	Fluoride	mg/L						△ 0.100	0.175	△ 0.100	△ 0.100	
LG-15	Sulfate	mg/L						△ 1.00	3.00	4.00	2.60	
LG-15	Cyanide, total	ug/L						△ 20	△ 20	△ 20	△ 20	
LG-15	Oil & Grease	mg/L						△ 1.00	△ 1.03	△ 1.01	△ 1.05	
LG-15	Turbidity, Lab	NTU						(PHT)	1.80	(PHT)	2.10	
LG-15	Cations	Meq/L						0.109	0.091	0.081	0.056	
LG-15	Anions	Meq/L						0	0.121	0.188	0.159	
LG-15	Cation and Anion Balance	%						100	-10	-40	-50	
LG-15	Boron, total	mg/L						△ 0.100	△ 0.100	△ 0.100	△ 0.100	
LG-15	Calcium, total	mg/L						1.27	1.16	1.30	1.13	
LG-15	Arsenic, total	mg/L						△ 0.005	△ 0.005	△ 0.005	△ 0.005	
LG-15	Barium, total	mg/L						△ 0.010	△ 0.010	△ 0.010	△ 0.010	
LG-15	Iron, dissolved	mg/L						△ 0.100	△ 0.100	0.194	0.178	
LG-15	Iron, total	mg/L						0.111	0.106	0.196	0.153	
LG-15	Manganese, dissolved	mg/L						0.073	0.030	0.091	0.092	
LG-15	Manganese, total	mg/L						0.088	0.040	0.096	0.090	
LG-15	Molybdenum, total	mg/L						△ 0.020	△ 0.020	△ 0.020	△ 0.020	
LG-15	Selenium, total	mg/L						△ 0.005	△ 0.005	△ 0.005	△ 0.005	
LG-15	Silver, total	mg/L						△ 0.010	△ 0.010	△ 0.010	△ 0.010	
LG-15	Chromium, total	mg/L						△ 0.020	△ 0.020	△ 0.020	△ 0.020	
LG-15	Chromium, total (Low Level)	ug/L						△ 0.270	0.310	0.34	0.30	
LG-15	Beryllium, total	mg/L						△ 0.005	△ 0.005	△ 0.005	△ 0.005	
LG-15	Thallium, total	mg/L						△ 0.005	△ 0.005	△ 0.005	△ 0.005	
LG-15	Nickel, total	mg/L						△ 0.030	△ 0.030	△ 0.030	△ 0.030	
LG-15	Antimony, total	mg/L						△ 0.005	△ 0.005	△ 0.005	△ 0.005	
LG-15	Magnesium, total	mg/L						△ 0.500	△ 0.500	△ 0.500	△ 0.500	
LG-15	Phosphorus, dissolved	mg/L						0.055	0.010	0.036	0.013	
LG-15	Phosphorus, total	mg/L						0.301	0.028	0.047	0.038	
LG-15	Potassium, total	mg/L						1.80	1.30	0.620	△ 0.600	
LG-15	Sodium, total	mg/L						△ 1.00	△ 1.00	△ 1.00	△ 1.00	
LG-15	Sodium Absorption Ratio	std						0	0	△ 0	0	
LG-15	Aluminum, total	ug/L						36.9	59.8	46.6	37.7	
LG-15	Cadmium, total	ug/L						△ 0.006	0.007	0.007	0.003	
LG-15	Copper, total	ug/L						0.258	0.391	0.284	0.274	
LG-15	Lead, total	ug/L						0.212	0.168	0.194	0.134	
LG-15	Mercury, total	ng/L						2	2	3.15	1.80	
LG-15	Zinc, total	ug/L						3.99	4.75	5.91	5.71	

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
LQ-15	pH (Field)	S.U.	5.08	5.96		5.94	5.97		5.87	4.81	5.28	
LQ-15	pH, Lab	S.U.	(PHT)	5.6		5.4	5.5		5.8	5.3	5.4	
LQ-15	Conductivity (Field)	umhos	19.6	14.36		13.67	16.07		59.2	54.1	20.6	
LQ-15	Conductivity, Lab	umhos	11.4									
LQ-15	Temperature (Field)	Degrees C	20.8	18.7		10.8	6.1		2.1	1.6	4.5	
LQ-15	Temperature (Field-DO Meter)	Degrees C	21.0	19		11.75	5.75		1.25	0.5	3.5	
LQ-15	Temperature (Field-DO Meter)-03'	Degrees C	21.0	16		9.75	4.75		1.1		4.0	
LQ-15	Dissolved Oxygen (Field)	%	3.4	5.0		4.7	6.2		7.0	0.9	5.1	
LQ-15	Dissolved Oxygen (Field)-03'	%	1.4	2.7		1.1	5.6		3.0		4.5	
LQ-15	Alkalinity	mg/L	2.40	< 5		5	6		10	15	5	
LQ-15	Alkalinity, Bicarbonate	mg/L	2.40	< 5		5	6		10	15	5	
LQ-15	Alkalinity, Carbonate	mg/L	0	< 5		< 5	< 5		< 5	< 5	< 5	
LQ-15	Alkalinity, Hydroxide	mg/L	0	< 5		< 5						
LQ-15	Hardness	mg/L	6.00	6.0		8	7		14	14	< 5	
LQ-15	Total Dissolved Solids	mg/L	23.0	59		46	62		62	46	34	
LQ-15	Total Suspended Solids	mg/L	< 5.00			< 5	< 5		11	< 5	< 5	
LQ-15	Biological Oxygen Demand	mg/L	< 3.00	< 2		< 3	< 3		15	14	9	
LQ-15	Chemical Oxygen Demand	mg/L	49.0									
LQ-15	Chemical Oxygen Demand, Low Level	mg/L		48		44	45		90	95	29	
LQ-15	Ammonia	mg/L	< 0.100	< 0.1		0.2	0.2		0.1	0.3	0.1	
LQ-15	Nitrate	mg/L	(PHT)	< 0.5		< 0.50	< 0.50		< 0.50	< 0.50	< 0.50	
LQ-15	Nitrogen, Total Kjeldahl	mg/L	0.924	1.2		1.1	1.3		2.0	2.5	0.6	
LQ-15	Chloride	mg/L	< 1	< 1		< 1	< 1		2	2	< 1	
LQ-15	Fluoride	mg/L	< 0.100	< 0.10		< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	
LQ-15	Sulfate	mg/L	10.0			11	11		10	4.9	< 1.0	
LQ-15	Cyanide, total	ug/L	< 20	< 20		< 20	< 20		< 20	< 20	< 20	
LQ-15	Oil & Grease	mg/L	< 1.01	6.4		< 4.6	< 4.6		< 4.6	< 4.6	< 4.6	
LQ-15	Turbidity, Lab	NTU	1.60	1.2		0.85	1.2		3.7	8.2	2.1	
LQ-15	Cations	Meq/L	0.067	0.065		0.111	0.108		0.30	0.39	0.11	
LQ-15	Anions	Meq/L	0.259	0.000		0.312	0.328		0.37	0.40	0.08	
LQ-15	Cation and Anion Balance	%	-60	99.51		-47.58	-50.38		-11.31	-1.75	12.81	
LQ-15	Boron, total	mg/L	< 0.100	< 0.20		< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	
LQ-15	Calcium, total	mg/L	1.34	1.3		1.5	1.4		2.9	3.7	1.1	
LQ-15	Arsenic, total	mg/L	< 0.005	< 0.005		< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	
LQ-15	Barium, total	mg/L	0.011	< 0.010		< 0.010	< 0.010		0.020	0.026	< 0.010	
LQ-15	Iron, dissolved	mg/L	0.137	0.13		0.17	0.14		0.34	0.40	0.12	
LQ-15	Iron, total	mg/L	0.171	0.16		0.19	0.21		0.50	0.74	0.13	
LQ-15	Manganese, dissolved	mg/L	0.101	0.073		0.090	0.083		0.23	0.29	0.10	
LQ-15	Manganese, total	mg/L	0.100	0.075		0.10	0.085		0.23	0.28	0.12	
LQ-15	Molybdenum, total	mg/L	< 0.020	< 0.020		< 0.020	< 0.020		< 0.020	< 0.020	< 0.020	
LQ-15	Selenium, total	mg/L	< 0.005	< 0.005		< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	
LQ-15	Silver, total	mg/L	< 0.010	< 0.010		< 0.010	< 0.010		< 0.010	< 0.010	< 0.010	
LQ-15	Chromium, total	mg/L	< 0.020									
LQ-15	Chromium, total (Low Level)	ug/L	0.34	0.404		< 0.30	0.26		0.414	0.502	0.202	
LQ-15	Beryllium, total	mg/L	< 0.005	< 0.010		< 0.010	< 0.010		< 0.010	< 0.010	< 0.010	
LQ-15	Thallium, total	mg/L	< 0.005	< 0.005		< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	
LQ-15	Nickel, total	mg/L	< 0.030	< 0.030		< 0.030	< 0.030		< 0.030	< 0.030	< 0.030	
LQ-15	Antimony, total	mg/L	< 0.005	< 0.005		< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	
LQ-15	Magnesium, total	mg/L	< 0.500	< 0.50		< 0.50	< 0.50		0.71	0.90	< 0.50	
LQ-15	Phosphorus, dissolved	mg/L	0.025	0.0050		< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	
LQ-15	Phosphorus, total	mg/L	0.037	0.0090		< 0.05	< 0.05		0.09	0.11	< 0.05	
LQ-15	Potassium, total	mg/L	< 0.600	< 1.0		1.4	1.5		3.2	5.2	2.0	
LQ-15	Sodium, total	mg/L	< 1.00	< 1.0		< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	
LQ-15	Sodium Absorption Ratio	std	0	0		0.000	0		0	0	0	
LQ-15	Aluminum, total	ug/L	38.6	51.0		76.3	101		144	182	42.6	
LQ-15	Cadmium, total	ug/L	< 0.006	< 0.006		0.0063	0.008		0.003	0.006	0.011	
LQ-15	Copper, total	ug/L	0.318	0.250		0.794	0.415		0.701	0.907	0.495	
LQ-15	Lead, total	ug/L	0.120	0.122		0.251	0.210		0.289	0.278	0.206	
LQ-15	Mercury, total	ng/L	1.29	1.26		1.64	1.7		2.56	3.29	2.32	
LQ-15	Zinc, total	ug/L	4.17	3.32		6.64	5.67		5.10	5.82	3.35	

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
LG-24	pH (Field)-05'	S.U.									7.41	
LG-24	pH (Field)-40'	S.U.									7.41	
LG-24	Conductivity (Field)-05'	umhos									275	
LG-24	Conductivity (Field)-40'	umhos									236	
LG-24	Temperature (Field)-05'	Degrees C									6.7	
LG-24	Temperature (Field)-40'	Degrees C									6.3	
LG-24	Temperature (Field-DO Meter)	Degrees C									1.0	
LG-24	Temperature (Field-DO Meter)-01	Degrees C									2.0	
LG-24	Temperature (Field-DO Meter)-02	Degrees C									5.25	
LG-24	Temperature (Field-DO Meter)-03	Degrees C									5.25	
LG-24	Temperature (Field-DO Meter)-04	Degrees C									5.5	
LG-24	Temperature (Field-DO Meter)-05	Degrees C									5.75	
LG-24	Temperature (Field-DO Meter)-06	Degrees C									5.75	
LG-24	Temperature (Field-DO Meter)-07	Degrees C									5.75	
LG-24	Temperature (Field-DO Meter)-08	Degrees C									5.75	
LG-24	Temperature (Field-DO Meter)-09	Degrees C									5.5	
LG-24	Temperature (Field-DO Meter)-10	Degrees C									5.25	
LG-24	Temperature (Field-DO Meter)-11	Degrees C									5.0	
LG-24	Temperature (Field-DO Meter)-12	Degrees C									5.0	
LG-24	Temperature (Field-DO Meter)-13	Degrees C									5.0	
LG-24	Temperature (Field-DO Meter)-14	Degrees C									5.0	
LG-24	Temperature (Field-DO Meter)-15	Degrees C									5.0	
LG-24	Temperature (Field-DO Meter)-16	Degrees C									4.75	
LG-24	Temperature (Field-DO Meter)-17	Degrees C									4.75	
LG-24	Temperature (Field-DO Meter)-18	Degrees C									4.75	
LG-24	Temperature (Field-DO Meter)-19	Degrees C									4.5	
LG-24	Temperature (Field-DO Meter)-20	Degrees C									4.5	
LG-24	Temperature (Field-DO Meter)-21	Degrees C									4.5	
LG-24	Temperature (Field-DO Meter)-22	Degrees C									4.5	
LG-24	Temperature (Field-DO Meter)-23	Degrees C									4.5	
LG-24	Temperature (Field-DO Meter)-24	Degrees C									4.75	
LG-24	Temperature (Field-DO Meter)-25	Degrees C									4.75	
LG-24	Temperature (Field-DO Meter)-26	Degrees C									4.75	
LG-24	Temperature (Field-DO Meter)-27	Degrees C									4.75	
LG-24	Temperature (Field-DO Meter)-28	Degrees C									4.75	
LG-24	Temperature (Field-DO Meter)-29	Degrees C									4.75	
LG-24	Temperature (Field-DO Meter)-30	Degrees C									4.75	
LG-24	Temperature (Field-DO Meter)-31	Degrees C									4.75	
LG-24	Temperature (Field-DO Meter)-32	Degrees C									4.75	
LG-24	Temperature (Field-DO Meter)-33	Degrees C									4.75	
LG-24	Temperature (Field-DO Meter)-34	Degrees C									4.75	
LG-24	Temperature (Field-DO Meter)-35	Degrees C									4.75	
LG-24	Temperature (Field-DO Meter)-36	Degrees C									4.75	
LG-24	Temperature (Field-DO Meter)-37	Degrees C									4.75	
LG-24	Temperature (Field-DO Meter)-38	Degrees C									4.75	
LG-24	Temperature (Field-DO Meter)-39	Degrees C									4.75	
LG-24	Temperature (Field-DO Meter)-40	Degrees C									4.75	
LG-24	Temperature (Field-DO Meter)-41	Degrees C									4.75	
LG-24	Temperature (Field-DO Meter)-42	Degrees C									4.75	
LG-24	Dissolved Oxygen (Field)	%									9.2	
LG-24	Dissolved Oxygen (Field)-01'	%									7.8	
LG-24	Dissolved Oxygen (Field)-02'	%									7.2	
LG-24	Dissolved Oxygen (Field)-03'	%									7.0	
LG-24	Dissolved Oxygen (Field)-04'	%									7.0	
LG-24	Dissolved Oxygen (Field)-05'	%									6.8	
LG-24	Dissolved Oxygen (Field)-06'	%									6.9	
LG-24	Dissolved Oxygen (Field)-07'	%									6.9	
LG-24	Dissolved Oxygen (Field)-08'	%									6.1	
LG-24	Dissolved Oxygen (Field)-09'	%									5.8	
LG-24	Dissolved Oxygen (Field)-10'	%									5.0	
LG-24	Dissolved Oxygen (Field)-11'	%									5.0	
LG-24	Dissolved Oxygen (Field)-12'	%									5.1	
LG-24	Dissolved Oxygen (Field)-13'	%									5.2	
LG-24	Dissolved Oxygen (Field)-14'	%									5.2	
LG-24	Dissolved Oxygen (Field)-15'	%									5.2	
LG-24	Dissolved Oxygen (Field)-16'	%									5.0	
LG-24	Dissolved Oxygen (Field)-17'	%									4.8	
LG-24	Dissolved Oxygen (Field)-18'	%									4.5	
LG-24	Dissolved Oxygen (Field)-19'	%									4.3	
LG-24	Dissolved Oxygen (Field)-20'	%									4.2	
LG-24	Dissolved Oxygen (Field)-21'	%									4.0	
LG-24	Dissolved Oxygen (Field)-22'	%									3.8	
LG-24	Dissolved Oxygen (Field)-23'	%									3.6	
LG-24	Dissolved Oxygen (Field)-24'	%									3.4	
LG-24	Dissolved Oxygen (Field)-25'	%									3.2	
LG-24	Dissolved Oxygen (Field)-26'	%									3.0	
LG-24	Dissolved Oxygen (Field)-27'	%									2.95	
LG-24	Dissolved Oxygen (Field)-28'	%									2.8	
LG-24	Dissolved Oxygen (Field)-29'	%									2.8	
LG-24	Dissolved Oxygen (Field)-30'	%									2.75	
LG-24	Dissolved Oxygen (Field)-31'	%									2.6	
LG-24	Dissolved Oxygen (Field)-32'	%									2.5	
LG-24	Dissolved Oxygen (Field)-33'	%									2.1	

3.7-8-67a

CMC Surface Water : November 1993 Through April 1995

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
LG-24	Dissolved Oxygen (Field)-34'	%									1.8	
LG-24	Dissolved Oxygen (Field)-35'	%									1.5	
LG-24	Dissolved Oxygen (Field)-36'	%									1.15	
LG-24	Dissolved Oxygen (Field)-37'	%									0.8	
LG-24	Dissolved Oxygen (Field)-38'	%									0.6	
LG-24	Dissolved Oxygen (Field)-39'	%									0.4	
LG-24	Dissolved Oxygen (Field)-40'	%									0.3	
LG-24	Dissolved Oxygen (Field)-41'	%									0.3	
LG-24	Dissolved Oxygen (Field)-42'	%									0.2	

3.7-8-67b

CMC Surface Water : November 1993 Through April 1995

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
LG-24-05'	pH, Lab	S.U.									7.5	
LG-24-05'	Alkalinity	mg/L									110	
LG-24-05'	Alkalinity, Bicarbonate	mg/L									110	
LG-24-05'	Alkalinity, Carbonate	mg/L								< 5		
LG-24-05'	Hardness	mg/L									120	
LG-24-05'	Total Dissolved Solids	mg/L									130	
LG-24-05'	Total Suspended Solids	mg/L								< 5		
LG-24-05'	Biological Oxygen Demand	mg/L								< 3		
LG-24-05'	Chemical Oxygen Demand, Low	mg/L								< 10		
LG-24-05'	Ammonia	mg/L									0.2	
LG-24-05'	Nitrate	mg/L								< 0.50		
LG-24-05'	Nitrogen, Total Kjeldahl	mg/L									0.4	
LG-24-05'	Chloride	mg/L								< 1		
LG-24-05'	Fluoride	mg/L								< 0.1		
LG-24-05'	Sulfate	mg/L									5.0	
LG-24-05'	Cyanide, total	ug/L								< 20		
LG-24-05'	Oil & Grease	mg/L								< 4.6		
LG-24-05'	Turbidity, Lab	NTU									1.4	
LG-24-05'	Cations	Meq/L									2.43	
LG-24-05'	Anions	Meq/L									1.91	
LG-24-05'	Cation and Anion Balance	%									12.15	
LG-24-05'	Boron, total	mg/L								< 0.10		
LG-24-05'	Calcium, total	mg/L									27	
LG-24-05'	Arsenic, total	mg/L								< 0.005		
LG-24-05'	Barium, total	mg/L									0.16	
LG-24-05'	Iron, dissolved	mg/L								< 0.050		
LG-24-05'	Iron, total	mg/L								< 0.010		
LG-24-05'	Manganese, dissolved	mg/L								< 0.010		
LG-24-05'	Manganese, total	mg/L								< 0.020		
LG-24-05'	Molybdenum, total	mg/L								< 0.005		
LG-24-05'	Selenium, total	mg/L								< 0.010		
LG-24-05'	Silver, total	mg/L								< 0.010		
LG-24-05'	Beryllium, total	mg/L								< 0.005		
LG-24-05'	Thallium, total	mg/L								< 0.030		
LG-24-05'	Nickel, total	mg/L								< 0.005		
LG-24-05'	Antimony, total	mg/L									12	
LG-24-05'	Magnesium, total	mg/L								< 0.05		
LG-24-05'	Phosphorus, dissolved	mg/L								< 0.05		
LG-24-05'	Phosphorus, total	mg/L								< 1.0		
LG-24-05'	Potassium, total	mg/L									1.8	
LG-24-05'	Sodium, total	mg/L									0.07	
LG-24-05'	Sodium Absorption Ratio	std										

CMC Surface Water : November 1993 Through April 1995

STATION	PARAMETER	Units	Aug-94	Sep-94	Sep-94-2	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95
LG-24-40'	pH, Lab	S.U.									7.3	
LG-24-40'	Alkalinity	mg/L									100	
LG-24-40'	Alkalinity, Bicarbonate	mg/L									100	
LG-24-40'	Alkalinity, Carbonate	mg/L								< 5		
LG-24-40'	Hardness	mg/L									130	
LG-24-40'	Total Dissolved Solids	mg/L									140	
LG-24-40'	Total Suspended Solids	mg/L								< 5		
LG-24-40'	Biological Oxygen Demand	mg/L								< 3		
LG-24-40'	Chemical Oxygen Demand, Low	mg/L								< 10		
LG-24-40'	Ammonia	mg/L									0.2	
LG-24-40'	Nitrate	mg/L								< 0.50		
LG-24-40'	Nitrogen, Total Kjeldahl	mg/L									0.5	
LG-24-40'	Chloride	mg/L									1	
LG-24-40'	Fluoride	mg/L								< 0.1		
LG-24-40'	Sulfate	mg/L									5.4	
LG-24-40'	Cyanide, total	ug/L								< 20		
LG-24-40'	Oil & Grease	mg/L								< 4.6		
LG-24-40'	Turbidity, Lab	NTU									2.3	
LG-24-40'	Cations	Meq/L									2.19	
LG-24-40'	Anions	Meq/L									1.78	
LG-24-40'	Cation and Anion Balance	%									10.35	
LG-24-40'	Boron, total	mg/L								< 0.10		
LG-24-40'	Calcium, total	mg/L									24	
LG-24-40'	Arsenic, total	mg/L								< 0.005		
LG-24-40'	Barium, total	mg/L									0.024	
LG-24-40'	Iron, dissolved	mg/L								< 0.050		
LG-24-40'	Iron, total	mg/L								< 0.050		
LG-24-40'	Manganese, dissolved	mg/L								< 0.010		
LG-24-40'	Manganese, total	mg/L								< 0.010		
LG-24-40'	Molybdenum, total	mg/L								< 0.020		
LG-24-40'	Selenium, total	mg/L								< 0.005		
LG-24-40'	Silver, total	mg/L								< 0.010		
LG-24-40'	Beryllium, total	mg/L								< 0.010		
LG-24-40'	Thallium, total	mg/L								< 0.005		
LG-24-40'	Nickel, total	mg/L								< 0.030		
LG-24-40'	Antimony, total	mg/L								< 0.005		
LG-24-40'	Magnesium, total	mg/L									11	
LG-24-40'	Phosphorus, dissolved	mg/L								< 0.05		
LG-24-40'	Phosphorus, total	mg/L									0.08	
LG-24-40'	Potassium, total	mg/L								< 1.0		
LG-24-40'	Sodium, total	mg/L									1.6	
LG-24-40'	Sodium Absorption Ratio	std									0.07	

3.7-8-67d

Crandon Surface Water Summary
Updated : 12/16/98

STATION	PARAMETER	Units	Dec-97
LG-357	pH (Field)	S.U.	
LG-357	pH, Lab	S.U.	6.9
LG-357	Conductivity (Field)	umhos	
LG-357	Conductivity, Lab	umhos	
LG-357	Temperature (Field)	Degrees C	
LG-357	Temperature (Field-DO Meter)	Degrees C	
LG-357	Temperature (Field-DO Meter)-	Degrees C	
LG-357	Dissolved Oxygen (Field)	%	
LG-357	Dissolved Oxygen (Field)-03'	%	
LG-357	Alkalinity	mg/L	100
LG-357	Alkalinity, Bicarbonate	mg/L	130
LG-357	Alkalinity, Carbonate	mg/L	< 1.4
LG-357	Alkalinity, Hydroxide	mg/L	
LG-357	Hardness	mg/L	95
LG-357	Total Dissolved Solids	mg/L	160
LG-357	Total Suspended Solids	mg/L	1
LG-357	Biological Oxygen Demand	mg/L	4
LG-357	Chemical Oxygen Demand	mg/L	25
LG-357	Chemical Oxygen Demand, Lo	mg/L	
LG-357	Color	CPU	80
LG-357	TVS	% DWB	12
LG-357	Ammonia	mg/L	0.39
LG-357	Nitrate	mg/L	
LG-357	Nitrate + Nitrite	mg/L	0.048
LG-357	Nitrogen, Total Kjeldahl	mg/L	0.60
LG-357	Chloride	mg/L	< 0.56
LG-357	Fluoride	mg/L	0.058
LG-357	Sulfate	mg/L	8.9
LG-357	Cyanide, total	mg/L	< 0.0046
LG-357	Oil & Grease	mg/L	< 7.2
LG-357	Turbidity, Lab	NTU	0.69
LG-357	Cations	Meq/L	
LG-357	Anions	Meq/L	
LG-357	Cation and Anion Balance	%	
LG-357	Boron, total	mg/L	< 0.018
LG-357	Calcium, total	mg/L	21
LG-357	Arsenic, total	mg/L	< 0.0018
LG-357	Barium, total	mg/L	0.0061
LG-357	Iron, dissolved	mg/L	
LG-357	Iron, total	mg/L	0.3
LG-357	Manganese, dissolved	mg/L	
LG-357	Manganese, total	mg/L	0.041
LG-357	Molybdenum, total	mg/L	< 0.0082
LG-357	Selenium, total	mg/L	< 0.0016
LG-357	Silver, total	mg/L	0.0029
LG-357	Chromium, total	ug/L	0.47
LG-357	Chromium III	ug/L	0.039
LG-357	Chromium VI	ug/L	0.43
LG-357	Beryllium, total	mg/L	
LG-357	Thallium, total	mg/L	
LG-357	Nickel, total	mg/L	
LG-357	Antimony, total	mg/L	
LG-357	Magnesium, total	mg/L	
LG-357	Phosphorus, dissolved	mg/L	
LG-357	Phosphorus, total	mg/L	0.01
LG-357	Potassium, total	mg/L	
LG-357	Sodium, total	mg/L	
LG-357	Sodium Absorption Ratio	std	
LG-357	Aluminum, total	ug/L	8.5
LG-357	Cadmium, total	ug/L	< 0.03
LG-357	Copper, total	ug/L	0.11
LG-357	Lead, total	ug/L	0.25
LG-357	Mercury, total	ug/L	0.0016
LG-357	Zinc, total	ug/L	1.3

3.7-8-67e

Crandon Surface Water Summary
Updated : 12/16/98

STATION	PARAMETER	Units	Dec-97
LG-357	pH (Field)	S.U.	
LG-357	pH, Lab	S.U.	6.9
LG-357	Conductivity (Field)	umhos	
LG-357	Conductivity, Lab	umhos	
LG-357	Temperature (Field)	Degrees C	
LG-357	Temperature (Field-DO Meter)	Degrees C	
LG-357	Temperature (Field-DO Meter)-	Degrees C	
LG-357	Dissolved Oxygen (Field)	%	
LG-357	Dissolved Oxygen (Field)-03'	%	
LG-357	Alkalinity	mg/L	100
LG-357	Alkalinity, Bicarbonate	mg/L	130
LG-357	Alkalinity, Carbonate	mg/L	< 1.4
LG-357	Alkalinity, Hydroxide	mg/L	
LG-357	Hardness	mg/L	95
LG-357	Total Dissolved Solids	mg/L	160
LG-357	Total Suspended Solids	mg/L	1
LG-357	Biological Oxygen Demand	mg/L	4
LG-357	Chemical Oxygen Demand	mg/L	25
LG-357	Chemical Oxygen Demand, Lo	mg/L	
LG-357	Color	CPU	80
LG-357	TVS	% DWB	12
LG-357	Ammonia	mg/L	0.39
LG-357	Nitrate	mg/L	
LG-357	Nitrate + Nitrite	mg/L	0.048
LG-357	Nitrogen, Total Kjeldahl	mg/L	0.60
LG-357	Chloride	mg/L	< 0.56
LG-357	Fluoride	mg/L	0.058
LG-357	Sulfate	mg/L	8.9
LG-357	Cyanide, total	mg/L	< 0.0046
LG-357	Oil & Grease	mg/L	< 7.2
LG-357	Turbidity, Lab	NTU	0.69
LG-357	Cations	Meq/L	
LG-357	Anions	Meq/L	
LG-357	Cation and Anion Balance	%	
LG-357	Boron, total	mg/L	< 0.018
LG-357	Calcium, total	mg/L	21
LG-357	Arsenic, total	mg/L	< 0.0018
LG-357	Barium, total	mg/L	0.0061
LG-357	Iron, dissolved	mg/L	
LG-357	Iron, total	mg/L	0.3
LG-357	Manganese, dissolved	mg/L	
LG-357	Manganese, total	mg/L	0.041
LG-357	Molybdenum, total	mg/L	< 0.0082
LG-357	Selenium, total	mg/L	< 0.0016
LG-357	Silver, total	mg/L	0.0029
LG-357	Chromium, total	ug/L	0.47
LG-357	Chromium III	ug/L	0.039
LG-357	Chromium VI	ug/L	0.43
LG-357	Beryllium, total	mg/L	
LG-357	Thallium, total	mg/L	
LG-357	Nickel, total	mg/L	
LG-357	Antimony, total	mg/L	
LG-357	Magnesium, total	mg/L	
LG-357	Phosphorus, dissolved	mg/L	
LG-357	Phosphorus, total	mg/L	0.01
LG-357	Potassium, total	mg/L	
LG-357	Sodium, total	mg/L	
LG-357	Sodium Absorption Ratio	std	
LG-357	Aluminum, total	ug/L	8.5
LG-357	Cadmium, total	ug/L	< 0.03
LG-357	Copper, total	ug/L	0.11
LG-357	Lead, total	ug/L	0.25
LG-357	Mercury, total	ug/L	0.0016
LG-357	Zinc, total	ug/L	1.3

3.7-8-67e

Statistical Summary of Surface Water Chemistry Data

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
SG-02	pH (Field)	S.U.	6.46	7.89	7.2367	7.2367
SG-02	pH, Lab	S.U.	7	7.6	7.2429	7.2429
SG-02	Conductivity (Field)	umhos	158.7	259	196.12	196.12
SG-02	Conductivity, Lab	umhos	176	210	191.2	191.2
SG-02	Temperature (Field)	Degrees C	0.2	19.2	8.1	8.1
SG-02	Temperature (Field-DO Meter)	Degrees C	0.25	19	7.3167	7.3167
SG-02	Dissolved Oxygen (Field)	%	6.3	13.2	9.9292	9.9292
SG-02	Fecal Coliform	MPN	< 1	< 1	1	0
SG-02	Alkalinity	mg/L	70	120	95.25	95.25
SG-02	Alkalinity, Bicarbonate	mg/L	70	120	95.25	95.25
SG-02	Alkalinity, Carbonate	mg/L	< 0	0	2.9167	0
SG-02	Alkalinity, Hydroxide	mg/L	< 0	0	1.4286	0
SG-02	Hardness	mg/L	78	130	104.36	104.36
SG-02	Total Dissolved Solids	mg/L	90	190	135.08	135.08
SG-02	Total Suspended Solids	mg/L	< 5	10	5.8182	2.6364
SG-02	Biological Oxygen Demand	mg/L	< 2	8	3.8333	1.6667
SG-02	Chemical Oxygen Demand	mg/L	10	27	20.6	20.6
SG-02	Chemical Oxygen Demand, Low Level	mg/L	10	23	17.143	17.143
SG-02	Ammonia	mg/L	< 0.1	0.2	0.1102	0.0556
SG-02	Nitrate	mg/L	< 0.5	0.72	0.5513	0.1763
SG-02	Nitrogen, Total Kjeldahl	mg/L	< 0.2	0.8	0.4863	0.4697
SG-02	Chloride	mg/L	2	3	2.6667	2.6667
SG-02	Fluoride	mg/L	< 0.1	0.83	0.1608	0.0775
SG-02	Sulfate	mg/L	4	13	7.1873	7.1873
SG-02	Cyanide, total	ug/L	< 20	< 20	20	0
SG-02	Oil & Grease	mg/L	< 1	6.6	3.0325	0.55
SG-02	Turbidity, Lab	NTU	0.9	5.1	2.2917	2.2917
SG-02	Cations	Meq/L	1.72	2.74	2.1348	2.1348
SG-02	Anions	Meq/L	1.34	2.21	1.7802	1.7802
SG-02	Cation and Anion Balance	%	1.89	13	9.0833	9.0833
SG-02	Boron, total	mg/L	< 0.099	< 0.2	0.1083	0
SG-02	Calcium, total	mg/L	18	29	22.517	22.517
SG-02	Arsenic, total	mg/L	< 0.005	0.006	0.0051	0.0005
SG-02	Barium, total	mg/L	< 0.01	0.014	0.0113	0.0096
SG-02	Iron, dissolved	mg/L	< 0.1	0.27	0.1573	0.1407
SG-02	Iron, total	mg/L	0.212	0.439	0.3238	0.3238
SG-02	Manganese, dissolved	mg/L	< 0.01	0.034	0.0148	0.0081
SG-02	Manganese, total	mg/L	0.037	0.142	0.0586	0.0586
SG-02	Molybdenum, total	mg/L	< 0.02	< 0.02	0.02	0
SG-02	Selenium, total	mg/L	< 0.005	0.006	0.0051	0.0005
SG-02	Silver, total	mg/L	< 0.01	< 0.01	0.01	0
SG-02	Chromium, total	mg/L	< 0.02	< 0.02	0.02	0
SG-02	Chromium, total (Low Level)	ug/L	0.297	0.79	0.4943	0.4943
SG-02	Beryllium, total	mg/L	< 0.005	< 0.01	0.0079	0
SG-02	Thallium, total	mg/L	< 0.005	< 0.005	0.005	0
SG-02	Nickel, total	mg/L	< 0.03	< 0.03	0.03	0
SG-02	Antimony, total	mg/L	< 0.005	< 0.005	0.005	0
SG-02	Magnesium, total	mg/L	8.5	14	10.899	10.899
SG-02	Phosphorus, dissolved	mg/L	< 0.05	0.021	0.0392	0.0058
SG-02	Phosphorus, total	mg/L	< 0.05	0.046	0.0445	0.0112
SG-02	Potassium, total	mg/L	< 0.6	1.1	0.8742	0.2242
SG-02	Sodium, total	mg/L	2.1	2.9	2.3167	2.3167
SG-02	Sodium Absorption Ratio	std	0.09	0.11	0.1	0.1
SG-02	Aluminum, total	ug/L	22.1	60.6	34.617	34.617
SG-02	Cadmium, total	ug/L	< 0.003	0.051	0.0094	0.0063
SG-02	Copper, total	ug/L	0.154	6.99	0.9521	0.9521
SG-02	Lead, total	ug/L	0.053	0.227	0.1235	0.1235
SG-02	Mercury, total	ng/L	0.982	4.66	2.2468	2.2468
SG-02	Zinc, total	ug/L	0.747	3.47	1.5755	1.5755

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
SG-03	pH (Field)	S.U.	6.93	7.96	7.4664	7.4664
SG-03	pH, Lab	S.U.	7.1	7.5	7.3333	7.3333
SG-03	Conductivity (Field)	umhos	175	262	207.35	207.35
SG-03	Conductivity, Lab	umhos	178	214	194.4	194.4
SG-03	Temperature (Field)	Degrees C	0.6	19.3	9.0364	9.0364
SG-03	Temperature (Field-DO Meter)	Degrees C	0.25	20	9.375	9.375
SG-03	Dissolved Oxygen (Field)	%	7.5	12	9.5682	9.5682
SG-03	Alkalinity	mg/L	75	130	96	96
SG-03	Alkalinity, Bicarbonate	mg/L	75	130	96	96
SG-03	Alkalinity, Carbonate	mg/L	Δ	0	2.7273	0
SG-03	Alkalinity, Hydroxide	mg/L	Δ	0	1.4286	0
SG-03	Hardness	mg/L	Δ	5	120	91.445
SG-03	Total Dissolved Solids	mg/L	68	190	124.55	124.55
SG-03	Total Suspended Solids	mg/L	Δ	5	7	5.4
SG-03	Biological Oxygen Demand	mg/L	Δ	2	12	4.3636
SG-03	Chemical Oxygen Demand	mg/L	12	23	17.6	17.6
SG-03	Chemical Oxygen Demand, Low Level	mg/L	Δ	10	23	16.333
SG-03	Ammonia	mg/L	Δ	0.1	0.28	0.118
SG-03	Nitrate	mg/L	Δ	0.5	Δ	0.5
SG-03	Nitrogen, Total Kjeldahl	mg/L	0.252	0.616	0.4596	0.4596
SG-03	Chloride	mg/L	1	3	2.5455	2.5455
SG-03	Fluoride	mg/L	Δ	0.1	0.621	0.1474
SG-03	Sulfate	mg/L	4	12	6.993	6.993
SG-03	Cyanide, total	ug/L	Δ	20	Δ	20
SG-03	Oil & Grease	mg/L	Δ	1	Δ	4.6
SG-03	Turbidity, Lab	NTU	0.65	2.3	1.385	1.385
SG-03	Cations	Meq/L	1.72	2.79	2.1256	2.1256
SG-03	Anions	Meq/L	1.34	2.37	1.7732	1.7732
SG-03	Cation and Anion Balance	%	4.42	12.6	9.11	9.11
SG-03	Boron, total	mg/L	Δ	0.1	Δ	0.2
SG-03	Calcium, total	mg/L	18	30	22.455	22.455
SG-03	Arsenic, total	mg/L	Δ	0.005	Δ	0.005
SG-03	Barium, total	mg/L	Δ	0.01	0.052	0.0151
SG-03	Iron, dissolved	mg/L	Δ	0.1	0.216	0.1439
SG-03	Iron, total	mg/L	0.228	0.379	0.3125	0.3125
SG-03	Manganese, dissolved	mg/L	Δ	0.01	0.047	0.0145
SG-03	Manganese, total	mg/L	0.037	0.076	0.0594	0.0594
SG-03	Molybdenum, total	mg/L	Δ	0.02	Δ	0.02
SG-03	Selenium, total	mg/L	Δ	0.005	Δ	0.005
SG-03	Silver, total	mg/L	Δ	0.01	Δ	0.01
SG-03	Chromium, total	mg/L	Δ	0.02	Δ	0.02
SG-03	Chromium, total (Low Level)	ug/L	Δ	0.3	0.713	0.407
SG-03	Beryllium, total	mg/L	Δ	0.005	Δ	0.01
SG-03	Thallium, total	mg/L	Δ	0.005	Δ	0.005
SG-03	Nickel, total	mg/L	Δ	0.03	Δ	0.03
SG-03	Antimony, total	mg/L	Δ	0.005	Δ	0.005
SG-03	Magnesium, total	mg/L	8.6	14	10.845	10.845
SG-03	Phosphorus, dissolved	mg/L	Δ	0.05	0.014	0.0365
SG-03	Phosphorus, total	mg/L	Δ	0.05	0.035	0.0408
SG-03	Potassium, total	mg/L	Δ	0.6	0.71	0.8327
SG-03	Sodium, total	mg/L	2	2.8	2.2991	2.2991
SG-03	Sodium Absorption Ratio	std	0.087	0.11	0.101	0.101
SG-03	Aluminum, total	ug/L	11.9	49.9	27.2	27.2
SG-03	Cadmium, total	ug/L	Δ	0.0039	0.024	0.0072
SG-03	Copper, total	ug/L	0.154	1.48	0.4709	0.4709
SG-03	Lead, total	ug/L	0.053	0.208	0.1108	0.1108
SG-03	Mercury, total	ng/L	0.9	3.36	1.8518	1.8518
SG-03	Zinc, total	ug/L	0.827	5.38	1.9834	1.9834

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
SG-04	pH (Field)	S.U.	6.68	8.03	7.26	7.26
SG-04	pH, Lab	S.U.	7.7	7.7	7.7	7.7
SG-04	Conductivity (Field)	umhos	181	193.8	186.93	186.93
SG-04	Conductivity, Lab	umhos	204	206	205	205
SG-04	Temperature (Field)	Degrees C	5.8	20.6	13.167	13.167
SG-04	Temperature (Field-DO Meter)	Degrees C	3.4	20	12.133	12.133
SG-04	Dissolved Oxygen (Field)	%	8	10.3	9.2	9.2
SG-04	Alkalinity	mg/L	90	96	92.333	92.333
SG-04	Alkalinity, Bicarbonate	mg/L	90	96	92.333	92.333
SG-04	Alkalinity, Carbonate	mg/L	≤ 5	0	1.6667	0
SG-04	Alkalinity, Hydroxide	mg/L	≤ 5	0	1.6667	0
SG-04	Hardness	mg/L	92.4	110	99.8	99.8
SG-04	Total Dissolved Solids	mg/L	88	117	103.67	103.67
SG-04	Total Suspended Solids	mg/L	≤ 5	8	6	2.6667
SG-04	Biological Oxygen Demand	mg/L	≤ 3	7	4.3333	2.3333
SG-04	Chemical Oxygen Demand	mg/L	≤ 10	14	12	7
SG-04	Chemical Oxygen Demand, Low Level	mg/L	≤ 20	20	20	0
SG-04	Ammonia	mg/L	≤ 0.1	≤ 0.1	0.1	0
SG-04	Nitrate	mg/L	≤ 0.5	≤ 0.5	0.5	0
SG-04	Nitrogen, Total Kjeldahl	mg/L	0.336	0.5	0.4093	0.4093
SG-04	Chloride	mg/L	5	5	5	5
SG-04	Fluoride	mg/L	≤ 0.1	≤ 0.1	0.1	0
SG-04	Sulfate	mg/L	5.29	9.1	6.6967	6.6967
SG-04	Cyanide, total	ug/L	≤ 20	20	20	0
SG-04	Oil & Grease	mg/L	≤ 1.03	≤ 4.6	2.4433	0
SG-04	Turbidity, Lab	NTU	1.7	3.2	2.45	2.45
SG-04	Cations	Meq/L	2.041	2.16	2.1203	2.1203
SG-04	Anions	Meq/L	1.75	1.84	1.7987	1.7987
SG-04	Cation and Anion Balance	%	6.12	10.4	8.1633	8.1633
SG-04	Boron, total	mg/L	≤ 0.099	≤ 0.1	0.0997	0
SG-04	Calcium, total	mg/L	21	23	22.067	22.067
SG-04	Arsenic, total	mg/L	≤ 0.005	≤ 0.005	0.005	0
SG-04	Barium, total	mg/L	0.011	0.014	0.0123	0.0123
SG-04	Iron, dissolved	mg/L	≤ 0.05	≤ 0.1	0.0833	0
SG-04	Iron, total	mg/L	0.093	0.274	0.1923	0.1923
SG-04	Manganese, dissolved	mg/L	≤ 0.01	≤ 0.01	0.01	0
SG-04	Manganese, total	mg/L	0.018	0.054	0.0303	0.0303
SG-04	Molybdenum, total	mg/L	≤ 0.02	≤ 0.02	0.02	0
SG-04	Selenium, total	mg/L	≤ 0.005	≤ 0.005	0.005	0
SG-04	Silver, total	mg/L	≤ 0.01	≤ 0.01	0.01	0
SG-04	Chromium, total	mg/L	≤ 0.005	≤ 0.02	0.015	0
SG-04	Beryllium, total	mg/L	≤ 0.005	≤ 0.01	0.0067	0
SG-04	Thallium, total	mg/L	≤ 0.005	≤ 0.005	0.005	0
SG-04	Nickel, total	mg/L	≤ 0.03	≤ 0.03	0.03	0
SG-04	Antimony, total	mg/L	≤ 0.005	≤ 0.005	0.005	0
SG-04	Magnesium, total	mg/L	10	10.6	10.267	10.267
SG-04	Phosphorus, dissolved	mg/L	≤ 0.05	0.004	0.0347	0.0013
SG-04	Phosphorus, total	mg/L	≤ 0.05	0.018	0.0393	0.006
SG-04	Potassium, total	mg/L	≤ 1	0.81	0.8667	0.5333
SG-04	Sodium, total	mg/L	3.4	3.63	3.5167	3.5167
SG-04	Sodium Absorption Ratio	std	0.153	0.159	0.1553	0.1553
SG-04	Aluminum, total	ug/L	≤ 50	200	150	0
SG-04	Cadmium, total	ug/L	≤ 5	5	5	0
SG-04	Copper, total	ug/L	≤ 30	30	30	0
SG-04	Lead, total	ug/L	≤ 50	50	50	0
SG-04	Mercury, total	ng/L	≤ 200	300	233.33	100
SG-04	Zinc, total	ug/L	≤ 20	20	20	0

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
SG-05A	pH (Field)	S.U.	7.06	7.32	7.1633	7.1633
SG-05A	pH, Lab	S.U.	7	7	7	7
SG-05A	Conductivity (Field)	umhos	183	208	195.33	195.33
SG-05A	Conductivity, Lab	umhos	199	247	223	223
SG-05A	Temperature (Field)	Degrees C	2.3	19.3	9.7333	9.7333
SG-05A	Temperature (Field-DO Meter)	Degrees C	8	19	13.5	13.5
SG-05A	Dissolved Oxygen (Field)	%	4.8	8.9	7.2333	7.2333
SG-05A	Alkalinity	mg/L	94	122	105.33	105.33
SG-05A	Alkalinity, Bicarbonate	mg/L	94	122	105.33	105.33
SG-05A	Alkalinity, Carbonate	mg/L	5	0	1.6667	0
SG-05A	Alkalinity, Hydroxide	mg/L	5	0	1.6667	0
SG-05A	Hardness	mg/L	101	129	113.33	113.33
SG-05A	Total Dissolved Solids	mg/L	97	149	118.67	118.67
SG-05A	Total Suspended Solids	mg/L	5	5	5	0
SG-05A	Biological Oxygen Demand	mg/L	3	5	3.6667	1.6667
SG-05A	Chemical Oxygen Demand	mg/L	10	12	11	6
SG-05A	Chemical Oxygen Demand, Low Level	mg/L	23	23	23	23
SG-05A	Ammonia	mg/L	0.1	0.1	0.1	0
SG-05A	Nitrate	mg/L	0.5	0.5	0.5	0
SG-05A	Nitrogen, Total Kjeldahl	mg/L	0.392	0.476	0.4227	0.4227
SG-05A	Chloride	mg/L	1	2	1.6667	1.6667
SG-05A	Fluoride	mg/L	0.1	0.1	0.1	0
SG-05A	Sulfate	mg/L	1	14	6.7667	6.4333
SG-05A	Cyanide, total	ug/L	20	20	20	0
SG-05A	Oil & Grease	mg/L	1.04	6.2	2.93	2.0667
SG-05A	Turbidity, Lab	NTU	0.8	1.1	0.95	0.95
SG-05A	Cations	Meq/L	2.102	2.66	2.3207	2.3207
SG-05A	Anions	Meq/L	1.69	2.15	1.9097	1.9097
SG-05A	Cation and Anion Balance	%	5.33	13.2	9.6767	9.6767
SG-05A	Boron, total	mg/L	0.1	0.1	0.1	0
SG-05A	Calcium, total	mg/L	22	29.7	25.2	25.2
SG-05A	Arsenic, total	mg/L	0.005	0.005	0.005	0
SG-05A	Barium, total	mg/L	0.01	0.017	0.0123	0.009
SG-05A	Iron, dissolved	mg/L	0.111	0.173	0.1413	0.1413
SG-05A	Iron, total	mg/L	0.173	0.274	0.2257	0.2257
SG-05A	Manganese, dissolved	mg/L	0.015	0.028	0.0233	0.0233
SG-05A	Manganese, total	mg/L	0.067	0.114	0.095	0.095
SG-05A	Molybdenum, total	mg/L	0.02	0.02	0.02	0
SG-05A	Selenium, total	mg/L	0.005	0.005	0.005	0
SG-05A	Silver, total	mg/L	0.01	0.01	0.01	0
SG-05A	Chromium, total	mg/L	0.005	0.02	0.015	0
SG-05A	Beryllium, total	mg/L	0.005	0.01	0.0067	0
SG-05A	Thallium, total	mg/L	0.005	0.005	0.005	0
SG-05A	Nickel, total	mg/L	0.03	0.03	0.03	0
SG-05A	Antimony, total	mg/L	0.005	0.005	0.005	0
SG-05A	Magnesium, total	mg/L	11	13.3	11.8	11.8
SG-05A	Phosphorus, dissolved	mg/L	0.05	0.018	0.0393	0.006
SG-05A	Phosphorus, total	mg/L	0.05	0.037	0.0457	0.0123
SG-05A	Potassium, total	mg/L	0.6	0.8	0.8	0.2667
SG-05A	Sodium, total	mg/L	1.7	1.83	1.7767	1.7767
SG-05A	Sodium Absorption Ratio	std	0.07	0.078	0.0733	0.0733
SG-05A	Aluminum, total	ug/L	50	200	150	0
SG-05A	Cadmium, total	ug/L	5	5	5	0
SG-05A	Copper, total	ug/L	30	30	30	0
SG-05A	Lead, total	ug/L	50	50	50	0
SG-05A	Mercury, total	ng/L	200	200	200	0
SG-05A	Zinc, total	ug/L	20	20	20	0

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
SG-06	pH (Field)	S.U.	6.83	8.05	7.5433	7.5433
SG-06	pH, Lab	S.U.	7.1	8.1	7.5571	7.5571
SG-06	Conductivity (Field)	umhos	97.8	248	184.59	184.59
SG-06	Conductivity, Lab	umhos	188	210	196.8	196.8
SG-06	Temperature (Field)	Degrees C	0.5	22.5	9.7667	9.7667
SG-06	Temperature (Field-DO Meter)	Degrees C	0.5	23	10.5	10.5
SG-06	Dissolved Oxygen (Field)	%	5.8	14.5	9.3375	9.3375
SG-06	Alkalinity	mg/L	76	130	101.93	101.93
SG-06	Alkalinity, Bicarbonate	mg/L	76	130	101.93	101.93
SG-06	Alkalinity, Carbonate	mg/L	0	0	2.9167	0
SG-06	Alkalinity, Hydroxide	mg/L	0	0	1.4286	0
SG-06	Hardness	mg/L	5	130	97.025	96.608
SG-06	Total Dissolved Solids	mg/L	90	190	126.5	126.5
SG-06	Total Suspended Solids	mg/L	5	6	5.0909	1
SG-06	Biological Oxygen Demand	mg/L	2	7	3.4167	1
SG-06	Chemical Oxygen Demand	mg/L	14	22	17.6	17.6
SG-06	Chemical Oxygen Demand, Low Level	mg/L	10	33	15.857	7.2857
SG-06	Ammonia	mg/L	0.1	0.168	0.1062	0.0335
SG-06	Nitrate	mg/L	0.5	0.5	0.5	0
SG-06	Nitrogen, Total Kjeldahl	mg/L	0.168	1.3	0.5357	0.5357
SG-06	Chloride	mg/L	1	2	1.0833	0.6667
SG-06	Fluoride	mg/L	0.1	0.619	0.1433	0.0683
SG-06	Sulfate	mg/L	4	16	6.9509	6.9509
SG-06	Cyanide, total	ug/L	20	20	20	0
SG-06	Oil & Grease	mg/L	1	4.6	2.8575	0
SG-06	Turbidity, Lab	NTU	0.5	3.3	1.5	1.4
SG-06	Cations	Meq/L	1.65	9.02	2.7142	2.7142
SG-06	Anions	Meq/L	1.37	2.31	1.8274	1.8274
SG-06	Cation and Anion Balance	%	3.14	11.97	8.1575	8.1575
SG-06	Boron, total	mg/L	0.1	0.2	0.1083	0
SG-06	Calcium, total	mg/L	18	31	22.85	22.85
SG-06	Arsenic, total	mg/L	0.005	0.005	0.005	0
SG-06	Barium, total	mg/L	0.01	0.058	0.014	0.0048
SG-06	Iron, dissolved	mg/L	0.05	0.23	0.0926	0.0509
SG-06	Iron, total	mg/L	0.05	0.3	0.1335	0.1293
SG-06	Manganese, dissolved	mg/L	0.01	0.109	0.0195	0.0137
SG-06	Manganese, total	mg/L	0.01	0.126	0.0307	0.0282
SG-06	Molybdenum, total	mg/L	0.02	0.02	0.02	0
SG-06	Selenium, total	mg/L	0.005	0.005	0.005	0
SG-06	Silver, total	mg/L	0.01	0.01	0.01	0
SG-06	Chromium, total	mg/L	0.02	0.02	0.02	0
SG-06	Chromium, total (Low Level)	ug/L	0.3	0.56	0.4115	0.3865
SG-06	Beryllium, total	mg/L	0.005	0.01	0.0079	0
SG-06	Thallium, total	mg/L	0.005	0.005	0.005	0
SG-06	Nickel, total	mg/L	0.03	0.03	0.03	0
SG-06	Antimony, total	mg/L	0.005	0.005	0.005	0
SG-06	Magnesium, total	mg/L	8.2	15	11.217	11.217
SG-06	Phosphorus, dissolved	mg/L	0.05	0.012	0.0366	0.0033
SG-06	Phosphorus, total	mg/L	0.05	0.048	0.0399	0.0108
SG-06	Potassium, total	mg/L	0.6	1.6	0.9008	0.3008
SG-06	Sodium, total	mg/L	1.4	2.2	1.7058	1.7058
SG-06	Sodium Absorption Ratio	std	0.067	0.08	0.073	0.073
SG-06	Aluminum, total	ug/L	3.36	58.2	20.395	20.395
SG-06	Cadmium, total	ug/L	0.003	0.0079	0.0051	0.0021
SG-06	Copper, total	ug/L	0.101	0.43	0.2293	0.2293
SG-06	Lead, total	ug/L	0.023	0.159	0.0817	0.0817
SG-06	Mercury, total	ng/L	0.5	3.12	1.6567	1.6567
SG-06	Zinc, total	ug/L	0.64	3.94	1.6922	1.6922

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
SG-19	pH (Field)	S.U.	6.37	8.13	7.331	7.331
SG-19	pH, Lab	S.U.	6.7	7.4	7.1333	7.1333
SG-19	Conductivity (Field)	umhos	94	241	156.5	156.5
SG-19	Conductivity, Lab	umhos	88.9	194	145.98	145.98
SG-19	Temperature (Field)	Degrees C	1.1	14.8	7.84	7.84
SG-19	Temperature (Field-DO Meter)	Degrees C	1	13	7.425	7.425
SG-19	Dissolved Oxygen (Field)	%	8.1	13.4	9.96	9.96
SG-19	Alkalinity	mg/L	41.8	120	71.836	71.836
SG-19	Alkalinity, Bicarbonate	mg/L	41.8	120	71.836	71.836
SG-19	Alkalinity, Carbonate	mg/L	Δ	0	2.7273	0
SG-19	Alkalinity, Hydroxide	mg/L	Δ	0	1.4286	0
SG-19	Hardness	mg/L	46	120	81.291	81.291
SG-19	Total Dissolved Solids	mg/L	58	190	119	119
SG-19	Total Suspended Solids	mg/L	Δ	5	19	5.7
SG-19	Biological Oxygen Demand	mg/L	Δ	2	9	4.2727
SG-19	Chemical Oxygen Demand	mg/L	23	45	32.2	32.2
SG-19	Chemical Oxygen Demand, Low Level	mg/L	Δ	10	69	38.167
SG-19	Ammonia	mg/L	Δ	0.1	0.2	0.1102
SG-19	Nitrate	mg/L	Δ	0.5	0.719	0.567
SG-19	Nitrogen, Total Kjeldahl	mg/L	Δ	0.2	0.8	0.5062
SG-19	Chloride	mg/L	Δ	1	2	1.1818
SG-19	Fluoride	mg/L	Δ	0.1	0.469	0.1335
SG-19	Sulfate	mg/L	5	28	10.985	10.985
SG-19	Cyanide, total	ug/L	Δ	20	20	0
SG-19	Oil & Grease	mg/L	Δ	1	12	3.3673
SG-19	Turbidity, Lab	NTU	Δ	0.5	9.9	2.825
SG-19	Cations	Meq/L	1.03	2.34	1.6194	1.6194
SG-19	Anions	Meq/L	0.029	2.12	1.134	1.134
SG-19	Cation and Anion Balance	%	1.18	96.3	23.421	23.421
SG-19	Boron, total	mg/L	Δ	0.1	0.2	0.1091
SG-19	Calcium, total	mg/L	10.7	25	17.064	17.064
SG-19	Arsenic, total	mg/L	Δ	0.005	0.005	0.005
SG-19	Barium, total	mg/L	Δ	0.01	0.036	0.0143
SG-19	Iron, dissolved	mg/L	Δ	0.05	1.38	0.3178
SG-19	Iron, total	mg/L	0.11	0.77	0.4001	0.4001
SG-19	Manganese, dissolved	mg/L	Δ	0.01	0.014	0.0104
SG-19	Manganese, total	mg/L	0.013	0.1	0.0428	0.0428
SG-19	Molybdenum, total	mg/L	Δ	0.02	0.02	0.02
SG-19	Selenium, total	mg/L	Δ	0.005	0.006	0.0051
SG-19	Silver, total	mg/L	Δ	0.01	0.01	0.01
SG-19	Chromium, total	mg/L	Δ	0.02	0.02	0.02
SG-19	Chromium, total (Low Level)	ug/L	Δ	0.3	1.24	0.5917
SG-19	Beryllium, total	mg/L	Δ	0.005	0.01	0.0077
SG-19	Thallium, total	mg/L	Δ	0.005	0.005	0.005
SG-19	Nickel, total	mg/L	Δ	0.03	0.03	0.03
SG-19	Antimony, total	mg/L	Δ	0.005	0.005	0.005
SG-19	Magnesium, total	mg/L	5.38	12	8.4018	8.4018
SG-19	Phosphorus, dissolved	mg/L	Δ	0.05	0.033	0.0423
SG-19	Phosphorus, total	mg/L	Δ	0.05	0.06	0.0503
SG-19	Potassium, total	mg/L	Δ	0.6	0.64	0.8218
SG-19	Sodium, total	mg/L	1.22	2.1	1.6273	1.6273
SG-19	Sodium Absorption Ratio	std	0.07	0.09	0.081	0.081
SG-19	Aluminum, total	ug/L	9.12	68.4	34.747	34.747
SG-19	Cadmium, total	ug/L	Δ	0.003	0.014	0.007
SG-19	Copper, total	ug/L	0.093	0.613	0.2949	0.2949
SG-19	Lead, total	ug/L	0.073	0.315	0.1489	0.1489
SG-19	Mercury, total	ng/L	0.81	7.95	3.5864	3.5864
SG-19	Zinc, total	ug/L	0.71	6.58	2.7427	2.7427

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
SG-30	pH (Field)	S.U.	7.16	7.98	7.5842	7.5842
SG-30	pH, Lab	S.U.	7.1	8	7.3857	7.3857
SG-30	Conductivity (Field)	umhos	129	307	231.67	231.67
SG-30	Conductivity, Lab	umhos	194	235	218.6	218.6
SG-30	Temperature (Field)	Degrees C	0.5	24.2	10.975	10.975
SG-30	Temperature (Field-DO Meter)	Degrees C	0.5	24	10.471	10.471
SG-30	Dissolved Oxygen (Field)	%	5.1	13.1	9.2042	9.2042
SG-30	Alkalinity	mg/L	84	150	116.33	116.33
SG-30	Alkalinity, Bicarbonate	mg/L	84	150	116.33	116.33
SG-30	Alkalinity, Carbonate	mg/L	Δ	0	4.8	3.3167
SG-30	Alkalinity, Hydroxide	mg/L	Δ	0	0	1.4286
SG-30	Hardness	mg/L	94	160	122.17	122.17
SG-30	Total Dissolved Solids	mg/L	104	200	149.83	149.83
SG-30	Total Suspended Solids	mg/L	Δ	5	13	6.3636
SG-30	Biological Oxygen Demand	mg/L	Δ	2	10	4.4167
SG-30	Chemical Oxygen Demand	mg/L	17	36	25.8	25.8
SG-30	Chemical Oxygen Demand, Low Level	mg/L	Δ	10	33	18.143
SG-30	Ammonia	mg/L	Δ	0.1	0.2	0.1111
SG-30	Nitrate	mg/L	Δ	0.5	Δ	0.5
SG-30	Nitrogen, Total Kjeldahl	mg/L	0.3	0.812	0.5467	0.5467
SG-30	Chloride	mg/L	Δ	1	1	0.5
SG-30	Fluoride	mg/L	Δ	0.1	0.621	0.1434
SG-30	Sulfate	mg/L	6	19	9.3082	9.3082
SG-30	Cyanide, total	ug/L	Δ	20	20	0
SG-30	Oil & Grease	mg/L	Δ	1	6.6	3.0433
SG-30	Turbidity, Lab	NTU	Δ	0.5	9.5	1.8973
SG-30	Cations	Meq/L	1.92	9.82	3.1577	3.1577
SG-30	Anions	Meq/L	0	2.64	1.787	1.787
SG-30	Cation and Anion Balance	%	6.06	99.95	23.993	23.993
SG-30	Boron, total	mg/L	Δ	0.1	Δ	0.2
SG-30	Calcium, total	mg/L	21	35	28.008	28.008
SG-30	Arsenic, total	mg/L	Δ	0.005	Δ	0.005
SG-30	Barium, total	mg/L	Δ	0.01	0.2	0.0263
SG-30	Iron, dissolved	mg/L	Δ	0.05	0.38	0.1321
SG-30	Iron, total	mg/L	Δ	0.05	0.3	0.1338
SG-30	Manganese, dissolved	mg/L	Δ	0.01	0.014	0.0108
SG-30	Manganese, total	mg/L	0.011	0.057	0.0231	0.0231
SG-30	Molybdenum, total	mg/L	Δ	0.02	Δ	0.02
SG-30	Selenium, total	mg/L	Δ	0.005	0.008	0.0053
SG-30	Silver, total	mg/L	Δ	0.01	Δ	0.01
SG-30	Chromium, total	mg/L	Δ	0.02	Δ	0.02
SG-30	Chromium, total (Low Level)	ug/L	Δ	0.3	1.01	0.6807
SG-30	Beryllium, total	mg/L	Δ	0.005	Δ	0.01
SG-30	Thallium, total	mg/L	Δ	0.005	Δ	0.005
SG-30	Nickel, total	mg/L	Δ	0.03	Δ	0.03
SG-30	Antimony, total	mg/L	Δ	0.005	Δ	0.005
SG-30	Magnesium, total	mg/L	9.6	102	20.225	20.225
SG-30	Phosphorus, dissolved	mg/L	Δ	0.05	0.06	0.046
SG-30	Phosphorus, total	mg/L	Δ	0.05	0.1	0.0572
SG-30	Potassium, total	mg/L	Δ	0.6	1.1	0.8425
SG-30	Sodium, total	mg/L	1.6	2.6	2.04	2.04
SG-30	Sodium Absorption Ratio	std	0.039	0.092	0.0762	0.0762
SG-30	Aluminum, total	ug/L	7.71	182	78.268	78.268
SG-30	Cadmium, total	ug/L	Δ	0.006	0.024	0.0106
SG-30	Copper, total	ug/L	0.229	1.13	0.4518	0.4518
SG-30	Lead, total	ug/L	0.037	0.465	0.2018	0.2018
SG-30	Mercury, total	ng/L	0.59	5.58	2.3583	2.3583
SG-30	Zinc, total	ug/L	0.817	7.35	2.9773	2.9773

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
SG-AB	pH (Field)	S.U.	6.87	7.71	7.3069	7.3069
SG-AB	pH, Lab	S.U.	6.8	7.7	7.2	7.2
SG-AB	Conductivity (Field)	umhos	151	275	202.92	202.92
SG-AB	Conductivity, Lab	umhos	158	257	209.4	209.4
SG-AB	Temperature (Field)	Degrees C	0	20.8	10.592	10.592
SG-AB	Temperature (Field-DO Meter)	Degrees C	1.9	21	14.933	14.933
SG-AB	Dissolved Oxygen (Field)	%	3.15	11.1	7.6038	7.6038
SG-AB	Fecal Coliform	MPN	< 1	< 1	1	0
SG-AB	Alkalinity	mg/L	59	124	96.092	96.092
SG-AB	Alkalinity, Bicarbonate	mg/L	59	124	96.092	96.092
SG-AB	Alkalinity, Carbonate	mg/L	< 0	0	1.9231	0
SG-AB	Alkalinity, Hydroxide	mg/L	< 0	0	1.3636	0
SG-AB	Hardness	mg/L	65	129	103.08	103.08
SG-AB	Total Dissolved Solids	mg/L	79	153	117.54	117.54
SG-AB	Total Suspended Solids	mg/L	< 5	12	5.5833	1.4167
SG-AB	Biological Oxygen Demand	mg/L	< 1	8	4.4615	3.3077
SG-AB	Chemical Oxygen Demand	mg/L	< 20	29	20.3	14.3
SG-AB	Chemical Oxygen Demand, Low Level	mg/L	< 20	48	30.333	23.667
SG-AB	Ammonia	mg/L	< 0.1	0.57	0.1742	0.105
SG-AB	Nitrate	mg/L	< 0.042	0.793	0.5567	0.383
SG-AB	Nitrogen, Total Kjeldahl	mg/L	0.252	4.48	1.0225	1.0225
SG-AB	Chloride	mg/L	2	4	3.0769	3.0769
SG-AB	Fluoride	mg/L	< 0.1	0.526	0.1328	0.0405
SG-AB	Sulfate	mg/L	4.77	18	7.6745	7.6745
SG-AB	Cyanide, total	ug/L	< 10	< 20	19.167	0
SG-AB	Oil & Grease	mg/L	< 1	6.5	2.1223	0.9385
SG-AB	Turbidity, Lab	NTU	< 0.5	7	1.9863	1.9238
SG-AB	Cations	Meq/L	1.419	2.72	2.1098	2.1098
SG-AB	Anions	Meq/L	0.085	2.27	1.6953	1.6953
SG-AB	Cation and Anion Balance	%	0.73	92.73	14.688	14.688
SG-AB	Boron, total	mg/L	< 0.099	< 0.2	0.1153	0
SG-AB	Calcium, total	mg/L	15	29	22.508	22.508
SG-AB	Arsenic, total	mg/L	< 0.005	< 0.005	0.005	0
SG-AB	Barium, total	mg/L	< 0.01	0.013	0.0111	0.008
SG-AB	Iron, dissolved	mg/L	< 0.1	0.266	0.1496	0.1265
SG-AB	Iron, total	mg/L	0.16	0.508	0.2869	0.2869
SG-AB	Manganese, dissolved	mg/L	< 0.01	0.051	0.0221	0.0167
SG-AB	Manganese, total	mg/L	0.025	0.098	0.0561	0.0561
SG-AB	Molybdenum, total	mg/L	< 0.02	< 0.02	0.02	0
SG-AB	Selenium, total	mg/L	< 0.005	< 0.005	0.005	0
SG-AB	Silver, total	mg/L	< 0.01	< 0.01	0.01	0
SG-AB	Chromium, total	mg/L	< 0.02	< 0.02	0.02	0
SG-AB	Chromium, total (Low Level)	ug/L	0.3	0.817	0.5332	0.5332
SG-AB	Beryllium, total	mg/L	< 0.001	< 0.01	0.0052	0
SG-AB	Thallium, total	mg/L	< 0.005	< 0.005	0.005	0
SG-AB	Nickel, total	mg/L	< 0.03	< 0.03	0.03	0
SG-AB	Antimony, total	mg/L	< 0.005	< 0.005	0.005	0
SG-AB	Magnesium, total	mg/L	7	13.6	10.875	10.875
SG-AB	Phosphorus, dissolved	mg/L	< 0.05	0.025	0.0416	0.0041
SG-AB	Phosphorus, total	mg/L	< 0.05	0.039	0.0436	0.0103
SG-AB	Potassium, total	mg/L	< 0.6	1.1	0.8623	0.4931
SG-AB	Sodium, total	mg/L	1.6	3.09	2.5215	2.5215
SG-AB	Sodium Absorption Ratio	std	0.086	0.148	0.1096	0.1096
SG-AB	Aluminum, total	ug/L	4.5	77.1	21.705	21.705
SG-AB	Cadmium, total	ug/L	< 0.006	0.011	0.0062	0.0044
SG-AB	Copper, total	ug/L	0.135	2.91	0.5431	0.5431
SG-AB	Lead, total	ug/L	0.0524	0.374	0.137	0.137
SG-AB	Mercury, total	ug/L	0.9	4.37	2.0025	2.0025
SG-AB	Zinc, total	ug/L	0.11	2.18	1.2313	1.2313

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
SG-CC	pH (Field)	S.U.	5.96	7.64	7.01	7.01
SG-CC	pH, Lab	S.U.	6.5	7.6	6.9667	6.9667
SG-CC	Conductivity (Field)	umhos	111	213	153.99	153.99
SG-CC	Conductivity, Lab	umhos	121	213	158	158
SG-CC	Temperature (Field)	Degrees C	0	20	9.9308	9.9308
SG-CC	Temperature (Field-DO Meter)	Degrees C	10	20	15.625	15.625
SG-CC	Dissolved Oxygen (Field)	%	2.8	10.9	7.7538	7.7538
SG-CC	Alkalinity	mg/L	40	97	69.069	69.069
SG-CC	Alkalinity, Bicarbonate	mg/L	40	97	69.069	69.069
SG-CC	Alkalinity, Carbonate	mg/L	< 0	0	1.9231	0
SG-CC	Alkalinity, Hydroxide	mg/L	< 0	0	1.3636	0
SG-CC	Hardness	mg/L	52.2	104	77.692	77.692
SG-CC	Total Dissolved Solids	mg/L	6	125	88.769	88.769
SG-CC	Total Suspended Solids	mg/L	< 5	7	5.25	2.3333
SG-CC	Biological Oxygen Demand	mg/L	< 2	8	4.3846	3.3077
SG-CC	Chemical Oxygen Demand	mg/L	17	32	22.9	22.9
SG-CC	Chemical Oxygen Demand, Low Level	mg/L	23	58	40.667	40.667
SG-CC	Ammonia	mg/L	< 0.1	1.47	0.2573	0.1906
SG-CC	Nitrate	mg/L	< 0.042	< 0.5	0.3855	0
SG-CC	Nitrogen, Total Kjeldahl	mg/L	< 0.2	2.58	0.8031	0.7877
SG-CC	Chloride	mg/L	2	3	2.6923	2.6923
SG-CC	Fluoride	mg/L	< 0.1	0.535	0.1335	0.0412
SG-CC	Sulfate	mg/L	4.12	24	8.6509	8.6509
SG-CC	Cyanide, total	ug/L	< 10	< 20	19.231	0
SG-CC	Oil & Grease	mg/L	< 1	8.9	1.9208	0.6846
SG-CC	Turbidity, Lab	NTU	1.6	2.8	2.1333	2.1333
SG-CC	Cations	Meq/L	0.968	2.27	1.5799	1.5799
SG-CC	Anions	Meq/L	0.454	1.8	1.3315	1.3315
SG-CC	Cation and Anion Balance	%	-11.21	44.2	10.133	10.133
SG-CC	Boron, total	mg/L	< 0.1	0.112	0.1167	0.0167
SG-CC	Calcium, total	mg/L	10	24.9	16.754	16.754
SG-CC	Arsenic, total	mg/L	< 0.005	< 0.005	0.005	0
SG-CC	Barium, total	mg/L	< 0.01	0.014	0.0112	0.0082
SG-CC	Iron, dissolved	mg/L	< 0.1	0.66	0.287	0.2793
SG-CC	Iron, total	mg/L	0.358	0.78	0.5005	0.5005
SG-CC	Manganese, dissolved	mg/L	< 0.01	0.101	0.0352	0.0314
SG-CC	Manganese, total	mg/L	0.035	0.139	0.0712	0.0712
SG-CC	Molybdenum, total	mg/L	< 0.02	< 0.02	0.02	0
SG-CC	Selenium, total	mg/L	< 0.005	< 0.005	0.005	0
SG-CC	Silver, total	mg/L	< 0.01	< 0.01	0.01	0
SG-CC	Chromium, total	mg/L	< 0.02	< 0.02	0.02	0
SG-CC	Chromium, total (Low Level)	ug/L	< 0.3	0.9	0.5263	0.493
SG-CC	Beryllium, total	mg/L	< 0.001	< 0.01	0.0052	0
SG-CC	Thallium, total	mg/L	< 0.005	< 0.005	0.005	0
SG-CC	Nickel, total	mg/L	< 0.03	< 0.03	0.03	0
SG-CC	Antimony, total	mg/L	< 0.005	< 0.005	0.005	0
SG-CC	Magnesium, total	mg/L	4.7	10.8	7.7369	7.7369
SG-CC	Phosphorus, dissolved	mg/L	< 0.05	0.022	0.0417	0.0042
SG-CC	Phosphorus, total	mg/L	< 0.05	0.046	0.045	0.0117
SG-CC	Potassium, total	mg/L	< 0.6	1.2	0.87	0.4238
SG-CC	Sodium, total	mg/L	1.4	2.73	2.1438	2.1438
SG-CC	Sodium Absorption Ratio	std	0.091	0.129	0.1091	0.1091
SG-CC	Aluminum, total	ug/L	20.4	98.4	42.146	42.146
SG-CC	Cadmium, total	ug/L	< 0.0039	0.032	0.0107	0.0091
SG-CC	Copper, total	ug/L	0.163	1.1	0.4279	0.4279
SG-CC	Lead, total	ug/L	0.131	0.557	0.2371	0.2371
SG-CC	Mercury, total	ng/L	1	7.18	2.63	2.63
SG-CC	Zinc, total	ug/L	0.969	6.48	2.0184	2.0184

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
SG-E	pH (Field)	S.U.	6.7	7.86	7.3275	7.3275
SG-E	pH, Lab	S.U.	7.3	7.7	7.4286	7.4286
SG-E	Conductivity (Field)	umhos	227	297	262.58	262.58
SG-E	Conductivity, Lab	umhos	259	286	273	273
SG-E	Temperature (Field)	Degrees C	4.1	20.6	9.575	9.575
SG-E	Temperature (Field-DO Meter)	Degrees C	4	20	10	10
SG-E	Dissolved Oxygen (Field)	%	5.5	10.8	8.7591	8.7591
SG-E	Alkalinity	mg/L	129	150	139.75	139.75
SG-E	Alkalinity, Bicarbonate	mg/L	129	150	139.75	139.75
SG-E	Alkalinity, Carbonate	mg/L	Δ	0	2.9167	0
SG-E	Alkalinity, Hydroxide	mg/L	Δ	0	1.4286	0
SG-E	Hardness	mg/L	129	150	143.92	143.92
SG-E	Total Dissolved Solids	mg/L	110	230	163.33	163.33
SG-E	Total Suspended Solids	mg/L	Δ	5	5	0.9091
SG-E	Biological Oxygen Demand	mg/L	Δ	2	9	3.5833
SG-E	Chemical Oxygen Demand	mg/L	Δ	10	10	0
SG-E	Chemical Oxygen Demand, Low Level	mg/L	Δ	10	10	12.857
SG-E	Ammonia	mg/L	Δ	0.1	0.1	0.1818
SG-E	Nitrate	mg/L	Δ	0.5	0.763	0.584
SG-E	Nitrogen, Total Kjeldahl	mg/L	Δ	0.2	0.5	0.2987
SG-E	Chloride	mg/L	1	2	1.8333	1.8333
SG-E	Fluoride	mg/L	Δ	0.1	0.763	0.1553
SG-E	Sulfate	mg/L	6.88	11	8.3164	8.3164
SG-E	Cyanide, total	ug/L	Δ	20	20	0
SG-E	Oil & Grease	mg/L	Δ	1	14	3.6542
SG-E	Turbidity, Lab	NTU	Δ	0.5	1.42	0.8267
SG-E	Cations	Meq/L	2.76	3.34	3.0248	3.0248
SG-E	Anions	Meq/L	0.37	2.71	2.3315	2.3315
SG-E	Cation and Anion Balance	%	7.04	78.17	15.022	15.022
SG-E	Boron, total	mg/L	Δ	0.099	Δ	0.2
SG-E	Calcium, total	mg/L	29.2	36	32.267	32.267
SG-E	Arsenic, total	mg/L	Δ	0.005	Δ	0.005
SG-E	Barium, total	mg/L	Δ	0.01	Δ	0.01
SG-E	Iron, dissolved	mg/L	Δ	0.05	0.227	0.0821
SG-E	Iron, total	mg/L	Δ	0.05	0.087	0.0749
SG-E	Manganese, dissolved	mg/L	Δ	0.01	Δ	0.01
SG-E	Manganese, total	mg/L	Δ	0.01	0.016	0.0108
SG-E	Molybdenum, total	mg/L	Δ	0.02	Δ	0.02
SG-E	Selenium, total	mg/L	Δ	0.005	Δ	0.005
SG-E	Silver, total	mg/L	Δ	0.01	Δ	0.01
SG-E	Chromium, total	mg/L	Δ	0.02	Δ	0.02
SG-E	Chromium, total (Low Level)	ug/L	0.3	1.92	1.22	1.22
SG-E	Beryllium, total	mg/L	Δ	0.005	Δ	0.01
SG-E	Thallium, total	mg/L	Δ	0.005	Δ	0.005
SG-E	Nickel, total	mg/L	Δ	0.03	Δ	0.03
SG-E	Antimony, total	mg/L	Δ	0.005	Δ	0.005
SG-E	Magnesium, total	mg/L	14.6	17	15.75	15.75
SG-E	Phosphorus, dissolved	mg/L	Δ	0.05	0.017	0.0368
SG-E	Phosphorus, total	mg/L	Δ	0.05	0.03	0.0405
SG-E	Potassium, total	mg/L	Δ	0.6	1.1	0.8717
SG-E	Sodium, total	mg/L	2.27	2.7	2.4108	2.4108
SG-E	Sodium Absorption Ratio	std	0.08	0.09	0.0864	0.0864
SG-E	Aluminum, total	ug/L	10.7	73.3	28.433	28.433
SG-E	Cadmium, total	ug/L	Δ	0.003	0.014	0.0054
SG-E	Copper, total	ug/L	0.107	0.649	0.2828	0.2828
SG-E	Lead, total	ug/L	0.022	0.192	0.0784	0.0784
SG-E	Mercury, total	ng/L	0.54	2.93	1.1773	1.1773
SG-E	Zinc, total	ug/L	0.571	6.66	1.6648	1.6648

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
SG-V	pH (Field)	S.U.	6.67	7.56	7.1207	7.1207
SG-V	pH, Lab	S.U.	6.6	7.7	7.1	7.1
SG-V	Conductivity (Field)	umhos	106	262	187.98	187.98
SG-V	Conductivity, Lab	umhos	124	248	193.18	193.18
SG-V	Temperature (Field)	Degrees C	0	20.2	9.2857	9.2857
SG-V	Temperature (Field-DO Meter)	Degrees C	2.1	20	13.733	13.733
SG-V	Dissolved Oxygen (Field)	%	2.8	10.6	7.3	7.3
SG-V	Fecal Coliform	MPN	< 1	< 1	1	0
SG-V	Alkalinity	mg/L	35	122	86.943	86.943
SG-V	Alkalinity, Bicarbonate	mg/L	35	122	86.943	86.943
SG-V	Alkalinity, Carbonate	mg/L	< 0	0	2.1429	0
SG-V	Alkalinity, Hydroxide	mg/L	< 0	0	1.3636	0
SG-V	Hardness	mg/L	61	140	101.32	101.32
SG-V	Total Dissolved Solids	mg/L	79	154	115.36	115.36
SG-V	Total Suspended Solids	mg/L	< 5	8	5.8462	2.3846
SG-V	Biological Oxygen Demand	mg/L	< 1	9	4.6429	3.4286
SG-V	Chemical Oxygen Demand	mg/L	< 20	34	22.545	17.091
SG-V	Chemical Oxygen Demand, Low Level	mg/L	20	61	39	39
SG-V	Ammonia	mg/L	< 0.1	0.482	0.1889	0.1274
SG-V	Nitrate	mg/L	< 0.042	0.728	0.454	0.1456
SG-V	Nitrogen, Total Kjeldahl	mg/L	0.308	8.54	1.2231	1.2231
SG-V	Chloride	mg/L	2	4	3	3
SG-V	Fluoride	mg/L	< 0.1	0.497	0.1536	0.0679
SG-V	Sulfate	mg/L	4.15	26	8.3375	8.3375
SG-V	Cyanide, total	ug/L	< 10	< 20	19.286	0
SG-V	Oil & Grease	mg/L	< 1	13	2.5293	1.3286
SG-V	Turbidity, Lab	NTU	< 0.5	3.3	1.84	1.74
SG-V	Cations	Meq/L	0.964	2.7	1.9484	1.9484
SG-V	Anions	Meq/L	1.1	2.21	1.6995	1.6995
SG-V	Cation and Anion Balance	%	-9.72	11.6	7.1454	7.1454
SG-V	Boron, total	mg/L	< 0.1	0.123	0.1164	0.0164
SG-V	Calcium, total	mg/L	10	29.7	20.843	20.843
SG-V	Arsenic, total	mg/L	< 0.005	< 0.005	0.005	0
SG-V	Barium, total	mg/L	< 0.01	0.014	0.0114	0.0085
SG-V	Iron, dissolved	mg/L	0.13	0.64	0.2841	0.2841
SG-V	Iron, total	mg/L	0.26	0.83	0.4918	0.4918
SG-V	Manganese, dissolved	mg/L	< 0.01	0.071	0.0279	0.0236
SG-V	Manganese, total	mg/L	0.025	0.117	0.0599	0.0599
SG-V	Molybdenum, total	mg/L	< 0.02	< 0.02	0.02	0
SG-V	Selenium, total	mg/L	< 0.005	< 0.005	0.005	0
SG-V	Silver, total	mg/L	< 0.01	< 0.01	0.01	0
SG-V	Chromium, total	mg/L	< 0.02	< 0.02	0.02	0
SG-V	Chromium, total (Low Level)	ug/L	< 0.3	0.9	0.5992	0.5659
SG-V	Beryllium, total	mg/L	< 0.001	< 0.01	0.0049	0
SG-V	Thallium, total	mg/L	< 0.005	< 0.005	0.005	0
SG-V	Nickel, total	mg/L	< 0.03	< 0.03	0.03	0
SG-V	Antimony, total	mg/L	< 0.005	< 0.005	0.005	0
SG-V	Magnesium, total	mg/L	4.7	13.1	9.8871	9.8871
SG-V	Phosphorus, dissolved	mg/L	< 0.05	0.022	0.0433	0.0038
SG-V	Phosphorus, total	mg/L	< 0.05	1.11	0.1268	0.1037
SG-V	Potassium, total	mg/L	< 0.6	1	0.8707	0.3136
SG-V	Sodium, total	mg/L	1.3	2.96	2.3236	2.3236
SG-V	Sodium Absorption Ratio	std	0.085	0.124	0.1054	0.1054
SG-V	Aluminum, total	ug/L	18.3	99.5	40.164	40.164
SG-V	Cadmium, total	ug/L	< 0.0039	0.07	0.013	0.0118
SG-V	Copper, total	ug/L	0.179	1.55	0.4099	0.4099
SG-V	Lead, total	ug/L	0.0925	0.316	0.1928	0.1928
SG-V	Mercury, total	ng/L	1	7.16	2.4314	2.4314
SG-V	Zinc, total	ug/L	0.795	3.67	1.7754	1.7754

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
SG-Y	pH (Field)	S.U.	6.44	10.87	7.3515	7.3515
SG-Y	pH, Lab	S.U.	6.9	7.6	7.1333	7.1333
SG-Y	Conductivity (Field)	umhos	92	197	137.96	137.96
SG-Y	Conductivity, Lab	umhos	97.1	188	126.31	126.31
SG-Y	Temperature (Field)	Degrees C	1.1	21.9	11.177	11.177
SG-Y	Temperature (Field-DO Meter)	Degrees C	10	22	16.463	16.463
SG-Y	Dissolved Oxygen (Field)	%	6.2	11.4	8.5846	8.5846
SG-Y	Alkalinity	mg/L	41	88.3	55.238	55.238
SG-Y	Alkalinity, Bicarbonate	mg/L	41	88.3	55.238	55.238
SG-Y	Alkalinity, Carbonate	mg/L	< 0	0	2.3077	0
SG-Y	Alkalinity, Hydroxide	mg/L	< 0	0	1.5	0
SG-Y	Hardness	mg/L	38.8	93.2	60.967	60.967
SG-Y	Total Dissolved Solids	mg/L	50	135	86	86
SG-Y	Total Suspended Solids	mg/L	< 5	5	5	0.4167
SG-Y	Biological Oxygen Demand	mg/L	< 1	9	4.3077	2.9231
SG-Y	Chemical Oxygen Demand	mg/L	20	36	27.6	27.6
SG-Y	Chemical Oxygen Demand, Low Level	mg/L	30	46	37	37
SG-Y	Ammonia	mg/L	< 0.1	0.81	0.2218	0.1526
SG-Y	Nitrate	mg/L	< 0.042	< 0.5	0.4084	0
SG-Y	Nitrogen, Total Kjeldahl	mg/L	0.448	7	1.2422	1.2422
SG-Y	Chloride	mg/L	2	4	2.6154	2.6154
SG-Y	Fluoride	mg/L	< 0.1	0.477	0.129	0.0367
SG-Y	Sulfate	mg/L	3.47	21	7.1591	7.1591
SG-Y	Cyanide, total	ug/L	< 10	< 20	19.167	0
SG-Y	Oil & Grease	mg/L	< 0.85	7.6	2.2138	1.4154
SG-Y	Turbidity, Lab	NTU	1.7	4.1	2.9	2.9
SG-Y	Cations	Meq/L	0.895	1.95	1.2717	1.2717
SG-Y	Anions	Meq/L	0.552	1.66	1.0831	1.0831
SG-Y	Cation and Anion Balance	%	0.32	28.25	9.6542	9.6542
SG-Y	Boron, total	mg/L	< 0.1	0.126	0.1866	0.0097
SG-Y	Calcium, total	mg/L	10	21.1	13.546	13.546
SG-Y	Arsenic, total	mg/L	< 0.005	< 0.005	0.005	0
SG-Y	Barium, total	mg/L	< 0.01	0.014	0.0114	0.0091
SG-Y	Iron, dissolved	mg/L	0.062	0.64	0.2617	0.2617
SG-Y	Iron, total	mg/L	0.27	0.82	0.409	0.409
SG-Y	Manganese, dissolved	mg/L	< 0.01	0.182	0.0354	0.03
SG-Y	Manganese, total	mg/L	0.026	0.219	0.0718	0.0718
SG-Y	Molybdenum, total	mg/L	< 0.02	< 0.02	0.02	0
SG-Y	Selenium, total	mg/L	< 0.005	< 0.005	0.005	0
SG-Y	Silver, total	mg/L	< 0.01	< 0.01	0.01	0
SG-Y	Chromium, total	mg/L	< 0.02	< 0.02	0.02	0
SG-Y	Chromium, total (Low Level)	ug/L	< 0.3	0.68	0.4456	0.4122
SG-Y	Beryllium, total	mg/L	< 0.001	< 0.01	0.0052	0
SG-Y	Thallium, total	mg/L	< 0.005	< 0.005	0.005	0
SG-Y	Nickel, total	mg/L	< 0.03	< 0.03	0.03	0
SG-Y	Antimony, total	mg/L	< 0.005	< 0.005	0.005	0
SG-Y	Magnesium, total	mg/L	4.8	9.19	6.1746	6.1746
SG-Y	Phosphorus, dissolved	mg/L	< 0.05	0.175	0.0517	0.0183
SG-Y	Phosphorus, total	mg/L	< 0.05	0.767	0.1062	0.077
SG-Y	Potassium, total	mg/L	< 0.6	0.9	0.8854	0.3315
SG-Y	Sodium, total	mg/L	1.59	2.64	2.0123	2.0123
SG-Y	Sodium Absorption Ratio	std	0.096	0.134	0.1139	0.1139
SG-Y	Aluminum, total	ug/L	13.4	60.7	27.7	27.7
SG-Y	Cadmium, total	ug/L	< 0.006	0.039	0.0103	0.0085
SG-Y	Copper, total	ug/L	0.137	4.09	0.6522	0.6522
SG-Y	Lead, total	ug/L	0.098	0.307	0.1929	0.1929
SG-Y	Mercury, total	ng/L	1	4.55	2.2723	2.2723
SG-Y	Zinc, total	ug/L	1.04	3.73	1.7562	1.7562

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
LG-07	pH (Field)	S.U.	5.42	6.75	6.2878	6.2878
LG-07	pH (Field)-02'	S.U.	5.76	5.76	5.76	5.76
LG-07	pH (Field)-07'	S.U.	5.49	5.49	5.49	5.49
LG-07	pH (Field)-10'	S.U.	5.86	5.86	5.86	5.86
LG-07	pH, Lab	S.U.	4.9	5.6	5.125	5.125
LG-07	Conductivity (Field)	umhos	12.58	47	22.779	22.779
LG-07	Conductivity (Field)-02'	umhos	34.6	34.6	34.6	34.6
LG-07	Conductivity (Field)-07'	umhos	36.9	36.9	36.9	36.9
LG-07	Conductivity (Field)-10'	umhos	58.6	58.6	58.6	58.6
LG-07	Conductivity, Lab	umhos	17	17.7	17.34	17.34
LG-07	Temperature (Field)	Degrees C	1.1	25.3	13.789	13.789
LG-07	Temperature (Field)-02'	Degrees C	4.9	4.9	4.9	4.9
LG-07	Temperature (Field)-07'	Degrees C	3.8	3.8	3.8	3.8
LG-07	Temperature (Field)-10'	Degrees C	4.9	4.9	4.9	4.9
LG-07	Temperature (Field-DO Meter)	Degrees C	0.25	21	9.6389	9.6389
LG-07	Temperature (Field-DO Meter)-01'	Degrees C	0.5	18	6.7083	6.7083
LG-07	Temperature (Field-DO Meter)-02'	Degrees C	1	18	7.6667	7.6667
LG-07	Temperature (Field-DO Meter)-03'	Degrees C	3	20.5	9.9286	9.9286
LG-07	Temperature (Field-DO Meter)-04'	Degrees C	4	18	8.3333	8.3333
LG-07	Temperature (Field-DO Meter)-05'	Degrees C	4	18	8.3333	8.3333
LG-07	Temperature (Field-DO Meter)-06'	Degrees C	4	20	10	10
LG-07	Temperature (Field-DO Meter)-07'	Degrees C	4	18	8.3333	8.3333
LG-07	Temperature (Field-DO Meter)-08'	Degrees C	4	18	8.3333	8.3333
LG-07	Temperature (Field-DO Meter)-09'	Degrees C	4	19.5	9.9286	9.9286
LG-07	Temperature (Field-DO Meter)-10'	Degrees C	4.25	18	8.375	8.375
LG-07	Temperature (Field-DO Meter)-11'	Degrees C	4.25	18	8.375	8.375
LG-07	Temperature (Field-DO Meter)-12'	Degrees C	4.5	19	10.833	10.833
LG-07	Temperature (Field-DO Meter)-13'	Degrees C	4.5	18	11.667	11.667
LG-07	Temperature (Field-DO Meter)-13.5'	Degrees C	4.75	4.75	4.75	4.75
LG-07	Temperature (Field-DO Meter)-14'	Degrees C	4.5	18	11.667	11.667
LG-07	Temperature (Field-DO Meter)-15'	Degrees C	4.5	19	13.5	13.5
LG-07	Temperature (Field-DO Meter)-16'	Degrees C	4.5	4.5	4.5	4.5
LG-07	Temperature (Field-DO Meter)-17'	Degrees C	4.5	4.5	4.5	4.5
LG-07	Temperature (Field-DO Meter)-18'	Degrees C	4.5	19	11.75	11.75
LG-07	Dissolved Oxygen (Field)	%	6.2	14.75	9.7188	9.7188
LG-07	Dissolved Oxygen (Field)-Surface	%	9.5	9.5	9.5	9.5
LG-07	Dissolved Oxygen (Field)-01'	%	9	14.5	10.79	10.79
LG-07	Dissolved Oxygen (Field)-02'	%	5.55	14.4	10.375	10.375
LG-07	Dissolved Oxygen (Field)-03'	%	5.2	12.3	9	9
LG-07	Dissolved Oxygen (Field)-04'	%	5.1	12.3	8.6667	8.6667
LG-07	Dissolved Oxygen (Field)-05'	%	5	12.3	8.5833	8.5833
LG-07	Dissolved Oxygen (Field)-06'	%	5	12.3	8.4857	8.4857
LG-07	Dissolved Oxygen (Field)-07'	%	5	12.3	8.5	8.5
LG-07	Dissolved Oxygen (Field)-08'	%	4.75	12.3	8.4417	8.4417
LG-07	Dissolved Oxygen (Field)-09'	%	4.75	12.3	8.4071	8.4071
LG-07	Dissolved Oxygen (Field)-10'	%	4.7	12.3	8.4083	8.4083
LG-07	Dissolved Oxygen (Field)-11'	%	4.1	12.3	8.2833	8.2833
LG-07	Dissolved Oxygen (Field)-12'	%	4.7	12.3	8.9	8.9
LG-07	Dissolved Oxygen (Field)-13'	%	8.8	10.6	9.4667	9.4667
LG-07	Dissolved Oxygen (Field)-13.5'	%	0.5	0.5	0.5	0.5
LG-07	Dissolved Oxygen (Field)-14'	%	8.6	10.6	9.3333	9.3333
LG-07	Dissolved Oxygen (Field)-15'	%	5.2	10.6	7.7	7.7
LG-07	Dissolved Oxygen (Field)-16'	%	10.6	10.6	10.6	10.6
LG-07	Dissolved Oxygen (Field)-17'	%	10.5	10.5	10.5	10.5
LG-07	Dissolved Oxygen (Field)-18'	%	8	10.5	9.25	9.25
LG-07	Dissolved Oxygen (Field)-Bottom	%	7.8	7.8	7.8	7.8
LG-07	Alkalinity	mg/L	5	34.6	10.018	3.6545
LG-07	Alkalinity, Bicarbonate	mg/L	5	34.6	10.018	3.6545
LG-07	Alkalinity, Carbonate	mg/L	5	0	2.7273	0
LG-07	Alkalinity, Hydroxide	mg/L	5	0	1.4286	0
LG-07	Hardness	mg/L	5	8.32	5.7991	3.5264
LG-07	Total Dissolved Solids	mg/L	5	51	29.182	29.182
LG-07	Total Suspended Solids	mg/L	5	5	5	0.5
LG-07	Biological Oxygen Demand	mg/L	2	7	3.3636	1.2727
LG-07	Chemical Oxygen Demand	mg/L	10	27	17.6	17.6
LG-07	Chemical Oxygen Demand, Low Level	mg/L	20	26	18.583	11.917
LG-07	Ammonia	mg/L	0.1	0.1	0.1	0.0273
LG-07	Nitrate	mg/L	0.5	0.718	0.5198	0.0653
LG-07	Nitrogen, Total Kjeldahl	mg/L	0.2	1.7	0.516	0.4978
LG-07	Chloride	mg/L	1	1	1	0.3636
LG-07	Fluoride	mg/L	0.1	0.218	0.1107	0.0198
LG-07	Sulfate	mg/L	3.05	7.8	5.135	5.135
LG-07	Cyanide, total	ug/L	20	20	20	0
LG-07	Oil & Grease	mg/L	1	4.6	2.6645	0
LG-07	Turbidity, Lab	NTU	0.5	2	0.892	0.8011
LG-07	Cations	Meq/L	0.058	0.2	0.1043	0.1043
LG-07	Anions	Meq/L	0.06	0.742	0.1852	0.1852
LG-07	Cation and Anion Balance	%	-90	29.8	-17.95	-17.95

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
LG-07	Boron, total	mg/L	< 0.1	< 0.2	0.1091	0
LG-07	Calcium, total	mg/L	1.17	2.2	1.3936	1.3936
LG-07	Arsenic, total	mg/L	< 0.005	< 0.005	0.005	0
LG-07	Barium, total	mg/L	< 0.01	0.2185	0.029	0.0208
LG-07	Iron, dissolved	mg/L	< 0.05	0.062	0.0751	0.016
LG-07	Iron, total	mg/L	< 0.1	0.1135	0.0874	0.042
LG-07	Manganese, dissolved	mg/L	< 0.01	0.025	0.0141	0.0114
LG-07	Manganese, total	mg/L	< 0.01	0.037	0.0154	0.0108
LG-07	Molybdenum, total	mg/L	< 0.02	< 0.02	0.02	0
LG-07	Selenium, total	mg/L	< 0.005	< 0.006	0.0051	0
LG-07	Silver, total	mg/L	< 0.01	< 0.01	0.01	0
LG-07	Chromium, total	mg/L	< 0.02	< 0.02	0.02	0
LG-07	Chromium, total (Low Level)	ug/L	< 0.3	0.45	0.2962	0.2416
LG-07	Beryllium, total	mg/L	< 0.005	< 0.01	0.0077	0
LG-07	Thallium, total	mg/L	< 0.005	< 0.005	0.005	0
LG-07	Nickel, total	mg/L	< 0.03	< 0.03	0.03	0
LG-07	Antimony, total	mg/L	< 0.005	< 0.005	0.005	0
LG-07	Magnesium, total	mg/L	< 0.5	0.9	0.5567	0.2385
LG-07	Phosphorus, dissolved	mg/L	< 0.004	0.007	0.0337	0.0015
LG-07	Phosphorus, total	mg/L	< 0.05	0.014	0.0362	0.0044
LG-07	Potassium, total	mg/L	< 0.6	0.7	0.8318	0.1773
LG-07	Sodium, total	mg/L	< 1	1.43	1.0391	0.13
LG-07	Sodium Absorption Ratio	std	0	0.341	0.031	0.031
LG-07	Aluminum, total	ug/L	33.5	122	72.145	72.145
LG-07	Cadmium, total	ug/L	0.0304	0.071	0.0538	0.0538
LG-07	Copper, total	ug/L	0.345	0.975	0.5749	0.5749
LG-07	Lead, total	ug/L	0.196	0.445	0.3042	0.3042
LG-07	Mercury, total	ng/L	1.69	2.27	1.94	1.94
LG-07	Zinc, total	ug/L	7.94	21.7	11.531	11.531

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
LG-07-02'	pH, Lab	S. U.	4.9	4.9	4.9	4.9
LG-07-02'	Alkalinity	mg/L	5	5	5	0
LG-07-02'	Alkalinity, Bicarbonate	mg/L	5	5	5	0
LG-07-02'	Alkalinity, Carbonate	mg/L	5	5	5	0
LG-07-02'	Hardness	mg/L	5	5	5	0
LG-07-02'	Total Dissolved Solids	mg/L	22	22	22	22
LG-07-02'	Total Suspended Solids	mg/L	5	5	5	0
LG-07-02'	Biological Oxygen Demand	mg/L	3	3	3	0
LG-07-02'	Chemical Oxygen Demand, Low Level	mg/L	13	13	13	13
LG-07-02'	Ammonia	mg/L	0.1	0.1	0.1	0.1
LG-07-02'	Nitrate	mg/L	0.5	0.5	0.5	0
LG-07-02'	Nitrogen, Total Kjeldahl	mg/L	0.2	0.2	0.2	0
LG-07-02'	Chloride	mg/L	1	1	1	0
LG-07-02'	Fluoride	mg/L	0.1	0.1	0.1	0
LG-07-02'	Sulfate	mg/L	3	3	3	3
LG-07-02'	Cyanide, total	ug/L	20	20	20	0
LG-07-02'	Oil & Grease	mg/L	4.6	4.6	4.6	0
LG-07-02'	Turbidity, Lab	NTU	0.5	0.5	0.5	0
LG-07-02'	Cations	Meq/L	0.05	0.05	0.05	0.05
LG-07-02'	Anions	Meq/L	0.06	0.06	0.06	0.06
LG-07-02'	Cation and Anion Balance	%	-6.45	-6.45	-6.45	-6.45
LG-07-02'	Boron, total	mg/L	0.1	0.1	0.1	0
LG-07-02'	Calcium, total	mg/L	1.1	1.1	1.1	1.1
LG-07-02'	Arsenic, total	mg/L	0.005	0.005	0.005	0
LG-07-02'	Barium, total	mg/L	0.4	0.4	0.4	0.4
LG-07-02'	Iron, dissolved	mg/L	0.05	0.05	0.05	0
LG-07-02'	Iron, total	mg/L	0.077	0.077	0.077	0.077
LG-07-02'	Manganese, dissolved	mg/L	0.019	0.019	0.019	0.019
LG-07-02'	Manganese, total	mg/L	0.032	0.032	0.032	0.032
LG-07-02'	Molybdenum, total	mg/L	0.02	0.02	0.02	0
LG-07-02'	Selenium, total	mg/L	0.005	0.005	0.005	0
LG-07-02'	Silver, total	mg/L	0.01	0.01	0.01	0
LG-07-02' (C)	Chromium, total (Low Level)	ug/L	0.162	0.162	0.162	0.162
LG-07-02'	Beryllium, total	mg/L	0.01	0.01	0.01	0
LG-07-02'	Thallium, total	mg/L	0.005	0.005	0.005	0
LG-07-02'	Nickel, total	mg/L	0.03	0.03	0.03	0
LG-07-02'	Antimony, total	mg/L	0.005	0.005	0.005	0
LG-07-02'	Magnesium, total	mg/L	0.5	0.5	0.5	0
LG-07-02'	Phosphorus, dissolved	mg/L	0.05	0.05	0.05	0
LG-07-02'	Phosphorus, total	mg/L	0.05	0.05	0.05	0
LG-07-02'	Potassium, total	mg/L	1	1	1	0
LG-07-02'	Sodium, total	mg/L	1	1	1	0
LG-07-02'	Sodium Absorption Ratio	std	0	0	0	0
LG-07-02' (C)	Aluminum, total	ug/L	83.9	83.9	83.9	83.9
LG-07-02' (C)	Cadmium, total	ug/L	0.07	0.07	0.07	0.07
LG-07-02' (C)	Copper, total	ug/L	0.556	0.556	0.556	0.556
LG-07-02' (C)	Lead, total	ug/L	0.404	0.404	0.404	0.404
LG-07-02' (C)	Mercury, total	ng/L	1.94	1.94	1.94	1.94
LG-07-02' (C)	Zinc, total	ug/L	7.94	7.94	7.94	7.94

(C) Sample Compositd With LG-07-10'

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
LG-07-10'	pH, Lab	S.U.	5.2	5.2	5.2	5.2
LG-07-10'	Alkalinity	mg/L	5	5	5	0
LG-07-10'	Alkalinity, Bicarbonate	mg/L	5	5	5	0
LG-07-10'	Alkalinity, Carbonate	mg/L	5	5	5	0
LG-07-10'	Hardness	mg/L	6	6	6	6
LG-07-10'	Total Dissolved Solids	mg/L	38	38	38	38
LG-07-10'	Total Suspended Solids	mg/L	5	5	5	0
LG-07-10'	Biological Oxygen Demand	mg/L	3	3	3	0
LG-07-10'	Chemical Oxygen Demand, Low Level	mg/L	16	16	16	16
LG-07-10'	Ammonia	mg/L	0.1	0.1	0.1	0.1
LG-07-10'	Nitrate	mg/L	0.5	0.5	0.5	0
LG-07-10'	Nitrogen, Total Kjeldahl	mg/L	0.4	0.4	0.4	0.4
LG-07-10'	Chloride	mg/L	1	1	1	0
LG-07-10'	Fluoride	mg/L	0.1	0.1	0.1	0
LG-07-10'	Sulfate	mg/L	3.1	3.1	3.1	3.1
LG-07-10'	Cyanide, total	ug/L	20	20	20	0
LG-07-10'	Oil & Grease	mg/L	4.6	4.6	4.6	0
LG-07-10'	Turbidity, Lab	NTU	0.5	0.5	0.5	0
LG-07-10'	Cations	Meq/L	0.15	0.15	0.15	0.15
LG-07-10'	Anions	Meq/L	0.06	0.06	0.06	0.06
LG-07-10'	Cation and Anion Balance	%	39.21	39.21	39.21	39.21
LG-07-10'	Boron, total	mg/L	0.1	0.1	0.1	0
LG-07-10'	Calcium, total	mg/L	1.6	1.6	1.6	1.6
LG-07-10'	Arsenic, total	mg/L	0.005	0.005	0.005	0
LG-07-10'	Barium, total	mg/L	0.037	0.037	0.037	0.037
LG-07-10'	Iron, dissolved	mg/L	0.074	0.074	0.074	0.074
LG-07-10'	Iron, total	mg/L	0.15	0.15	0.15	0.15
LG-07-10'	Manganese, dissolved	mg/L	0.031	0.031	0.031	0.031
LG-07-10'	Manganese, total	mg/L	0.042	0.042	0.042	0.042
LG-07-10'	Molybdenum, total	mg/L	0.02	0.02	0.02	0
LG-07-10'	Selenium, total	mg/L	0.005	0.005	0.005	0
LG-07-10'	Silver, total	mg/L	0.01	0.01	0.01	0
LG-07-10' (C)	Chromium, total (Low Level)	ug/L	0.162	0.162	0.162	0.162
LG-07-10'	Beryllium, total	mg/L	0.01	0.01	0.01	0
LG-07-10'	Thallium, total	mg/L	0.005	0.005	0.005	0
LG-07-10'	Nickel, total	mg/L	0.03	0.03	0.03	0
LG-07-10'	Antimony, total	mg/L	0.005	0.005	0.005	0
LG-07-10'	Magnesium, total	mg/L	0.54	0.54	0.54	0.54
LG-07-10'	Phosphorus, dissolved	mg/L	0.05	0.05	0.05	0
LG-07-10'	Phosphorus, total	mg/L	0.05	0.05	0.05	0
LG-07-10'	Potassium, total	mg/L	1	1	1	0
LG-07-10'	Sodium, total	mg/L	1	1	1	0
LG-07-10'	Sodium Absorption Ratio	std	0	0	0	0
LG-07-10' (C)	Aluminum, total	ug/L	83.9	83.9	83.9	83.9
LG-07-10' (C)	Cadmium, total	ug/L	0.07	0.07	0.07	0.07
LG-07-10' (C)	Copper, total	ug/L	0.556	0.556	0.556	0.556
LG-07-10' (C)	Lead, total	ug/L	0.404	0.404	0.404	0.404
LG-07-10' (C)	Mercury, total	ng/L	1.94	1.94	1.94	1.94
LG-07-10' (C)	Zinc, total	ug/L	7.94	7.94	7.94	7.94

(C) Sample Compositied With LG-07-02'

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
LG-09	pH (Field)	S.U.	7.36	7.94	7.7067	7.7067
LG-09	pH, Lab	S.U.	7.6	7.6	7.6	7.6
LG-09	Conductivity (Field)	umhos	17.4	182	120.63	120.63
LG-09	Conductivity, Lab	umhos	142	174	158	158
LG-09	Temperature (Field)	Degrees C	8	23.3	14.133	14.133
LG-09	Temperature (Field-DO Meter)	Degrees C	8	23	14.167	14.167
LG-09	Temperature (Field-DO Meter)-01'	Degrees C	11.75	11.75	11.75	11.75
LG-09	Temperature (Field-DO Meter)-02'	Degrees C	11.75	11.75	11.75	11.75
LG-09	Temperature (Field-DO Meter)-03'	Degrees C	11.75	11.75	11.75	11.75
LG-09	Temperature (Field-DO Meter)-04'	Degrees C	11.75	11.75	11.75	11.75
LG-09	Temperature (Field-DO Meter)-05'	Degrees C	11.75	11.75	11.75	11.75
LG-09	Temperature (Field-DO Meter)-06'	Degrees C	11.75	11.75	11.75	11.75
LG-09	Temperature (Field-DO Meter)-07'	Degrees C	11.75	11.75	11.75	11.75
LG-09	Temperature (Field-DO Meter)-08'	Degrees C	11.75	11.75	11.75	11.75
LG-09	Temperature (Field-DO Meter)-09'	Degrees C	11.75	11.75	11.75	11.75
LG-09	Temperature (Field-DO Meter)-10'	Degrees C	12	12	12	12
LG-09	Dissolved Oxygen (Field)	%	6.2	8.5	7.35	7.35
LG-09	Dissolved Oxygen (Field)-Surface	%	8.5	8.5	8.5	8.5
LG-09	Dissolved Oxygen (Field)-01'	%	8.5	8.5	8.5	8.5
LG-09	Dissolved Oxygen (Field)-02'	%	8.4	8.4	8.4	8.4
LG-09	Dissolved Oxygen (Field)-03'	%	8.4	8.4	8.4	8.4
LG-09	Dissolved Oxygen (Field)-04'	%	8.4	8.4	8.4	8.4
LG-09	Dissolved Oxygen (Field)-05'	%	8.4	8.4	8.4	8.4
LG-09	Dissolved Oxygen (Field)-06'	%	8.4	8.4	8.4	8.4
LG-09	Dissolved Oxygen (Field)-07'	%	8.4	8.4	8.4	8.4
LG-09	Dissolved Oxygen (Field)-08'	%	8.4	8.4	8.4	8.4
LG-09	Dissolved Oxygen (Field)-09'	%	8.4	8.4	8.4	8.4
LG-09	Dissolved Oxygen (Field)-10'	%	4.8	4.8	4.8	4.8
LG-09	Dissolved Oxygen (Field)-Bottom	%	8	8	8	8
LG-09	Alkalinity	mg/L	77	87.4	80.8	80.8
LG-09	Alkalinity, Bicarbonate	mg/L	77	87.4	80.8	80.8
LG-09	Alkalinity, Carbonate	mg/L	5	0	1.6667	0
LG-09	Alkalinity, Hydroxide	mg/L	5	0	1.6667	0
LG-09	Hardness	mg/L	68.4	82	76.8	76.8
LG-09	Total Dissolved Solids	mg/L	92	105	97	97
LG-09	Total Suspended Solids	mg/L	5	5	5	0
LG-09	Biological Oxygen Demand	mg/L	3	8	4.6667	2.6667
LG-09	Chemical Oxygen Demand	mg/L	15	23	19	19
LG-09	Chemical Oxygen Demand, Low Level	mg/L	28	28	28	28
LG-09	Ammonia	mg/L	0.1	0.1	0.1	0.0333
LG-09	Nitrate	mg/L	0.5	0.5	0.5	0
LG-09	Nitrogen, Total Kjeldahl	mg/L	0.252	0.8	0.444	0.444
LG-09	Chloride	mg/L	1	1	1	0.6667
LG-09	Fluoride	mg/L	0.1	0.1	0.1	0
LG-09	Sulfate	mg/L	4.06	11	6.72	6.72
LG-09	Cyanide, total	ug/L	20	20	20	0
LG-09	Oil & Grease	mg/L	1.02	4.6	2.22	0
LG-09	Turbidity, Lab	NTU	0.6	1.5	1.1	1.1
LG-09	Cations	Meq/L	1.75	1.8	1.7753	1.7753
LG-09	Anions	Meq/L	1.42	1.52	1.4867	1.4867
LG-09	Cation and Anion Balance	%	7.78	10.3	8.8833	8.8833
LG-09	Boron, total	mg/L	0.1	0.1	0.1	0
LG-09	Calcium, total	mg/L	18	19.4	18.467	18.467
LG-09	Arctic, total	mg/L	0.005	0.005	0.005	0
LG-09	Barium, total	mg/L	0.01	0.012	0.0107	0.004
LG-09	Iron, dissolved	mg/L	0.1	0.086	0.0953	0.0287
LG-09	Iron, total	mg/L	0.1	0.129	0.1163	0.083
LG-09	Manganese, dissolved	mg/L	0.01	0.01	0.01	0
LG-09	Manganese, total	mg/L	0.01	0.017	0.014	0.0107
LG-09	Molybdenum, total	mg/L	0.02	0.02	0.02	0
LG-09	Selenium, total	mg/L	0.005	0.005	0.005	0
LG-09	Silver, total	mg/L	0.01	0.01	0.01	0
LG-09	Chromium, total	mg/L	0.005	0.02	0.015	0
LG-09	Beryllium, total	mg/L	0.005	0.01	0.0067	0
LG-09	Thallium, total	mg/L	0.005	0.005	0.005	0
LG-09	Nickel, total	mg/L	0.03	0.03	0.03	0
LG-09	Antimony, total	mg/L	0.005	0.005	0.005	0
LG-09	Magnesium, total	mg/L	9.1	9.6	9.4067	9.4067
LG-09	Phosphorus, dissolved	mg/L	0.05	0.012	0.0373	0.004
LG-09	Phosphorus, total	mg/L	0.05	0.417	0.162	0.1453
LG-09	Potassium, total	mg/L	0.6	1	0.7333	0
LG-09	Sodium, total	mg/L	1.6	1.96	1.73	1.73
LG-09	Sodium Absorption Ratio	std	0.076	0.092	0.0817	0.0817
LG-09	Aluminum, total	ug/L	50	314	188	104.67
LG-09	Cadmium, total	ug/L	5	5	5	0
LG-09	Copper, total	ug/L	30	30	30	0
LG-09	Lead, total	ug/L	50	50	50	0
LG-09	Mercury, total	ng/L	200	300	233.33	100

3.7-8-85

(1) Non-Detects Replaced With Detection Limit (2) Non-Detects Replaced With Zero

CMC Surface Water : November 1993 Through April 1995

STATION	PARAMETER	Units	Minimum		Maximum		Mean (1)	Mean (2)
LG-09	Zinc, total	ug/L	<	20	<	20	20	0

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
LG-11	pH (Field)	S. U.	5.34	6.76	6.2856	6.2856
LG-11	pH (Field)-05'	S. U.	6.06	6.06	6.06	6.06
LG-11	pH (Field)-10'	S. U.	6.08	6.08	6.08	6.08
LG-11	pH (Field)-30'	S. U.	5.9	5.9	5.9	5.9
LG-11	pH (Field)-33'	S. U.	5.39	5.39	5.39	5.39
LG-11	pH, Lab	S. U.	5.25	6.2	5.6083	5.6083
LG-11	Conductivity (Field)	umhos	17	27	21.796	21.796
LG-11	Conductivity (Field)-05'	umhos	74.3	74.3	74.3	74.3
LG-11	Conductivity (Field)-10'	umhos	26.3	26.3	26.3	26.3
LG-11	Conductivity (Field)-30'	umhos	63.2	63.2	63.2	63.2
LG-11	Conductivity (Field)-33'	umhos	29.6	29.6	29.6	29.6
LG-11	Conductivity, Lab	umhos	18.9	21	19.82	19.82
LG-11	Temperature (Field)	Degrees C	0.1	22.9	13.3	13.3
LG-11	Temperature (Field)-05'	Degrees C	11.2	11.2	11.2	11.2
LG-11	Temperature (Field)-10'	Degrees C	5.8	5.8	5.8	5.8
LG-11	Temperature (Field)-30'	Degrees C	4.2	4.2	4.2	4.2
LG-11	Temperature (Field)-33'	Degrees C	10.2	10.2	10.2	10.2
LG-11	Temperature (Field-DO Meter)	Degrees C	0.5	20	10.25	10.25
LG-11	Temperature (Field-DO Meter)-01'	Degrees C	1	18	7.7083	7.7083
LG-11	Temperature (Field-DO Meter)-02'	Degrees C	2	18	8.1667	8.1667
LG-11	Temperature (Field-DO Meter)-03'	Degrees C	3.5	20	10.107	10.107
LG-11	Temperature (Field-DO Meter)-04'	Degrees C	4	18	8.5417	8.5417
LG-11	Temperature (Field-DO Meter)-05'	Degrees C	4	18	8.5833	8.5833
LG-11	Temperature (Field-DO Meter)-06'	Degrees C	4	20.5	10.321	10.321
LG-11	Temperature (Field-DO Meter)-07'	Degrees C	4	18	8.625	8.625
LG-11	Temperature (Field-DO Meter)-08'	Degrees C	4	18	8.6667	8.6667
LG-11	Temperature (Field-DO Meter)-09'	Degrees C	4	20.5	10.357	10.357
LG-11	Temperature (Field-DO Meter)-10'	Degrees C	4	18	8.6667	8.6667
LG-11	Temperature (Field-DO Meter)-11'	Degrees C	4	18	8.6667	8.6667
LG-11	Temperature (Field-DO Meter)-12'	Degrees C	4	20.5	10.393	10.393
LG-11	Temperature (Field-DO Meter)-13'	Degrees C	4	18	8.7083	8.7083
LG-11	Temperature (Field-DO Meter)-14'	Degrees C	4	18	8.7083	8.7083
LG-11	Temperature (Field-DO Meter)-15'	Degrees C	4	20.5	10.393	10.393
LG-11	Temperature (Field-DO Meter)-16'	Degrees C	4	18	8.7083	8.7083
LG-11	Temperature (Field-DO Meter)-17'	Degrees C	4	18	8.7083	8.7083
LG-11	Temperature (Field-DO Meter)-18'	Degrees C	4	20	10.321	10.321
LG-11	Temperature (Field-DO Meter)-19'	Degrees C	4	18	8.7083	8.7083
LG-11	Temperature (Field-DO Meter)-20'	Degrees C	4	18	8.7083	8.7083
LG-11	Temperature (Field-DO Meter)-21'	Degrees C	4	18	9.8929	9.8929
LG-11	Temperature (Field-DO Meter)-22'	Degrees C	4	17	8.5417	8.5417
LG-11	Temperature (Field-DO Meter)-23'	Degrees C	4	16	8.375	8.375
LG-11	Temperature (Field-DO Meter)-24'	Degrees C	4.25	17	9.5	9.5
LG-11	Temperature (Field-DO Meter)-25'	Degrees C	4.25	14	8.0833	8.0833
LG-11	Temperature (Field-DO Meter)-26'	Degrees C	4.5	14	8.0333	8.0333
LG-11	Temperature (Field-DO Meter)-27'	Degrees C	4.5	14	8.4286	8.4286
LG-11	Temperature (Field-DO Meter)-28'	Degrees C	4.5	13.75	7.6667	7.6667
LG-11	Temperature (Field-DO Meter)-29'	Degrees C	4.5	13.75	7.6667	7.6667
LG-11	Temperature (Field-DO Meter)-30'	Degrees C	4.5	13.75	8	8
LG-11	Temperature (Field-DO Meter)-31'	Degrees C	4.5	13.75	7.6	7.6
LG-11	Temperature (Field-DO Meter)-32'	Degrees C	4.75	13.75	7.65	7.65
LG-11	Temperature (Field-DO Meter)-33'	Degrees C	4.75	12	7.75	7.75
LG-11	Temperature (Field-DO Meter)-34'	Degrees C	4.75	10	6.5833	6.5833
LG-11	Temperature (Field-DO Meter)-35'	Degrees C	5	10	7.5	7.5
LG-11	Temperature (Field-DO Meter)-36'	Degrees C	5	10	7.5	7.5
LG-11	Temperature (Field-DO Meter)-37'	Degrees C	5	5	5	5
LG-11	Temperature (Field-DO Meter)-38'	Degrees C	5	5	5	5
LG-11	Dissolved Oxygen (Field)	%	0.5	12	8.6111	8.6111
LG-11	Dissolved Oxygen (Field)-Surface	%	9.5	9.5	9.5	9.5
LG-11	Dissolved Oxygen (Field)-01'	%	0.5	11.6	8.4583	8.4583
LG-11	Dissolved Oxygen (Field)-02'	%	0.5	11.25	8.525	8.525
LG-11	Dissolved Oxygen (Field)-03'	%	0.5	11.2	8.1429	8.1429
LG-11	Dissolved Oxygen (Field)-04'	%	6.8	14.8	10.275	10.275
LG-11	Dissolved Oxygen (Field)-05'	%	6.8	14.6	10.225	10.225
LG-11	Dissolved Oxygen (Field)-06'	%	6.7	14.6	10.029	10.029
LG-11	Dissolved Oxygen (Field)-07'	%	6.7	14.4	10.167	10.167
LG-11	Dissolved Oxygen (Field)-08'	%	6.6	13.8	10.042	10.042
LG-11	Dissolved Oxygen (Field)-09'	%	6.5	13.9	9.9	9.9
LG-11	Dissolved Oxygen (Field)-10'	%	6.3	13.6	9.967	9.967
LG-11	Dissolved Oxygen (Field)-11'	%	6.2	13.3	9.95	9.95
LG-11	Dissolved Oxygen (Field)-12'	%	6.1	13.1	9.7143	9.7143
LG-11	Dissolved Oxygen (Field)-13'	%	5.9	11.2	9.35	9.35
LG-11	Dissolved Oxygen (Field)-14'	%	5.6	11.2	9.2833	9.2833
LG-11	Dissolved Oxygen (Field)-15'	%	5.4	11.2	9.1714	9.1714
LG-11	Dissolved Oxygen (Field)-16'	%	5.4	11.2	9.2333	9.2333
LG-11	Dissolved Oxygen (Field)-17'	%	5.1	11.2	9.2083	9.2083
LG-11	Dissolved Oxygen (Field)-18'	%	4.9	11.2	9.0714	9.0714
LG-11	Dissolved Oxygen (Field)-19'	%	4.9	11.2	8.9167	8.9167
LG-11	Dissolved Oxygen (Field)-20'	%	4.9	11.2	8.8833	8.8833

3.7-8-87

(1) Non-Detects Replaced With Detection Limit (2) Non-Detects Replaced With Zero

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
LG-11	Dissolved Oxygen (Field)-21'	%	4.8	11.2	8.7857	8.7857
LG-11	Dissolved Oxygen (Field)-22'	%	4.4	11.2	8.7667	8.7667
LG-11	Dissolved Oxygen (Field)-23'	%	3.5	11.2	8.025	8.025
LG-11	Dissolved Oxygen (Field)-24'	%	1.6	11.2	7.35	7.35
LG-11	Dissolved Oxygen (Field)-25'	%	0.8	11.2	6.3	6.3
LG-11	Dissolved Oxygen (Field)-26'	%	0.3	11.2	5.5417	5.5417
LG-11	Dissolved Oxygen (Field)-27'	%	0.1	11.2	4.7571	4.7571
LG-11	Dissolved Oxygen (Field)-28'	%	0.1	11.2	4.7417	4.7417
LG-11	Dissolved Oxygen (Field)-29'	%	0.1	11.1	4.5667	4.5667
LG-11	Dissolved Oxygen (Field)-30'	%	0.1	10.6	3.6	3.6
LG-11	Dissolved Oxygen (Field)-31'	%	0.1	8.2	2.38	2.38
LG-11	Dissolved Oxygen (Field)-32'	%	0.1	8.2	2.36	2.36
LG-11	Dissolved Oxygen (Field)-33'	%	0	1.5	0.5667	0.5667
LG-11	Dissolved Oxygen (Field)-34'	%	0	0.4	0.2	0.2
LG-11	Dissolved Oxygen (Field)-35'	%	0	0.4	0.2	0.2
LG-11	Dissolved Oxygen (Field)-36'	%	0	0.4	0.2	0.2
LG-11	Dissolved Oxygen (Field)-37'	%	0.2	0.2	0.2	0.2
LG-11	Dissolved Oxygen (Field)-38'	%	0.2	0.2	0.2	0.2
LG-11	Dissolved Oxygen (Field)-Bottom	%	9	9	9	9
LG-11	Alkalinity	mg/L	5	5	7.3545	1.4455
LG-11	Alkalinity, Bicarbonate	mg/L	5	5	7.3545	1.4455
LG-11	Alkalinity, Carbonate	mg/L	5	0	2.7273	0
LG-11	Alkalinity, Hydroxide	mg/L	5	0	1.4286	0
LG-11	Hardness	mg/L	5	10	6.9827	6.0736
LG-11	Total Dissolved Solids	mg/L	5	44	23	22.091
LG-11	Total Suspended Solids	mg/L	5	7	5.2	0.7
LG-11	Biological Oxygen Demand	mg/L	2	10	3.8182	1.4545
LG-11	Chemical Oxygen Demand	mg/L	10	16	12.2	10.2
LG-11	Chemical Oxygen Demand, Low Level	mg/L	20	51	21.583	14.917
LG-11	Ammonia	mg/L	0.1	0.15	0.1091	0.0273
LG-11	Nitrate	mg/L	0.5	0.713	0.9713	0.0713
LG-11	Nitrogen, Total Kjeldahl	mg/L	0.2	0.7	0.4107	0.3925
LG-11	Chloride	mg/L	1	1	1	0.3636
LG-11	Fluoride	mg/L	0.1	0.246	0.1133	0.0224
LG-11	Sulfate	mg/L	3.6	9.01	5.181	5.181
LG-11	Cyanide, total	ug/L	20	20	20	0
LG-11	Oil & Grease	mg/L	1	6	3.1364	0.9909
LG-11	Turbidity, Lab	NTU	0.21	2.4	1.0145	1.0145
LG-11	Cations	Meq/L	0.119	0.171	0.145	0.145
LG-11	Anions	Meq/L	0.075	0.226	0.1451	0.1451
LG-11	Cation and Anion Balance	%	-30	29.31	2.861	2.861
LG-11	Boron, total	mg/L	0.1	0.124	0.1113	0.0113
LG-11	Calcium, total	mg/L	1.5	2.4	1.7182	1.7182
LG-11	Argenic, total	mg/L	0.005	0.0055	0.005	0.0005
LG-11	Barium, total	mg/L	0.01	0.065	0.015	0.0059
LG-11	Iron, dissolved	mg/L	0.05	0.085	0.0764	0.0127
LG-11	Iron, total	mg/L	0.05	0.49	0.1215	0.067
LG-11	Manganese, dissolved	mg/L	0.01	0.342	0.0484	0.0411
LG-11	Manganese, total	mg/L	0.01	0.12	0.0278	0.0233
LG-11	Molybdenum, total	mg/L	0.02	0.02	0.02	0
LG-11	Selenium, total	mg/L	0.005	0.005	0.005	0
LG-11	Silver, total	mg/L	0.01	0.01	0.01	0
LG-11	Chromium, total	mg/L	0.02	0.02	0.02	0
LG-11	Chromium, total (Low Level)	ug/L	0.18	0.45	0.2813	0.2033
LG-11	Beryllium, total	mg/L	0.005	0.01	0.0077	0
LG-11	Thallium, total	mg/L	0.005	0.005	0.005	0
LG-11	Nickel, total	mg/L	0.03	0.03	0.03	0
LG-11	Antimony, total	mg/L	0.005	0.005	0.005	0
LG-11	Magnesium, total	mg/L	0.52	0.89	0.5915	0.5915
LG-11	Phosphorus, dissolved	mg/L	0.004	0.004	0.0333	0.0004
LG-11	Phosphorus, total	mg/L	0.05	0.019	0.0369	0.0051
LG-11	Potassium, total	mg/L	0.6	1.4	0.8855	0.3218
LG-11	Sodium, total	mg/L	1	1	1	0
LG-11	Sodium Absorption Ratio	std	0	0	0	0
LG-11	Aluminum, total	ug/L	11.7	31.4	20.045	20.045
LG-11	Cadmium, total	ug/L	0.004	0.025	0.0137	0.0137
LG-11	Copper, total	ug/L	0.287	0.764	0.4135	0.4135
LG-11	Lead, total	ug/L	0.077	0.262	0.1418	0.1418
LG-11	Mercury, total	ng/L	0.839	2.35	1.2572	1.2572
LG-11	Zinc, total	ug/L	2.33	4.78	3.2382	3.2382

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
LG-11-05'	pH, Lab	S.U.	5.1	5.1	5.1	5.1
LG-11-05'	Alkalinity	mg/L	< 5	< 5	5	0
LG-11-05'	Alkalinity, Bicarbonate	mg/L	< 5	< 5	5	0
LG-11-05'	Alkalinity, Carbonate	mg/L	< 5	< 5	5	0
LG-11-05'	Hardness	mg/L	6	6	6	6
LG-11-05'	Total Dissolved Solids	mg/L	28	28	28	28
LG-11-05'	Total Suspended Solids	mg/L	< 5	< 5	5	0
LG-11-05'	Biological Oxygen Demand	mg/L	< 3	< 3	3	0
LG-11-05'	Chemical Oxygen Demand, Low Level	mg/L	13	13	13	13
LG-11-05'	Ammonia	mg/L	0.2	0.2	0.2	0.2
LG-11-05'	Nitrate	mg/L	< 0.5	< 0.5	0.5	0
LG-11-05'	Nitrogen, Total Kjeldahl	mg/L	0.4	0.4	0.4	0.4
LG-11-05'	Chloride	mg/L	< 1	< 1	1	0
LG-11-05'	Fluoride	mg/L	< 0.1	< 0.1	0.1	0
LG-11-05'	Sulfate	mg/L	4.6	4.6	4.6	4.6
LG-11-05'	Cyanide, total	ug/L	< 20	< 20	20	0
LG-11-05'	Oil & Grease	mg/L	< 4.6	< 4.6	4.6	0
LG-11-05'	Turbidity, Lab	NTU	0.6	0.6	0.6	0.6
LG-11-05'	Cations	Meq/L	0.16	0.16	0.16	0.16
LG-11-05'	Anions	Meq/L	0.1	0.1	0.1	0.1
LG-11-05'	Cation and Anion Balance	%	25.2	25.2	25.2	25.2
LG-11-05'	Boron, total	mg/L	< 0.1	< 0.1	0.1	0
LG-11-05'	Calcium, total	mg/L	1.8	1.8	1.8	1.8
LG-11-05'	Arsenic, total	mg/L	0.006	0.006	0.006	0.006
LG-11-05'	Barium, total	mg/L	< 0.01	< 0.01	0.01	0
LG-11-05'	Iron, dissolved	mg/L	0.05	0.05	0.05	0.05
LG-11-05'	Iron, total	mg/L	< 0.05	< 0.05	0.05	0
LG-11-05'	Manganese, dissolved	mg/L	0.014	0.014	0.014	0.014
LG-11-05'	Manganese, total	mg/L	0.025	0.025	0.025	0.025
LG-11-05'	Molybdenum, total	mg/L	< 0.02	< 0.02	0.02	0
LG-11-05'	Selenium, total	mg/L	< 0.005	< 0.005	0.005	0
LG-11-05'	Silver, total	mg/L	< 0.01	< 0.01	0.01	0
LG-11-05'	Chromium, total (Low Level)	ug/L	0.132	0.132	0.132	0.132
LG-11-05'	Beryllium, total	mg/L	< 0.01	< 0.01	0.01	0
LG-11-05'	Thallium, total	mg/L	< 0.005	< 0.005	0.005	0
LG-11-05'	Nickel, total	mg/L	< 0.03	< 0.03	0.03	0
LG-11-05'	Antimony, total	mg/L	< 0.005	< 0.005	0.005	0
LG-11-05'	Magnesium, total	mg/L	0.63	0.63	0.63	0.63
LG-11-05'	Phosphorus, dissolved	mg/L	< 0.05	< 0.05	0.05	0
LG-11-05'	Phosphorus, total	mg/L	< 0.05	< 0.05	0.05	0
LG-11-05'	Potassium, total	mg/L	< 1	< 1	1	0
LG-11-05'	Sodium, total	mg/L	< 1	< 1	1	0
LG-11-05'	Sodium Absorption Ratio	std	0	0	0	0
LG-11-05' (C)	Aluminum, total	ug/L	19.8	19.8	19.8	19.8
LG-11-05' (C)	Cadmium, total	ug/L	0.017	0.017	0.017	0.017
LG-11-05' (C)	Copper, total	ug/L	0.438	0.438	0.438	0.438
LG-11-05' (C)	Lead, total	ug/L	0.14	0.14	0.14	0.14
LG-11-05' (C)	Mercury, total	ng/L	1.15	1.15	1.15	1.15
LG-11-05' (C)	Zinc, total	ug/L	2.33	2.33	2.33	2.33

(C) Sample Compositied With LG-11-33'

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
LG-11-10'	pH, Lab	S.U.	5.2	5.2	5.2	5.2
LG-11-10'	Alkalinity	mg/L	5	5	5	5
LG-11-10'	Alkalinity, Bicarbonate	mg/L	5	5	5	5
LG-11-10'	Alkalinity, Carbonate	mg/L	Δ	5	Δ	5
LG-11-10'	Hardness	mg/L	8	8	8	8
LG-11-10'	Total Dissolved Solids	mg/L	46	46	46	46
LG-11-10'	Total Suspended Solids	mg/L	Δ	5	Δ	5
LG-11-10'	Biological Oxygen Demand	mg/L	Δ	3	Δ	3
LG-11-10'	Chemical Oxygen Demand, Low Level	mg/L	17	17	17	17
LG-11-10'	Ammonia	mg/L	Δ	0.1	Δ	0.1
LG-11-10'	Nitrate	mg/L	Δ	0.5	Δ	0.5
LG-11-10'	Nitrogen, Total Kjeldahl	mg/L	0.5	0.5	0.5	0.5
LG-11-10'	Chloride	mg/L	Δ	1	Δ	1
LG-11-10'	Fluoride	mg/L	Δ	0.1	Δ	0.1
LG-11-10'	Sulfate	mg/L	4.5	4.5	4.5	4.5
LG-11-10'	Cyanide, total	ug/L	Δ	20	Δ	20
LG-11-10'	Oil & Grease	mg/L	Δ	4.6	Δ	4.6
LG-11-10'	Turbidity, Lab	NTU	0.7	0.7	0.7	0.7
LG-11-10'	Phosphorus, dissolved	mg/L	Δ	0.05	Δ	0.05
LG-11-10'	Phosphorus, total	mg/L	Δ	0.05	Δ	0.05
LG-11-10'	Potassium, total	mg/L	1.5	1.5	1.5	1.5

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
LG-11-30'	pH, Lab	S.U.	5.3	5.3	5.3	5.3
LG-11-30'	Alkalinity	mg/L	5	5	5	5
LG-11-30'	Alkalinity, Bicarbonate	mg/L	5	5	5	5
LG-11-30'	Alkalinity, Carbonate	mg/L	5	5	5	0
LG-11-30'	Hardness	mg/L	7	7	7	7
LG-11-30'	Total Dissolved Solids	mg/L	39	39	39	39
LG-11-30'	Total Suspended Solids	mg/L	5	5	5	0
LG-11-30'	Biological Oxygen Demand	mg/L	3	3	3	0
LG-11-30'	Chemical Oxygen Demand, Low Level	mg/L	14	14	14	14
LG-11-30'	Ammonia	mg/L	0.2	0.2	0.2	0.2
LG-11-30'	Nitrate	mg/L	0.5	0.5	0.5	0
LG-11-30'	Nitrogen, Total Kjeldahl	mg/L	0.6	0.6	0.6	0.6
LG-11-30'	Chloride	mg/L	1	1	1	0
LG-11-30'	Fluoride	mg/L	0.1	0.1	0.1	0
LG-11-30'	Sulfate	mg/L	4.7	4.7	4.7	4.7
LG-11-30'	Cyanide, total	ug/L	20	20	20	0
LG-11-30'	Oil & Grease	mg/L	4.6	4.6	4.6	0
LG-11-30'	Turbidity, Lab	NTU	0.6	0.6	0.6	0.6
LG-11-30'	Phosphorus, dissolved	mg/L	0.05	0.05	0.05	0
LG-11-30'	Phosphorus, total	mg/L	0.05	0.05	0.05	0
LG-11-30'	Potassium, total	mg/L	1.3	1.3	1.3	1.3

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
LG-11-33'	pH, Lab	S.U.	5.5	5.5	5.5	5.5
LG-11-33'	Alkalinity	mg/L	5	5	5	0
LG-11-33'	Alkalinity, Bicarbonate	mg/L	5	5	5	0
LG-11-33'	Alkalinity, Carbonate	mg/L	5	5	5	0
LG-11-33'	Hardness	mg/L	6	6	6	6
LG-11-33'	Total Dissolved Solids	mg/L	11	11	11	11
LG-11-33'	Total Suspended Solids	mg/L	5	5	5	0
LG-11-33'	Biological Oxygen Demand	mg/L	3	3	3	0
LG-11-33'	Chemical Oxygen Demand, Low Level	mg/L	13	13	13	13
LG-11-33'	Ammonia	mg/L	0.1	0.1	0.1	0
LG-11-33'	Nitrate	mg/L	0.5	0.5	0.5	0
LG-11-33'	Nitrogen, Total Kjeldahl	mg/L	0.5	0.5	0.5	0.5
LG-11-33'	Chloride	mg/L	1	1	1	0
LG-11-33'	Fluoride	mg/L	0.1	0.1	0.1	0
LG-11-33'	Sulfate	mg/L	4.6	4.6	4.6	4.6
LG-11-33'	Cyanide, total	ug/L	20	20	20	0
LG-11-33'	Oil & Grease	mg/L	4.6	4.6	4.6	0
LG-11-33'	Turbidity, Lab	NTU	0.6	0.6	0.6	0.6
LG-11-33'	Cations	Meq/L	0.18	0.18	0.18	0.18
LG-11-33'	Anions	Meq/L	0.1	0.1	0.1	0.1
LG-11-33'	Cation and Anion Balance	%	30.41	30.41	30.41	30.41
LG-11-33'	Boron, total	mg/L	0.1	0.1	0.1	0
LG-11-33'	Calcium, total	mg/L	2	2	2	2
LG-11-33'	Arsenic, total	mg/L	0.005	0.005	0.005	0
LG-11-33'	Barium, total	mg/L	0.12	0.12	0.12	0.12
LG-11-33'	Iron, dissolved	mg/L	0.12	0.12	0.12	0.12
LG-11-33'	Iron, total	mg/L	0.16	0.16	0.16	0.16
LG-11-33'	Manganese, dissolved	mg/L	0.67	0.67	0.67	0.67
LG-11-33'	Manganese, total	mg/L	0.057	0.057	0.057	0.057
LG-11-33'	Molybdenum, total	mg/L	0.02	0.02	0.02	0
LG-11-33'	Selenium, total	mg/L	0.005	0.005	0.005	0
LG-11-33'	Silver, total	mg/L	0.01	0.01	0.01	0
LG-11-33'	Beryllium, total	mg/L	0.01	0.01	0.01	0
LG-11-33'	Thallium, total	mg/L	0.005	0.005	0.005	0
LG-11-33'	Nickel, total	mg/L	0.03	0.03	0.03	0
LG-11-33'	Antimony, total	mg/L	0.005	0.005	0.005	0
LG-11-33'	Magnesium, total	mg/L	0.67	0.67	0.67	0.67
LG-11-33'	Phosphorus, dissolved	mg/L	0.05	0.05	0.05	0
LG-11-33'	Phosphorus, total	mg/L	0.05	0.05	0.05	0
LG-11-33'	Potassium, total	mg/L	1	1	1	0
LG-11-33'	Sodium, total	mg/L	1	1	1	0
LG-11-33'	Sodium Absorption Ratio	std	0	0	0	0
LG-11-33' (C)	Aluminum, total	ug/L	19.8	19.8	19.8	19.8
LG-11-33' (C)	Cadmium, total	ug/L	0.017	0.017	0.017	0.017
LG-11-33' (C)	Copper, total	ug/L	0.438	0.438	0.438	0.438
LG-11-33' (C)	Lead, total	ug/L	0.14	0.14	0.14	0.14
LG-11-33' (C)	Mercury, total	ng/L	1.15	1.15	1.15	1.15
LG-11-33' (C)	Zinc, total	ug/L	2.33	2.33	2.33	2.33

(C) Sample Composited With LG-11-05'

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
LG-11-Composite	Boron, total	mg/L	< 0.1	< 0.1	0.1	0
LG-11-Composite	Calcium, total	mg/L	2.4	2.4	2.4	2.4
LG-11-Composite	Arsenic, total	mg/L	< 0.005	< 0.005	0.005	0
LG-11-Composite	Barium, total	mg/L	< 0.01	< 0.01	0.01	0
LG-11-Composite	Iron, dissolved	mg/L	< 0.05	< 0.05	0.05	0
LG-11-Composite	Iron, total	mg/L	0.069	0.069	0.069	0.069
LG-11-Composite	Manganese, dissolved	mg/L	0.024	0.024	0.024	0.024
LG-11-Composite	Manganese, total	mg/L	0.04	0.04	0.04	0.04
LG-11-Composite	Molybdenum, total	mg/L	< 0.02	< 0.02	0.02	0
LG-11-Composite	Selenium, total	mg/L	< 0.005	< 0.005	0.005	0
LG-11-Composite	Silver, total	mg/L	< 0.01	< 0.01	0.01	0
LG-11-Composite	Chromium, total (Low Level)	ug/L	0.192	0.192	0.192	0.192
LG-11-Composite	Beryllium, total	mg/L	< 0.01	< 0.01	0.01	0
LG-11-Composite	Thallium, total	mg/L	< 0.005	< 0.005	0.005	0
LG-11-Composite	Nickel, total	mg/L	< 0.03	< 0.03	0.03	0
LG-11-Composite	Antimony, total	mg/L	< 0.005	< 0.005	0.005	0
LG-11-Composite	Magnesium, total	mg/L	0.89	0.89	0.89	0.89
LG-11-Composite	Potassium, total	mg/L	1.2	1.2	1.2	1.2
LG-11-Composite	Sodium, total	mg/L	< 1	< 1	1	0
LG-11-Composite	Aluminum, total	ug/L	27.2	27.2	27.2	27.2
LG-11-Composite	Cadmium, total	ug/L	0.004	0.004	0.004	0.004
LG-11-Composite	Copper, total	ug/L	0.305	0.305	0.305	0.305
LG-11-Composite	Lead, total	ug/L	0.127	0.127	0.127	0.127
LG-11-Composite	Mercury, total	ng/L	1.15	1.15	1.15	1.15
LG-11-Composite	Zinc, total	ug/L	2.41	2.41	2.41	2.41

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
LG-12	pH (Field)	S.U.	4.91	6.37	5.6167	5.6167
LG-12	pH (Field)-02'	S.U.	5.74	5.74	5.74	5.74
LG-12	pH (Field)-05'	S.U.	4.93	5.82	5.375	5.375
LG-12	pH, Lab	S.U.	4.7	5.4	5.0917	5.0917
LG-12	Conductivity (Field)	umhos	13	38.7	19.192	19.192
LG-12	Conductivity (Field)-02'	umhos	18.73	18.73	18.73	18.73
LG-12	Conductivity (Field)-05'	umhos	67.1	197.7	132.4	132.4
LG-12	Conductivity, Lab	umhos	15.1	16.2	15.66	15.66
LG-12	Temperature (Field)	Degrees C	2.4	25.3	14.122	14.122
LG-12	Temperature (Field)-02'	Degrees C	5.1	5.1	5.1	5.1
LG-12	Temperature (Field)-05'	Degrees C	2.3	5.6	3.95	3.95
LG-12	Temperature (Field-DO Meter)	Degrees C	0.75	20	10.756	10.756
LG-12	Temperature (Field-DO Meter)-01'	Degrees C	0.75	18	6.7917	6.7917
LG-12	Temperature (Field-DO Meter)-02'	Degrees C	1	18	7.375	7.375
LG-12	Temperature (Field-DO Meter)-03'	Degrees C	3	19	9.1786	9.1786
LG-12	Temperature (Field-DO Meter)-04'	Degrees C	4	17	7.7917	7.7917
LG-12	Temperature (Field-DO Meter)-05'	Degrees C	4	17	7.8333	7.8333
LG-12	Temperature (Field-DO Meter)-06'	Degrees C	4	19	9.4643	9.4643
LG-12	Temperature (Field-DO Meter)-07'	Degrees C	4	17	7.875	7.875
LG-12	Temperature (Field-DO Meter)-08'	Degrees C	4	17	7.875	7.875
LG-12	Temperature (Field-DO Meter)-09'	Degrees C	19	19	19	19
LG-12	Dissolved Oxygen (Field)	%	6.4	13.6	9.2857	9.2857
LG-12	Dissolved Oxygen (Field)-Surface	%	8.5	8.5	8.5	8.5
LG-12	Dissolved Oxygen (Field)-01'	%	8.3	13.6	10.083	10.083
LG-12	Dissolved Oxygen (Field)-02'	%	8.1	13.2	9.5333	9.5333
LG-12	Dissolved Oxygen (Field)-03'	%	6.5	11.1	8.2286	8.2286
LG-12	Dissolved Oxygen (Field)-04'	%	3	11.1	7.4167	7.4167
LG-12	Dissolved Oxygen (Field)-05'	%	2.6	11	7.2	7.2
LG-12	Dissolved Oxygen (Field)-06'	%	2.3	11	7.1	7.1
LG-12	Dissolved Oxygen (Field)-07'	%	1.8	11	6.6167	6.6167
LG-12	Dissolved Oxygen (Field)-08'	%	0.2	10.9	4.45	4.45
LG-12	Dissolved Oxygen (Field)-09'	%	6	6	6	6
LG-12	Dissolved Oxygen (Field)-Bottom	%	8.2	8.2	8.2	8.2
LG-12	Alkalinity	mg/L	5	3.7	7.3	0.9364
LG-12	Alkalinity, Bicarbonate	mg/L	5	3.7	8.6636	0.9364
LG-12	Alkalinity, Carbonate	mg/L	0	0	2.7273	0
LG-12	Alkalinity, Hydroxide	mg/L	0	0	1.4286	0
LG-12	Hardness	mg/L	5	12	7.4927	6.5836
LG-12	Total Dissolved Solids	mg/L	8	54	28.636	28.636
LG-12	Total Suspended Solids	mg/L	5	5	5	0
LG-12	Biological Oxygen Demand	mg/L	2	10	4.2727	2.1818
LG-12	Chemical Oxygen Demand	mg/L	21	36	30.6	30.6
LG-12	Chemical Oxygen Demand, Low Level	mg/L	21	53	33.167	33.167
LG-12	Ammonia	mg/L	0.1	0.672	0.152	0.0793
LG-12	Nitrate	mg/L	0.5	0.5	0.5	0
LG-12	Nitrogen, Total Kjeldahl	mg/L	0.4	1	0.652	0.652
LG-12	Chloride	mg/L	1	1	1	0.0909
LG-12	Fluoride	mg/L	0.1	0.223	0.1112	0.0203
LG-12	Sulfate	mg/L	2.35	10	6.555	6.555
LG-12	Cyanide, total	ug/L	20	20	20	0
LG-12	Oil & Grease	mg/L	1	4.6	2.6691	0
LG-12	Turbidity, Lab	NTU	0.5	2.4	1.145	1.095
LG-12	Cations	Meq/L	0.058	0.17	0.1045	0.1045
LG-12	Anions	Meq/L	0.049	0.297	0.1674	0.1674
LG-12	Cation and Anion Balance	%	-60	31.3	-19.77	-19.77
LG-12	Boron, total	mg/L	0.1	0.144	0.1131	0.0131
LG-12	Calcium, total	mg/L	1.1	2.6	1.5255	1.5255
LG-12	Arsenic, total	mg/L	0.005	0.005	0.005	0
LG-12	Barium, total	mg/L	0.01	0.02	0.0112	0.003
LG-12	Iron, dissolved	mg/L	0.082	0.15	0.115	0.115
LG-12	Iron, total	mg/L	0.1	0.17	0.1295	0.1295
LG-12	Manganese, dissolved	mg/L	0.01	0.03	0.02	0.0181
LG-12	Manganese, total	mg/L	0.01	0.04	0.0232	0.0223
LG-12	Molybdenum, total	mg/L	0.02	0.02	0.02	0
LG-12	Selenium, total	mg/L	0.005	0.006	0.0051	0.0005
LG-12	Silver, total	mg/L	0.01	0.01	0.01	0
LG-12	Chromium, total	mg/L	0.02	0.02	0.02	0
LG-12	Chromium, total (Low Level)	ug/L	0.3	0.51	0.369	0.3417
LG-12	Beryllium, total	mg/L	0.005	0.01	0.0077	0
LG-12	Thallium, total	mg/L	0.005	0.005	0.005	0
LG-12	Nickel, total	mg/L	0.03	0.03	0.03	0
LG-12	Antimony, total	mg/L	0.005	0.005	0.005	0
LG-12	Magnesium, total	mg/L	0.5	0.74	0.5368	0.2186
LG-12	Phosphorus, dissolved	mg/L	0.004	0.015	0.0358	0.0036
LG-12	Phosphorus, total	mg/L	0.05	0.028	0.0413	0.0095
LG-12	Potassium, total	mg/L	0.6	1.9	0.9418	0.4145
LG-12	Sodium, total	mg/L	1	1	1	0
LG-12	Sodium Absorption Ratio	std	0	0	0	0

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STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
LG-12	Aluminum, total	ug/L	62.3	154	91.864	91.864
LG-12	Cadmium, total	ug/L	< 0.006	0.039	0.0206	0.02
LG-12	Copper, total	ug/L	0.447	3.49	0.9021	0.9021
LG-12	Lead, total	ug/L	0.413	2.18	0.9966	0.9966
LG-12	Mercury, total	ng/L	2.3	3.95	3.0991	3.0991
LG-12	Zinc, total	ug/L	4.68	10.1	6.4064	6.4064

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
LG-12-02'	pH, Lab	S.U.	4.8	4.8	4.8	4.8
LG-12-02'	Alkalinity	mg/L	5	5	5	0
LG-12-02'	Alkalinity, Bicarbonate	mg/L	5	5	5	0
LG-12-02'	Alkalinity, Carbonate	mg/L	5	5	5	0
LG-12-02'	Hardness	mg/L	8	8	8	8
LG-12-02'	Total Dissolved Solids	mg/L	11	11	11	11
LG-12-02'	Total Suspended Solids	mg/L	5	5	5	0
LG-12-02'	Biological Oxygen Demand	mg/L	3	3	3	0
LG-12-02'	Chemical Oxygen Demand, Low Level	mg/L	17	17	17	17
LG-12-02'	Ammonia	mg/L	0.1	0.1	0.1	0.1
LG-12-02'	Nitrate	mg/L	0.5	0.5	0.5	0
LG-12-02'	Nitrogen, Total Kjeldahl	mg/L	0.3	0.3	0.3	0.3
LG-12-02'	Chloride	mg/L	1	1	1	0
LG-12-02'	Fluoride	mg/L	0.1	0.1	0.1	0
LG-12-02'	Sulfate	mg/L	1.8	1.8	1.8	1.8
LG-12-02'	Cyanide, total	ug/L	20	20	20	0
LG-12-02'	Oil & Grease	mg/L	4.6	4.6	4.6	0
LG-12-02'	Turbidity, Lab	NTU	0.6	0.6	0.6	0.6
LG-12-02'	Cations	Meq/L	0.09	0.09	0.09	0.09
LG-12-02'	Anions	Meq/L	0.04	0.04	0.04	0.04
LG-12-02'	Cation and Anion Balance	%	40.03	40.03	40.03	40.03
LG-12-02'	Boron, total	mg/L	0.1	0.1	0.1	0
LG-12-02'	Calcium, total	mg/L	1.4	1.4	1.4	1.4
LG-12-02'	Arsenic, total	mg/L	0.005	0.005	0.005	0
LG-12-02'	Barium, total	mg/L	0.01	0.01	0.01	0
LG-12-02'	Iron, dissolved	mg/L	0.059	0.059	0.059	0.059
LG-12-02'	Iron, total	mg/L	0.11	0.11	0.11	0.11
LG-12-02'	Manganese, dissolved	mg/L	0.014	0.014	0.014	0.014
LG-12-02'	Manganese, total	mg/L	0.034	0.034	0.034	0.034
LG-12-02'	Molybdenum, total	mg/L	0.02	0.02	0.02	0
LG-12-02'	Selenium, total	mg/L	0.005	0.005	0.005	0
LG-12-02'	Silver, total	mg/L	0.01	0.01	0.01	0
LG-12-02' (C)	Chromium, total (Low Level)	ug/L	0.285	0.285	0.285	0.285
LG-12-02'	Beryllium, total	mg/L	0.01	0.01	0.01	0
LG-12-02'	Thallium, total	mg/L	0.005	0.005	0.005	0
LG-12-02'	Nickel, total	mg/L	0.03	0.03	0.03	0
LG-12-02'	Antimony, total	mg/L	0.005	0.005	0.005	0
LG-12-02'	Magnesium, total	mg/L	0.5	0.5	0.5	0
LG-12-02'	Phosphorus, dissolved	mg/L	0.05	0.05	0.05	0
LG-12-02'	Phosphorus, total	mg/L	0.05	0.05	0.05	0
LG-12-02'	Potassium, total	mg/L	1	1	1	0
LG-12-02'	Sodium, total	mg/L	1	1	1	0
LG-12-02'	Sodium Absorption Ratio	std	0	0	0	0
LG-12-02' (C)	Aluminum, total	ug/L	110	110	110	110
LG-12-02' (C)	Cadmium, total	ug/L	0.039	0.039	0.039	0.039
LG-12-02' (C)	Copper, total	ug/L	0.696	0.696	0.696	0.696
LG-12-02' (C)	Lead, total	ug/L	1.07	1.07	1.07	1.07
LG-12-02' (C)	Mercury, total	ng/L	2.78	2.78	2.78	2.78
LG-12-02' (C)	Zinc, total	ug/L	6.79	6.79	6.79	6.79

(C) Sample Composited With LG-12-05'

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
LG-12-05'	pH, Lab	S.U.	5.1	5.1	5.1	5.1
LG-12-05'	Alkalinity	mg/L	< 5	< 5	5	0
LG-12-05'	Alkalinity, Bicarbonate	mg/L	< 5	< 5	5	0
LG-12-05'	Alkalinity, Carbonate	mg/L	< 5	< 5	5	0
LG-12-05'	Hardness	mg/L	7	7	7	7
LG-12-05'	Total Dissolved Solids	mg/L	53	53	53	53
LG-12-05'	Total Suspended Solids	mg/L	< 5	< 5	5	0
LG-12-05'	Biological Oxygen Demand	mg/L	< 3	< 3	3	0
LG-12-05'	Chemical Oxygen Demand, Low Level	mg/L	33	33	33	33
LG-12-05'	Ammonia	mg/L	< 0.1	< 0.1	0.1	0
LG-12-05'	Nitrate	mg/L	< 0.5	< 0.5	0.5	0
LG-12-05'	Nitrogen, Total Kjeldahl	mg/L	0.5	0.5	0.5	0.5
LG-12-05'	Chloride	mg/L	< 1	< 1	1	0
LG-12-05'	Fluoride	mg/L	< 0.1	< 0.1	0.1	0
LG-12-05'	Sulfate	mg/L	4.2	4.2	4.2	4.2
LG-12-05'	Cyanide, total	ug/L	< 20	< 20	20	0
LG-12-05'	Oil & Grease	mg/L	< 4.6	< 4.6	4.6	0
LG-12-05'	Turbidity, Lab	NTU	0.9	0.9	0.9	0.9
LG-12-05'	Cations	Meq/L	0.14	0.14	0.14	0.14
LG-12-05'	Anions	Meq/L	0.09	0.09	0.09	0.09
LG-12-05'	Cation and Anion Balance	%	22.57	22.57	22.57	22.57
LG-12-05'	Boron, total	mg/L	< 0.1	< 0.1	0.1	0
LG-12-05'	Calcium, total	mg/L	1.9	1.9	1.9	1.9
LG-12-05'	Arsenic, total	mg/L	< 0.005	< 0.005	0.005	0
LG-12-05'	Barium, total	mg/L	< 0.01	< 0.01	0.01	0
LG-12-05'	Iron, dissolved	mg/L	0.18	0.18	0.18	0.18
LG-12-05'	Iron, total	mg/L	0.16	0.16	0.16	0.16
LG-12-05'	Manganese, dissolved	mg/L	0.035	0.035	0.035	0.035
LG-12-05'	Manganese, total	mg/L	0.046	0.046	0.046	0.046
LG-12-05'	Molybdenum, total	mg/L	< 0.02	< 0.02	0.02	0
LG-12-05'	Selenium, total	mg/L	< 0.005	< 0.005	0.005	0
LG-12-05'	Silver, total	mg/L	< 0.01	< 0.01	0.01	0
LG-12-05' (C)	Chromium, total (Low Level)	ug/L	0.285	0.285	0.285	0.285
LG-12-05'	Beryllium, total	mg/L	< 0.01	< 0.01	0.01	0
LG-12-05'	Thallium, total	mg/L	< 0.005	< 0.005	0.005	0
LG-12-05'	Nickel, total	mg/L	< 0.03	< 0.03	0.03	0
LG-12-05'	Antimony, total	mg/L	< 0.005	< 0.005	0.005	0
LG-12-05'	Magnesium, total	mg/L	0.53	0.53	0.53	0.53
LG-12-05'	Phosphorus, dissolved	mg/L	< 0.05	< 0.05	0.05	0
LG-12-05'	Phosphorus, total	mg/L	< 0.05	< 0.05	0.05	0
LG-12-05'	Potassium, total	mg/L	< 1	< 1	1	0
LG-12-05'	Sodium, total	mg/L	< 1	< 1	1	0
LG-12-05'	Sodium Absorption Ratio	std	0	0	0	0
LG-12-05' (C)	Aluminum, total	ug/L	110	110	110	110
LG-12-05' (C)	Cadmium, total	ug/L	0.039	0.039	0.039	0.039
LG-12-05' (C)	Copper, total	ug/L	0.696	0.696	0.696	0.696
LG-12-05' (C)	Lead, total	ug/L	1.07	1.07	1.07	1.07
LG-12-05' (C)	Mercury, total	ng/L	2.78	2.78	2.78	2.78
LG-12-05' (C)	Zinc, total	ug/L	6.79	6.79	6.79	6.79

(C) Sample Compositd With LG-12-02'

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
LG-13	pH (Field)	S.U.	5.31	6.63	5.9544	5.9544
LG-13	pH (Field)-02'	S.U.	6.58	6.58	6.58	6.58
LG-13	pH (Field)-06'	S.U.	5.84	5.84	5.84	5.84
LG-13	pH (Field)-07'	S.U.	6.11	6.11	6.11	6.11
LG-13	pH, Lab	S.U.	5.3	5.8	5.5917	5.5917
LG-13	Conductivity (Field)	umhos	20.9	40.2	27.789	27.789
LG-13	Conductivity (Field)-02'	umhos	57.8	57.8	57.8	57.8
LG-13	Conductivity (Field)-06'	umhos	137.3	137.3	137.3	137.3
LG-13	Conductivity (Field)-07'	umhos	65.7	65.7	65.7	65.7
LG-13	Conductivity, Lab	umhos	19.6	22	20.4	20.4
LG-13	Temperature (Field)	Degrees C	2.8	24.6	14.033	14.033
LG-13	Temperature (Field)-02'	Degrees C	4.5	4.5	4.5	4.5
LG-13	Temperature (Field)-06'	Degrees C	4.2	4.2	4.2	4.2
LG-13	Temperature (Field)-07'	Degrees C	4.8	4.8	4.8	4.8
LG-13	Temperature (Field-DO Meter)	Degrees C	0.75	20	9.7778	9.7778
LG-13	Temperature (Field-DO Meter)-01'	Degrees C	0.75	18	7	7
LG-13	Temperature (Field-DO Meter)-02'	Degrees C	1.5	18	7.5417	7.5417
LG-13	Temperature (Field-DO Meter)-03'	Degrees C	2.5	19	9.3929	9.3929
LG-13	Temperature (Field-DO Meter)-04'	Degrees C	4.25	18	8.0833	8.0833
LG-13	Temperature (Field-DO Meter)-05'	Degrees C	4.25	18	8.1667	8.1667
LG-13	Temperature (Field-DO Meter)-06'	Degrees C	4.25	19	9.6786	9.6786
LG-13	Temperature (Field-DO Meter)-07'	Degrees C	4.25	18	8.125	8.125
LG-13	Temperature (Field-DO Meter)-08'	Degrees C	4.5	17	8.7	8.7
LG-13	Temperature (Field-DO Meter)-09'	Degrees C	4.5	19	11.375	11.375
LG-13	Temperature (Field-DO Meter)-10'	Degrees C	5	17	11	11
LG-13	Temperature (Field-DO Meter)-10.5'	Degrees C	4.5	4.5	4.5	4.5
LG-13	Dissolved Oxygen (Field)	%	8.2	12.8	10.388	10.388
LG-13	Dissolved Oxygen (Field)-Surface	%	8.4	8.4	8.4	8.4
LG-13	Dissolved Oxygen (Field)-01'	%	8.6	13	10.38	10.38
LG-13	Dissolved Oxygen (Field)-02'	%	8.2	14.4	10.567	10.567
LG-13	Dissolved Oxygen (Field)-03'	%	5.6	14.25	9.4643	9.4643
LG-13	Dissolved Oxygen (Field)-04'	%	2.6	11.9	8.775	8.775
LG-13	Dissolved Oxygen (Field)-05'	%	2.25	11.2	8.1167	8.1167
LG-13	Dissolved Oxygen (Field)-06'	%	2.2	11.2	7.6286	7.6286
LG-13	Dissolved Oxygen (Field)-07'	%	0.8	11.2	6.1083	6.1083
LG-13	Dissolved Oxygen (Field)-08'	%	1.7	11.2	7.02	7.02
LG-13	Dissolved Oxygen (Field)-09'	%	1.2	9	4.775	4.775
LG-13	Dissolved Oxygen (Field)-10'	%	0.8	2.2	1.5	1.5
LG-13	Dissolved Oxygen (Field)-10.5'	%	0.3	0.3	0.3	0.3
LG-13	Dissolved Oxygen (Field)-Bottom	%	8.4	8.4	8.4	8.4
LG-13	Alkalinity	mg/L	2	5	7.3364	1.7
LG-13	Alkalinity, Bicarbonate	mg/L	2	5	7.3364	1.7
LG-13	Alkalinity, Carbonate	mg/L	5	0	2.7273	0
LG-13	Alkalinity, Hydroxide	mg/L	5	0	1.4286	0
LG-13	Hardness	mg/L	5	12.5	8.7	7.7909
LG-13	Total Dissolved Solids	mg/L	15	78	40.182	40.182
LG-13	Total Suspended Solids	mg/L	5	5	5	0
LG-13	Biological Oxygen Demand	mg/L	2	6	3.4545	1.3636
LG-13	Chemical Oxygen Demand	mg/L	15	29	22.6	22.6
LG-13	Chemical Oxygen Demand, Low Level	mg/L	23	41	30.167	30.167
LG-13	Ammonia	mg/L	0.1	0.336	0.1215	0.0487
LG-13	Nitrate	mg/L	0.5	0.714	0.5238	0.0793
LG-13	Nitrogen, Total Kjeldahl	mg/L	0.336	2.16	0.8065	0.8065
LG-13	Chloride	mg/L	1	1	1	0
LG-13	Fluoride	mg/L	0.1	0.204	0.1095	0.0185
LG-13	Sulfate	mg/L	3.94	12	7.889	7.889
LG-13	Cyanide, total	ug/L	20	20	20	0
LG-13	Oil & Grease	mg/L	1	8.3	2.9973	0.7545
LG-13	Turbidity, Lab	NTU	0.9	2.98	1.5073	1.5073
LG-13	Cations	Meq/L	0.123	0.27	0.172	0.172
LG-13	Anions	Meq/L	0.023	0.279	0.1868	0.1868
LG-13	Cation and Anion Balance	%	-40	75.33	-0.207	-0.207
LG-13	Boron, total	mg/L	0.1	0.15	0.1136	0.0136
LG-13	Calcium, total	mg/L	1.53	3.2	2.1045	2.1045
LG-13	Argenic, total	mg/L	0.005	0.005	0.005	0
LG-13	Barium, total	mg/L	0.011	0.165	0.0325	0.0325
LG-13	Iron, dissolved	mg/L	0.1	0.24	0.1302	0.112
LG-13	Iron, total	mg/L	0.146	0.41	0.1984	0.1984
LG-13	Manganese, dissolved	mg/L	0.018	0.032	0.0237	0.0237
LG-13	Manganese, total	mg/L	0.018	0.075	0.0292	0.0292
LG-13	Molybdenum, total	mg/L	0.02	0.02	0.02	0
LG-13	Selenium, total	mg/L	0.005	0.005	0.005	0
LG-13	Silver, total	mg/L	0.01	0.01	0.01	0
LG-13	Chromium, total	mg/L	0.02	0.02	0.02	0
LG-13	Chromium, total (Low Level)	ug/L	0.27	0.615	0.4025	0.3507
LG-13	Beryllium, total	mg/L	0.005	0.01	0.0077	0
LG-13	Thallium, total	mg/L	0.005	0.005	0.005	0
LG-13	Nickel, total	mg/L	0.03	0.07	0.0336	0.0064

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STATION	PARAMETER	Units		Minimum	Maximum	Mean (1)	Mean (2)
LG-13	Antimony, total	mg/L	<=	0.005	0.017	0.0061	0.0015
LG-13	Magnesium, total	mg/L		0.529	1.6	0.7068	0.7068
LG-13	Phosphorus, dissolved	mg/L	<=	0.05	0.012	0.0357	0.0039
LG-13	Phosphorus, total	mg/L	<=	0.05	0.097	0.0463	0.019
LG-13	Potassium, total	mg/L	<=	0.6	1.5	0.8655	0.1927
LG-13	Sodium, total	mg/L	<=	1	1	1	0
LG-13	Sodium Absorption Ratio	std		0	0	0	0
LG-13	Aluminum, total	ug/L		90.4	248	145.85	145.85
LG-13	Cadmium, total	ug/L		0.009	0.151	0.0334	0.0334
LG-13	Copper, total	ug/L		0.493	1.07	0.7195	0.7195
LG-13	Lead, total	ug/L		0.421	1.62	0.8049	0.8049
LG-13	Mercury, total	ng/L		2.39	3.01	2.7336	2.7336
LG-13	Zinc, total	ug/L		6.03	14.9	8.37	8.37

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
LG-13-02'	pH, Lab	S.U.	5.7	5.7	5.7	5.7
LG-13-02'	Alkalinity	mg/L	< 5	< 5	5	0
LG-13-02'	Alkalinity, Bicarbonate	mg/L	< 5	< 5	5	0
LG-13-02'	Alkalinity, Carbonate	mg/L	< 5	< 5	5	0
LG-13-02'	Hardness	mg/L	8	8	8	8
LG-13-02'	Total Dissolved Solids	mg/L	46	46	46	46
LG-13-02'	Total Suspended Solids	mg/L	< 5	< 5	5	0
LG-13-02'	Biological Oxygen Demand	mg/L	5	5	5	5
LG-13-02'	Chemical Oxygen Demand, Low Level	mg/L	28	28	28	28
LG-13-02'	Ammonia	mg/L	0.1	0.1	0.1	0.1
LG-13-02'	Nitrate	mg/L	< 0.5	< 0.5	0.5	0
LG-13-02'	Nitrogen, Total Kjeldahl	mg/L	0.5	0.5	0.5	0.5
LG-13-02'	Chloride	mg/L	< 1	< 1	1	0
LG-13-02'	Fluoride	mg/L	< 0.1	< 0.1	0.1	0
LG-13-02'	Sulfate	mg/L	4.6	4.6	4.6	4.6
LG-13-02'	Cyanide, total	ug/L	< 20	< 20	20	0
LG-13-02'	Oil & Grease	mg/L	< 4.6	< 4.6	4.6	0
LG-13-02'	Turbidity, Lab	NTU	1	1	1	1
LG-13-02'	Cations	Meq/L	0.17	0.17	0.17	0.17
LG-13-02'	Anions	Meq/L	0.1	0.1	0.1	0.1
LG-13-02'	Cation and Anion Balance	%	27.69	27.69	27.69	27.69
LG-13-02'	Boron, total	mg/L	< 0.1	< 0.1	0.1	0
LG-13-02'	Calcium, total	mg/L	2.4	2.4	2.4	2.4
LG-13-02'	Arsenic, total	mg/L	< 0.005	< 0.005	0.005	0
LG-13-02'	Barium, total	mg/L	0.22	0.22	0.22	0.22
LG-13-02'	Iron, dissolved	mg/L	0.1	0.1	0.1	0.1
LG-13-02'	Iron, total	mg/L	0.21	0.21	0.21	0.21
LG-13-02'	Manganese, dissolved	mg/L	0.025	0.025	0.025	0.025
LG-13-02'	Manganese, total	mg/L	0.04	0.04	0.04	0.04
LG-13-02'	Molybdenum, total	mg/L	< 0.02	< 0.02	0.02	0
LG-13-02'	Selenium, total	mg/L	< 0.005	< 0.005	0.005	0
LG-13-02'	Silver, total	mg/L	< 0.01	< 0.01	0.01	0
LG-13-02' (C)	Chromium, total (Low Level)	ug/L	0.321	0.321	0.321	0.321
LG-13-02'	Beryllium, total	mg/L	< 0.01	< 0.01	0.01	0
LG-13-02'	Thallium, total	mg/L	< 0.005	< 0.005	0.005	0
LG-13-02'	Nickel, total	mg/L	< 0.03	< 0.03	0.03	0
LG-13-02'	Antimony, total	mg/L	< 0.005	< 0.005	0.005	0
LG-13-02'	Magnesium, total	mg/L	0.6	0.6	0.6	0.6
LG-13-02'	Phosphorus, dissolved	mg/L	< 0.05	< 0.05	0.05	0
LG-13-02'	Phosphorus, total	mg/L	< 0.05	< 0.05	0.05	0
LG-13-02'	Potassium, total	mg/L	< 1	< 1	1	0
LG-13-02'	Sodium, total	mg/L	< 1	< 1	1	0
LG-13-02'	Sodium Absorption Ratio	std	0	0	0	0
LG-13-02' (C)	Aluminum, total	ug/L	177	177	177	177
LG-13-02' (C)	Cadmium, total	ug/L	0.151	0.151	0.151	0.151
LG-13-02' (C)	Copper, total	ug/L	1.07	1.07	1.07	1.07
LG-13-02' (C)	Lead, total	ug/L	1.62	1.62	1.62	1.62
LG-13-02' (C)	Mercury, total	ng/L	2.57	2.57	2.57	2.57
LG-13-02' (C)	Zinc, total	ug/L	8.26	8.26	8.26	8.26

(C) Sample Composited With LG-13-07

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
LG-13-07'	pH, Lab	S.U.	5.8	5.8	5.8	5.8
LG-13-07'	Alkalinity	mg/L	5	5	5	5
LG-13-07'	Alkalinity, Bicarbonate	mg/L	5	5	5	5
LG-13-07'	Alkalinity, Carbonate	mg/L	5	5	5	0
LG-13-07'	Hardness	mg/L	17	17	17	17
LG-13-07'	Total Dissolved Solids	mg/L	42	42	42	42
LG-13-07'	Total Suspended Solids	mg/L	5	5	5	0
LG-13-07'	Biological Oxygen Demand	mg/L	5	5	5	5
LG-13-07'	Chemical Oxygen Demand, Low Level	mg/L	32	32	32	32
LG-13-07'	Ammonia	mg/L	0.1	0.1	0.1	0.1
LG-13-07'	Nitrate	mg/L	0.5	0.5	0.5	0
LG-13-07'	Nitrogen, Total Kjeldahl	mg/L	0.7	0.7	0.7	0.7
LG-13-07'	Chloride	mg/L	1	1	1	0
LG-13-07'	Fluoride	mg/L	0.1	0.1	0.1	0
LG-13-07'	Sulfate	mg/L	4.9	4.9	4.9	4.9
LG-13-07'	Cyanide, total	ug/L	20	20	20	0
LG-13-07'	Oil & Grease	mg/L	4.6	4.6	4.6	0
LG-13-07'	Turbidity, Lab	NTU	1	1	1	1
LG-13-07'	Cations	Meq/L	0.36	0.36	0.36	0.36
LG-13-07'	Anions	Meq/L	0.18	0.18	0.18	0.18
LG-13-07'	Cation and Anion Balance	%	32.85	32.85	32.85	32.85
LG-13-07'	Boron, total	mg/L	0.2	0.2	0.2	0.2
LG-13-07'	Calcium, total	mg/L	2.5	2.5	2.5	2.5
LG-13-07'	Arsenic, total	mg/L	0.005	0.005	0.005	0
LG-13-07'	Barium, total	mg/L	0.11	0.11	0.11	0.11
LG-13-07'	Iron, dissolved	mg/L	0.16	0.16	0.16	0.16
LG-13-07'	Iron, total	mg/L	0.29	0.29	0.29	0.29
LG-13-07'	Manganese, dissolved	mg/L	0.032	0.032	0.032	0.032
LG-13-07'	Manganese, total	mg/L	0.11	0.11	0.11	0.11
LG-13-07'	Molybdenum, total	mg/L	0.02	0.02	0.02	0
LG-13-07'	Selenium, total	mg/L	0.005	0.005	0.005	0
LG-13-07'	Silver, total	mg/L	0.01	0.01	0.01	0
LG-13-07' (C)	Chromium, total (Low Level)	ug/L	0.321	0.321	0.321	0.321
LG-13-07'	Beryllium, total	mg/L	0.01	0.01	0.01	0
LG-13-07'	Thallium, total	mg/L	0.005	0.005	0.005	0
LG-13-07'	Nickel, total	mg/L	0.11	0.11	0.11	0.11
LG-13-07'	Antimony, total	mg/L	0.029	0.029	0.029	0.029
LG-13-07'	Magnesium, total	mg/L	2.6	2.6	2.6	2.6
LG-13-07'	Phosphorus, dissolved	mg/L	0.05	0.05	0.05	0
LG-13-07'	Phosphorus, total	mg/L	0.05	0.05	0.05	0
LG-13-07'	Potassium, total	mg/L	1	1	1	0
LG-13-07'	Sodium, total	mg/L	1	1	1	0
LG-13-07'	Sodium Absorption Ratio	std	0	0	0	0
LG-13-07' (C)	Aluminum, total	ug/L	177	177	177	177
LG-13-07' (C)	Cadmium, total	ug/L	0.151	0.151	0.151	0.151
LG-13-07' (C)	Copper, total	ug/L	1.07	1.07	1.07	1.07
LG-13-07' (C)	Lead, total	ug/L	1.62	1.62	1.62	1.62
LG-13-07' (C)	Mercury, total	ug/L	2.57	2.57	2.57	2.57
LG-13-07' (C)	Zinc, total	ug/L	8.26	8.26	8.26	8.26

(C) Sample Compositied With LG-13-02'

STATION	PARAMETER	Units	Minimum	Maximum	Mean (1)	Mean (2)
LG-15	pH (Field)	S.U.	4.81	5.96	5.4182	5.4182
LG-15	pH, Lab	S.U.	5.3	5.8	5.5	5.5
LG-15	Conductivity (Field)	umhos	11	59.2	22.691	22.691
LG-15	Conductivity, Lab	umhos	10.7	16.2	12.84	12.84
LG-15	Temperature (Field)	Degrees C	1.6	24.1	12.282	12.282
LG-15	Temperature (Field-DO Meter)	Degrees C	0.5	21	10.525	10.525
LG-15	Temperature (Field-DO Meter)-03'	Degrees C	1.1	21	9.4333	9.4333
LG-15	Dissolved Oxygen (Field)	%	0.9	8	4.8636	4.8636
LG-15	Dissolved Oxygen (Field)-03'	%	1.1	5.6	3.05	3.05
LG-15	Alkalinity	mg/L	5	15	9.2	5.1091
LG-15	Alkalinity, Bicarbonate	mg/L	5	15	9.2	5.1091
LG-15	Alkalinity, Carbonate	mg/L	0	0	2.7273	0
LG-15	Alkalinity, Hydroxide	mg/L	0	0	1.4286	0
LG-15	Hardness	mg/L	5	14	8.1	6.7364
LG-15	Total Dissolved Solids	mg/L	15	62	39.727	39.727
LG-15	Total Suspended Solids	mg/L	5	11	5.6	1.1
LG-15	Biological Oxygen Demand	mg/L	2	15	6.7273	5.4545
LG-15	Chemical Oxygen Demand	mg/L	33	50	40.4	40.4
LG-15	Chemical Oxygen Demand, Low Level	mg/L	29	95	58.5	58.5
LG-15	Ammonia	mg/L	0.1	0.336	0.1609	0.1245
LG-15	Nitrate	mg/L	0.5	0.5	0.5	0
LG-15	Nitrogen, Total Kjeldahl	mg/L	0.6	2.5	1.2698	1.2698
LG-15	Chloride	mg/L	1	2	1.1818	0.3636
LG-15	Fluoride	mg/L	0.1	0.175	0.1068	0.0159
LG-15	Sulfate	mg/L	1	11	5.85	5.65
LG-15	Cyanide, total	ug/L	20	20	20	0
LG-15	Oil & Grease	mg/L	1	6.4	3.1364	0.5818
LG-15	Turbidity, Lab	NTU	0.85	8.2	2.5278	2.5278
LG-15	Cations	Meq/L	0.056	0.39	0.1353	0.1353
LG-15	Anions	Meq/L	0	0.4	0.2015	0.2015
LG-15	Cation and Anion Balance	%	-60	100	-5.336	-5.336
LG-15	Boron, total	mg/L	0.1	0.2	0.1091	0
LG-15	Calcium, total	mg/L	1.1	3.7	1.6455	1.6455
LG-15	Arsenic, total	mg/L	0.005	0.005	0.005	0
LG-15	Barium, total	mg/L	0.01	0.026	0.0125	0.0052
LG-15	Iron, dissolved	mg/L	0.1	0.4	0.1826	0.1645
LG-15	Iron, total	mg/L	0.106	0.74	0.2425	0.2425
LG-15	Manganese, dissolved	mg/L	0.03	0.29	0.1139	0.1139
LG-15	Manganese, total	mg/L	0.04	0.28	0.1185	0.1185
LG-15	Molybdenum, total	mg/L	0.02	0.02	0.02	0
LG-15	Selenium, total	mg/L	0.005	0.005	0.005	0
LG-15	Silver, total	mg/L	0.01	0.01	0.01	0
LG-15	Chromium, total	mg/L	0.02	0.02	0.02	0
LG-15	Chromium, total (Low Level)	ug/L	0.27	0.502	0.3311	0.2793
LG-15	Beryllium, total	mg/L	0.005	0.01	0.0077	0
LG-15	Thallium, total	mg/L	0.005	0.005	0.005	0
LG-15	Nickel, total	mg/L	0.03	0.03	0.03	0
LG-15	Antimony, total	mg/L	0.005	0.005	0.005	0
LG-15	Magnesium, total	mg/L	0.5	0.9	0.5555	0.1464
LG-15	Phosphorus, dissolved	mg/L	0.05	0.055	0.0358	0.0131
LG-15	Phosphorus, total	mg/L	0.05	0.301	0.0736	0.06
LG-15	Potassium, total	mg/L	0.6	5.2	1.7473	1.5473
LG-15	Sodium, total	mg/L	1	1	1	0
LG-15	Sodium Absorption Ratio	std	0	0	0	0
LG-15	Aluminum, total	ug/L	36.9	182	74.227	74.227
LG-15	Cadmium, total	ug/L	0.006	0.011	0.0063	0.0047
LG-15	Copper, total	ug/L	0.25	0.907	0.4625	0.4625
LG-15	Lead, total	ug/L	0.12	0.289	0.1985	0.1985
LG-15	Mercury, total	ng/L	1.26	3.29	2.0918	2.0918
LG-15	Zinc, total	ug/L	3.32	6.64	4.9482	4.9482

Appendix 3.7-9

Surface Water Laboratory Data Reports Corresponding to Data Collected Between 1993 and 1997

- Surface Water Data Corrections Summary
- Correspondence with PACE Environmental Laboratory
- November 1993 Surface Water Laboratory Data
- December 1993 Surface Water Laboratory Data
- January 1994 Surface Water Laboratory Data
- February 1994 Surface Water Laboratory Data
- March 1994 Surface Water Laboratory Data
- April 1994 Surface Water Laboratory Data
- April 1994 High Flow Event Surface Water Laboratory Data
- May 1994 Surface Water Laboratory Data
- June 1994 Surface Water Laboratory Data
- July 1994 Surface Water Laboratory Data
- August 1994 Surface Water Laboratory Data
- September 1994 Surface Water Laboratory Data
- September 1994 High Flow Event Surface Water Laboratory Data
- October 1994 Surface Water Laboratory Data
- November 1994 Single Event Sampling Surface Water Laboratory Data
- November-December 1994 Surface Water Laboratory Data
- January 1995 Surface Water Laboratory Data
- January-February-March 1995 Surface Water Laboratory Data
- April 1995 Surface Water Laboratory Data
- December 1997 Surface Water Laboratory Data

(Note: The information in the database has undergone several levels of review during the course of this project. As a result of these reviews, the laboratory was asked to verify certain laboratory results. In most cases, the laboratory verified the results as originally reported, while in a limited number of cases the reported results were corrected. The database contains the verified and corrected laboratory results, while the laboratory results sheets in this appendix do not. A summary of those data which were corrected is included in the beginning of this appendix, which contains the results sheets received from the laboratory.)

Surface Water Data Corrections Summary

**Surface Water Data Corrections
Summary
Crandon Project**

Sample Point	Month/ Year	Analyte	Corrected Result (mg/l)
LG-07	Apr 94	Chloride	<1
LG-07	May 94	Chloride	1
LG-07	Jun 94	Chloride	1
LG-07	Jul 94	Chloride	1
LG-07	Aug 94	Chloride	1
LG-09	Apr 94	Chloride	<1
LG-09	Jul 94	Chloride	1
LG-11	Apr 94	Chloride	<1
LG-11	May 94	Chloride	1
LG-11	Jun 94	Chloride	1
LG-11	Jul 94	Chloride	1
LG-11	Aug 94	Chloride	1
LG-12	Apr 94	Chloride	<1
LG-12	May 94	Chloride	1
LG-12	Jun 94	Chloride	<1
LG-12	Jul 94	Chloride	<1
LG-12	Aug 94	Chloride	<1
LG-13	Apr 94	Chloride	<1
LG-13	May 94	Chloride	<1
LG-13	June 94	Chloride	<1
LG-13	July 94	Chloride	<1
LG-13	Aug 94	Chloride	<1
LG-13	Apr 94	Chloride	<1
LG-13	May 94	Chloride	<1
LG-13	Jun 94	Chloride	<1
LG-13	Jul 94	Chloride	<1
LG-13	Aug 94	Chloride	<1
LG-15	Apr 94	Chloride	<1
LG-15	May 94	Chloride	<1

Sample Point	Month/ Year	Analyte	Corrected Result (mg/l)
LG-15	Jun 94	Chloride	<1
LG-15	Jul 94	Chloride	<1
LG-15	Aug 94	Chloride	<1
SG-02	Apr 94	Chloride	3
SG-02	May 94	Chloride	3
SG-02	Jun 94	Chloride	3
SG-02	Jul 94	Chloride	2
SG-02	Aug 94	Chloride	2
SG-03	Apr 94	Chloride	3
SG-03	May 94	Chloride	3
SG-03	Jun 94	Chloride	3
SG-03	Jul 94	Chloride	2
SG-03	Aug 94	Chloride	2
SG-04	Apr 94	Chloride	5
SG-04	Jul 94	Chloride	5
SG-05A	Apr 94	Chloride	2
SG-05A	Jul 94	Chloride	1
SG-06	Apr 94	Chloride	1
SG-06	May 94	Chloride	1
SG-06	Jun 94	Chloride	1
SG-06	Jul 94	Chloride	1
SG-06	Aug 94	Chloride	1
SG-19	Apr 94	Chloride	1
SG-19	May 94	Chloride	1
SG-19	Jun 94	Chloride	1
SG-19	Jul 94	Chloride	1
SG-19	Aug 94	Chloride	1
SG-30	Apr 94	Chloride	1
SG-30	May 94	Chloride	1
SG-30	Jun 94	Chloride	1
SG-30	July 94	Chloride	1
SG-30	Aug 94	Chloride	<1

Sample Point	Month/ Year	Analyte	Corrected Result (mg/l)
SG-AB	Dec 93	Chloride	3
SG-AB	Jan 94	Chloride	3
SG-AB	Feb 94	Chloride	3
SG-AB	Mar 94	Chloride	3
SG-AB	Apr 94	Chloride	3
SG-AB	May 94	Chloride	4
SG-AB	Jun 94	Chloride	3
SG-AB	July 94	Chloride	3
SG-AB	Aug 94	Chloride	3
SG-CC	Nov 93	Chloride	3
SG-CC	Dec 93	Chloride	3
SG-CC	Jan 94	Chloride	3
SG-CC	Feb 94	Chloride	3
SG-CC	Mar 94	Chloride	3
SG-CC	Apr 94	Chloride	3
SG-CC	May 94	Chloride	3
SG-CC	Jun 94	Chloride	3
SG-CC	Jul 94	Chloride	3
SG-CC	Aug 94	Chloride	2
SG-E	Apr 94	Chloride	2
SG-E	May 94	Chloride	2
SG-E	Jun 94	Chloride	2
SG-E	Jul 94	Chloride	2
SG-E	Aug 94	Chloride	2
SG-V	Nov 93	Chloride	4
SG-V	Dec 93	Chloride	3
SG-V	Jan 94	Chloride	3
SG-V	Feb 94	Chloride	3
SG-V	Mar 94	Chloride	3
SG-V	Apr 94	Chloride	3
SG-V	May 94	Chloride	3
SG-V	Jun 94	Chloride	3

Sample Point	Month/ Year	Analyte	Corrected Result (mg/l)
SG-V	Jul 94	Chloride	3
SG-V	Aug 94	Chloride	3
SG-Y	Nov 93	Chloride	3
SG-Y	Dec 93	Chloride	2
SG-Y	Jan 94	Chloride	3
SG-Y	Feb 94	Chloride	3
SG-Y	Mar 94	Chloride	3
SG-Y	Apr 94	Chloride	3
SG-Y	May 94	Chloride	3
SG-Y	Jun 94	Chloride	2
SG-Y	Jul 94	Chloride	2
SG-Y	Aug 94	Chloride	2

Prepared by: RTJ
Checked by: AWZ

Correspondence with PACE Environmental Laboratory

- March 21, 1995
- July 6, 1995
- October 23, 1995

March 21, 1995

Mr. Russell Janeshek
Foth & Van Dyke
2737 S. Ridge Rd.
Green Bay, WI 54307-9012

**Re: Crandon Mining Company Project - Sept. 1994 Surface Water Samples
Response to Data Validation Comments**

Dear Mr. Janeshek:

Samples SG-30, SG-6, SG-2, SG-3, SG-E -> Phosphorous Results The target detection limit (TDL) in the QAPP is set at 0.05 mg/L. The reported positive detects are below this limit and should not have been reported. "ND" should have been reported in these situations. The positive detects reported are between the MDL and TDL for NLS. The difference between the MDL and TDL is not very large.

Sample LG-15-02 -> Phosphorous Results The issue raised in validation was the fact that the total result was lower than the soluble result. Both values are below the TDL and an "ND" (not detected) should have been reported for both results. The results are just barely above the MDL.

Sample LG-15-01 -> Oil & Grease Result The reported oil & grease value (6.4 mg/L) is in the region of less certain quantitation, just above the MDL. For this sample, the reported value is less than twice the MDL of 4.6 mg/L. (The MDL was incorrectly reported as 1 mg/L.) This result is low for the method. At this level, it does not take much mass to register a "hit". Please note that the method blank and spike recovery for the batch were within QC acceptance ranges. Hits in the blank can occur if glassware is not scrupulously cleaned. Again, I want to emphasize that any "bubble" or mass of Oil & Grease can register as a positive detect at this level.

Sample LG-12 -> Manganese Result It is ideal for the total result to be greater than the dissolved result, however, it is not uncommon for some low level results to be "backwards". Confidence in data decreases at or near the detection limit. The difference between 10 ppb and 14 ppb is less than the detection limit for the instrument (ICP). To gain more confidence at this level, an alternate analytical technique is required (e.g., GFAA as opposed to ICP).

Mr. Russell Janeshek
Foth & Van Dyke
4/26/95
Page 2

Manganese is a very common element that can appear as laboratory/field contamination. The dissolved and total fractions are in separate sample containers. The total fraction is preserved in the field while the dissolved fraction is not created until the unpreserved sample portion arrives at the laboratory. The dissolved fraction is passed through filtration equipment and placed in a preserved sample bottle. The dissolved fraction inherently has a greater chance of experiencing contamination. Please note that the supporting QC for this batch is compliant and does not indicate any sample preparation or instrument operation errors. Given this information, these three anomalous events should not be viewed as significant and the manganese data considered valid.

Nitrate LCS Recovery A 0% recovery was incorrectly reported as the recovery for the laboratory control sample (LCS). The actual recovery is 96%. This result is documented in the raw data on page 200001.

Definition of "MI" "MI" is the abbreviation for matrix interference. The initial analysis of the footnoted samples indicated a high hardness concentration. The samples were reanalyzed, treating the samples as high level. However, the reanalysis indicated the samples were low level. Additional attempts reproduced the inconsistent results. It is suspected that a "buffering situation" existed in the samples as an obstacle towards obtaining a precise and/or accurate endpoint in the titration.

If you have any questions or require additional information after reading this letter, please contact me at (612) 525-3454, and I will work with you to resolve your concerns.

Sincerely,

Steven R. Crupi

Steven R. Crupi
Project Manager

cc: Steve Timmerman, PACE

July 6 1995

Mr. Russell Janeshek
Foth & Van Dyke
2737 S. Ridge Rd.
Green Bay, WI 54307-9012

Re: Crandon Mining Project Response Data Inquiries
PACE Project 941005505, Samples 23172.0, 23171.1
PACE Project 950324512

Dear Mr. Janeshek:

Samples 23172.0 (SG-3) and 23171.1 (SG-2) - The reported copper values of 1.48 µg/L and 6.99 µg/L, respectively, are correct and supported by the Battelle raw data package submitted with the report. The associated control spike and matrix spike recoveries are within quality control (QC) limits. The relative percent differences (RPDs) for the replicate analyses of samples LG-7 and LG-15-02 are 18 and 60, respectively. The latter RPD is outside of the QC limits. The outlier is probably related to the sample matrix of LG-15-02 since the control spike recoveries and matrix spike recoveries are consistent. Unfortunately, a matrix spike recovery of sample LG-15-02 is not available.

It is suspected that the higher than expected concentration is matrix related, based on the available information.

Project 950324512 - Northern Lake Service performed the TDS analyses.

At the time of analysis, the control limits for replicates were 20% for sample concentrations of 0 - 200 mg/L, 8% for sample concentrations of 200-500 mg/L, and 5% for sample concentrations greater than 500 mg/L. Since the concentrations of the samples listed on the validation request were less than 200 mg/L, the 20% control limit applied at the time of analysis. The replicate analyses were compliant with this control limit.

If you have any questions or require additional information, please contact Tim Parsons at (612) 525-3384.

Sincerely,

Steven R. Crupi

Steven R. Crupi
Project Manager

MEMOOctober 23, 1995

TO: Russ Janesheck

FROM: Tim Parsons

RE: C.M.C. Surface Water Data Review/Verification

LG-07 Oct-94

Total Dissolved Solid; The result of 6.0 was verified in the raw data.

LG-07 Nov-94

Hardness; The reported result of 220 is incorrect. The result should be reported as <5 .

LG-07 Jan-95

Manganese, dissolved; The result of 0.014 was verified in the raw data.

Manganese, total; The result of <0.010 was verified in the raw data.

LG-07-10 Mar-95

Iron, dissolved; The reported result of 0.74 is incorrect. The result should be reported as 0.074 .

LG-07-2 Mar-95

Barium, total; The result of 0.40 was verified in the raw data.

LG-11 Jan-95

Chemical Oxygen Demand, Low Level; The reported result of 51 was verified in the raw data.

LG-11-33 Mar-95

Manganese, dissolved; The reported result of 0.67 was verified in the raw data.

Manganese, total; The reported result of 0.057 was verified in the raw data.

LG-15 Feb-95

Total Dissolved Solids; The reported result of 46 was verified in the raw data.

LG-15 Mar-95

Total Dissolved Solids; The reported result of 34 was verified in the raw data.

LG-15 Oct-94, Nov-94

Copper, total; This is ICP-MS data from Battelle. The results of 0.794 and 0.415 were verified in the raw data.

LG-24-40 Mar-95

Barium, total; The result of 0.024 was verified in the raw data.

SG-03 Oct-94

Copper, total; The result of 1.48 was verified in the raw data.

SG-06 Jan-95

Manganese, dissolved; The result of 0.017 was verified in the raw data.

Manganese, total; The result of <0.010 was verified in the raw data.

SG-19 Feb-95

Alkalinity, Bicarbonate; The reported result of 150 is incorrect. The result should be reported as 120 .

SG-19 Sep94-1

Phosphorus, total; The reported result of 0.035 is incorrect. The result should be reported as <0.05 .

Phosphorus, dissolved; The reported result of 0.018 is incorrect. The result should be reported as <0.05 .

SG-30 Nov-94

Cation and Anion Balance; The result of 95.02 was verified in the raw data.

SG-AB Sep-94-1

Cation and Anion Balance; The result of 92.73 was verified in the raw data.

SG-CC Oct-94

Total Dissolved Solids; The result of 6.0 was verified in the raw data (NLS data).

SG-E Oct-94

Iron, total; The result of 0.037 is reported incorrectly. The reported result should be <0.050 .

SG-E Nov-94

Iron, dissolved; The result of 0.058 was verified in the raw data.

Iron, total; The result of <0.050 was verified in the raw data.

SG-V Sep-94-2

Ammonia; NLS reported a result of 0.040. The result of < 0.2 could be changed to <0.1 .

Nitrate; The result of <0.042 was verified in the raw data. A narrative was attached to the report explaining how a different nitrate procedure was performed. The narrative also explains why hardness is missing for SG-E. The narrative is attached.

General Comments

All potassium data should be reported to a detection limit of 1.0 ppm.

Data missing for Alkalinity, Hydroxide could be filled in with the result of <5 .

All beryllium data should be reported with two significant figures. <0.010 .

All boron data should have been reported with two significant figures. <0.10 .

Discrepancies between total and dissolved metals (dissolved greater than total) results are present but not severe or widespread. Total and dissolved fractions are two distinct samples that are exposed to different bottles, preservatives and laboratory equipment. Iron and manganese are ubiquitous and therefore difficult to eliminate as field and laboratory contaminants. Many of the discrepancies involve data that is at or near the detection limit of the instrument. An example would be SG-06 Jan-95 manganese data of <0.010 and 0.017 ppm. Data confidence decreases as the detection limit is approached. Detection limits are the standard deviation of the "noise" of the instrument. These discrepancies should be considered insignificant and attributed to the nature of the element and the limits of the instrumentation used to measure the concentration of the element.

November 1993
Surface Water Laboratory Data



An ETC Laboratory

320 Tesconi Circle

Suite G

Santa Rosa, CA
95401

Telephone
(707) 544-5570

Facsimile
(707) 544-4906

July 14, 1994

CLIENT: FOTH & VAN DYKE
P.O. BOX 19012
2737 S. RIDGE ROAD
GREEN BAY, WI 54307-9012

ATTN: RUSS JANESHEK

JOB LINK: 810046
PROJECT: SW SAMPLING

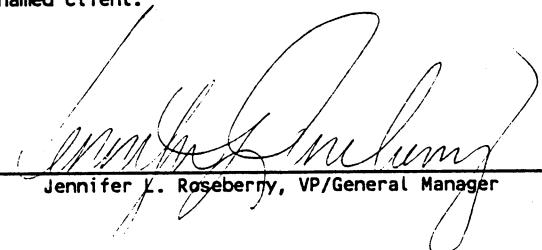
ANALYSIS

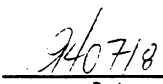
EPA METHOD 200 SERIES - METALS

CONVENTIONALS: ALKALINITY AS CaCO_3 ; ALKALINITY, BICARBONATE CaCO_3 ;
ALKALINITY, CARBONATE AS CaCO_3 ; AMMONIA AS N; ANIONS; BIOCHEMICAL OXYGEN DEMAND;
CATION AND ANION BALANCE; CATIONS; CHEMICAL OXYGEN DEMAND (COD); CHLORIDE;
CONDUCTIVITY; CYANIDE, TOTAL; FLUORIDE; HARDNESS AS CaCO_3 ; NITRATE AS N;
NITROGEN, TOTAL KJELDAHL (TKN); OIL AND GREASE, (IR); PH; PHOSPHORUS;
PHOSPHORUS AS P, DISSOLVED; SODIUM ABSORPTION RATIO (SAR); SOLIDS, TOTAL SUSPENDED;
SULFATE AS SO_4 ; TOTAL DISSOLVED SOLIDS (TDS); TURBIDITY

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE DATE</u>	<u>DATE IN LAB</u>
MF0782	SG-CC-01	LIQUID	11-29-93	12-01-93
MF0783	SG-CC-02	LIQUID	11-29-93	12-01-93
MF0784	SG-Y	LIQUID	11-29-93	12-01-93
MF0785	SG-V	LIQUID	11-29-93	12-01-93
MF0786	SG-CC-01	LIQUID	11-29-93	12-01-93
MF0787	SG-CC-02	LIQUID	11-29-93	12-01-93
MF0788	SG-Y	LIQUID	11-29-93	12-01-93
MF0789	SG-V	LIQUID	11-29-93	12-01-93
MF0790	SG-CC-01	LIQUID	11-29-93	12-01-93
MF0791	SG-CC-02	LIQUID	11-29-93	12-01-93
MF0792	SG-Y	LIQUID	11-29-93	12-01-93
MF0793	SG-V	LIQUID	11-29-93	12-01-93
MF0998	SG-CC-01	LIQUID	11-29-93	12-01-93
MF0999	SG-CC-02	LIQUID	11-29-93	12-01-93
MF1000	SG-Y	LIQUID	11-29-93	12-01-93
MF1001	SG-V	LIQUID	11-29-93	12-01-93
MF1383	QCCHARGES	NOT APPLICABLE	NOT APPLICABLE	12-01-93
MF1384	BOTTLES	NOT APPLICABLE	NOT APPLICABLE	12-01-93

This report is "PROPRIETARY AND CONFIDENTIAL" and delivered to, and intended for the exclusive use of the above named client only. ETC, a Division of APBI Environmental Sciences Group, Inc. assumes no responsibility or liability for the reliance hereon or use hereof by anyone other than the above named client.


Jennifer L. Roseberry, VP/General Manager


Date

3.7-9-10

REVISÉ



FOTH & VAN DYKE
JULY 18, 1994
810046 AMENDED

SAMPLE MATRIX: LIQUID

<u>Parameter</u>	<u>EPA Prep Method</u>	<u>EPA Analysis Method</u>
ICP Metals	3015	200.7
Total Aluminum*	NA	200.8
Total Antimony	3015	204.2
Total Arsenic	3015	206.2
Total Cadmium*	**	200.8
Total Copper*	**	200.8
Total Lead*	**	200.8
Total Mercury*	‡	‡
Total Selenium	3015	270.2
Total Thallium	3015	279.2
Total Zinc*	NA	200.9m
Alkalinity as CaCO3	NA	310.1
Alkalinity, Hydroxide as CaCO3	NA	310.1
Bicarbonate as CaCO3	NA	310.1
Carbonate Alkalinity as CaCO3	NA	310.1
Ammonia as N	350.2	350.2
Anions	CALC.	CALC.
Cation & Anion Balance	CALC.	CALC.
Cations	CALC.	CALC.
Chemical Oxygen Demand	NA	410.4
Chloride	NA	300.0
Conductivity	NA	9050
Total Cyanide	9010	9010
Fluoride	NA	340.2
Hardness as CaCO3	NA	130.2
Nitrate as N	NA	300.0
Total Kjeldahl Nitrogen	351.3	351.3
Oil & Grease	9070	413.2
pH	NA	9040
Phosphorus	365.3	365.3
Phosphorus as P, Dissolved	365.3	365.3
Sodium Absorptions Ratio (SAR)	CALC.	CALC.
Total Suspended Solids	NA	160.2
Sulfate as SO4	NA	300.0
Total Dissolved Solids	NA	160.1
Turbidity	NA	180.1
Biochemical Oxygen Demand**	405.1	405.1

* ANALYSES PERFORMED BY BATTELLE MARINE SCIENCES LAB

** PREP METHOD APDC EXTRACTION

‡ COLD VAPOR ATOMIC FLUORESCENCE

** ANALYSIS PERFORMED BY WARZYN INC

ns



FOTH & VAN DYKE
14 JULY 1994

**EXECUTIVE SUMMARY
ETC JOBLINK 810046
(THIRD AMENDED REPORT)**

On 01 December 1993 ETC-Santa Rosa received samples SG-CC-01, SG-CC-02, SG-Y, and SG-V from Foth & Van Dyke via Federal Express. The cooler temperatures were both 0°C upon receipt at the laboratory. The original report was dated 30 December 1993; an addendum was submitted on 02 February containing results for low level metals analyses performed by Batelle.

Samples were filtered at the laboratory through a 0.45 µm filter prior to analysis for iron, manganese, and phosphorus; these results reflect dissolved parameters. Phosphorus was also analyzed without filtration; these results reflect total parameters.

Samples SG-CC-01, SG-CC-02, SG-Y, and SG-V were received past the method-recommended holding time for pH analysis.

Low level metals analyses were performed by Batelle; Biochemical Oxygen Demand (BOD) analyses were performed by Warzyn.

CALCULATIONS:

Results for Sodium Absorption Ratio (Modified SAR), Cations, Anions, and Cation and Anion Balance were obtained by calculation using analytical data. The Cations reflect results for Calcium, Magnesium, Potassium, and Sodium; the Anions reflect results for Chloride, Fluoride, Nitrate, Sulfate, Carbonate, and Bicarbonate.

LOW LEVEL METALS ANALYSES:

Direct analysis of water by ICP-MS was used for Aluminum. For the analysis of Cadmium, Copper, and Lead, a preconcentration step was followed by quantification using ICP-MS. Mercury was analyzed by cold vapor atomic fluorescence. Zinc was originally analyzed by ICP-MS; at the recommendation of Batelle, it was re-analyzed using direct graphite furnace atomic absorption. Results of the Zinc re-analysis are included with this amended report.

The QC samples included three standard reference materials (QC Spikes), two matrix spikes and one duplicate. Only one QC Spike is reported for each analyte on the tabled QC; for cases where there is data for more than one QC spike or matrix spike, recovery information may be obtained from raw data copies included herein. The results for QC Spikes were near the certified range. The matrix spike recovery for Cadmium was slightly outside the criteria of 75% to 125% recovery. Mercury was not analyzed in duplicate due to lack of sample volume. The relative percent difference (RPD) for Zinc was slightly greater than the criteria of +/- 25% for the re-analysis.

Batelle originally reported blank-corrected results; at the request of Foth & Van Dyke, the data reported herein is not blank-corrected.

FIRST AMENDED REPORT:

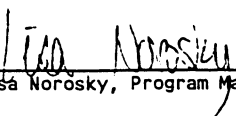
At the request of the client, samples SG-CC-01 and SG-CC-02 were re-analyzed for Ammonia and Total Kjeldahl Nitrogen; results of the re-analysis are included with this amended report. There was insufficient sample remaining to re-analyze sample SG-V as requested. Detection limits for Phosphorus and dissolved Phosphorus analyses were originally reported at 0.10 mg/L; these have been corrected to 0.05 mg/L for samples SG-CC-01 and SG-CC-02, and to 0.06 mg/L for sample SG-V.

SECOND AMENDED REPORT:

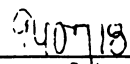
At the recommendation of Batelle and under the direction of Russ Janeshek, this amended report is submitted to include results for Zinc using the GFAA method of analysis.

THIRD AMENDED REPORT:

At the request of the client, each sample point was modified to include "SG" at the start of the identifier. Additionally, duplicate samples were modified to include "-01" or "-02" at the end of the identifier.


Lisa Norosky, Program Manager

3.7-9-12


Date

Joblink: 810046

DATA SUMMARY REPORT

DATE: 07/14/94

PAGE: 1

Company: FOTH & VAN DYKE

Sample Point ID:	SG-CC-01	SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02	SG-CC-02	SG-V	SG-V
ETC Sample Number:	MF0782	MF0786	MF0790	MF0783	MF0787	MF0791	MF0785	MF0789
Sample Date:	931129	931129	931129	931129	931129	931129	931129	931129
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD 200 SERIES - METALS (AR08)

Antimony, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Arsenic, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Barium, Total	mg/L	.011	-	-	.011	-	-	.011	-
Beryllium, Total	mg/L	<.001	-	-	<.001	-	-	<.001	-
Boron, Total	mg/L	.112	-	-	.124	-	-	.123	-
Calcium, Total	mg/L	18.8	-	-	19.1	-	-	25.2	-
Chromium, Total	mg/L	<.020	-	-	<.020	-	-	<.020	-
Iron, Total	mg/L	.358	-	-	.359	-	-	.296	-
Magnesium, Total	mg/L	8.49	-	-	8.54	-	-	11.4	-
Manganese, Total	mg/L	.035	-	-	.036	-	-	.038	-
Molybdenum, Total	mg/L	<.020	-	-	<.020	-	-	<.020	-
Nickel, Total	mg/L	<.030	-	-	<.030	-	-	<.030	-
Potassium, Total	mg/L	<1.00	-	-	<1.00	-	-	<1.00	-
Selenium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Silver, Total	mg/L	<.010	-	-	<.010	-	-	<.010	-
Sodium, Total	mg/L	2.57	-	-	2.59	-	-	2.91	-
Thallium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Aluminum, Total	ug/L	-	20.8	-	-	20.2	-	-	18.3
Cadmium, Total	ug/L	-	.032	-	-	.025	-	-	.024
Copper, Total	ug/L	-	.236	-	-	.249	-	-	.222
Lead, Total	ug/L	-	.149	-	-	.148	-	-	.126
Mercury, Total	ug/L	-	.002	-	-	.002	-	-	.002
Zinc, Total	ug/L	-	1.04	-	-	1.78	-	-	.890
Iron	mg/L	-	-	.226	-	-	.224	-	-
Manganese	mg/L	-	-	.023	-	-	.024	-	-

3.7-9-13

Joblink: 810046

DATA SUMMARY REPORT

DATE: 07/14/94

Company: FOTH & VAN DYKE

PAGE: 2

Sample Point ID:	SG-V	SG-Y	SG-Y	SG-Y
ETC Sample Number:	MF0793	MF0784	MF0788	MF0792
Sample Date:	931129	931129	931129	931129
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters	Units
------------	-------

EPA METHOD 200 SERIES - METALS (AR08)

Antimony, Total	mg/L	-	<.005	-	-
Arsenic, Total	mg/L	-	<.005	-	-
Barium, Total	mg/L	-	.011	-	-
Beryllium, Total	mg/L	-	<.001	-	-
Boron, Total	mg/L	-	.126	-	-
Calcium, Total	mg/L	-	14.4	-	-
Chromium, Total	mg/L	-	<.020	-	-
Iron, Total	mg/L	-	.377	-	-
Magnesium, Total	mg/L	-	6.31	-	-
Manganese, Total	mg/L	-	.030	-	-
Molybdenum, Total	mg/L	-	<.020	-	-
Nickel, Total	mg/L	-	<.030	-	-
Potassium, Total	mg/L	-	<1.00	-	-
Selenium, Total	mg/L	-	<.005	-	-
Silver, Total	mg/L	-	<.010	-	-
Sodium, Total	mg/L	-	2.43	-	-
Thallium, Total	mg/L	-	<.005	-	-
Aluminum, Total	ug/L	-	-	21.8	-
Cadmium, Total	ug/L	-	-	.032	-
Copper, Total	ug/L	-	-	.360	-
Lead, Total	ug/L	-	-	.166	-
Mercury, Total	ug/L	-	-	.002	-
Zinc, Total	ug/L	-	-	1.26	-
Iron	mg/L	.167	-	-	.273
Manganese	mg/L	.026	-	-	.020

3.7-9-14

Joblink: 810046

DATA SUMMARY REPORT

DATE: 07/14/94

Company: FOTH & VAN DYKE

PAGE: 3

Sample Point ID:	SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02	SG-V	SG-V	SG-Y	SG-Y
ETC Sample Number:	MF0782	MF0998	MF0783	MF0999	MF0785	MF1001	MF0784	MF1000
Sample Date:	931129	931129	931129	931129	931129	931129	931129	931129
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Oil and Grease, (IR)	mg/L	<1.01	-	<1.02	-	<1.02	-	<1.01	-
pH	std	7.30	-	7.30	-	7.20	-	7.50	-
Fluoride	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Chloride	mg/L	2.93	-	3.16	-	3.59	-	2.83	-
Nitrate as N	mg/L	.774	-	.781	-	.821	-	<.500	-
Sulfate as SO4	mg/L	4.45	-	4.38	-	5.15	-	3.61	-
Alkalinity as CaCO3	mg/L	77.0	-	74.0	-	100	-	54.0	-
Hardness as CaCO3	mg/L	83.3	-	84.3	-	113	-	64.3	-
Conductivity	umhos	158	-	160	-	207	-	122	-
Chemical Oxygen Demand (COD)	mg/L	29.0	-	<20.0	-	<20.0	-	32.0	-
Phosphorus	mg/L	<.050	-	.327	-	1.11	-	.767	-
Solids, total suspended	mg/L	<5.00	-	<5.00	-	<5.00	-	<5.00	-
Total Dissolved Solids (TDS)	mg/L	97.0	-	87.0	-	127	-	74.0	-
Turbidity	NTU	1.62	-	1.13	-	1.65	-	1.34	-
Phosphorus as P, dissolved	mg/L	<.050	-	<.050	-	<.063	-	.175	-
Alkalinity, Bicarbonate CaCO3	mg/L	77.0	-	74.0	-	100	-	54.0	-
Alkalinity, Carbonate as CaCO3	mg/L	<5.00	-	<5.00	-	<5.00	-	<5.00	-
Sodium Absorption Ratio (SAR)	std	.124	-	.124	-	.121	-	.134	-
Cations	meq/l	1.75	-	1.77	-	2.32	-	1.34	-
Anions	meq/l	1.45	-	1.41	-	1.86	-	1.04	-
Cation and Anion Balance	%	9.32	-	11.4	-	11.0	-	12.7	-
Ammonia as N	mg/L	1.47	-	1.37	-	.446	-	.672	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	2.58	-	1.99	-	.560	-	7.00	-
Biochemical Oxygen Demand	mg/L	-	2.00	-	2.00	-	1.00	-	2.00

3.7-9-15

ETC

CHAIN-OF-CUSTODY RECORD

810046

Form 0019
Field Technical Services
Rev. 11/91

No. 113219

Environmental Testing and Certification Corp. • 284 Raritan Center Parkway • Edison, NJ 08818 • 908-225-6700

COMPANY FOTH + VAN DYKE		FACILITY/SITE CRANDON MINING Co 93C049		NUMBER OF CONTAINERS FILT. (Y/N) PRESERV. ANALYSIS REQUIRED SEE ATTACHMENT		LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₄ + H ₂ SO ₄	
PROJECT CONTACT RUSS JANESHEK		TELEPHONE NO. 414-497-2500					
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT				
1		R	C.C.	11/29/93	1035	Source Codes: Well (W) Outfall (O) Soil (S) River/Stream (R)	
2		R	C.C.-2		1100	Bottom Sediment (B)	
3		R	Y		1300	Generation Point (G)	
4		R	V		1430	Surface Impoundment (I)	
5						Treatment Facility (T)	
6						Leachate Collection Sys (C)	
7						Lake/Ocean (L)	
8						Other (X)	
9						Specify	

CHAIN OF CUSTODY CHRONICLE

1	Shuttle Opened By: (print) <u>SCOTT JANSSEN</u>	Date: <u>11/29/93</u>	Time: _____
	Signature: <u>Scott Janssen</u>	Seal #: <u>64625</u>	Intact: <u>YES</u>
I have received these materials in good condition from the above person			
2	Name: _____	Signature: _____	
	Date: _____	Time: _____	Remarks: _____
I have received these materials in good condition from the above person			
3	Name: _____	Signature: _____	
	Date: _____	Time: _____	Remarks: _____
4	Shuttle Sealed By: (print) <u>SCOTT JANSSEN</u>	Date: <u>11/30/93</u>	Time: <u>1100</u>
	Signature: <u>Scott Janssen</u>	Seal #: <u>65510</u>	Intact: <u>YES</u>
LAB USE ONLY Opened By: <u>Julius</u> Date: <u>12/1/93</u> Time: <u>0940</u>			
SHUTTLE # _____ TEMP. °C <u>8.343</u> SEAL # <u>65510</u> COND. <u>GOOD</u>			

REMARKS

DISSOLVED IRON + MANGANESE
MUST BE FILTERED IN lab BEFORE PRESERVING.

SAMPLER'S SIGNATURE

Scott Janssen

3.7-9-16



No 015122

CHAIN OF CUSTODY RECORD

PROJECT NO.		PROJECT NAME		No. OF CONTAINERS	REMARKS
CITY & STATE					
930048 3021300 206		CRANDON MINING Co / ETC			
APPLERS (Signature) Scott Oansen		CRANDON WI.			
AB No.	DATE	TIME	COM.	ONAB	STATION LOCATION
CC	11/29/93	1100		X	930048
B-2		1100		X	
Y		1300		X	
V	11/29/93	1430		X	
Relinquished by: (Signature) Scott Oansen Date / Time 11/30/93 1000 Received by: (Signature) Received for Laboratory by: (Signature) Date / Time 1/1-93 10:20					
PROJECT MANAGER: RUSS JANESHER (GJO.) / S. Tauscher					

3.7-9-17

SENT BY: EIC CONT.
FROM: ARZYN INC

TO:

5082256777

DEC 2, 1993

2:05PM

P.02

Entered, rec'd on rec, ^{RLH} rec'd Fred Exp

December 1993
Surface Water Laboratory Data



An ETC Laboratory

320 Tesconi Circle

Suite G

Santa Rosa, CA

95401

Telephone

(707) 544-5570

Facsimile

(707) 544-4906

July 14, 1994

CLIENT: FOTH & VAN DYKE
P.O. BOX 19012
2737 S. RIDGE ROAD
GREEN BAY, WI 54307-9012

ATTN: RUSS JANESHEK

JOBLINK: 810178
PROJECT: S.W. SAMPLING

ANALYSIS

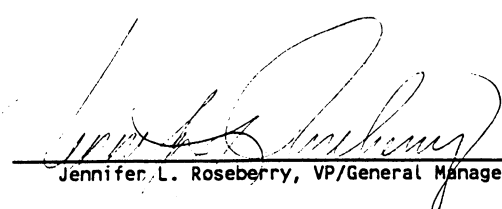
EPA METHOD 200 SERIES - METALS

CONVENTIONALS: ALKALINITY AS CaCO_3 ; ALKALINITY, BICARBONATE CaCO_3 ;
ALKALINITY, CARBONATE AS CaCO_3 ; AMMONIA AS N; ANIONS; BIOCHEMICAL OXYGEN DEMAND;
CATION AND ANION BALANCE; CATIONS; CHEMICAL OXYGEN DEMAND (COD); CHLORIDE;
CONDUCTIVITY; CYANIDE, TOTAL; FLUORIDE; HARDNESS AS CaCO_3 ; NITRATE AS N;
NITROGEN, TOTAL KJELDAHL (TKN); OIL AND GREASE; PH; PHOSPHORUS;
PHOSPHORUS AS P, DISSOLVED; SODIUM ABSORPTION RATIO (SAR); SOLIDS, TOTAL SUSPENDED;
SULFATE AS SO_4 ; TOTAL DISSOLVED SOLIDS (TDS); TURBIDITY

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE DATE</u>	<u>DATE IN LAB</u>
MF1536	SG-AB	LIQUID	12-20-93	12-22-93
MF1537	SG-V	LIQUID	12-20-93	12-22-93
MF1538	SG-Y	LIQUID	12-20-93	12-22-93
MF1539	SG-CC-01	LIQUID	12-20-93	12-22-93
MF1540	SG-CC-02	LIQUID	12-20-93	12-22-93
MF1541	SG-AB	LIQUID	12-20-93	12-22-93
MF1542	SG-V	LIQUID	12-20-93	12-22-93
MF1543	SG-Y	LIQUID	12-20-93	12-22-93
MF1544	SG-CC-01	LIQUID	12-20-93	12-22-93
MF1545	SG-CC-02	LIQUID	12-20-93	12-22-93
MF1546	SG-AB	LIQUID	12-20-93	12-22-93
MF1547	SG-V	LIQUID	12-20-93	12-22-93
MF1548	SG-Y	LIQUID	12-20-93	12-22-93
MF1549	SG-CC-01	LIQUID	12-20-93	12-22-93
MF1550	SG-CC-02	LIQUID	12-20-93	12-22-93
MF1551	SG-AB	LIQUID	12-20-93	12-22-93
MF1552	SG-V	LIQUID	12-20-93	12-22-93
MF1553	SG-Y	LIQUID	12-20-93	12-22-93
MF1554	SG-CC-01	LIQUID	12-20-93	12-22-93
MF1555	SG-CC-02	LIQUID	12-20-93	12-22-93
MF1873	QCCHARGES	NOT APPLICABLE	NOT APPLICABLE	12-22-93
MF1874	BOTTLES	NOT APPLICABLE	NOT APPLICABLE	12-22-93

This report is "PROPRIETARY AND CONFIDENTIAL" and delivered to, and intended for the exclusive use of the above named client only. ETC, a Division of APBI Environmental Sciences Group, Inc. assumes no responsibility or liability for the reliance hereon or use hereof by anyone other than the above named client.

A division of
APBI Environmental
Sciences Group, Inc.


Jennifer L. Roseberry, VP/General Manager

940718
Date

3.7-9-20

REVISED



FOTH & VAN DYKE
JULY 18, 1994
810178 AMENDED

SAMPLE MATRIX: LIQUID

<u>Parameter</u>	<u>EPA Prep Method</u>	<u>EPA Analysis Method</u>
ICP Metals	3015	200.7
Total Aluminum*	NA	200.8
Total Antimony	3015	204.2
Total Arsenic	3015	206.2
Total Cadmium*	**	200.8
Total Copper*	**	200.8
Total Lead*	**	200.8
Total Mercury*	‡	‡
Total Selenium	3015	270.2
Total Thallium	3015	279.2
Total Zinc*	NA	200.9
Alkalinity as CaCO ₃	NA	310.1
Bicarbonate as CaCO ₃	NA	310.1
Carbonate Alkalinity as CaCO ₃	NA	310.1
Ammonia as N	350.2	350.2
Anions	CALC	CALC
Cation & Anion Balance	CALC	CALC
Cations	CALC	CALC
Chemical Oxygen Demand	NA	410.4
Chloride	NA	300.0
Conductivity	NA	9050
Total Cyanide	9010	9010
Fluoride	NA	340.2
Hardness as CaCO ₃	NA	130.2
Nitrate as N	NA	300.0
Total Kjeldahl Nitrogen	351.3	351.3
Oil & Grease	9070	413.2
pH	NA	9040
Phosphorus	365.3	365.3
Phosphorus as P, Dissolved	365.3	365.3
Sodium Absorption Ratio (SAR)	CALC	CALC
Total Suspended Solids	NA	160.2
Sulfate as SO ₄	NA	300.0
Total Dissolved Solids	NA	160.1
Turbidity	NA	180.1
Biochemical Oxygen Demand**	405.1	405.1

* ANALYSES PERFORMED BY BATTELLE MARINE SCIENCES LAB

** PREP METHOD APDC EXTRACTION

‡ COLD VAPOR ATOMIC FLUORESCENCE

** ANALYSIS PERFORMED BY NORTHERN LAKE SERVICE INC

ns



FOTH & VAN DYKE
14 JULY 1994

EXECUTIVE SUMMARY
ETC JOBLINK 810178
(SECOND AMENDED REPORT)

On 22 December 1993 ETC-Santa Rosa received samples SG-AB, SG-CC-01, SG-CC-02, SG-Y, and SG-V from Foth & Van Dyke via Federal Express. The cooler temperatures were both 0°C upon receipt at the laboratory. The samples were analyzed as specified on the preceding page. This amended report includes results for low level metals analyses performed by Batelle; these results were not available when the original report was issued.

Samples were filtered at the laboratory through a 0.45 μ m filter prior to analysis for iron, manganese, and phosphorus; these results reflect dissolved parameters. Phosphorus was also analyzed without filtration; these results reflect total parameters.

Samples SG-AB, SG-CC-01, SG-CC-02, SG-Y, and SG-V were received past the method-recommended holding time for pH analysis.

Low level metals analyses were performed by Batelle; Biochemical Oxygen Demand (BOD) analyses were performed by Warzyn.

CALCULATIONS:

Results for Sodium Absorption Ratio (Modified SAR), Cations, Anions, and Cation and Anion Balance were obtained by calculation using analytical data. The Cations reflect results for Calcium, Magnesium, Potassium, and Sodium; the Anions reflect results for Chloride, Fluoride, Nitrate, Sulfate, Carbonate, and Bicarbonate.

LOW LEVEL METALS ANALYSES:

Direct analysis of water by ICP-MS was used for Aluminum. Direct analysis of water by GFAA was used for Zinc. For the analysis of Cadmium, Copper, and Lead, a preconcentration step was followed by quantification using ICP-MS. Mercury was analyzed by cold vapor atomic fluorescence.

The QC samples included four standard reference materials (QC Spikes), three matrix spikes and two duplicates. Only one QC Spike is reported for each analyte on the tabled QC; for cases where there is data for more than one QC spike or matrix spike, recovery information may be obtained from raw data copies included herein. When the procedural blank is accounted for, the QC Spike results are usually within +/- 25% of the certified value. The relative percent difference for Zinc was slightly greater than the criteria of +/- 25%.

Sample SG-Y contained unusually high Copper. The sample was re-analyzed without preconcentration; the re-analysis confirmed the original result.

FIRST AMENDED REPORT:

At the request of the client, samples SG-AB, SG-V, SG-Y, SG-CC-01, and SG-CC-02 were re-analyzed for Ammonia and Total Kjeldahl Nitrogen; results of the re-analysis are included with this amended report. Detection limits for Phosphorus and dissolved Phosphorus analyses were originally reported at 0.10 mg/L; these have been corrected to 0.05 mg/L.

SECOND AMENDED REPORT:

At the request of the client, each sample point was modified to include "SG" at the start of the identifier. Additionally, duplicate samples were modified to include "-01" or "-02" at the end of the identifier.

Liisa Norosky
Liisa Norosky, Program Manager

840718
Date

Joblink: 810178

DATA SUMMARY REPORT

DATE: 07/14/94

Company: FOTH & VAN DYKE

PAGE: 1

Sample Point ID:		SG-AB	SG-AB	SG-AB	SG-CC-01	SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02
ETC Sample Number:		MF1536	MF1541	MF1546	MF1539	MF1544	MF1549	MF1540	MF1545
Sample Date:		931220	931220	931220	931220	931220	931220	931220	931220
Facility Code:		FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC
Parameters	Units								
EPA METHOD 200 SERIES - METALS (AR08)									
Antimony, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Arsenic, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Barium, Total	mg/L	.010	-	-	.010	-	-	.011	-
Beryllium, Total	mg/L	<.001	-	-	<.001	-	-	<.001	-
Boron, Total	mg/L	<.100	-	-	<.100	-	-	<.100	-
Calcium, Total	mg/L	25.7	-	-	19.0	-	-	18.9	-
Chromium, Total	mg/L	<.020	-	-	<.020	-	-	<.020	-
Iron, Total	mg/L	.239	-	-	.457	-	-	.457	-
Magnesium, Total	mg/L	11.8	-	-	8.44	-	-	8.30	-
Manganese, Total	mg/L	.034	-	-	.051	-	-	.050	-
Molybdenum, Total	mg/L	<.020	-	-	<.020	-	-	<.020	-
Nickel, Total	mg/L	<.030	-	-	<.030	-	-	<.030	-
Potassium, Total	mg/L	<1.00	-	-	1.20	-	-	<1.00	-
Selenium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Silver, Total	mg/L	<.010	-	-	<.010	-	-	<.010	-
Sodium, Total	mg/L	3.09	-	-	2.68	-	-	2.61	-
Thallium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Aluminum	ug/L	-	16.9	-	-	35.6	-	-	35.4
Cadmium	ug/L	-	.011	-	-	.014	-	-	.014
Copper	ug/L	-	.147	-	-	.246	-	-	.243
Lead	ug/L	-	.095	-	-	.255	-	-	.204
Mercury	ug/L	-	.002	-	-	.002	-	-	.001
Zinc	ug/L	-	.740	-	-	1.18	-	-	1.26
Iron	mg/L	-	-	.213	-	-	.417	-	-
Manganese	mg/L	-	-	.031	-	-	.047	-	-

3.7-9-23

Joblink: 810178

DATA SUMMARY REPORT

DATE: 07/14/94

Company: FOTH & VAN DYKE

PAGE: 2

Sample Point ID:	SG-CC-02	SG-V	SG-V	SG-V	SG-Y	SG-Y	SG-Y
ETC Sample Number:	MF1550	MF1537	MF1542	MF1547	MF1538	MF1543	MF1548
Sample Date:	931220	931220	931220	931220	931220	931220	931220
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD 200 SERIES - METALS (AR08)

Antimony, Total	mg/L	-	<.005	-	-	<.005	-	-
Arsenic, Total	mg/L	-	<.005	-	-	<.005	-	-
Barium, Total	mg/L	-	<.010	-	-	<.010	-	-
Beryllium, Total	mg/L	-	<.001	-	-	<.001	-	-
Boron, Total	mg/L	-	.106	-	-	<.100	-	-
Calcium, Total	mg/L	-	23.9	-	-	14.8	-	-
Chromium, Total	mg/L	-	<.020	-	-	<.020	-	-
Iron, Total	mg/L	-	.389	-	-	.391	-	-
Magnesium, Total	mg/L	-	10.6	-	-	6.34	-	-
Manganese, Total	mg/L	-	.045	-	-	.038	-	-
Molybdenum, Total	mg/L	-	<.020	-	-	<.020	-	-
Nickel, Total	mg/L	-	<.030	-	-	<.030	-	-
Potassium, Total	mg/L	-	<1.00	-	-	<1.00	-	-
Selenium, Total	mg/L	-	<.005	-	-	<.005	-	-
Silver, Total	mg/L	-	<.010	-	-	<.010	-	-
Sodium, Total	mg/L	-	2.90	-	-	2.31	-	-
Thallium, Total	mg/L	-	<.005	-	-	<.005	-	-
Aluminum	ug/L	-	-	37.7	-	-	30.2	-
Cadmium	ug/L	-	-	.011	-	-	.039	-
Copper	ug/L	-	-	.180	-	-	4.09	-
Lead	ug/L	-	-	.198	-	-	.225	-
Mercury	ug/L	-	-	.002	-	-	.002	-
Zinc	ug/L	-	-	1.04	-	-	2.44	-
Iron	mg/L	.414	-	-	.356	-	-	.404
Manganese	mg/L	.048	-	-	.041	-	-	.037

3.7-9-24

Joblink: 810178

DATA SUMMARY REPORT

DATE: 07/14/94

Company: FOTH & VAN DYKE

PAGE: 3

Sample Point ID:		SG-AB	SG-AB	SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02	SG-V	SG-V
ETC Sample Number:		MF1536	MF1551	MF1539	MF1554	MF1540	MF1555	MF1537	MF1552
Sample Date:		931220	931220	931220	931220	931220	931220	931220	931220
Facility Code:		FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC
Parameters	Units								
CONVENTIONALS (AR55)									
Cyanide, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Hardness as CaCO ₃	mg/L	113	-	81.6	-	81.8	-	105	-
Alkalinity as CaCO ₃	mg/L	113	-	72.0	-	77.0	-	94.0	-
Alkalinity, Bicarbonate CaCO ₃	mg/L	113	-	72.0	-	77.0	-	94.0	-
Alkalinity, Carbonate as CaCO ₃	mg/L	<5.00	-	<5.00	-	<5.00	-	<5.00	-
Fluoride	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Conductivity	umhos	225	-	160	-	156	-	204	-
Chemical Oxygen Demand (COD)	mg/L	<20.0	-	21.0	-	22.0	-	21.0	-
pH	std	7.60	-	7.40	-	7.40	-	7.40	-
Turbidity	NTU	1.30	-	3.70	-	3.40	-	3.10	-
Solids, total suspended	mg/L	<5.00	-	<5.00	-	<5.00	-	<5.00	-
Total Dissolved Solids (TDS)	mg/L	122	-	84.0	-	91.0	-	154	-
Chloride	mg/L	3.22	-	2.69	-	2.72	-	2.86	-
Nitrate as N	mg/L	.983	-	.918	-	.918	-	.941	-
Sulfate as SO ₄	mg/L	5.21	-	4.12	-	4.14	-	4.75	-
Oil and Grease	mg/L	<1.00	-	<1.00	-	<1.00	-	<1.00	-
Phosphorus	mg/L	<.050	-	<.050	-	<.050	-	<.050	-
Phosphorus as P, dissolved	mg/L	<.050	-	<.050	-	<.050	-	<.050	-
Anions	meq/l	2.07	-	1.36	-	1.44	-	1.74	-
Cations	meq/l	2.39	-	1.79	-	1.74	-	2.19	-
Cation and Anion Balance	%	7.17	-	13.8	-	9.41	-	11.6	-
Sodium Absorption Ratio (SAR)	std	.127	-	.129	-	.126	-	.124	-
Ammonia as N	mg/L	<.100	-	.493	-	.515	-	.482	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	.756	-	.616	-	.616	-	.560	-
Biochemical Oxygen Demand	mg/L	-	<1.00	-	2.00	-	<1.00	-	<1.00

3.7-9-25

Joblink: 810178

DATA SUMMARY REPORT

DATE: 07/14/94

Company: FOTH & VAN DYKE

PAGE: 4

Sample Point ID: SG-Y SG-Y
ETC Sample Number: MF1538 MF1553
Sample Date: 931220 931220
Facility Code: FVDGRNBCMC FVDGRNBCMC

Parameters Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-
Hardness as CaCO3	mg/L	72.9	-
Alkalinity as CaCO3	mg/L	56.0	-
Alkalinity, Bicarbonate CaCO3	mg/L	56.0	-
Alkalinity, Carbonate as CaCO3	mg/L	<5.00	-
Fluoride	mg/L	<.100	-
Conductivity	umhos	127	-
Chemical Oxygen Demand (COD)	mg/L	31.0	-
pH	std	7.50	-
Turbidity	NTU	2.00	-
Solids, total suspended	mg/L	<5.00	-
Total Dissolved Solids (TDS)	mg/L	82.0	-
Chloride	mg/L	2.39	-
Nitrate as N	mg/L	.814	-
Sulfate as SO4	mg/L	3.47	-
Oil and Grease	mg/L	<1.00	-
Phosphorus	mg/L	<.050	-
Phosphorus as P, dissolved	mg/L	<.050	-
Anions	meq/l	1.07	-
Cations	meq/l	1.36	-
Cation and Anion Balance	%	11.9	-
Sodium Absorption Ratio (SAR)	std	.127	-
Ammonia as N	mg/L	.112	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	.532	-
Biochemical Oxygen Demand	mg/L	-	<1.00

3.7-9-26

ETC

CHAIN-OF-CUSTODY RECORD

810178

Form 0019
Field Technical Services
Rev. 11/91

No. 113236

Environmental Testing and Certification Corp. • 284 Raritan Center Parkway • Edison, NJ 08818 • 908-225-6700

COMPANY FOTH : VAN DYKE		FACILITY/SITE 93C049		NUMBER OF CONTAINERS 8	FILT. (Y/N) PRESERV. ANALYSIS REQUIRED SEE Below	LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₃ + H ₂ SO ₄	
PROJECT CONTACT RUSS JANESHEK		TELEPHONE NO. 414-497-2500					
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT				
1		R	A.B.	93/12/20	1345		
2		R	V		1220		
3		R	Y		1120		
4		R	C.C.		0940		
5		R	C.C.-2		0940		
6							
7							
8							
9							

CHAIN OF CUSTODY CHRONICLE

1.	Shuttle Opened By: (print) SCOTT JANSEN	Date: 12/20/93	Time: 0900
	Signature: Scott Jansen	Seal #: 64715	Intact: YES
2.	I have received these materials in good condition from the above person		
	Name: _____	Signature: _____	
	Date: _____	Time: _____	Remarks: _____
3.	I have received these materials in good condition from the above person		
	Name: _____	Signature: _____	
	Date: _____	Time: _____	Remarks: _____
4.	Shuttle Sealed By: (print) SCOTT JANSEN	Date: 12/21/93	Time: 1500
	Signature: Scott Jansen	Seal #: 64714	Intact: YES

REMARKS

For Analysis Required check
ATTACHED SHEET.

SAMPLER'S SIGNATURE

Scott Jansen

LAB USE ONLY Opened By: **Self Hype!** Date: **12-22-93** Time: **10am**
COOL # **114** TEMP. °C **0** SM # **64714** SEAL # **64714** COND. **good**

3.7-9-27

CHAIN OF CUSTODY

Client: CRANDON MINING Co Scope I.D.: 93C049
 Project: S.W. Sampling TASK 5.13 Page:
 Prepared by: SOJ Date: 12/20/93
 Sampler(s): Scott Janson Date:
 (Signature)

No. of Containers

Lab Numbers

Analysis Required

ALUMINUM
CADMIUM
COPPER
LEAD
MERCURY
ZINC

Remarks

Sta. No.	Date	Time	Comp	Grab	Station Location	Serial Tag Number	No. of Containers	Lab Numbers	Analysis Required	Remarks
AB	12/20/93	1345		✓	93C049		1	677X5	X X X X X X	Low Level Technique
Y		1220		✓			1	677X6	X X X X X X	
Y		1120		✓			1	X7	X X X X X X	
CC		0940		✓			1	X8	X X X X X X	
CC-2		0940		✓			1	X9	X X X X X X	

Signature	Company	Date	Time	Carrier
Relinquished By: <u>Scott Janson</u>	<u>FOTH & VAN DYKE</u>	<u>12/21/93</u>	<u>1500</u>	<u>UPS NEXT DAY AIR</u>
Received By: <u>EA Ruelius / Battelle</u>	<u>MSL Battelle</u>	<u>12/22/93</u>		
Relinquished By:				
Received By:				
Relinquished By:				
Received by Lab:				

Foth & Van Dyke

Remarks: RESULTS to ETC LAB
Samples Double Bag

EA Ruelius
677X5 lid loose, some leak age in bag
all 5 bottles had loose lids,
PH OK



№ 015184

CHAIN OF CUSTODY RECORD

[illegible]

contract, acid on ice, acid F&D Ex

January 1994
Surface Water Laboratory Data



An ETC Laboratory

320 Tesconi Circle

Suite G

Santa Rosa, CA
95401

Telephone
(707) 544-5570

Facsimile
(707) 544-4906

July 14, 1994

CLIENT: FOTH & VAN DYKE
P.O. BOX 19012
2737 S. RIDGE ROAD
GREEN BAY, WI 54307-9012

ATTN: RUSS JANESHEK

JOB LINK: 810249 AMENDED REPORT
PROJECT: TASK 5.13

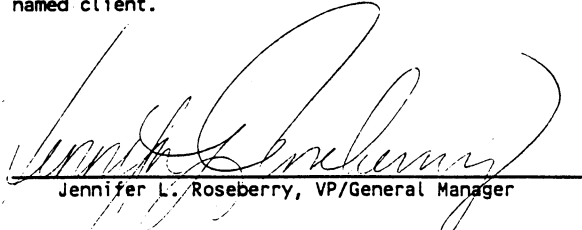
ANALYSIS

EPA METHOD 200 SERIES - METALS

CONVENTIONALS: ALKALINITY AS CaCO_3 ; ALKALINITY, BICARBONATE CaCO_3 ;
ALKALINITY, CARBONATE AS CaCO_3 ; AMMONIA AS N; ANIONS; BIOCHEMICAL OXYGEN DEMAND;
CATION AND ANION BALANCE; CATIONS; CHEMICAL OXYGEN DEMAND (COD); CHLORIDE;
CONDUCTIVITY; CYANIDE, TOTAL; FLUORIDE; HARDNESS AS CaCO_3 ; NITRATE AS N;
NITROGEN, TOTAL KJELDAHL (TKN); OIL AND GREASE, (IR); PH; PHOSPHORUS;
PHOSPHORUS AS P, DISSOLVED; SODIUM ABSORPTION RATIO (SAR); SOLIDS, TOTAL SUSPENDED;
SULFATE AS SO_4 ; TOTAL DISSOLVED SOLIDS (TDS); TURBIDITY

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE DATE</u>	<u>DATE IN LAB</u>
MF1857	SG-AB	LIQUID	01-10-94	01-12-94
MF1858	SG-Y-01	LIQUID	01-10-94	01-12-94
MF1859	SG-Y-02	LIQUID	01-10-94	01-12-94
MF1860	SG-V	LIQUID	01-10-94	01-12-94
MF1861	SG-AB	LIQUID	01-10-94	01-12-94
MF1862	SG-Y-01	LIQUID	01-10-94	01-12-94
MF1863	SG-Y-02	LIQUID	01-10-94	01-12-94
MF1864	SG-V	LIQUID	01-10-94	01-12-94
MF1865	SG-AB	LIQUID	01-10-94	01-12-94
MF1866	SG-Y-01	LIQUID	01-10-94	01-12-94
MF1867	SG-Y-02	LIQUID	01-10-94	01-12-94
MF1868	SG-V	LIQUID	01-10-94	01-12-94
MF1869	SG-AB	LIQUID	01-10-94	01-12-94
MF1870	SG-Y-01	LIQUID	01-10-94	01-12-94
MF1871	SG-Y-02	LIQUID	01-10-94	01-12-94
MF1872	SG-V	LIQUID	01-10-94	01-12-94
MF2369	BOTTLES	NOT APPLICABLE	NOT APPLICABLE	01-12-94

This report is "PROPRIETARY AND CONFIDENTIAL" and delivered to, and intended for the exclusive use of the above named client only. ETC, a Division of APBI Environmental Sciences Group, Inc. assumes no responsibility or liability for the reliance hereon or use hereof by anyone other than the above named client.


Jennifer L. Roseberry, VP/General Manager

9/7/94
Date

3.7-9-31

REVISER



FOTH & VAN DYKE
JULY 18, 1994
810249 AMENDED

SAMPLE MATRIX: LIQUID

<u>Parameter</u>	<u>EPA Prep Method</u>	<u>EPA Analysis Method</u>
ICP Metals	3015	200.7
Total Aluminum*	NA	200.8
Total Antimony	3015	204.2
Total Arsenic	3015	206.2
Total Cadmium*	**	200.8
Total Copper*	**	200.8
Total Lead*	**	200.8
Total Mercury*	±	±
Total Selenium	3015	270.2
Total Thallium	3015	279.2
Total Zinc*	NA	200.9
Alkalinity as CaCO ₃	NA	310.1
Bicarbonate as CaCO ₃	NA	310.1
Carbonate Alkalinity as CaCO ₃	NA	310.1
Ammonia as N	350.2	350.2
Anions	CALC	CALC
Cation & Anion Balance	CALC	CALC
Cations	CALC	CALC
Chemical Oxygen Demand	NA	410.4
Chloride	NA	300.0
Conductivity	NA	9050
Total Cyanide	9010	9010
Fluoride	NA	340.2
Hardness as CaCO ₃	NA	130.2
Nitrate as N	NA	300.0
Total Kjeldahl Nitrogen	351.3	351.3
Oil & Grease	9070	413.2
pH	NA	9040
Phosphorus	365.3	365.3
Phosphorus as P, Dissolved	365.3	365.3
Sodium Absorption Ratio (SAR)	CALC	CALC
Total Suspended Solids	NA	160.2
Sulfate as SO ₄	NA	300.0
Total Dissolved Solids	NA	160.1
Turbidity	NA	180.1
Biochemical Oxygen Demand**	405.1	405.1

* ANALYSES PERFORMED BY BATTELLE MARINE SCIENCES LAB

** PREP METHOD APDC EXTRACTION

± COLD VAPOR ATOMIC FLUORESCENCE

++ ANALYSIS PERFORMED BY NORTHERN LAKE SERVICE INC

ns



FOTH & VAN DYKE
14 JULY 1994

**EXECUTIVE SUMMARY
ETC JOBLINK 810249
(SECOND AMENDED REPORT)**

On 12 January 1994 ETC-Santa Rosa received samples SG-AB, SG-Y-01, SG-Y-02, and SG-V from Foth & Van Dyke via Federal Express. The cooler temperatures were both 0°C upon receipt at the laboratory. The samples were analyzed as specified on the preceding page. This amended report includes results for low level metals analyses performed by Batelle; these results were not available when the original report was issued.

Samples were filtered at the laboratory through a 0.45 µm filter prior to analysis for iron, manganese, and phosphorus; these results reflect dissolved parameters. Phosphorus was also analyzed without filtration; these results reflect total parameters.

Samples SG-AB, SG-Y-01, SG-Y-02, and SG-V were received past the method-recommended holding time for pH analysis.

Low level metals analyses were performed by Batelle; Biochemical Oxygen Demand (BOD) analyses were performed by Northern Lake Service, Inc.

CALCULATIONS:

Results for Sodium Absorption Ratio (Modified SAR), Cations, Anions, and Cation and Anion Balance were obtained by calculation using analytical data. The Cations reflect results for Calcium, Magnesium, Potassium, and Sodium; the Anions reflect results for Chloride, Fluoride, Nitrate, Sulfate, Carbonate, and Bicarbonate.

LOW LEVEL METALS ANALYSES:

Direct analysis of water by ICP-MS was used for Aluminum. Direct analysis of water by GFAA was used for Zinc. For the analysis of Cadmium, Copper, and Lead, a preconcentration step was followed by quantification using ICP-MS. Mercury was analyzed by cold vapor atomic fluorescence.

The QC samples included four standard reference materials (QC Spikes), three matrix spikes and two duplicates. Only one QC Spike is reported for each analyte on the tabled QC; for cases where there is data for more than one QC spike or matrix spike, recovery information may be obtained from raw data copies included herein. When the procedural blank is accounted for, the QC Spike results are usually within +/- 25% of the certified value. The relative percent difference for Zinc was slightly greater than the criteria of +/- 25%.

AMENDED REPORT:

At the request of the client, samples SG-AB, SG-Y-01, and SG-Y-02 were re-analyzed for Ammonia and Total Kjeldahl Nitrogen; results of the re-analysis are included with this amended report. Detection limits for alkalinity analyses were originally reported at 20 mg/L; these have been corrected to 5 mg/L. Additionally, the sample identifier for Y-2 (SG-Y-02) was incorrectly entered into the laboratory computer system as Y-Z; this has been corrected in the amended report.

SECOND AMENDED REPORT:

At the request of the client, each sample point was modified to include "SG" at the start of the identifier. Additionally, duplicate samples were modified to include "-01" or "-02" at the end of the identifier.

Lisa Norosky
Lisa Norosky, Program Manager

940718
Date

Joblink: 810249

DATA SUMMARY REPORT

DATE: 07/14/94

PAGE: 1

Company: FOTH & VAN DYKE

Sample Point ID:	SG-AB	SG-AB	SG-AB	SG-V	SG-V	SG-V	SG-Y-01	SG-Y-01
ETC Sample Number:	MF1857	MF1861	MF1865	MF1860	MF1864	MF1868	MF1858	MF1862
Sample Date:	940110	940110	940110	940110	940110	940110	940110	940110
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD 200 SERIES - METALS (AR08)

Antimony, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Arsenic, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Barium, Total	mg/L	.012	-	-	.012	-	-	.012	-
Beryllium, Total	mg/L	<.001	-	-	<.001	-	-	<.001	-
Boron, Total	mg/L	<.100	-	-	<.100	-	-	<.100	-
Calcium, Total	mg/L	26.9	-	-	25.4	-	-	15.6	-
Chromium, Total	mg/L	<.020	-	-	<.020	-	-	<.020	-
Iron, Total	mg/L	.252	-	-	.392	-	-	.420	-
Magnesium, Total	mg/L	13.0	-	-	12.6	-	-	7.24	-
Manganese, Total	mg/L	.076	-	-	.092	-	-	.079	-
Molybdenum, Total	mg/L	<.020	-	-	<.020	-	-	<.020	-
Nickel, Total	mg/L	<.030	-	-	<.030	-	-	<.030	-
Potassium, Total	mg/L	<1.00	-	-	<1.00	-	-	<1.00	-
Selenium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Silver, Total	mg/L	<.010	-	-	<.010	-	-	<.010	-
Sodium, Total	mg/L	2.96	-	-	2.96	-	-	2.43	-
Thallium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Aluminum	ug/L	-	19.5	-	-	19.7	-	-	57.6
Cadmium	ug/L	-	.011	-	-	.013	-	-	.010
Copper	ug/L	-	.135	-	-	.179	-	-	.137
Lead	ug/L	-	.081	-	-	.145	-	-	.098
Mercury	ug/L	-	.001	-	-	.001	-	-	.002
Zinc	ug/L	-	.740	-	-	1.04	-	-	1.41
Iron	mg/L	-	-	.092	-	-	.152	-	-
Manganese	mg/L	-	-	.050	-	-	.064	-	-

3.7-9-34

Joblink: 810249

DATA SUMMARY REPORT

DATE: 07/14/94

Company: FOTH & VAN DYKE

PAGE: 2

Sample Point ID:	SG-Y-01	SG-Y-02	SG-Y-02	SG-Y-02
ETC Sample Number:	MF1866	MF1859	MF1863	MF1867
Sample Date:	940110	940110	940110	940110
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD 200 SERIES - METALS (AR08)

Antimony, Total	mg/L	-	<.005	-	-
Arsenic, Total	mg/L	-	<.005	-	-
Barium, Total	mg/L	-	.012	-	-
Beryllium, Total	mg/L	-	<.001	-	-
Boron, Total	mg/L	-	<.100	-	-
Calcium, Total	mg/L	-	15.4	-	-
Chromium, Total	mg/L	-	<.020	-	-
Iron, Total	mg/L	-	.419	-	-
Magnesium, Total	mg/L	-	7.26	-	-
Manganese, Total	mg/L	-	.079	-	-
Molybdenum, Total	mg/L	-	<.020	-	-
Nickel, Total	mg/L	-	<.030	-	-
Potassium, Total	mg/L	-	<1.00	-	-
Selenium, Total	mg/L	-	<.005	-	-
Silver, Total	mg/L	-	<.010	-	-
Sodium, Total	mg/L	-	2.44	-	-
Thallium, Total	mg/L	-	<.005	-	-
Aluminum	ug/L	-	-	37.4	-
Cadmium	ug/L	-	-	.010	-
Copper	ug/L	-	-	.122	-
Lead	ug/L	-	-	.141	-
Mercury	ug/L	-	-	.003	-
Zinc	ug/L	-	-	1.18	-
Iron	mg/L	.304	-	-	.296
Manganese	mg/L	.075	-	-	.073

3-7-9-35

Joblink: 810249

DATA SUMMARY REPORT

DATE: 07/14/94

Company: FOTH & VAN DYKE

PAGE: 3

Sample Point ID:	SG-AB	SG-AB	SG-V	SG-V	SG-Y-01	SG-Y-01	SG-Y-02	SG-Y-02
ETC Sample Number:	MF1857	MF1869	MF1860	MF1872	MF1858	MF1870	MF1859	MF1871
Sample Date:	940110	940110	940110	940110	940110	940110	940110	940110
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
pH	std	7.66	-	7.04	-	7.26	-	7.11	-
Solids, total suspended	mg/L	<5.00	-	8.00	-	<5.00	-	<5.00	-
Hardness as CaCO ₃	mg/L	129	-	122	-	72.7	-	87.8	-
Fluoride	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Conductivity	umhos	251	-	238	-	144	-	143	-
Total Dissolved Solids (TDS)	mg/L	144	-	102	-	113	-	132	-
Oil and Grease, (IR)	mg/L	<1.01	-	<1.02	-	<1.01	-	<1.04	-
Turbidity	NTU	1.40	-	2.10	-	1.40	-	1.20	-
Phosphorus	mg/L	<.050	-	<.050	-	<.050	-	<.050	-
Phosphorus as P, dissolved	mg/L	<.050	-	<.050	-	<.050	-	<.050	-
Alkalinity as CaCO ₃	mg/L	124	-	117	-	64.0	-	66.0	-
Alkalinity, Bicarbonate CaCO ₃	mg/L	124	-	117	-	64.0	-	66.0	-
Alkalinity, Carbonate as CaCO ₃	mg/L	<5.00	-	<5.00	-	<5.00	-	<5.00	-
Chloride	mg/L	3.48	-	3.10	-	2.53	-	2.50	-
Nitrate as N	mg/L	.985	-	.951	-	.844	-	.842	-
Sulfate as SO ₄	mg/L	5.91	-	5.47	-	3.94	-	3.90	-
Sodium Absorption Ratio (SAR)	std	.117	-	.120	-	.127	-	.128	-
Cations	meq/l	2.54	-	2.43	-	1.48	-	1.47	-
Anions	meq/l	2.27	-	2.14	-	1.22	-	1.25	-
Cation and Anion Balance	%	5.62	-	6.52	-	9.77	-	8.25	-
Chemical Oxygen Demand (COD)	mg/L	<20.0	-	<20.0	-	33.0	-	30.0	-
Ammonia as N	mg/L	.570	-	.392	-	.810	-	.680	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	3.30	-	.980	-	1.76	-	2.32	-
Biochemical Oxygen Demand	mg/L	-	<3.00	-	<3.00	-	<3.00	-	<3.00

3.7-9-36

JAN 17 '94 03:05PM BATTELLE MARINE SCIENCES LAB

FORM # 384 GEM (Rev. 5/68)

ETC

CHAIN-OF-CUSTODY RECORD

Form 0019
Field Technical Services
Rev. 11/91

No. 113485

810249

Environmental Testing and Certification Corp. • 284 Raritan Center Parkway • Edison, NJ 08818 • 908-225-6700

COMPANY FOTH: VAN DYKE		FACILITY/SITE CRANDON MENING Co.		NUMBER OF CONTAINERS	FILT. (Y/N)	PRESERV.	ANALYSIS REQUIRED	SEE ATTACHED LIST OR REQUEST FOR	LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₃ + H ₂ SO ₄	
PROJECT CONTACT RUSS JANESHEK		TELEPHONE NO. 414-497-2500								
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT							
1		R	AB	9/1/10	1400					
2		R	Y		1000					
3		R	Y-Z		1000					
4		R	V		1200					
5										
6										
7										
8										
9										

CHAIN OF CUSTODY CHRONICLE

3.7-9-38	Shuttle Opened By: (print) SCOTT JANSEN		Date: 1/10/94	Time: 0700
	Signature: Scott Jansen		Seal #: 63642 + 63725	Intact: YES
	I have received these materials in good condition from the above person			
	Name: _____ Signature: _____ Date: _____ Time: _____ Remarks: _____			
3	I have received these materials in good condition from the above person			
	Name: _____ Signature: _____ Date: _____ Time: _____ Remarks: _____			
	Name: _____ Signature: _____ Date: _____ Time: _____ Remarks: _____			
	Name: _____ Signature: _____ Date: _____ Time: _____ Remarks: _____			
4	Shuttle Sealed By: (print) SCOTT JANSEN		Date: 1/14/94	Time: 1400
	Signature: Scott Jansen		Seal #: 63642	Intact: YES
	LAB USE ONLY Opened By: Jeff Haper Date: 1-12-94 Time: 9:45 AM			
	SHUTTLE # _____ TEMP. °C 0 SMS SEAL # 63794 COND. 2-2			

REMARKS

ALL PRESERVATIVES ADDED IN FIELD
 NO SAMPLES FIELD FILTERED
 ANY QUESTIONS CONTACT RUSS JANESHEK
 TEMP BLANKS FROZEN

SAMPLER'S SIGNATURE

Scott Jansen

NO. 07890

NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

**SAMPLE COLLECTION AND
CHAIN OF CUSTODY RECORD**

Wisconsin Lab Cert. No. 72102660

RETURN THIS FORM WITH SAMPLES.

CLIENT <i>SEND RESULTS</i> ETC / FOTH. VANDYKE				PROJECT TITLE CRANDON MINING CO / SW.			
ADDRESS 320 TESCONZ Circle, Ste G				PROJECT NO. 93C049		P.O. NO.	
CITY SANTA ROSA		STATE CA		ZIP 95401		CONTACT RUSS JANESHEK SDS	
						PHONE 414-497-2500	

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			P	N	S	Z	
1.	50376	Y	1/10/94	1000	SW	GRAB	1				
2.	50377	Y-Z		1000			1				
3.	50378	AB		1400			1				
4.	50379	V		1200			1				
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE: SW = surface water DW = drinking water PROD = product WW = wastewater TIS = tissue SOIL = soil GW = groundwater AIR = air SED = sediment describe others			CONTAINER P = plastic, NP = nothing added OH = sodium hydroxide G = glass S = sulfuric acid HA = hydrochloric & V = glass vial N = nitric acid ascorbic acid B = plastic bag Z = zinc acetate H = hydrochloric acid describe others F = field interm		
--	--	--	---	--	--

COLLECTED BY (signature) <i>Scott Jensen</i>		CUSTODY SEAL NO. (IF ANY)		DATE/TIME 1/10/94 1520	
RELINQUISHED BY (signature)		RECEIVED BY (signature)		DATE/TIME	
RELINQUISHED BY (signature)		RECEIVED BY (signature)		DATE/TIME	
DISPATCHED BY (signature) <i>Scott Jensen</i>		METHOD OF TRANSPORT BY F-40		DATE/TIME 1/10/94 1520	
RECEIVED AT NLS BY (signature) <i>Scott Jensen</i>		DATE/TIME 01-10-94 15:20		CONDITION Recd on Ice	
SEAL INTACT? ☐ YES ☐ NO		SEAL #		REMARKS & OTHER INFORMATION Hand Delivered	

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
 2. PLEASE USE ONE LINE PER SAMPLE. **NOT** PER BOTTLE.
 3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY

February 1994
Surface Water Laboratory Data

RECEIVED
SEP - 6 1994
FOTH & VAN DYKE

AUGUST 31, 1994



An ETC Laboratory

320 Tesconi Circle

Suite G

Santa Rosa, CA

95401

Telephone
(707) 544-5570

Facsimile
(707) 544-4906

CLIENT: FOTH & VAN DYKE
P.O. BOX 19012
2737 S. RIDGE ROAD
GREEN BAY, WI 54307-9012

ATTN: RUSS JANESHEK

JOBLINK: 810428
PROJECT:

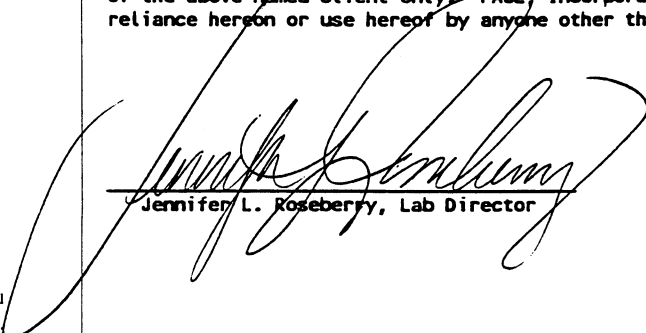
ANALYSIS

EPA METHOD 200 SERIES - METALS

CONVENTIONALS: ALKALINITY AS CaCO_3 ; ALKALINITY, HYDROXIDE AS CaCO_3 ;
ALKALINITY, BICARBONATE CaCO_3 ; ALKALINITY, CARBONATE AS CaCO_3 ; AMMONIA AS N; ANIONS;
BIOCHEMICAL OXYGEN DEMAND; CATION AND ANION BALANCE; CATIONS;
CHEMICAL OXYGEN DEMAND (COD); CHLORIDE; CONDUCTIVITY; CYANIDE, TOTAL; FLUORIDE;
HARDNESS AS CaCO_3 ; NITRATE AS N; NITROGEN, TOTAL KJELDAHL (TKN); OIL AND GREASE, (IR);
PH; PHOSPHORUS; PHOSPHORUS AS P, DISSOLVED; SODIUM ABSORPTION RATIO (SAR);
SOLIDS, TOTAL SUSPENDED; SULFATE AS SO_4 ; TOTAL DISSOLVED SOLIDS (TDS); TURBIDITY

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE COLLECTION DATE</u>	<u>DATE RECEIVED BY LAB</u>
MF2881	SG-CC-01	WATER	02-07-94	02-11-94
MF2882	SG-CC-02	WATER	02-07-94	02-11-94
MF2883	SG-V-01	WATER	02-07-94	02-11-94
MF2884	SG-AB-01	WATER	02-07-94	02-09-94
MF2885	SG-CC-01	WATER	02-08-94	02-09-94
MF2886	SG-CC-02	WATER	02-08-94	02-09-94
MF2887	SG-V-01	WATER	02-08-94	02-09-94
MF2888	SG-AB-01	WATER	02-08-94	02-09-94
MF2889	SG-CC-01	WATER	02-07-94	02-09-94
MF2890	SG-CC-02	WATER	02-07-94	02-09-94
MF2891	SG-V-01	WATER	02-07-94	02-09-94
MF2892	SG-AB-01	WATER	02-07-94	02-09-94
MF2893	SG-CC-01	WATER	02-07-94	02-09-94
MF2894	SG-CC-02	WATER	02-07-94	02-09-94
MF2895	SG-V-01	WATER	02-07-94	02-09-94
MF2896	SG-AB-01	WATER	02-07-94	02-09-94
MF3326	BOTTLES	NOT APPLICABLE	NOT APPLICABLE	02-09-94
MF3327	QCCHARGES	NOT APPLICABLE	NOT APPLICABLE	02-09-94

This report is "PROPRIETARY AND CONFIDENTIAL" and delivered to, and intended for the exclusive use of the above named client only. PACE, Incorporated, assumes no responsibility or liability for the reliance hereon or use hereof by anyone other than the above named client.


Jennifer L. Roseberry, Lab Director

940831
Date

A division of
APBI Environmental
Sciences Group, Inc.

3.7-9-41

SEP 02 1994



FOTH & VAN DYKE
AUGUST 25, 1994
810428 AMENDED

SAMPLE MATRIX: LIQUID

Parameter	EPA	
	Prep Method	Analysis Method
ICP Metals	3015	200.7
Total Antimony	3015	204.2
Total Arsenic	3015	206.2
Total Potassium**	3010	6010
Total Thallium	3015	279.2
Aluminum*	NA	200.8
Cadmium*	APDC EXTRACTION	200.8
Copper*	APDC EXTRACTION	200.8
Lead*	APDC EXTRACTION	200.8
Mercury*	‡	‡
Zinc*	NA	200.9m
Alkalinity as CaCO3	NA	310.1
Alkalinity, Hydroxide as CaCO3	NA	310.1
Bicarbonate as CaCO3	NA	310.1
Carbonate Alkalinity as CaCO3	NA	310.1
Ammonia as N	350.2	350.2
Anions	NA	CALC.
Cations	NA	CALC.
Cation & Anion Balance	NA	CALC.
Chemical Oxygen Demand	NA	410.4
Chloride	NA	300.0
Conductivity	NA	9050
Total Cyanide	NA	9010
Fluoride	NA	340.2
Hardness as CaCO3	NA	130.2
Nitrate as N	NA	300.0
Total Kjeldahl Nitrogen	351.3	351.3
Oil & Grease	413.2	413.2
pH	NA	9040
Phosphorus	365.3	365.3
Phosphorus as P, Dissolved	NA	365.3
Sodium Absorption Ratio	NA	CALC.
Total Suspended Solids	NA	160.2
Sulfate as SO4	NA	300.0
Total Dissolved Solids	NA	160.1
Turbidity	NA	180.1
Biochemical Oxygen Demand**	405.1	405.1

* ANALYSIS PERFORMED BY BATELLE MARINE SCIENCES LABORATORY

‡ COLD VAPOR ATOMIC FLUORESCENCE

** ANALYSIS PERFORMED BY NORTHERN LAKE SERVICE, INC

ns



FOTH & VAN DYKE
24 AUGUST 1994

**EXECUTIVE SUMMARY
ETC JOBLINK 810428
(SECOND AMENDED REPORT)**

On 09 February 1994 ETC-Santa Rosa received sample SG-AB-01 from Foth & Van Dyke via Federal Express. The cooler temperature was 0°C upon receipt at the laboratory. On 11 February samples SG-CC-01, SG-CC-02, and SG-V-01 were received. The cooler temperature was 0°C upon receipt. The samples were analyzed as specified on the preceding page.

Samples were filtered at the laboratory through a 0.45 µm filter prior to analysis for iron, manganese, and phosphorus; these results reflect dissolved parameters. Phosphorus was also analyzed without filtration; these results reflect total parameters.

Samples SG-CC-01, SG-CC-02, SG-V-01, and SG-AB-01 were received past the method-recommended holding time for pH analysis. Samples SG-CC-01, SG-CC-02, and SG-V-01 were received past the method-recommended holding times for Nitrate and Turbidity analyses; analysis proceeded at the client's request.

Due to a laboratory error ammonia analyses for samples SG-CC-01, SG-CC-02, and SG-V-01 were originally performed on unpreserved sample aliquots. The recommended holding time for this analysis had expired upon initiation of re-analysis; ammonia data for these three samples was deemed unusable by the client and is not reported herein.

Low level metals analyses were performed by Batelle; Biochemical Oxygen Demand (BOD) analyses were performed by Northern Lake Service.

CALCULATIONS:

Results for Sodium Absorption Ratio (Modified SAR), Cations, Anions, and Cation and Anion Balance were obtained by calculation using analytical data. The Cations reflect results for Calcium, Magnesium, Potassium, and Sodium; the Anions reflect results for Chloride, Fluoride, Nitrate, Sulfate, Carbonate, and Bicarbonate.

LOW LEVEL METALS ANALYSES:

Direct analysis of water by ICP-MS was used for Aluminum. Direct analysis of water by GFAA was used for Zinc. For the analysis of Cadmium, Copper, and Lead, a preconcentration step was followed by quantification using ICP-MS. Mercury was analyzed by cold vapor atomic fluorescence.

The QC samples included standard reference materials (QC Spikes), matrix spikes and replicates. Only one QC Spike is reported for each analyte on the tabled QC; for cases where there is data for more than one matrix spike or replicate, recovery information may be obtained from raw data copies included herein. When the procedural blank is accounted for, the QC Spike results are usually within +/- 25% of the certified value. The Lead matrix spike value was higher than the +/- 125% criterion, but the blank spike result was acceptable. The RPD for Zinc was slightly greater than the criteria of +/- 25%.

AMENDED REPORT:

At the request of the client, sample identifiers as listed on the Chain of Custody Record were edited to add "SG" prior to each identifier and either "-01" or "-02" after each identifier. The new sample identifiers are reflected in this amended report.

SECOND AMENDED REPORT:

At the time of analysis of these samples, ETC did not hold certification for Potassium with Wisconsin DNR. At the request of the client, the samples were re-analyzed at Northern Lake Service (NLS) for this parameter. Potassium results from NLS are reflected in this amended report. Additionally, bicarbonate alkalinity and total alkalinity results were corrected to reflect a reporting detection limit of 20 mg/L instead of 5 mg/L; these samples were not analyzed for low-level alkalinity. Lastly, the reporting detection limit for carbonate alkalinity was changed to "N/A", as this result is determined by calculation and, therefore, does not have an associated detection limit. Hydroxide alkalinity data was added for consistency with later joblinks.

Lisa Norosky
Lisa Norosky, Program Manager

3.7-9-43

040825
Date

Joblink: 810428

DATA SUMMARY REPORT

DATE: 08/24/94

Company: FOTH & VAN DYKE

PAGE: 1

Sample Point ID:	SG-AB-01	SG-CC-01	SG-CC-02	SG-V-01
ETC Sample Number:	MF2888	MF2885	MF2886	MF2887
Sample Date:	940208	940208	940208	940208
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters	Units
------------	-------

EPA METHOD 200 SERIES - METALS (AR08)

Aluminum	ug/L	8.04	20.4	20.5	27.7
Cadmium	ug/L	.004	.017	.007	.008
Copper	ug/L	.151	.391	.203	.199
Lead	ug/L	.077	.136	.142	.138
Mercury	ug/L	.0009	.001	.001	.001
Zinc	ug/L	.910	1.57	1.05	1.05

Sample Point ID:	SG-AB-01	SG-AB-01	SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02	SG-V-01	SG-V-01
ETC Sample Number:	MF2884	MF2896	MF2881	MF2893	MF2882	MF2894	MF2883	MF2895
Sample Date:	940207	940207	940207	940207	940207	940207	940207	940207
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters	Units
------------	-------

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Solids, total suspended	mg/L	<5.00	-	<5.00	-	<5.00	-	<5.00	-
Hardness as CaCO3	mg/L	124	-	104	-	104	-	126	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	4.48	-	1.62	-	1.46	-	1.82	-
Fluoride	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
pH	std	6.52	-	6.39	-	6.47	-	6.54	-
Total Dissolved Solids (TDS)	mg/L	153	-	122	-	131	-	153	-
Chemical Oxygen Demand (COD)	mg/L	<20.0	-	22.0	-	20.0	-	<20.0	-
Conductivity	umhos	257	-	213	-	215	-	248	-
Alkalinity as CaCO3	mg/L	122	-	97.0	-	102	-	122	-
Alkalinity, Bicarbonate CaCO3	mg/L	122	-	97.0	-	102	-	122	-
Alkalinity, Carbonate as CaCO3	mg/L	0	-	0	-	0	-	0	-
Chloride	mg/L	3.12	-	3.03	-	2.93	-	2.95	-
Nitrate as N	mg/L	.544	-	.555	-	.509	-	.501	-
Sulfate as SO4	mg/L	6.37	-	5.22	-	5.16	-	5.70	-
Sodium Absorption Ratio (SAR)	std	.111	-	.113	-	.114	-	.106	-
Cations	meq/l	2.72	-	2.27	-	2.26	-	2.70	-
Anions	meq/l	2.23	-	1.79	-	1.87	-	2.21	-
Cation and Anion Balance	%	9.84	-	11.7	-	9.54	-	10.0	-

3.7-9-44

Joblink: 810428

DATA SUMMARY REPORT

DATE: 08/24/94

Company: FOTH & VAN DYKE

PAGE: 2

Sample Point ID:	SG-AB-01	SG-AB-01	SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02	SG-V-01	SG-V-01
ETC Sample Number:	MF2884	MF2896	MF2881	MF2893	MF2882	MF2894	MF2883	MF2895
Sample Date:	940207	940207	940207	940207	940207	940207	940207	940207
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

CONVENTIONALS (AR55)

Turbidity	NTU	1.31	-	3.15	-	3.21	-	4.23	-
Phosphorus	mg/L	<.050	-	<.050	-	.194	-	.050	-
Phosphorus as P, dissolved	mg/L	<.050	-	<.050	-	<.050	-	<.050	-
Oil and Grease, (IR)	mg/L	<1.02	-	<1.00	-	<1.03	-	<1.01	-
Ammonia as N	mg/L	.459	-	-	-	-	-	-	-
Alkalinity, Hydroxide as CaCO ₃	mg/L	0	-	0	-	0	-	0	-
Biochemical Oxygen Demand	mg/L	-	6.00	-	8.00	-	7.00	-	6.00

Sample Point ID:	SG-AB-01	SG-AB-01	SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02	SG-V-01	SG-V-01
ETC Sample Number:	MF2884	MF2892	MF2881	MF2889	MF2882	MF2890	MF2883	MF2891
Sample Date:	940207	940207	940207	940207	940207	940207	940207	940207
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	.091	-	.290	-	.330	-	.176
Manganese	mg/L	-	.051	-	.097	-	.096	-	.071
Antimony, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Arsenic, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Barium, Total	mg/L	.011	-	.014	-	.014	-	.014	-
Beryllium, Total	mg/L	<.001	-	<.001	-	<.001	-	<.001	-
Boron, Total	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Calcium, Total	mg/L	29.0	-	24.9	-	24.8	-	29.7	-
Chromium, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Iron, Total	mg/L	.222	-	.502	-	.488	-	.410	-
Magnesium, Total	mg/L	13.6	-	10.8	-	10.8	-	13.1	-
Manganese, Total	mg/L	.077	-	.132	-	.129	-	.117	-
Molybdenum, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Nickel, Total	mg/L	<.030	-	<.030	-	<.030	-	<.030	-
Potassium, Total	mg/L	.840	-	.820	-	.860	-	.960	-
Selenium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Silver, Total	mg/L	<.010	-	<.010	-	<.010	-	<.010	-
Sodium, Total	mg/L	2.90	-	2.68	-	2.70	-	2.76	-

3.7-9-45

Joblink: 810428

DATA SUMMARY REPORT

DATE: 08/24/94

Company: FOTH & VAN DYKE

PAGE: 3

Sample Point ID:	SG-AB-01	SG-AB-01	SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02	SG-V-01	SG-V-01
ETC Sample Number:	MF2884	MF2892	MF2881	MF2889	MF2882	MF2890	MF2883	MF2891
Sample Date:	940207	940207	940207	940207	940207	940207	940207	940207
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Thallium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
-----------------	------	-------	---	-------	---	-------	---	-------	---

3.7-9-46

Batch 4

No.
of
Con-
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ers

Lab Numbers

Analysis Required

Remarks

1
1
1
1

[illegible]

Low Level Technique

Company

Date

Time

Carrier

Relinquished By: Scott Jensen
Received By: Deborah J. Varner
Relinquished By: _____
Received By: _____
Relinquished By: _____
Received By Lab: _____

FOTH: VAN DYKE
Bathelle

2/8/94

1200

Fed Ex

2/9/94

1200

Remarks:

marks: SEND RESULTS TO ETC

Foth & Van Dyke

3.7-9-47

ETC

CHAIN-OF-CUSTODY RECORD

Form 0019
Field Technical Services
Rev. 11/91

31028

No. 113486

Environmental Testing and Certification Corp. • 284 Raritan Center Parkway • Edison, NJ 08818 • 908-225-6700

COMPANY FOTH: VAN DYKE		FACILITY/SITE 93C049		NUMBER OF CONTAINERS	FILT. (Y/N) N	LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₃ + H ₂ SO ₄		
PROJECT CONTACT RUSS JANESHEK		TELEPHONE NO. 414-497-2500			PRESERV.			
					ANALYSIS REQUIRED SEE ATTACHMENT			
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	Source Codes: Well (W) Outfall (O) Soil (S) River/Stream (R) Bottom Sediment (B) Generation Point (G) Surface Impoundment (I) Treatment Facility (T) Leachate Collection Sys (C) Lake/Ocean (L) Other (X) Specify _____	SAMPLER OBSERVATIONS	LAB OBSERVATIONS
1		R	CC	9/2/7	0945			
2		R	CC-2		0945			
3		R	V		1300			
4		R	A.B		1430			
5								
6								
7								
8								
9								

CHAIN OF CUSTODY CHRONICLE

3.7-948	Shuttle Opened By: (print) SCOTT JANSSEN Date: _____ Time: _____
	Signature: Scott Janssen Seal #: _____ Intact: YES
2.	I have received these materials in good condition from the above person. Name: _____ Signature: _____ Date: _____ Time: _____ Remarks: _____
3.	I have received these materials in good condition from the above person. Name: _____ Signature: _____ Date: _____ Time: _____ Remarks: _____
4.	Shuttle Sealed By: (print) SCOTT JANSSEN Date: 2/8/94 Time: 1200 Signature: Scott Janssen Seal #: 64883 Intact: YES

REMARKS

FOR ANALYSIS REQUIRED
SEE ATTACHMENT
NO SAMPLES FILTERED

LAB USE ONLY	Opened By: SCOTT JANSSEN Date: 2-9-94 Time: 9:50AM
SHUTTLE #	TEMP. °C SM SEAL # 64883 COND. _____

SAMPLER'S SIGNATURE

Scott Janssen

ETC

CHAIN-OF-CUSTODY RECORD

810428

Form 0019
Field Technical Services
Rev. 11/91

No. 113486

Environmental Testing and Certification Corp. • 284 Raritan Center Parkway • Edison, NJ 08818 • 908-225-6700

COMPANY <i>Edison Vt. Dr.</i>		FACILITY/SITE <i>9500</i>		NUMBER OF CONTAINERS	FILT. (Y/N)	LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₃ + H ₂ SO ₄
PROJECT CONTACT <i>Russ Schmitt</i>		TELEPHONE NO. <i>414 112 2500</i>			PRESERV.	
					ANALYSIS REQUIRED <i>SEE ATTACHMENT</i>	
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	
1		R	C.C. 11111111111111111111	9/12/94	0815	Well (W) Outfall (O)
2		R	C.C. 11111111111111111111	9/12/94	0845	Soil (S) River/Stream (R)
3		A	V. 11111111111111111111	9/12/94	0800	Bottom Sediment (B)
4		R	A. 11111111111111111111	9/12/94	0930	Generation Point (G)
5						Surface Impoundment (I)
6						Treatment Facility (T)
7						Leachate Collection Sys (C)
8						Lake/Ocean (L)
9						Other (X)
						Specify _____

CHAIN OF CUSTODY CHRONICLE

37-949	Shuttle Opened By: (print) <i>Scott Hansen</i>	Date: <i>9/17/94</i>	Time: <i>12:00</i>
	Signature: <i>Scott Hansen</i>	Seal #: <i>75</i>	Intact: <i>Yes</i>
2.	I have received these materials in good condition from the above person.		
	Name: _____	Signature: _____	
	Date: _____	Time: _____	Remarks: _____
3.	I have received these materials in good condition from the above person.		
	Name: _____	Signature: _____	
	Date: _____	Time: _____	Remarks: _____
4.	Shuttle Sealed By: (print) <i>Scott Hansen</i>	Date: <i>2/18/94</i>	Time: <i>10:00</i>
	Signature: <i>Scott Hansen</i>	Seal #: <i>64881</i>	Intact: <i>Yes</i>

REMARKS

The Analysis Requested
SEE ATTACHMENT
THE SAMPLES ENTERED

SAMPLER'S SIGNATURE

Scott Hansen

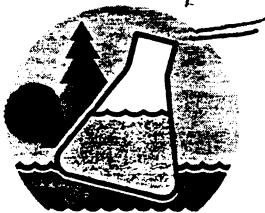
LAB USE ONLY Opened By: *SCOTT HANSEN* Date: *2-9-94* Time: *9:50AM*SHUTTLE # _____ TEMP. °C _____ SEAL # *64881* COND. _____

ENVIRONMENTAL TESTING AND CERTIFICATION CORP ■ 320 TESCONI CIRCLE SUITE G ■ SANTA ROSA CA 95401 ■ (707)544-5570

SUBCONTRACT LAB	TELEPHONE NUMBER	NUMBER OF CONTAINERS	N							FILT. (Y/N)	LEGEND FOR PRESERVATIVE
Northern Lake Services										PRESERV.	
LABORATORY CONTACT	TELEPHONE NUMBER										
Jim Fisher	(715) 478-2777										
ADDRESS											
400 Northlake Ave. Crandon, WI 54520											
		Total Potassium	92								

[illegible]

CHAIN OF CUSTODY CHRONICLE		RESULTS REQUESTED BY (DATE):	NOV 11 1994
1.	Relinquished To: <u>Federal Express</u> Date: <u>7/16/94</u> Time: <u>1330</u> By (signature): <u>[Signature]</u> Shuttle/Seal # <u>71586</u> Intact: <u> </u>	SEND RESULTS TO: <u>Lisa Novosky</u>	RESULTS MUST INCLUDE: STANDARD ☒ EXTENDED ☒ OTHER ☐ • Method Blank ☐ • Raw Data ☒ • Blank Spike ☐ • Other ☐ • MS/MSD ☐
2.	I have received these materials in good condition from the above person Receiving Lab/Opened By: <u>D. Cottrell</u> Date: <u>7-18-94</u> Time: <u>16:00</u> Temp. °C <u> </u> Seal #: <u> </u> Condition: <u> </u>		
3.	Shuttle Returned By: (print) <u> </u> Date: <u> </u> Time: <u> </u> Signature: <u> </u> Seal # <u> </u> Intact: <u> </u>	PO #: <u>7158603</u> PLEASE INCLUDE PO # AND/OR JOBLINK # ON INVOICE	FOR ETC USE ONLY: "SENT" DATE: <u> </u> INITIALS: <u> </u> NOTES: <u> </u>



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 08041

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT FOTH: VAN DYKE		PROJECT TITLE CRANDON MENING Co S.W. 5.13	
ADDRESS 2737 S. RIDGE Rd		PROJECT NO. 93C049	P.O. NO.
CITY GREEN BAY	STATE WI.	ZIP 54307	CONTACT RUSS JAWESHEIN (GJB)
			PHONE 414-497-2500

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			P	N	P		
1.	51271	CC	2/7/94	0945	S.W.	GRAB	1				
2.	51272	CC-2		0945			1				
3.	51273	V		1300			1				
4.	51274	AB		1430			1				
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE:
SW = surface water
WW = wastewater
GW = groundwater
DW = drinking water
TIS = tissue
AIR = air
PROD = product
SOIL = soil
SED = sediment
describe others

CONTAINER
P = plastic
G = glass
V = glass vial
B = plastic bag
describe others
PRESERVATIVES & PREPARATION
NP = nothing added
S = sulfuric acid
N = nitric acid
Z = zinc acetate
OH = sodium hydroxide
HA = hydrochloric & ascorbic acid
H = hydrochloric acid
F = field filtered

COLLECTED BY (signature) Scott Jansen	CUSTODY SEAL NO. (IF ANY)	DATE/TIME 2/7/94 1630
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME
DISPATCHED BY (signature) Scott Jansen	METHOD OF TRANSPORT FVD	DATE/TIME 2/8/94 0805

RECEIVED AT NLS BY (signature) Honey Huber	DATE/TIME 2-08-94 08:05	CONDITION	TEMP. 0.2°
SEAL INTACT? ☐ YES ☐ NO	SEAL #	REMARKS & OTHER INFORMATION * SEND INVOICE AND RESULTS to ETC LAB 320 TESONI Circle Ste G SANTA ROSA, CA 95401	

- IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY

3.7-9-51



USE THIS AIRBILL FOR SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII.
USE THE INTERNATIONAL AIR WAYBILL FOR SHIPMENTS TO PUERTO RICO AND ALL NON U.S. LOCATIONS.
QUESTIONS? CALL 800-238-5355 TOLL FREE.

PACKAGE
TRACKING NUMBER

0718751075

0718751075

Date

RECIPIENT'S COPY

From (Your Name) Please Print		Your Phone Number (Very Important)		To (Recipient's Name) Please Print		Recipient's Phone Number (Very Important)	
Company		Department/Floor No.		Company		Department/Floor No.	
Street Address				Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.)			
City		State		City		State	
ZIP Required		ZIP Required		ZIP Required		ZIP Required	
YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.)				IF HOLD AT FEDEX LOCATION, Print FEDEX Address Here			
PAYMENT 1 ☐ Bill Sender 2 ☐ Bill Recipient's FedEx Acct. No. 3 ☐ Bill 3rd Party FedEx Acct. No. 4 ☐ Bill Credit Card				City State ZIP Required			
5 ☐ Cash/Check							
4 SERVICES (Check only one box)		5 DELIVERY AND SPECIAL HANDLING (Check services required)		6 PACKAGES WEIGHT In Pounds Only YOUR DECLARED VALUE (See right)		Emp. No. Date	
Priority Overnight (Delivery by next business morning) 11 ☐ OTHER PACKAGING 16 ☐ FEDEX LETTER 12 ☐ FEDEX PAK 13 ☐ FEDEX BOX 14 ☐ FEDEX TUBE Economy Two-Day (Delivery by second business day) 30 ☐ ECONOMY Economy Letter Rate not available. Minimum charge One pound Economy rate. 70 ☐ OVERNIGHT FREIGHT Government Overnight (Delivery by next business afternoon No Saturday delivery) 51 ☐ OTHER PACKAGING 56 ☐ FEDEX LETTER 52 ☐ FEDEX PAK 53 ☐ FEDEX BOX 54 ☐ FEDEX TUBE 46 ☐ GOVT LETTER 41 ☐ GOVT PACKAGE Freight Service (for packages over 150 lbs.) 80 ☐ TWO-DAY FREIGHT		1 ☐ HOLD AT FEDEX LOCATION WEEKDAY (Fill in Section H) 2 ☐ DELIVER WEEKDAY 31 ☐ HOLD AT FEDEX LOCATION SATURDAY (Fill in Section H) 3 ☐ DELIVER SATURDAY (Extra charge) (Not available to all locations) 9 ☐ SATURDAY PICK-UP (Extra charge) 4 ☐ DANGEROUS GOODS (Extra charge) 6 ☐ DRY ICE (Dangerous Goods Shipper's Declaration not required) Dry Ice 9 UN 1845 X kg 904 III 12 ☐ HOLIDAY DELIVERY (II offered) (Extra charge)		Total Total Total DIMENSIONAL WEIGHT Release Signature:		Street Address City State Zip Received By: X Date/Time Received FedEx Employee Number	
						REVISION DATE 12/92 FORMAT #158 158	



USE THIS AIRBILL FOR SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII.
USE THE INTERNATIONAL AIR WAYBILL FOR SHIPMENTS TO PUERTO RICO AND ALL NON U.S. LOCATIONS.
QUESTIONS? CALL 800-238-5355 TOLL FREE.

AIRBILL
PACKAGE
TRACKING NUMBER

0718751095

0718751095

Date

RECIPIENT'S COPY

From (Your Name) Please Print		Your Phone Number (Very Important)		To (Recipient's Name) Please Print		Recipient's Phone Number (Very Important)	
Company		Department/Floor No.		Company		Department/Floor No.	
Street Address				Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.)			
City		State		City		State	
ZIP Required		ZIP Required		ZIP Required		ZIP Required	
YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.)				IF HOLD AT FEDEX LOCATION, Print FEDEX Address Here			
PAYMENT 1 ☐ Bill Sender 2 ☐ Bill Recipient's FedEx Acct. No. 3 ☐ Bill 3rd Party FedEx Acct. No. 4 ☐ Bill Credit Card				City State ZIP Required			
5 ☐ Cash/Check							
4 SERVICES (Check only one box)		5 DELIVERY AND SPECIAL HANDLING (Check services required)		6 PACKAGES WEIGHT In Pounds Only YOUR DECLARED VALUE (See right)		Emp. No. Date	
Priority Overnight (Delivery by next business morning) 11 ☐ OTHER PACKAGING 16 ☐ FEDEX LETTER 12 ☐ FEDEX PAK 13 ☐ FEDEX BOX 14 ☐ FEDEX TUBE Economy Two-Day (Delivery by second business day) 30 ☐ ECONOMY Economy Letter Rate not available. Minimum charge One pound Economy rate. 70 ☐ OVERNIGHT FREIGHT Government Overnight (Delivery by next business afternoon No Saturday delivery) 51 ☐ OTHER PACKAGING 56 ☐ FEDEX LETTER 52 ☐ FEDEX PAK 53 ☐ FEDEX BOX 54 ☐ FEDEX TUBE 46 ☐ GOVT LETTER 41 ☐ GOVT PACKAGE Freight Service (for packages over 150 lbs.) 80 ☐ TWO-DAY FREIGHT		1 ☐ HOLD AT FEDEX LOCATION WEEKDAY (Fill in Section H) 2 ☐ DELIVER WEEKDAY 31 ☐ HOLD AT FEDEX LOCATION SATURDAY (Fill in Section H) 3 ☐ DELIVER SATURDAY (Extra charge) (Not available to all locations) 9 ☐ SATURDAY PICK-UP (Extra charge) 4 ☐ DANGEROUS GOODS (Extra charge) 6 ☐ DRY ICE (Dangerous Goods Shipper's Declaration not required) Dry Ice 9 UN 1845 X kg 904 III 12 ☐ HOLIDAY DELIVERY (II offered) (Extra charge)		Total Total Total DIMENSIONAL WEIGHT Release Signature:		Street Address City State Zip Received By: X Date/Time Received FedEx Employee Number	
						REVISION DATE 12/92 FORMAT #158 158	

March 1994
Surface Water Laboratory Data



An ETC Laboratory

320 Tesconi Circle

Suite G

Santa Rosa, CA
95401

Telephone
(707) 544-5570

Facsimile
(707) 544-4906

AUGUST 25, 1994

CLIENT: FOTH & VAN DYKE
P.O. BOX 19012
2737 S. RIDGE ROAD
GREEN BAY, WI 54307-9012

ATTN: RUSS JANESHEK

JOBLINK: 810596 AMENDED
PROJECT:

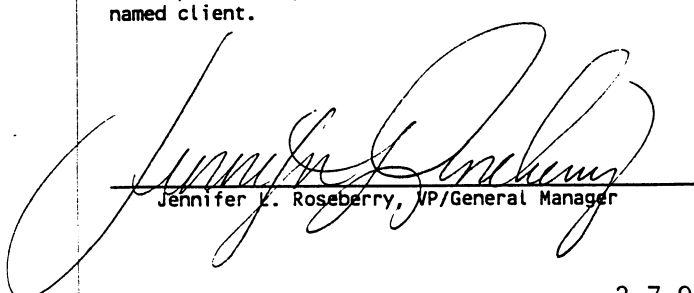
ANALYSIS

EPA METHOD 200 SERIES - METALS
CONVENTIONAL: ALKALINITY AS CaCO_3 ; ALKALINITY, BICARBONATE CaCO_3 ;
ALKALINITY, CARBONATE AS CaCO_3 ; AMMONIA AS N; ANIONS; BIOCHEMICAL OXYGEN DEMAND;
CATION AND ANION BALANCE; CATIONS; CHEMICAL OXYGEN DEMAND (COD); CHLORIDE;
CONDUCTIVITY; CYANIDE, TOTAL; FLUORIDE; HARDNESS AS CaCO_3 ; NITRATE AS N;
NITROGEN, TOTAL KJELDAHL (TKN); OIL AND GREASE, (IR); PH; PHOSPHORUS;
PHOSPHORUS AS P, DISSOLVED; SODIUM ABSORPTION RATIO (SAR); SOLIDS, TOTAL SUSPENDED;
SULFATE AS SO_4 ; TOTAL DISSOLVED SOLIDS (TDS); TURBIDITY

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE DATE</u>	<u>DATE IN LAB</u>
MF3665	SG-CC-01	LIQUID	03-07-94	03-09-94
MF3666	SG-CC-02	LIQUID	03-07-94	03-09-94
MF3667	SG-Y-01	LIQUID	03-07-94	03-09-94
MF3668	SG-V-01	LIQUID	03-07-94	03-09-94
MF3669	SG-AB-01	LIQUID	03-07-94	03-09-94
MF3670	SG-CC-01	LIQUID	03-07-94	03-09-94
MF3671	SG-CC-02	LIQUID	03-07-94	03-09-94
MF3672	SG-Y-01	LIQUID	03-07-94	03-09-94
MF3673	SG-V-01	LIQUID	03-07-94	03-09-94
MF3674	SG-AB-01	LIQUID	03-07-94	03-09-94
MF3688	SG-CC-01	LIQUID	03-07-94	03-09-94
MF3689	SG-CC-02	LIQUID	03-07-94	03-09-94
MF3690	SG-Y-01	LIQUID	03-07-94	03-09-94
MF3691	SG-V-01	LIQUID	03-07-94	03-09-94
MF3692	SG-AB-01	LIQUID	03-07-94	03-09-94
MF3693	SG-CC-01	LIQUID	03-07-94	03-09-94
MF3694	SG-CC-02	LIQUID	03-07-94	03-09-94
MF3695	SG-Y-01	LIQUID	03-07-94	03-09-94
MF3696	SG-V-01	LIQUID	03-07-94	03-09-94
MF3697	SG-AB-01	LIQUID	03-07-94	03-09-94
MF4210	BOTTLES	NOT APPLICABLE	NOT APPLICABLE	03-09-94

This report is "PROPRIETARY AND CONFIDENTIAL" and delivered to, and intended for the exclusive use of the above named client only. ETC, a Division of APBI Environmental Sciences Group, Inc. assumes no responsibility or liability for the reliance hereon or use hereof by anyone other than the above named client.

A division of
APBI Environmental
Sciences Group, Inc.


Jennifer L. Roseberry, VP/General Manager

940826
Date

3.7-9-54

AUG 25 1994



FOTH & VAN DYKE
AUGUST 25, 1994
810596 AMENDED

SAMPLE MATRIX: LIQUID

Parameter	EPA Prep Method	EPA Analysis Method
ICP Metals	3015	200.7
Total Antimony	3015	204.2
Total Arsenic	3015	206.2
Total Potassium**	3010	6010
Total Thallium	3015	279.2
Aluminum*	NA	200.8
Cadmium*	APDC EXTRACTION	200.8
Copper*	APDC EXTRACTION	200.8
Lead*	APDC EXTRACTION	200.8
Mercury*	±	±
Zinc*	NA	200.9m
Alkalinity as CaCO3	NA	310.1
Alkalinity, Hydroxide as CaCO3	NA	310.1
Bicarbonate as CaCO3	NA	310.1
Carbonate Alkalinity as CaCO3	NA	310.1
Ammonia as N	350.2	350.2
Anions	NA	CALC.
Cations	NA	CALC.
Cation & Anion Balance	NA	CALC.
Chemical Oxygen Demand	NA	410.4
Chloride	NA	300.0
Conductivity	NA	9050
Total Cyanide	NA	9010
Fluoride	NA	340.2
Hardness as CaCO3	NA	130.2
Nitrate as N	NA	300.0
Total Kjeldahl Nitrogen	351.3	351.3
Oil & Grease	413.2	413.2
pH	NA	9040
Phosphorus	365.3	365.3
Phosphorus as P, Dissolved	NA	365.3
Sodium Absorption Ratio	NA	CALC.
Total Suspended Solids	NA	160.2
Sulfate as SO4	NA	300.0
Total Dissolved Solids	NA	160.1
Turbidity	NA	180.1
Biochemical Oxygen Demand**	405.1	405.1

* ANALYSIS PERFORMED BY BATELLE MARINE SCIENCES LABORATORY

± COLD VAPOR ATOMIC FLUORESCENCE

** ANALYSIS PERFORMED BY NORTHERN LAKE SERVICE, INC

ns



FOTH & VAN DYKE
24 AUGUST 1994

**EXECUTIVE SUMMARY
ETC JOBLINK 810596
(AMENDED REPORT)**

On 09 and 10 March 1994 ETC-Santa Rosa received aqueous samples from Foth & Van Dyke via Federal Express. The cooler temperatures were 0°C upon receipt at the laboratory. The samples were analyzed as specified on the preceding page.

At the request of the client, sample identifiers as listed on the Chain of Custody Record were edited to add "SG" prior to each identifier and either "-01" or "-02" after each identifier. The new sample identifiers are reflected in this report.

Samples were filtered at the laboratory through a 0.45 μ m filter prior to analysis for iron, manganese, and phosphorus; these results reflect dissolved parameters. Phosphorus was also analyzed without filtration; these results reflect total parameters.

Samples SG-CC-01, SG-CC-02, SG-Y-01, SG-V-01, and SG-AB-01 were received past the method-recommended holding time for pH analysis. Samples SG-CC-01, SG-CC-02, SG-Y-01, SG-V-01, and SG-AB-01 were received on the date the method-recommended holding time was up for Nitrate and Turbidity analyses; the holding time could not be met for these tests.

Low level metals analyses were performed by Batelle; Biochemical Oxygen Demand (BOD) analyses were performed by Northern Lake Service.

CALCULATIONS:

Results for Sodium Absorption Ratio (Modified SAR), Cations, Anions, and Cation and Anion Balance were obtained by calculation using analytical data. The Cations reflect results for Calcium, Magnesium, Potassium, and Sodium; the Anions reflect results for Chloride, Fluoride, Nitrate, Sulfate, Carbonate, and Bicarbonate.

LOW LEVEL METALS ANALYSES:

Direct analysis of water by ICP-MS was used for Aluminum. Direct analysis of water by GFAA was used for Zinc. For the analysis of Cadmium, Copper, and Lead, a preconcentration step was followed by quantification using ICP-MS. Mercury was analyzed by cold vapor atomic fluorescence.

The QC samples included standard reference materials (QC Spikes), matrix spikes and replicates. Only one QC Spike is reported for each analyte on the tabled QC; for cases where there is data for more than one matrix spike or replicate, recovery information may be obtained from raw data copies included herein. When the procedural blank is accounted for, the QC Spike results are usually within +/- 25% of the certified value. The Lead matrix spike value was higher than the +/- 125% criterion, but the blank spike result was acceptable. The RPD for Zinc was slightly greater than the criteria of +/- 25%.

AMENDED REPORT:

At the time of analysis of these samples, ETC did not hold certification for Potassium with Wisconsin DNR. At the request of the client, the samples were re-analyzed at Northern Lake Service (NLS) for this parameter. Potassium results from NLS are reflected in this amended report. Additionally, bicarbonate alkalinity and total alkalinity results were corrected to reflect a reporting detection limit of 20 mg/L instead of 5 mg/L; these samples were not analyzed for low-level alkalinity. Lastly, the reporting detection limit for carbonate alkalinity was changed to "N/A", as this result is determined by calculation and, therefore, does not have an associated detection limit. Hydroxide alkalinity data was added for consistency with later joblinks.

Lisa Norosky

Lisa Norosky, Program Manager

440825

Date

Joblink: 810596

DATA SUMMARY REPORT

DATE: 08/24/94

Company: FOTH & VAN DYKE

PAGE: 1

Sample Point ID:	SG-AB-01	SG-CC-01	SG-CC-02	SG-V-01	SG-Y-01
ETC Sample Number:	MF3692	MF3688	MF3689	MF3691	MF3690
Sample Date:	940307	940307	940307	940307	940307
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD 200 SERIES - METALS (AR08)

Aluminum	ug/L	13.1	24.9	25.9	23.9	17.0
Cadmium	ug/L	.004	.005	.007	.005	.006
Copper	ug/L	.177	.217	.218	.204	.250
Lead	ug/L	.110	.142	.142	.160	.141
Mercury	ug/L	.001	.002	.003	.002	.002
Zinc	ug/L	.110	1.11	1.44	1.70	1.57

Sample Point ID:	SG-AB-01	SG-AB-01	SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02	SG-V-01	SG-V-01
ETC Sample Number:	MF3669	MF3697	MF3665	MF3693	MF3666	MF3694	MF3668	MF3696
Sample Date:	940307	940307	940307	940307	940307	940307	940307	940307
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Chloride	mg/L	3.13	-	3.11	-	3.22	-	3.12	-
Nitrate as N	mg/L	.543	-	.622	-	.622	-	.535	-
Sulfate as SO4	mg/L	5.67	-	5.77	-	5.76	-	5.73	-
Hardness as CaCO3	mg/L	110	-	102	-	104	-	110	-
Chemical Oxygen Demand (COD)	mg/L	10.0	-	17.0	-	15.0	-	18.0	-
Conductivity	umhos	209	-	205	-	203	-	211	-
Alkalinity as CaCO3	mg/L	103	-	96.2	-	106	-	103	-
Alkalinity, Bicarbonate CaCO3	mg/L	103	-	96.2	-	106	-	103	-
Alkalinity, Carbonate as CaCO3	mg/L	0	-	0	-	0	-	0	-
Turbidity	NTU	2.40	-	3.20	-	3.30	-	3.80	-
Fluoride	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Phosphorus	mg/L	<.050	-	<.050	-	<.050	-	<.050	-
Phosphorus as P, dissolved	mg/L	<.050	-	<.050	-	<.050	-	<.050	-
Ammonia as N	mg/L	.112	-	.112	-	<.100	-	.179	-
Total Dissolved Solids (TDS)	mg/L	129	-	125	-	135	-	125	-
Sodium Absorption Ratio (SAR)	std	.106	-	.121	-	.113	-	.107	-
Cations	meq/l	2.18	-	2.08	-	2.10	-	2.26	-
Anions	meq/l	1.90	-	1.80	-	1.96	-	1.90	-

3.7-9-57

Joblink: 810596

DATA SUMMARY REPORT

DATE: 08/24/94

Company: FOTH & VAN DYKE

PAGE: 2

Sample Point ID:	SG-AB-01	SG-AB-01	SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02	SG-V-01	SG-V-01
ETC Sample Number:	MF3669	MF3697	MF3665	MF3693	MF3666	MF3694	MF3668	MF3696
Sample Date:	940307	940307	940307	940307	940307	940307	940307	940307
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters	Units
------------	-------

CONVENTIONALS (AR55)

Cation and Anion Balance	%	6.83	-	7.38	-	3.47	-	8.50	-
Solids, total suspended	mg/L	<5.00	-	<5.00	-	<5.00	-	<5.00	-
Oil and Grease, (IR)	mg/L	<1.00	-	<1.00	-	<1.00	-	<1.00	-
pH	std	7.20	-	7.20	-	7.30	-	7.10	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	.560	-	.392	-	.308	-	.392	-
Alkalinity, Hydroxide as CaCO3	mg/L	0	-	0	-	0	-	0	-
Biochemical Oxygen Demand	mg/L	-	5.00	-	5.00	-	5.00	-	8.00

Sample Point ID:	SG-Y-01	SG-Y-01
ETC Sample Number:	MF3667	MF3695
Sample Date:	940307	940307
Facility Code:	FVDGRNBCMC	FVDGRNBCMC

Parameters	Units
------------	-------

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-
Chloride	mg/L	2.98	-
Nitrate as N	mg/L	.540	-
Sulfate as SO4	mg/L	5.61	-
Hardness as CaCO3	mg/L	93.2	-
Chemical Oxygen Demand (COD)	mg/L	20.0	-
Conductivity	umhos	188	-
Alkalinity as CaCO3	mg/L	88.3	-
Alkalinity, Bicarbonate CaCO3	mg/L	88.3	-
Alkalinity, Carbonate as CaCO3	mg/L	0	-
Turbidity	NTU	2.20	-
Fluoride	mg/L	<.100	-
Phosphorus	mg/L	<.050	-
Phosphorus as P, dissolved	mg/L	<.050	-
Ammonia as N	mg/L	<.100	-
Total Dissolved Solids (TDS)	mg/L	135	-
Sodium Absorption Ratio (SAR)	std	.121	-
Cations	meq/l	1.95	-
Anions	meq/l	1.66	-

3.7-9-58

Joblink: 810596

DATA SUMMARY REPORT

DATE: 08/24/94

Company: FOTH & VAN DYKE

PAGE: 3

Sample Point ID:	SG-Y-01	SG-Y-01
ETC Sample Number:	MF3667	MF3695
Sample Date:	940307	940307
Facility Code:	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

CONVENTIONALS (AR55)

Cation and Anion Balance	%	8.02	-
Solids, total suspended	mg/L	<5.00	-
Oil and Grease, (IR)	mg/L	<1.00	-
pH	std	7.10	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	.504	-
Alkalinity, Hydroxide as CaCO3	mg/L	0	-
Biochemical Oxygen Demand	mg/L	-	9.00

Sample Point ID:	SG-AB-01	SG-AB-01	SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02	SG-V-01	SG-V-01
ETC Sample Number:	MF3669	MF3674	MF3665	MF3670	MF3666	MF3671	MF3668	MF3673
Sample Date:	940307	940307	940307	940307	940307	940307	940307	940307
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	.089	-	.274	-	.270	-	.150
Manganese	mg/L	-	.039	-	.101	-	.097	-	.052
Antimony, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Arsenic, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Barium, Total	mg/L	<.010	-	.012	-	.011	-	.011	-
Beryllium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Boron, Total	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Calcium, Total	mg/L	23.3	-	22.2	-	22.7	-	24.4	-
Chromium, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Iron, Total	mg/L	.241	-	.509	-	.517	-	.412	-
Magnesium, Total	mg/L	10.8	-	10.1	-	10.1	-	11.0	-
Manganese, Total	mg/L	.057	-	.139	-	.136	-	.084	-
Molybdenum, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Nickel, Total	mg/L	<.030	-	<.030	-	<.030	-	<.030	-
Potassium, Total	mg/L	.970	-	.940	-	.950	-	1.00	-
Selenium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Silver, Total	mg/L	<.010	-	<.010	-	<.010	-	<.010	-
Sodium, Total	mg/L	2.46	-	2.73	-	2.57	-	2.54	-

3.7-9-59

Joblink: 810596

DATA SUMMARY REPORT

DATE: 08/24/94

Company: FOTH & VAN DYKE

PAGE: 4

Sample Point ID:	SG-AB-01	SG-AB-01	SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02	SG-V-01	SG-V-01
ETC Sample Number:	MF3669	MF3674	MF3665	MF3670	MF3666	MF3671	MF3668	MF3673
Sample Date:	940307	940307	940307	940307	940307	940307	940307	940307
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Thallium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
-----------------	------	-------	---	-------	---	-------	---	-------	---

Sample Point ID:	SG-Y-01	SG-Y-01
ETC Sample Number:	MF3667	MF3672
Sample Date:	940307	940307
Facility Code:	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	.392
Manganese	mg/L	-	.182
Antimony, Total	mg/L	<.005	-
Arsenic, Total	mg/L	<.005	-
Barium, Total	mg/L	.014	-
Beryllium, Total	mg/L	<.005	-
Boron, Total	mg/L	<.100	-
Calcium, Total	mg/L	21.1	-
Chromium, Total	mg/L	<.020	-
Iron, Total	mg/L	.579	-
Magnesium, Total	mg/L	9.19	-
Manganese, Total	mg/L	.219	-
Molybdenum, Total	mg/L	<.020	-
Nickel, Total	mg/L	<.030	-
Potassium, Total	mg/L	.880	-
Selenium, Total	mg/L	<.005	-
Silver, Total	mg/L	<.010	-
Sodium, Total	mg/L	2.64	-
Thallium, Total	mg/L	<.005	-

3.7-9-60

ETC

CHAIN-OF-CUSTODY RECORD

810596

Form 0019
Field Technical Services
Rev. 11/91

No. 113602

Environmental Testing and Certification Corp. • 284 Raritan Center Parkway • Edison, NJ 08818 • 908-225-6700

COMPANY FOTH; VAN DYKE		FACILITY/SITE CRANDON MINING Co 93CO 9		NUMBER OF CONTAINERS	FILT. (Y/N) N	LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₃ + H ₂ SO ₄
PROJECT CONTACT RUSS JANESHER		TELEPHONE NO. 414-497-2500			PRESERV.	
					ANALYSIS REQUIRED SEE ATTACHMENT	
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	
1		R	CC	91/3/7	0945	Well (W) Outfall (O)
2		R	CC-2		0945	Soil (S) River/Stream (R)
3		R	Y		1130	Bottom Sediment (B)
4		R	V		1230	Generation Point (G)
5		R	AB		1430	Surface Impoundment (I)
6						Treatment Facility (T)
7						Leachate Collection Sys (C)
8						Lake/Ocean (L)
9						Other (X)
						Specify _____

CHAIN OF CUSTODY CHRONICLE

3.7-9-61	Shuttle Opened By: (print) SCOTT JANSEN Date: 3/8/94 Time: 0700
	Signature: Scott Jansen Seal #: _____ Intact: YES
2	I have received these materials in good condition from the above person Name: _____ Signature: _____ Date: _____ Time: _____ Remarks: _____
3	I have received these materials in good condition from the above person Name: _____ Signature: _____ Date: _____ Time: _____ Remarks: _____
4	Shuttle Sealed By: (print) SCOTT JANSEN Date: 3/8/94 Time: 0900 Signature: Scott Jansen Seal #: 64738 Intact: YES Seal #: 64732
LAB USE ONLY Opened By: Phil Jansen Date: 3/9/94 Time: 0945 SHUTTLE # N/A TEMP. °C 0.512 SEAL # 14132 COND. GOOD	

REMARKS

SAMPLER'S SIGNATURE

Scott Jansen

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3.7-9-62

MAR 10 '94 03:25PM BATTELLE MARINE SCIENCES LAB

CHAIN OF CUSTODY

Client: FOTH; VANDYKE / CRANDON MENSURE Co Scope I.D.: 93C049
Project: SW. Sampling TASK 5.12 Page: _____
Prepared by: SOS Date: 3/7/84
Sampler(s): Scott Danese Date: _____
(Signature)

No.
of
Con-
tain-
ers

Lab Numbers

Analysis Required

Remarks

Aluminum
Cadmium
Copper
Lead
Mercury
Zinc

[illegible]

← No label on bottle - assume
that is all
Expense is
this one

Signature	Company	Date	Time	Carrier
Relinquished By: <i>Scott Jansen</i>	<i>FOTH; Van DYKE</i>	<i>3/8/94</i>	<i>0900</i>	<i>FED EX</i>
Received By:				
Relinquished By:				
Received By:				
Relinquished By:				
Received By: <i>Jim J...</i>	<i>Boettcher</i>	<i>3/9/94</i>	<i>1200</i>	
Received By Lab:				
Foth & Van Dyke		Remarks: <i>SEND RESULTS TO ERC</i>		

ETC

CHAIN-OF-CUSTODY RECORD
REQUEST FOR ANALYTICAL SERVICESRLV. 04/93
FORM 301

ENVIRONMENTAL TESTING AND CERTIFICATION CORP ■ 320 TESCONI CIRCLE SUITE G ■ SANTA ROSA CA 95401 ■ (707)544-5570

SUBCONTRACT LAB

Northern Lake Services

LABORATORY CONTACT

Jim Fisher

ADDRESS

400 North Lake Ave.

Crandon, WI 54520

TELEPHONE NUMBER

TELEPHONE NUMBER

(715) 478-2777

NUMBER
OF CONTAINERSN
Total Potassium 2

FILT. (Y/N)

PRESERV.

LEGEND FOR
PRESERVATIVE0 - NONE
1 - HCL
2 - HNO₃
3 - H₂SO₄
4 - H₂SO₄ + H₂SO₃

MATRIX CODES:

	ETC JOB NUMBER	MATRIX CODE	JOB LINK NUMBER	SAMPLE DATE	
1	MF2881	1	810428	940211	Liquid..... 1
2	MF2882	↓	↓	↓	Solid/Sludge..... 2
3	MF2883	↓	↓	↓	Oily Solid..... 3
4	MF2884	↓	↓	940209	Oily Liquid..... 4
5	MF3665	↓	810596	940309	Wipe..... 5
6	MF3666	↓	↓	↓	Leachate..... 7
7	MF3667	↓	↓	↓	Air..... 8
8	MF3668	↓	↓	↓	Other.....

REMARKS:

please analyze for
total potassium by ICP.
(method 6010)

CHAIN OF CUSTODY CHRONICLE

- Relinquished To: Federal Express Date: 7/16/94 Time: 1330
By (signature): Phil Danner Shuttle/Seal # 71586 Intact:
- I have received these materials in good condition from the above person
Receiving Lab/Opened By: D. Cottrell Date: 7-18-94 Time: 16:00
Temp. °C Seal #: Condition:
- Shuttle Returned By: (print) Date: Time:
Signature: Seal # Intact:

RESULTS REQUESTED BY (DATE): Normal TAT
SEND RESULTS TO: Via Norosty

RESULTS MUST INCLUDE:

STANDARD ☒ EXTENDED ☒ OTHER ☐
• Method Blank • Raw Data
• Blank Spike • Other
• MS/MSD

PO #:

PLEASE INCLUDE PO # AND/OR JOBLINK # ON INVOICE

FOR ETC USE ONLY:

"SENT"
NOTES:

DATE:

INITIALS:

3.7-9-63

CHAIN-OF-CUSTODY RECORD REQUEST FOR ANALYTICAL SERVICES

ENVIRONMENTAL TESTING AND CERTIFICATION CORP ■ 320 TESCONI CIRCLE SUITE G ■ SANTA ROSA CA 95401 ■ (707)544-5570

TELEPHONE NUMBER

LABORATORY CONTACT

TELEPHONE NUMBER

ADDRESS

NUMBER
OF CONTAINERS

Total Potassium	2	N
-----------------	---	---

FILT. (Y/N)

PRESERV.

LEGEND FOR
PRESERVATIVE

0 - NONE
1 - HCL
2 - HNO₃
3 - H₂SO₄
4 - Na₂SO₄ + H₂SO₄

REMARKS:

methion 6010

MATRIX CODES:

Liquid.....	1
Solid/Sludge.....	2
Oily Solid.....	3
Oily Liquid.....	4
Wipe.....	5
Leachate.....	7
Air.....	8
Other	

Other _____

CHAIN OF CUSTODY CHRONICLE

Relinquished To: Federal Express Date: 7/16/94 Time: 1330

By (signature): Phil Casser Shuttle/Seal# 71386 Intact:

I have received these materials in good condition from the above person

Receiving Lab/Opened By: D. Cathers Date: 7-18-94 Time: 16:00

Temp. °C _____ Seal #: _____ Condition: _____

Shuttle Returned By: (print) _____ Date: _____ Time: _____

Signature: _____ Seal # _____ Intact: _____

RESULTS REQUESTED BY (DATE): Normal T4 7
SEND RESULTS TO: 1111 Alameda

RESULTS MUST INCLUDE:

STANDARD ☒ EXTENDED ☒ OTHER ☐

- Method Blank
- Blank Spike
- MS/MSD

•

- Raw Data
- Other

PO #: _____

PLEASE INCLUDE PO # AND/OR JOBLINK # ON INVOICE

FOR ETC USE ONLY:

"SENT" _____ DATE: _____ INITIALS: _____
NOTES: _____



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 08240

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT FOTH VAN DYKE		PROJECT TITLE CRANDON MINING CO TASK 5.12	
ADDRESS 2737 S. RIDGE RD		PROJECT NO. 93C049	P.O. NO.
CITY GREEN BAY	STATE WI.	ZIP 54307	CONTACT RUSS JANESHEK
			PHONE 414-497-2500

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE					COLLECTION REMARKS
			DATE	TIME			P	N	P			
1.	52742	CC	3/7/94	0945	S.W.	GRAB	1					
2.	52743	CC-Z		0945			1					
3.	52744	Y		1230			1					
4.	52745	V		1230			1					
5.	52746	AB		1430			1					
6.												
7.												
8.												
9.												
10.												
11.												
12.												

SAMPLE TYPE:

SW = surface water
WW = wastewater
GW = groundwater

DW = drinking water
TIS = tissue
AIR = air

PROD = product
SOIL = soil
SED = sediment

describe others

CONTAINER

P = plastic
G = glass
V = glass vial
B = plastic bag

describe others

PRESERVATIVES & PREPARATION

NP = nothing added
S = sulfuric acid
N = nitric acid
Z = zinc acetate

OH = sodium hydroxide
HA = hydrochloric & ascorbic acid
H = hydrochloric acid

F = field filtered

COLLECTED BY (signature) Scott Spence	CUSTODY SEAL NO. (IF ANY)	DATE/TIME 3/7/94 1640
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME
DISPATCHED BY (signature) Scott Spence	METHOD OF TRANSPORT FYD	DATE/TIME 3/7/94 1640

RECEIVED AT NLS BY (signature) Kourea Gartner	DATE/TIME 3-7-94 4:43	CONDITION	TEMP. ICE
SEAL INTACT? ☐ YES ☐ NO	SEAL #	REMARKS & OTHER INFORMATION SEND RESULTS TO ETC	

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY

6029144505

RECIPIENT'S COPY

Date		Print	
From (Your Name) Please Print		To (Recipient's Name) Please Print	
Your Phone Number (Very Important)		Recipient's Phone Number (Very Important)	
Company		Company	
Department/Floor No.		Department/Floor No.	
Street Address		Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.)	
City	State	City	State
ZIP Required	ZIP Required	ZIP Required	ZIP Required
YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.)			
PAYMENT 1 ☒ Bill Sender 2 ☐ Bill Recipient's FedEx Acct. No. 3 ☐ Bill 3rd Party FedEx Acct. No. 4 ☐ Bill Credit Card		IF HOLD FOR PICKUP, Print FEDEX Address Here	
5 ☐ Cash/Check		Street Address	
		City	
		State	
		ZIP Required	
SERVICES (Check only one box)		DELIVERY AND SPECIAL HANDLING (Check services required)	
Priority Overnight (Delivery by next business morning) 11 ☐ OTHER PACKAGING 16 ☐ FEDEX LETTER [®] 12 ☐ FEDEX PAK [®] 13 ☐ FEDEX BOX [®] 14 ☐ FEDEX TUBE	Standard Overnight (Delivery by next business afternoon, no Saturday delivery) 51 ☐ OTHER PACKAGING 56 ☐ FEDEX LETTER [®] 52 ☐ FEDEX PAK [®] 53 ☐ FEDEX BOX [®] 54 ☐ FEDEX TUBE	HOLD FOR PICK-UP (Fill in Box H) { 1 WEEKDAY or 31 SATURDAY DELIVER { 2 WEEKDAY or 3 SATURDAY (Extra charge) (Not available to all locations) 4 ☐ DANGEROUS GOODS (Extra charge) 5 ☐ 6 ☐ DRY ICE (Dangerous Goods Shipper's Declaration not required) 7 ☐ OTHER SPECIAL SERVICE 9 ☐ SATURDAY PICK-UP (Extra charge) 12 ☐ HOLIDAY DELIVERY (if offered) (Extra charge)	PACKAGES WEIGHT in Pounds Only YOUR DECLARED VALUE (See note) Total Total Total DIM SHIPMENT (Chargeable weight) Received By: X Date/Time Received FedEx Employee Number Release Signature:
Economy Two-Day (Delivery by second business day) 30 ☐ ECONOMY		Government Overnight (Restricted for authorized users only) 46 ☐ GOVT LETTER 41 ☐ GOVT PACKAGE	
Freight Service (for packages over 150 lbs.) 70 ☐ OVERNIGHT FREIGHT [™] (Confirmed reservation required) 80 ☐ TWO-DAY FREIGHT [™] (Delivery commitment may vary)		REVISION DATE 6/92 PART #137205 GBFE FORMAT #136 136 1991-92 FED. REG. PRINTED IN U.S.A.	



QUESTIONS? CALL 800-238-5355-TOLL FREE.

6029344536

AIRBILL

**PACKAGE.
TRACKING NUMBER**

6029144516

RECIPIENT'S COPY[illegible]

April 1994
Surface Water Laboratory Data



An ETC Laboratory

320 Tesconi Circle

Suite G

Santa Rosa, CA

95401

Telephone

(707) 544-5570

Facsimile

(707) 544-4906

SEPTEMBER 1, 1994

CLIENT: FOTH & VAN DYKE
P.O. BOX 19012
2737 S. RIDGE ROAD
GREEN BAY, WI 54307-9012

ATTN: RUSS JANESHEK

JOB LINK: 810771 AMENDED REPORT
PROJECT: CMC TASK 5.13

ANALYSIS

EPA METHOD 200 SERIES - METALS; 6010 & 7000 SERIES METALS

CONVENTIONALS: ALKALINITY AS CaCO_3 ; ALKALINITY, HYDROXIDE AS CaCO_3 ;
ALKALINITY, BICARBONATE CaCO_3 ; ALKALINITY, CARBONATE AS CaCO_3 ; AMMONIA AS N; ANIONS;
BIOCHEMICAL OXYGEN DEMAND; CATION AND ANION BALANCE; CATIONS;
CHEMICAL OXYGEN DEMAND (COD); CHLORIDE; CONDUCTIVITY; CYANIDE, TOTAL; FLUORIDE;
HARDNESS AS CaCO_3 ; NITRATE AS N; NITROGEN, TOTAL KJELDAHL (TKN); OIL AND GREASE, (IR);
PH; PHOSPHORUS; PHOSPHORUS AS P, DISSOLVED; SODIUM ABSORPTION RATIO (SAR);
SOLIDS, TOTAL SUSPENDED; SULFATE AS SO_4 ; TOTAL DISSOLVED SOLIDS (TDS); TURBIDITY

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE COLLECTION DATE</u>	<u>DATE RECEIVED BY LAB</u>
MF4700	SG-6	WATER	04-04-94	04-06-94
MF4701	SG-5A	WATER	04-04-94	04-06-94
MF4702	SG-CC-01	WATER	04-05-94	04-06-94
MF4703	SG-CC-02	WATER	04-05-94	04-06-94
MF4704	SG-V	WATER	04-05-94	04-06-94
MF4705	SG-Y	WATER	04-05-94	04-06-94
MF4706	SG-6	WATER	04-04-94	04-06-94
MF4707	SG-5A	WATER	04-04-94	04-06-94
MF4708	SG-CC-01	WATER	04-05-94	04-06-94
MF4709	SG-CC-02	WATER	04-05-94	04-06-94
MF4710	SG-V	WATER	04-05-94	04-06-94
MF4711	SG-Y	WATER	04-05-94	04-06-94
MF4712	SG-6	WATER	04-04-94	04-06-94
MF4713	SG-5A	WATER	04-04-94	04-06-94
MF4714	SG-CC-01	WATER	04-05-94	04-06-94
MF4715	SG-CC-02	WATER	04-05-94	04-06-94
MF4716	SG-V	WATER	04-05-94	04-06-94
MF4717	SG-Y	WATER	04-05-94	04-06-94
MF4718	SG-6	WATER	04-04-94	04-06-94
MF4719	SG-5A	WATER	04-04-94	04-06-94
MF4720	SG-CC-01	WATER	04-05-94	04-06-94

(Continued)

This report is "PROPRIETARY AND CONFIDENTIAL" and delivered to, and intended for the exclusive use of the above named client only. ETC, a Division of APBI Environmental Sciences Group, Inc. assumes no responsibility or liability for the reliance hereon or use hereof by anyone other than the above named client.

A division of
APBI Environmental
Sciences Group, Inc.

Jennifer L. Roseberry, VP/General Manager

940901
Date

3.7-9-68

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE COLLECTION DATE</u>	<u>DATE RECEIVED BY LAB</u>
MF4721	SG-CC-02	WATER	04-05-94	04-06-94
MF4722	SG-V	WATER	04-05-94	04-06-94
MF4723	SG-Y	WATER	04-05-94	04-06-94
MF4791	SG-3	WATER	04-05-94	04-07-94
MF4792	SG-4	WATER	04-05-94	04-07-94
MF4793	SG-E	WATER	04-06-94	04-07-94
MF4794	SG-2	WATER	04-06-94	04-07-94
MF4795	SG-AB	WATER	04-06-94	04-07-94
MF4796	SG-3	WATER	04-05-94	04-07-94
MF4797	SG-4	WATER	04-05-94	04-07-94
MF4798	SG-E	WATER	04-06-94	04-07-94
MF4799	SG-2	WATER	04-06-94	04-07-94
MF4800	SG-AB	WATER	04-06-94	04-07-94
MF4801	SG-3	WATER	04-05-94	04-07-94
MF4802	SG-4	WATER	04-05-94	04-07-94
MF4803	SG-E	WATER	04-06-94	04-07-94
MF4804	SG-2	WATER	04-06-94	04-07-94
MF4805	SG-AB	WATER	04-06-94	04-07-94
MF4806	SG-3	WATER	04-05-94	04-07-94
MF4807	SG-4	WATER	04-05-94	04-07-94
MF4808	SG-E	WATER	04-06-94	04-07-94
MF4809	SG-2	WATER	04-06-94	04-07-94
MF4810	SG-AB	WATER	04-06-94	04-07-94
MF5016	SG-19	WATER	04-07-94	04-08-94
MF5017	SG-30	WATER	04-07-94	04-08-94
MF5018	SG-19	WATER	04-07-94	04-08-94
MF5019	SG-30	WATER	04-07-94	04-08-94
MF5020	SG-19	WATER	04-07-94	04-08-94
MF5021	SG-30	WATER	04-07-94	04-08-94
MF5022	SG-19	WATER	04-07-94	04-08-94
MF5023	SG-30	WATER	04-07-94	04-08-94
MF6314	BOTTLES	NOT APPLICABLE	NOT APPLICABLE	04-07-94
MF6315	QCCHARGES	NOT APPLICABLE	NOT APPLICABLE	04-07-94
MF9129	SG-3	WATER	04-05-94	08-17-94
MF9130	SG-4	WATER	04-05-94	08-17-94
MF9131	SG-E	WATER	04-06-94	08-17-94
MF9132	SG-2	WATER	04-06-94	08-17-94
MF9133	SG-AB	WATER	04-06-94	08-17-94
MF9134	SG-6	WATER	04-04-94	08-17-94
MF9135	SG-5A	WATER	04-04-94	08-17-94
MF9136	SG-CC-01	WATER	04-05-94	08-17-94
MF9137	SG-CC-02	WATER	04-05-94	08-17-94
MF9138	SG-V	WATER	04-05-94	08-17-94
MF9139	SG-Y	WATER	04-05-94	08-17-94
MF9147	SG-19	WATER	04-07-94	08-17-94
MF9148	SG-30	WATER	04-07-94	08-17-94
MF9256	QCCHARGES	NOT APPLICABLE	NOT APPLICABLE	04-07-94



FOTH & VAN DYKE
SEPTEMBER 1, 1994
810771 AMENDED

SAMPLE MATRIX: WATER

<u>Parameter</u>	<u>EPA Prep Method</u>	<u>EPA Analysis Method</u>
ICP Metals	3015	6010
Antimony	3015	7041
Arsenic	3015	7060
Potassium*	3010	6010
Selenium	3015	7740
Thallium	3015	7841
Mercury	7470	7470
Aluminum**	NA	200.8m
Cadmium**	APDC EXTRACTION	200.8m
Chromium**	NA	200.9m
Copper**	APDC EXTRACTION	200.8m
Lead**	APDC EXTRACTION	200.8m
Mercury**	‡	‡
Zinc**	NA	200.9m
Alkalinity as CaCO3	NA	310.1
Alkalinity, Hydroxide as CaCO3	NA	310.1
Bicarbonate as CaCO3	NA	310.1
Carbonate Alkalinity as CaCO3	NA	310.1
Ammonia as N	350.2	350.2
Anions	NA	CALC.
Cations	NA	CALC.
Cation & Anion Balance	NA	CALC.
Chemical Oxygen Demand	NA	410.4
Chloride	NA	300.0
Conductivity	NA	9050
Total Cyanide	NA	9010
Fluoride	NA	340.2
Hardness as CaCO3	NA	130.2
Nitrate as N	NA	300.0
Total Kjeldahl Nitrogen	351.3	351.3
Oil & Grease	413.2	413.2
pH	NA	9040
Phosphorus	365.3	365.3
Phosphorus as P, Dissolved	365.3	365.3
Sodium Absorption Ratio	NA	CALC.
Total Suspended Solids	NA	160.2
Sulfate as SO4	NA	300.0
Total Dissolved Solids	NA	160.1
Turbidity	NA	180.1
Biochemical Oxygen Demand*	405.1	405.1

* ANALYSIS PERFORMED BY NORTHERN LAKE SERVICE INC

** ANALYSIS PERFORMED BY BATTELLE LABORATORY

‡ COLD VAPOR ATOMIC FLUORESCENCE



FOTH & VAN DYKE
31 AUGUST 1994

EXECUTIVE SUMMARY
ETC JOBLINK 810771
(AMENDED REPORT & LOW-LEVEL METALS)

On 06, 07, and 08 April 1994 ETC-Santa Rosa received aqueous samples from Foth & Van Dyke via Federal Express. The cooler temperatures were all 0°C upon receipt at the laboratory. The samples were analyzed as specified on the preceding page.

Samples were filtered at the laboratory through a 0.45 μ m filter prior to analysis for iron, manganese, and phosphorus; these results reflect dissolved parameters. Phosphorus was also analyzed without filtration; these results reflect total parameters.

All samples were received past the method-recommended holding time for pH analysis.

Low level metals analyses were performed by Batelle; Biochemical Oxygen Demand (BOD) and Potassium analyses were performed by Northern Lake Service.

CALCULATIONS:

Results for Sodium Absorption Ratio (Modified SAR), Cations, Anions, and Cation and Anion Balance were obtained by calculation using analytical data. The Cations reflect results for Calcium, Magnesium, Potassium, and Sodium; the Anions reflect results for Chloride, Fluoride, Nitrate, Sulfate, Carbonate, and Bicarbonate.

OIL & GREASE ANALYSIS:

There was insufficient sample available to run replicate matrix spikes for Oil & Grease analysis; QC Duplicate data was calculated from replicate blank spikes.

AMENDED REPORT:

At the time of analysis of these samples, ETC did not hold certification for Potassium with Wisconsin DNR. At the request of the client, the samples were re-analyzed at Northern Lake Service (NLS) for this parameter. Potassium results from NLS are reflected in this report. Carbonate and hydroxide alkalinity results are based on calculations; these results, therefore, have no associated detection limits. The reporting detection limit column shows dashes for these parameters on the tabled data; if the analyte was not detected in the sample, the analyte concentration appears as zero on the Data Summary Reports. The original report listed detection limits for these parameters; corrected detection limit notations are included herein.

LOW-LEVEL METALS:

Direct analysis of water by ICP-MS was used for Aluminum. Direct analysis of water by GFAA was used for Chromium and Zinc. For the analysis of Cadmium, Copper, and Lead, a preconcentration step was followed by quantification using ICP-MS. Mercury was analyzed by cold vapor atomic fluorescence.

The QC samples included standard reference materials (QC Spikes), matrix spikes and replicates. Only one QC Spike is reported for each analyte on the tabled QC; for cases where there is data for more than one matrix spike or replicate, recovery information may be obtained from raw data copies included herein. When the procedural blank is accounted for, the QC Spike results are usually within +/- 25% of the certified value. The blank spike result for Lead is greater than the criteria range of +/- 25%, even with blank correction.

Lisa Norosky
Lisa Norosky, Program Manager

940901
Date

Joblink: 810771

DATA SUMMARY REPORT

DATE: 08/29/94

Company: FOTH & VAN DYKE

PAGE: 1.

Sample Point ID:	SG-19	SG-2	SG-3	SG-30	SG-6	SG-AB	SG-CC-01	SG-CC-02
ETC Sample Number:	MF5020	MF4799	MF4796	MF5021	MF4712	MF4800	MF4714	MF4715
Sample Date:	940407	940406	940405	940407	940404	940406	940405	940405
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD 200 SERIES - METALS (AR08)

Aluminum	ug/L	14.4	26.3	24.1	25.8	20.5	22.3	35.8	34.5
Cadmium	ug/L	<.006	<.006	<.006	<.006	<.006	<.006	.006	.009
Chromium	ug/L	.700	.390	.470	.860	.470	.620	.470	.470
Copper	ug/L	.365	.365	.463	1.13	.187	.261	.340	.323
Lead	ug/L	.084	.084	.208	.113	.122	.159	.211	.204
Mercury	ug/L	.002	.002	.002	.001	.002	.001	.002	.001
Zinc	ug/L	1.31	1.09	1.31	2.32	1.23	1.31	1.60	1.38

Sample Point ID:	SG-E	SG-V	SG-Y
ETC Sample Number:	MF4798	MF4716	MF4717
Sample Date:	940406	940405	940405
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD 200 SERIES - METALS (AR08)

Aluminum	ug/L	36.3	56.1	13.4
Cadmium	ug/L	<.006	.006	.009
Chromium	ug/L	1.48	.470	.390
Copper	ug/L	.273	.550	.242
Lead	ug/L	.095	.298	.130
Mercury	ug/L	.0009	.002	.001
Zinc	ug/L	.870	1.67	1.45

3.7-9-72

Joblink: 810771

DATA SUMMARY REPORT

DATE: 08/29/94

Company: FOTH & VAN DYKE

PAGE: 2

Sample Point ID:	SG-19	SG-19	SG-2	SG-2	SG-3	SG-3	SG-30	SG-30
ETC Sample Number:	MF5016	MF5022	MF4794	MF4809	MF4791	MF4806	MF5017	MF5023
Sample Date:	940407	940407	940406	940406	940405	940405	940407	940407
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Fluoride	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Total Dissolved Solids (TDS)	mg/L	117	-	113	-	106	-	142	-
pH	std	7.40	-	7.40	-	7.60	-	7.80	-
Hardness as CaCO3	mg/L	97.4	-	90.8	-	91.0	-	121	-
Chemical Oxygen Demand (COD)	mg/L	23.0	-	10.0	-	12.0	-	17.0	-
Conductivity	umhos	194	-	191	-	191	-	230	-
Oil and Grease, (IR)	mg/L	<1.52	-	<1.56	-	<1.50	-	<1.52	-
Phosphorus	mg/L	<.050	-	<.050	-	<.050	-	<.050	-
Phosphorus as P, dissolved	mg/L	<.050	-	<.050	-	<.050	-	<.050	-
Solids, total suspended	mg/L	6.00	-	<5.00	-	<5.00	-	<5.00	-
Ammonia as N	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Alkalinity as CaCO3	mg/L	96.0	-	90.0	-	92.0	-	130	-
Alkalinity, Hydroxide as CaCO3	mg/L	0	-	0	-	0	-	0	-
Alkalinity, Bicarbonate CaCO3	mg/L	96.0	-	90.0	-	92.0	-	130	-
Alkalinity, Carbonate as CaCO3	mg/L	0	-	0	-	0	-	0	-
Turbidity	NTU	.950	-	.900	-	.650	-	.500	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	.308	-	<.200	-	.616	-	.336	-
Sodium Absorption Ratio (SAR)	std	.089	-	.107	-	.106	-	.084	-
Cations	meq/l	2.14	-	2.08	-	2.06	-	2.75	-
Anions	meq/l	1.73	-	1.68	-	1.69	-	2.30	-
Cation and Anion Balance	%	10.4	-	10.5	-	9.88	-	8.87	-
Chloride	mg/L	1.47	-	2.96	-	2.94	-	1.24	-
Nitrate as N	mg/L	.675	-	.690	-	<.500	-	<.500	-
Sulfate as SO4	mg/L	5.15	-	5.46	-	4.83	-	6.69	-
Biochemical Oxygen Demand	mg/L	-	9.00	-	8.00	-	5.00	-	10.0

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Sample Point ID:	SG-4	SG-4	SG-5A	SG-5A	SG-6	SG-6	SG-AB	SG-AB
ETC Sample Number:	MF4792	MF4807	MF4701	MF4719	MF4700	MF4718	MF4795	MF4810
Sample Date:	940405	940405	940404	940404	940404	940404	940406	940406
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Fluoride	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Total Dissolved Solids (TDS)	mg/L	106	-	97.0	-	93.0	-	111	-
pH	std	7.80	-	7.70	-	7.40	-	7.90	-
Hardness as CaCO3	mg/L	92.4	-	101	-	97.8	-	96.0	-
Chemical Oxygen Demand (COD)	mg/L	<10.0	-	<10.0	-	14.0	-	23.0	-
Conductivity	umhos	206	-	199	-	191	-	202	-
Oil and Grease, (IR)	mg/L	<1.70	-	<1.55	-	<1.50	-	<1.53	-
Phosphorus	mg/L	<.050	-	<.050	-	<.050	-	<.050	-
Phosphorus as P, dissolved	mg/L	<.050	-	<.050	-	<.050	-	<.050	-
Solids, total suspended	mg/L	<5.00	-	<5.00	-	6.00	-	<5.00	-
Ammonia as N	mg/L	<.100	-	<.100	-	<.100	-	.112	-
Alkalinity as CaCO3	mg/L	91.0	-	100	-	98.0	-	96.0	-
Alkalinity, Hydroxide as CaCO3	mg/L	0	-	0	-	0	-	0	-
Alkalinity, Bicarbonate CaCO3	mg/L	91.0	-	100	-	98.0	-	96.0	-
Alkalinity, Carbonate as CaCO3	mg/L	0	-	0	-	0	-	0	-
Turbidity	NTU	.700	-	.850	-	1.30	-	2.93	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	.392	-	.476	-	.392	-	.336	-
Sodium Absorption Ratio (SAR)	std	.159	-	.072	-	.067	-	.107	-
Cations	meq/l	2.16	-	2.20	-	2.12	-	2.14	-
Anions	meq/l	1.75	-	1.69	-	1.74	-	1.80	-
Cation and Anion Balance	%	10.4	-	13.2	-	9.96	-	8.69	-
Chloride	mg/L	5.35	-	1.74	-	1.34	-	3.31	-
Nitrate as N	mg/L	<.500	-	<.500	-	<.500	-	.774	-
Sulfate as SO4	mg/L	5.29	-	<1.00	-	4.46	-	5.69	-
Biochemical Oxygen Demand	mg/L	-	7.00	-	5.00	-	5.00	-	8.00

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Sample Point ID:	SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02	SG-E	SG-E	SG-V	SG-V
ETC Sample Number:	MF4702	MF4720	MF4703	MF4721	MF4793	MF4808	MF4704	MF4722
Sample Date:	940405	940405	940405	940405	940406	940406	940405	940405
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Fluoride	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Total Dissolved Solids (TDS)	mg/L	77.0	-	73.0	-	155	-	98.0	-
pH	std	7.70	-	7.70	-	7.80	-	7.70	-
Hardness as CaCO3	mg/L	77.0	-	76.4	-	137	-	84.6	-
Chemical Oxygen Demand (COD)	mg/L	17.0	-	18.0	-	<10.0	-	17.0	-
Conductivity	umhos	165	-	163	-	274	-	176	-
Oil and Grease, (IR)	mg/L	<1.00	-	<1.73	-	<1.79	-	<1.52	-
Phosphorus	mg/L	<.050	-	<.050	-	<.050	-	<.050	-
Phosphorus as P, dissolved	mg/L	<.050	-	<.050	-	<.050	-	<.050	-
Solids, total suspended	mg/L	5.00	-	12.0	-	<5.00	-	8.00	-
Ammonia as N	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Alkalinity as CaCO3	mg/L	76.0	-	76.0	-	144	-	82.0	-
Alkalinity, Hydroxide as CaCO3	mg/L	0	-	0	-	0	-	0	-
Alkalinity, Bicarbonate CaCO3	mg/L	76.0	-	76.0	-	144	-	82.0	-
Alkalinity, Carbonate as CaCO3	mg/L	0	-	0	-	0	-	0	-
Turbidity	NTU	2.00	-	1.90	-	.900	-	2.10	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	.308	-	.588	-	<.200	-	.476	-
Sodium Absorption Ratio (SAR)	std	.106	-	.103	-	.090	-	.101	-
Cations	meq/l	1.75	-	1.74	-	3.07	-	1.92	-
Anions	meq/l	1.43	-	1.43	-	2.57	-	1.54	-
Cation and Anion Balance	%	10.0	-	9.72	-	8.92	-	11.3	-
Chloride	mg/L	2.88	-	2.89	-	1.87	-	2.98	-
Nitrate as N	mg/L	<.500	-	<.500	-	.763	-	<.500	-
Sulfate as SO4	mg/L	4.99	-	5.00	-	6.88	-	5.10	-
Biochemical Oxygen Demand	mg/L	-	8.00	-	6.00	-	9.00	-	6.00

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Sample Point ID: SG-Y SG-Y
ETC Sample Number: MF4705 MF4723
Sample Date: 940405 940405
Facility Code: FVDGRNBCMC FVDGRNBCMC

Parameters

Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-
Fluoride	mg/L	<.100	-
Total Dissolved Solids (TDS)	mg/L	101	-
pH	std	7.50	-
Hardness as CaCO3	mg/L	72.0	-
Chemical Oxygen Demand (COD)	mg/L	21.0	-
Conductivity	umhos	157	-
Oil and Grease, (IR)	mg/L	<.850	-
Phosphorus	mg/L	<.050	-
Phosphorus as P, dissolved	mg/L	<.050	-
Solids, total suspended	mg/L	<5.00	-
Ammonia as N	mg/L	<.100	-
Alkalinity as CaCO3	mg/L	74.0	-
Alkalinity, Hydroxide as CaCO3	mg/L	0	-
Alkalinity, Bicarbonate CaCO3	mg/L	74.0	-
Alkalinity, Carbonate as CaCO3	mg/L	0	-
Turbidity	NTU	1.70	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	.756	-
Sodium Absorption Ratio (SAR)	std	.111	-
Cations	meq/l	1.67	-
Anions	meq/l	1.39	-
Cation and Anion Balance	%	8.99	-
Chloride	mg/L	2.82	-
Nitrate as N	mg/L	<.500	-
Sulfate as SO4	mg/L	4.83	-
Biochemical Oxygen Demand	mg/L	-	8.00

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Sample Point ID:	SG-19	SG-19	SG-2	SG-2	SG-3	SG-3	SG-30	SG-30
ETC Sample Number:	MF5016	MF5018	MF4794	MF4804	MF4791	MF4801	MF5017	MF5019
Sample Date:	940407	940407	940406	940406	940405	940405	940407	940407
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	.151	-	<.100	-	<.100	-	<.100
Manganese	mg/L	-	.014	-	.014	-	<.010	-	<.010
Selenium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Arsenic, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Antimony, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Barium, Total	mg/L	.014	-	.011	-	.011	-	<.010	-
Beryllium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Boron, Total	mg/L	<.100	-	<.099	-	<.100	-	<.100	-
Calcium, Total	mg/L	22.4	-	22.0	-	21.9	-	30.2	-
Chromium, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Iron, Total	mg/L	.342	-	.251	-	.286	-	<.100	-
Magnesium, Total	mg/L	11.1	-	10.4	-	10.3	-	13.8	-
Manganese, Total	mg/L	.046	-	.040	-	.064	-	.021	-
Molybdenum, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Nickel, Total	mg/L	<.030	-	<.030	-	<.030	-	<.030	-
Potassium, Total	mg/L	.640	-	.740	-	.710	-	.610	-
Silver, Total	mg/L	<.010	-	<.01	-	<.010	-	<.010	-
Sodium, Total	mg/L	2.07	-	2.43	-	2.41	-	2.23	-
Thallium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-

Sample Point ID:	SG-4	SG-4	SG-4	SG-5A	SG-5A	SG-5A	SG-6	SG-6
ETC Sample Number:	MF4792	MF4797	MF4802	MF4701	MF4707	MF4713	MF4700	MF4706
Sample Date:	940405	940405	940405	940404	940404	940404	940404	940404
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	-	<.100	-	.173	-	-	.138
Manganese	mg/L	-	-	<.010	-	.028	-	-	.109
Selenium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Arsenic, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Antimony, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Barium, Total	mg/L	.014	-	-	<.010	-	-	<.010	-
Beryllium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-

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Sample Point ID:	SG-4	SG-4	SG-4	SG-5A	SG-5A	SG-5A	SG-6	SG-6
ETC Sample Number:	MF4792	MF4797	MF4802	MF4701	MF4707	MF4713	MF4700	MF4706
Sample Date:	940405	940405	940405	940404	940404	940404	940404	940404
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Boron, Total	mg/L	<.099	-	-	<.100	-	-	<.100	-
Calcium, Total	mg/L	22.2	-	-	23.9	-	-	23.8	-
Chromium, Total	mg/L	<.020	-	-	<.020	-	-	<.020	-
Iron, Total	mg/L	.210	-	-	.173	-	-	.187	-
Magnesium, Total	mg/L	10.6	-	-	11.1	-	-	10.3	-
Manganese, Total	mg/L	.019	-	-	.104	-	-	.126	-
Molybdenum, Total	mg/L	<.020	-	-	<.020	-	-	<.020	-
Nickel, Total	mg/L	<.030	-	-	<.030	-	-	<.030	-
Potassium, Total	mg/L	.790	-	-	.800	-	-	.740	-
Silver, Total	mg/L	<.01	-	-	<.010	-	-	<.010	-
Sodium, Total	mg/L	3.63	-	-	1.70	-	-	1.56	-
Thallium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Aluminum, Total	mg/L	-	<.200	-	-	-	<.200	-	-
Cadmium, Total	mg/L	-	<.005	-	-	-	<.005	-	-
Copper, Total	mg/L	-	<.030	-	-	-	<.030	-	-
Lead, Total	mg/L	-	<.050	-	-	-	<.050	-	-
Zinc, Total	mg/L	-	<.020	-	-	-	<.020	-	-
Mercury, Total	mg/L	-	<.0002	-	-	-	<.0002	-	-

Sample Point ID:	SG-AB	SG-AB	SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02	SG-E	SG-E
ETC Sample Number:	MF4795	MF4805	MF4702	MF4708	MF4703	MF4709	MF4793	MF4803
Sample Date:	940406	940406	940405	940405	940405	940405	940406	940406
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	<.100	-	<.100	-	.229	-	<.100
Manganese	mg/L	-	<.010	-	.076	-	.025	-	<.010
Selenium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Arsenic, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Antimony, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Barium, Total	mg/L	<.01	-	<.010	-	.011	-	<.01	-
Beryllium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Boron, Total	mg/L	<.099	-	<.100	-	<.100	-	<.099	-

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Sample Point ID:	SG-AB	SG-AB	SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02	SG-E	SG-E
ETC Sample Number:	MF4795	MF4805	MF4702	MF4708	MF4703	MF4709	MF4793	MF4803
Sample Date:	940406	940406	940405	940405	940405	940405	940406	940406
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Calcium, Total	mg/L	22.6	-	18.9	-	19.0	-	33.0	-
Chromium, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Iron, Total	mg/L	.254	-	.432	-	.454	-	<.099	-
Magnesium, Total	mg/L	10.8	-	8.37	-	8.24	-	16.0	-
Manganese, Total	mg/L	.039	-	.063	-	.077	-	<.01	-
Molybdenum, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Nickel, Total	mg/L	<.030	-	<.030	-	<.030	-	<.030	-
Potassium, Total	mg/L	.690	-	.890	-	.820	-	<.600	-
Silver, Total	mg/L	<.01	-	<.010	-	<.010	-	<.01	-
Sodium, Total	mg/L	2.46	-	2.20	-	2.14	-	2.52	-
Thallium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Aluminum, Total	mg/L	-	-	-	-	-	-	-	-
Cadmium, Total	mg/L	-	-	-	-	-	-	-	-
Copper, Total	mg/L	-	-	-	-	-	-	-	-
Lead, Total	mg/L	-	-	-	-	-	-	-	-
Zinc, Total	mg/L	-	-	-	-	-	-	-	-
Mercury, Total	mg/L	-	-	-	-	-	-	-	-

Sample Point ID:	SG-V	SG-V	SG-Y	SG-Y
ETC Sample Number:	MF4704	MF4710	MF4705	MF4711
Sample Date:	940405	940405	940405	940405
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	.227	-	.243
Manganese	mg/L	-	.024	-	.017
Selenium, Total	mg/L	<.005	-	<.005	-
Arsenic, Total	mg/L	<.005	-	<.005	-
Antimony, Total	mg/L	<.005	-	<.005	-
Barium, Total	mg/L	<.010	-	.012	-
Beryllium, Total	mg/L	<.005	-	<.005	-
Boron, Total	mg/L	<.100	-	<.100	-
Calcium, Total	mg/L	20.7	-	18.0	-

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Sample Point ID:	SG-V	SG-V	SG-Y	SG-Y
ETC Sample Number:	MF4704	MF4710	MF4705	MF4711
Sample Date:	940405	940405	940405	940405
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Chromium, Total	mg/L	<.020	-	<.020	-
Iron, Total	mg/L	.409	-	.397	-
Magnesium, Total	mg/L	9.42	-	7.91	-
Manganese, Total	mg/L	.057	-	.070	-
Molybdenum, Total	mg/L	<.020	-	<.020	-
Nickel, Total	mg/L	<.030	-	<.030	-
Potassium, Total	mg/L	.850	-	.880	-
Silver, Total	mg/L	<.010	-	<.010	-
Sodium, Total	mg/L	2.21	-	2.24	-
Thallium, Total	mg/L	<.005	-	<.005	-
Aluminum, Total	mg/L	-	-	-	-
Cadmium, Total	mg/L	-	-	-	-
Copper, Total	mg/L	-	-	-	-
Lead, Total	mg/L	-	-	-	-
Zinc, Total	mg/L	-	-	-	-
Mercury, Total	mg/L	-	-	-	-

3.7-9-80

ETC

CHAIN-OF-CUSTODY RECORD

No. 114690

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570

COMPANY FOTH: VAN DYKE		FACILITY/SITE 93C049		NUMBER OF CONTAINERS		FILT. (Y/N) N PRESERV. SEE ATTACHEMENT ANALYSIS REQUIRED SEE ATTACHEMENT										LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₄ +H ₂ SO ₄						
PROJECT CONTACT RUSS JANESHEK			TELEPHONE NO. 414-497-2500																			
ITEM NO.		ETC JOB #	SOURCE CODE			SAMPLE POINT	START DATE YY/MM/DD	START TIME	Source Codes: Well.....(W) Outfall.....(O) Soil.....(S) River/Stream.....(R) Bottom Sediment.....(B) Generation Point.....(G) Surface Impoundment (I) Treatment Facility.....(T) Leachate Collection Sys.....(C) Lake/Ocean.....(L) Other.....(X) Specify _____										SAMPLER OBSERVATIONS	LAB OBSERVATIONS		
1		R	SG-16		94/4/1	1015	7 7 7 7 4															
2		R	SG-15A		↓	1150																
3		R	SG-CC-01		74/4/5	0930																
4		R	SG-CC-02		↓	0930																
5		R	SG-DESOS		↓	1315																
6																						
7																						
8																						
9																						

CHAIN OF CUSTODY CHRONICLE

3.7-9-81 Shuttle Opened By: (print) SCOTT JANSSEN Date: 4/5/94 Time: 1600
 Signature: Scott Jansen Seal #: 37988 Intact: YES

I have received these materials in good condition from the above person

2. Name: _____ Signature: _____
 Date: _____ Time: _____ Remarks: _____

I have received these materials in good condition from the above person

3. Name: _____ Signature: _____
 Date: _____ Time: _____ Remarks: _____

I have received these materials in good condition from the above person

4. Shuttle Sealed By: (print) SCOTT JANSSEN Date: 4/5/94 Time: _____
 Signature: Scott Jansen Seal #: _____ Intact: _____

REMARKS
SG-V OIL + GREASE + TOTAL METALS
WILL BE IN NEXT SHIPMENT

SAMPLER'S SIGNATURE
Scott Jansen

LAB USE ONLY Opened By: Jeff Hape Date: 4-6-94 Time: 7:50A

SHUTTLE # _____ TEMP. °C 0 SM SEAL # 37984 COND. good

WHITE: LAB COPY

YELLOW: SAMPLER COPY

PINK: CLIENT COPY

ETC

CHAIN-OF-CUSTODY RECORD

No. 114691

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570

COMPANY FOTH: VAN DYKE		FACILITY/SITE 93C049		NUMBER OF CONTAINERS	FILT. (Y/N)	PRESERV.	ANALYSIS REQUIRED	LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₄ +H ₂ SO ₄
PROJECT CONTACT RUSS JANESSEN		TELEPHONE NO. 414-497-2500						

ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	Source Codes: Well.....(W) Outfall.....(O) Soil.....(S) River/Stream.....(R) Bottom Sediment.....(B) Generation Point.....(G) Surface Impoundment (I) Treatment Facility.....(T) Leachate Collection Sys.....(C) Lake/Ocean.....(L) Other.....(X) Specify	SAMPLER OBSERVATIONS	LAB OBSERVATIONS
1		R	SG-Y	94/4/5	1315			
2		R	SG-3		1630			
3		R	SG-4		1530			
4		R	SG-E	94/4/6	1200			
5		R	SG-2		0930			
6		R	SG-AB		0815			
7		R	SG-Y	94/4/5	1115			
8								
9								

CHAIN OF CUSTODY CHRONICLE

3.7-9-82	Shuttle Opened By: (print) <u>Scott Janesen</u>	Date: <u>4/1/94</u>	Time: <u>1600</u>
	Signature: <u>SCOTT JANESSEN</u>	Seal #: <u>37991</u>	Intact: <u>YES</u>
2.	I have received these materials in good condition from the above person		
	Name: _____	Signature: _____	
	Date: _____	Time: _____	Remarks: _____
3.	I have received these materials in good condition from the above person		
	Name: _____	Signature: _____	
	Date: _____	Time: _____	Remarks: _____
4.	Shuttle Sealed By: (print) <u>SCOTT JANESSEN</u>	Date: <u>4/6/94</u>	Time: <u>1400</u>
	Signature: <u>SCOTT JANESSEN</u>	Seal #: <u>37982</u>	Intact: <u>YES</u>
LAB USE ONLY Opened By: <u>SCOTT JANESSEN</u> Date: <u>4-7-94</u> Time: <u>9:40am</u>			
SHUTTLE # _____ TEMP. °C <u>0.5m3</u> SEAL # _____ COND. <u>9</u>			

REMARKS

SG-Y - BOTTLES FOR SHIPMENT ON
C.O.C 114690

SG-Y - BOTTLES WERE SHIPPED IN
C.O.C 114690

SAMPLER'S SIGNATURE

Scott Janesen

WHITE: LAB COPY

YELLOW: SAMPLER COPY

PINK: CLIENT COPY

ETC

CHAIN-OF-CUSTODY RECORD

No. 114687

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570

COMPANY FOTH: VANDYKE		FACILITY/SITE CRANDON MINING Co		NUMBER OF CONTAINERS	FILT. (Y/N)	LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₄ +H ₂ SO ₄
PROJECT CONTACT RUSS JANESHEK		TELEPHONE NO. 414-497-2500			PRESERV.	
93C049					ANALYSIS REQUIRED	
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	
1		R	56-19	94/4/7	0830	SEE ATTACHMENT
2		R	56-30	↓	0930	
3						
4						
5						
6						
7						
8						
9						

CHAIN OF CUSTODY CHRONICLE

3-7-9-83	Shuttle Opened By: (print) <u>SCOTT JANSEN</u> Date: <u>4/1/94</u> Time: <u>1600</u>
	Signature: <u>Scott Jansen</u> Seal #: <u>37790</u> Intact: <u>YES</u>
2.	I have received these materials in good condition from the above person
	Name: _____ Signature: _____
	Date: _____ Time: _____ Remarks: _____
3.	I have received these materials in good condition from the above person
	Name: _____ Signature: _____
	Date: _____ Time: _____ Remarks: _____
4.	Shuttle Sealed By: (print) <u>SCOTT JANSEN</u> Date: <u>4/1/94</u> Time: <u>1100</u>
	Signature: <u>Scott Jansen</u> Seal #: <u>37778</u> Intact: <u>YES</u>
LAB USE ONLY Opened By: <u>Scott Jansen</u> Date: <u>4/8/94</u> Time: <u>1050</u>	
SHUTTLE # <u>N/A</u> TEMP. °C <u>0.5M3</u> SEAL # <u>37778</u> COND. <u>GOOD</u>	

REMARKS

SAMPLER'S SIGNATURE

Scott Jansen

ETC

CHAIN-OF-CUSTODY RECORD REQUEST FOR ANALYTICAL SERVICES

REV. 04/93
FORM 301

ENVIRONMENTAL TESTING AND CERTIFICATION CORP ■ 320 TESCONI CIRCLE SUITE G ■ SANTA ROSA CA 95401 ■ (707)544-5570

SUBCONTRACT LAB
NLS
LABORATORY CONTACT

TELEPHONE NUMBER

TELEPHONE NUMBER

ADDRESS

NUMBER
OF CONTAINERS

Total 8

FILT. (Y/N)

PRESERV.

LEGEND FOR
PRESERVATIVE

0 - NONE
1 - HCL
2 - HNO₃
3 - H₂SO₄
4 - Na₂SO₄ + H₂SO₄

MATRIX CODES:

Liquid..... 1
Solid/Sludge..... 2
Oily Solid..... 3
Oily Liquid..... 4
Wipe..... 5
Leachate..... 7
Air..... 8
Other _____

REMARKS:

method 6010

CHAIN OF CUSTODY CHRONICLE

1. Relinquished To: *Federal Express* Date: *7/16/94* Time: *1330*
By (signature): *Phil Wasser* Shuttle/Seal # *71586* Intact: _____

2. I have received these materials in good condition from the above person
Receiving Lab/Opened By: *D. Cottrell* Date: *7-18-94* Time: *16:00*
Temp. °C _____ Seal #: _____ Condition: _____

3. Shuttle Returned By: (print) _____ Date: _____ Time: _____
Signature: _____ Seal # _____ Intact: _____

RESULTS REQUESTED BY (DATE): *Normal TAT*
SEND RESULTS TO: *Lisa Novosky*

RESULTS MUST INCLUDE:

STANDARD ☒ EXTENDED ☒ OTHER ☐
• Method Blank ☒ Raw Data _____
• Blank Spike • Other _____
• MS/MSD _____

PO #:

PLEASE INCLUDE PO # AND/OR JOBLINK # ON INVOICE

FOR ETC USE ONLY

"SENT"

DATE:

INITIALS:

3.7-9-85

ETC

CHAIN-OF-CUSTODY RECORD REQUEST FOR ANALYTICAL SERVICES

REV. 04/93
FORM 301

ENVIRONMENTAL TESTING AND CERTIFICATION CORP ■ 320 TESCOMI CIRCLE SUITE G ■ SANTA ROSA CA 95401 ■ (707)544-5570

SUBCONTRACT LAB <i>NLS</i>		TELEPHONE NUMBER		NUMBER OF CONTAINERS <i>N 2</i> <i>750g Potassium</i>	FILT. (Y/N)	PRESERV.	LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₄ + H ₂ SO ₄
LABORATORY CONTACT		TELEPHONE NUMBER					
ADDRESS							
MATRIX CODES:							
	ETC JOB NUMBER	MATRIX CODE	JOB LINK NUMBER	SAMPLE DATE			
262	1	MF4792	1	810771	940407		
263	2	MF4793					
264	3	MF4794					
265	4	MF4795					
266	5	MF5016			940408		
267	6	MF5017					
268	7	MF5512		810907	940422		
269	8	MF5513					

CHAIN OF CUSTODY CHRONICLE

3.7-9-86

Relinquished To: Federal Express Date: 7/16/94 Time: 1330

By (signature): Phil J. Jansen Shuttle/Seal # 71586 Intact:

I have received these materials in good condition from the above person

2. Receiving Lab/Opened By: D. Cottrell Date: 7-18-94 Time: 16:00

Temp. °C Seal #: Condition:

3. Shuttle Returned By: (print) Date: Time:

Signature: Seal #: Intact:

RESULTS REQUESTED BY (DATE): Norma STAT
SEND RESULTS TO: Lisa Norosky

RESULTS MUST INCLUDE:

STANDARD ☒ EXTENDED ☒ OTHER ☐

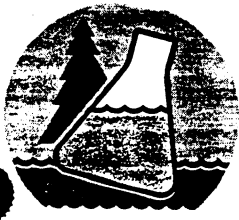
- Method Blank ☒ Raw Data
- Blank Spike ☐ Other
- HS/MSD

PO #:

PLEASE INCLUDE PO # AND/OR JOBLINK # ON INVOICE

FOR ETC USE ONLY:

"SENT" DATE: INITIAL:



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 08249

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT FOTH: VAN DYKE		PROJECT TITLE CRANDON MINING Co	
ADDRESS 2737 S. RIDGE Rd		PROJECT NO. 930049	P.O. NO.
CITY GREEN BAY	STATE WI.	ZIP 54307	CONTACT RUSS JANESHEK
			PHONE 414-497-2500

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			PNP				
1.	54715	SG-AB	1/6/94	0815	S.W.	GRAB	1				
2.	54716	SG-2	↓	0930	↓	↓	1				
3.	54717	SG-E	↓	1200	↓	↓	1				
4.	54718	SG-19	1/7/94	0830	S.W.	GRAB	1				
5.	54719	SG-30	↓	0930	S.W.	GRAB	1				
6.											
7.											
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE:

SW = surface water
WW = wastewater
GW = groundwater

DW = drinking water
TIS = tissue
AIR = air

PROD = product
SOIL = soil
SED = sediment

describe others

CONTAINER

P = plastic
G = glass
V = glass vial
B = plastic bag

describe others

PRESERVATIVES & PREPARATION

NP = nothing added OH = sodium hydroxide
S = sulfuric acid HA = hydrochloric &
N = nitric acid ascorbic acid
Z = zinc acetate H = hydrochloric acid

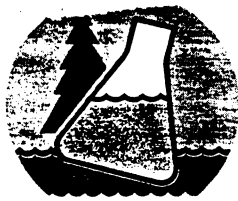
F = field filtered

COLLECTED BY (signature) Scott Jensen		CUSTODY SEAL NO. (IF ANY) DATE/TIME 91794 0930	
RELINQUISHED BY (signature)		RECEIVED BY (signature) DATE/TIME	
RELINQUISHED BY (signature)		RECEIVED BY (signature) DATE/TIME	
DISPATCHED BY (signature) Scott Jensen		METHOD OF TRANSPORT FVD	
		DATE/TIME 4/7/94 1000	

RECEIVED AT NLS BY (signature) Cindy Flannery	DATE/TIME 4/7/94 @ 10:05	CONDITION OK	TEMP.
SEAL INTACT? ☒ YES ☐ NO	SEAL #	REMARKS & OTHER INFORMATION	

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 08720

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT FOTH: VAN DYKE			PROJECT TITLE CMC			
ADDRESS 2732 S RIDGE Rd			PROJECT NO. 930049		P.O. NO.	
CITY GREEN BAY		STATE WI	ZIP 54307	CONTACT RUSS JANE SHEK (GJB)		PHONE 414-497-2500

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			PNP				
1.	54481	SG-6	4/4/94	1015	S.W.	GRAB	1				
2.	54482	SG-SA	↓	1150	↓	↓	1				
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE:

SW = surface water DW = drinking water PROD = product
WW = wastewater TIS = tissue SOIL = soil
GW = groundwater AIR = air SED = sediment

describe others

CONTAINER

P = plastic G = glass V = glass vial B = plastic bag

describe others

PRESERVATIVES & PREPARATION

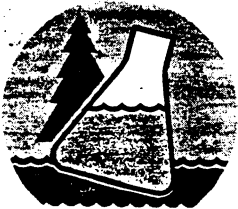
NP = nothing added OH = sodium hydroxide
S = sulfuric acid HA = hydrochloric & ascorbic acid
N = nitric acid Z = zinc acetate H = hydrochloric acid

F = field filtered

COLLECTED BY (signature) Scott J. Janssen		CUSTODY SEAL NO. (IF ANY) DATE/TIME 3/5/94 0740	
RELINQUISHED BY (signature)		RECEIVED BY (signature) DATE/TIME	
RELINQUISHED BY (signature)		RECEIVED BY (signature) DATE/TIME	
DISPATCHED BY (signature) Scott J. Janssen		METHOD OF TRANSPORT FYD DATE/TIME 4/5/94 0740	
RECEIVED AT NLS BY (signature) Dawn R. Janssen		DATE/TIME 4/5 7:40	CONDITION
SEAL INTACT? ☐ YES ☐ NO	SEAL #	REMARKS & OTHER INFORMATION	

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 08793

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT <i>FOTH: VAN DYKE</i>			PROJECT TITLE <i>CRANDON MINING Co</i>		
ADDRESS <i>2737 S. RIDGE Rd</i>			PROJECT NO. <i>93C049</i>		P.O. NO.
CITY <i>GREEN BAY</i>	STATE <i>WI.</i>	ZIP <i>54307</i>	CONTACT <i>RUSS JANESHEK</i>		PHONE <i>414-497-2500</i>

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			PNP				
1.	<i>54585</i>	<i>SG-V</i>	<i>4/5/94</i>	<i>1315</i>	<i>S.W.</i>	<i>CRAB</i>	<i>1</i>				
2.	<i>54586</i>	<i>SG-3</i>		<i>1630</i>							
3.	<i>54587</i>	<i>SG-CC-02</i>		<i>0930</i>							
4.	<i>54588</i>	<i>SG-CC-01</i>		<i>0930</i>							
5.	<i>54589</i>	<i>SG-4</i>		<i>1530</i>							
6.	<i>54590</i>	<i>SG-Y</i>		<i>1115</i>							
7.											
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE:

SW = surface water
WW = wastewater
GW = groundwater

DW = drinking water
TIS = tissue
AIR = air

PROD = product
SOIL = soil
SED = sediment

describe others

CONTAINER

P = plastic
G = glass
V = glass vial
B = plastic bag

describe others

PRESERVATIVES & PREPARATION

NP = nothing added
S = sulfuric acid
N = nitric acid
Z = zinc acetate

OH = sodium hydroxide
HA = hydrochloric & ascorbic acid
H = hydrochloric acid

F = field filtered

COLLECTED BY (signature) <i>Scott Janssen</i>		CUSTODY SEAL NO. (IF ANY)		DATE/TIME <i>4/5/94 1800</i>
RELINQUISHED BY (signature)		RECEIVED BY (signature)		DATE/TIME
RELINQUISHED BY (signature)		RECEIVED BY (signature)		DATE/TIME
DISPATCHED BY (signature) <i>Scott Janssen</i>		METHOD OF TRANSPORT <i>FYD</i>		DATE/TIME <i>4/6/94 0715</i>

RECEIVED AT NLS BY (signature) <i>W. J. Janssen</i>	DATE/TIME <i>4/6/94 0715</i>	CONDITION <i>ON ICE</i>	TEMP.
SEAL INTACT? ☐ YES ☐ NO	SEAL #	REMARKS & OTHER INFORMATION	

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY



QUESTIONS? CALL 800-238-5355 TOLL FREE.

6029144726

AIRBILL
PACKAGE
TRACKING-NUMBER

6029144726

Date
4/1/90

RECIPIENT'S COPY

From (Your Name) Please Print Scott Janssen		Your Phone Number (Very Important) (414) 497-2500		To (Recipient's Name) Please Print ETC - Smith		Recipient's Phone Number (Very Important) (708) 541-5550	
Company FOTH: VAN DYKE / CRANDON TRADING CO		Department/Floor No.		Company		Department/Floor No.	
Street Address 104 W. MADISON				Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.) 330 TE... ..			
City CRANDON		State WI		City CRANDON		State WI	
ZIP Required 54520		ZIP Required 54520		ZIP Required 54520		ZIP Required 54520	

YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.)

730049

IF HOLD FOR PICK-UP, Print FEDEX Address Here

Street
Address

City

State

ZIP Required

PAYMENT			
1 ☐ Bill Sender	2 ☒ Bill Recipient's FedEx Acct. No.	3 ☐ Bill 3rd Party FedEx Acct. No.	4 ☐ Bill Credit Card
5 ☐ Cash/Check			

SERVICES (Check only one box)		DELIVERY AND SPECIAL HANDLING (Check services required)		PACKAGES		WEIGHT In Pounds Only		YOUR DECLARED VALUE (See right)		Emp. No.		Date		Federal Express Use	
Priority Overnight: (Delivery by next business morning)		Standard Overnight: (Delivery by next business afternoon No Saturday delivery)		HOLD FOR PICK-UP (Fill in Box H)		1 ☐ WEEKDAY or 31 ☐ SATURDAY		Total Total Total		1 30		Total		Total	
11 ☐ OTHER PACKAGING		51 ☐ OTHER PACKAGING		DELIVER		2 ☒ WEEKDAY or 3 ☐ SATURDAY (Extra charge) (Not available to all locations)		Total Total Total		1 30		Total		Total	
12 ☐ FEDEX LETTER*		52 ☐ FEDEX LETTER*		4 ☐ DANGEROUS GOODS (Extra charge)		5 ☐ DRY ICE Dangerous Goods Shipper's Declaration not required		Total Total Total		1 30		Total		Total	
13 ☐ FEDEX PAK*		53 ☐ FEDEX PAK*		6 ☐ OTHER SPECIAL SERVICE		7 ☐ SATURDAY PICK-UP (Extra charge)		Total Total Total		1 30		Total		Total	
14 ☐ FEDEX BOX		54 ☐ FEDEX BOX		8 ☐ HOLIDAY DELIVERY (if offered) (Extra charge)		9 ☐ DIM SHIPMENT (uninsurable weight)		Total Total Total		1 30		Total		Total	
30 ☐ ECONOMY		46 ☐ GOVT LETTER		10 ☐ OTHER SPECIAL SERVICE		11 ☐ SATURDAY PICK-UP (Extra charge)		Total Total Total		1 30		Total		Total	
41 ☐ GOVT PACKAGE		47 ☐ GOVT LETTER		12 ☐ HOLIDAY DELIVERY (if offered) (Extra charge)		13 ☐ DIM SHIPMENT (uninsurable weight)		Total Total Total		1 30		Total		Total	
70 ☐ OVERNIGHT FREIGHT** (Covered insurance required)		80 ☐ TWO-DAY FREIGHT** (Covered insurance required)		14 ☐ DIM SHIPMENT (uninsurable weight)		15 ☐ DIM SHIPMENT (uninsurable weight)		Total Total Total		1 30		Total		Total	
1 Delivery commitment may be later in some areas.		*Declared Value Limit \$500. **Call for delivery schedule.		16 ☐ DIM SHIPMENT (uninsurable weight)		17 ☐ DIM SHIPMENT (uninsurable weight)		Total Total Total		1 30		Total		Total	

REVISION DATE 6/92
PART #137215 GBPS
FORMAT #136

136

Release
Signature:

QUESTIONS? CALL 800-238-5355 TOLL FREE.

6029144730

AIRBILL
PACKAGE
TRACKING NUMBER

6029144730

Date
4/1/90

RECIPIENT'S COPY

From (Your Name) Please Print Scott Janssen		Your Phone Number (Very Important) (414) 497-2500		To (Recipient's Name) Please Print ETC - Smith		Recipient's Phone Number (Very Important) (708) 541-5550	
Company FOTH: VAN DYKE / CRANDON TRADING CO		Department/Floor No.		Company		Department/Floor No.	
Street Address 104 W. MADISON				Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.) 330 TE... ..			
City CRANDON		State WI		City CRANDON		State WI	
ZIP Required 54520		ZIP Required 54520		ZIP Required 54520		ZIP Required 54520	

YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.)

730049

IF HOLD FOR PICK-UP, Print FEDEX Address Here

Street
Address

City

State

ZIP Required

PAYMENT			
1 ☐ Bill Sender	2 ☒ Bill Recipient's FedEx Acct. No.	3 ☐ Bill 3rd Party FedEx Acct. No.	4 ☐ Bill Credit Card
5 ☐ Cash/Check			

SERVICES (Check only one box)		DELIVERY AND SPECIAL HANDLING (Check services required)		PACKAGES		WEIGHT In Pounds Only		YOUR DECLARED VALUE (See right)		Emp. No.		Date		Federal Express Use	
Priority Overnight: (Delivery by next business morning)		Standard Overnight: (Delivery by next business afternoon No Saturday delivery)		HOLD FOR PICK-UP (Fill in Box H)		1 ☐ WEEKDAY or 31 ☐ SATURDAY		Total Total Total		1 30		Total		Total	
11 ☐ OTHER PACKAGING		51 ☐ OTHER PACKAGING		DELIVER		2 ☒ WEEKDAY or 3 ☐ SATURDAY (Extra charge) (Not available to all locations)		Total Total Total		1 30		Total		Total	
12 ☐ FEDEX LETTER*		52 ☐ FEDEX LETTER*		4 ☐ DANGEROUS GOODS (Extra charge)		5 ☐ DRY ICE Dangerous Goods Shipper's Declaration not required		Total Total Total		1 30		Total		Total	
13 ☐ FEDEX PAK*		53 ☐ FEDEX PAK*		6 ☐ OTHER SPECIAL SERVICE		7 ☐ SATURDAY PICK-UP (Extra charge)		Total Total Total		1 30		Total		Total	
14 ☐ FEDEX BOX		54 ☐ FEDEX BOX		8 ☐ HOLIDAY DELIVERY (if offered) (Extra charge)		9 ☐ DIM SHIPMENT (uninsurable weight)		Total Total Total		1 30		Total		Total	
30 ☐ ECONOMY		46 ☐ GOVT LETTER		10 ☐ OTHER SPECIAL SERVICE		11 ☐ SATURDAY PICK-UP (Extra charge)		Total Total Total		1 30		Total		Total	
41 ☐ GOVT PACKAGE		47 ☐ GOVT LETTER		12 ☐ HOLIDAY DELIVERY (if offered) (Extra charge)		13 ☐ DIM SHIPMENT (uninsurable weight)		Total Total Total		1 30		Total		Total	
70 ☐ OVERNIGHT FREIGHT** (Covered insurance required)		80 ☐ TWO-DAY FREIGHT** (Covered insurance required)		14 ☐ DIM SHIPMENT (uninsurable weight)		15 ☐ DIM SHIPMENT (uninsurable weight)		Total Total Total		1 30		Total		Total	
1 Delivery commitment may be later in some areas.		*Declared Value Limit \$500. **Call for delivery schedule.		16 ☐ DIM SHIPMENT (uninsurable weight)		17 ☐ DIM SHIPMENT (uninsurable weight)		Total Total Total		1 30		Total		Total	

REVISION DATE 6/92
PART #137215 GBPS
FORMAT #136

136

3.7-9-90



QUESTIONS? CALL 800-238-5355 TOLL-FREE

AIRBILL
PACKAGE
TRACKING NUMBER

6029144671

6029144671

RECIPIENT'S COPY

From (Your Name) Please Print Scott J. Anderson		Your Phone Number (Very Important) (414) 917-5100		To (Recipient's Name) Please Print (111) 917-5100		Recipient's Phone Number (Very Important)	
Company FETAL VAS OIL / FETAL VAS OIL		Department/Floor No.		Company ETC		Department/Floor No.	
Street Address 104 W. MADISON		State WI		Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.) 300 TOWN		State CA	
City MADISON		ZIP Required 53704		City SAN JOSE		ZIP Required	
YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.) 730049				IF HOLD FOR PICK-UP, Print FEDEX Address Here Street Address City State ZIP Required			
PAYMENT 1 ☐ Bill Sender 2 ☒ Bill Recipient's FedEx Acct. No. 3 ☐ Bill 3rd Party FedEx Acct. No. 4 ☐ Bill Credit Card				Emp. No. Date Federal Express Use			
5 ☐ Cash/Check				☐ Cash Received ☐ Return Shipment ☐ Third Party ☐ Chg. To Del. ☐ Chg. To Hold			
SERVICES (Check only one box)				DELIVERY AND SPECIAL HANDLING (Check services required)			
11 ☐ OTHER PACKAGING 16 ☐ FEDEX LETTER 12 ☐ FEDEX PAK 13 ☐ FEDEX BOX 14 ☐ FEDEX TUBE				1 ☐ WEEKDAY 31 ☐ SATURDAY 2 ☒ WEEKDAY or 3 ☐ SATURDAY (Extra charge) (Not available to all locations)			
30 ☐ ECONOMY 46 ☐ GOVT LETTER 41 ☐ GOVT PACKAGE				4 ☐ DANGEROUS GOODS (Extra charge) 5 ☐ DRY ICE 6 ☐ DANGEROUS GOODS Shipper's Declaration not required			
70 ☐ OVERNIGHT FREIGHT 80 ☐ TWO-DAY FREIGHT				7 ☐ OTHER SPECIAL SERVICE 8 ☐ SATURDAY PICK-UP (Extra charge) 12 ☐ HOLIDAY DELIVERY (If offered) (Extra charge)			
70 ☐ OVERNIGHT FREIGHT 80 ☐ TWO-DAY FREIGHT				Total Total Total			
70 ☐ OVERNIGHT FREIGHT 80 ☐ TWO-DAY FREIGHT				DIM SHIPMENT (Chargeable Weight)			
70 ☐ OVERNIGHT FREIGHT 80 ☐ TWO-DAY FREIGHT				Regular Stock Drop E			
70 ☐ OVERNIGHT FREIGHT 80 ☐ TWO-DAY FREIGHT				Release Signature: [Signature]			



QUESTIONS? CALL 800-238-5355 TOLL-FREE

AIRBILL
PACKAGE
TRACKING NUMBER

6029144693

6029144693

RECIPIENT'S COPY

From (Your Name) Please Print Scott J. Anderson		Your Phone Number (Very Important) (414) 917-5100		To (Recipient's Name) Please Print (111) 917-5100		Recipient's Phone Number (Very Important)	
Company FETAL VAS OIL / FETAL VAS OIL		Department/Floor No.		Company ETC		Department/Floor No.	
Street Address 104 W. MADISON		State WI		Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.) 300 TOWN		State CA	
City MADISON		ZIP Required 53704		City SAN JOSE		ZIP Required	
YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.) 730049				IF HOLD FOR PICK-UP, Print FEDEX Address Here Street Address City State ZIP Required			
PAYMENT 1 ☐ Bill Sender 2 ☒ Bill Recipient's FedEx Acct. No. 3 ☐ Bill 3rd Party FedEx Acct. No. 4 ☐ Bill Credit Card				Emp. No. Date Federal Express Use			
5 ☐ Cash/Check				☐ Cash Received ☐ Return Shipment ☐ Third Party ☐ Chg. To Del. ☐ Chg. To Hold			
SERVICES (Check only one box)				DELIVERY AND SPECIAL HANDLING (Check services required)			
11 ☐ OTHER PACKAGING 16 ☐ FEDEX LETTER 12 ☐ FEDEX PAK 13 ☐ FEDEX BOX 14 ☐ FEDEX TUBE				1 ☐ WEEKDAY 31 ☐ SATURDAY 2 ☒ WEEKDAY or 3 ☐ SATURDAY (Extra charge) (Not available to all locations)			
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70 ☐ OVERNIGHT FREIGHT 80 ☐ TWO-DAY FREIGHT				7 ☐ OTHER SPECIAL SERVICE 8 ☐ SATURDAY PICK-UP (Extra charge) 12 ☐ HOLIDAY DELIVERY (If offered) (Extra charge)			
70 ☐ OVERNIGHT FREIGHT 80 ☐ TWO-DAY FREIGHT				Total Total Total			
70 ☐ OVERNIGHT FREIGHT 80 ☐ TWO-DAY FREIGHT				DIM SHIPMENT (Chargeable Weight)			
70 ☐ OVERNIGHT FREIGHT 80 ☐ TWO-DAY FREIGHT				Regular Stock Drop E			
70 ☐ OVERNIGHT FREIGHT 80 ☐ TWO-DAY FREIGHT				Release Signature: [Signature]			



**AIRBILL
PACKAGE
TRACKING NUMBER**

6029144682

6029144632

RECIPIENT'S COPY

From (Your Name) Please Print		Your Phone Number (Very Important)	To (Recipient's Name) Please Print		Recipient's Phone Number (Very Important)
Company JENSEN Street Address 124 W. ... City ... State ... ZIP Required ... Department/Floor No. ...		Company ... Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.) ... City ... State ... ZIP Required ...			
YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.) ...					
PAYMENT ☐ 1 Bill Sender ☐ 2 Bill Recipient's FedEx Acct. No. ☐ 3 Bill 3rd Party FedEx Acct. No. ☐ 4 Bill Credit Card ☐ 5 Cash Check					
SERVICES (Check only one box) Priority Overnight (Delivery by next business morning) 11 ☐ OTHER PACKAGING 16 ☐ FEDEX LETTER 12 ☐ FEDEX PAK 13 ☐ FEDEX BOX 14 ☐ FEDEX TUBE Standard Overnight (Delivery by next business morning No Saturday delivery) 51 ☐ OTHER PACKAGING 56 ☐ FEDEX LETTER 52 ☐ FEDEX PAK 53 ☐ FEDEX BOX 54 ☐ FEDEX TUBE DELIVERY AND SPECIAL HANDLING (Check services required) HOLD FOR PICK-UP (Fill in Box H) 1 ☐ WEEKDAY or 31 ☐ SATURDAY DELIVER 2 ☐ WEEKDAY or 3 ☐ SATURDAY (Extra charge) (Not available to all locations) 4 ☐ DANGEROUS GOODS (Extra charge) 5 ☐ 6 ☐ DRY ICE Dangerous Goods Shipper's Declaration not required Dry Ice: ☐ UN 1845 ☐ X ☐ kg III 7 ☐ OTHER SPECIAL SERVICE 8 ☐ SATURDAY PICK-UP (Extra charge) 9 ☐ 10 ☐ HOLIDAY DELIVERY (if offered) (Extra charge) PACKAGES 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ 11 ☐ 12 ☐ 13 ☐ 14 ☐ 15 ☐ 16 ☐ 17 ☐ 18 ☐ 19 ☐ 20 ☐ 21 ☐ 22 ☐ 23 ☐ 24 ☐ 25 ☐ 26 ☐ 27 ☐ 28 ☐ 29 ☐ 30 ☐ 31 ☐ 32 ☐ 33 ☐ 34 ☐ 35 ☐ 36 ☐ 37 ☐ 38 ☐ 39 ☐ 40 ☐ 41 ☐ 42 ☐ 43 ☐ 44 ☐ 45 ☐ 46 ☐ 47 ☐ 48 ☐ 49 ☐ 50 ☐ 51 ☐ 52 ☐ 53 ☐ 54 ☐ 55 ☐ 56 ☐ 57 ☐ 58 ☐ 59 ☐ 60 ☐ 61 ☐ 62 ☐ 63 ☐ 64 ☐ 65 ☐ 66 ☐ 67 ☐ 68 ☐ 69 ☐ 70 ☐ 71 ☐ 72 ☐ 73 ☐ 74 ☐ 75 ☐ 76 ☐ 77 ☐ 78 ☐ 79 ☐ 80 ☐ 81 ☐ 82 ☐ 83 ☐ 84 ☐ 85 ☐ 86 ☐ 87 ☐ 88 ☐ 89 ☐ 90 ☐ 91 ☐ 92 ☐ 93 ☐ 94 ☐ 95 ☐ 96 ☐ 97 ☐ 98 ☐ 99 ☐ 100 ☐ 101 ☐ 102 ☐ 103 ☐ 104 ☐ 105 ☐ 106 ☐ 107 ☐ 108 ☐ 109 ☐ 110 ☐ 111 ☐ 112 ☐ 113 ☐ 114 ☐ 115 ☐ 116 ☐ 117 ☐ 118 ☐ 119 ☐ 120 ☐ 121 ☐ 122 ☐ 123 ☐ 124 ☐ 125 ☐ 126 ☐ 127 ☐ 128 ☐ 129 ☐ 130 ☐ 131 ☐ 132 ☐ 133 ☐ 134 ☐ 135 ☐ 136 ☐ 137 ☐ 138 ☐ 139 ☐ 140 ☐ 141 ☐ 142 ☐ 143 ☐ 144 ☐ 145 ☐ 146 ☐ 147 ☐ 148 ☐ 149 ☐ 150 ☐ 151 ☐ 152 ☐ 153 ☐ 154 ☐ 155 ☐ 156 ☐ 157 ☐ 158 ☐ 159 ☐ 160 ☐ 161 ☐ 162 ☐ 163 ☐ 164 ☐ 165 ☐ 166 ☐ 167 ☐ 168 ☐ 169 ☐ 170 ☐ 171 ☐ 172 ☐ 173 ☐ 174 ☐ 175 ☐ 176 ☐ 177 ☐ 178 ☐ 179 ☐ 180 ☐ 181 ☐ 182 ☐ 183 ☐ 184 ☐ 185 ☐ 186 ☐ 187 ☐ 188 ☐ 189 ☐ 190 ☐ 191 ☐ 192 ☐ 193 ☐ 194 ☐ 195 ☐ 196 ☐ 197 ☐ 198 ☐ 199 ☐ 200 ☐ 201 ☐ 202 ☐ 203 ☐ 204 ☐ 205 ☐ 206 ☐ 207 ☐ 208 ☐ 209 ☐ 210 ☐ 211 ☐ 212 ☐ 213 ☐ 214 ☐ 215 ☐ 216 ☐ 217 ☐ 218 ☐ 219 ☐ 220 ☐ 221 ☐ 222 ☐ 223 ☐ 224 ☐ 225 ☐ 226 ☐ 227 ☐ 228 ☐ 229 ☐ 230 ☐ 231 ☐ 232 ☐ 233 ☐ 234 ☐ 235 ☐ 236 ☐ 237 ☐ 238 ☐ 239 ☐ 240 ☐ 241 ☐ 242 ☐ 243 ☐ 244 ☐ 245 ☐ 246 ☐ 247 ☐ 248 ☐ 249 ☐ 250 ☐ 251 ☐ 252 ☐ 253 ☐ 254 ☐ 255 ☐ 256 ☐ 257 ☐ 258 ☐ 259 ☐ 260 ☐ 261 ☐ 262 ☐ 263 ☐ 264 ☐ 265 ☐ 266 ☐ 267 ☐ 268 ☐ 269 ☐ 270 ☐ 271 ☐ 272 ☐ 273 ☐ 274 ☐ 275 ☐ 276 ☐ 277 ☐ 278 ☐ 279 ☐ 280 ☐ 281 ☐ 282 ☐ 283 ☐ 284 ☐ 285 ☐ 286 ☐ 287 ☐ 288 ☐ 289 ☐					

SEPTEMBER 15, 1994



An ETC Laboratory

320 Tesconi Circle

Suite G

Santa Rosa, CA

95401

Telephone

(707) 544-5570

Facsimile

(707) 544-4906

CLIENT: FOTH & VAN DYKE
P.O. BOX 19012
2737 S. RIDGE ROAD
GREEN BAY, WI 54307-9012

ATTN: RUSS JANESHEK

JOB LINK: 810907 SECOND AMENDED REPORT
PROJECT: CMC TASK 5.13

ANALYSIS

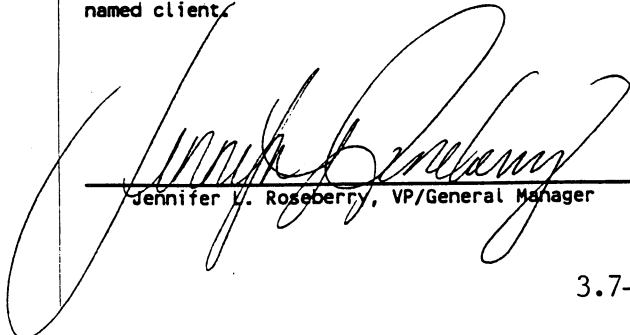
EPA METHOD 200 SERIES - METALS; 6010 & 7000 SERIES METALS

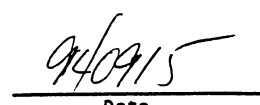
CONVENTIONALS: ALKALINITY AS CaCO_3 ; ALKALINITY, HYDROXIDE AS CaCO_3 ;
ALKALINITY, BICARBONATE CaCO_3 ; ALKALINITY, CARBONATE AS CaCO_3 ; AMMONIA AS N; ANIONS;
BIOCHEMICAL OXYGEN DEMAND; CATION AND ANION BALANCE; CATIONS;
CHEMICAL OXYGEN DEMAND (COD); CHLORIDE; CONDUCTIVITY; CYANIDE, TOTAL; FLUORIDE;
HARDNESS AS CaCO_3 ; NITRATE AS N; NITROGEN, TOTAL KJELDAHL (TKN); OIL AND GREASE, (IR);
PH; PHOSPHORUS; PHOSPHORUS AS P, DISSOLVED; SODIUM ABSORPTION RATIO (SAR);
SOLIDS, TOTAL SUSPENDED; SULFATE AS SO_4 ; TOTAL DISSOLVED SOLIDS (TDS); TURBIDITY

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE COLLECTION DATE</u>	<u>DATE RECEIVED BY LAB</u>
MF5512	LG-15	WATER	04-20-94	04-22-94
MF5513	LG-12	WATER	04-20-94	04-22-94
MF5514	LG-11-01	WATER	04-20-94	04-22-94
MF5515	LG-11-02	WATER	04-20-94	04-22-94
MF5516	LG-13	WATER	04-20-94	04-22-94
MF5517	LG-9	WATER	04-21-94	04-22-94
MF5518	LG-7	WATER	04-21-94	04-22-94
MF5519	LG-9	WATER	04-21-94	04-22-94
MF5520	LG-15	WATER	04-20-94	04-22-94
MF5521	LG-12	WATER	04-20-94	04-22-94
MF5522	LG-11-01	WATER	04-20-94	04-22-94
MF5523	LG-11-02	WATER	04-20-94	04-22-94
MF5524	LG-13	WATER	04-20-94	04-22-94
MF5525	LG-7	WATER	04-21-94	04-22-94
MF5526	LG-15	WATER	04-20-94	04-22-94
MF5527	LG-12	WATER	04-20-94	04-22-94
MF5528	LG-11-01	WATER	04-20-94	04-22-94
MF5529	LG-11-02	WATER	04-20-94	04-22-94
MF5530	LG-13	WATER	04-20-94	04-22-94
MF5531	LG-9	WATER	04-21-94	04-22-94
MF5532	LG-7	WATER	04-21-94	04-22-94

(Continued)

This report is "PROPRIETARY AND CONFIDENTIAL" and delivered to, and intended for the exclusive use of the above named client only. ETC, a Division of APBI Environmental Sciences Group, Inc. assumes no responsibility or liability for the reliance hereon or use hereof by anyone other than the above named client.


Jennifer L. Roseberry, VP/General Manager


Date

A division of
APBI Environmental
Sciences Group, Inc.

3.7-9-93

707 544 5570



SEPTEMBER 15, 1994

Page 2

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE COLLECTION DATE</u>	<u>DATE RECEIVED BY LAB</u>
MF5533	LG-15	WATER	04-20-94	04-22-94
MF5534	LG-12	WATER	04-20-94	04-22-94
MF5535	LG-11-01	WATER	04-20-94	04-22-94
MF5536	LG-11-02	WATER	04-20-94	04-22-94
MF5537	LG-13	WATER	04-20-94	04-22-94
MF5538	LG-9	WATER	04-21-94	04-22-94
MF5539	LG-7	WATER	04-21-94	04-22-94
MF6312	BOTTLES	NOT APPLICABLE	NOT APPLICABLE	04-22-94
MF6313	QCCHARGES	NOT APPLICABLE	NOT APPLICABLE	04-22-94

3.7-9-94



FOTH & VAN DYKE
 SEPTEMBER 15, 1994
 810907 AMENDED

SAMPLE MATRIX: WATER

<u>Parameter</u>	<u>EPA Prep Method</u>	<u>EPA Analysis Method</u>
ICP Metals	3015	6010
Antimony	3015	7041
Arsenic	3015	7060
Potassium*	3010	6010
Selenium	3015	7740
Thallium	3015	7841
Mercury	7470	7470
Aluminum**	NA	200.8m
Cadmium**	APDC EXTRACTION	200.8m
Chromium**	NA	200.9m
Copper**	APDC EXTRACTION	200.8m
Lead**	APDC EXTRACTION	200.8m
Mercury**	‡	‡
Zinc**	NA	200.9m
Alkalinity as CaCO ₃	NA	310.1
Alkalinity, Hydroxide as CaCO ₃	NA	310.1
Bicarbonate as CaCO ₃	NA	310.1
Carbonate Alkalinity as CaCO ₃	NA	310.1
Ammonia as N	350.2	350.2
Anions	NA	CALC.
Cations	NA	CALC.
Cation & Anion Balance	NA	CALC.
Chemical Oxygen Demand	NA	410.4
Chloride	NA	300.0
Conductivity	NA	9050
Total Cyanide	NA	9010
Fluoride	NA	340.2
Hardness as CaCO ₃	NA	130.2
Nitrate as N	NA	300.0
Total Kjeldahl Nitrogen	351.3	351.3
Oil & Grease	413.2	413.2
pH	NA	9040
Phosphorus	365.3	365.3
Phosphorus as P, Dissolved	365.3	365.3
Sodium Absorption Ratio	NA	CALC.
Total Suspended Solids	NA	160.2
Sulfate as SO ₄	NA	300.0
Total Dissolved Solids	NA	160.1
Turbidity	NA	180.1
Biochemical Oxygen Demand*	405.1	405.1

* ANALYSIS PERFORMED BY NORTHERN LAKE SERVICE INC

** ANALYSIS PERFORMED BY BATTELLE LABORATORY

‡ COLD VAPOR ATOMIC FLUORESCENCE



FOTH & VAN DYKE
14 SEPTEMBER 1994

**EXECUTIVE SUMMARY
ETC JOBLINK 810907
(SECOND AMENDED REPORT)**

On 22 April 1994 ETC-Santa Rosa received aqueous samples from Foth & Van Dyke via Federal Express. The cooler temperatures were both 0°C upon receipt at the laboratory. The samples were analyzed as specified on the preceding page.

Samples were filtered at the laboratory through a 0.45 μ m filter prior to analysis for iron, manganese, and phosphorus; these results reflect dissolved parameters. Phosphorus was also analyzed without filtration; these results reflect total parameters.

All samples were received past the method-recommended holding time for pH analysis.

Low level metals analyses were performed by Batelle; Biochemical Oxygen Demand (BOD) and Potassium analyses were performed by Northern Lake Service.

CALCULATIONS:

Results for Sodium Absorption Ratio (Modified SAR), Cations, Anions, and Cation and Anion Balance were obtained by calculation using analytical data. The Cations reflect results for Calcium, Magnesium, Potassium, and Sodium; the Anions reflect results for Chloride, Fluoride, Nitrate, Sulfate, Carbonate, and Bicarbonate.

CORRECTED REPORT (FROM 02 JUNE 1994):

This report is being re-submitted to correct results for Dissolved Phosphorus for samples LG-15, LG-12, LG-13 and LG-9. The sample filter may have been contaminated with Phosphorus on the original analysis run. The re-analyses were performed past the method-recommended holding time for this analysis.

AMENDED REPORT:

At the time of analysis of these samples, ETC did not hold certification for Potassium with Wisconsin DNR. At the request of the client, the samples were re-analyzed at Northern Lake Service (NLS) for this parameter. Potassium results from NLS are reflected in this report. Carbonate and hydroxide alkalinity results are based on calculations; these results, therefore, have no associated detection limits. The reporting detection limit column shows dashes for these parameters on the tabled data; if the analyte was not detected in the sample, the analyte concentration appears as zero on the Data Summary Reports. The original report listed detection limits for these parameters; corrected detection limit notations are included herein.

LOW-LEVEL METALS:

Direct analysis of water by ICP-MS was used for Aluminum. Direct analysis of water by GFAA was used for Chromium and Zinc. For the analysis of Cadmium, Copper, and Lead, a preconcentration step was followed by quantification using ICP-MS. Mercury was analyzed by cold vapor atomic fluorescence.

The QC samples included standard reference materials (QC Spikes), matrix spikes and replicates. Only one QC Spike is reported for each analyte on the tabled QC; for cases where there is data for more than one matrix spike or replicate, recovery information may be obtained from raw data copies included herein. When the procedural blank is accounted for, the QC Spike results are usually within +/- 25% of the certified value. The blank spike result for Lead is greater than the criteria range of +/- 25%, even with blank correction.

SECOND AMENDED REPORT:

This report was re-submitted on 03 June to correct results for Dissolved Phosphorus for samples LG-15, LG-12, LG-13 and LG-9 due to filter contamination on the original analysis run. The result for sample LG-11-02 was also suspect, but was inadvertently omitted from the reanalysis. When the tabled data was reprinted on 31 August for inclusion in an amended report to correct the alkalinity report DL, the Dissolved Phosphorus result for LG-11-02 showed up as ND. The ND result had been erroneously entered into the system after the corrected report of 03 June was issued. This second amended report includes the original Dissolved Phosphorus value of 0.094 mg/L. This result should be considered highly suspect due to probable contamination during filtration. Also included in this second amendment are corrected report DL's for Sulfate for samples LG-11-01 and LG-11-02.

Lisa Norosky

Lisa Norosky, Program Manager

3.7-9-96

940915

Date

Joblink: 810907

DATA SUMMARY REPORT

DATE: 09/14/94

PAGE: 1

Company: FOTH & VAN DYKE

Sample Point ID:	LG-11-01	LG-11-02	LG-12	LG-13	LG-15	LG-7
ETC Sample Number:	MF5522	MF5523	MF5521	MF5524	MF5520	MF5525
Sample Date:	940420	940420	940420	940420	940420	940421
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD 200 SERIES - METALS (AR08)

Aluminum	ug/L	17.5	17.1	62.9	104	36.9	65.5
Cadmium	ug/L	.017	.013	.013	.017	<.006	.053
Chromium	ug/L	.310	.310	.310	<.270	<.270	.310
Copper	ug/L	.386	.314	.447	.493	.258	.683
Lead	ug/L	.139	.121	.720	.586	.212	.286
Mercury	ug/L	.0009	.001	.003	.003	.002	.002
Zinc	ug/L	4.65	4.28	5.23	6.03	3.99	11.5

Sample Point ID:	LG-11-01	LG-11-01	LG-11-02	LG-11-02	LG-12	LG-12	LG-13	LG-13
ETC Sample Number:	MF5514	MF5535	MF5515	MF5536	MF5513	MF5534	MF5516	MF5537
Sample Date:	940420	940420	940420	940420	940420	940420	940420	940420
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Phosphorus	mg/L	<.050	-	<.050	-	<.050	-	.097	-
Oil and Grease, (IR)	mg/L	<1.00	-	<1.00	-	<1.00	-	<1.02	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	.252	-	.318	-	.644	-	.700	-
Ammonia as N	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
pH	std	6.30	-	6.20	-	5.80	-	6.10	-
Chemical Oxygen Demand (COD)	mg/L	11.0	-	16.0	-	32.0	-	20.0	-
Solids, total suspended	mg/L	<5.00	-	<5.00	-	<5.00	-	<5.00	-
Total Dissolved Solids (TDS)	mg/L	17.0	-	21.0	-	23.0	-	15.0	-
Fluoride	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Turbidity	NTU	.210	-	.160	-	1.10	-	1.50	-
Hardness as CaCO3	mg/L	<5.00	-	<5.00	-	<5.00	-	<5.00	-
Sodium Absorption Ratio (SAR)	std	0	-	0	-	0	-	0	-
Cations	meq/l	.123	-	.126	-	.065	-	.128	-
Anions	meq/l	.188	-	.185	-	.049	-	.082	-
Cation and Anion Balance	%	-20	-	-20	-	14.0	-	21.8	-
Chloride	mg/L	<.500	-	<.500	-	<.500	-	<.500	-
Nitrate as N	mg/L	<.500	-	<.500	-	<.500	-	<.500	-

3.7-9-97

Joblink: 810907

DATA SUMMARY REPORT

DATE: 09/14/94

Company: FOTH & VAN DYKE

PAGE: 2

Sample Point ID:	LG-11-01	LG-11-01	LG-11-02	LG-11-02	LG-12	LG-12	LG-13	LG-13
ETC Sample Number:	MF5514	MF5535	MF5515	MF5536	MF5513	MF5534	MF5516	MF5537
Sample Date:	940420	940420	940420	940420	940420	940420	940420	940420
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

CONVENTIONALS (AR55)

Sulfate as SO4	mg/L	9.01	-	8.87	-	2.35	-	3.94	-
Conductivity	umhos	19.6	-	19.7	-	15.6	-	19.6	-
Alkalinity as CaCO3	mg/L	<20.0	-	<20.0	-	<20.0	-	<20.0	-
Alkalinity, Hydroxide as CaCO3	mg/L	0	-	0	-	0	-	0	-
Alkalinity, Bicarbonate CaCO3	mg/L	<20.0	-	<20.0	-	<20.0	-	<20.0	-
Alkalinity, Carbonate as CaCO3	mg/L	0	-	0	-	0	-	0	-
Phosphorus as P, dissolved	mg/L	<.050	-	.094	-	<.050	-	<.050	-
Biochemical Oxygen Demand	mg/L	-	10.0	-	10.0	-	10.0	-	6.00

Sample Point ID:	LG-15	LG-15	LG-7	LG-7	LG-9	LG-9
ETC Sample Number:	MF5512	MF5533	MF5518	MF5539	MF5517	MF5538
Sample Date:	940420	940420	940421	940421	940421	940421
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-	<.020	-	<.020	-
Phosphorus	mg/L	.301	-	<.050	-	.417	-
Oil and Grease, (IR)	mg/L	<1.00	-	<1.00	-	<1.02	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	1.04	-	.336	-	.252	-
Ammonia as N	mg/L	<.100	-	<.100	-	<.100	-
pH	std	6.00	-	6.10	-	8.60	-
Chemical Oxygen Demand (COD)	mg/L	35.0	-	12.0	-	15.0	-
Solids, total suspended	mg/L	<5.00	-	<5.00	-	<5.00	-
Total Dissolved Solids (TDS)	mg/L	15.0	-	25.0	-	94.0	-
Fluoride	mg/L	<.100	-	<.100	-	<.100	-
Turbidity	NTU	1.80	-	2.00	-	1.50	-
Hardness as CaCO3	mg/L	<5.00	-	<5.00	-	82.0	-
Sodium Absorption Ratio (SAR)	std	0	-	.341	-	.092	-
Cations	meq/l	.109	-	.146	-	1.80	-
Anions	meq/l	<0	-	.079	-	1.52	-
Cation and Anion Balance	%	100	-	29.8	-	8.57	-
Chloride	mg/L	<.500	-	<.500	-	<.500	-
Nitrate as N	mg/L	<.500	-	<.500	-	<.500	-

3.7-9-98

Joblink: 810907

DATA SUMMARY REPORT

DATE: 09/14/94

Company: FOTH & VAN DYKE

PAGE: 3

Sample Point ID:	LG-15	LG-15	LG-7	LG-7	LG-9	LG-9
ETC Sample Number:	MF5512	MF5533	MF5518	MF5539	MF5517	MF5538
Sample Date:	940420	940420	940421	940421	940421	940421
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

CONVENTIONALS (AR55)

Sulfate as SO4	mg/L	<1.00	-	3.80	-	4.06	-
Conductivity	umhos	16.2	-	17.4	-	174	-
Alkalinity as CaCO3	mg/L	<20.0	-	<20.0	-	87.4	-
Alkalinity, Hydroxide as CaCO3	mg/L	0	-	0	-	0	-
Alkalinity, Bicarbonate CaCO3	mg/L	<20.0	-	<20.0	-	87.4	-
Alkalinity, Carbonate as CaCO3	mg/L	0	-	0	-	0	-
Phosphorus as P, dissolved	mg/L	.055	-	<.050	-	<.050	-
Biochemical Oxygen Demand	mg/L	-	9.00	-	7.00	-	8.00

Sample Point ID:	LG-11-01	LG-11-01	LG-11-02	LG-11-02	LG-12	LG-12	LG-13	LG-13
ETC Sample Number:	MF5514	MF5528	MF5515	MF5529	MF5513	MF5527	MF5516	MF5530
Sample Date:	940420	940420	940420	940420	940420	940420	940420	940420
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	<.100	-	<.100	-	.100	-	<.100
Manganese	mg/L	-	<.010	-	<.010	-	.026	-	.018
Antimony, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Arsenic, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Barium, Total	mg/L	<.010	-	<.010	-	<.010	-	.013	-
Beryllium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Boron, Total	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Calcium, Total	mg/L	1.58	-	1.60	-	1.30	-	1.69	-
Chromium, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Iron, Total	mg/L	<.100	-	<.100	-	.134	-	.146	-
Magnesium, Total	mg/L	.540	-	.558	-	<.500	-	.529	-
Manganese, Total	mg/L	<.010	-	<.010	-	.027	-	.020	-
Molybdenum, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Nickel, Total	mg/L	<.030	-	<.030	-	<.030	-	<.030	-
Potassium, Total	mg/L	<.600	-	<.600	-	<.600	-	<.600	-
Selenium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Silver, Total	mg/L	<.010	-	<.010	-	<.010	-	<.010	-

3.7-9-99

Joblink: 810907

DATA SUMMARY REPORT

DATE: 09/14/94

PAGE: 4

Company: FOTH & VAN DYKE

Sample Point ID:	LG-11-01	LG-11-01	LG-11-02	LG-11-02	LG-12	LG-12	LG-13	LG-13
ETC Sample Number:	MF5514	MF5528	MF5515	MF5529	MF5513	MF5527	MF5516	MF5530
Sample Date:	940420	940420	940420	940420	940420	940420	940420	940420
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Sodium, Total	mg/L	<1.00	-	<1.00	-	<1.00	-	<1.00	-
Thallium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-

Sample Point ID:	LG-15	LG-15	LG-7	LG-7	LG-9	LG-9	LG-9
ETC Sample Number:	MF5512	MF5526	MF5518	MF5532	MF5517	MF5519	MF5531
Sample Date:	940420	940420	940421	940421	940421	940421	940421
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	<.100	-	<.100	-	-	<.100
Manganese	mg/L	-	.073	-	.010	-	-	<.010
Antimony, Total	mg/L	<.005	-	<.005	-	<.005	-	-
Arsenic, Total	mg/L	<.005	-	<.005	-	<.005	-	-
Barium, Total	mg/L	<.010	-	<.010	-	<.010	-	-
Beryllium, Total	mg/L	<.005	-	<.005	-	<.005	-	-
Boron, Total	mg/L	<.100	-	<.100	-	<.100	-	-
Calcium, Total	mg/L	1.27	-	1.33	-	19.4	-	-
Chromium, Total	mg/L	<.020	-	<.020	-	<.020	-	-
Iron, Total	mg/L	.111	-	<.100	-	<.100	-	-
Magnesium, Total	mg/L	<.500	-	<.500	-	9.10	-	-
Manganese, Total	mg/L	.088	-	.012	-	<.010	-	-
Molybdenum, Total	mg/L	<.020	-	<.020	-	<.020	-	-
Nickel, Total	mg/L	<.030	-	<.030	-	<.030	-	-
Potassium, Total	mg/L	1.80	-	.700	-	<.600	-	-
Selenium, Total	mg/L	<.005	-	<.005	-	<.005	-	-
Silver, Total	mg/L	<.010	-	<.010	-	<.010	-	-
Sodium, Total	mg/L	<1.00	-	1.43	-	1.96	-	-
Thallium, Total	mg/L	<.005	-	<.005	-	<.005	-	-
Aluminum, Total	mg/L	-	-	-	-	-	.314	-
Cadmium, Total	mg/L	-	-	-	-	-	<.005	-
Copper, Total	mg/L	-	-	-	-	-	<.030	-
Lead, Total	mg/L	-	-	-	-	-	<.050	-
Zinc, Total	mg/L	-	-	-	-	-	<.020	-

3.7-9-100

Joblink: 810907

DATA SUMMARY REPORT

DATE: 09/14/94

Company: FOTH & VAN DYKE

PAGE: 5

Sample Point ID:	LG-15	LG-15	LG-7	LG-7	LG-9	LG-9	LG-9
ETC Sample Number:	MF5512	MF5526	MF5518	MF5532	MF5517	MF5519	MF5531
Sample Date:	940420	940420	940421	940421	940421	940421	940421
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Mercury, Total	mg/L	-	-	-	-	-	<.0002	-
----------------	------	---	---	---	---	---	--------	---

3.7-9-101

ETC

CHAIN-OF-CUSTODY RECORD

No. 114759

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570

810907

COMPANY FOTH: VAN DYKE		FACILITY/SITE 93C049		NUMBER OF CONTAINERS	FILT. (Y/N)	LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₄ +H ₂ SO ₄	
PROJECT CONTACT RUSS JANESHEK		TELEPHONE NO. 414-497-2500			PRESERV.		
					ANALYSIS REQUIRED		
					SEE ATTACHED LIST		
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD			START TIME
Source Codes: Well(W) Outfall.....(O) Soil.....(S) River/Stream.....(R) Bottom Sediment.....(B) Generation Point.....(G) Surface Impoundment (I) Treatment Facility.....(T) Leachate Collection Sys.....(C) Lake/Ocean.....(L) Other.....(X) Specify _____							
1		R	LG-1.5	9/14/20	0930		
2			LG-1.2		1100		
3			LG-1.1-0.1		1315		
4			LG-1.1-0.2		1315		
5			LG-1.3		1500		
6			LG-9	9/16/21	0830		
7			LG-7		1615		
8							
9							

CHAIN OF CUSTODY CHRONICLE

3.2-9-102	Shuttle Opened By: (print) SCOTT JANSSEN	Date: 4/20/94	Time: 0900
	Signature: Scott Janssen	Seal #: 70016, 70017	Intact: YES
	I have received these materials in good condition from the above person.		
	Name: _____	Signature: _____	
	Date: _____	Time: _____	Remarks: _____
3.	I have received these materials in good condition from the above person.		
	Name: _____	Signature: _____	
	Date: _____	Time: _____	Remarks: _____
4.	Shuttle Sealed By: (print) SCOTT JANSSEN	Date: 4/21/94	Time: 1230
	Signature: Scott Janssen	Seal #: 70008 70012 70013	Intact: YES
	LAB USE ONLY Opened By: Allen H. Harty Date: 4/22/94 Time: 10:45		
	SHUTTLE # Various TEMP. °C 00C SEAL # Various COND. OK		

REMARKS

PRESERVED IN FIELD

SAMPLER'S SIGNATURE

Scott Janssen

ETC

CHAIN-OF-CUSTODY RECORD
REQUEST FOR ANALYTICAL SERVICESREV. 04/93
FORM 301

ENVIRONMENTAL TESTING AND CERTIFICATION CORP ■ 320 TESCONI CIRCLE SUITE G ■ SANTA ROSA CA 95401 ■ (707)544-5570

SUBCONTRACT LAB
NLS
LABORATORY CONTACT

TELEPHONE NUMBER

TELEPHONE NUMBER

ADDRESS

NUMBER
OF CONTAINERS2
Total Potassium

FILT. (Y/N)

PRESERV.

LEGEND FOR
PRESERVATIVE0 - NONE
1 - HCL
2 - HNO₃
3 - H₂SO₄
4 - Na₂SO₄ / H₂SO₄

MATRIX CODES:

REMARKS:

method 6010

	ETC JOB NUMBER	MATRIX CODE	JOB LINK NUMBER	SAMPLE DATE
1	MF4792	1	810771	940407
2	MF4793			
3	MF4794			
4	MF4795			
5	MF5016			940408
6	MF5017			
7	MF5512		810907	940422
8	MF5513			

Liquid..... 1
Solid/Sludge..... 2
Oily Solid..... 3
Oily Liquid..... 4
Wipe..... 5
Leachate..... 7
Air..... 8
Other.....

CHAIN OF CUSTODY CHRONICLE

Relinquished To: Federal Express Date: 7/16/94 Time: 1330
(carrier) (tracking number)By (signature): Phil J. Jasser Shuttle/Seal # 71586 Intact: _____I have retained these materials in good condition from the above person
Receiving Lab/Opened By: D. Cottrell Date: 7-18-94 Time: 16:00
Temp. °C _____ Seal #: _____ Condition: _____

Shuttle Returned By: (print) _____ Date: _____ Time: _____

Signature: _____ Seal # _____ Intact: _____

RESULTS REQUESTED BY (DATE): Norma D. AT
SEND RESULTS TO: Lisa Norosky

RESULTS MUST INCLUDE:

STANDARD ☒ EXTENDED ☒ OTHER ☐• Method Blank Raw Data
• Blank Spike • Other _____
• MS/MSD _____

PO #: _____

PLEASE INCLUDE PO # AND/OR JOBLINK # ON INVOICE

FOR ETC USE ONLY:

"SENT" DATE: _____ INITIALS: _____

ETC

CHAIN-OF-CUSTODY RECORD
REQUEST FOR ANALYTICAL SERVICESREV. 04/93
FORM 301

ENVIRONMENTAL TESTING AND CERTIFICATION CORP ■ 320 TESCONI CIRCLE SUITE G ■ SANTA ROSA CA 95401 ■ (707)544-5570

SUBCONTRACT LAB
NLS
LABORATORY CONTACT

TELEPHONE NUMBER

TELEPHONE NUMBER

ADDRESS

NUMBER
OF CONTAINERSN
2
Total Potassium

FILT. (Y/N)

PRESERV.

LEGEND FOR
PRESERVATIVE0 - NONE
1 - HCL
2 - HNO₃
3 - H₂SO₄
4 - Na₂SO₄ + H₂SO₄

MATRIX CODES:

Liquid..... 1
Solid/Sludge..... 2
Oily Solid..... 3
Oily Liquid..... 4
Wipe..... 5
Leachate..... 7
Air..... 8
Other _____

REMARKS:

method 6010

CHAIN OF CUSTODY CHRONICLE

RESULTS REQUESTED BY (DATE): Normal TAT
SEND RESULTS TO: Lab Noreck

RESULTS MUST INCLUDE:

STANDARD ☒EXTENDED ☒OTHER ☐

• Method Blank

• Raw Data

• Blank Spike

• Other

• MS/MSD

PO #:

PLEASE INCLUDE PO # AND/OR JOBLINK # ON INVOICE

FOR ETC USE ONLY:

"SENT"
DATE:

DATE:

INITIAL

Relinquished To: Federal Express Date: 7/16/94 Time: 1330By (signature): [Signature] Shuttle/Seal # 71586 Intact: _____I have received these materials in good condition from the above person.
Receiving Lab/Opened By: [Signature] Date: 7-18-94 Time: 16:00
Temp. °C _____ Seal #: _____ Condition: _____

3. Shuttle Returned By:(print) _____ Date: _____ Time: _____

Signature: _____ Seal # _____ Intact: _____



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 08962

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT <u>FOTH: VAN DYKE</u>		PROJECT TITLE <u>CRANDON MINING Co</u>	
ADDRESS <u>2737 S. RIDGE Rd</u>		PROJECT NO. <u>93C049</u>	P.O. NO.
CITY <u>GREEN BAY</u>	STATE <u>WI</u>	ZIP <u>54307</u>	CONTACT <u>RUSS JAMESHEIL</u>
			PHONE <u>414-497-2500</u>

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			PNP				
1.	<u>55275</u>	<u>LG-15</u>	<u>4/20/94</u>	<u>0930</u>	<u>S.W.</u>	<u>GRAB</u>	<u>1</u>				
2.	<u>55276</u>	<u>LG-12</u>	<u>1</u>	<u>1100</u>	<u>1</u>						
3.	<u>55277</u>	<u>LG-11-01</u>	<u>1</u>	<u>1315</u>	<u>1</u>						
4.	<u>55278</u>	<u>LG-11-02</u>	<u>1</u>	<u>1315</u>	<u>1</u>						
5.	<u>55279</u>	<u>LG-13</u>	<u>1</u>	<u>1500</u>	<u>1</u>						
6.											
7.											
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE:

SW = surface water
WW = wastewater
GW = groundwater

DW = drinking water
TIS = tissue
AIR = air

PROD = product
SOIL = soil
SED = sediment

describe others

CONTAINER

P = plastic
G = glass
V = glass vial
B = plastic bag

describe others

PRESERVATIVES & PREPARATION

NP = nothing added
S = sulfuric acid
N = nitric acid
Z = zinc acetate
OH = sodium hydroxide
HA = hydrochloric & ascorbic acid
H = hydrochloric acid

F = field filtered

COLLECTED BY (signature)

Scott Jensen

CUSTODY SEAL NO. (IF ANY) DATE/TIME

1600/94 1600

RELINQUISHED BY (signature)

RECEIVED BY (signature)

DATE/TIME

RELINQUISHED BY (signature)

RECEIVED BY (signature)

DATE/TIME

DISPATCHED BY (signature)

Scott Jensen

METHOD OF TRANSPORT

FYD

DATE/TIME

4/20/94 1600

RECEIVED AT NLS BY (signature)

Cottrell

DATE/TIME

4-20-94 16:05

CONDITION

On Ice

TEMP.

SEAL INTACT?

☐ YES ☐ NO

SEAL #

REMARKS & OTHER INFORMATION

SEND RESULTS + INVOICES to ETC LAB

Hand Delivered

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 08256

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026

RETURN THIS FORM WITH SAMPLES.

CLIENT <i>FOTI, Yau D. T.</i>		PROJECT TITLE <i>CRANDON MINING Co</i>	
ADDRESS <i>2737 S RIDGE RD</i>		PROJECT NO. <i>93049</i>	P.O. NO.
CITY <i>GREEN BA-</i>	STATE <i>WI</i>	ZIP <i>54307</i>	CONTACT <i>RUSS JAVESHEK</i>
			PHONE <i>414-497 2500</i>

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			NP				
1.		<i>LG-9</i>	<i>4/21/94</i>	<i>0830</i>	<i>S.W</i>	<i>GRAB</i>	<i>1</i>				
2.		<i>LG-7</i>	<i>↓</i>	<i>1015</i>	<i>↓</i>	<i>↓</i>	<i>1</i>				
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE:

SW = surface water
WW = wastewater
GW = groundwater

DW = drinking water
TIS = tissue
AIR = air

PROD = product
SOIL = soil
SED = sediment

describe others

CONTAINER

P = plastic
G = glass
V = glass vial
B = plastic bag

describe others

PRESERVATIVES & PREPARATION

NP = nothing added
S = sulfuric acid
N = nitric acid
Z = zinc acetate

OH = sodium hydroxide
HA = hydrochloric & ascorbic acid
H = hydrochloric acid

F = field filtered

COLLECTED BY (signature) <i>Scott Jensen</i>		CUSTODY SEAL NO. (IF ANY)		DATE/TIME <i>4/21/94 11:45</i>
RELINQUISHED BY (signature)		RECEIVED BY (signature)		DATE/TIME
RELINQUISHED BY (signature)		RECEIVED BY (signature)		DATE/TIME
DISPATCHED BY (signature) <i>Scott Jensen</i>		METHOD OF TRANSPORT <i>FXD</i>		DATE/TIME <i>4/21/94 11:45</i>
RECEIVED AT NLS BY (signature) <i>W. Cottrell</i>		DATE/TIME <i>4-21-94 11:45</i>	CONDITION <i>On Ice</i>	TEMP.
SEAL INTACT? ☐ YES ☐ NO	SEAL #	REMARKS & OTHER INFORMATION <i>Hand Delivered</i>		

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY

8099585410

183M

8099585410

170343557

4/21/94



SCOTT JANSSEN

414 497-2500

707-544-5570

CRANDON MINING Co / FOTH VAN DYKE

ETC-SANTA ROSA

104 W. MADISON ST

320 TESCONI CIRCLE UNIT 5

CRANDON

WI 54520

SANTA ROSA

CA

95401

93C049

REVISION DATE 11/89

014

Scott Janssen

8099585060

183M

8099585060

170343557

4/21/94



SCOTT JANSSEN

414 497-2500

707-544-5570

CRANDON MINING Co / FOTH VAN DYKE

ETC-SANTA ROSA

104 W. MADISON

320 TESCONI CIRCLE UNIT 5

CRANDON

WI 54520

SANTA ROSA

CA

95401

93C049

REVISION DATE 11/89

014

Scott Janssen

3.7-9-108

8099585082

183M

8099585082



170343557

4/21/94

SCOTT JANSSEN

414 497-2500

707-344-5570

CRANDUN MINING CO / FOTH. VAN DYKE

ETC-SANTA ROSA

104 W MADISON ST.

320 TESCONI CIRCLE UNIT S

CRANDUN

WI. 54520

SANTA ROSA

CA

9 5 4 0 1

930049

60

60

REVISION DATE 11/89

014

Scott Janssen

April 1994
Surface Water Laboratory Data
High Flow Sampling Event

SEPTEMBER 1, 1994



An ETC Laboratory

320 Tesconi Circle

Suite G

Santa Rosa, CA
95401

Telephone
(707) 544-5570

Facsimile
(707) 544-4906

CLIENT: FOTH & VAN DYKE
P.O. BOX 19012
2737 S. RIDGE ROAD
GREEN BAY, WI 54307-9012

ATTN: RUSS JANESHEK

JOBLINK: 810940 AMENDED REPORT
PROJECT: CMC TASK 5.13

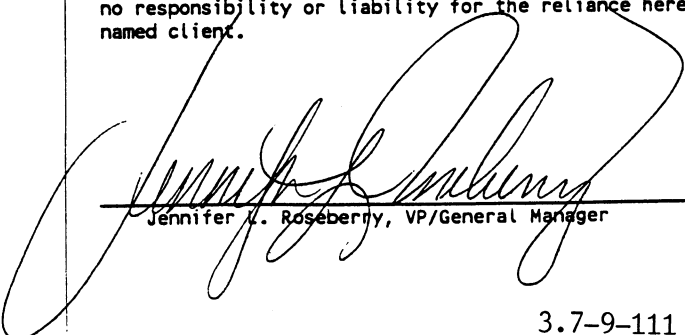
ANALYSIS

EPA METHOD 200 SERIES - METALS; 6010 & 7000 SERIES METALS

CONVENTIONALS: ALKALINITY AS CaCO_3 ; ALKALINITY, HYDROXIDE AS CaCO_3 ;
ALKALINITY, BICARBONATE CaCO_3 ; ALKALINITY, CARBONATE AS CaCO_3 ; AMMONIA AS N; ANIONS;
BIOCHEMICAL OXYGEN DEMAND; CATION AND ANION BALANCE; CATIONS;
CHEMICAL OXYGEN DEMAND (COD); CHLORIDE; CONDUCTIVITY; CYANIDE, TOTAL; FLUORIDE;
HARDNESS AS CaCO_3 ; NITRATE AS N; NITROGEN, TOTAL KJELDAHL (TKN); OIL AND GREASE, (IR);
PH; PHOSPHORUS; PHOSPHORUS AS P, DISSOLVED; SODIUM ABSORPTION RATIO (SAR);
SOLIDS, TOTAL SUSPENDED; SULFATE AS SO_4 ; TOTAL DISSOLVED SOLIDS (TDS); TURBIDITY

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE COLLECTION DATE</u>	<u>DATE RECEIVED BY LAB</u>
MF5698	SG-AB	WATER	04-26-94	04-27-94
MF5699	SG-V	WATER	04-26-94	04-27-94
MF5700	SG-Y	WATER	04-26-94	04-27-94
MF5701	SG-CC-01	WATER	04-25-94	04-27-94
MF5702	SG-CC-02	WATER	04-25-94	04-27-94
MF5703	SG-AB	WATER	04-26-94	04-27-94
MF5704	SG-V	WATER	04-26-94	04-27-94
MF5705	SG-Y	WATER	04-26-94	04-27-94
MF5706	SG-CC-01	WATER	04-25-94	04-27-94
MF5707	SG-CC-02	WATER	04-25-94	04-27-94
MF5708	SG-AB	WATER	04-26-94	04-27-94
MF5709	SG-V	WATER	04-26-94	04-27-94
MF5710	SG-Y	WATER	04-26-94	04-27-94
MF5711	SG-CC-01	WATER	04-25-94	04-27-94
MF5712	SG-CC-02	WATER	04-25-94	04-27-94
MF5713	SG-AB	WATER	04-26-94	04-27-94
MF5714	SG-V	WATER	04-26-94	04-27-94
MF5715	SG-Y	WATER	04-26-94	04-27-94
MF5716	SG-CC-01	WATER	04-25-94	04-27-94
MF5717	SG-CC-02	WATER	04-25-94	04-27-94
MF6311	BOTTLES	WATER	NOT APPLICABLE	04-27-94

This report is "PROPRIETARY AND CONFIDENTIAL" and delivered to, and intended for the exclusive use of the above named client only. ETC, a Division of APBI Environmental Sciences Group, Inc. assumes no responsibility or liability for the reliance hereon or use hereof by anyone other than the above named client.


Jennifer L. Roseberry, VP/General Manager

9/6/901
Date

A division of
APBI Environmental
Sciences Group, Inc.

3.7-9-111



FOTH & VAN DYKE
SEPTEMBER 1, 1994
810940 AMENDED

SAMPLE MATRIX: WATER

Parameter	EPA	EPA
	Prep Method	Analysis Method
ICP Metals	3015	6010
Antimony	3015	7041
Arsenic	3015	7060
Potassium*	3010	6010
Selenium	3015	7740
Thallium	3015	7841
Aluminum**	NA	200.8m
Cadmium**	APDC EXTRACTION	200.8m
Chromium**	NA	200.9m
Copper**	APDC EXTRACTION	200.8m
Lead**	APDC EXTRACTION	200.8m
Mercury**	‡	‡
Zinc**	NA	200.9m
Alkalinity as CaCO3	NA	310.1
Alkalinity, Hydroxide as CaCO3	NA	310.1
Bicarbonate as CaCO3	NA	310.1
Carbonate Alkalinity as CaCO3	NA	310.1
Ammonia as N	350.2	350.2
Anions	NA	CALC.
Cations	NA	CALC.
Cation & Anion Balance	NA	CALC.
Chemical Oxygen Demand	NA	410.4
Chloride	NA	300.0
Conductivity	NA	9050
Total Cyanide	9010	9010
Fluoride	NA	340.2
Hardness as CaCO3	NA	130.2
Nitrate as N	NA	300.0
Total Kjeldahl Nitrogen	351.3	351.3
Oil & Grease	413.2	413.2
pH	NA	9040
Phosphorus	365.3	365.3
Phosphorus as P, Dissolved	365.3	365.3
Sodium Absorption Ratio	NA	CALC.
Total Suspended Solids	NA	160.2
Sulfate as SO4	NA	300.0
Total Dissolved Solids	NA	160.1
Turbidity	NA	180.1
Biochemical Oxygen Demand*	405.1	405.1

* ANALYSIS PERFORMED BY NORTHERN LAKE SERVICE INC

** ANALYSIS PERFORMED BY BATTELLE LABORATORY

‡ COLD VAPOR ATOMIC FLUORESCENCE



FOTH & VAN DYKE
31 AUGUST 1994

EXECUTIVE SUMMARY
ETC JOBLINK 810940
(AMENDED REPORT & LOW-LEVEL METALS)

On 27 April 1994 ETC-Santa Rosa received aqueous samples from Foth & Van Dyke via Federal Express: The cooler temperatures were both 0°C upon receipt at the laboratory. The samples were analyzed as specified on the preceding page.

Samples were filtered at the laboratory through a 0.45 μm filter prior to analysis for iron, manganese, and phosphorus; these results reflect dissolved parameters. Phosphorus was also analyzed without filtration; these results reflect total parameters.

All samples were received past the method-recommended holding time for pH analysis.

Low level metals analyses were performed by Batelle; Biochemical Oxygen Demand (BOD) and Potassium analyses were performed by Northern Lake Service.

CALCULATIONS:

Results for Sodium Absorption Ratio (Modified SAR), Cations, Anions, and Cation and Anion Balance were obtained by calculation using analytical data. The Cations reflect results for Calcium, Magnesium, Potassium, and Sodium; the Anions reflect results for Chloride, Fluoride, Nitrate, Sulfate, Carbonate, and Bicarbonate.

AMENDED REPORT:

At the time of analysis of these samples, ETC did not hold certification for Potassium with Wisconsin DNR. At the request of the client, the samples were re-analyzed at Northern Lake Service (NLS) for this parameter. Potassium results from NLS are reflected in this report. Carbonate and hydroxide alkalinity results are based on calculations; these results, therefore, have no associated detection limits. The reporting detection limit column shows dashes for these parameters on the tabled data; if the analyte was not detected in the sample, the analyte concentration appears as zero on the Data Summary Reports. The original report listed detection limits for these parameters; corrected detection limit notations are included herein.

LOW-LEVEL METALS:

Direct analysis of water by ICP-MS was used for Aluminum. Direct analysis of water by GFAA was used for Chromium and Zinc. For the analysis of Cadmium, Copper, and Lead, a preconcentration step was followed by quantification using ICP-MS. Mercury was analyzed by cold vapor atomic fluorescence.

The QC samples included standard reference materials (QC Spikes), matrix spikes and replicates. Only one QC Spike is reported for each analyte on the tabled QC; for cases where there is data for more than one matrix spike or replicate, recovery information may be obtained from raw data copies included herein. When the procedural blank is accounted for, the QC Spike results are usually within +/- 25% of the certified value. The blank spike result for Lead is greater than the criteria range of +/- 25%, even with blank correction.

Lisa Norosky
Lisa Norosky, Program Manager

940901
Date

Joblink: 810940

DATA SUMMARY REPORT

DATE: 08/29/94

Company: FOTH & VAN DYKE

PAGE: 1

Sample Point ID:	SG-AB	SG-CC-01	SG-CC-02	SG-V	SG-Y
ETC Sample Number:	MF5708	MF5711	MF5712	MF5709	MF5710
Sample Date:	940426	940425	940425	940426	940426
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD 200 SERIES - METALS (AR08)

Aluminum	ug/L	77.1	32.0	29.7	40.3	17.4
Cadmium	ug/L	.006	<.006	.003	<.006	<.006
Chromium	ug/L	.470	.470	.390	.470	.390
Copper	ug/L	.450	.350	.361	.360	.280
Lead	ug/L	.374	.240	.236	.309	.179
Mercury	ug/L	.004	.002	.002	.004	.002
Zinc	ug/L	2.18	1.12	1.55	1.96	1.23

Sample Point ID:	SG-AB	SG-AB	SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02	SG-V	SG-V
ETC Sample Number:	MF5698	MF5713	MF5701	MF5716	MF5702	MF5717	MF5699	MF5714
Sample Date:	940426	940426	940425	940425	940425	940425	940426	940426
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Fluoride	mg/L	<.100	-	<.100	-	<.100	-	.454	-
Hardness as CaCO3	mg/L	65.0	-	59.0	-	52.0	-	61.0	-
Chloride	mg/L	2.80	-	2.62	-	2.63	-	2.55	-
Nitrate as N	mg/L	.731	-	.714	-	.719	-	.728	-
Sulfate as SO4	mg/L	4.77	-	4.61	-	6.34	-	4.15	-
Solids, total suspended	mg/L	12.0	-	5.00	-	<5.00	-	<5.00	-
Conductivity	umhos	158	-	125	-	125	-	124	-
Phosphorus	mg/L	<.050	-	<.050	-	<.050	-	.059	-
Ammonia as N	mg/L	.112	-	<.100	-	<.100	-	.157	-
Oil and Grease, (IR)	mg/L	<1.11	-	<1.34	-	<1.41	-	<1.53	-
Chemical Oxygen Demand (COD)	mg/L	29.0	-	24.0	-	28.0	-	28.0	-
Alkalinity as CaCO3	mg/L	72.6	-	55.0	-	53.0	-	55.0	-
Alkalinity, Hydroxide as CaCO3	mg/L	0	-	0	-	0	-	0	-
Alkalinity, Bicarbonate CaCO3	mg/L	72.6	-	55.0	-	53.0	-	55.0	-
Alkalinity, Carbonate as CaCO3	mg/L	0	-	0	-	0	-	0	-
Turbidity	NTU	7.00	-	3.00	-	2.90	-	3.30	-
pH	std	7.70	-	7.60	-	7.60	-	7.50	-

3.7-9-114

Joblink: 810940

DATA SUMMARY REPORT

DATE: 08/29/94

Company: FOTH & VAN DYKE

PAGE: 2

Sample Point ID:	SG-AB	SG-AB	SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02	SG-V	SG-V
ETC Sample Number:	MF5698	MF5713	MF5701	MF5716	MF5702	MF5717	MF5699	MF5714
Sample Date:	940426	940426	940425	940425	940425	940425	940426	940426
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

CONVENTIONALS (AR55)

Total Dissolved Solids (TDS)	mg/L	79.0	-	71.0	-	60.0	-	94.0	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	.672	-	.952	-	.756	-	8.54	-
Phosphorus as P, dissolved	mg/L	<.050	-	<.050	-	<.050	-	<.050	-
Sodium Absorption Ratio (SAR)	std	.148	-	.128	-	.128	-	.119	-
Cations	meq/l	1.62	-	1.23	-	1.21	-	1.23	-
Anions	meq/l	1.38	-	1.08	-	1.09	-	1.10	-
Cation and Anion Balance	%	7.82	-	6.32	-	5.43	-	5.66	-
Biochemical Oxygen Demand	mg/L	-	8.00	-	5.00	-	5.00	-	7.00

Sample Point ID:	SG-Y	SG-Y
ETC Sample Number:	MF5700	MF5715
Sample Date:	940426	940426
Facility Code:	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-
Fluoride	mg/L	<.100	-
Hardness as CaCO3	mg/L	54.0	-
Chloride	mg/L	2.57	-
Nitrate as N	mg/L	<.500	-
Sulfate as SO4	mg/L	4.19	-
Solids, total suspended	mg/L	<5.00	-
Conductivity	umhos	113	-
Phosphorus	mg/L	<.050	-
Ammonia as N	mg/L	<.100	-
Oil and Grease, (IR)	mg/L	<1.20	-
Chemical Oxygen Demand (COD)	mg/L	21.0	-
Alkalinity as CaCO3	mg/L	52.4	-
Alkalinity, Hydroxide as CaCO3	mg/L	0	-
Alkalinity, Bicarbonate CaCO3	mg/L	52.4	-
Alkalinity, Carbonate as CaCO3	mg/L	0	-
Turbidity	NTU	4.10	-
pH	std	7.90	-

3.7-9-115

Joblink: 810940

DATA SUMMARY REPORT

DATE: 08/29/94

Company: FOTH & VAN DYKE

PAGE: 3

Sample Point ID:	SG-Y	SG-Y
ETC Sample Number:	MF5700	MF5715
Sample Date:	940426	940426
Facility Code:	FVDGRNBCMC	FVDGRNBCMC

Parameters	Units
------------	-------

CONVENTIONALS (AR55)

Total Dissolved Solids (TDS)	mg/L	90.0	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	.448	-
Phosphorus as P, dissolved	mg/L	<.050	-
Sodium Absorption Ratio (SAR)	std	.125	-
Cations	meq/l	1.15	-
Anions	meq/l	1.02	-
Cation and Anion Balance	%	6.10	-
Biochemical Oxygen Demand	mg/L	-	6.00

Sample Point ID:	SG-AB	SG-AB	SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02	SG-V	SG-V
ETC Sample Number:	MF5698	MF5703	MF5701	MF5706	MF5702	MF5707	MF5699	MF5704
Sample Date:	940426	940426	940425	940425	940425	940425	940426	940426
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters	Units
------------	-------

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	.141	-	.300	-	.290	-	.446
Manganese	mg/L	-	<.010	-	<.010	-	<.010	-	<.010
Antimony, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Arsenic, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Barium, Total	mg/L	<.010	-	<.010	-	<.010	-	<.010	-
Beryllium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Boron, Total	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Calcium, Total	mg/L	16.6	-	12.6	-	12.6	-	12.6	-
Chromium, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Iron, Total	mg/L	.508	-	.553	-	.530	-	.716	-
Magnesium, Total	mg/L	7.68	-	5.86	-	5.67	-	5.90	-
Manganese, Total	mg/L	.088	-	.048	-	.046	-	.037	-
Molybdenum, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Nickel, Total	mg/L	<.030	-	<.030	-	<.030	-	<.030	-
Potassium, Total	mg/L	1.10	-	.910	-	.860	-	.960	-
Selenium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Silver, Total	mg/L	<.010	-	<.010	-	<.010	-	<.010	-

3.7-9-116

Joblink: 810940

DATA SUMMARY REPORT

DATE: 08/29/94

Company: FOTH & VAN DYKE

PAGE: 4

Sample Point ID:	SG-AB	SG-AB	SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02	SG-V	SG-V
ETC Sample Number:	MF5698	MF5703	MF5701	MF5706	MF5702	MF5707	MF5699	MF5704
Sample Date:	940426	940426	940425	940425	940425	940425	940426	940426
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Sodium, Total	mg/L	2.91	-	2.19	-	2.17	-	2.04	-
Thallium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-

Sample Point ID:	SG-Y	SG-Y
ETC Sample Number:	MF5700	MF5705
Sample Date:	940426	940426
Facility Code:	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	.196
Manganese	mg/L	-	<.010
Antimony, Total	mg/L	<.005	-
Arsenic, Total	mg/L	<.005	-
Barium, Total	mg/L	<.010	-
Beryllium, Total	mg/L	<.005	-
Boron, Total	mg/L	<.100	-
Calcium, Total	mg/L	12.0	-
Chromium, Total	mg/L	<.020	-
Iron, Total	mg/L	.360	-
Magnesium, Total	mg/L	5.36	-
Manganese, Total	mg/L	.053	-
Molybdenum, Total	mg/L	<.020	-
Nickel, Total	mg/L	<.030	-
Potassium, Total	mg/L	.840	-
Selenium, Total	mg/L	<.005	-
Silver, Total	mg/L	<.010	-
Sodium, Total	mg/L	2.07	-
Thallium, Total	mg/L	<.005	-

3.7-9-117

ETC

CHAIN-OF-CUSTODY RECORD

Form 0019
Field Technical Services
Rev. 11/91

No. 112887

210940

Environmental Testing and Certification Corp. • 284 Raritan Center Parkway • Edison, NJ 08818 • 908-225-6700

COMPANY FOTH: VAN DYKE				FACILITY/SITE 93C049		NUMBER OF CONTAINERS	FILT. (Y/N)	PRESERV.	ANALYSIS REQUIRED	LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₃ + H ₂ SO ₄
PROJECT CONTACT RUSS JAMESHER				TELEPHONE NO. 914-497-2500						
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME					
1		R	SIG-1A1B	94/04/26	1100	Well (W) Outfall (O)	7			
2			SIG-1V		1000	Soil (S) River/Stream (R)	7			
3			SIG-1Y		0900	Bottom Sediment (B)	7			
4			SIG-1C1-101	94/04/25	1315	Generation Point (G)	7			
5			SIG-1C1-102		1315	Surface Impoundment (I)	7			
6						Treatment Facility (T)				
7						Leachate Collection Sys (C)				
8						Lake/Ocean (L)				
9						Other (X)				
						Specify _____				

CHAIN OF CUSTODY CHRONICLE

1.	Shuttle Opened By: (print) <u>SCOTT JANSSEN</u>	Date: <u>4/25/94</u>	Time: <u>1100</u>
	Signature: <u>Scott Janssen</u>	Seal #: <u>64917</u>	Intact: <u>YES</u>
2.	I have received these materials in good condition from the above person		
	Name: _____	Signature: _____	
	Date: _____	Time: _____	Remarks: _____
3.	I have received these materials in good condition from the above person		
	Name: _____	Signature: _____	
	Date: _____	Time: _____	Remarks: _____
4.	Shuttle Sealed By: (print) <u>SCOTT JANSSEN</u>	Date: <u>4/28/94</u>	Time: <u>1300</u>
	Signature: <u>Scott Janssen</u>	Seal #: <u>64914</u>	Intact: <u>YES</u>

REMARKS

SAMPLER'S SIGNATURE

LAB USE ONLY Opened By: Scott Janssen Date: 4/27/94 Time: 0940
SHUTTLE # _____ TEMP. °C 0.5M2 SEAL # 64914 COND. _____

3.7-9-118

ETC

CHAIN-OF-CUSTODY RECORD
REQUEST FOR ANALYTICAL SERVICESREV. 04/93
FORM 301

ENVIRONMENTAL TESTING AND CERTIFICATION CORP ■ 320 TESCONI CIRCLE SUITE G ■ SANTA ROSA CA 95401 ■ (707)544-5570

SUBCONTRACT LAB
NLS
LABORATORY CONTACT

TELEPHONE NUMBER

TELEPHONE NUMBER

ADDRESS

NUMBER
OF CONTAINERSN
2
Total Potassium

FILT. (Y/N)

PRESERV.

LEGEND FOR
PRESERVATIVE0 - NONE
1 - HCL
2 - HNO₃
3 - H₂SO₄
4 - Na₂SO₄ + H₂SO₄

MATRIX CODES:

REMARKS:

method 6010

	ETC JOB NUMBER	MATRIX CODE	JOB LINK NUMBER	SAMPLE DATE
1	MF5514	1	810907	940422
2	MF5515			
3	MF5516			
4	MF5517			
5	MF5518			
6	MF5518		810946	940427
7	MF5519			
8	MF5700			

Liquid..... 1
Solid/Sludge..... 2
Oily Solid..... 3
Oily Liquid..... 4
Wipe..... 5
Leachate..... 7
Air..... 8
Other _____

CHAIN OF CUSTODY CHRONICLE

- Relinquished To: Federal Express Date: 7/16/94 Time: 1330
By (signature): [Signature] Shuttle/Seal # 71586 Intact: _____
- I have received these materials in good condition from the above person
Receiving Lab/Opened By: [Signature] Date: 7-18-94 Time: 16:00
Temp. °C _____ Seal #: _____ Condition: _____
- Shuttle Returned By: (print) _____ Date: _____ Time: _____
Signature: _____ Seal #: _____ Intact: _____

RESULTS REQUESTED BY (DATE): Normal TAT
SEND RESULTS TO: Lab - Dorsey

RESULTS MUST INCLUDE:

STANDARD ☒ EXTENDED ☒ OTHER ☐
• Method Blank ☒ Raw Data _____
• Blank Spike • Other _____
• MS/MSD _____

PO #:

PLEASE INCLUDE PO # AND/OR JOBLINK # ON INVOICE

FOR ETC USE ONLY:

SENT
DATE:

DATE:

INITIALS:

270

271

272

273

274

275

276

277

3.7-9-120

ETC

CHAIN-OF-CUSTODY RECORD
REQUEST FOR ANALYTICAL SERVICESRLV. 04/93
FORM 301

ENVIRONMENTAL TESTING AND CERTIFICATION CORP ■ 320 TESCONI CIRCLE SUITE G ■ SANTA ROSA CA 95401 ■ (707)544-5570

SUBCONTRACT LAB
NLS
LABORATORY CONTACT

TELEPHONE NUMBER

TELEPHONE NUMBER

ADDRESS

NUMBER
OF CONTAINERSN
Z
Total Petasium

FILT. (Y/N)

PRESERV.

LEGEND FOR
PRESERVATIVE0 - NONE
1 - HCL
2 - HNO₃
3 - H₂SO₄
4 - Na₂SO₄ + H₂SO₄

MATRIX CODES:

Liquid..... 1
Solid/Sludge..... 2
Oily Solid..... 3
Oily Liquid..... 4
Wipe..... 5
Leachate..... 7
Air..... 8
Other _____

REMARKS:

method 6010

CHAIN OF CUSTODY CHRONICLE

1.	Relinquished To: <u>Federal Express</u> Date: <u>7/16/94</u> Time: <u>1330</u> By (signature): <u>[Signature]</u> Shuttle/Seal# <u>71586</u> Intact: _____
2.	I have received these materials in good condition from the above person Receiving Lab/Opened By: <u>[Signature]</u> Date: <u>7-18-94</u> Time: <u>16:00</u> Temp. °C _____ Seal #: _____ Condition: _____
3.	Shuttle Returned By: (print) _____ Date: _____ Time: _____ Signature: _____ Seal #: _____ Intact: _____

RESULTS REQUESTED BY (DATE): Normal TAT
SEND RESULTS TO: Lisa Worosky

RESULTS MUST INCLUDE:

STANDARD ☒ EXTENDED ☒ OTHER ☐
• Method Blank ☒ Raw Data _____
• Blank Spike ☐ Other _____
• MS/MSD _____

PO #:

PLEASE INCLUDE PO # AND/OR JOBLINK # ON INVOICE

FOR ETC USE ONLY:

"SENT"
NOTES:

DATE:

INI:

278
279

3.7-9-121



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 08420

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT FOTH VAN DYKE			PROJECT TITLE CRANDON MINING CO.		
ADDRESS 2737 S. RIDGE Rd			PROJECT NO. 930049		P.O. NO.
CITY GREEN BAY	STATE WI	ZIP 54307	CONTACT RUSS JAMES		PHONE 914-497-2500

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			P	G	V	B	
1.	5556	SG-AB	9/4/04	1100	S.W.	GRAB	1				
2.	5556	SG-V		1000			1				
3.	55570	SG-Y		0900			1				
4.	55571	SG-CC-01	4/25/94	1315			1				
5.	55572	SG-CC-02		1315			1				
6.											
7.											
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE:

SW = surface water
WW = wastewater
GW = groundwater

DW = drinking water
TIS = tissue
AIR = air

PROD = product
SOIL = soil
SED = sediment

describe others

CONTAINER

P = plastic
G = glass
V = glass vial
B = plastic bag

describe others

PRESERVATIVES & PREPARATION

NP = nothing added
S = sulfuric acid
N = nitric acid
Z = zinc acetate

OH = sodium hydroxide
HA = hydrochloric & ascorbic acid
H = hydrochloric acid

F = field filtered

COLLECTED BY (signature)

Scott Jensen

CUSTODY SEAL NO. (IF ANY) DATE/TIME

1/24/94 1300

RELINQUISHED BY (signature)

RECEIVED BY (signature)

DATE/TIME

RELINQUISHED BY (signature)

RECEIVED BY (signature)

DATE/TIME

DISPATCHED BY (signature)

METHOD OF TRANSPORT

DATE/TIME

Scott Jensen

4 FV D

4/26/94 1245

RECEIVED AT NLS BY (signature)

DATE/TIME

CONDITION

TEMP.

Mary Huber
SEAL INTACT? ☐ YES ☐ NO
SEAL #

4-26-94 12:45
REMARKS & OTHER INFORMATION

0.2°

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY



QUESTIONS? CALL 800-238-5355 TOLL FREE

AIRBILL
PACKAGE
TRACKING NUMBER

6029144612

6029144612

RECIPIENT'S COPY

From (Your Name) Please Print JOOT JANSSEN		Your Phone Number (Very Important) (414) 977-2500		To (Recipient's Name) Please Print ETC		Recipient's Phone Number (Very Important) (707) 544-1111	
Company FedEx Van Driver / Random House Co		Department/Floor No. 		Company 		Department/Floor No. 	
Street Address 104 W. MADISON				Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.) 320 TERRACE CIRCLE UNIT 15			
City CRAIDON		State WI		City SANTA ROSA		State CA	
ZIP Required 53001		ZIP Required 95401					
YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.) 93C047				IF HOLD FOR PICK-UP, Print FEDEX Address Here Street Address City State ZIP Required			
PAYMENT 1 ☒ Bill Sender 2 ☐ Bill Recipient's FedEx Acct. No. 3 ☐ Bill 3rd Party FedEx Acct. No. 4 ☐ Bill Credit Card 5 ☐ Cash/Check				Emp. No. Date Federal Express Use: ☐ Cash Received ☐ Return Shipment ☐ Third Party ☐ Chg. To Del. ☐ Chg. To Hold Declared value Charge Street Address City State Zip Received By: X Date/Time Received FedEx Employee Number REVISION DATE 6/92 PART #137235 GSE FORMAT #136 136			
4 SERVICES (Check only one box) Priority Overnight (Delivery by next business morning) 11 ☒ OTHER PACKAGING 16 ☐ FEDEX LETTER 12 ☐ FEDEX PAK 13 ☐ FEDEX BOX 14 ☐ FEDEX TUBE Economy Two-Day (Delivery by second business day) 30 ☐ ECONOMY Freight Service (for packages over 150 lbs) 70 ☐ OVERNIGHT FREIGHT 80 ☐ TWO-DAY FREIGHT		5 DELIVERY AND SPECIAL HANDLING (Check services required) HOLD FOR PICK-UP (Fill in Box H) { 1 WEEKDAY or 31 SATURDAY DELIVER { 2 WEEKDAY or 3 SATURDAY (Extra charge) (Not available to all locations) 4 DANGEROUS GOODS (Extra charge) 5 6 DRY ICE (Dangerous Goods Shipper's Declaration not required) Dry Ice 9 UN 1845 X kg. III 7 OTHER SPECIAL SERVICE 8 SATURDAY PICK-UP (Extra charge) 12 HOLIDAY DELIVERY (if offered) (Extra charge)		6 PACKAGES WEIGHT in Pounds Only YOUR DECLARED VALUE (See right) 1 70 Total Total Total 1 70 DIM SHIPMENT (Chargeable Weight) 1 70 Receivable Stop 3 Drop 5 Release Signature: Scott Janssen		7	



QUESTIONS? CALL 800-238-5355 TOLL FREE

AIRBILL
PACKAGE
TRACKING NUMBER

6029144601

6029144601

RECIPIENT'S COPY

From (Your Name) Please Print JOOT JANSSEN		Your Phone Number (Very Important) (414) 977-2500		To (Recipient's Name) Please Print ETC		Recipient's Phone Number (Very Important) (707) 544-1111	
Company FedEx Van Driver / Random House Co		Department/Floor No. 		Company 		Department/Floor No. 	
Street Address 104 W. MADISON				Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.) 320 TERRACE CIRCLE UNIT 15			
City CRAIDON		State WI		City SANTA ROSA		State CA	
ZIP Required 53001		ZIP Required 95401					
YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.) 93C047				IF HOLD FOR PICK-UP, Print FEDEX Address Here Street Address City State ZIP Required			
PAYMENT 1 ☒ Bill Sender 2 ☐ Bill Recipient's FedEx Acct. No. 3 ☐ Bill 3rd Party FedEx Acct. No. 4 ☐ Bill Credit Card 5 ☐ Cash/Check				Emp. No. Date Federal Express Use: ☐ Cash Received ☐ Return Shipment ☐ Third Party ☐ Chg. To Del. ☐ Chg. To Hold Declared value Charge Street Address City State Zip Received By: X Date/Time Received FedEx Employee Number REVISION DATE 6/92 PART #137235 GSE FORMAT #136 136			
4 SERVICES (Check only one box) Priority Overnight (Delivery by next business morning) 11 ☒ OTHER PACKAGING 16 ☐ FEDEX LETTER 12 ☐ FEDEX PAK 13 ☐ FEDEX BOX 14 ☐ FEDEX TUBE Economy Two-Day (Delivery by second business day) 30 ☐ ECONOMY Freight Service (for packages over 150 lbs) 70 ☐ OVERNIGHT FREIGHT 80 ☐ TWO-DAY FREIGHT		5 DELIVERY AND SPECIAL HANDLING (Check services required) HOLD FOR PICK-UP (Fill in Box H) { 1 WEEKDAY or 31 SATURDAY DELIVER { 2 WEEKDAY or 3 SATURDAY (Extra charge) (Not available to all locations) 4 DANGEROUS GOODS (Extra charge) 5 6 DRY ICE (Dangerous Goods Shipper's Declaration not required) Dry Ice 9 UN 1845 X kg. III 7 OTHER SPECIAL SERVICE 8 SATURDAY PICK-UP (Extra charge) 12 HOLIDAY DELIVERY (if offered) (Extra charge)		6 PACKAGES WEIGHT in Pounds Only YOUR DECLARED VALUE (See right) 1 70 Total Total Total 1 70 DIM SHIPMENT (Chargeable Weight) 1 70 Receivable Stop 3 Drop 5 Release Signature: Scott Janssen		7	

May 1994
Surface Water Laboratory Data

SEPTEMBER 1, 1994



An ETC Laboratory

320 Tesconi Circle

Suite G

Santa Rosa, CA
95401

Telephone
(707) 544-5570

Facsimile
(707) 544-4906

CLIENT: FOTH & VAN DYKE
P.O. BOX 19012
2737 S. RIDGE ROAD
GREEN BAY, WI 54307-9012

ATTN: RUSS JANESHEK

JOBLINK: 811081 AMENDED REPORT
PROJECT: CMC TASK 5.13

ANALYSIS

EPA METHOD 200 SERIES - METALS; 6010 & 7000 SERIES METALS

CONVENTIONALS: ALKALINITY AS CaCO_3 ; ALKALINITY, HYDROXIDE AS CaCO_3 ;
ALKALINITY, BICARBONATE CaCO_3 ; ALKALINITY, CARBONATE AS CaCO_3 ; AMMONIA AS N; ANIONS;
BIOCHEMICAL OXYGEN DEMAND; CATION AND ANION BALANCE; CATIONS;
CHEMICAL OXYGEN DEMAND (COD); CHLORIDE; CONDUCTIVITY; CYANIDE, TOTAL; FLUORIDE;
HARDNESS AS CaCO_3 ; NITRATE AS N; NITROGEN, TOTAL KJELDAHL (TKN); OIL AND GREASE, (IR);
PH; PHOSPHORUS; PHOSPHORUS AS P, DISSOLVED; SODIUM ABSORPTION RATIO (SAR);
SOLIDS, TOTAL SUSPENDED; SULFATE AS SO_4 ; TOTAL DISSOLVED SOLIDS (TDS); TURBIDITY

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE COLLECTION DATE</u>	<u>DATE RECEIVED BY LAB</u>
MF6237	SG-2	WATER	05-10-94	05-11-94
MF6238	SG-3	WATER	05-10-94	05-11-94
MF6239	SG-2	WATER	05-10-94	05-11-94
MF6240	SG-3	WATER	05-10-94	05-11-94
MF6241	SG-2	WATER	05-10-94	05-11-94
MF6242	SG-3	WATER	05-10-94	05-11-94
MF6243	SG-2	WATER	05-10-94	05-11-94
MF6244	SG-3	WATER	05-10-94	05-11-94
MF6245	SG-CC-01	WATER	05-09-94	05-11-94
MF6246	SG-CC-02	WATER	05-09-94	05-11-94
MF6247	SG-Y	WATER	05-09-94	05-11-94
MF6248	SG-V	WATER	05-09-94	05-11-94
MF6249	SG-AB	WATER	05-09-94	05-11-94
MF6250	SG-6	WATER	05-09-94	05-11-94
MF6251	SG-CC-01	WATER	05-09-94	05-11-94
MF6252	SG-CC-02	WATER	05-09-94	05-11-94
MF6253	SG-Y	WATER	05-09-94	05-11-94
MF6254	SG-V	WATER	05-09-94	05-11-94
MF6255	SG-AB	WATER	05-09-94	05-11-94
MF6256	SG-6	WATER	05-09-94	05-11-94
MF6257	SG-CC-01	WATER	05-09-94	05-11-94

(Continued)

This report is "PROPRIETARY AND CONFIDENTIAL" and delivered to, and intended for the exclusive use of the above named client only. ETC, a Division of APBI Environmental Sciences Group, Inc. assumes no responsibility or liability for the reliance hereon or use hereof by anyone other than the above named client.

A division of
APBI Environmental
Sciences Group, Inc.

Jennifer L. Roseberry, VP/General Manager

940901
Date

3.7-9-125



SEPTEMBER 1, 1994

Page 2

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE COLLECTION DATE</u>	<u>DATE RECEIVED BY LAB</u>
MF6258	SG-CC-02	WATER	05-09-94	05-11-94
MF6259	SG-Y	WATER	05-09-94	05-11-94
MF6260	SG-V	WATER	05-09-94	05-11-94
MF6261	SG-AB	WATER	05-09-94	05-11-94
MF6262	SG-6	WATER	05-09-94	05-11-94
MF6263	SG-CC-01	WATER	05-09-94	05-11-94
MF6264	SG-CC-02	WATER	05-09-94	05-11-94
MF6265	SG-Y	WATER	05-09-94	05-11-94
MF6266	SG-V	WATER	05-09-94	05-11-94
MF6267	SG-AB	WATER	05-09-94	05-11-94
MF6268	SG-6	WATER	05-09-94	05-11-94
MF6674	BOTTLES	NOT APPLICABLE	NOT APPLICABLE	05-11-94
MF7297	QC CHARGES	NOT APPLICABLE	NOT APPLICABLE	05-11-94
MF9121	SG-2	WATER	05-10-94	08-17-94
MF9122	SG-3	WATER	05-10-94	08-17-94
MF9123	SG-CC-01	WATER	05-09-94	08-17-94
MF9124	SG-CC-02	WATER	05-09-94	08-17-94
MF9125	SG-Y	WATER	05-09-94	08-17-94
MF9126	SG-V	WATER	05-09-94	08-17-94
MF9127	SG-AB	WATER	05-09-94	08-17-94
MF9128	SG-6	WATER	05-09-94	08-17-94
MF9257	QCCHARGES	NOT APPLICABLE	NOT APPLICABLE	05-11-94
MF9258	SMPDEVICE	NOT APPLICABLE	NOT APPLICABLE	05-11-94



FOTH & VAN DYKE
SEPTEMBER 1, 1994
811081 AMENDED

SAMPLE MATRIX: WATER

<u>Parameter</u>	<u>EPA Prep Method</u>	<u>EPA Analysis Method</u>
ICP Metals	3015	6010
Antimony	3015	7041
Arsenic	3015	7060
Lead	3015	7421
Potassium*	3010	6010
Selenium	7740	7740
Thallium	3015	7841
Mercury	7470	7470
Aluminum**	NA	200.8m
Cadmium**	APDC EXTRACTION	200.8m
Chromium**	NA	200.9m
Copper**	APDC EXTRACTION	200.8m
Lead**	APDC EXTRACTION	200.8m
Mercury**	**	**
Zinc**	NA	200.9m
Alkalinity as CaCO ₃	NA	310.1
Alkalinity, Hydroxide as CaCO ₃	NA	310.1
Bicarbonate as CaCO ₃	NA	310.1
Carbonate Alkalinity as CaCO ₃	NA	310.1
Ammonia as N	350.2	350.2
Anions	+	+
Cation and Anion Balance	+	+
Cations	+	+
Chemical Oxygen Demand	NA	410.4
Chloride	NA	300.0
Conductivity	NA	9050
Total Cyanide	9010	9010
Fluoride	NA	340.2
Hardness as CaCO ₃	NA	130.2
Nitrate as N	NA	300.0
Total Kjeldahl Nitrogen	351.3	351.3
Oil & Grease	413.2	413.2
pH	NA	9040
Phosphorus*	365.2	365.2
Phosphorus as P, Dissolved*	365.2	365.2
Sodium Absorption Ratio	+	+
Total Suspended Solids	NA	160.2
Sulfate as SO ₄ *	NA	375.2
Total Dissolved Solids	NA	160.1
Turbidity	NA	180.1
Biochemical Oxygen Demand*	405.1	405.1

* ANALYSIS PERFORMED BY NORTHERN LAKE SERVICE, INC

± CALCULATION

** ANALYSIS PERFORMED BY BATTELLE LABORATORY

** COLD VAPOR ATOMIC FLUORESCENCE



FOTH & VAN DYKE
31 AUGUST 1994

EXECUTIVE SUMMARY
ETC JOBLINK 811081
(AMENDED TO INCLUDE LOW-LEVEL METALS RESULTS)

On 11 May 1994 ETC-Santa Rosa received aqueous samples from Foth & Van Dyke via Federal Express. The cooler temperatures were all 0°C upon receipt at the laboratory. The samples were analyzed as specified on the preceding page.

Samples were filtered at the laboratory through a 0.45 μ m filter prior to analysis for Iron, Manganese, and Phosphorus; these results reflect dissolved parameters. These analytes were also analyzed without filtration; these results reflect total parameters.

All samples were received past the method-recommended holding time for pH analysis.

Low level metals analyses were performed by Batelle; Biochemical Oxygen Demand (BOD), Sulfate, Dissolved Phosphorus, Total Phosphorus, and Total Potassium analyses were performed by Northern Lake Services (NLS). Samples were filtered for Dissolved Phosphorus at NLS just prior to analysis.

CALCULATIONS:

Results for Sodium Absorption Ratio (Modified SAR), Cations, Anions, and Cation and Anion Balance were obtained by calculation using analytical data. The Cations reflect results for Calcium, Magnesium, Potassium, and Sodium; the Anions reflect results for Chloride, Fluoride, Nitrate, Sulfate, Carbonate, and Bicarbonate.

LOW-LEVEL METALS:

Direct analysis of water by ICP-MS was used for Aluminum. Direct analysis of water by GFAA was used for Chromium and Zinc. For the analysis of Cadmium, Copper, and Lead, a preconcentration step was followed by quantification using ICP-MS. Mercury was analyzed by cold vapor atomic fluorescence.

The QC samples included standard reference materials (QC Spikes), matrix spikes and replicates. Only one QC Spike is reported for each analyte on the tabled QC; for cases where there is data for more than one matrix spike or replicate, recovery information may be obtained from raw data copies included herein. When the procedural blank is accounted for, the QC Spike results are usually within +/- 25% of the certified value. The recovery for the matrix spike for Copper was outside of the accuracy recovery range of 75-125%.

Lisa Norosky
Lisa Norosky, Program Manager

040901
Date

Joblink: 811081

DATA SUMMARY REPORT

DATE: 08/29/94

Company: FOTH & VAN DYKE

PAGE: 1

Sample Point ID:	SG-2	SG-3	SG-6	SG-AB	SG-CC-01	SG-CC-02	SG-V	SG-Y
ETC Sample Number:	MF6241	MF6242	MF6262	MF6261	MF6257	MF6258	MF6260	MF6259
Sample Date:	940510	940510	940509	940509	940509	940509	940509	940509
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC
Parameters	Units							

EPA METHOD 200 SERIES - METALS (AR08)

Aluminum	ug/L	25.8	17.6	16.4	21.1	24.1	27.0	33.0	23.5
Cadmium	ug/L	.007	.004	.003	.006	.005	.005	.005	.003
Chromium	ug/L	.470	.310	.470	.450	.900	.790	.900	.680
Copper	ug/L	.483	.370	.415	.451	.507	.357	.318	.646
Lead	ug/L	.113	.097	.076	.164	.164	.164	.156	.160
Mercury	ug/L	.002	.002	.002	.002	.002	.002	.002	.002
Zinc	ug/L	1.04	1.55	1.04	1.21	1.47	1.12	1.35	1.30

Sample Point ID:	SG-2	SG-2	SG-3	SG-3	SG-6	SG-6	SG-AB	SG-AB
ETC Sample Number:	MF6237	MF6243	MF6238	MF6244	MF6250	MF6268	MF6249	MF6267
Sample Date:	940510	940510	940510	940510	940509	940509	940509	940509
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC
Parameters	Units							

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Ammonia as N	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Oil and Grease, (IR)	mg/L	<1.06	-	<1.02	-	<1.07	-	<1.07	-
Conductivity	umhos	177	-	178	-	204	-	186	-
Chloride	mg/L	3.05	-	3.06	-	1.36	-	3.61	-
Nitrate as N	mg/L	.705	-	<.500	-	<.500	-	.775	-
Solids, total suspended	mg/L	5.00	-	5.00	-	5.00	-	5.00	-
Total Dissolved Solids (TDS)	mg/L	90.0	-	68.0	-	97.0	-	82.0	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	.504	-	.252	-	.616	-	.364	-
Hardness as CaCO3	mg/L	84.8	-	87.8	-	87.0	-	78.2	-
Chemical Oxygen Demand (COD)	mg/L	18.0	-	16.0	-	16.0	-	16.0	-
Turbidity	NTU	3.60	-	2.10	-	6.30	-	7.00	-
pH	std	7.70	-	8.00	-	8.10	-	7.90	-
Phosphorus	mg/L	.027	-	.026	-	.048	-	.038	-
Phosphorus as P, dissolved	mg/L	.016	-	.012	-	.012	-	.012	-
Sulfate as SO4	mg/L	6.00	-	5.00	-	4.00	-	6.00	-
Fluoride	mg/L	.830	-	.621	-	.619	-	.526	-
Alkalinity as CaCO3	mg/L	74.6	-	90.0	-	106	-	85.6	-

3.7-9-129

Joblink: 811081

DATA SUMMARY REPORT

DATE: 08/29/94

Company: FOTH & VAN DYKE

PAGE: 2

Sample Point ID:		SG-2	SG-2	SG-3	SG-3	SG-6	SG-6	SG-AB	SG-AB
ETC Sample Number:		MF6237	MF6243	MF6238	MF6244	MF6250	MF6268	MF6249	MF6267
Sample Date:		940510	940510	940510	940510	940509	940509	940509	940509
Facility Code:		FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC
Parameters	Units								
CONVENTIONALS (AR55)									
Alkalinity, Hydroxide as CaCO ₃	mg/L	0	-	0	-	0	-	0	-
Alkalinity, Bicarbonate CaCO ₃	mg/L	74.6	-	90.0	-	106	-	85.6	-
Alkalinity, Carbonate as CaCO ₃	mg/L	0	-	0	-	0	-	0	-
Sodium Absorption Ratio (SAR)	std	.100	-	.103	-	.068	-	.109	-
Cations	meq/l	1.93	-	2.04	-	9.02	-	1.67	-
Anions	meq/l	1.49	-	1.70	-	1.89	-	1.67	-
Cation and Anion Balance	%	13.0	-	9.19	-	9.02	-	10.7	-
Biochemical Oxygen Demand	mg/L	-	5.00	-	4.00	-	7.00	-	6.00
3.7-9-130									
Sample Point ID:		SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02	SG-V	SG-V	SG-Y	SG-Y
ETC Sample Number:		MF6245	MF6263	MF6246	MF6264	MF6248	MF6266	MF6247	MF6265
Sample Date:		940509	940509	940509	940509	940509	940509	940509	940509
Facility Code:		FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC
Parameters	Units								
CONVENTIONALS (AR55)									
Cyanide, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Ammonia as N	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Oil and Grease, (IR)	mg/L	<1.05	-	<1.05	-	<1.03	-	<1.09	-
Conductivity	umhos	125	-	125	-	161	-	97.1	-
Chloride	mg/L	2.74	-	2.77	-	3.02	-	2.51	-
Nitrate as N	mg/L	.747	-	.741	-	.741	-	<.500	-
Solids, total suspended	mg/L	5.00	-	<5.00	-	<5.00	-	<5.00	-
Total Dissolved Solids (TDS)	mg/L	75.0	-	59.0	-	79.0	-	57.0	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	.756	-	.308	-	.308	-	.784	-
Hardness as CaCO ₃	mg/L	52.2	-	56.8	-	76.0	-	39.6	-
Chemical Oxygen Demand (COD)	mg/L	19.0	-	23.0	-	23.0	-	24.0	-
Turbidity	NTU	2.20	-	2.80	-	2.60	-	2.60	-
pH	std	7.60	-	7.60	-	7.70	-	7.70	-
Phosphorus	mg/L	.031	-	.034	-	.036	-	.031	-
Phosphorus as P, dissolved	mg/L	.008	-	.009	-	.013	-	.009	-
Sulfate as SO ₄	mg/L	6.00	-	5.00	-	6.00	-	5.00	-
Fluoride	mg/L	.535	-	.494	-	.497	-	.477	-
Alkalinity as CaCO ₃	mg/L	54.6	-	55.4	-	75.2	-	42.4	-

Joblink: 811081

DATA SUMMARY REPORT

DATE: 08/29/94

Company: FOTH & VAN DYKE

PAGE: 3

Sample Point ID:	SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02	SG-V	SG-V	SG-Y	SG-Y
ETC Sample Number:	MF6245	MF6263	MF6246	MF6264	MF6248	MF6266	MF6247	MF6265
Sample Date:	940509	940509	940509	940509	940509	940509	940509	940509
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

CONVENTIONALS (AR55)

Parameters	Units	SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02	SG-V	SG-V	SG-Y	SG-Y
Alkalinity, Hydroxide as CaCO ₃	mg/L	0	-	0	-	0	-	0	-
Alkalinity, Bicarbonate CaCO ₃	mg/L	54.6	-	55.4	-	75.2	-	42.4	-
Alkalinity, Carbonate as CaCO ₃	mg/L	0	-	0	-	0	-	0	-
Sodium Absorption Ratio (SAR)	std	.105	-	.105	-	.101	-	.107	-
Cations	meq/l	1.34	-	1.31	-	1.48	-	.895	-
Anions	meq/l	1.14	-	1.13	-	1.48	-	.895	-
Cation and Anion Balance	%	8.30	-	7.39	-	7.85	-	7.22	-
Biochemical Oxygen Demand	mg/L	-	8.00	-	6.00	-	4.00	-	6.00

Sample Point ID:	SG-2	SG-2	SG-3	SG-3	SG-6	SG-6	SG-AB	SG-AB
ETC Sample Number:	MF6237	MF6239	MF6238	MF6240	MF6250	MF6256	MF6249	MF6255
Sample Date:	940510	940510	940510	940510	940509	940509	940509	940509
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Parameters	Units	SG-2	SG-2	SG-3	SG-3	SG-6	SG-6	SG-AB	SG-AB
Iron	mg/L	-	<.100	-	.101	-	<.100	-	<.100
Manganese	mg/L	-	<.010	-	<.010	-	<.010	-	<.010
Selenium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Antimony, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Barium, Total	mg/L	.010	-	.012	-	<.010	-	<.010	-
Beryllium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Boron, Total	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Calcium, Total	mg/L	20.1	-	21.1	-	24.4	-	21.1	-
Chromium, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Magnesium, Total	mg/L	9.89	-	10.6	-	11.7	-	10.8	-
Molybdenum, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Nickel, Total	mg/L	<.030	-	<.030	-	<.030	-	<.030	-
Potassium, Total	mg/L	.850	-	.650	-	.630	-	.810	-
Silver, Total	mg/L	<.010	-	<.010	-	<.010	-	<.010	-
Sodium, Total	mg/L	2.19	-	2.32	-	1.64	-	2.48	-
Thallium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Arsenic, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-

3.7-9-131

Joblink: 811081

DATA SUMMARY REPORT

DATE: 08/29/94

Company: FOTH & VAN DYKE

PAGE: 4

Sample Point ID:	SG-2	SG-2	SG-3	SG-3	SG-6	SG-6	SG-AB	SG-AB
ETC Sample Number:	MF6237	MF6239	MF6238	MF6240	MF6250	MF6256	MF6249	MF6255
Sample Date:	940510	940510	940510	940510	940509	940509	940509	940509
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron, Total	mg/L	.212	-	.228	-	.123	-	.327	-
Manganese, Total	mg/L	.037	-	.047	-	.021	-	.070	-

Sample Point ID:	SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02	SG-V	SG-V	SG-Y	SG-Y
ETC Sample Number:	MF6245	MF6251	MF6246	MF6252	MF6248	MF6254	MF6247	MF6253
Sample Date:	940509	940509	940509	940509	940509	940509	940509	940509
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	.146	-	.138	-	.170	-	.141
Manganese	mg/L	-	<.010	-	<.010	-	<.010	-	<.010
Selenium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Antimony, Total	mg/L	<.005	-	.006	-	<.005	-	<.005	-
Barium, Total	mg/L	<.010	-	.011	-	<.010	-	<.010	-
Beryllium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Boron, Total	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Calcium, Total	mg/L	13.8	-	13.4	-	17.8	-	10.5	-
Chromium, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Magnesium, Total	mg/L	6.72	-	6.56	-	8.98	-	5.04	-
Molybdenum, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Nickel, Total	mg/L	<.030	-	<.030	-	<.030	-	<.030	-
Potassium, Total	mg/L	.750	-	.740	-	.620	-	.900	-
Silver, Total	mg/L	<.010	-	<.010	-	<.010	-	<.010	-
Sodium, Total	mg/L	1.91	-	1.87	-	2.09	-	1.68	-
Thallium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Arsenic, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Iron, Total	mg/L	.383	-	.391	-	.450	-	.321	-
Manganese, Total	mg/L	.046	-	.044	-	.061	-	.026	-

3.7-9-132

ETC

CHAIN-OF-CUSTODY RECORD

811081

No. 114082

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570

COMPANY FORTH VAN DYKE		FACILITY/SITE 93C049		NUMBER OF CONTAINERS	FILT. (Y/N)	LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₄ +H ₂ SO ₄
PROJECT CONTACT RUSS JANESNEK		TELEPHONE NO 414-497-2500			PRESERV.	
					ANALYSIS REQUIRED	
SEE ATTACHMENT						
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	
1		R	SG-2	94/05/10	0945	Source Codes: Well(W) Outfall.....(O) Soil(S) River/Stream.....(R)
2		R	SG-3	94/05/10	1020	Bottom Sediment.....(B) Generation Point.....(G)
3						Surface Impoundment (I)
4						Treatment Facility.....(T)
5						Leachate Collection Sys.....(C)
6						Lake/Ocean.....(L)
7						Other.....(X)
8						Specify
9						

CHAIN OF CUSTODY CHRONICLE

3.2-9-133	Shuttle Opened By: (print) <u>SCOTT JANSEN</u> Date: <u>5/7/94</u> Time: <u>1300</u>
	Signature: <u>Scott Jansen</u> Seal #: <u>70118</u> Intact: <u>YES</u>
2.	I have received these materials in good condition from the above person
	Name: _____ Signature: _____ Date: _____ Time: _____ Remarks: _____
3.	I have received these materials in good condition from the above person
	Name: _____ Signature: _____ Date: _____ Time: _____ Remarks: _____
4.	Shuttle Sealed By: (print) <u>SCOTT JANSEN</u> Date: <u>5/8/94</u> Time: <u>1200</u>
	Signature: <u>Scott Jansen</u> Seal #: <u>70117</u> Intact: <u>YES</u>
LAB USE ONLY Opened By: <u>Jeff Harper</u> Date: <u>5-11-94</u> Time: <u>9:30A</u>	
SHUTTLE # <u>210</u> TEMP. °C <u>0.5m3</u> SEAL # <u>70117</u> COND. <u>GOOD</u>	

REMARKS

SAMPLER'S SIGNATURE

Scott Jansen

WHITE LAB COPY

YELLOW SAMPLER COPY

PINK CLIENT COPY

ETC

CHAIN-OF-CUSTODY RECORD

811082

No. 114078

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570

COMPANY FOTH : VAN DYKE		FACILITY/SITE CRANDON MINING Co		NUMBER OF CONTAINERS	FILT. (Y/N)	LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₄ +H ₂ SO ₄
PROJECT CONTACT RUSS JANESHEK		TELEPHONE NO. 414-497-2506			PRESERV.	
					ANALYSIS REQUIRED	

SEE ATTACHMENT

ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	Source Codes: Well(W) Outfall.....(O) Soil.....(S) River/Stream.....(R) Bottom Sediment.....(B) Generation Point.....(G) Surface Impoundment (I) Treatment Facility.....(T) Leachate Collection Sys.....(C) Lake/Ocean.....(L) Other.....(X) Specify	SAMPLER OBSERVATIONS	LAB OBSERVATIONS
1			SG-CC-01	94/5/9	0920			
2			SG-CC-02		0920			
3			SG-Y		1120			
4			SG-V		1245			
5			SG-AB		1345			
6			SG-L		1630			
7								
8								
9								

CHAIN OF CUSTODY CHRONICLE

37-9-1342	Shuttle Opened By: (print) <u>SCOTT JANSEN</u> Date: <u>5/7/94</u> Time: <u>1300</u>
	Signature: <u>Scott Jansen</u> Seal #: <u>70118</u> Intact: <u>YES</u>
	I have received these materials in good condition from the above person
	Name: _____ Signature _____
	Date: _____ Time: _____ Remarks: _____
	I have received these materials in good condition from the above person.
3.	Name: _____ Signature _____
	Date: _____ Time: _____ Remarks: _____
4.	Shuttle Sealed By: (print) <u>SCOTT JANSEN</u> Date: <u>5/10/94</u> Time: <u>1200</u>
	Signature: <u>Scott Jansen</u> Seal #: <u>70113</u> Intact: <u>YES</u>

REMARKS

1- Glass Amber Broke in shipment to FVD

LAB USE ONLY Opened By: JEFF HARPER Date: 5-11-94 Time: 9:30 AMSHUTTLE # 11A TEMP. °C 0 SM7 SEAL # N COND. Good

SAMPLER'S SIGNATURE

Scott Jansen

ETC

CHAIN-OF-CUSTODY RECORD

811082

No. 114077

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570

COMPANY FOTH: VAN DYKE		FACILITY/SITE CRANDON MINING Co		NUMBER OF CONTAINERS	FILT. (Y/N)										LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₄ +H ₂ SO ₄			
PROJECT CONTACT RUSS JANESHEK		TELEPHONE NO 414-497-2500			PRESERV.													
					ANALYSIS REQUIRED													
SEE ATTACHMENT																		
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	Source Codes: Well.....(W) Outfall.....(O) Soil.....(S) River/Stream.....(R) Bottom Sediment.....(B) Generation Point.....(G) Surface Impoundment (I) Treatment Facility.....(T) Leachate Collection Sys.....(C) Lake/Ocean.....(L) Other.....(X) Specify _____											SAMPLER OBSERVATIONS	LAB OBSERVATIONS
1			SG-CC-01	9/15/99	0920		1											
2			SG-CC-02		0920		1											
3			SG-Y		1120		1											
4			SG-N		1245		1											
5			SG-AB		1345		1											
6			SG-L	9/15/99	1630		1											
7																		
8																		
9																		

CHAIN OF CUSTODY CHRONICLE

3.7-9-135	Shuttle Opened By: (print) <u>SCOTT JANSSEN</u> Date: <u>5/7/94</u> Time: <u>1300</u> Signature: <u>Scott Jansen</u> Seal #: <u>70119</u> Intact: <u>YES</u>
	I have received these materials in good condition from the above person.
2.	Name: _____ Signature: _____ Date: _____ Time: _____ Remarks: _____
	I have received these materials in good condition from the above person.
3.	Name: _____ Signature: _____ Date: _____ Time: _____ Remarks: _____
4.	Shuttle Sealed By: (print) <u>SCOTT JANSSEN</u> Date: <u>5/10/94</u> Time: <u>1200</u> Signature: <u>Scott Jansen</u> Seal #: <u>70110</u> Intact: <u>YES</u>

REMARKS

SAMPLER'S SIGNATURE

LAB USE ONLY Opened By: JEFF HARRIS Date: 5-11-94 Time: 9:30amSHUTTLE # N/A TEMP. °C 0.528 SEAL # 70110 COND. good

Scott Jansen

ENVIRONMENTAL TESTING AND CERTIFICATION CORP ■ 320 TESCOMI CIRCLE SUITE G ■ SANTA ROSA CA 95401 ■ (707)544-5570

SUBCONTRACT LAB

SUBCONTRACT LAB
NORTHERN LAKE SERVICES

LABORATORY CONTACT

WM FISHER

ADDRESS

ADDRESS
205 NORTH PROSPECT

CRANDON, WI. 54520

TELEPHONE NUMBER

TELEPHONE NUMBER

FILT. (Y/N)

PRESERV.

LEGEND FOR
PRESERVATIVE

0 - NONE
1 - HCL
2 - HNO₃
3 - H₂SO₄
4 - Na₂SO₄, H₂SO₄

NUMBER
OF CONTAINERS

$Q(\text{Abs})$	0	Z
504	0	Z
$Q(T)$	3	Z

MATRIX CODES:

REMARKS:

~~SECRET~~

5798

S7981

5798

5798

57998

57990

57991

5177a

RESULTS REQUESTED BY (DATE):

RESULTS REQUESTED BY: [REDACTED]
SEND RESULTS TO: Lisa NORDSKY

RESULTS MUST INCLUDE:

STANDARD ~~ED~~EXTENDED ☐

OTHER ☐

- Method Blank

- Raw Data

- Blank Spike

- Other

- **MS/MSD**

PO #: 29941

PLEASE INCLUDE PO # AND/OR JOBLINK # ON INVOICE

FOR ETC. USE ONLY:

SENT
NOTES

DATE _____

INITIALS

ETC

CHAIN-OF-CUSTODY RECORD
REQUEST FOR ANALYTICAL SERVICES

REV. 04/
FGM 3

ENVIRONMENTAL TESTING AND CERTIFICATION CORP ■ 320 TESCOMI CIRCLE SUITE G ■ SANTA ROSA CA 95401 ■ (707)544-5570

SUBCONTRACT LAB
NORTHERN LAKE SERVICES
LABORATORY CONTACT
SIMPSON

TELEPHONE NUMBER
TELEPHONE NUMBER

ADDRESS
**203 N. PROSPECT
CRANDON, WI. 54520**

NUMBER OF CONTAINERS	1									
	2									
	*									
	1									
	2									
	3									
	4									
	5									

FILT. (Y/N)

PRESERV.

LEGEND FOR
PRESERVATIVE:

- 0 - NONE
- 1 - HCL
- 2 - HNO₃
- 3 - H₂SO₄
- 4 - Na₂SO₄, H₂SO₄

MATRIX CODES:

	ETC JOB NUMBER	MATRIX CODE	JOBLINK NUMBER	SAMPLE DATE
1	MF6237	1	811081	940510
2	MF6238	1	↓	↓
3	MF6245	1	811081	940509
4	MF6246	1	↓	
5	MF6247	1	↓	
6	MF6248	1	↓	
7	MF6249	1	↓	
8	MF6250	1	↓	

- Liquid..... 1
- Solid/Sludge..... 2
- Oily Solid..... 3
- Oily Liquid..... 4
- Wipe..... 5
- Leachate..... 7
- Air..... 8
- Other.....

REMARKS:

* TOTAL ARSENICUM
BASIC.
#1350

CHAIN OF CUSTODY CHRONICLE

1. Relinquished To: **FEDERAL EXPRESS** Date: **6/14/94** Time: **1540**
By (signature): **[Signature]** Shuttle/Seal# **71862** Intact: _____

2. I have received these materials in good condition from the above person
Receiving Lab/Opened By: **[Signature]** Date: **6-15-94** Time: **15:30**
Temp. °C _____ Seal # _____ Condition: _____

3. Shuttle Returned By: (print) _____ Date: _____ Time: _____
Signature: _____ Seal # _____ Intact: _____

RESULTS REQUESTED BY (DATE): **10/24/94 TAT**
SEND RESULTS TO: **LISA NORDSKJOL**

RESULTS MUST INCLUDE:

- STANDARD ☒ EXTENDED ☐ OTHER ☐
- Method Blank
 - Raw Data
 - Blank Spike
 - Other
 - MS/MSD

PO #: **29962**

PLEASE INCLUDE PO # AND/OR JOBLINK # ON INVOICE

FOR ETC USE ONLY:

"SENT" DATE: _____ INITIALS: _____
NOTES:

54231
51232
51233
51234
51235
51236
51237
51238
3.7-9-137

CHAIN OF CUSTODY

Client: CRANDON MINING CO Scope I.D.: 93C049
 Project: TAKE S.13 SW. SAMPLING Page: _____
 Prepared by: SCS Date: _____
 Sampler(s): Scott Jensen Date: 5/12/94
 (Signature)

No. of
Con-
tain-
ers

Lab
Numbers

Analysis Required

Remarks

ALUMINUM
CADMIUM
COPPER
LEAD
MERCURY
ZINC

Sta. No.	Date	Time	Comp	Grab	Station Location	Serial Tag Number											
47 56-CC-01	5/11/94	0920		✓	93C049		1			X	X	X	X	X	X		
48 56-CC-02		0920		✓			1			X	X	X	X	X	X		
49 56-Y		1120		✓			1			X	X	X	X	X	X		
50 56-V		1245		✓			1			X	X	X	X	X	X		
51 56-AB		1345		✓			1			X	X	X	X	X	X		
52 56-G	5/11/94	1630		✓			1			X	X	X	X	X	X		
53 56-2	5/11/94	0745		✓			1			X	X	X	X	X	X		
54 56-3		1020		✓			1			X	X	X	X	X	X		
55 56-19		1340		✓			1			X	X	X	X	X	X		
56 56-30		1415		✓			1			X	X	X	X	X	X		
57 56-E		1605		✓			1			X	X	X	X	X	X		
58 56-11	5/11/94	0900		✓			1			X	X	X	X	X	X	*	
59 56-15		1100		✓			1			X	X	X	X	X	X		
60 56-12		1230		✓			1			X	X	X	X	X	X	*	

Signature

Company

Date

Time

Carrier

Relinquished By: Scott Jensen

FOTH VAN DYKE

5/12/94

1500

FED EX

Received By: Eric R. ... 5-14-94

1-11-94

5-14-94

1:00

Relinquished By:

Received By:

Relinquished By:

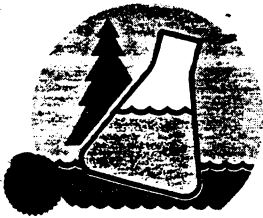
Received by Lab:

Remarks: * USED NISKIN SAMPLING BOTTLE MODEL 1080

SEND INVOICES & RESULTS TO ETC LAB

Foth & Van Dyke

3.7-9-138



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 09192

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT FOTH: VAN DYKE			PROJECT TITLE CRANDON MINING CO		
ADDRESS 2737 S. RIDGE Rd			PROJECT NO. 93C049		P.O. NO.
CITY GREEN BAY	STATE WI	ZIP 54162	CONTACT RUSS JANESHEK		PHONE 414-497-2500

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			PNP				
1.	56587	SG-CC-01	5/9/94	0920	S.W.	GRAB	1				
2.	56588	SG-CC-02		0920			1				
3.	56589	SG-Y		1120			1				
4.	56590	SG-V		1245			1				
5.	56591	SG-AB		1345			1				
6.	56592	SG-L		1630			1				
7.	56593	SG-2	5/10/94	0745	SW.	GRAB	1				
8.	56594	SG-3		1020			1				
9.											
10.											
11.											
12.											

SAMPLE TYPE:

SW = surface water
WW = wastewater
GW = groundwater

DW = drinking water
TIS = tissue
AIR = air

PROD = product
SOIL = soil
SED = sediment

describe others

CONTAINER

P = plastic
G = glass
V = glass vial
B = plastic bag

describe others

PRESERVATIVES & PREPARATION

NP = nothing added
S = sulfuric acid
N = nitric acid
Z = zinc acetate

OH = sodium hydroxide
HA = hydrochloric & ascorbic acid
H = hydrochloric acid

F = field filtered

COLLECTED BY (signature)

CUSTODY SEAL NO. (IF ANY) DATE/TIME

RELINQUISHED BY (signature)

RECEIVED BY (signature)

DATE/TIME

RELINQUISHED BY (signature)

RECEIVED BY (signature)

DATE/TIME

DISPATCHED BY (signature)

METHOD OF TRANSPORT

DATE/TIME

RECEIVED AT NLS BY (signature)

DATE/TIME

CONDITION

TEMP.

SEAL INTACT?

☐ YES ☐ NO

SEAL #

REMARKS & OTHER INFORMATION

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY

3.7-9-139

FEDERAL
EXPRESS

QUESTIONS? CALL 800-238-5355 TOLL FREE

AIRBILL
PACKAGE
TRACKING NUMBER

8099584905

1831 8099584905

RECIPIENT'S COPY

Date 5/10/94		To (Recipient's Name) Please Print ETC-SANTA ROSA	
From (Your Name) Please Print Scott Janssen		Your Phone Number (Very Important) (414) 477-2500	
Company FBI Van Dyke / Cranston Moving Co		Department/Floor No. 3	
Street Address 104 W Madison		Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes) 320 TESCOMI CIRCLE UNIT 3	
City CRANSTON		State RI	
ZIP Required 02920		City SANTA ROSA	
State WI		State CA	
ZIP Required 54520		ZIP Required 95403	
YOUR INTERNAL BILLING REFERENCE INFORMATION (First 24 characters will appear on invoice.) 920047			
IF HOLD FOR PICK-UP, Print FEDEX Address Here Street Address City State ZIP Required			
PAYMENT ☐ Bill Sender ☐ Bill Recipient's FedEx Acct. No. ☐ Bill 3rd Party FedEx Acct. No. ☐ Bill Credit Card ☐ Cash			
SERVICES (Check only one box)		DELIVERY AND SPECIAL HANDLING	
Priority Overnight Service (Delivery by next business morning) 11 ☐ YOUR PACKAGING 16 ☐ FEDEX LETTER 12 ☐ FEDEX PAK 13 ☐ FEDEX BOX 14 ☐ FEDEX TUBE Economy Service (formerly Standard Air) (Delivery by second business day) 30 ☐ ECONOMY SERVICE		Standard Overnight Service (Delivery by next business afternoon) 51 ☐ FEDEX LETTER 52 ☐ FEDEX PAK 53 ☐ FEDEX BOX 54 ☐ FEDEX TUBE Heavyweight Service (for Extra Large or any package over 150 lbs.) 70 ☐ HEAVYWEIGHT 80 ☐ DEFERRED HEAVYWEIGHT Declared Value Limit \$100 **Call for delivery schedule.	
1 ☐ HOLD FOR PICK-UP (if in box)		2 ☐ DELIVER WEEKDAY	
3 ☐ DELIVER SATURDAY (Extra charge) (Not available to all locations)		4 ☐ DANGEROUS GOODS (Extra charge) (CSS not available for Dangerous Goods shipments)	
5 ☐ CONSTANT SURVEILLANCE SVC. (CSS) (Extra charge) (Signature Not Applicable)		6 ☐ DRY ICE (Extra charge) (Not available to all locations)	
7 ☐ OTHER SPECIAL SERVICE		8 ☐ SATURDAY PICK-UP (Extra charge)	
9 ☐ HOLIDAY DELIVERY (if charged) (Extra charge)		10 ☐ DIM SHIPMENT (Heavyweight Services Only)	
11 ☐ REGULAR STOP		12 ☐ DROP BOX	
13 ☐ BSC		14 ☐ STATION	
15 ☐ ON-CALL STOP		16 ☐ STATION	
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97 ☐ STATION		98 ☐ STATION	
99 ☐ STATION		100 ☐ STATION	

FEDERAL
EXPRESS

QUESTIONS? CALL 800-238-5355 TOLL FREE

AIRBILL
PACKAGE
TRACKING NUMBER

8099584931

1834 8099584931

RECIPIENT'S COPY

Date 5/10/94		To (Recipient's Name) Please Print ETC-SANTA ROSA	
From (Your Name) Please Print Scott Janssen		Your Phone Number (Very Important) (414) 477-2500	
Company FBI Van Dyke / Cranston Moving Co		Department/Floor No. 3	
Street Address 104 W Madison		Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes) 320 TESCOMI CIRCLE UNIT 3	
City CRANSTON		State RI	
ZIP Required 02920		City SANTA ROSA	
State WI		State CA	
ZIP Required 54520		ZIP Required 95403	
YOUR INTERNAL BILLING REFERENCE INFORMATION (First 24 characters will appear on invoice.) 930049			
IF HOLD FOR PICK-UP, Print FEDEX Address Here Street Address City State ZIP Required			
PAYMENT ☐ Bill Sender ☐ Bill Recipient's FedEx Acct. No. ☐ Bill 3rd Party FedEx Acct. No. ☐ Bill Credit Card ☐ Cash			
SERVICES (Check only one box)		DELIVERY AND SPECIAL HANDLING	
Priority Overnight Service (Delivery by next business morning) 11 ☐ YOUR PACKAGING 16 ☐ FEDEX LETTER 12 ☐ FEDEX PAK 13 ☐ FEDEX BOX 14 ☐ FEDEX TUBE Economy Service (formerly Standard Air) (Delivery by second business day) 30 ☐ ECONOMY SERVICE		Standard Overnight Service (Delivery by next business afternoon) 51 ☐ FEDEX LETTER 52 ☐ FEDEX PAK 53 ☐ FEDEX BOX 54 ☐ FEDEX TUBE Heavyweight Service (for Extra Large or any package over 150 lbs.) 70 ☐ HEAVYWEIGHT 80 ☐ DEFERRED HEAVYWEIGHT Declared Value Limit \$100 **Call for delivery schedule.	
1 ☐ HOLD FOR PICK-UP (if in box)		2 ☐ DELIVER WEEKDAY	
3 ☐ DELIVER SATURDAY (Extra charge) (Not available to all locations)		4 ☐ DANGEROUS GOODS (Extra charge) (CSS not available for Dangerous Goods shipments)	
5 ☐ CONSTANT SURVEILLANCE SVC. (CSS) (Extra charge) (Signature Not Applicable)		6 ☐ DRY ICE (Extra charge) (Not available to all locations)	
7 ☐ OTHER SPECIAL SERVICE		8 ☐ SATURDAY PICK-UP (Extra charge)	
9 ☐ HOLIDAY DELIVERY (if charged) (Extra charge)		10 ☐ DIM SHIPMENT (Heavyweight Services Only)	
11 ☐ REGULAR STOP		12 ☐ DROP BOX	
13 ☐ BSC		14 ☐ STATION	
15 ☐ ON-CALL STOP		16 ☐ STATION	
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97 ☐ STATION		98 ☐ STATION	
99 ☐ STATION		100 ☐ STATION	

8099584953

1834

8099584953

Date _____

5/10/54

RECIPIENT'S COPY

From (Your Name) Please Print SCOTT JANSEN		Your Phone Number (Very Important) (415) 497-2502		To (Recipient's Name) Please Print (707-544-3570)	
Company FOTH VAN DYKE / CRANDON MINING CO.		Department/Floor No. 		Company ETC-SANTA ROSA	
Street Address 104 WES. MADISON		Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip * Codes) 320 TERCINI CIRCLE UNIT 1			
City CRANDON	State WI	ZIP Required 54520	City SANTA ROSA	State CA	ZIP Required 95404
YOUR INTERNAL BILLING REFERENCE INFORMATION (First 24 characters will appear on invoice.) 93049			IF HOLD FOR PICK-UP, Print FEDEX Address Here Street Address 		
PAYMENT: ☒ Bill Sender ☐ Bill Recipient's FedEx Acct. No. ☐ Bill 3rd Party FedEx Acct. No. ☐ Bill Credit Card ☐ Cash			City State ZIP Required 		
SERVICES (Check only one box)		DELIVERY AND SPECIAL HANDLING		Emp. No. Date Federal Express Use	
Priority Overnight Service (Delivery by next business morning) 11 ☐ YOUR PACKAGING 51 ☐ 16 ☐ FEDEX LETTER 56 ☐ FEDEX LETTER * 12 ☐ FEDEX PAK 52 ☐ FEDEX PAK * 23 ☐ FEDEX BOX 63 ☐ FEDEX BOX 14 ☐ FEDEX TUBE 64 ☐ FEDEX TUBE Economy Service (formerly Standard Air) (Delivery by second business day) 70 ☐ HEAVYWEIGHT ** 80 ☐ DEFERRED HEAVYWEIGHT **		1 ☐ HOLD FOR PICK-UP (see box 1) 2 ☒ DELIVER WEEKDAY 3 DELIVER SATURDAY (Extra charge) ☐ 4 DANGEROUS GOODS (Extra charge) (CBS not available for Dangerous Goods Shipments) 5 CONSTANT SURVEILLANCE SVC. (CSS) (Extra charge) (Requires Signature Not Acknowledged) 6 DRY ICE lbs. 7 OTHER SPECIAL SERVICE 8 9 SATURDAY PICK-UP (Extra charge) 10 11 ☐ RESCRIPTION 12 HOLIDAY DELIVERY (if allowed) (Extra charge)		1 80 2 80 3 80 Total Total Total DIM SHIPMENT (Heavyweight Services Only) Received At ☐ Regular Stop ☐ Drop Box ☐ B.S.C. ☒ On-Call Stop ☐ Station FedEx Emp. No. 	
*Declared Value Limit \$100. **Call for delivery schedule.		Received By X Date/Time Received FedEx Employee Number 		Street Address City State Zip Total Charges REVISION DATE 11/89 PART #119531 FXEM 6/90 FORMAT #014 014 • 1989 F.E.C. PRINTED IN U.S.A.	

SEPTEMBER 1, 1994



An ETC Laboratory

320 Tesconi Circle

Suite G

Santa Rosa, CA

95401

Telephone

(707) 544-5570

Facsimile

(707) 544-4906

CLIENT: FOTH & VAN DYKE
P.O. BOX 19012
2737 S. RIDGE ROAD
GREEN BAY, WI 54307-9012

ATTN: RUSS JANESHEK

JOB LINK: 811098 AMENDED REPORT
PROJECT: CMC TASK

ANALYSIS

EPA METHOD 200 SERIES - METALS; 6010 & 7000 SERIES METALS

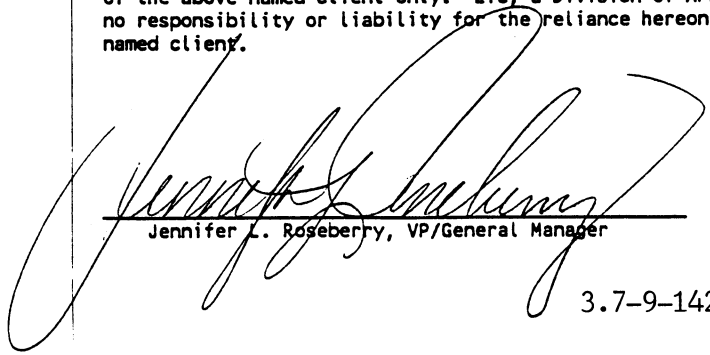
CONVENTIONALS: ALKALINITY AS CaCO_3 ; ALKALINITY, HYDROXIDE AS CaCO_3 ;
ALKALINITY, BICARBONATE CaCO_3 ; ALKALINITY, CARBONATE AS CaCO_3 ; AMMONIA AS N; ANIONS;
BIOCHEMICAL OXYGEN DEMAND; CATION AND ANION BALANCE; CATIONS;
CHEMICAL OXYGEN DEMAND (COD); CHLORIDE; CONDUCTIVITY; CYANIDE, TOTAL; FLUORIDE;
HARDNESS AS CaCO_3 ; NITRATE AS N; NITROGEN, TOTAL KJELDAHL (TKN); OIL AND GREASE, (IR);
PH; PHOSPHORUS; PHOSPHORUS AS P, DISSOLVED; SODIUM ABSORPTION RATIO (SAR);
SOLIDS, TOTAL SUSPENDED; SULFATE AS SO_4 ; TOTAL DISSOLVED SOLIDS (TDS); TURBIDITY

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE COLLECTION DATE</u>	<u>DATE RECEIVED BY LAB</u>
MF6317	SG-19	WATER	05-10-94	05-12-94
MF6318	SG-30	WATER	05-10-94	05-12-94
MF6319	SG-E	WATER	05-10-94	05-12-94
MF6320	LG-11	WATER	05-11-94	05-12-94
MF6321	LG-15	WATER	05-11-94	05-12-94
MF6322	LG-12	WATER	05-11-94	05-12-94
MF6326	SG-19	WATER	05-10-94	05-12-94
MF6327	SG-30	WATER	05-10-94	05-12-94
MF6328	SG-E	WATER	05-10-94	05-12-94
MF6329	LG-11	WATER	05-11-94	05-12-94
MF6330	LG-15	WATER	05-11-94	05-12-94
MF6331	LG-12	WATER	05-11-94	05-12-94
MF6335	SG-19	WATER	05-10-94	05-12-94
MF6336	SG-30	WATER	05-10-94	05-12-94
MF6337	SG-E	WATER	05-10-94	05-12-94
MF6338	LG-11	WATER	05-11-94	05-12-94
MF6339	LG-15	WATER	05-11-94	05-12-94
MF6340	LG-12	WATER	05-11-94	05-12-94
MF6347	SG-19	WATER	05-11-94	05-12-94
MF6348	SG-30	WATER	05-11-94	05-12-94
MF6349	SG-E	WATER	05-11-94	05-12-94

(Continued)

This report is "PROPRIETARY AND CONFIDENTIAL" and delivered to, and intended for the exclusive use of the above named client only. ETC, a Division of APBI Environmental Sciences Group, Inc. assumes no responsibility or liability for the reliance hereon or use hereof by anyone other than the above named client.

A division of
APBI Environmental
Sciences Group, Inc.


Jennifer L. Roseberry, VP/General Manager

940901
Date

3.7-9-142

SEP 1 1994



SEPTEMBER 1, 1994

Page 2

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE COLLECTION DATE</u>	<u>DATE RECEIVED BY LAB</u>
MF6350	LG-11	WATER	05-12-94	05-12-94
MF6351	LG-15	WATER	05-12-94	05-12-94
MF6352	LG-12	WATER	05-12-94	05-12-94
MF6675	BOTTLES	NOT APPLICABLE	NOT APPLICABLE	05-12-94
MF9115	SG-19	WATER	05-10-94	08-17-94
MF9116	SG-30	WATER	05-10-94	08-17-94
MF9117	SG-E	WATER	05-10-94	08-17-94
MF9118	LG-11	WATER	05-11-94	08-17-94
MF9119	LG-15	WATER	05-11-94	08-17-94
MF9120	LG-12	WATER	05-11-94	08-17-94



FOTH & VAN DYKE
SEPTEMBER 1, 1994
811098 AMENDED

SAMPLE MATRIX: WATER

<u>Parameter</u>	<u>EPA Prep Method</u>	<u>EPA Analysis Method</u>
ICP Metals	3015	6010
Antimony	3015	7041
Arsenic	3015	7060
Lead	3015	7421
Potassium*	3010	6010
Selenium	7740	7740
Thallium	3015	7841
Mercury	7470	7470
Aluminum**	NA	200.8m
Cadmium**	APDC EXTRACTION	200.8m
Chromium**	NA	200.9m
Copper**	APDC EXTRACTION	200.8m
Lead**	APDC EXTRACTION	200.8m
Mercury**	**	**
Zinc**	NA	200.9m
Alkalinity as CaCO3	NA	310.1
Alkalinity, Hydroxide as CaCO3	NA	310.1
Bicarbonate as CaCO3	NA	310.1
Carbonate Alkalinity as CaCO3	NA	310.1
Ammonia as N	350.2	350.2
Anions	‡	‡
Cation and Anion Balance	‡	‡
Cations	‡	‡
Chemical Oxygen Demand	NA	410.4
Chloride	NA	300.0
Conductivity	NA	9050
Total Cyanide	9010	9010
Fluoride	NA	340.2
Hardness as CaCO3	NA	130.2
Nitrate as N	NA	300.0
Total Kjeldahl Nitrogen	351.3	351.3
Oil & Grease	413.2	413.2
pH	NA	9040
Phosphorus*	365.2	365.2
Phosphorus as P, Dissolved*	365.2	365.2
Sodium Absorption Ratio	‡	‡
Total Suspended Solids	NA	160.2
Sulfate as SO4*	NA	375.2
Total Dissolved Solids	NA	160.1
Turbidity	NA	180.1
Biochemical Oxygen Demand*	405.1	405.1

* ANALYSIS PERFORMED BY NORTHERN LAKE SERVICE, INC

‡ CALCULATION

** ANALYSIS PERFORMED BY BATELLE LABORATORY

** COLD VAPOR ATOMIC FLUORESCENCE



FOTH & VAN DYKE
31 AUGUST 1994

**EXECUTIVE SUMMARY
ETC JOBLINK 811098
(AMENDED TO INCLUDE LOW-LEVEL METALS RESULTS)**

On 12 May 1994 ETC-Santa Rosa received aqueous samples from Foth & Van Dyke via Federal Express. The cooler temperatures were both 0°C upon receipt at the laboratory. The samples were analyzed as specified on the preceding page.

The anions portion for sample LG-15 was not labelled with the sample identifier; it was the only unlabelled sample container.

Samples were filtered at the laboratory through a 0.45 μ m filter prior to analysis for Iron, Manganese, and Phosphorus; these results reflect dissolved parameters. These analytes were also analyzed without filtration; these results reflect total parameters.

All samples were received past the method-recommended holding time for pH analysis.

Low level metals analyses were performed by Batelle; Biochemical Oxygen Demand (BOD), Sulfate, Dissolved Phosphorus, Total Phosphorus, and Total Potassium analyses were performed by Northern Lake Services (NLS). Samples were filtered for Dissolved Phosphorus at NLS just prior to analysis.

CALCULATIONS:

Results for Sodium Absorption Ratio (Modified SAR), Cations, Anions, and Cation and Anion Balance were obtained by calculation using analytical data. The Cations reflect results for Calcium, Magnesium, Potassium, and Sodium; the Anions reflect results for Chloride, Fluoride, Nitrate, Sulfate, Carbonate, and Bicarbonate.

LOW-LEVEL METALS:

Direct analysis of water by ICP-MS was used for Aluminum. Direct analysis of water by GFAA was used for Chromium and Zinc. For the analysis of Cadmium, Copper, and Lead, a preconcentration step was followed by quantification using ICP-MS. Mercury was analyzed by cold vapor atomic fluorescence.

The QC samples included standard reference materials (QC Spikes), matrix spikes and replicates. Only one QC Spike is reported for each analyte on the tabled QC; for cases where there is data for more than one matrix spike or replicate, recovery information may be obtained from raw data copies included herein. When the procedural blank is accounted for, the QC Spike results are usually within +/- 25% of the certified value. The recovery for the matrix spike for Copper was outside of the accuracy recovery range of 75-125%.

Lisa Norosky
Lisa Norosky, Program Manager

940901
Date

Joblink: 811098

DATA SUMMARY REPORT

DATE: 08/29/94

Company: FOTH & VAN DYKE

PAGE: 1

Sample Point ID:	LG-11	LG-12	LG-15	SG-19	SG-30	SG-E
ETC Sample Number:	MF6338	MF6340	MF6339	MF6335	MF6336	MF6337
Sample Date:	940511	940511	940511	940510	940510	940510
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD 200 SERIES - METALS (AR08)

Aluminum	ug/L	23.2	104	59.8	23.2	107	37.1
Cadmium	ug/L	.025	.026	.007	.005	.014	.004
Chromium	ug/L	.310	.450	.310	.470	.780	1.17
Copper	ug/L	.539	.603	.391	.273	.463	.297
Lead	ug/L	.096	1.05	.168	.106	.191	.097
Mercury	ug/L	.001	.003	.002	.003	.003	.002
Zinc	ug/L	4.32	5.01	4.75	1.38	2.59	.860

3.7-9-14

Sample Point ID:	LG-11	LG-11	LG-12	LG-12	LG-15	LG-15	SG-19	SG-19
ETC Sample Number:	MF6320	MF6350	MF6322	MF6352	MF6321	MF6351	MF6317	MF6347
Sample Date:	940511	940512	940511	940512	940511	940512	940510	940511
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Chloride	mg/L	1.18	-	1.03	-	<.500	-	1.34	-
Nitrate as N	mg/L	<.500	-	<.500	-	<.500	-	.728	-
Conductivity	umhos	21.0	-	16.0	-	14.0	-	121	-
Solids, total suspended	mg/L	<5.00	-	<5.00	-	<5.00	-	<5.00	-
Total Dissolved Solids (TDS)	mg/L	<5.00	-	18.0	-	22.0	-	58.0	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	<.200	-	.504	-	.784	-	.280	-
Hardness as CaCO3	mg/L	<5.00	-	<5.00	-	<5.00	-	62.6	-
Turbidity	NTU	1.40	-	1.20	-	1.80	-	3.40	-
pH	std	6.70	-	5.70	-	6.00	-	7.40	-
Oil and Grease, (IR)	mg/L	<1.12	-	<1.18	-	<1.03	-	<1.02	-
Phosphorus	mg/L	.019	-	.026	-	.028	-	.027	-
Phosphorus as P, dissolved	mg/L	<.004	-	.014	-	.010	-	.023	-
Sulfate as SO4	mg/L	5.00	-	4.00	-	3.00	-	6.00	-
Chemical Oxygen Demand (COD)	mg/L	16.0	-	34.0	-	35.0	-	31.0	-
Fluoride	mg/L	.246	-	.223	-	.175	-	.469	-
Ammonia as N	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Alkalinity as CaCO3	mg/L	<20.0	-	<20.0	-	<20.0	-	58.2	-

Joblink: 811098

DATA SUMMARY REPORT

DATE: 08/29/94

Company: FOTH & VAN DYKE

PAGE: 2.

Sample Point ID:	LG-11	LG-11	LG-12	LG-12	LG-15	LG-15	SG-19	SG-19
ETC Sample Number:	MF6320	MF6350	MF6322	MF6352	MF6321	MF6351	MF6317	MF6347
Sample Date:	940511	940512	940511	940512	940511	940512	940510	940511
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC
Parameters	Units							

CONVENTIONALS (AR55)

Alkalinity, Hydroxide as CaCO ₃	mg/L	0	-	0	-	0	-	0	-
Alkalinity, Bicarbonate CaCO ₃	mg/L	<20.0	-	<20.0	-	<20.0	-	58.2	-
Alkalinity, Carbonate as CaCO ₃	mg/L	0	-	0	-	0	-	0	-
Sodium Absorption Ratio (SAR)	std	0	-	0	-	0	-	.073	-
Cations	meq/l	.142	-	.065	-	.091	-	1.32	-
Anions	meq/l	.150	-	.124	-	.121	-	1.15	-
Cation and Anion Balance	%	-3	-	-30	-	-10	-	6.88	-
Biochemical Oxygen Demand	mg/L	-	6.00	-	7.00	-	6.00	-	6.00

3.7-9-147

Sample Point ID:	SG-30	SG-30	SG-E	SG-E
ETC Sample Number:	MF6318	MF6348	MF6319	MF6349
Sample Date:	940510	940511	940510	940511
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-	<.020	-
Chloride	mg/L	1.11	-	2.02	-
Nitrate as N	mg/L	<.500	-	.729	-
Conductivity	umhos	194	-	272	-
Solids, total suspended	mg/L	<5.00	-	<5.00	-
Total Dissolved Solids (TDS)	mg/L	104	-	121	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	.560	-	.224	-
Hardness as CaCO ₃	mg/L	102	-	129	-
Turbidity	NTU	3.10	-	.900	-
pH	std	8.70	-	8.00	-
Oil and Grease, (IR)	mg/L	<1.33	-	<1.03	-
Phosphorus	mg/L	.036	-	.019	-
Phosphorus as P, dissolved	mg/L	.018	-	.017	-
Sulfate as SO ₄	mg/L	7.00	-	7.00	-
Chemical Oxygen Demand (COD)	mg/L	28.0	-	<10.0	-
Fluoride	mg/L	.621	-	.763	-
Ammonia as N	mg/L	<.100	-	<.100	-
Alkalinity as CaCO ₃	mg/L	95.0	-	138	-

Joblink: 811098

DATA SUMMARY REPORT

DATE: 08/29/94

PAGE: 3

Company: FOTH & VAN DYKE

Sample Point ID:	SG-30	SG-30	SG-E	SG-E
ETC Sample Number:	MF6318	MF6348	MF6319	MF6349
Sample Date:	940510	940511	940510	940511
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

CONVENTIONALS (AR55)

Alkalinity, Hydroxide as CaCO ₃	mg/L	0	-	0	-
Alkalinity, Bicarbonate CaCO ₃	mg/L	95.0	-	138	-
Alkalinity, Carbonate as CaCO ₃	mg/L	4.80	-	0	-
Sodium Absorption Ratio (SAR)	std	.070	-	.083	-
Cations	meq/l	2.18	-	2.98	-
Anions	meq/l	1.93	-	2.52	-
Cation and Anion Balance	%	6.06	-	8.41	-
Biochemical Oxygen Demand	mg/L	-	8.00	-	5.00

3.7-9-148

Sample Point ID:	LG-11	LG-11	LG-12	LG-12	LG-15	LG-15	SG-19	SG-19
ETC Sample Number:	MF6320	MF6329	MF6322	MF6331	MF6321	MF6330	MF6317	MF6326
Sample Date:	940511	940511	940511	940511	940511	940511	940510	940510
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	<.100	-	.117	-	<.100	-	.177
Manganese	mg/L	-	<.010	-	.023	-	.030	-	<.010
Antimony, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Barium, Total	mg/L	<.010	-	<.010	-	<.010	-	.012	-
Beryllium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Boron, Total	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Calcium, Total	mg/L	1.59	-	1.30	-	1.16	-	13.4	-
Chromium, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Magnesium, Total	mg/L	.561	-	<.500	-	<.500	-	7.26	-
Molybdenum, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Nickel, Total	mg/L	<.030	-	<.030	-	<.030	-	<.030	-
Potassium, Total	mg/L	.630	-	<.600	-	1.30	-	<.600	-
Silver, Total	mg/L	<.010	-	<.010	-	<.010	-	<.010	-
Sodium, Total	mg/L	<1.00	-	<1.00	-	<1.00	-	1.33	-
Thallium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Arsenic, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Selenium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-

Joblink: 811098

DATA SUMMARY REPORT

DATE: 08/29/94

Company: FOTH & VAN DYKE

PAGE: 4.

Sample Point ID:	LG-11	LG-11	LG-12	LG-12	LG-15	LG-15	SG-19	SG-19
ETC Sample Number:	MF6320	MF6329	MF6322	MF6331	MF6321	MF6330	MF6317	MF6326
Sample Date:	940511	940511	940511	940511	940511	940511	940510	940510
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron, Total	mg/L	<.100	-	.124	-	.106	-	.228	-
Manganese, Total	mg/L	<.010	-	.024	-	.040	-	.013	-

Sample Point ID:	SG-30	SG-30	SG-E	SG-E
ETC Sample Number:	MF6318	MF6327	MF6319	MF6328
Sample Date:	940510	940510	940510	940510
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	<.100	-	<.100
Manganese	mg/L	-	<.010	-	<.010
Antimony, Total	mg/L	<.005	-	<.005	-
Barium, Total	mg/L	<.010	-	<.010	-
Beryllium, Total	mg/L	<.005	-	<.005	-
Boron, Total	mg/L	<.100	-	<.100	-
Calcium, Total	mg/L	23.7	-	31.0	-
Chromium, Total	mg/L	<.020	-	<.020	-
Magnesium, Total	mg/L	11.2	-	16.0	-
Molybdenum, Total	mg/L	<.020	-	<.020	-
Nickel, Total	mg/L	<.030	-	<.030	-
Potassium, Total	mg/L	<.600	-	.700	-
Silver, Total	mg/L	<.010	-	<.010	-
Sodium, Total	mg/L	1.66	-	2.27	-
Thallium, Total	mg/L	<.005	-	<.005	-
Arsenic, Total	mg/L	<.005	-	<.005	-
Selenium, Total	mg/L	<.005	-	<.005	-
Iron, Total	mg/L	.104	-	<.100	-
Manganese, Total	mg/L	.019	-	<.010	-

3.7-9-149

PINK · CLIENT COPY

ETC

1100

ORIGINAL
IN
OTHER
BOOK

CHAIN-OF-CUSTODY RECORD

No. 114075

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570

811098

COMPANY FOTH: VAN DYKE				FACILITY/SITE CRANDON MINING Co 93CD19		NUMBER OF CONTAINERS	FILT. (Y/N)										LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₄ + H ₂ SO ₄	
PROJECT CONTACT RUSS JANESHER				TELEPHONE NO. 414-497-2500			PRESERV.											
ANALYSIS REQUIRED SEE ATTACHMENT																		
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	Source Codes: Well.....(W) Outfall.....(O) Soil.....(S) River/Stream.....(R) Bottom Sediment.....(B) Generation Point.....(G) Surface Impoundment (I) Treatment Facility.....(T) Leachate Collection Sys.....(C) Lake/Ocean.....(L) Other.....(X) Specify											SAMPLER OBSERVATIONS	LAB OBSERVATIONS
1		R	SG-19	94/5/10	1340		7											
2		R	SG-30	↓	1415		7											
3		R	SG-E	↓	1605		7											
4		LAKE	L G-111	94/05/11	0900		7											
5		LAKE	L G-115	↓	1100		7											
6		LAKE	L G-112	↓	1230		7											
7																		
8																		
9																		

CHAIN OF CUSTODY CHRONICLE

REMARKS

3.7.9-151	Shuttle Opened By: (print) <u>SCOTT JANSEN</u> Date: <u>5/10/94</u> Time: <u>1100</u>
	Signature: <u>Scott Jansen</u> Seal #: _____ Intact: <u>YES</u>
2.	I have received these materials in good condition from the above person.
	Name: _____ Signature _____
	Date: _____ Time: _____ Remarks: _____
3.	I have received these materials in good condition from the above person.
	Name: _____ Signature _____
	Date: _____ Time: _____ Remarks: _____
4.	Shuttle Sealed By: (print) <u>SCOTT JANSEN</u> Date: <u>5/11/94</u> Time: <u>1400</u>
	Signature: <u>Scott Jansen</u> Seal #: <u>20115</u> Intact: <u>YES</u>
LAB USE ONLY Opened By: <u>JRCF Lopez</u> Date: <u>5-12-94</u> Time: <u>9:30A</u>	
SHUTTLE # <u>NIA</u> TEMP. °C <u>05m2</u> SEAL # <u>20115</u> COND. <u>good</u>	

SAMPLER'S SIGNATURE

Scott Jansen



CHAIN-OF-CUSTODY RECORD REQUEST FOR ANALYTICAL SERVICES

REV. 04/93
FORM 301

ENVIRONMENTAL TESTING AND CERTIFICATION CORP ■ 320 TESCOMI CIRCLE SUITE G ■ SANTA ROSA CA 95401 ■ (707)544-5570

SUBCONTRACT LAB
NORTHERN LAKE SERVICES

TELEPHONE NUMBER

LABORATORY CONTACT

DM FISHER

TELEPHONE NUMBER

ADDRESS

205 NORTH PROSPECT

CRANDON, WI. 54520

NUMBER
OF CONTAINERS

2 2 2
0 0 3
9 (DSS) 504 9 (L)

FILT. (Y/N)

PRESERV.

LEGEND FOR
PRESERVATIVE

0 - NONE
1 - HCL
2 - HNO₃
3 - H₂SO₄
4 - H₂SO₄ + H₂SO₃

MATRIX CODES:

	ETC JOB NUMBER	MATRIX CODE	JOB LINK NUMBER	SAMPLE DATE
1	MT6317	1	811098	9A0510
2	MT6318	1		
3	MT6319	1		
4	MT6320	1		9A0511
5	MT6321	1		
6	MT6322	1		
7	MT6323	1	811099	9A0512
8	MT6324	1		

Liquid..... 1

Solid/Sludge..... 2

Oily Solid..... 3

Oily Liquid..... 4

Wipe..... 5

Leachate..... 7

Air..... 8

Other.....

REMARKS:

57993

57994

57995

57996

57997

57998

57999

58000

CHAIN OF CUSTODY CHRONICLE

RESULTS REQUESTED BY (DATE): ASAP

SEND RESULTS TO: LISA NOWAK

RESULTS MUST INCLUDE:

STANDARD ☒

EXTENDED ☐

OTHER ☐

• Method Blank

• Raw Data

• Blank Spike

• Other

• MS/MSD

PO #:

29946

PLEASE INCLUDE PO # AND/OR JOBLINK # ON INVOICE

FOR ETC USE ONLY:

SENT
NOTES:

DATE:

INITIALS:

3.7-9-152

ETC

REV. 04
FORM

SUBCONTRACT LAB

SUBCONTRACT LAB
NORTHERN LAKE SERVICES

LABORATORY CONTACT

DM TISHER

ADDRESS

ADDRESS 216 N. PROSPECT

GRANDON, WI. 53520

TELEPHONE NUMBER

TELEPHONE NUMBER

FILT. (Y/N)

PRESERV.

LEGEND FOR
PRESERVATIVE

0 - NONE
1 - HCL
2 - HNO₃
3 - H₂SO₄
4 - Na₂SO₄ + H₂SO₄

NUMBER OF CONTAINERS

五五*

MATRIX CODES:

REMARKS:

* TOTAL POTASSIUM
By ICP.
\$1300 EACH

CHAIN OF CUSTODY CHRONICLE

RESULTS REQUESTED BY (DATE):

SEND RESULTS TO: LISA 06105KU

RESULTS MUST INCLUDE:

STANDARD ☒

EXTENDED ☐

OTHER ☐

- Method Blank

- Raw Data

- **Blank Spike**

- Other

- HS/MSD

PO #: 2962

PLEASE INCLUDE PO # AND/OR JOBLINK # ON INVOICE

FOR ETC USE ONLY:

"SENT"
NOTES:

DATE:

INITIALS

3.7-9-153

CHAIN OF CUSTODY

Client: CRANDON MINING CO Scope I.D.: 93C049
 Project: TRAIL 5.13 S.W. SAMPLING Page: _____
 Prepared by: SLD Date: _____
 Sampler(s): S.A. Johnson Date: 5/12/94
 (Signature)

No.
of
Con-
tain-
ers

Lab
Numbers

Analysis Required

Remarks

ALUMINUM
CADMIUM
COPPER
LEAD
MERCURY
ZINC

Sta. No.	Date	Time	Comp	Grab	Station Location	Serial Tag Number	No. of Containers	Lab Numbers	Analysis Required	Remarks
87 56-CC-01	5/11/94	0920		✓	93C049		1		X X X X X X	
87 56-CC-02		0920		✓			1		X X X X X X	
87 56-Y		1120		✓			1		X X X X X X	
87 56-V		1245		✓			1		X X X X X X	
87 56-AB		1345		✓			1		X X X X X X	
46 56-6	5/11/94	1630		✓			1		X X X X X X	
17 56-2	5/11/94	0745		✓			1		X X X X X X	
18 56-3		1020		✓			1		X X X X X X	
19 56-19		1340		✓			1		X X X X X X	
50 56-30		1415		✓			1		X X X X X X	
51 56-E		1605		✓			1		X X X X X X	
52 56-11	5/11/94	0900		✓			1		X X X X X X	*
53 56-15		1100		✓			1		X X X X X X	
54 56-12		1230		✓			1		X X X X X X	*

Signature

Company

Date

Time

Carrier

Relinquished By: Scott Johnson

FOTH VAN DYKE

5/12/94

1500

FED EX

Received By: SCC [Signature] 5/14/94

Int'l [Signature]

5/14/94

1:00

Relinquished By:

Received By:

Relinquished By:

Received by Lab:

Remarks: * USED NISKIN SAMPLING BOTTLE MODEL 1080

SEND INVOICES + RESULTS to ETC LAB

Foth & Van Dyke

3.7-9-154



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520
Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 08262

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT FOTH: VAN DYKE		PROJECT TITLE CRANDON MINING CO	
ADDRESS 2737 S. RIDGE RD		PROJECT NO. 93C049	P.O. NO.
CITY GREEN BAY	STATE WI	ZIP 54307	CONTACT RUSS JAMESHEIK
			PHONE 414-497-2500

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			PNP				
1.	56824	SG-19	5/10/94	1340	S.W.	GRAB	1				
2.	56825	SG-30	↓	1415	↓	↓	1				
3.	56826	SG-E	↓	1665	↓	↓	1				
4.	56827	LG-11	5/11/94	0900	↓	↓	1				
5.	56828	LG-15	↓	1100	↓	↓	1				
6.	56829	LG-12	↓	1230	↓	↓	1				
7.											
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE:
SW = surface water DW = drinking water PROD = product
WW = wastewater TIS = tissue SOIL = soil
GW = groundwater AIR = air SED = sediment
describe others

CONTAINER PRESERVATIVES & PREPARATION
P = plastic NP = nothing added OH = sodium hydroxide
G = glass S = sulfuric acid HA = hydrochloric &
V = glass vial N = nitric acid ascorbic acid
B = plastic bag Z = zinc acetate H = hydrochloric acid
describe others **F = field filtered**

COLLECTED BY (signature) Scott Jensen		CUSTODY SEAL NO. (IF ANY)		DATE/TIME 5/11/94 1400
RELINQUISHED BY (signature)		RECEIVED BY (signature)		DATE/TIME 176
RELINQUISHED BY (signature)		RECEIVED BY (signature)		DATE/TIME
DISPATCHED BY (signature) Scott Jensen		METHOD OF TRANSPORT FVQ		DATE/TIME 5/11/94 1400
RECEIVED AT NLS BY (signature) Tracy Huber	DATE/TIME 5-11-94 9:30	CONDITION	TEMP. 0.2°	
SEAL INTACT? ☐ YES ☐ NO	SEAL #	REMARKS & OTHER INFORMATION		

- IMPORTANT:**
1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
 2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
 3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY

FEDERAL
EXPRESS

QUESTIONS? CALL 800-238-5355 TOLL FREE

AIRBILL
PACKAGE
TRACKING NUMBER

8099584942

1834 8099584942

RECIPIENT'S COPY

From (Your Name) Please Print SCOTT JANSEN		Your Phone Number (Very Important) (414) 977-2500		To (Recipient's Name) Please Print ETC-SANTA ROSA		Recipient's Phone Number (Very Important) (707) 544-5570	
Company FOTHA VINEYARD / CRANSON ME INC CO		Department/Floor No.		Company ETC-SANTA ROSA		Department/Floor No.	
Street Address 104 W MADISON WE				Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip * Codes.) 320 TESCOMI CIRCLE UNIT 5			
City CRANSON		State WE		City SANTA ROSA		State CA	
ZIP Required 54520				ZIP Required 95401			

YOUR INTERNAL BILLING REFERENCE INFORMATION (First 24 characters will appear on invoice.)

PAYMENT 1 ☒ Bill Sender 2 ☐ Bill Recipient's FedEx Acct. No. 3 ☐ Bill 3rd Party FedEx Acct. No. 4 ☐ Bill Credit Card				IF HOLD FOR PICK-UP, Print FEDEX Address Here Street Address City State ZIP Required			
---	--	--	--	--	--	--	--

SERVICES (Check only one box)		DELIVERY AND SPECIAL HANDLING		DIM SHIPMENT (Heavyweight Services Only)		Emp. No. Date		Federal Express Use	
Priority Overnight Service (Delivery by next business morning)	Standard Overnight Service (Delivery by next business afternoon)	1 ☐ HOLD FOR PICK-UP (P.O. in Box 14)	2 ☐ DELIVER WEEKDAY	Total 1 85		X		Base Charges	
11 ☒ YOUR PACKAGING	12 ☐ FEDEX LETTER	3 ☐ DELIVER SATURDAY (Extra charge)	4 ☐ DANGEROUS GOODS (Extra charge)	Total 1 85		X		Declared Value Charge	
16 ☐ FEDEX LETTER	17 ☐ FEDEX PAK	5 ☐ CONSTANT SURVEILLANCE SVC. (CSS)	6 ☐ DRY ICE	Total 1 85		X		Other 1	
12 ☐ FEDEX PAK	13 ☐ FEDEX BOX	7 ☐ OTHER SPECIAL SERVICE	8 ☐ SATURDAY PICK-UP	Total 1 85		X		Other 2	
13 ☐ FEDEX BOX	14 ☐ FEDEX TUBE	9 ☐ HOLIDAY DELIVERY (if offered)	10 ☐ DEFERRED HEAVYWEIGHT	Total 1 85		X		Total Charges	
14 ☐ FEDEX TUBE				Total 1 85		X		REVISION DATE 11/89	
Economy Service (Formerly Standard Air) (Delivery by second business day)	Heavyweight Service (For Extra Large or any package over 150 lbs.)			Total 1 85		X		PART #119501 FXEM 6/90	
30 ☐ ECONOMY SERVICE	70 ☐ HEAVYWEIGHT			Total 1 85		X		FORMAT #014	
				Total 1 85		X		014	
				Total 1 85		X		© 1989 F.E.C. PRINTED IN U.S.A.	

FEDERAL
EXPRESS

QUESTIONS? CALL 800-238-5355 TOLL FREE

AIRBILL
PACKAGE
TRACKING NUMBER

8099584986

1834 8099584986

RECIPIENT'S COPY

From (Your Name) Please Print SCOTT JANSEN		Your Phone Number (Very Important) (414) 977-2500		To (Recipient's Name) Please Print ETC-SANTA ROSA		Recipient's Phone Number (Very Important) (707) 544-5570	
Company FOTHA VINEYARD / CRANSON ME INC CO		Department/Floor No.		Company ETC-SANTA ROSA		Department/Floor No.	
Street Address 104 WES MADISON WE				Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip * Codes.) 320 TESCOMI CIRCLE UNIT 5			
City CRANSON		State WE		City SANTA ROSA		State CA	
ZIP Required 54520				ZIP Required 95401			

YOUR INTERNAL BILLING REFERENCE INFORMATION (First 24 characters will appear on invoice.)

PAYMENT 1 ☒ Bill Sender 2 ☐ Bill Recipient's FedEx Acct. No. 3 ☐ Bill 3rd Party FedEx Acct. No. 4 ☐ Bill Credit Card				IF HOLD FOR PICK-UP, Print FEDEX Address Here Street Address City State ZIP Required			
---	--	--	--	--	--	--	--

SERVICES (Check only one box)		DELIVERY AND SPECIAL HANDLING		DIM SHIPMENT (Heavyweight Services Only)		Emp. No. Date		Federal Express Use	
Priority Overnight Service (Delivery by next business morning)	Standard Overnight Service (Delivery by next business afternoon)	1 ☐ HOLD FOR PICK-UP (P.O. in Box 14)	2 ☐ DELIVER WEEKDAY	Total 1 85		X		Base Charges	
11 ☒ YOUR PACKAGING	12 ☐ FEDEX LETTER	3 ☐ DELIVER SATURDAY (Extra charge)	4 ☐ DANGEROUS GOODS (Extra charge)	Total 1 85		X		Declared Value Charge	
16 ☐ FEDEX LETTER	17 ☐ FEDEX PAK	5 ☐ CONSTANT SURVEILLANCE SVC. (CSS)	6 ☐ DRY ICE	Total 1 85		X		Other 1	
12 ☐ FEDEX PAK	13 ☐ FEDEX BOX	7 ☐ OTHER SPECIAL SERVICE	8 ☐ SATURDAY PICK-UP	Total 1 85		X		Other 2	
13 ☐ FEDEX BOX	14 ☐ FEDEX TUBE	9 ☐ HOLIDAY DELIVERY (if offered)	10 ☐ DEFERRED HEAVYWEIGHT	Total 1 85		X		Total Charges	
14 ☐ FEDEX TUBE				Total 1 85		X		REVISION DATE 11/89	
Economy Service (Formerly Standard Air) (Delivery by second business day)	Heavyweight Service (For Extra Large or any package over 150 lbs.)			Total 1 85		X		PART #119501 FXEM 6/90	
30 ☐ ECONOMY SERVICE	70 ☐ HEAVYWEIGHT			Total 1 85		X		FORMAT #014	
				Total 1 85		X		014	
				Total 1 85		X		© 1989 F.E.C. PRINTED IN U.S.A.	

SEPTEMBER 1, 1994



An ETC Laboratory

320 Tesconi Circle

Suite G

Santa Rosa, CA

95401

Telephone

(707) 544-5570

Facsimile

(707) 544-4906

CLIENT: FOTH & VAN DYKE
P.O. BOX 19012
2737 S. RIDGE ROAD
GREEN BAY, WI 54307-9012

ATTN: RUSS JANESHEK

JOB LINK: 811099 AMENDED REPORT
PROJECT: CMC TASK

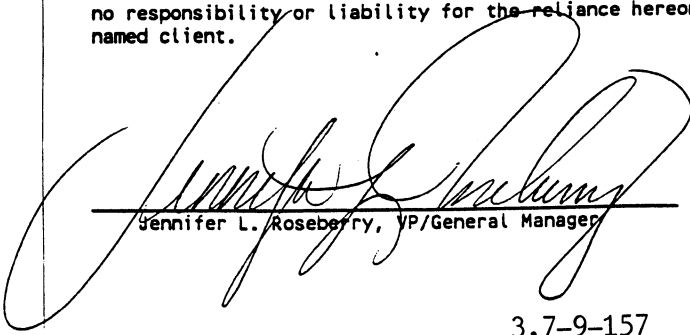
ANALYSIS

EPA METHOD 200 SERIES - METALS; 6010 & 7000 SERIES METALS

CONVENTIONALS: ALKALINITY AS CaCO_3 ; ALKALINITY, HYDROXIDE AS CaCO_3 ;
ALKALINITY, BICARBONATE CaCO_3 ; ALKALINITY, CARBONATE AS CaCO_3 ; AMMONIA AS N; ANIONS;
BIOCHEMICAL OXYGEN DEMAND; CATION AND ANION BALANCE; CATIONS;
CHEMICAL OXYGEN DEMAND (COD); CHLORIDE; CONDUCTIVITY; CYANIDE, TOTAL; FLUORIDE;
HARDNESS AS CaCO_3 ; NITRATE AS N; NITROGEN, TOTAL KJELDAHL (TKN); OIL AND GREASE, (IR);
PH; PHOSPHORUS; PHOSPHORUS AS P, DISSOLVED; SODIUM ABSORPTION RATIO (SAR);
SOLIDS, TOTAL SUSPENDED; SULFATE AS SO_4 ; TOTAL DISSOLVED SOLIDS (TDS); TURBIDITY

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE COLLECTION DATE</u>	<u>DATE RECEIVED BY LAB</u>
MF6323	LG-13-01	WATER	05-12-94	05-13-94
MF6324	LG-13-02	WATER	05-12-94	05-13-94
MF6325	LG-7	WATER	05-12-94	05-13-94
MF6332	LG-13-01	WATER	05-12-94	05-13-94
MF6333	LG-13-02	WATER	05-12-94	05-13-94
MF6334	LG-7	WATER	05-12-94	05-13-94
MF6341	LG-13-01	WATER	05-12-94	05-13-94
MF6342	LG-13-02	WATER	05-12-94	05-13-94
MF6343	LG-7	WATER	05-12-94	05-13-94
MF6353	LG-13-01	WATER	05-12-94	05-13-94
MF6354	LG-13-02	WATER	05-12-94	05-13-94
MF6355	LG-7	WATER	05-12-94	05-13-94
MF6676	BOTTLES	NOT APPLICABLE	NOT APPLICABLE	05-13-94
MF9112	LG-13-01	WATER	05-12-94	08-17-94
MF9113	LG-13-02	WATER	05-12-94	08-17-94
MF9114	LG-7	WATER	05-12-94	08-17-94

This report is "PROPRIETARY AND CONFIDENTIAL" and delivered to, and intended for the exclusive use of the above named client only. ETC, a Division of APBI Environmental Sciences Group, Inc. assumes no responsibility or liability for the reliance hereon or use hereof by anyone other than the above named client.


Jennifer L. Roseberry, VP/General Manager

940901
Date

A division of
APBI Environmental
Sciences Group, Inc.

3.7-9-157



FOTH & VAN DYKE
SEPTEMBER 1, 1994
811099 AMENDED

SAMPLE MATRIX: WATER

<u>Parameter</u>	<u>EPA Prep Method</u>	<u>EPA Analysis Method</u>
ICP Metals	3015	6010
Antimony	3015	7041
Arsenic	3015	7060
Lead	3015	7421
Potassium*	3010	6010
Selenium	7740	7740
Thallium	3015	7841
Mercury	7470	7470
Aluminum**	NA	200.8m
Cadmium**	APDC EXTRACTION	200.8m
Chromium**	NA	200.9m
Copper**	APDC EXTRACTION	200.8m
Lead**	APDC EXTRACTION	200.8m
Mercury**	**	**
Zinc**	NA	200.9m
Alkalinity as CaCO3	NA	310.1
Alkalinity, Hydroxide as CaCO3	NA	310.1
Bicarbonate as CaCO3	NA	310.1
Carbonate Alkalinity as CaCO3	NA	310.1
Ammonia as N	350.2	350.2
Anions	+	+
Cation and Anion Balance	+	+
Cations	+	+
Chemical Oxygen Demand	NA	410.4
Chloride	NA	300.0
Conductivity	NA	9050
Total Cyanide	9010	9010
Fluoride	NA	340.2
Hardness as CaCO3	NA	130.2
Nitrate as N	NA	300.0
Total Kjeldahl Nitrogen	351.3	351.3
Oil & Grease	413.2	413.2
pH	NA	9040
Phosphorus*	365.2	365.2
Phosphorus as P, Dissolved*	365.2	365.2
Sodium Absorption Ratio	+	+
Total Suspended Solids	NA	160.2
Sulfate as SO4*	NA	375.2
Total Dissolved Solids	NA	160.1
Turbidity	NA	180.1
Biochemical Oxygen Demand*	405.1	405.1

* ANALYSIS PERFORMED BY NORTHERN LAKE SERVICE, INC

† CALCULATION

** ANALYSIS PERFORMED BY BATELLE LABORATORY

** COLD VAPOR ATOMIC FLUORESCENCE



FOTH & VAN DYKE
31 AUGUST 1994

EXECUTIVE SUMMARY
ETC JO8LINK 811099
(AMENDED TO INCLUDE LOW-LEVEL METALS RESULTS)

On 13 May 1994 ETC-Santa Rosa received aqueous samples from Foth & Van Dyke via Federal Express. The cooler temperature was 01°C upon receipt at the laboratory. The samples were analyzed as specified on the preceding page.

The metals portion for sample LG-7 was not labelled with the sample identifier; it was the only unlabelled sample container.

Samples were filtered at the laboratory through a 0.45 μ m filter prior to analysis for Iron, Manganese, and Phosphorus; these results reflect dissolved parameters. These analytes were also analyzed without filtration; these results reflect total parameters.

All samples were received past the method-recommended holding time for pH analysis.

Low level metals analyses were performed by Batelle; Biochemical Oxygen Demand (BOD), Sulfate, Dissolved Phosphorus, Total Phosphorus, and Total Potassium analyses were performed by Northern Lake Services (NLS). Samples were filtered for Dissolved Phosphorus at NLS just prior to analysis.

CALCULATIONS:

Results for Sodium Absorption Ratio (Modified SAR), Cations, Anions, and Cation and Anion Balance were obtained by calculation using analytical data. The Cations reflect results for Calcium, Magnesium, Potassium, and Sodium; the Anions reflect results for Chloride, Fluoride, Nitrate, Sulfate, Carbonate, and Bicarbonate.

LOW-LEVEL METALS:

Direct analysis of water by ICP-MS was used for Aluminum. Direct analysis of water by GFAA was used for Chromium and Zinc. For the analysis of Cadmium, Copper, and Lead, a preconcentration step was followed by quantification using ICP-MS. Mercury was analyzed by cold vapor atomic fluorescence.

The QC samples included standard reference materials (QC Spikes), matrix spikes and replicates. Only one QC Spike is reported for each analyte on the tabled QC; for cases where there is data for more than one matrix spike or replicate, recovery information may be obtained from raw data copies included herein. When the procedural blank is accounted for, the QC Spike results are usually within +/- 25% of the certified value. The recovery for the matrix spike for Copper was outside of the accuracy recovery range of 75-125%.

Lisa Norosky

Lisa Norosky, Program Manager

940901

Date

Joblink: 811099

DATA SUMMARY REPORT

DATE: 08/29/94

Company: FOTH & VAN DYKE

PAGE: 1

Sample Point ID:	LG-13-01	LG-13-02	LG-7
ETC Sample Number:	MF6341	MF6342	MF6343
Sample Date:	940512	940512	940512
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD 200 SERIES - METALS (AR08)

Aluminum	ug/L	130	133	68.2
Cadmium	ug/L	.031	.030	.055
Chromium	ug/L	.560	.450	.340
Copper	ug/L	.724	.573	.660
Lead	ug/L	.655	.671	.222
Mercury	ug/L	.003	.003	.002
Zinc	ug/L	6.91	8.03	11.2

3.7-9-16

Sample Point ID:	LG-13-01	LG-13-01	LG-13-02	LG-13-02	LG-7	LG-7
ETC Sample Number:	MF6323	MF6353	MF6324	MF6354	MF6325	MF6355
Sample Date:	940512	940512	940512	940512	940512	940512
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-	<.020	-	<.020	-
Conductivity	umhos	20.0	-	20.0	-	17.0	-
Chloride	mg/L	.999	-	1.00	-	1.11	-
Nitrate as N	mg/L	<.500	-	<.500	-	<.500	-
Solids, total suspended	mg/L	<5.00	-	<5.00	-	<5.00	-
Total Dissolved Solids (TDS)	mg/L	25.0	-	22.0	-	5.00	-
Hardness as CaCO3	mg/L	<5.00	-	<5.00	-	<5.00	-
pH	std	5.60	-	5.70	-	5.70	-
Oil and Grease, (IR)	mg/L	<1.12	-	<1.04	-	<1.05	-
Phosphorus	mg/L	.028	-	.028	-	.013	-
Phosphorus as P, dissolved	mg/L	.009	-	.008	-	.007	-
Sulfate as SO4	mg/L	6.00	-	9.00	-	4.00	-
Chemical Oxygen Demand (COD)	mg/L	29.0	-	31.0	-	27.0	-
Fluoride	mg/L	.204	-	.227	-	.218	-
Turbidity	NTU	2.00	-	1.90	-	.770	-
Sodium Absorption Ratio (SAR)	std	0	-	0	-	0	-
Cations	meq/l	.137	-	.138	-	.066	-
Anions	meq/l	.164	-	.228	-	.121	-

Joblink: 811099

DATA SUMMARY REPORT

DATE: 08/29/94

Company: FOTH & VAN DYKE

PAGE: 2.

Sample Point ID:	LG-13-01	LG-13-01	LG-13-02	LG-13-02	LG-7	LG-7
ETC Sample Number:	MF6323	MF6353	MF6324	MF6354	MF6325	MF6355
Sample Date:	940512	940512	940512	940512	940512	940512
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

CONVENTIONALS (AR55)

Cation and Anion Balance	%	-9	-	-20	-	-30	-
Ammonia as N	mg/L	<.100	-	<.100	-	<.100	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	.476	-	.420	-	<.200	-
Alkalinity as CaCO ₃	mg/L	<20.0	-	<20.0	-	<20.0	-
Alkalinity, Hydroxide as CaCO ₃	mg/L	0	-	0	-	0	-
Alkalinity, Bicarbonate CaCO ₃	mg/L	<20.0	-	<20.0	-	<20.0	-
Alkalinity, Carbonate as CaCO ₃	mg/L	0	-	0	-	0	-
Biochemical Oxygen Demand	mg/L	-	4.00	-	4.00	-	4.00

Sample Point ID:	LG-13-01	LG-13-01	LG-13-02	LG-13-02	LG-7	LG-7
ETC Sample Number:	MF6323	MF6332	MF6324	MF6333	MF6325	MF6334
Sample Date:	940512	940512	940512	940512	940512	940512
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	.138	-	<.100	-	<.100
Manganese	mg/L	-	.020	-	.021	-	.024
Arsenic, Total	mg/L	<.005	-	<.005	-	<.005	-
Selenium, Total	mg/L	<.005	-	<.005	-	<.005	-
Antimony, Total	mg/L	<.005	-	<.005	-	<.005	-
Barium, Total	mg/L	.015	-	.013	-	<.010	-
Beryllium, Total	mg/L	<.005	-	<.005	-	<.005	-
Boron, Total	mg/L	<.100	-	<.100	-	<.100	-
Calcium, Total	mg/L	1.80	-	1.79	-	1.33	-
Chromium, Total	mg/L	<.020	-	<.020	-	<.020	-
Magnesium, Total	mg/L	.574	-	.587	-	<.500	-
Molybdenum, Total	mg/L	<.020	-	<.020	-	<.020	-
Nickel, Total	mg/L	<.030	-	<.030	-	<.030	-
Potassium, Total	mg/L	<.600	-	<.600	-	<.600	-
Silver, Total	mg/L	<.010	-	<.010	-	<.010	-
Sodium, Total	mg/L	<1.00	-	<1.00	-	<1.00	-
Thallium, Total	mg/L	<.005	-	<.005	-	<.005	-

Joblink: 811099

DATA SUMMARY REPORT

DATE: 08/29/94

Company: FOTH & VAN DYKE

PAGE: 3

Sample Point ID:	LG-13-01	LG-13-01	LG-13-02	LG-13-02	LG-7	LG-7
ETC Sample Number:	MF6323	MF6332	MF6324	MF6333	MF6325	MF6334
Sample Date:	940512	940512	940512	940512	940512	940512
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron, Total	mg/L	.174	-	.147	-	<.100	-
Manganese, Total	mg/L	.023	-	.022	-	<.010	-

3.7-9-162

ETC

CHAIN-OF-CUSTODY RECORD

No. 114079

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570

811099

COMPANY FOTH: VAN DYKE		FACILITY/SITE CRANDON MINING Co / 930049		NUMBER OF CONTAINERS FILT. (Y/N) PRESERV. ANALYSIS REQUIRED SEE ATTACHMENT		LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₄ +H ₂ SO ₄		
PROJECT CONTACT RUSS JANESHEK		TELEPHONE NO. 414-497-2500						
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	Source Codes: Well.....(W) Outfall.....(O) Soil.....(S) River/Stream.....(R) Bottom Sediment.....(B) Generation Point.....(G) Surface Impoundment (I) Treatment Facility.....(T) Leachate Collection Sys.....(C) Lake/Ocean.....(L) Other.....(X) Specify _____	SAMPLER OBSERVATIONS	LAB OBSERVATIONS
1		LAKE	L 6 - 1 3 - 0 1	94/05/12	1100			
2		LAKE	L 6 - 1 3 - 0 2	↓	1100			
3		LAKE	L 6 - 7	↓	1230			
4								
5								
6								
7								
8								
9								

CHAIN OF CUSTODY CHRONICLE

3.7-9-163	Shuttle Opened By: (print) <u>SCOTT JANSEN</u> Date: <u>5/7/94</u> Time: <u>1100</u>	
	Signature: <u>Scott Jansen</u> Seal #: _____ Intact: <u>YES</u>	
	I have received these materials in good condition from the above person.	
	Name: _____ Signature: _____ Date: _____ Time: _____ Remarks: _____	
3.	I have received these materials in good condition from the above person.	
	Name: _____ Signature: _____ Date: _____ Time: _____ Remarks: _____	
4.	Shuttle Sealed By: (print) <u>SCOTT JANSEN</u> Date: <u>5/7/94</u> Time: <u>1500</u>	
	Signature: <u>Scott Jansen</u> Seal #: <u>7011</u> Intact: <u>YES</u>	
LAB USE ONLY Opened By: <u>JANE HANSEN</u> Date: <u>5-13-94</u> Time: <u>9:40am</u>		
SHUTTLE # <u>NIA</u> TEMP. °C <u>15.8</u> SEAL # <u>7011</u> COND. <u>good</u>		

REMARKS

SAMPLER'S SIGNATURE

Scott Jansen

ENVIRONMENTAL TESTING AND CERTIFICATION CORP ■ 320 TESCONI CIRCLE SUITE G ■ SANTA ROSA CA 95401 ■ (707)544-5570

[illegible]

3.7-9-164

ETC

CHAIN-OF-CUSTODY RECORD REQUEST FOR ANALYTICAL SERVICES

REV. 04/93
FORM 301

ENVIRONMENTAL TESTING AND CERTIFICATION CORP ■ 320 TESCOMI CIRCLE SUITE G ■ SANTA ROSA CA 95401 ■ (707)544-5570

SUBCONTRACT LAB

NORTHERN LAKE SERVICES

LABORATORY CONTACT

JIM FISHER

ADDRESS

205 NORTH PROSPECT

CRANDON, WI. 54520

TELEPHONE NUMBER

TELEPHONE NUMBER

NUMBER
OF CONTAINERS

2
1
1
1
1
1
1
1

FILT. (Y/N)

PRESERV.

LEGEND FOR
PRESERVATIVE

0 - NONE
1 - HCL
2 - HNO₃
3 - H₂SO₄
4 - Na₂SO₄, H₂SO₄

MATRIX CODES:

	ETC JOB NUMBER	MATRIX CODE	JOBLINK NUMBER	SAMPLE DATE
1	MT625	1	811099	940512
2	MT6A01	1	811114	940515
3	MT6A02	1		
4	MT6A05	1		
5	MT6A06	1		
6	MT6A07	1		
7	MT6A08	1		940516
8	MT6A09	1		

Liquid..... 1
Solid/Sludge..... 2
Oily Solid..... 3
Oily Liquid..... 4
Wipe..... 5
Leachate..... 7
Air..... 8
Other _____

REMARKS:

S8001
S8002
S8003
S8004
S8005
S8006
S8007
S8008

CHAIN OF CUSTODY CHRONICLE

- Relinquished To: _____ Date: _____ Time: _____
By (signature): Kona Shuttle/Seal # 70172 Intact: Yes
- I have received these materials in good condition from the above person
Receiving Lab/Opened By: JD Cattrell Date: 5-31-94 Time: 10:30
Temp. °C 13° Seal #: _____ Condition: _____
- Shuttle Returned By:(print) _____ Date: _____ Time: _____
Signature: _____ Seal #: _____ Intact: _____

RESULTS REQUESTED BY (DATE): ASAP
SEND RESULTS TO: LISA NOROSKY

RESULTS MUST INCLUDE:

STANDARD ☒ EXTENDED ☐ OTHER ☐
• Method Blank • Raw Data
• Blank Spike • Other
• MS/MSD

PO #: 29946

PLEASE INCLUDE PO # AND/OR JOBLINK # ON INVOICE

FOR ETC USE ONLY

DATE: _____ INITIALS: _____
NOTES:

3-7-9-165

2012
ETC

CHAIN-OF-CUSTODY RECORD REQUEST FOR ANALYTICAL SERVICES

REV. 04
FORM

ENVIRONMENTAL TESTING AND CERTIFICATION CORP ■ 320 TESCOMI CIRCLE SUITE G ■ SANTA ROSA CA 95401 ■ (707)544-5570

SUBCONTRACT LAB
NORTHERN LAKE SERVICES
LABORATORY CONTACT
JIM FISHER
ADDRESS
2155 N. PROSPECT
GRANDON, WI. 54620

TELEPHONE NUMBER
TELEPHONE NUMBER

NUMBER
OF CONTAINERS

FILT. (Y/N)

PRESERV.

LEGEND FOR
PRESERVATIVE

- 0 - NONE
- 1 - HCL
- 2 - HNO₃
- 3 - H₂SO₄
- 4 - Na₂SO₄ • H₂SO₄

MATRIX CODES:

51231
51244
51241
51242
51243
51244
51245
51246
51247

	ETC JOB NUMBER	MATRIX CODE	JOB LINK NUMBER	SAMPLE DATE
1	MF6317	1	811098	QAD510
2	MF6318	1		
3	MF6319	1		
4	MF6320	1		QAD511
5	MF6321	1		
6	MF6322	1		
7	MF6323	1	811099	QAD512
8	MF6324	1		

- Liquid..... 1
- Solid/Sludge..... 2
- Oily Solid..... 3
- Oily Liquid..... 4
- Wipe..... 5
- Leachate..... 7
- Air..... 8
- Other _____

REMARKS:

* TOTAL POTASSIUM
BY ICP.
\$1300 EACH

CHAIN OF CUSTODY CHRONICLE

RESULTS REQUESTED BY (DATE): 10 DAY TAT
SEND RESULTS TO: LDA MONTGOMERY

RESULTS MUST INCLUDE:

STANDARD ☒ EXTENDED ☐ OTHER ☐

- Method Blank
- Blank Spike
- MS/MSD
- Raw Data
- Other

PO #: 29963

PLEASE INCLUDE PO # AND/OR JOBLINK # ON INVOICE

FOR ETC USE ONLY:

"SENT"
NOTES:

DATE:

INITIALS:

3.7-9-166

- Relinquished To: Federal Express Date: 6/14/94 Time: 15:00
By (signature): [Signature] Shuttle/Seal # 71562 Intact: _____
- I have received these materials in good condition from the above person
Receiving Lab/Opened By: Tracy Huber Date: 6-15-94 Time: 15:30
Temp. °C — Seal #: _____ Condition: _____
- Shuttle Returned By: (print) _____ Date: _____ Time: _____
Signature: _____ Seal # _____ Intact: _____



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 09191

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT FOTH VAN DYKE			PROJECT TITLE CRANDON MINING CO		
ADDRESS 2737 S. RIDGE Rd			PROJECT NO. 930049		P.O. NO.
CITY GREEN BAY	STATE WI	ZIP 54307	CONTACT RUSS JANESHEK		PHONE 414-497-2500

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			PNP				
1.	56975	LG-13-01	5/12/94		S.W.	GRAB	1				
2.	56976	LG-13-02					1				
3.	56977	LG-7					1				
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE:

SW = surface water
WW = wastewater
GW = groundwater

DW = drinking water
TIS = tissue
AIR = air

PROD = product
SOIL = soil
SED = sediment

describe others

CONTAINER

P = plastic
G = glass
V = glass vial
B = plastic bag

describe others

PRESERVATIVES & PREPARATION

NP = nothing added
S = sulfuric acid
N = nitric acid
Z = zinc acetate
OH = sodium hydroxide
HA = hydrochloric & ascorbic acid
H = hydrochloric acid

F = field filtered

COLLECTED BY (signature) SCOTT JANSEN		CUSTODY SEAL NO. (IF ANY)		DATE/TIME 5/12/94 1445	
RELINQUISHED BY (signature)		RECEIVED BY (signature)		DATE/TIME	
RELINQUISHED BY (signature)		RECEIVED BY (signature)		DATE/TIME	
DISPATCHED BY (signature) Scott Jansen		METHOD OF TRANSPORT by F.V.O.		DATE/TIME 5/12/94 1447	
RECEIVED AT NLS BY (signature) N. Cattell		DATE/TIME 5-12-94 14:47		CONDITION On Ice	
SEAL INTACT? ☐ YES ☐ NO		SEAL #		REMARKS & OTHER INFORMATION Hand Delivered	

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE. **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

3.7-9-168

DUPLICATE COPY

June 1994
Surface Water Laboratory Data



An ETC Laboratory

320 Tesconi Circle

Suite G

Santa Rosa, CA

95401

Telephone

(707) 544-5570

Facsimile

(707) 544-4906

July 22, 1994

CLIENT: FOTH & VAN DYKE
P.O. BOX 19012
2737 S. RIDGE ROAD
GREEN BAY, WI 54307-9012

ATTN: RUSS JANESHEK

JOB LINK: 811250
PROJECT: CRANDON MINING CO 93C049

ANALYSIS

6010 & 7000 SERIES METALS

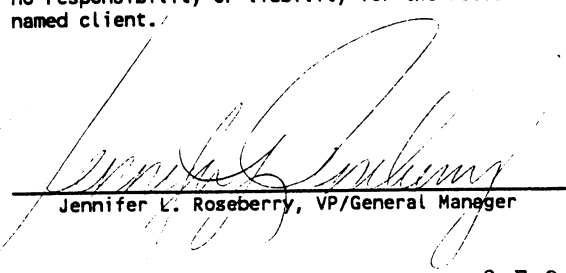
CONVENTIONALS: ALKALINITY AS CaCO_3 ; ALKALINITY, HYDROXIDE AS CaCO_3 ;
ALKALINITY, BICARBONATE CaCO_3 ; ALKALINITY, CARBONATE AS CaCO_3 ; AMMONIA AS N; ANIONS;
BIOCHEMICAL OXYGEN DEMAND; CATION AND ANION BALANCE; CATIONS;
CHEMICAL OXYGEN DEMAND (COD); CHLORIDE; CONDUCTIVITY; CYANIDE, TOTAL; FECAL COLIFORM;
FLUORIDE; HARDNESS AS CaCO_3 ; NITRATE AS N; NITROGEN, TOTAL KJELDAHL (TKN);
OIL AND GREASE, (IR); PH; PHOSPHORUS; PHOSPHORUS AS P, DISSOLVED;
SODIUM ABSORPTION RATIO (SAR); SOLIDS, TOTAL SUSPENDED; SULFATE AS SO_4 ;
TOTAL DISSOLVED SOLIDS (TDS); TURBIDITY

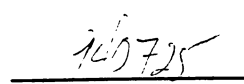
<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE DATE</u>	<u>DATE IN LAB</u>
MF7021	SG-19	LIQUID	06-06-94	06-08-94
MF7022	SG-30	LIQUID	06-06-94	06-08-94
MF7023	SG-2	LIQUID	06-07-94	06-08-94
MF7023	SG-2	LIQUID	06-07-94	06-08-94
MF7024	SG-3	LIQUID	06-07-94	06-08-94
MF7025	SG-6	LIQUID	06-07-94	06-08-94
MF7026	SG-CC-01	LIQUID	06-06-94	06-08-94
MF7027	SG-CC-02	LIQUID	06-06-94	06-08-94
MF7028	SG-Y	LIQUID	06-06-94	06-08-94
MF7029	SG-V	LIQUID	06-06-94	06-08-94
MF7030	SG-AB	LIQUID	06-06-94	06-08-94
MF7031	SG-19	LIQUID	06-06-94	06-08-94
MF7032	SG-30	LIQUID	06-06-94	06-08-94
MF7033	SG-2	LIQUID	06-07-94	06-08-94
MF7034	SG-3	LIQUID	06-07-94	06-08-94
MF7035	SG-6	LIQUID	06-07-94	06-08-94
MF7041	SG-19	LIQUID	06-06-94	06-08-94
MF7042	SG-30	LIQUID	06-06-94	06-08-94
MF7043	SG-2	LIQUID	06-07-94	06-08-94
MF7044	SG-3	LIQUID	06-07-94	06-08-94
MF7045	SG-6	LIQUID	06-07-94	06-08-94

(Continued)

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A division of
APBI Environmental
Sciences Group, Inc.


Jennifer L. Roseberry, VP/General Manager


Date

3.7-9-171

July 22, 1994

Page 2

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE DATE</u>	<u>DATE IN LAB</u>
MF7046	SG-CC-01	LIQUID	06-06-94	06-08-94
MF7047	SG-CC-02	LIQUID	06-06-94	06-08-94
MF7048	SG-Y	LIQUID	06-06-94	06-08-94
MF7049	SG-V	LIQUID	06-06-94	06-08-94
MF7050	SG-AB	LIQUID	06-06-94	06-08-94
MF7051	SG-19	LIQUID	06-06-94	06-08-94
MF7052	SG-30	LIQUID	06-06-94	06-08-94
MF7053	SG-2	LIQUID	06-07-94	06-08-94
MF7054	SG-3	LIQUID	06-07-94	06-08-94
MF7055	SG-6	LIQUID	06-07-94	06-08-94
MF7056	SG-CC-01	LIQUID	06-06-94	06-08-94
MF7057	SG-CC-02	LIQUID	06-06-94	06-08-94
MF7058	SG-Y	LIQUID	06-06-94	06-08-94
MF7059	SG-V	LIQUID	06-06-94	06-08-94
MF7060	SG-AB	LIQUID	06-06-94	06-08-94
MF7061	SG-19	LIQUID	06-06-94	06-08-94
MF7062	SG-30	LIQUID	06-06-94	06-08-94
MF7063	SG-2	LIQUID	06-07-94	06-08-94
MF7064	SG-3	LIQUID	06-07-94	06-08-94
MF7065	SG-6	LIQUID	06-07-94	06-08-94
MF7066	SG-CC-01	LIQUID	06-06-94	06-08-94
MF7067	SG-CC-02	LIQUID	06-06-94	06-08-94
MF7068	SG-Y	LIQUID	06-06-94	06-08-94
MF7069	SG-V	LIQUID	06-06-94	06-08-94
MF7070	SG-AB	LIQUID	06-06-94	06-08-94
MF7071	SG-V	LIQUID	06-06-94	06-08-94
MF7449	SG-AB	LIQUID	06-06-94	06-08-94
MF8654	SG-2	LIQUID	06-07-94	06-07-94
MF8678	BOTTLES	NOT APPLICABLE	NOT APPLICABLE	06-08-94



FOTH & VAN DYKE
JULY 22, 1994
811250

SAMPLE MATRIX: LIQUID

<u>Parameter</u>	<u>EPA Prep Method</u>	<u>EPA Analysis Method</u>
ICP Metals	3015	6010
Antimony	3015	7041
Arsenic	3015	7060
Lead	3015	7421
Potassium*	3010	6010
Selenium	7740	7740
Thallium	3015	7841
Mercury	7470	7470
Alkalinity as CaCO ₃	NA	310.1
Alkalinity, Hydroxide as CaCO ₃	NA	310.1
Bicarbonate as CaCO ₃	NA	310.1
Carbonate Alkalinity as CaCO ₃	NA	310.1
Ammonia as N	350.2	350.2
Anions	±	±
Cation and Anion Balance	±	±
Cations	±	±
Chemical Oxygen Demand	NA	410.4
Chloride	NA	300.0
Conductivity	NA	9050
Total Cyanide	9010	9010
Fluoride	NA	340.2
Fecal Coliform*	SM 922D	SM 922D
Hardness as CaCO ₃	NA	130.2
Nitrate as N	NA	300.0
Total Kjeldahl Nitrogen	351.3	351.3
Oil & Grease	413.2	413.2
pH	NA	9040
Phosphorus*	365.2	365.2
Phosphorus as P, Dissolved*	365.2	365.2
Sodium Absorption Ratio	±	±
Total Suspended Solids	NA	160.2
Sulfate as SO ₄ *	NA	375.2
Total Dissolved Solids	NA	160.1
Turbidity	NA	180.1
Biochemical Oxygen Demand*	405.1	405.1

* ANALYSIS PERFORMED BY NORTHERN LAKE SERVICE, INC

± CALCULATION

ns



FOTH & VAN DYKE
22 JULY 1994

EXECUTIVE SUMMARY
ETC JOBLINK 811250

On 08 June 1994 ETC-Santa Rosa received aqueous samples from Foth & Van Dyke via Federal Express. The cooler temperatures were 0°C, 0°C, and 02°C upon receipt at the laboratory. The samples were analyzed as specified on the preceding page.

Samples SG-CC-01, SG-CC-02, SG-Y, SG-V, and SG-AB were not received by the subcontract laboratory; due to a miscommunication, these sample locations were not analyzed for Sulfate, Total Phosphorus, or Dissolved Phosphorus parameters. Values for Anions and Cation and Anion Balance can not be provided for these samples.

Samples were filtered at the laboratory through a 0.45 µm filter prior to analysis for Iron, Manganese, and Phosphorus; these results reflect dissolved parameters. Phosphorus was also analyzed without filtration; these results reflect total parameters.

All samples were received past the method-recommended holding time for pH analysis.

Low level metals analyses were performed by Batelle; Biochemical Oxygen Demand (BOD), Sulfate, Dissolved Phosphorus, Total Phosphorus, and Total Potassium analyses were performed by Northern Lake Services (NLS). Samples were filtered for Dissolved Phosphorus upon receipt at NLS. All results are included herein, with the exception of low level metals; those results will follow in an amended report.

CALCULATIONS:

Results for Sodium Absorption Ratio (Modified SAR), Cations, Anions, and Cation and Anion Balance were obtained by calculation using analytical data. The Cations reflect results for Calcium, Magnesium, Potassium, and Sodium; the Anions reflect results for Chloride, Fluoride, Nitrate, Sulfate, Carbonate, and Bicarbonate.

Lisa Norosky
Lisa Norosky, Program Manager

940722
Date

Joblink: 811250

DATA SUMMARY REPORT

DATE: 07/27/94

PAGE: 1

Company: FOTH & VAN DYKE

Sample Point ID:	SG-19	SG-19	SG-19	SG-2	SG-2	SG-2	SG-2	SG-3
ETC Sample Number:	MF7021	MF7031	MF7061	MF7023	MF7033	MF7063	MF8654	MF7024
Sample Date:	940606	940606	940606	940607	940607	940607	940607	940607
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

CONVENTIONALS (AR55)

Parameters	Units	SG-19	SG-19	SG-19	SG-2	SG-2	SG-2	SG-2	SG-3
Cyanide, Total	mg/L	<.020	-	-	<.020	-	-	-	<.020
pH	std	7.20	-	-	7.70	-	-	-	7.80
Alkalinity as CaCO3	mg/L	41.8	-	-	85.0	-	-	-	94.0
Alkalinity, Hydroxide as CaCO3	mg/L	<0	-	-	<0	-	-	-	<0
Alkalinity, Bicarbonate CaCO3	mg/L	41.8	-	-	85.0	-	-	-	94.0
Alkalinity, Carbonate as CaCO3	mg/L	<0	-	-	<0	-	-	-	<0
Ammonia as N	mg/L	.112	-	-	.112	-	-	-	.280
Total Dissolved Solids (TDS)	mg/L	74.0	-	-	96.0	-	-	-	93.0
Fluoride	mg/L	<.100	-	-	<.100	-	-	-	<.100
Oil and Grease, (IR)	mg/L	<1.08	-	-	<1.13	-	-	-	<1.15
Chemical Oxygen Demand (COD)	mg/L	45.0	-	-	25.0	-	-	-	23.0
Conductivity	umhos	88.9	-	-	176	-	-	-	185
Hardness as CaCO3	mg/L	54.2	-	-	88.7	-	-	-	92.1
Nitrogen, Total Kjeldahl (TKN)	mg/L	.420	-	-	.336	-	-	-	.392
Solids, total suspended	mg/L	19.0	-	-	9.00	-	-	-	6.00
Chloride	mg/L	1.17	-	-	2.52	-	-	-	2.78
Nitrate as N	mg/L	.709	-	-	<.500	-	-	-	<.500
Sodium Absorption Ratio (SAR)	std	.076	-	-	.101	-	-	-	.104
Cations	meq/l	1.03	-	-	1.92	-	-	-	2.05
Anions	meq/l	.834	-	-	1.55	-	-	-	1.70
Cation and Anion Balance	%	10.5	-	-	10.7	-	-	-	9.15
Turbidity	NTU	2.70	-	-	2.20	-	-	-	.650
Phosphorus	mg/L	-	.055	-	-	.036	-	-	-
Phosphorus as P, dissolved	mg/L	-	.029	-	-	.017	-	-	-
Sulfate as SO4	mg/L	-	5.00	-	-	4.00	-	-	-
Biochemical Oxygen Demand	mg/L	-	-	<3.00	-	-	<3.00	-	-
Fecal Coliform	MPN	-	-	-	-	-	-	<1.00	-

3.7-9-175

Joblink: 811250

DATA SUMMARY REPORT

DATE: 07/27/94

PAGE: 2

Company: FOTH & VAN DYKE

		Sample Point ID:	SG-3	SG-3	SG-30	SG-30	SG-30	SG-6	SG-6	SG-6
		ETC Sample Number:	MF7034	MF7064	MF7022	MF7032	MF7062	MF7025	MF7035	MF7065
		Sample Date:	940607	940607	940606	940606	940606	940607	940607	940607
		Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC
Parameters	Units									
CONVENTIONALS (AR55)										
Cyanide, Total	mg/L	-	-	-	<.020	-	-	<.020	-	-
pH	std	-	-	-	8.40	-	-	7.60	-	-
Alkalinity as CaCO ₃	mg/L	-	-	-	102	-	-	92.0	-	-
Alkalinity, Hydroxide as CaCO ₃	mg/L	-	-	-	<0	-	-	<0	-	-
Alkalinity, Bicarbonate CaCO ₃	mg/L	-	-	-	102	-	-	92.0	-	-
Alkalinity, Carbonate as CaCO ₃	mg/L	-	-	-	<0	-	-	<0	-	-
Ammonia as N	mg/L	-	-	-	.112	-	-	.168	-	-
Total Dissolved Solids (TDS)	mg/L	-	-	-	114	-	-	95.0	-	-
Fluoride	mg/L	-	-	-	<.100	-	-	<.100	-	-
Oil and Grease, (IR)	mg/L	-	-	-	<1.03	-	-	<1.08	-	-
Chemical Oxygen Demand (COD)	mg/L	-	-	-	36.0	-	-	22.0	-	-
Conductivity	umhos	-	-	-	200	-	-	188	-	-
Hardness as CaCO ₃	mg/L	-	-	-	102	-	-	95.0	-	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	-	-	-	.504	-	-	.336	-	-
Solids, total suspended	mg/L	-	-	-	9.00	-	-	<5.00	-	-
Chloride	mg/L	-	-	-	1.10	-	-	1.22	-	-
Nitrate as N	mg/L	-	-	-	<.500	-	-	<.500	-	-
Sodium Absorption Ratio (SAR)	std	-	-	-	.076	-	-	.072	-	-
Cations	meq/l	-	-	-	2.20	-	-	2.02	-	-
Anions	meq/l	-	-	-	1.83	-	-	1.63	-	-
Cation and Anion Balance	%	-	-	-	9.19	-	-	10.8	-	-
Turbidity	NTU	-	-	-	.950	-	-	1.30	-	-
Phosphorus	mg/L	.029	-	-	-	.045	-	-	.029	-
Phosphorus as P, dissolved	mg/L	.014	-	-	-	.033	-	-	.011	-
Sulfate as SO ₄	mg/L	4.00	-	-	-	6.00	-	-	4.00	-
Biochemical Oxygen Demand	mg/L	-	<3.00	-	-	-	<3.00	-	-	<3.00
Fecal Coliform	MPN	-	-	-	-	-	-	-	-	-

3.7-9-176

Joblink: 811250

DATA SUMMARY REPORT

DATE: 07/27/94

Company: FOTH & VAN DYKE

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Sample Point ID:	SG-AB	SG-AB	SG-AB	SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02	SG-V
ETC Sample Number:	MF7030	MF7070	MF7449	MF7026	MF7066	MF7027	MF7067	MF7029
Sample Date:	940606	940606	940606	940606	940606	940606	940606	940606
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-	-	<.020	-	<.020	-	<.020
pH	std	7.70	-	-	7.40	-	7.40	-	7.50
Alkalinity as CaCO ₃	mg/L	80.0	-	-	56.0	-	54.0	-	72.0
Alkalinity, Hydroxide as CaCO ₃	mg/L	<0	-	-	<0	-	<0	-	<0
Alkalinity, Bicarbonate CaCO ₃	mg/L	80.0	-	-	56.0	-	54.0	-	72.0
Alkalinity, Carbonate as CaCO ₃	mg/L	<0	-	-	<0	-	<0	-	<0
Ammonia as N	mg/L	<.100	-	-	.112	-	.224	-	<.100
Total Dissolved Solids (TDS)	mg/L	105	-	-	73.0	-	69.0	-	100
Fluoride	mg/L	<.100	-	-	<.100	-	<.100	-	<.100
Oil and Grease, (IR)	mg/L	<1.01	-	-	<1.03	-	<1.12	-	<1.05
Chemical Oxygen Demand (COD)	mg/L	25.0	-	-	26.0	-	32.0	-	34.0
Conductivity	umhos	176	-	-	121	-	116	-	154
Hardness as CaCO ₃	mg/L	82.8	-	-	59.0	-	63.0	-	69.5
Nitrogen, Total Kjeldahl (TKN)	mg/L	.308	-	-	.504	-	.784	-	.420
Solids, total suspended	mg/L	<5.00	-	-	7.00	-	9.00	-	8.00
Chloride	mg/L	3.01	-	-	2.54	-	2.53	-	2.63
Nitrate as N	mg/L	.764	-	-	.736	-	.735	-	.761
Sodium Absorption Ratio (SAR)	std	.107	-	-	.108	-	.109	-	.104
Cations	meq/l	1.91	-	-	1.26	-	1.29	-	1.67
Anions	meq/l	-	-	-	-	-	-	-	-
Cation and Anion Balance	%	-	-	-	-	-	-	-	-
Turbidity	NTU	1.00	-	-	1.90	-	2.20	-	1.30
Phosphorus	mg/L	-	-	-	-	-	-	-	-
Phosphorus as P, dissolved	mg/L	-	-	-	-	-	-	-	-
Sulfate as SO ₄	mg/L	-	-	-	-	-	-	-	-
Biochemical Oxygen Demand	mg/L	-	5.00	-	-	<3.00	-	4.00	-
Fecal Coliform	MPN	-	-	<1.00	-	-	-	-	-

3.7-9-177

Joblink: 811250

DATA SUMMARY REPORT

DATE: 07/27/94

Company: FOTH & VAN DYKE

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Sample Point ID:	SG-V	SG-V	SG-Y	SG-Y
ETC Sample Number:	MF7069	MF7071	MF7028	MF7068
Sample Date:	940606	940606	940606	940606
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	-	-	<.020	-
pH	std	-	-	7.60	-
Alkalinity as CaCO ₃	mg/L	-	-	41.0	-
Alkalinity, Hydroxide as CaCO ₃	mg/L	-	-	<0	-
Alkalinity, Bicarbonate CaCO ₃	mg/L	-	-	41.0	-
Alkalinity, Carbonate as CaCO ₃	mg/L	-	-	<0	-
Ammonia as N	mg/L	-	-	.190	-
Total Dissolved Solids (TDS)	mg/L	-	-	62.0	-
Fluoride	mg/L	-	-	<.100	-
Oil and Grease, (IR)	mg/L	-	-	<1.15	-
Chemical Oxygen Demand (COD)	mg/L	-	-	30.0	-
Conductivity	umhos	-	-	100	-
Hardness as CaCO ₃	mg/L	-	-	38.8	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	-	-	.588	-
Solids, total suspended	mg/L	-	-	<5.00	-
Chloride	mg/L	-	-	2.48	-
Nitrate as N	mg/L	-	-	<.500	-
Sodium Absorption Ratio (SAR)	std	-	-	.114	-
Cations	meq/l	-	-	1.05	-
Anions	meq/l	-	-	-	-
Cation and Anion Balance	%	-	-	-	-
Turbidity	NTU	-	-	1.80	-
Phosphorus	mg/L	-	-	-	-
Phosphorus as P, dissolved	mg/L	-	-	-	-
Sulfate as SO ₄	mg/L	-	-	-	-
Biochemical Oxygen Demand	mg/L	5.00	-	-	<3.00
Fecal Coliform	MPN	-	<1.00	-	-

3.7-9-178

Joblink: 811250

DATA SUMMARY REPORT

DATE: 07/27/94

Company: FOTH & VAN DYKE

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Sample Point ID:	SG-19	SG-19	SG-2	SG-2	SG-3	SG-3	SG-30	SG-30
ETC Sample Number:	MF7021	MF7041	MF7023	MF7043	MF7024	MF7044	MF7022	MF7042
Sample Date:	940606	940606	940607	940607	940607	940607	940606	940606
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	.167	-	.168	-	.163	-	.101
Manganese	mg/L	-	<.010	-	<.010	-	<.010	-	<.010
Selenium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Antimony, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Arsenic, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Barium, Total	mg/L	<.010	-	.014	-	.013	-	.011	-
Beryllium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Boron, Total	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Calcium, Total	mg/L	10.7	-	20.4	-	21.8	-	24.2	-
Chromium, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Iron, Total	mg/L	.333	-	.439	-	.354	-	<.100	-
Magnesium, Total	mg/L	5.38	-	9.80	-	10.4	-	11.1	-
Manganese, Total	mg/L	.022	-	.088	-	.076	-	.019	-
Molybdenum, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Nickel, Total	mg/L	<.030	-	<.030	-	<.030	-	<.030	-
Potassium, Total	mg/L	<.600	-	<.600	-	<.600	-	<.600	-
Silver, Total	mg/L	<.010	-	<.010	-	<.010	-	<.010	-
Sodium, Total	mg/L	1.22	-	2.21	-	2.36	-	1.79	-
Thallium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-

Sample Point ID:	SG-6	SG-6	SG-AB	SG-AB	SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02
ETC Sample Number:	MF7025	MF7045	MF7030	MF7050	MF7026	MF7046	MF7027	MF7047
Sample Date:	940607	940607	940606	940606	940606	940606	940606	940606
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	.108	-	.266	-	.260	-	.267
Manganese	mg/L	-	<.010	-	<.010	-	<.010	-	<.010
Selenium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Antimony, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Arsenic, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Barium, Total	mg/L	<.010	-	.012	-	.011	-	.012	-
Beryllium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-

3.7-9-179

Joblink: 811250

DATA SUMMARY REPORT

DATE: 07/27/94

Company: FOTH & VAN DYKE

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Sample Point ID:	SG-6	SG-6	SG-AB	SG-AB	SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02
ETC Sample Number:	MF7025	MF7045	MF7030	MF7050	MF7026	MF7046	MF7027	MF7047
Sample Date:	940607	940607	940606	940606	940606	940606	940606	940606
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Boron, Total	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Calcium, Total	mg/L	21.7	-	19.8	-	13.1	-	13.3	-
Chromium, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Iron, Total	mg/L	.160	-	.401	-	.542	-	.542	-
Magnesium, Total	mg/L	10.5	-	10.0	-	6.40	-	6.44	-
Manganese, Total	mg/L	.061	-	.098	-	.096	-	.097	-
Molybdenum, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Nickel, Total	mg/L	<.030	-	<.030	-	<.030	-	<.030	-
Potassium, Total	mg/L	<.600	-	<.600	-	<.600	-	.670	-
Silver, Total	mg/L	<.010	-	<.010	-	<.010	-	<.010	-
Sodium, Total	mg/L	1.64	-	2.34	-	1.91	-	1.93	-
Thallium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-

Sample Point ID:	SG-V	SG-V	SG-Y	SG-Y
ETC Sample Number:	MF7029	MF7049	MF7028	MF7048
Sample Date:	940606	940606	940606	940606
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	.351	-	.188
Manganese	mg/L	-	<.010	-	<.010
Selenium, Total	mg/L	<.005	-	<.005	-
Antimony, Total	mg/L	<.005	-	<.005	-
Arsenic, Total	mg/L	<.005	-	<.005	-
Barium, Total	mg/L	.011	-	.010	-
Beryllium, Total	mg/L	<.005	-	<.005	-
Boron, Total	mg/L	<.100	-	<.100	-
Calcium, Total	mg/L	17.3	-	10.7	-
Chromium, Total	mg/L	<.020	-	<.020	-
Iron, Total	mg/L	.674	-	.341	-
Magnesium, Total	mg/L	8.72	-	5.02	-
Manganese, Total	mg/L	.080	-	.065	-
Molybdenum, Total	mg/L	<.020	-	<.020	-

3.7-9-180

Joblink: 811250

DATA SUMMARY REPORT

DATE: 07/27/94

PAGE: 7

Company: FOTH & VAN DYKE

Sample Point ID:	SG-V	SG-V	SG-Y	SG-Y
ETC Sample Number:	MF7029	MF7049	MF7028	MF7048
Sample Date:	940606	940606	940606	940606
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Nickel, Total	mg/L	<.030	-	<.030	-
Potassium, Total	mg/L	<.600	-	.810	-
Silver, Total	mg/L	<.010	-	<.010	-
Sodium, Total	mg/L	2.12	-	1.81	-
Thallium, Total	mg/L	<.005	-	<.005	-

3.7-9-181

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570

51250

ITEM NO.		ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	
1		R	SG-CC-01	9/6/86	0920	Well.....(W) Outfall.....(O)	
2		R	SG-CE-02	/	1	Soil.....(S) River/Stream.....(R)	
3		R	SG-Y	/	1135	Bottom Sediment.....(B)	
4		R	SG-V	/	13:00	Generation Point.....(G)	
5		R	SG-AB	/	14:25	Surface Impoundment (I)	
6						Treatment Facility.....(T)	
7						Leachate Collection Sys.....(C)	
8						Lake/Ocean.....(L)	
9						Other.....(X)	
						Specify _____	

CHAIN OF CUSTODY CHRONICLE

1.	Shuttle Opened By: (print) <u>SCOTT JANSSEN</u>	Date: <u>6/6/94</u>	Time: <u>0800</u>
	Signature: <u>Scott Jansen</u>	Seal #: <u>71538</u>	Intact: <u>YES</u>
I have received these materials in good condition from the above person			
2.	Name _____	Signature _____	
	Date: _____	Time: _____	Remarks: _____
I have received these materials in good condition from the above person			
3.	Name: _____	Signature _____	
	Date: _____	Time: _____	Remarks: _____
4.	Shuttle Sealed By: (print) <u>SCOTT JANSSEN</u>	Date: <u>6/7/94</u>	Time: <u>1330</u>
	Signature: <u>Scott Jansen</u>	Seal #: <u>70160</u>	Intact: <u>YES</u>

REMARKS

SAMPLER'S SIGNATURE

LAB USE ONLY Opened By: Phil Dwyer Date: 6/8/94 Time: 0930
SHUTTLE # N/A TEMP. °C 0.5M2 SEAL # 10160 COND. Good

Scott Jansen

WHITE: LAB COPY

YELLOW: SAMPLER COPY

PINK: CLIENT COPY

3.7-9-182

ETC

CHAIN-OF-CUSTODY RECORD

No. 114104

811250

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570

COMPANY **FOTH & VAN DYKE** FACILITY/SITE **CRANDON MINING Co. 93C049**

PROJECT CONTACT **RUSS JANESHEK** TELEPHONE NO. **414-497-2500**

NUMBER
OF CONTAINERS

FILT. (Y/N)

PRESERV.

ANALYSIS
REQUIREDLEGEND FOR
PRESERVATIVE

0 - NONE
1 - HCL
2 - HNO₃
3 - H₂SO₄
4 - Na₂SO₄+H₂SO₄

SEE ATTACHMENT

SAMPLER
OBSERVATIONSLAB
OBSERVATIONS

ITEM NO	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	Source Codes: Well.....(W) Outfall.....(O) Soil.....(S) River/Stream.....(R) Bottom Sediment.....(B) Generation Point.....(G) Surface Impoundment (I) Treatment Facility.....(T) Leachate Collection Sys.....(C) Lake/Ocean.....(L) Other.....(X) Specify
1		R	SG-19	6/6/94	1715	
2		R	SG-30	6/6/94	1800	
3		R	SG-2	6/7/94	0900	
4		R	SG-3	↓	1100	
5		R	SG-6	↓	1200	
6						
7						
8						
9						

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) SCOTT JANSEN Date: 6/6/94 Time: 0800
Signature: Scott Jansen Seal #: 71533 Intact: YES

I have received these materials in good condition from the above person.

2. Name: _____ Signature: _____
Date: _____ Time: _____ Remarks: _____

I have received these materials in good condition from the above person.

3. Name: _____ Signature: _____
Date: _____ Time: _____ Remarks: _____

4. Shuttle Sealed By: (print) SCOTT JANSEN Date: 6/7/94 Time: 1300
Signature: Scott Jansen Seal #: 70156 Intact: YES

LAB USE ONLY Opened By: Bill Jansen Date: 6/8/94 Time: 0930
SHUTTLE # WJA TEMP. °C 0548 SEAL # 70156 COND. GOOD

REMARKS

SG-3 - HNO₃ Top to vial in sample bottle

SAMPLER'S SIGNATURE

Scott Jansen

WHITE: LAB COPY

YELLOW: SAMPLER COPY

PINK: CLIENT COPY

3.7-9-183

1 of 2

ETC

CHAIN-OF-CUSTODY RECORD REQUEST FOR ANALYTICAL SERVICES

REV. 04/9
FORM 30

ENVIRONMENTAL TESTING AND CERTIFICATION CORP ■ 320 TESCOMI CIRCLE SUITE G ■ SANTA ROSA CA 95401 ■ (707)544-5570

SUBCONTRACT LAB
NORTHERN LAKE SERVICES

TELEPHONE NUMBER

LABORATORY CONTACT

TELEPHONE NUMBER

JIM FISHER

ADDRESS

202N PROSPECT

CRANDON, WI 54520

NUMBER
OF CONTAINERSN
2
X
H

FILT. (Y/N)

PRESERV.

LEGEND FOR
PRESERVATIVE:

- 0 - NONE
- 1 - HCL
- 2 - HNO₃
- 3 - H₂SO₄
- 4 - Na₂SO₄ + H₂SO₄

MATRIX CODES:

	ETC JOB NUMBER	MATRIX CODE	JOB LINK NUMBER	SAMPLE DATE	
1	MF7021	1	81250	9A0606	Liquid..... 1
2	MF7022	1			Solid/Sludge..... 2
3	MF7023	1		9A0607	Oily Solid..... 3
4	MF7024	1			Oily Liquid..... 4
5	MF7025	1			Wipe..... 5
6	MF7026	1		9A0606	Leachate..... 7
7	MF7027	1			Air..... 8
8	MF7028	1			Other.....

REMARKS:

* TOTAL POTASSIUM
By ICP.
#1350 EACH

CHAIN OF CUSTODY CHRONICLE

 RESULTS REQUESTED BY (DATE): 14 DAY TAT
 SEND RESULTS TO: LISA NEWOSKY

RESULTS MUST INCLUDE:

STANDARD ☒EXTENDED ☐OTHER ☐

• Method Blank

• Raw Data

• Blank Spike

• Other

• MS/MSD

1. Relinquished To: FEDERAL EXPRESS Date: 4/13/94 Time: 1645

(Carrier) (Tracking Number)

By (signature): Jim Fisher Shuttle/Seal# 71560 Intact: _____2. Receiving Lab/Opened By: D. Cottrell Date: 4-15-94 Time: _____

Temp. °C

Seal #:

Condition: _____

3.7-9-184

 54411
 54412
 54413
 54414
 54415
 54416
 54417
 54418

ETC

CHAIN-OF-CUSTODY RECORD REQUEST FOR ANALYTICAL SERVICES

REV. 04/9
FORM 30

ENVIRONMENTAL TESTING AND CERTIFICATION CORP ■ 320 TESCONI CIRCLE SUITE G ■ SANTA ROSA CA 95401 ■ (707)544-5570

[illegible]

CHAIN OF CUSTODY CHRONICLE

1.	Relinquished To: <u>FEDERAL EXPRESS</u> (carrier) By (signature): <u>[Signature]</u> (tracking number)	Date: <u>4/13/94</u> Time: <u>1645</u> Shuttle/Seal# <u>71560</u> Intact: <u> </u>
2.	I have received these materials in good condition from the above person Receiving Lab/Opened By: <u>[Signature]</u> Seal #:	Date: <u>6-15-94</u> Time: <u> </u> Condition: <u> </u>

RESULTS REQUESTED BY (DATE): 14 DAY TAT
SEND RESULTS TO: LISA NOROSKY

RESULTS MUST INCLUDE:

STANDARD ☒ EXTENDED ☐ OTHER ☐

- Method Blank

- Raw Data

- **Blank Spike**

- Other

- MS/MSD



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 09526

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT FATH & VAN DYKE				PROJECT TITLE CRANDON MINING CO.			
ADDRESS 2737 S. RIDGE RD.				PROJECT NO. 93C049		P.O. NO.	
CITY GREEN BAY		STATE WI		ZIP 54307		CONTACT RUSS JANESHEK	
						PHONE 414-497-2500	

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE		COLLECTION REMARKS
			DATE	TIME					
1.	58389	SG-19	6-6-94	17:15	SW	GRAB	2	1	
2.	58390	SG-30	6-6-94	17:55	SW	GRAB	2	1	
3.	58391	SG-2	6/7/94	0900			3	1	
4.	58392	SG-3		1100			2	1	
5.	58393	SG-6		1200			2	1	
6.									
7.									
8.									
9.									
10.									
11.									
12.									

SAMPLE TYPE: SW = surface water DW = drinking water PROD = product WW = wastewater TIS = tissue SOIL = soil GW = groundwater AIR = air SED = sediment describe others	CONTAINER P = plastic G = glass V = glass vial B = plastic bag describe others
PRESERVATIVES & PREPARATION NP = nothing added OH = sodium hydroxide S = sulfonic acid HA = hydrochloric & ascorbic acid N = nitric acid H = hydrochloric acid Z = zinc acetate F = field filtered	

COLLECTED BY (signature) <i>Scott Jones</i>		CUSTODY SEAL NO. (IF ANY)		DATE/TIME 6/7/94 1230	
RELINQUISHED BY (signature)		RECEIVED BY (signature)		DATE/TIME	
RELINQUISHED BY (signature)		RECEIVED BY (signature)		DATE/TIME	
DISPATCHED BY (signature) <i>Scott Jones</i>		METHOD OF TRANSPORT FVD		DATE/TIME 6/7/94 1245	
RECEIVED AT NLS BY (signature) <i>David H. Jones</i>		DATE/TIME 6/7/94 12:45		CONDITION	
SEAL INTACT? ☐ YES ☐ NO		REMARKS & OTHER INFORMATION		TEMP.	

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
 2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
 3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 09492

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT FUTH VANDYKE		PROJECT TITLE CRANDON MINE C	
ADDRESS 2737 S. RIDGE RD		PROJECT NO. 93049	P.O. NO.
CITY GREEN BAY	STATE WI	ZIP 54307	CONTACT RUSS JANESHEK
			PHONE 914-497-2500

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			PNP				
1.	S8331	SG-CC-01	6/6/94	0920	SW	GRAB	1				
2.	S8332	SG-CC-02	1	0920	1	1	1				
3.	S8333	SG-Y	1	1135	1	1	1				
4.	S8334	SG-V	1	1520	1	1	2				
5.	S8335	SG-AB	1	1425	1	1	2				
6.											
7.											
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE:

SW = surface water
WW = wastewater
GW = groundwater

DW = drinking water
TIS = tissue
AIR = air

PROD = product
SOIL = soil
SED = sediment

describe others

CONTAINER

P = plastic
G = glass
V = glass vial
B = plastic bag

describe others

PRESERVATIVES & PREPARATION

NP = nothing added
S = sulfuric acid
N = nitric acid
Z = zinc acetate

OH = sodium hydroxide
HA = hydrochloric & ascorbic acid
H = hydrochloric acid

F = field filtered

COLLECTED BY (signature) Scott Janeshek		CUSTODY SEAL NO. (IF ANY)		DATE/TIME 6/6/94 1550
RELINQUISHED BY (signature)		RECEIVED BY (signature)		DATE/TIME
RELINQUISHED BY (signature)		RECEIVED BY (signature)		DATE/TIME
DISPATCHED BY (signature) Scott Janeshek		METHOD OF TRANSPORT FVD		DATE/TIME 6/6/94 1550
RECEIVED AT NLS BY (signature) Haley Shivers		DATE/TIME 6-06-94 15:50	CONDITION	TEMP. 0.2°
SEAL INTACT ☐ YES ☐ NO		REMARKS & OTHER INFORMATION		

IMPORTANT:

1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY

July 19, 1994



An ETC Laboratory

320 Tesconi Circle

Suite G

Santa Rosa, CA

95401

Telephone

(707) 544-5570

Facsimile

(707) 544-4906

CLIENT: FOTH & VAN DYKE
P.O. BOX 19012
2737 S. RIDGE ROAD
GREEN BAY, WI 54307-9012

ATTN: RUSS JANESHEK

JOB LINK: 811267
PROJECT: CRANDON MINING CO

ANALYSIS

6010 & 7000 SERIES METALS

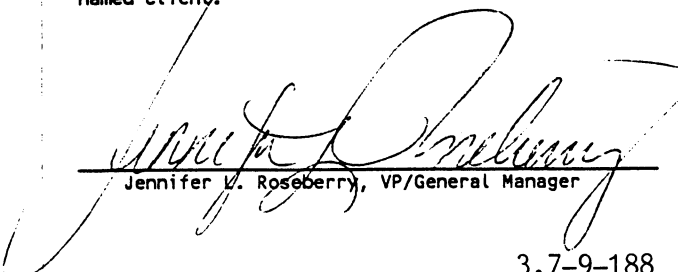
CONVENTIONALS: ALKALINITY AS CaCO_3 ; ALKALINITY, HYDROXIDE AS CaCO_3 ;
ALKALINITY, BICARBONATE CaCO_3 ; ALKALINITY, CARBONATE AS CaCO_3 ; AMMONIA AS N; ANIONS;
BIOCHEMICAL OXYGEN DEMAND; CATION AND ANION BALANCE; CATIONS;
CHEMICAL OXYGEN DEMAND (COD); CHLORIDE; CONDUCTIVITY; CYANIDE, TOTAL; FLUORIDE;
HARDNESS AS CaCO_3 ; NITRATE AS N; NITROGEN, TOTAL KJELDAHL (TKN); OIL AND GREASE, (IR);
PH; PHOSPHORUS; PHOSPHORUS AS P, DISSOLVED; SODIUM ABSORPTION RATIO (SAR);
SOLIDS, TOTAL SUSPENDED; SULFATE AS SO_4 ; TOTAL DISSOLVED SOLIDS (TDS); TURBIDITY

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE DATE</u>	<u>DATE IN LAB</u>
MF7171	SG-E	LIQUID	06-07-94	06-09-94
MF7172	LG-13	LIQUID	06-07-94	06-09-94
MF7173	LG-07-01	LIQUID	06-08-94	06-09-94
MF7174	LG-07-02	LIQUID	06-08-94	06-09-94
MF7175	LG-11	LIQUID	06-08-94	06-09-94
MF7176	SG-E	LIQUID	06-07-94	06-09-94
MF7177	LG-13	LIQUID	06-07-94	06-09-94
MF7178	LG-07-01	LIQUID	06-08-94	06-09-94
MF7179	LG-07-02	LIQUID	06-08-94	06-09-94
MF7180	LG-11	LIQUID	06-08-94	06-09-94
MF7181	SG-E	LIQUID	06-07-94	06-09-94
MF7182	LG-13	LIQUID	06-07-94	06-09-94
MF7183	LG-07-01	LIQUID	06-08-94	06-09-94
MF7184	LG-07-02	LIQUID	06-08-94	06-09-94
MF7185	LG-11	LIQUID	06-08-94	06-09-94
MF7186	SG-E	LIQUID	06-07-94	06-09-94
MF7187	LG-13	LIQUID	06-07-94	06-09-94
MF7188	LG-07-01	LIQUID	06-08-94	06-09-94
MF7189	LG-07-02	LIQUID	06-08-94	06-09-94
MF7190	LG-11	LIQUID	06-08-94	06-09-94
MF7191	SG-E	LIQUID	06-07-94	06-09-94
MF7192	LG-13	LIQUID	06-07-94	06-09-94

(Continued)

This report is "PROPRIETARY AND CONFIDENTIAL" and delivered to, and intended for the exclusive use of the above named client only. ETC, a Division of APBI Environmental Sciences Group, Inc. assumes no responsibility or liability for the reliance hereon or use hereof by anyone other than the above named client.

A division of
APBI Environmental
Sciences Group, Inc.


Jennifer V. Roseberry, VP/General Manager

9/40725
Date

3.7-9-188



July 19, 1994

Page 2

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE DATE</u>	<u>DATE IN LAB</u>
MF7193	LG-07-01	LIQUID	06-08-94	06-09-94
MF7194	LG-07-02	LIQUID	06-08-94	06-09-94
MF7195	LG-11	LIQUID	06-08-94	06-09-94



FOTH & VAN DYKE
JULY 19, 1994
811267

SAMPLE MATRIX: LIQUID

<u>Parameter</u>	<u>EPA Prep Method</u>	<u>EPA Analysis Method</u>
ICP Metals	3015	6010
Antimony	3015	7041
Arsenic	3015	7060
Potassium*	3010	6010
Selenium	7740	7740
Thallium	3015	7841
Mercury	7470	7470
Alkalinity as CaCO ₃	NA	310.1
Alkalinity, Hydroxide as CaCO ₃	NA	310.1
Bicarbonate as CaCO ₃	NA	310.1
Carbonate Alkalinity as CaCO ₃	NA	310.1
Ammonia as N	350.2	350.2
Anions	‡	‡
Cation and Anion Balance	‡	‡
Cations	‡	‡
Chemical Oxygen Demand	NA	410.4
Chloride	NA	300.0
Conductivity	NA	9050
Total Cyanide	9010	9010
Fluoride	NA	340.2
Hardness as CaCO ₃	NA	130.2
Nitrate as N	NA	300.0
Total Kjeldahl Nitrogen	351.3	351.3
Oil & Grease	413.2	413.2
pH	NA	9040
Phosphorus*	365.2	365.2
Phosphorus as P, Dissolved*	365.2	365.2
Sodium Absorption Ratio	‡	‡
Total Suspended Solids	NA	160.2
Sulfate as SO ₄ *	NA	375.2
Total Dissolved Solids	NA	160.1
Turbidity	NA	180.1
Biochemical Oxygen Demand*	405.1	405.1

* ANALYSIS PERFORMED BY NORTHERN LAKE SERVICE, INC

‡ CALCULATION

ns



FOTH & VAN DYKE
15 JULY 1994

EXECUTIVE SUMMARY
ETC JOBLINK 811267

On 09 June 1994 ETC-Santa Rosa received aqueous samples from Foth & Van Dyke via Federal Express. The cooler temperatures were both 0°C upon receipt at the laboratory. The samples were analyzed as specified on the preceding page.

Sample LG-13 was received unpreserved for Cyanide; this analysis was cancelled by the client on 22 June.

Samples were filtered at the laboratory through a 0.45 μ m filter prior to analysis for Iron, Manganese, and Phosphorus; these results reflect dissolved parameters. Phosphorus was also analyzed without filtration; these results reflect total parameters.

All samples were received past the method-recommended holding time for pH analysis.

Low level metals analyses were performed by Batelle; Biochemical Oxygen Demand (BOD), Sulfate, Dissolved Phosphorus, Total Phosphorus, and Total Potassium analyses were performed by Northern Lake Services (NLS). Samples were filtered for Dissolved Phosphorus upon receipt at NLS. All results are included herein, with the exception of low level metals; those results will follow in an amended report.

CALCULATIONS:

Results for Sodium Absorption Ratio (Modified SAR), Cations, Anions, and Cation and Anion Balance were obtained by calculation using analytical data. The Cations reflect results for Calcium, Magnesium, Potassium, and Sodium; the Anions reflect results for Chloride, Fluoride, Nitrate, Sulfate, Carbonate, and Bicarbonate.

Lisa Norosky
Lisa Norosky, Program Manager

940725
Date

Joblink: 811267

DATA SUMMARY REPORT

DATE: 07/15/94

Company: FOTH & VAN DYKE

PAGE: 1

Sample Point ID:		LG-07-01	LG-07-01	LG-07-01	LG-07-02	LG-07-02	LG-07-02	LG-11	LG-11
ETC Sample Number:		MF7173	MF7178	MF7193	MF7174	MF7179	MF7194	MF7175	MF7180
Sample Date:		940608	940608	940608	940608	940608	940608	940608	940608
Facility Code:		FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC
Parameters	Units								
CONVENTIONALS (AR55)									
Cyanide, Total	mg/L	<.020	-	-	<.020	-	-	<.020	-
pH	std	5.80	-	-	5.70	-	-	6.60	-
Ammonia as N	mg/L	<.100	-	-	<.100	-	-	<.100	-
Fluoride	mg/L	<.100	-	-	<.100	-	-	<.100	-
Solids, total suspended	mg/L	<5.00	-	-	<5.00	-	-	<5.00	-
Total Dissolved Solids (TDS)	mg/L	29.0	-	-	<5.00	-	-	<5.00	-
Oil and Grease, (IR)	mg/L	<1.02	-	-	<1.01	-	-	<1.00	-
Hardness as CaCO ₃	mg/L	8.32	-	-	9.11	-	-	8.71	-
Chemical Oxygen Demand (COD)	mg/L	19.0	-	-	12.0	-	-	13.0	-
Conductivity	umhos	17.0	-	-	16.9	-	-	18.9	-
Turbidity	NTU	.492	-	-	.553	-	-	1.20	-
Chloride	mg/L	1.08	-	-	1.07	-	-	1.07	-
Nitrate as N	mg/L	<.500	-	-	<.500	-	-	<.500	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	.308	-	-	.224	-	-	.308	-
Alkalinity as CaCO ₃	mg/L	34.6	-	-	13.6	-	-	2.80	-
Alkalinity, Hydroxide as CaCO ₃	mg/L	0	-	-	0	-	-	0	-
Alkalinity, Bicarbonate CaCO ₃	mg/L	34.6	-	-	13.6	-	-	2.80	-
Alkalinity, Carbonate as CaCO ₃	mg/L	0	-	-	0	-	-	0	-
Sodium Absorption Ratio (SAR)	std	0	-	-	0	-	-	0	-
Cations	meq/l	.058	-	-	.058	-	-	.119	-
Anions	meq/l	.742	-	-	.378	-	-	.201	-
Cation and Anion Balance	%	-90	-	-	-70	-	-	-30	-
Phosphorus	mg/L	-	.011	-	-	.010	-	-	.014
Phosphorus as P, dissolved	mg/L	-	.006	-	-	.004	-	-	<.004
Sulfate as SO ₄	mg/L	-	5.00	-	-	6.00	-	-	6.00
Biochemical Oxygen Demand	mg/L	-	-	<3.00	-	-	<3.00	-	-

3.7-9-192

Joblink: 811267

DATA SUMMARY REPORT

DATE: 07/15/94

Company: FOTH & VAN DYKE

PAGE: 2

Sample Point ID:	LG-11	LG-13	LG-13	LG-13	SG-E	SG-E	SG-E
ETC Sample Number:	MF7195	MF7172	MF7177	MF7192	MF7171	MF7176	MF7191
Sample Date:	940608	940607	940607	940607	940607	940607	940607
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	-	-	-	-	<.020	-	-
pH	std	-	5.70	-	-	7.90	-	-
Ammonia as N	mg/L	-	<.100	-	-	<.100	-	-
Fluoride	mg/L	-	<.100	-	-	<.100	-	-
Solids, total suspended	mg/L	-	<5.00	-	-	<5.00	-	-
Total Dissolved Solids (TDS)	mg/L	-	25.0	-	-	141	-	-
Oil and Grease, (IR)	mg/L	-	<1.10	-	-	<1.01	-	-
Hardness as CaCO3	mg/L	-	10.3	-	-	138	-	-
Chemical Oxygen Demand (COD)	mg/L	-	29.0	-	-	<10.0	-	-
Conductivity	umhos	-	20.0	-	-	259	-	-
Turbidity	NTU	-	2.98	-	-	1.42	-	-
Chloride	mg/L	-	.993	-	-	2.02	-	-
Nitrate as N	mg/L	-	<.500	-	-	.714	-	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	-	2.16	-	-	.308	-	-
Alkalinity as CaCO3	mg/L	-	4.40	-	-	129	-	-
Alkalinity, Hydroxide as CaCO3	mg/L	-	0	-	-	0	-	-
Alkalinity, Bicarbonate CaCO3	mg/L	-	4.40	-	-	129	-	-
Alkalinity, Carbonate as CaCO3	mg/L	-	0	-	-	0	-	-
Sodium Absorption Ratio (SAR)	std	-	0	-	-	.087	-	-
Cations	meq/l	-	.123	-	-	2.76	-	-
Anions	meq/l	-	.279	-	-	2.40	-	-
Cation and Anion Balance	%	-	-40	-	-	7.04	-	-
Phosphorus	mg/L	-	-	.025	-	-	.030	-
Phosphorus as P, dissolved	mg/L	-	-	.012	-	-	.009	-
Sulfate as SO4	mg/L	-	-	7.00	-	-	9.00	-
Biochemical Oxygen Demand	mg/L	<3.00	-	-	<3.00	-	-	<3.00

3.7-9-193

Joblink: 811267

DATA SUMMARY REPORT

DATE: 07/15/94

PAGE: 3

Company: FOTH & VAN DYKE

Sample Point ID:	LG-07-01	LG-07-01	LG-07-02	LG-07-02	LG-11	LG-11	LG-13	LG-13
ETC Sample Number:	MF7173	MF7183	MF7174	MF7184	MF7175	MF7185	MF7172	MF7182
Sample Date:	940608	940608	940608	940608	940608	940608	940607	940607
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	<.100	-	<.100	-	<.100	-	.117
Manganese	mg/L	-	.011	-	.012	-	<.010	-	.032
Selenium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Antimony, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Arsenic, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Barium, Total	mg/L	<.010	-	<.010	-	<.010	-	.011	-
Beryllium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-
Boron, Total	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Calcium, Total	mg/L	1.17	-	1.16	-	1.51	-	1.53	-
Chromium, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Iron, Total	mg/L	<.100	-	<.100	-	<.100	-	.149	-
Magnesium, Total	mg/L	<.500	-	<.500	-	.536	-	.567	-
Manganese, Total	mg/L	.015	-	.015	-	<.010	-	.037	-
Molybdenum, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Nickel, Total	mg/L	<.030	-	<.030	-	<.030	-	<.030	-
Potassium, Total	mg/L	<.600	-	<.600	-	<.600	-	<.600	-
Silver, Total	mg/L	<.010	-	<.010	-	<.010	-	<.010	-
Sodium, Total	mg/L	<1.00	-	<1.00	-	<1.00	-	<1.00	-
Thallium, Total	mg/L	<.005	-	<.005	-	<.005	-	<.005	-

Sample Point ID:	SG-E	SG-E
ETC Sample Number:	MF7171	MF7181
Sample Date:	940607	940607
Facility Code:	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	<.100
Manganese	mg/L	-	<.010
Selenium, Total	mg/L	<.005	-
Antimony, Total	mg/L	<.005	-
Arsenic, Total	mg/L	<.005	-
Barium, Total	mg/L	<.010	-
Beryllium, Total	mg/L	<.005	-

3.7-9-194

Joblink: 811267

DATA SUMMARY REPORT

DATE: 07/15/94

Company: FOTH & VAN DYKE

PAGE: 4

Sample Point ID: SG-E SG-E
ETC Sample Number: MF7171 MF7181
Sample Date: 940607 940607
Facility Code: FVDGRNBCMC FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Boron, Total	mg/L	<.100	-
Calcium, Total	mg/L	29.2	-
Chromium, Total	mg/L	<.020	-
Iron, Total	mg/L	<.100	-
Magnesium, Total	mg/L	14.6	-
Manganese, Total	mg/L	.012	-
Molybdenum, Total	mg/L	<.020	-
Nickel, Total	mg/L	<.030	-
Potassium, Total	mg/L	<.600	-
Silver, Total	mg/L	<.010	-
Sodium, Total	mg/L	2.31	-
Thallium, Total	mg/L	<.005	-

3.7-9-195

ETC

CHAIN-OF-CUSTODY RECORD

811267

No. 114110

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570									
COMPANY FOTH & VAN DYKE				FACILITY/SITE CRANDON MINING Co				FILT. (Y/N) PRESERV. ANALYSIS REQUIRED SEE ATTACHMENT	
PROJECT CONTACT RUSS JANESHEK				TELEPHONE NO 414-417-2500					
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	Source Codes: Well.....(W) Outfall.....(O) Soil.....(S) River/Stream.....(R) Bottom Sediment.....(B) Generation Point.....(G) Surface Impoundment (I) Treatment Facility.....(T) Leachate Collection Sys.....(C) Lake/Ocean.....(L) Other.....(X) Specify _____	LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₄ +H ₂ SO ₄		
							SAMPLER OBSERVATIONS	LAB OBSERVATIONS	
1		R	SG-2 S03 6/8/94	6/7/94					
2		R	SG-3 S03						
3		R	SG-6 S03						
4		R	SG-E		1515				
5		R	SLG-13		1715				
6		R	LG-07-01	6/8/94	0900				
7		R	LG-07-02		0900				
8		R	LG-11		1030				
9									

CHAIN OF CUSTODY CHRONICLE				REMARKS
3.7-9-196	Shuttle Opened By: (print) <u>SCOTT JANUSSEN</u> Date: <u>6/6/94</u> Time: <u>0700</u>			
	Signature: <u>Scott Janssen</u> Seal #: <u>71531</u> Intact: <u>YES</u>			
	I have received these materials in good condition from the above person			
	Name: _____ Signature: _____			
2.	Date: _____ Time: _____ Remarks: _____			
	I have received these materials in good condition from the above person			
	Name: _____ Signature: _____			
	Date: _____ Time: _____ Remarks: _____			
3.	Name: _____ Signature: _____			
	Date: _____ Time: _____ Remarks: _____			
	I have received these materials in good condition from the above person			
	Name: _____ Signature: _____			
4.	Shuttle Sealed By: (print) <u>SCOTT JANUSSEN</u> Date: <u>6/8/94</u> Time: <u>1200</u>			
	Signature: <u>Scott Janssen</u> Seal #: <u>70164</u> Intact: <u>YES</u>			
	LAB USE ONLY Opened By: <u>Phil Janssen</u> Date: <u>6/9/94</u> Time: <u>0945</u>			
	SHUTTLE # _____ TEMP. °C <u>0548</u> SEAL # <u>70162</u> COND. _____			

SAMPLER'S SIGNATURE <u>Scott Janssen</u>	
---	--

WHITE: LAB COPY

YELLOW: SAMPLER COPY

PINK: CLIENT COPY

2 of 2

ETC

CHAIN-OF-CUSTODY RECORD REQUEST FOR ANALYTICAL SERVICES

REV. 04/9
FORM 30

ENVIRONMENTAL TESTING AND CERTIFICATION CORP ■ 320 TESCOMI CIRCLE SUITE G ■ SANTA ROSA CA 95401 ■ (707)544-5570

SUBCONTRACT LAB
NORTHERN LAKE SERVICES

TELEPHONE NUMBER

LABORATORY CONTACT

TELEPHONE NUMBER

ADDRESS

200 N PROSPECT
CRANDON, WI 54520NUMBER
OF CONTAINERS

FILT. (Y/N)

PRESERV.

LEGEND FOR
PRESERVATIVE

0 - NONE
1 - HCL
2 - HNO₃
3 - H₂SO₄
4 - Na₂SO₄, H₂SO₄

MATRIX CODES:

REMARKS:

	ETC JOB NUMBER	MATRIX CODE	JOB LINK NUMBER	SAMPLE DATE
1	MF7029	1	811250	940606
2	MF7030	1	↓	↓
3	MF7171	1	811267	940607
4	MF7172	1	↓	↓
5	MF7173	1	↓	940608
6	MF7174	1	↓	↓
7	MF7175	1	↓	↓
8	MF7196 MF7197	1	811268	940608

Liquid..... 1
Solid/Sludge..... 2
Oily Solid..... 3
Oily Liquid..... 4
Wipe..... 5
Leachate..... 7
Air..... 8
Other _____

CHAIN OF CUSTODY CHRONICLE

RESULTS REQUESTED BY (DATE): 14 DAY TAT
SEND RESULTS TO: LISA NOROSKY

RESULTS MUST INCLUDE:

STANDARD ☒ EXTENDED ☐ OTHER ☐
 • Method Blank • Raw Data
 • Blank Spike • Other
 • MS/MSD

PO #: 29961

PLEASE INCLUDE PO # AND/OR JOBLINK # ON INVOICE

FOR ETC USE ONLY:

SENT DATE: INITIALS:
NOTES:

59049
59050
59051
59052
59053
59054
59055
59056
59057

3.7-9-197



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 09263

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT FOTH: VAN DYKE		PROJECT TITLE CRANDON MINING CO	
ADDRESS 2737 S. RIDGE Rd		PROJECT NO. 93049	P.O. NO.
CITY GREEN BAY	STATE WI	ZIP 54307	CONTACT RUSS JANESHEIK
			PHONE 414-497-2500

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			PNP	PS			
1.	58519	SG-E	6/8/94	1515	S.W.	GRAB	2	1			
2.	58520	LG-13		1715			2	1			
3.	58521	LG-7-01	6/8/94	0900			2	1			
4.	58522	LG-7-02		0900			2	1			
5.	58523	LG-11		1030			2	1			
6.											
7.											
8.											
9.											
10.											

SAMPLE TYPE: SW = surface water WW = wastewater GW = groundwater describe others	DW = drinking water TIS = tissue AIR = air	PROD = product SOIL = soil SED = sediment	CONTAINER P = plastic G = glass V = glass vial B = plastic bag describe others	PRESERVATIVES & PREPARATION NP = nothing added S = sulfuric acid N = nitric acid Z = zinc acetate OH = sodium hydroxide HA = hydrochloric & ascorbic acid H = hydrochloric acid F = field filtered
---	--	---	--	---

COLLECTED BY (signature) <i>Scott Janesheik</i>	CUSTODY SEAL NO. (IF ANY)	DATE/TIME 6/8/94 1130	
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME	
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME	
DISPATCHED BY (signature) <i>Scott Janesheik</i>	METHOD OF TRANSPORT FVD	DATE/TIME 6/8/94 1130	
RECEIVED AT NLS BY (signature) <i>N. Cottrell</i>	DATE/TIME 6-8-94 11:30	CONDITION In Ice	TEMP.
SEAL INTACT? ☐ YES ☐ NO	SEAL #	REMARKS & OTHER INFORMATION Hand Delivered	

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY

1232482230

RECIPIENT'S COPY

RECIPIENT'S COPY															
From (Your Name) Please Print		Your Phone Number (Very Important)		To (Recipient's Name) Please Print		Recipient's Phone Number (Very Important)									
Company		Department/Floor No.		Company		Department/Floor No.									
Street Address		Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.)													
City		State		ZIP Required		City		State		ZIP Required					
YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.)						IF HOLD AT FEDEX LOCATION, Print FEDEX Address Here									
PAYMENT 1 ☒ Bill Sender 2 ☐ Bill Recipient's FedEx Acct. No. 3 ☐ Bill 3rd Party FedEx Acct. No. 4 ☐ Bill Credit Card						Street Address									
5 ☐ Cash Check						City						State		ZIP Required	
SERVICES (Check only one box)		5 DELIVERY AND SPECIAL HANDLING (Check services required)		6 PACKAGES		WEIGHT in Pounds Only		YOUR DECLARED VALUE (See right)		Emp. No.		Date			
1 ☒ OTHER PACKAGING		1 ☐ HOLD AT FEDEX LOCATION WEEKDAY (Fill in Section H)		2 ☒ DELIVER WEEKDAY		1 70				☐ Cash Received					
16 ☐ FEDEX LETTER		51 ☐ OTHER PACKAGING								☐ Return Shipment					
12 ☐ FEDEX PAK		56 ☐ FEDEX LETTER								☐ Third Party		☐ Chg. To Del ☐ Chg. To Hold			
13 ☐ FEDEX BOX		52 ☐ FEDEX PAK		31 ☐ HOLD AT FEDEX LOCATION SATURDAY (Fill in Section H)						Street Address					
14 ☐ FEDEX TUBE		53 ☐ FEDEX BOX		3 ☐ DELIVER SATURDAY (Extra charge) (Not available to all locations)		Total Total Total				City		State Zip			
		54 ☐ FEDEX TUBE		9 ☐ SATURDAY PICK-UP (Extra charge)		1 16				Received By:					
30 ☐ ECONOMY		46 ☐ GOVT LETTER		4 ☐ DANGEROUS GOODS (Extra charge)						Date/Time Received		FedEx Employee Number			
41 ☐ GOVT PACKAGE		41 ☐ GOVT PACKAGE		6 ☐ DRY ICE Dangerous Goods Shipper's Declaration not required						REVISION DATE 12/92		FORMAT #158			
70 ☐ OVERNIGHT FREIGHT		80 ☐ TWO-DAY FREIGHT		12 ☐ HOLIDAY DELIVERY (if offered Extra charge)						158					



USE THIS AIRBILL FOR SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII
USE THE INTERNATIONAL AIR WAYBILL FOR SHIPMENTS TO PUERTO RICO AND ALL NON U.S. LOCATIONS.
QUESTIONS? CALL 800-238-5355 TOLL FREE.

AIRBILL
PACKAGE
TRACKING NUMBER

1332482241

12224 22241

RECIPIENT'S COPY[illegible]



An ETC Laboratory

320 Tesconi Circle

Suite G

Santa Rosa, CA
95401

Telephone
(707) 544-5570

Facsimile
(707) 544-4906

July 19, 1994

CLIENT: FOTH & VAN DYKE
P.O. BOX 19012
2737 S. RIDGE ROAD
GREEN BAY, WI 54307-9012

ATTN: RUSS JANESHEK

JOB LINK: 811268
PROJECT: CRANDON MINING CO 93C049

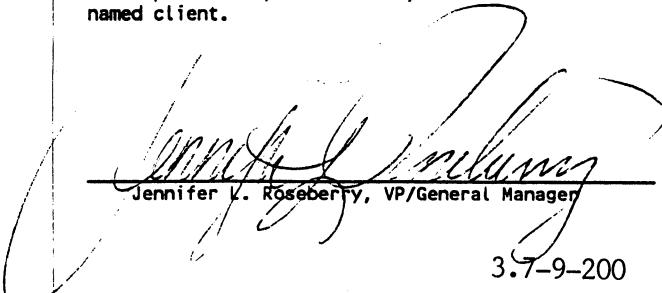
ANALYSIS

6010 & 7000 SERIES METALS

CONVENTIONAL: ALKALINITY AS CaCO_3 ; ALKALINITY, HYDROXIDE AS CaCO_3 ;
ALKALINITY, BICARBONATE CaCO_3 ; ALKALINITY, CARBONATE AS CaCO_3 ; AMMONIA AS N; ANIONS;
BIOCHEMICAL OXYGEN DEMAND; CATION AND ANION BALANCE; CATIONS;
CHEMICAL OXYGEN DEMAND (COD); CHLORIDE; CONDUCTIVITY; CYANIDE, TOTAL; FLUORIDE;
HARDNESS AS CaCO_3 ; NITRATE AS N; NITROGEN, TOTAL KJELDAHL (TKN); OIL AND GREASE, (IR);
PH; PHOSPHORUS; PHOSPHORUS AS P, DISSOLVED; SODIUM ABSORPTION RATIO (SAR);
SOLIDS, TOTAL SUSPENDED; SULFATE AS SO_4 ; TOTAL DISSOLVED SOLIDS (TDS); TURBIDITY

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE DATE</u>	<u>DATE IN LAB</u>
MF7196	LG-15	LIQUID	06-08-94	06-10-94
MF7197	LG-12	LIQUID	06-08-94	06-10-94
MF7198	LG-15	LIQUID	06-08-94	06-10-94
MF7199	LG-12	LIQUID	06-08-94	06-10-94
MF7200	LG-15	LIQUID	06-08-94	06-10-94
MF7201	LG-12	LIQUID	06-08-94	06-10-94
MF7202	LG-15	LIQUID	06-08-94	06-10-94
MF7203	LG-12	LIQUID	06-08-94	06-10-94
MF7204	LG-15	LIQUID	06-08-94	06-10-94
MF7205	LG-12	LIQUID	06-08-94	06-10-94

This report is "PROPRIETARY AND CONFIDENTIAL" and delivered to, and intended for the exclusive use of the above named client only. ETC, a Division of APBI Environmental Sciences Group, Inc. assumes no responsibility or liability for the reliance hereon or use hereof by anyone other than the above named client.


Jennifer L. Roseberry, VP/General Manager

940725
Date



FOTH & VAN DYKE
JULY 19, 1994
811268

SAMPLE MATRIX: LIQUID

Parameter	EPA	EPA
	Prep Method	Analysis Method
ICP Metals	3015	6010
Antimony	3015	7041
Arsenic	3015	7060
Potassium*	3010	6010
Selenium	7740	7740
Thallium	3015	7841
Mercury	7470	7470
Alkalinity as CaCO ₃	NA	310.1
Alkalinity, Hydroxide as CaCO ₃	NA	310.1
Bicarbonate as CaCO ₃	NA	310.1
Carbonate Alkalinity as CaCO ₃	NA	310.1
Ammonia as N	350.2	350.2
Anions	±	±
Cation and Anion Balance	±	±
Cations	±	±
Chemical Oxygen Demand	NA	410.4
Chloride	NA	300.0
Conductivity	NA	9050
Total Cyanide	9010	9010
Fluoride	NA	340.2
Hardness as CaCO ₃	NA	130.2
Nitrate as N	NA	300.0
Total Kjeldahl Nitrogen	351.3	351.3
Oil & Grease	413.2	413.2
pH	NA	9040
Phosphorus*	365.2	365.2
Phosphorus as P, Dissolved*	365.2	365.2
Sodium Absorption Ratio	±	±
Total Suspended Solids	NA	160.2
Sulfate as SO ₄ *	NA	375.2
Total Dissolved Solids	NA	160.1
Turbidity	NA	180.1
Biochemical Oxygen Demand*	405.1	405.1

* ANALYSIS PERFORMED BY NORTHERN LAKE SERVICE, INC

± CALCULATION

ns



FOTH & VAN DYKE
15 JULY 1994

EXECUTIVE SUMMARY
ETC JOBLINK 811268

On 10 June 1994 ETC-Santa Rosa received aqueous samples from Foth & Van Dyke via Federal Express. The cooler temperature was 0°C upon receipt at the laboratory. The samples were analyzed as specified on the preceding page.

Samples were filtered at the laboratory through a 0.45 μ m filter prior to analysis for Iron, Manganese, and Phosphorus; these results reflect dissolved parameters. Phosphorus was also analyzed without filtration; these results reflect total parameters.

All samples were received past the method-recommended holding time for pH analysis.

Low level metals analyses were performed by Batelle; Biochemical Oxygen Demand (BOD), Sulfate, Dissolved Phosphorus, Total Phosphorus, and Total Potassium analyses were performed by Northern Lake Services (NLS). Samples were filtered for Dissolved Phosphorus upon receipt at NLS. All results are included herein, with the exception of low level metals; those results will follow in an amended report.

CALCULATIONS:

Results for Sodium Absorption Ratio (Modified SAR), Cations, Anions, and Cation and Anion Balance were obtained by calculation using analytical data. The Cations reflect results for Calcium, Magnesium, Potassium, and Sodium; the Anions reflect results for Chloride, Fluoride, Nitrate, Sulfate, Carbonate, and Bicarbonate.

Lisa Norosky
Lisa Norosky, Program Manager

940725
Date

Joblink: 811268

DATA SUMMARY REPORT

DATE: 07/15/94

Company: FOTH & VAN DYKE

PAGE: 1

Sample Point ID:	LG-12	LG-12	LG-12	LG-15	LG-15	LG-15
ETC Sample Number:	MF7197	MF7199	MF7205	MF7196	MF7198	MF7204
Sample Date:	940608	940608	940608	940608	940608	940608
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-	-	<.020	-	-
pH	std	5.60	-	-	5.60	-	-
Chloride	mg/L	.977	-	-	<.500	-	-
Nitrate as N	mg/L	<.500	-	-	<.500	-	-
Solids, total suspended	mg/L	<5.00	-	-	<5.00	-	-
Total Dissolved Solids (TDS)	mg/L	8.00	-	-	27.0	-	-
Oil and Grease, (IR)	mg/L	<1.11	-	-	<1.01	-	-
Hardness as CaCO3	mg/L	7.92	-	-	11.1	-	-
Chemical Oxygen Demand (COD)	mg/L	30.0	-	-	50.0	-	-
Conductivity	umhos	15.1	-	-	11.9	-	-
Fluoride	mg/L	<.100	-	-	<.100	-	-
Ammonia as N	mg/L	<.100	-	-	.134	-	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	.420	-	-	1.54	-	-
Alkalinity as CaCO3	mg/L	3.60	-	-	6.40	-	-
Alkalinity, Hydroxide as CaCO3	mg/L	<0	-	-	<0	-	-
Alkalinity, Bicarbonate CaCO3	mg/L	3.60	-	-	6.40	-	-
Alkalinity, Carbonate as CaCO3	mg/L	<0	-	-	<0	-	-
Sodium Absorption Ratio (SAR)	std	<0	-	-	<0	-	-
Cations	meq/l	.058	-	-	.081	-	-
Anions	meq/l	.211	-	-	.188	-	-
Cation and Anion Balance	%	-60	-	-	-40	-	-
Turbidity	NTU	1.10	-	-	3.70	-	-
Phosphorus	mg/L	-	.026	-	-	.047	-
Phosphorus as P, dissolved	mg/L	-	<.004	-	-	.036	-
Sulfate as SO4	mg/L	-	6.00	-	-	4.00	-
Biochemical Oxygen Demand	mg/L	-	-	7.00	-	-	7.00

3.7-9-203

Joblink: 811268

DATA SUMMARY REPORT

DATE: 07/15/94

Company: FOTH & VAN DYKE

PAGE: 2

Sample Point ID:	LG-12	LG-12	LG-15	LG-15
ETC Sample Number:	MF7197	MF7201	MF7196	MF7200
Sample Date:	940608	940608	940608	940608
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	.134	-	.194
Manganese	mg/L	-	.030	-	.091
Selenium, Total	mg/L	<.005	-	<.005	-
Antimony, Total	mg/L	<.005	-	<.005	-
Arsenic, Total	mg/L	<.005	-	<.005	-
Barium, Total	mg/L	<.010	-	<.010	-
Beryllium, Total	mg/L	<.005	-	<.005	-
Boron, Total	mg/L	<.100	-	<.100	-
Calcium, Total	mg/L	1.16	-	1.30	-
Chromium, Total	mg/L	<.020	-	<.020	-
Iron, Total	mg/L	.116	-	.196	-
Magnesium, Total	mg/L	<.500	-	<.500	-
Manganese, Total	mg/L	.033	-	.096	-
Molybdenum, Total	mg/L	<.020	-	<.020	-
Nickel, Total	mg/L	<.030	-	<.030	-
Potassium, Total	mg/L	<.600	-	.620	-
Silver, Total	mg/L	<.010	-	<.010	-
Sodium, Total	mg/L	<1.00	-	<1.00	-
Thallium, Total	mg/L	<.005	-	<.005	-

3-7-9-204

ETC

CHAIN-OF-CUSTODY RECORD

811265

No. 114108

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570

COMPANY FOTH: VAN DYKE		FACILITY/SITE CRANDON MENING Co 930049		NUMBER OF CONTAINERS	FILT. (Y/N)										LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₄ + H ₂ SO ₄			
PROJECT CONTACT RUSS SANESHER		TELEPHONE NO 414-497-2500			PRESERV.													
					ANALYSIS REQUIRED SEE ATTACHMENT													
ITEM NO	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	Source Codes: Well.....(W) Outfall.....(O) Soil.....(S) River/Stream.....(R) Bottom Sediment.....(B) Generation Point.....(G) Surface Impoundment (I) Treatment Facility.....(T) Leachate Collection Sys.....(C) Lake/Ocean.....(L) Other.....(X) Specify											SAMPLER OBSERVATIONS	LAB OBSERVATIONS
1			L 6-15	9/4/08	1300		7											
2			L 6-12	↓	1415		7											
3																		
4																		
5																		
6																		
7																		
8																		
9																		

CHAIN OF CUSTODY CHRONICLE

REMARKS

1.	Shuttle Opened By: (print) SCOTT JANSSEN		Date: 6/6/94	Time: 0700
	Signature: Scott Janssen		Seal #: 71535	Intact: YES
I have received these materials in good condition from the above person				
2.	Name: _____		Signature: _____	
	Date: _____		Time: _____	
	Remarks: _____			
I have received these materials in good condition from the above person				
3.	Name: _____		Signature: _____	
	Date: _____		Time: _____	
	Remarks: _____			
4.	Shuttle Sealed By: (print) SCOTT JANSSEN		Date: 6/9/94	Time: 0900
	Signature: Scott Janssen		Seal #: 70159	Intact: YES
LAB USE ONLY Opened By: Scott Janssen Date: 6/10/94 Time: 0950				
SHUTTLE # N/A TEMP. °C 0.545 SEAL # 70159 COND. GOOD				

SAMPLER'S SIGNATURE

Scott Janssen

WHITE: LAB COPY

YELLOW: SAMPLER COPY

PINK: CLIENT COPY

3.7-9-205

ETC

REV. 04/93
FORM 301

[illegible]

	ETC JOB NUMBER	MATRIX CODE	JOB LINK NUMBER	SAMPLE DATE
1	MF1029	1	811250	940606
2	MF1030	1	↓	↓
3	MF1171	1	811267	940607
4	MF1172	1	↓	↓
5	MF1173	1	↓	940608
6	MF1174	1	↓	↓
7	MF1175	1	↓	↓
8	MF1196 MF1197	1	811268	940608

Liquid.....	1
Solid/Sludge.....	2
Oily Solid.....	3
Oily Liquid.....	4
Wipe.....	5
Leachate.....	7
Air.....	8
Other.....	

NUMBER
OF CONTAINERS
$$\frac{N}{2}$$

PRESERV.

· LEGEND FOR
PRESERVATIVE

0 - NONE
1 - HCL
2 - HNO₃
3 - H₂SO₄
4 - Na₂SO₄ & H₂SO₄

REMARKS:

* TOTAL POTASSIUM
Per ICP.
1350 EACH

RESULTS REQUESTED BY (DATE): 14 DAY TAT
SEND RESULTS TO: LISA NOROSKY

RESULTS MUST INCLUDE:

STANDARD ☒ EXTENDED ☐ OTHER ☐

- Method Blank
- Blank Spike
- MS/MSD
- Raw Data
- Other

PO #: 29961

PLEASE INCLUDE PO # AND/OR JOBLINK # ON INVOICE

FOR ETC USE ONLY:

STATE
MEXICO



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 09493

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT FOTH: VANDYKE		PROJECT TITLE CRANDON MINING Co	
ADDRESS 2737 S RIDGE RD		PROJECT NO. 930049	P.O. NO.
CITY GREEN BAY	STATE WI	ZIP 54307	CONTACT RUSS JANESHEK
			PHONE 715-497-2500

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			PNP	PS			
1.	58591	LG-15	6/8/94	1300	G.W	GRAB	2	1			
2.	58592	LG-12	↓	1415	↓	↓	2	1			
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE:

SW = surface water
WW = wastewater
GW = groundwater

DW = drinking water
TIS = tissue
AIR = air

PROD = product
SOIL = soil
SED = sediment

describe others

CONTAINER

P = plastic
G = glass
V = glass vial
B = plastic bag

describe others

PRESERVATIVES & PREPARATION

NP = nothing added
S = sulfuric acid
N = nitric acid
Z = zinc acetate

OH = sodium hydroxide
HA = hydrochloric &
ascorbic acid
H = hydrochloric acid

F = field filtered

COLLECTED BY (signature) Scott Janssen		CUSTODY SEAL NO. (IF ANY)		DATE/TIME 6/8/94 1600
RELINQUISHED BY (signature)		RECEIVED BY (signature)		DATE/TIME
RELINQUISHED BY (signature)		RECEIVED BY (signature)		DATE/TIME
DISPATCHED BY (signature) Scott Janssen		METHOD OF TRANSPORT FVD		DATE/TIME 6/8/94 0750
RECEIVED AT NLS BY (signature) Jenny Huber	DATE/TIME 6-07-94 07:50	CONDITION 15	TEMP. 12.2	
SEAL INTACT? ☐ YES ☐ NO	SEAL #	REMARKS & OTHER INFORMATION		

- IMPORTANT:**
1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
 2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
 3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY



QUESTIONS? CALL 800-238-5355 TOLL FREE

PACKAGE TRACKING NUMBER

8099584872

183

8099584872

RECIPIENT'S COPY

From (Your Name) Please Print [Redacted]		Date 6/7/91	To (Recipient's Name) Please Print [Redacted]	
Your Phone Number (Very Important) [Redacted]		Recipient's Phone Number (Very Important) [Redacted]		
Company [Redacted]		Company [Redacted]		
Department/Floor No. [Redacted]		Department/Floor No. [Redacted]		
Street Address [Redacted]		Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Code.) 320 TESCOVILLE UNIT 5		
City [Redacted]		City SANTA FE		
State [Redacted]		State NM		
ZIP Required [Redacted]		ZIP Required 85401		

YOUR INTERNAL BILLING REFERENCE INFORMATION (First 24 characters will appear on invoice.)

PAYMENT 1 ☐ Bill Sender 2 ☐ Bill Recipient's FedEx Acct. No. 3 ☐ Bill 3rd Party FedEx Acct. No. 4 ☐ Bill Credit Card.

5 ☐ Cash

SERVICES (Check only one box)	
Priority Overnight Service (Delivery by next business morning)	Standard Overnight Service (Delivery by next business afternoon)
11 ☐ YOUR PACKAGING 51 ☐	
16 ☐ FEDEX LETTER * 56 ☐ FEDEX LETTER *	
12 ☐ FEDEX PAK * 52 ☐ FEDEX PAK *	
13 ☐ FEDEX BOX 53 ☐ FEDEX BOX	
14 ☐ FEDEX TUBE 54 ☐ FEDEX TUBE	
Economy Service (formerly Standard Air) (Delivery by second business day)	Heavyweight Service (for Extra Large or any package over 150 lbs.)
30 ☐ ECONOMY SERVICE 70 ☐ HEAVYWEIGHT **	
	80 ☐ DEFERRED HEAVYWEIGHT **

*Delivery commitment may be later in some areas.
**Declared Value Limit \$100.
**Call for delivery schedule.

DELIVERY AND SPECIAL HANDLING

1 ☐ HOLD FOR PICK-UP (Fe in Box #1)
2 ☒ DELIVER WEEKDAY
3 ☐ DELIVER SATURDAY (Extra charge) (Not available to all locations)
4 ☐ DANGEROUS GOODS (Extra charge) (CSS not available for Dangerous Goods Shipments)
5 ☐ CONSTANT SURVEILLANCE SVC. (CSS) (Extra charge) (Package Signature Not Applicable)
6 ☐ DRY ICE (Extra charge)
7 ☐ OTHER SPECIAL SERVICE
8 ☐
9 ☐ SATURDAY PICK-UP (Extra charge)
10 ☐
11 ☐
12 ☐ HOLIDAY DELIVERY (at address) (Extra charge)

PACKAGES	WEIGHT in Pounds Oz	YOUR DECLARED VALUE	OVER- SIZE
1	70		
Total - Total - Total			
DIM SHIPMENT (As weight services only)			
Regular Stop			
Drop Box			
On-Call Stop			
FedEx Emp. No.			

IF HOLD FOR PICK-UP, Print FEDEX Address Here

Street Address	
City	
State	
ZIP Required	
Emp. No.	Date
☐ Cash Received	
☐ Return Shipment	
☐ Third Party ☐ Chg. To Del. ☐ Chg. To Hold	
Street Address	
City	
State	
Zip	
Received By:	
X	
Date/Time Received	FedEx Employee Number
Release Signature	
Date/Time	

Federal Express Use
Base Charges
Declared Value Charge
Other 1
Other 2
Total Charges
REVISION DATE 11/89 PART #119501 FXEM 6/90 FORMAT 8014
014
* 1995 FEC PRINTED IN U.S.A.



January 5, 1995

Mr. Russell Janeshek
Foth & Van Dyke
2737 S. Ridge Rd.
Green Bay, WI 54307-9012

Re: Crandon Mining Company Project
Battelle Results for June and July Surface Waters

Dear Mr. Janeshek:

Enclosed are reports on PACE report paper summarizing Battelle results for surface water samples collected in June and July, 1994. The Battelle reports (summary report and raw data) were originally submitted to you on November 21, 1994. In a FAX dated 11/23/94, you requested that PACE submit a summary report on PACE letterhead.

Included in this submittal is an addendum package consisting of raw data pertinent to the results. Please place this information at the end of the package in the submittal dated November 21, 1994.

An electronic deliverable summarizing the results is also included in this submittal.

If you have any questions concerning this submittal, feel free to contact me at (612) 525-3454.

Sincerely,

A handwritten signature in cursive script that reads "Steven R. Crupi".

Steven R. Crupi
Project Manager

Enclosures



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 3

January 03, 1995
PACE Project Number: 941219505

Client Reference: Battelle June Surface Waters

PACE Sample Number:	10 0300390	10 0300403	10 0300411
Date Collected:	06/07/94	06/08/94	06/08/94
Date Received:	06/10/94	06/10/94	06/10/94
Client Sample ID:	LG-13	LG-7-1	LG-7-2
<u>Parameter</u>	<u>Units</u>	<u>MDL</u>	

SUBCONTRACT ANALYSIS

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.20	135	59.3	61.0
Cadmium	ug/L	0.003	0.033	0.065	0.071
Chromium	ug/L	0.20	0.45	0.45	0.56
Copper	ug/L	0.030	0.506	0.468	0.550
Lead	ug/L	0.002	0.648	0.265	0.296
Mercury	ng/L	0.10	2.73	1.69	2.58
Zinc	ug/L	0.39	8.34	12.3	12.2



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 4

January 03, 1995
PACE Project Number: 941219505

Client Reference: Battelle June Surface Waters

PACE Sample Number:

10 0300420 10 0300438 10 0300446

Date Collected:

06/08/94 06/08/94 06/08/94

Date Received:

06/10/94 06/10/94 06/10/94

Client Sample ID:

LG-11 LG-15 LG-12

Parameter

Units

MDL

SUBCONTRACT ANALYSIS

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.20	17.9	46.6	84.6
Cadmium	ug/L	0.003	0.015	0.007	0.029
Chromium	ug/L	0.20	0.45	0.34	0.45
Copper	ug/L	0.030	0.303	0.284	0.495
Lead	ug/L	0.002	0.113	0.194	0.952
Mercury	ng/L	0.10	2.35	3.15	3.95
Zinc	ug/L	0.39	3.30	5.91	6.87



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 5

January 03, 1995
PACE Project Number: 941219505

Client Reference: Battelle June Surface Waters

PACE Sample Number:

10 0300454 10 0300462 10 0300470

Date Collected:

06/06/94 06/06/94 06/06/94

Date Received:

06/10/94 06/10/94 06/10/94

Client Sample ID:

SG-CC-2 SG-Y SG-V

Parameter

Units

MDL

SUBCONTRACT ANALYSIS

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.20	43.6	19.6	36.5
Cadmium	ug/L	0.003	0.004	0.004	0.005
Chromium	ug/L	0.20	0.68	0.45	0.90
Copper	ug/L	0.030	0.246	0.389	0.291
Lead	ug/L	0.002	0.180	0.212	0.206
Mercury	ng/L	0.10	3.05	2.19	2.48
Zinc	ug/L	0.39	1.56	1.04	1.48



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 6

January 03, 1995
PACE Project Number: 941219505

Client Reference: Battelle June Surface Waters

PACE Sample Number:	10 0300489	10 0300497
Date Collected:	06/06/94	06/06/94
Date Received:	06/10/94	06/10/94
Client Sample ID:	SG-AB	SG-CC-1
<u>Parameter</u>	<u>Units</u>	<u>MDL</u>

SUBCONTRACT ANALYSIS

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.20	13.9	44.9
Cadmium	ug/L	0.003	0.003	0.010
Chromium	ug/L	0.20	0.68	0.56
Copper	ug/L	0.030	0.233	0.390
Lead	ug/L	0.002	0.204	0.271
Mercury	ng/L	0.10	4.37	3.69
Zinc	ug/L	0.39	1.22	1.56

These data have been reviewed and are approved for release.

Steven R. Crupi

Steve Crupi
Project Manager



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 7

FOOTNOTES
for pages 1 through 6

January 03, 1995
PACE Project Number: 941219505

Client Reference: Battelle June Surface Waters

MDL Method Detection Limit

July 1994
Surface Water Laboratory Data



An ETC Laboratory

320 Tesconi Circle

Suite G

Santa Rosa, CA
95401

Telephone
(707) 544-5570

Facsimile
(707) 544-4906

AUGUST 23, 1994

CLIENT: FOTH & VAN DYKE
P.O. BOX 19012
2737 S. RIDGE ROAD
GREEN BAY, WI 54307-9012

ATTN: RUSS JANESHEK

JOB LINK: 811427
PROJECT: CRANDON MINING CO (SW) 93C049

ANALYSIS

6010 & 7000 SERIES METALS

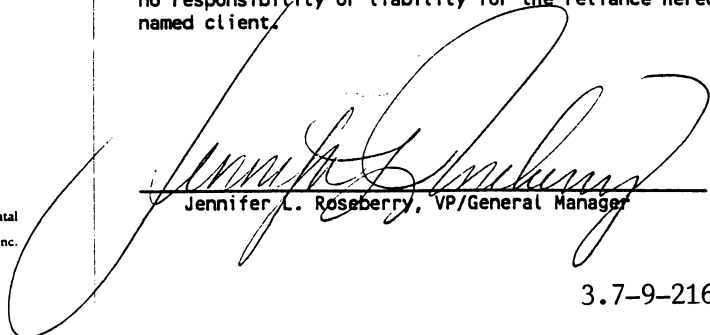
CONVENTIONALS: ALKALINITY AS CaCO_3 ; ALKALINITY, HYDROXIDE AS CaCO_3 ;
ALKALINITY, BICARBONATE CaCO_3 ; ALKALINITY, CARBONATE AS CaCO_3 ; AMMONIA AS N; ANIONS;
BIOCHEMICAL OXYGEN DEMAND; CATION AND ANION BALANCE; CATIONS;
CHEMICAL OXYGEN DEMAND (COD); CHLORIDE; CONDUCTIVITY; CYANIDE, TOTAL; FLUORIDE;
HARDNESS AS CaCO_3 ; NITRATE AS N; NITROGEN, TOTAL KJELDAHL (TKN); OIL AND GREASE, (IR);
PH; PHOSPHORUS; PHOSPHORUS AS P, DISSOLVED; SODIUM ABSORPTION RATIO (SAR);
SOLIDS, TOTAL SUSPENDED; SULFATE AS SO_4 ; TOTAL DISSOLVED SOLIDS (TDS); TURBIDITY

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE COLLECTION DATE</u>	<u>DATE RECEIVED BY LAB</u>
MF8008	SG-CC-01	WATER	07-05-94	07-07-94
MF8009	SG-CC-02	WATER	07-05-94	07-07-94
MF8010	SG-Y	WATER	07-05-94	07-07-94
MF8011	SG-V	WATER	07-05-94	07-07-94
MF8012	SG-AB	WATER	07-05-94	07-07-94
MF8013	SG-19	WATER	07-05-94	07-07-94
MF8014	SG-30	WATER	07-05-94	07-07-94
MF8015	SG-2	WATER	07-06-94	07-07-94
MF8016	SG-3	WATER	07-06-94	07-07-94
MF8017	SG-4	WATER	07-06-94	07-07-94
MF8018	SG-5A	WATER	07-06-94	07-07-94
MF8019	SG-CC-01	WATER	07-05-94	07-07-94
MF8020	SG-CC-02	WATER	07-05-94	07-07-94
MF8021	SG-Y	WATER	07-05-94	07-07-94
MF8022	SG-V	WATER	07-05-94	07-07-94
MF8023	SG-AB	WATER	07-05-94	07-07-94
MF8024	SG-19	WATER	07-05-94	07-07-94
MF8025	SG-30	WATER	07-05-94	07-07-94
MF8026	SG-2	WATER	07-06-94	07-07-94
MF8027	SG-3	WATER	07-06-94	07-07-94
MF8028	SG-4	WATER	07-06-94	07-07-94

(Continued)

This report is "PROPRIETARY AND CONFIDENTIAL" and delivered to, and intended for the exclusive use of the above named client only. ETC, a Division of APBI Environmental Sciences Group, Inc. assumes no responsibility or liability for the reliance hereon or use hereof by anyone other than the above named client.

A division of
APBI Environmental
Sciences Group, Inc.


Jennifer L. Roseberry, VP/General Manager

940824
Date

3.7-9-216

AUG 23 1994



AUGUST 23, 1994

Page 2

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE COLLECTION DATE</u>	<u>DATE RECEIVED BY LAB</u>
MF8029	SG-5A	WATER	07-06-94	07-07-94
MF8030	SG-CC-01	WATER	07-05-94	07-07-94
MF8031	SG-CC-02	WATER	07-05-94	07-07-94
MF8032	SG-Y	WATER	07-05-94	07-07-94
MF8033	SG-V	WATER	07-05-94	07-07-94
MF8034	SG-AB	WATER	07-05-94	07-07-94
MF8035	SG-19	WATER	07-05-94	07-07-94
MF8036	SG-30	WATER	07-05-94	07-07-94
MF8037	SG-2	WATER	07-06-94	07-07-94
MF8038	SG-3	WATER	07-06-94	07-07-94
MF8039	SG-4	WATER	07-06-94	07-07-94
MF8040	SG-5A	WATER	07-06-94	07-07-94
MF8041	SG-CC-01	WATER	07-05-94	07-07-94
MF8042	SG-CC-02	WATER	07-05-94	07-07-94
MF8043	SG-Y	WATER	07-05-94	07-07-94
MF8044	SG-V	WATER	07-05-94	07-07-94
MF8045	SG-AB	WATER	07-05-94	07-07-94
MF8046	SG-19	WATER	07-05-94	07-07-94
MF8047	SG-30	WATER	07-05-94	07-07-94
MF8048	SG-2	WATER	07-06-94	07-07-94
MF8049	SG-3	WATER	07-06-94	07-07-94
MF8673	SHIPPING	NOT APPLICABLE	NOT APPLICABLE	07-21-94
MF9230	BOTTLES	NOT APPLICABLE	NOT APPLICABLE	07-07-94
MF9231	QCCHARGES	NOT APPLICABLE	NOT APPLICABLE	07-07-94
MF9232	SMPLDEVICE	NOT APPLICABLE	NOT APPLICABLE	07-07-94



FOTH & VAN DYKE
AUGUST 23, 1994
811427

SAMPLE MATRIX: LIQUID

<u>Parameter</u>	<u>EPA Prep Method</u>	<u>EPA Analysis Method</u>
ICP Metals	3015	6010
Antimony	3015	7041
Arsenic	3015	7060
Lead	3015	7421
Potassium*	3010	6010
Selenium	7740	7740
Thallium	3015	7841
Mercury	7470	7470
Alkalinity as CaCO ₃	NA	310.1
Alkalinity, Hydroxide as CaCO ₃	NA	310.1
Bicarbonate as CaCO ₃	NA	310.1
Carbonate Alkalinity as CaCO ₃	NA	310.1
Ammonia as N	350.2	350.2
Anions	‡	‡
Cation and Anion Balance	‡	‡
Cations	‡	‡
Chemical Oxygen Demand	NA	410.4
Chloride	NA	300.0
Conductivity	NA	9050
Total Cyanide	9010	9010
Fluoride	NA	340.2
Hardness as CaCO ₃	NA	130.2
Nitrate as N	NA	300.0
Total Kjeldahl Nitrogen	351.3	351.3
Oil & Grease	413.2	413.2
pH	NA	9040
Phosphorus*	365.2	365.2
Phosphorus as P, Dissolved*	365.2	365.2
Sodium Absorption Ratio	‡	‡
Total Suspended Solids	NA	160.2
Sulfate as SO ₄ *	NA	375.2
Total Dissolved Solids	NA	160.1
Turbidity	NA	180.1
Biochemical Oxygen Demand*	405.1	405.1

* ANALYSIS PERFORMED BY NORTHERN LAKE SERVICE, INC

‡ CALCULATION

ns



FOTH & VAN DYKE
23 AUGUST 1994

EXECUTIVE SUMMARY
ETC JOBLINK 811427

On 07 July 1994 ETC-Santa Rosa received aqueous samples from Foth & Van Dyke via Federal Express. The cooler temperatures ranged from 0°C to 05°C upon receipt at the laboratory. The samples were analyzed as specified on the preceding page.

Samples were filtered at the laboratory through a 0.45 μ m filter prior to analysis for Iron, Manganese, and Phosphorus; these results reflect dissolved parameters. These parameters were also analyzed without filtration; these results reflect total parameters.

All samples were received past the method-recommended holding time for pH analysis.

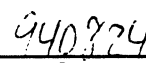
Low level metals analyses were performed by Batelle; Biochemical Oxygen Demand (BOD), Sulfate, Dissolved Phosphorus, Total Phosphorus, and Total Potassium analyses were performed by Northern Lake Services (NLS). Samples were filtered for Dissolved Phosphorus upon receipt at NLS. All results are included herein, with the exception of low level metals; those results will follow in an amended report.

CALCULATIONS:

Results for Sodium Absorption Ratio (Modified SAR), Cations, Anions, and Cation and Anion Balance were obtained by calculation using analytical data. The Cations reflect results for Calcium, Magnesium, Potassium, and Sodium; the Anions reflect results for Chloride, Fluoride, Nitrate, Sulfate, Carbonate, and Bicarbonate.



Lisa Norosky, Program Manager



Date

Joblink: 811427

DATA SUMMARY REPORT

DATE: 08/23/94

Company: FOTH & VAN DYKE

PAGE: 4

Sample Point ID:	SG-19	SG-19	SG-19	SG-2	SG-2	SG-2	SG-3	SG-3
ETC Sample Number:	MF8013	MF8024	MF8035	MF8015	MF8026	MF8037	MF8016	MF8027
Sample Date:	940705	940705	940705	940706	940706	940706	940706	940706
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	-	.138	-	-	.217	-	-
Manganese	mg/L	-	-	<.010	-	-	.031	-	-
Antimony, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Arsenic, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Barium, Total	mg/L	.016	-	-	.014	-	-	.012	-
Beryllium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Boron, Total	mg/L	<.100	-	-	<.100	-	-	<.100	-
Calcium, Total	mg/L	23.3	-	-	25.4	-	-	26.1	-
Chromium, Total	mg/L	<.020	-	-	<.020	-	-	<.020	-
Iron, Total	mg/L	.369	-	-	.413	-	-	.379	-
Magnesium, Total	mg/L	10.4	-	-	11.3	-	-	11.8	-
Manganese, Total	mg/L	.044	-	-	.142	-	-	.075	-
Molybdenum, Total	mg/L	<.020	-	-	<.020	-	-	<.020	-
Nickel, Total	mg/L	<.030	-	-	<.030	-	-	<.030	-
Selenium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Silver, Total	mg/L	<.010	-	-	<.010	-	-	<.010	-
Sodium, Total	mg/L	1.96	-	-	2.18	-	-	2.18	-
Thallium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Potassium, Total	mg/L	-	<.600	-	-	<.600	-	-	<.600

Sample Point ID:	SG-3	SG-30	SG-30	SG-30	SG-4	SG-4	SG-4	SG-5A
ETC Sample Number:	MF8038	MF8014	MF8025	MF8036	MF8017	MF8028	MF8039	MF8018
Sample Date:	940706	940705	940705	940705	940706	940706	940706	940706
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	.216	-	-	<.100	-	-	<.100	-
Manganese	mg/L	<.010	-	-	<.010	-	-	<.010	-
Antimony, Total	mg/L	-	<.005	-	-	<.005	-	-	<.005
Arsenic, Total	mg/L	-	<.005	-	-	<.005	-	-	<.005
Barium, Total	mg/L	-	.011	-	-	.012	-	-	.017
Beryllium, Total	mg/L	-	<.005	-	-	<.005	-	-	<.005
Boron, Total	mg/L	-	<.100	-	-	<.100	-	-	<.100

3-7-9-220

Joblink: 811427

DATA SUMMARY REPORT

DATE: 08/23/94

Company: FOTH & VAN DYKE

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Sample Point ID:	SG-3	SG-30	SG-30	SG-30	SG-4	SG-4	SG-4	SG-5A
ETC Sample Number:	MF8038	MF8014	MF8025	MF8036	MF8017	MF8028	MF8039	MF8018
Sample Date:	940706	940705	940705	940705	940706	940706	940706	940706
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Calcium, Total	mg/L	-	33.6	-	-	23.0	-	-	29.7
Chromium, Total	mg/L	-	<.020	-	-	<.020	-	-	<.020
Iron, Total	mg/L	-	<.100	-	-	.274	-	-	.274
Magnesium, Total	mg/L	-	13.9	-	-	10.2	-	-	13.3
Manganese, Total	mg/L	-	.021	-	-	.054	-	-	.114
Molybdenum, Total	mg/L	-	<.020	-	-	<.020	-	-	<.020
Nickel, Total	mg/L	-	<.030	-	-	<.030	-	-	<.030
Selenium, Total	mg/L	-	<.005	-	-	<.005	-	-	<.005
Silver, Total	mg/L	-	<.010	-	-	<.010	-	-	<.010
Sodium, Total	mg/L	-	1.99	-	-	3.52	-	-	1.83
Thallium, Total	mg/L	-	<.005	-	-	<.005	-	-	<.005
Potassium, Total	mg/L	-	-	<.600	-	-	.810	-	-
Aluminum, Total	mg/L	-	-	-	-	<.200	-	-	<.200
Cadmium, Total	mg/L	-	-	-	-	<.005	-	-	<.005
Copper, Total	mg/L	-	-	-	-	<.030	-	-	<.030
Lead, Total	mg/L	-	-	-	-	<.050	-	-	<.050
Zinc, Total	mg/L	-	-	-	-	<.020	-	-	<.020
Mercury, Total	mg/L	-	-	-	-	.0003	-	-	<.0002

Sample Point ID:	SG-5A	SG-5A	SG-AB	SG-AB	SG-AB	SG-CC-01	SG-CC-01	SG-CC-01
ETC Sample Number:	MF8029	MF8040	MF8012	MF8023	MF8034	MF8008	MF8019	MF8030
Sample Date:	940706	940706	940705	940705	940705	940705	940705	940705
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	.111	-	-	.216	-	-	.324
Manganese	mg/L	-	.015	-	-	.023	-	-	.019
Antimony, Total	mg/L	-	-	<.005	-	-	<.005	-	-
Arsenic, Total	mg/L	-	-	<.005	-	-	<.005	-	-
Barium, Total	mg/L	-	-	.013	-	-	.013	-	-
Beryllium, Total	mg/L	-	-	<.005	-	-	<.005	-	-
Boron, Total	mg/L	-	-	<.100	-	-	.105	-	-
Calcium, Total	mg/L	-	-	25.0	-	-	17.8	-	-

3.7-9-221

Joblink: 811427

DATA SUMMARY REPORT

DATE: 08/23/94

Company: FOTH & VAN DYKE

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Sample Point ID:	SG-5A	SG-5A	SG-AB	SG-AB	SG-AB	SG-CC-01	SG-CC-01	SG-CC-01
ETC Sample Number:	MF8029	MF8040	MF8012	MF8023	MF8034	MF8008	MF8019	MF8030
Sample Date:	940706	940706	940705	940705	940705	940705	940705	940705
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Chromium, Total	mg/L	-	-	<.020	-	-	<.020	-
Iron, Total	mg/L	-	-	.292	-	-	.482	-
Magnesium, Total	mg/L	-	-	11.9	-	-	7.93	-
Manganese, Total	mg/L	-	-	.050	-	-	.079	-
Molybdenum, Total	mg/L	-	-	<.020	-	-	<.020	-
Nickel, Total	mg/L	-	-	<.030	-	-	<.030	-
Selenium, Total	mg/L	-	-	<.005	-	-	<.005	-
Silver, Total	mg/L	-	-	<.010	-	-	<.010	-
Sodium, Total	mg/L	-	-	2.19	-	-	1.83	-
Thallium, Total	mg/L	-	-	<.005	-	-	<.005	-
Potassium, Total	mg/L	<.600	-	-	<.600	-	-	<.600
Aluminum, Total	mg/L	-	-	-	-	-	-	-
Cadmium, Total	mg/L	-	-	-	-	-	-	-
Copper, Total	mg/L	-	-	-	-	-	-	-
Lead, Total	mg/L	-	-	-	-	-	-	-
Zinc, Total	mg/L	-	-	-	-	-	-	-
Mercury, Total	mg/L	-	-	-	-	-	-	-

Sample Point ID:	SG-CC-02	SG-CC-02	SG-CC-02	SG-V	SG-V	SG-V	SG-Y	SG-Y
ETC Sample Number:	MF8009	MF8020	MF8031	MF8011	MF8022	MF8033	MF8010	MF8021
Sample Date:	940705	940705	940705	940705	940705	940705	940705	940705
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	-	.309	-	-	.346	-
Manganese	mg/L	-	-	.019	-	-	.022	-
Antimony, Total	mg/L	<.005	-	-	<.005	-	<.005	-
Arsenic, Total	mg/L	<.005	-	-	<.005	-	<.005	-
Barium, Total	mg/L	.011	-	-	.014	-	.010	-
Beryllium, Total	mg/L	<.005	-	-	<.005	-	<.005	-
Boron, Total	mg/L	<.100	-	-	<.100	-	<.100	-
Calcium, Total	mg/L	18.2	-	-	23.8	-	12.3	-
Chromium, Total	mg/L	<.020	-	-	<.020	-	<.020	-

Joblink: 811427

DATA SUMMARY REPORT

DATE: 08/23/94

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Company: FOTH & VAN DYKE

Sample Point ID:	SG-CC-02	SG-CC-02	SG-CC-02	SG-V	SG-V	SG-V	SG-Y	SG-Y
ETC Sample Number:	MF8009	MF8020	MF8031	MF8011	MF8022	MF8033	MF8010	MF8021
Sample Date:	940705	940705	940705	940705	940705	940705	940705	940705
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron, Total	mg/L	.479	-	-	.540	-	-	.379	-
Magnesium, Total	mg/L	8.01	-	-	11.2	-	-	5.26	-
Manganese, Total	mg/L	.080	-	-	.078	-	-	.060	-
Molybdenum, Total	mg/L	<.020	-	-	<.020	-	-	<.020	-
Nickel, Total	mg/L	<.030	-	-	<.030	-	-	<.030	-
Selenium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Silver, Total	mg/L	<.010	-	-	<.010	-	-	<.010	-
Sodium, Total	mg/L	1.83	-	-	2.10	-	-	1.59	-
Thallium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Potassium, Total	mg/L	-	<.600	-	-	<.600	-	-	<.600
Aluminum, Total	mg/L	-	-	-	-	-	-	-	-
Cadmium, Total	mg/L	-	-	-	-	-	-	-	-
Copper, Total	mg/L	-	-	-	-	-	-	-	-
Lead, Total	mg/L	-	-	-	-	-	-	-	-
Zinc, Total	mg/L	-	-	-	-	-	-	-	-
Mercury, Total	mg/L	-	-	-	-	-	-	-	-

Sample Point ID:	SG-Y
ETC Sample Number:	MF8032
Sample Date:	940705
Facility Code:	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	.261
Manganese	mg/L	<.010
Antimony, Total	mg/L	-
Arsenic, Total	mg/L	-
Barium, Total	mg/L	-
Beryllium, Total	mg/L	-
Boron, Total	mg/L	-
Calcium, Total	mg/L	-
Chromium, Total	mg/L	-
Iron, Total	mg/L	-

3-7-9-223

ETC

CHAIN-OF-CUSTODY RECORD

No. 114139

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570

811427

COMPANY FOTH: VAN DYKE		FACILITY/SITE CRANDON MINING CO (SW) / 930049		NUMBER OF CONTAINERS	FILT. (Y/N)										LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₄ + H ₂ SO ₄			
PROJECT CONTACT RUSS JANESHER		TELEPHONE NO. 714-497-2500			PRESERV.													
					ANALYSIS REQUIRED													
SEE ATTACHMENT																		
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	Source Codes: Well.....(W) Outfall.....(O) Soil.....(S) River/Stream.....(R) Bottom Sediment.....(B) Generation Point.....(G) Surface Impoundment (I) Treatment Facility.....(T) Leachate Collection Sys.....(C) Lake/Ocean.....(L) Other.....(X) Specify											SAMPLER OBSERVATIONS	LAB OBSERVATIONS
1		R	SG-CC-011	94/08/5	0920		7											
2		R	SG-CC-021		0920		7											
3		R	SG-Y		1100		7											
4		R	SG-Y		1215		7											
5		R	SG-AB		1315		7											
6		R	SG-19		1515		7											
7		R	SG-30		1545		7											
8																		
9																		

CHAIN OF CUSTODY CHRONICLE

1.	Shuttle Opened By: (print) SCOTT JANSSEN Signature: Scott Janssen Date: 7/6/94 Time: 0700 Seal #: 70283 70284 Intact: YES
I have received these materials in good condition from the above person.	
2.	Name: _____ Signature: _____ Date: _____ Time: _____ Remarks: _____
I have received these materials in good condition from the above person.	
3.	Name: _____ Signature: _____ Date: _____ Time: _____ Remarks: _____
I have received these materials in good condition from the above person.	
4.	Shuttle Sealed By: (print) SCOTT JANSSEN Signature: Scott Janssen Date: 7/6/94 Time: 1315 Seal #: 70276 70277 70278 70279 Intact: YES

REMARKS

SAMPLER'S SIGNATURE

LAB USE ONLY Opened By: **SCOTT JANSSEN** Date: **7-7-94** Time: **9:45 AM**
 SHUTTLE # **N/A** TEMP. °C **0.5 m 8** SEAL # **70273** COND. **Scanned**

Scott Janssen **Joseph J. Arnold**

3-7-9-224

ETC

CHAIN-OF-CUSTODY RECORD

No. 114139

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570

811427

COMPANY FOTH : VAN DYKE		FACILITY/SITE CRANDON MINING Co (SW) / 93C049		NUMBER OF CONTAINERS	FILT. (Y/N)										LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₄ +H ₂ SO ₄			
PROJECT CONTACT RUSS JANESHEK		TELEPHONE NO. 414-497-2500			PRESERV.													
					ANALYSIS REQUIRED													
					SEE ATTACHMENT													
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	Source Codes: Well.....(W) Outfall.....(O) Soil.....(S) River/Stream.....(R) Bottom Sediment.....(B) Generation Point.....(G) Surface Impoundment (I) Treatment Facility.....(T) Leachate Collection Sys.....(C) Lake/Ocean.....(L) Other.....(X) Specify											SAMPLER OBSERVATIONS	LAB OBSERVATIONS
1		R	SG-CC-01	94/02/5	0920		7											
2		R	SG-CC-02		0920		7											
3		R	SG-Y		1100		7											
4		R	SG-Y		1215		7											
5		R	SG-AB		1315		7											
6		R	SG-19		1515		7											
7		R	SG-30		1545		7											
8																		
9																		

CHAIN OF CUSTODY CHRONICLE

1.	Shuttle Opened By: (print) SCOTT JANSSEN	Date: 7/5/94	Time: 0700
	Signature: Scott Janssen	Seal #: 70285 70283	Intact: YES
I have received these materials in good condition from the above person.			
2.	Name: _____	Signature: _____	
	Date: _____	Time: _____	Remarks: _____
I have received these materials in good condition from the above person.			
3.	Name: _____	Signature: _____	
	Date: _____	Time: _____	Remarks: _____
4.	Shuttle Sealed By: (print) SCOTT JANSSEN	Date: 7/6/94	Time: 1315
	Signature: Scott Janssen	Seal #: 70276 70277	Intact: YES

REMARKS

SAMPLER'S SIGNATURE

LAB USE ONLY Opened By: **Jeff Wayne** Date: **7-7-94** Time: **9450**

SHUTTLE # **21A** TEMP. °C **3** SM2 SEAL # **70276** COND. **2000**

Scott Janssen **Joseph J. Amato**

3-7-9-225

ETC

CHAIN-OF-CUSTODY RECORD

No. 114139

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570																		
COMPANY FOTH: VAN DYKE			FACILITY/SITE CRANDON MINING Co (SW)/930049			NUMBER OF CONTAINERS	FILT. (Y/N)										LEGEND FOR PRESERVATIVE	
PROJECT CONTACT RUSS JANESHEK			TELEPHONE NO 714-497-2500				PRESERV.										0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₄ +H ₂ SO ₄	
							ANALYSIS REQUIRED											
							SEE ATTACHMENT											
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	Source Codes: Well.....(W) Outfall.....(O) Soil.....(S) River/Stream.....(R) Bottom Sediment.....(B) Generation Point.....(G) Surface Impoundment (I) Treatment Facility.....(T) Leachate Collection Sys.....(C) Lake/Ocean.....(L) Other.....(X) Specify _____											SAMPLER OBSERVATIONS	LAB OBSERVATIONS
1		R	SG-CC-01	94/02/5	0920		7											
2		R	SG-CC-02		0920		7											
3		R	SG-Y		1100		7											
4		R	SG-V		1215		7											
5		R	SG-AB		1315		7											
6		R	SG-19		1515		7											
7		R	SG-30		1545		7											
8																		
9																		

CHAIN OF CUSTODY CHRONICLE				REMARKS
1.	Shuttle Opened By: (print) <u>SCOTT JANSSEN</u>	Date: <u>7/5/94</u>	Time: <u>0700</u>	
	Signature: <u>Scott Jansen</u>	Seal #: <u>70285 70283 70284</u>	Intact: <u>YES</u>	
I have received these materials in good condition from the above person.				
2.	Name: _____	Signature: _____		
	Date: _____	Time: _____	Remarks: _____	
I have received these materials in good condition from the above person.				
3.	Name: _____	Signature: _____		
	Date: _____	Time: _____	Remarks: _____	
4.	Shuttle Sealed By: (print) <u>SCOTT JANSSEN</u>	Date: <u>7/6/94</u>	Time: <u>1315</u>	
	Signature: <u>Scott Jansen</u>	Seal #: <u>70276 70277 70278 70273</u>	Intact: <u>YES</u>	
LAB USE ONLY Opened By: <u>Jeff Harper</u>				SAMPLER'S SIGNATURE
Date: <u>7-7-94</u>				<u>Scott Jansen</u> <u>Joseph J. Arnold</u>
Time: <u>9:40am</u>				
SHUTTLE # <u>158</u> TEMP. °C <u>0 SMS</u> SEAL # <u>70278</u> COND. <u>Good</u>				

3.7-9-226

ETC

CHAIN-OF-CUSTODY RECORD

No. 114139

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570

811427

COMPANY FOTH: VAN DYKE		FACILITY/SITE CRANDON MINING Co (SW) / 930049		NUMBER OF CONTAINERS	FILT. (Y/N)										LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₄ + H ₂ SO ₄			
PROJECT CONTACT RUSS JANESHER		TELEPHONE NO. 414-497-2500			PRESERV.													
					ANALYSIS REQUIRED													
SEE ATTACHMENT																		
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YYMMDD	START TIME	Source Codes: Well.....(W) Outfall.....(O) Soil.....(S) River/Stream.....(R) Bottom Sediment.....(B) Generation Point.....(G) Surface Impoundment (I) Treatment Facility.....(T) Leachate Collection Sys.....(C) Lake/Ocean.....(L) Other.....(X) Specify											SAMPLER OBSERVATIONS	LAB OBSERVATIONS
1		R	SG-CC-0.1	94/02/5	0920		7											
2		R	SG-CC-0.2		0920		7											
3		R	SG-Y		1100		7											
4		R	SG-Y		1215		7											
5		R	SG-AB		1315		7											
6		R	SG-1.9		1515		7											
7		R	SG-3.0		1545		7											
8																		
9																		

CHAIN OF CUSTODY CHRONICLE

1.	Shuttle Opened By: (print) <u>SCOTT JANSSEN</u>	Date: <u>7/5/94</u>	Time: <u>0700</u>
	Signature: <u>Scott Jansen</u>	Seal #: <u>70285, 70283</u>	Intact: <u>YES</u>
I have received these materials in good condition from the above person.			
2.	Name: _____	Signature: _____	
	Date: _____	Time: _____	Remarks: _____
I have received these materials in good condition from the above person.			
3.	Name: _____	Signature: _____	
	Date: _____	Time: _____	Remarks: _____
4.	Shuttle Sealed By: (print) <u>SCOTT JANSSEN</u>	Date: <u>7/6/94</u>	Time: <u>1315</u>
	Signature: <u>Scott Jansen</u>	Seal #: <u>70276, 70277</u>	Intact: <u>YES</u>

REMARKS

SAMPLER'S SIGNATURE

 LAB USE ONLY Opened By: Jeff Harper Date: 7-7-94 Time: 9:45 AM
 SHUTTLE # 11A TEMP. °C 5.5m7 SEAL # 70277 COND. Good
Scott Jansen Joseph J. Amato

3.7-9-227

ETC

CHAIN-OF-CUSTODY RECORD

No. 114641

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570

811427

COMPANY FOTH: VAN DYKE		FACILITY/SITE CRANDON MENTING Co (SW) 930049		NUMBER OF CONTAINERS	FILT. (Y/N)	PRESERV.	ANALYSIS REQUIRED	LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₄ + H ₂ SO ₄	
PROJECT CONTACT RUSS JANESHEK		TELEPHONE NO. 414-497-2500							
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	Source Codes: Well.....(W) Outfall.....(O) Soil.....(S) River/Stream.....(R) Bottom Sediment.....(B) Generation Point.....(G) Surface Impoundment (I) Treatment Facility.....(T) Leachate Collection Sys.....(C) Lake/Ocean.....(L) Other.....(X) Specify			
1		R	SG-12	94/07/06	0815	7			
2		R	SG-3		1000	7			
3		R	SG-A		1045	7			
4		R	SG-SA		1115	7			
5									
6									
7									
8									
9									

CHAIN OF CUSTODY CHRONICLE

1.	Shuttle Opened By: (print) <u>SCOTT JANUSSEN</u> Signature: <u>Scott Janussen</u> Date: <u>7/6/94</u> Time: <u>0700</u> Seal #: <u>70285, 70283</u> Intact: <u>YES</u>
2.	I have received these materials in good condition from the above person. Name: _____ Signature: _____ Date: _____ Time: _____ Remarks: _____
3.	I have received these materials in good condition from the above person. Name: _____ Signature: _____ Date: _____ Time: _____ Remarks: _____
4.	Shuttle Sealed By: (print) <u>SCOTT JANUSSEN</u> Signature: <u>Scott Janussen</u> Date: <u>7/6/94</u> Time: <u>1300</u> Seal #: <u>70276, 70277, 70278, 70273</u> Intact: <u>YES</u>

REMARKS

LAB USE ONLY	Opened By: <u>Jeff Harper</u> Date: <u>7-7-94</u> Time: <u>9:45a</u>
COPIES: 158	TEMP. °C <u>0.5ms</u> SEAL # <u>70278</u> COND. <u>good</u>

SAMPLER'S SIGNATURE

Scott JanussenPaul J. Hunt

ETC

CHAIN-OF-CUSTODY RECORD

No. 114641

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570

811421

COMPANY FOTH: VAN DYKE		FACILITY/SITE CRANDON MINING Co (SW) 930049		NUMBER OF CONTAINERS	FILT. (Y/N)	LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₄ +H ₂ SO ₄
PROJECT CONTACT RUSS JANESHEK		TELEPHONE NO. 414-497-2500			PRESERV.	
					ANALYSIS REQUIRED	
SEE ATTACHMENT						
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	
1		R	SG-2	9/4/07/06	0815	Well.....(W) Outfall.....(O)
2		R	SG-3		1000	Soil.....(S) River/Stream.....(R)
3		R	SG-4		1045	Bottom Sediment.....(B)
4		R	SG-5A		1115	Generation Point.....(G)
5						Surface Impoundment (I)
6						Treatment Facility.....(T)
7						Leachate Collection Sys.....(C)
8						Lake/Ocean.....(L)
9						Other.....(X)
						Specify

CHAIN OF CUSTODY CHRONICLE

REMARKS

3-7-9-229	Shuttle Opened By: (print) SCOTT JANSEN		Date: 7/5/94	Time: 0700
	Signature: Scott Jansen		Seal #: 70285, 70283	Intact: YES
	I have received these materials in good condition from the above person.			
	Name: _____ Signature: _____			
2.	Date: _____ Time: _____ Remarks: _____			
I have received these materials in good condition from the above person.				
3.	Name: _____ Signature: _____			
Date: _____ Time: _____ Remarks: _____				
4.	Shuttle Sealed By: (print) SCOTT JANSEN		Date: 7/6/94	Time: 1300
Signature: Scott Jansen		Seal #: 70276, 70277, 70278, 70273	Intact: YES	
LAB USE ONLY Opened By: Jeff H. Hays Date: 7-7-94 Time: 9:45am				
SHUTTLE # N/A TEMP. °C 0 SM8 SEAL # 70273 COND. GOOD				

SAMPLER'S SIGNATURE




ETC

CHAIN-OF-CUSTODY RECORD

No. 114641

811427

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570

COMPANY FOTH: VAN DYKE		FACILITY/SITE CRANDON MINING Co (SW) 930049		NUMBER OF CONTAINERS	FILT. (Y/N)	LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₄ +H ₂ SO ₄
PROJECT CONTACT RUSS JANESHEK		TELEPHONE NO. 414-497-2500			PRESERV.	
					ANALYSIS REQUIRED	
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	
1		R	SG-12	9/4/07/06	0815	
2		R	SG-3	↓	1000	
3		R	SG-4	↓	1045	
4		R	SG-5A	↓	1115	
5						
6						
7						
8						
9						

Source Codes:
Well.....(W) Outfall.....(O)
Soil.....(S) River/Stream.....(R)
Bottom Sediment.....(B)
Generation Point.....(G)
Surface Impoundment (I)
Treatment Facility.....(T)
Leachate Collection Sys.....(C)
Lake/Ocean.....(L)
Other.....(X)
Specify _____

SEE ATTACHMENT

SAMPLER OBSERVATIONS

LAB OBSERVATIONS

CHAIN OF CUSTODY CHRONICLE

REMARKS

3.7-9-230

Shuttle Opened By: (print) SCOTT JANUSSEN Date: 7/5/94 Time: 0700
Signature: Scott Janussen Seal #: 70285, 70283 Intact: YES

I have received these materials in good condition from the above person.

2. Name: _____ Signature: _____
Date: _____ Time: _____ Remarks: _____

I have received these materials in good condition from the above person.

3. Name: _____ Signature: _____
Date: _____ Time: _____ Remarks: _____

4. Shuttle Sealed By: (print) SCOTT JANUSSEN Date: 7/6/94 Time: 1300
Signature: Scott Janussen Seal #: 70276, 70277 Intact: YES
Seal #: 70278, 70273

LAB USE ONLY Opened By: SELF Helper Date: 7-7-94 Time: 7:45a
SHUTTLE # N/A TEMP. °C 3 Sm 2 SEAL # 70276 COND. good

SAMPLER'S SIGNATURE

Scott Janussen John J. Smith

ETC

CHAIN-OF-CUSTODY RECORD

No. 114641

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570						811421		
COMPANY FOTH: VAN DYKE			FACILITY/SITE CRANDON MINING CO (SW) 93C049			NUMBER OF CONTAINERS	FILT. (Y/N) PRESERV. ANALYSIS REQUIRED SEE ATTACHMENT	LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₄ +H ₂ SO ₄
PROJECT CONTACT RUSS JANESHEK			TELEPHONE NO. 414-497-2500					
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME			
1		R	SG-12	94/07/06	0815	Well.....(W) Outfall.....(O)		
2		R	SG-3		1000	Soil.....(S) River/Stream.....(R)		
3		R	SG-A		1045	Bottom Sediment.....(B)		
4		R	SG-5A		1115	Generation Point.....(G)		
5						Surface Impoundment (I)		
6						Treatment Facility.....(T)		
7						Leachate Collection Sys.....(C)		
8						Lake/Ocean.....(L)		
9						Other.....(X)		
						Specify		
CHAIN OF CUSTODY CHRONICLE						REMARKS		
3.7-9-231	Shuttle Opened By: (print) <u>SCOTT JANSEN</u> Date: <u>7/5/94</u> Time: <u>0700</u>							
	Signature: <u>Scott Jansen</u> Seal # <u>70285, 70283</u> Intact: <u>YES</u>							
	I have received these materials in good condition from the above person.							
	Name: _____ Signature: _____ Date: _____ Time: _____ Remarks: _____							
3.	I have received these materials in good condition from the above person.							
	Name: _____ Signature: _____ Date: _____ Time: _____ Remarks: _____							
	Name: _____ Signature: _____ Date: _____ Time: _____ Remarks: _____							
	Name: _____ Signature: _____ Date: _____ Time: _____ Remarks: _____							
4.	Shuttle Sealed By: (print) <u>SCOTT JANSEN</u> Date: <u>7/6/94</u> Time: <u>1300</u>							
	Signature: <u>Scott Jansen</u> Seal # <u>70276, 70277</u> Intact: <u>YES</u>							
	I have received these materials in good condition from the above person.							
	Name: _____ Signature: _____ Date: _____ Time: _____ Remarks: _____							
LAB USE ONLY Opened By: <u>JEFF HANPK</u> Date: <u>7-7-94</u> Time: <u>5:45pm</u>								
SHUTTLE # <u>N/A</u> TEMP. °C <u>5</u> Sm <u>7</u> SEAL # <u>70277</u> COND. <u>GOOD</u>								
SAMPLER'S SIGNATURE								
<u>Scott Jansen</u> <u>Jeff Hanpk</u>								



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 07672

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT FOTH VAN DYKE		PROJECT TITLE CRANDON MINING CO (S.W.)	
ADDRESS 2737 S. RIDGE RD		PROJECT NO. 930049	P.O. NO.
CITY GREEN BAY	STATE WI	ZIP 54307	CONTACT RUSS JANESHER
		PHONE 414-497-2500	

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE			COLLECTION REMARKS
			DATE	TIME			PNP	PS	PN	
1.	60649	SG-CC-01	7/5/94	0920	S.W	GRAB	1	1	1	
2.	60650	SG-CC-02		0920			1	1	1	
3.	60651	SG-Y		1100			1	1	1	
4.	60652	SG-V		1215			1	1	1	
5.	60653	SG-AB		1315			1	1	1	11/1/94
6.	60654	SG-19		1515			1	1	1	
7.	60655	SG-30		1545			1	1	1	
8.	60656	SG-2	7/6/94	0815			1	1	1	
9.	60657	SG-3		1000			1	1	1	
10.	60658	SG-4		1045			1	1	1	
11.	60659	SG-SA		1115			1	1	1	
12.										

SAMPLE TYPE:

SW = surface water
WW = wastewater
GW = groundwater

DW = drinking water
TIS = tissue
AIR = air

PROD = product
SOIL = soil
SED = sediment

describe others

CONTAINER

P = plastic
G = glass
V = glass vial
B = plastic bag

describe others

PRESERVATIVES & PREPARATION

NP = nothing added
S = sulfuric acid
N = nitric acid
Z = zinc acetate

OH = sodium hydroxide
HA = hydrochloric & ascorbic acid
H = hydrochloric acid

F = field filtered

COLLECTED BY (signature)

Scott Jensen, Jr.

CUSTODY SEAL NO. (IF ANY) DATE/TIME

7/6/94 1300

RELINQUISHED BY (signature)

RECEIVED BY (signature)

DATE/TIME

RELINQUISHED BY (signature)

RECEIVED BY (signature)

DATE/TIME

DISPATCHED BY (signature)

Scott Jensen

METHOD OF TRANSPORT

FVD

DATE/TIME

7/6/94 1315

RECEIVED AT NLS BY (signature)

Scott Jensen

DATE/TIME

7-06-94 13:15

CONDITION

On Ice

TEMP.

SEAL INTACT?

☐ YES ☐ NO

SEAL

REMARKS & OTHER INFORMATION

Hand Delivered

- IMPORTANT:**
1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
 2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
 3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY

8077504572

183

8099584592



170343557

2/6/94

SCOTT JANSSEN

414 497-2500

707-544-5570

FOOT VAN DYKE / CRANDON MINING Co

ETC-SANTA ROSA

104 W. MADISON

320 TESCONI CIRCLE UNIT 3

CRANDON

WE 54520

SANTA ROSA

CA

95401

930649

130967218

1 70

1 70

REVISION DATE 11/89

014

Scott Jansen

8099584614

183

8099584614



170343557

7/6/94

SCOTT JANSSEN

414 497-2500

707-544-5570

FOOT VAN DYKE / CRANDON MINING Co

ETC-SANTA ROSA

104 W. MADISON

320 TESCONI CIRCLE UNIT 3

CRANDON

WE 54520

SANTA ROSA

CA

95401

930649

130967218

1 80

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REVISION DATE 11/89

014

Scott Jansen

3.7-9-233

8099584651

183M

8099584651

170343557

7/6/94



SCOTT JANSSEN

414 497-2500

707-544-5570

FOTH: VAN DYKE / CRANDON MINING CO

ETC-SANTA ROSA

104 W. MADISON

320 TESCONI CIRCLE UNIT

CRANDON

WI 54520

SANTA ROSA

CA

95401

930049

X 130967248

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REVISION DATE 11/88

Scott Janssen

014

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8099584706

8099584706

170343557

7/6/94



SCOTT JANSSEN

414 497-2500

707-544-5570

FOTH: VAN DYKE / CRANDON MINING

ETC-SANTA ROSA

104 WEST MADISON ST

320 TESCONI CIRCLE UNIT S

CRANDON

WI 54520

SANTA ROSA

CA

95401

INTERNAL BILLING REFERENCE INFORMATION (P. 24 OF 24) - WILL BE USED BY PROVIDER

X 130967248

SERVICE

HANDLING

1 80

1 80

3-7-9-234

REVISION DATE 11/88

014

Scott Janssen

AUGUST 24, 1994



An ETC Laboratory

320 Tesconi Circle

Suite G

Santa Rosa, CA
95401

Telephone
(707) 544-5570

Facsimile
(707) 544-4906

CLIENT: FOTH & VAN DYKE
P.O. BOX 19012
2737 S. RIDGE ROAD
GREEN BAY, WI 54307-9012

ATTN: RUSS JANESHEK

JOBLINK: 811445
PROJECT: CRANDON MINING CO (SW) 93C049

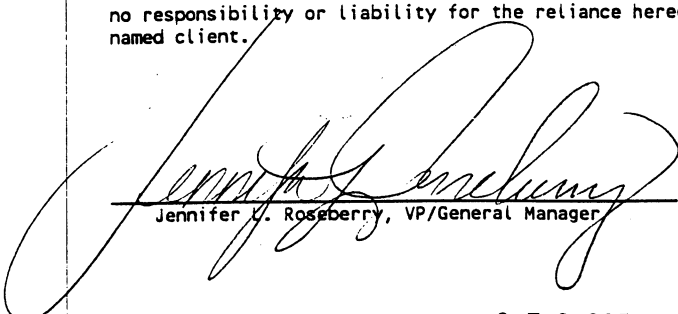
ANALYSIS

6010 & 7000 SERIES METALS

CONVENTIONALS: ALKALINITY AS CaCO_3 ; ALKALINITY, HYDROXIDE AS CaCO_3 ;
ALKALINITY, BICARBONATE CaCO_3 ; ALKALINITY, CARBONATE AS CaCO_3 ; AMMONIA AS N; ANIONS;
BIOCHEMICAL OXYGEN DEMAND; CATION AND ANION BALANCE; CATIONS;
CHEMICAL OXYGEN DEMAND (COD); CHLORIDE; CONDUCTIVITY; CYANIDE, TOTAL; FLUORIDE;
HARDNESS AS CaCO_3 ; NITRATE AS N; NITROGEN, TOTAL KJELDAHL (TKN); OIL AND GREASE, (IR);
PH; PHOSPHORUS; PHOSPHORUS AS P, DISSOLVED; SODIUM ABSORPTION RATIO (SAR);
SOLIDS, TOTAL SUSPENDED; SULFATE AS SO_4 ; TOTAL DISSOLVED SOLIDS (TDS); TURBIDITY

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE COLLECTION DATE</u>	<u>DATE RECEIVED BY LAB</u>
MF8106	SG-6	WATER	07-06-94	07-08-94
MF8107	SG-E	WATER	07-06-94	07-08-94
MF8108	LG-7	WATER	07-06-94	07-08-94
MF8109	LG-9	WATER	07-07-94	07-08-94
MF8110	LG-11	WATER	07-07-94	07-08-94
MF8111	SG-6	WATER	07-06-94	07-08-94
MF8112	SG-E	WATER	07-06-94	07-08-94
MF8113	LG-7	WATER	07-06-94	07-08-94
MF8114	LG-9	WATER	07-07-94	07-08-94
MF8115	LG-11	WATER	07-07-94	07-08-94
MF8116	SG-6	WATER	07-06-94	07-08-94
MF8117	SG-E	WATER	07-06-94	07-08-94
MF8118	LG-7	WATER	07-06-94	07-08-94
MF8119	LG-9	WATER	07-07-94	07-08-94
MF8120	LG-11	WATER	07-07-94	07-08-94
MF8121	SG-6	WATER	07-06-94	07-08-94
MF8122	SG-E	WATER	07-06-94	07-08-94
MF8123	LG-7	WATER	07-06-94	07-08-94
MF8124	LG-11	WATER	07-07-94	07-08-94
MF8671	SHIPPING	NOT APPLICABLE	NOT APPLICABLE	07-21-94
MF9233	BOTTLES	NOT APPLICABLE	NOT APPLICABLE	07-07-94

This report is "PROPRIETARY AND CONFIDENTIAL" and delivered to, and intended for the exclusive use of the above named client only. ETC, a Division of APBI Environmental Sciences Group, Inc. assumes no responsibility or liability for the reliance hereon or use hereof by anyone other than the above named client.


Jennifer L. Roseberry, VP/General Manager

Date

A division of
APBI Environmental
Sciences Group, Inc.

3.7-9-235



FOTH & VAN DYKE
AUGUST 24, 1994
811445

SAMPLE MATRIX: LIQUID

<u>Parameter</u>	<u>EPA Prep Method</u>	<u>EPA Analysis Method</u>
ICP Metals	3015	6010
Antimony	3015	7041
Arsenic	3015	7060
Lead	3015	7421
Potassium*	3010	6010
Selenium	7740	7740
Thallium	3015	7841
Mercury	7470	7470
Alkalinity as CaCO ₃	NA	310.1
Alkalinity, Hydroxide as CaCO ₃	NA	310.1
Bicarbonate as CaCO ₃	NA	310.1
Carbonate Alkalinity as CaCO ₃	NA	310.1
Ammonia as N	350.2	350.2
Anions	±	±
Cation and Anion Balance	±	±
Cations	±	±
Chemical Oxygen Demand	NA	410.4
Chloride	NA	300.0
Conductivity	NA	9050
Total Cyanide	9010	9010
Fluoride	NA	340.2
Hardness as CaCO ₃	NA	130.2
Nitrate as N	NA	300.0
Total Kjeldahl Nitrogen	351.3	351.3
Oil & Grease	413.2	413.2
pH	NA	9040
Phosphorus*	365.2	365.2
Phosphorus as P, Dissolved*	365.2	365.2
Sodium Absorption Ratio	±	±
Total Suspended Solids	NA	160.2
Sulfate as SO ₄ *	NA	375.2
Total Dissolved Solids	NA	160.1
Turbidity	NA	180.1
Biochemical Oxygen Demand*	405.1	405.1

* ANALYSIS PERFORMED BY NORTHERN LAKE SERVICE, INC

± CALCULATION

ns



FOTH & VAN DYKE
23 AUGUST 1994

EXECUTIVE SUMMARY
ETC JOBLINK 811445

On 08 July 1994 ETC-Santa Rosa received aqueous samples from Foth & Van Dyke via Federal Express. The cooler temperatures were 0°C and 01°C upon receipt at the laboratory. The samples were analyzed as specified on the preceding page.

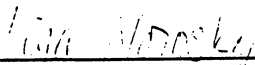
Samples were filtered at the laboratory through a 0.45 μ m filter prior to analysis for Iron, Manganese, and Phosphorus; these results reflect dissolved parameters. These parameters were also analyzed without filtration; these results reflect total parameters.

All samples were received past the method-recommended holding time for pH analysis.

Low level metals analyses were performed by Batelle; Biochemical Oxygen Demand (BOD), Sulfate, Dissolved Phosphorus, Total Phosphorus, and Total Potassium analyses were performed by Northern Lake Services (NLS). Samples were filtered for Dissolved Phosphorus upon receipt at NLS. All results are included herein, with the exception of low level metals; those results will follow in an amended report.

CALCULATIONS:

Results for Sodium Absorption Ratio (Modified SAR), Cations, Anions, and Cation and Anion Balance were obtained by calculation using analytical data. The Cations reflect results for Calcium, Magnesium, Potassium, and Sodium; the Anions reflect results for Chloride, Fluoride, Nitrate, Sulfate, Carbonate, and Bicarbonate.



Lisa Norosky, Program Manager



Date

Joblink: 811445

DATA SUMMARY REPORT

DATE: 08/23/94

Company: FOTH & VAN DYKE

PAGE: 1

Sample Point ID:	LG-11	LG-11	LG-7	LG-7	LG-9	LG-9	SG-6	SG-6
ETC Sample Number:	MF8110	MF8115	MF8108	MF8113	MF8109	MF8114	MF8106	MF8111
Sample Date:	940707	940707	940706	940706	940707	940707	940706	940706
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
pH	std	6.40	-	6.00	-	9.10	-	8.30	-
Turbidity	NTU	.750	-	1.90	-	.600	-	.850	-
Chloride	mg/L	1.07	-	1.09	-	1.43	-	1.19	-
Nitrate as N	mg/L	<.500	-	<.500	-	<.500	-	<.500	-
Solids, total suspended	mg/L	<5.00	-	<5.00	-	<5.00	-	<5.00	-
Total Dissolved Solids (TDS)	mg/L	22.0	-	33.0	-	105	-	130	-
Oil and Grease, (IR)	mg/L	<1.05	-	<1.12	-	<1.04	-	<1.02	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	.250	-	.252	-	.280	-	.616	-
Chemical Oxygen Demand (COD)	mg/L	11.0	-	20.0	-	23.0	-	15.0	-
Conductivity	umhos	20.3	-	17.7	-	142	-	210	-
Hardness as CaCO3	mg/L	10.0	-	5.97	-	68.4	-	99.5	-
Fluoride	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Alkalinity as CaCO3	mg/L	4.50	-	2.80	-	78.0	-	109	-
Alkalinity, Hydroxide as CaCO3	mg/L	0	-	0	-	0	-	0	-
Alkalinity, Bicarbonate CaCO3	mg/L	4.50	-	2.80	-	78.0	-	109	-
Alkalinity, Carbonate as CaCO3	mg/L	0	-	0	-	0	-	0	-
Ammonia as N	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Sodium Absorption Ratio (SAR)	std	0	-	0	-	.077	-	.072	-
Cations	meq/l	.147	-	.079	-	1.75	-	2.23	-
Anions	meq/l	.202	-	.168	-	1.42	-	1.94	-
Cation and Anion Balance	%	-20	-	-40	-	10.3	-	6.80	-
Biochemical Oxygen Demand	mg/L	-	<3.00	-	<3.00	-	<3.00	-	<3.00
Phosphorus	mg/L	-	.013	-	.014	-	.019	-	.020
Phosphorus as P, dissolved	mg/L	-	<.004	-	<.004	-	.012	-	.011
Sulfate as SO4	mg/L	-	4.70	-	4.40	-	5.10	-	5.90

3.7-9-238

Joblink: 811445

DATA SUMMARY REPORT

DATE: 08/23/94

Company: FOTH & VAN DYKE

PAGE: 2

Sample Point ID: SG-E SG-E
ETC Sample Number: MF8107 MF8112
Sample Date: 940706 940706
Facility Code: FVDGRNBCMC FVDGRNBCMC

Parameters Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-
pH	std	7.90	-
Turbidity	NTU	.900	-
Chloride	mg/L	1.90	-
Nitrate as N	mg/L	.706	-
Solids, total suspended	mg/L	<5.00	-
Total Dissolved Solids (TDS)	mg/L	160	-
Oil and Grease, (IR)	mg/L	<1.02	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	.252	-
Chemical Oxygen Demand (COD)	mg/L	<10.0	-
Conductivity	umhos	274	-
Hardness as CaCO3	mg/L	135	-
Fluoride	mg/L	<.100	-
Alkalinity as CaCO3	mg/L	138	-
Alkalinity, Hydroxide as CaCO3	mg/L	0	-
Alkalinity, Bicarbonate CaCO3	mg/L	138	-
Alkalinity, Carbonate as CaCO3	mg/L	0	-
Ammonia as N	mg/L	<.100	-
Sodium Absorption Ratio (SAR)	std	.083	-
Cations	meq/l	3.09	-
Anions	meq/l	2.47	-
Cation and Anion Balance	%	11.0	-
Biochemical Oxygen Demand	mg/L	-	<3.00
Phosphorus	mg/L	-	.018
Phosphorus as P, dissolved	mg/L	-	.006
Sulfate as SO4	mg/L	-	7.00

3.7-9-239

Joblink: 811445

DATA SUMMARY REPORT

DATE: 08/23/94

Company: FOTH & VAN DYKE

PAGE: 3

Sample Point ID:	LG-11	LG-11	LG-11	LG-7	LG-7	LG-7	LG-9	LG-9
ETC Sample Number:	MF8110	MF8115	MF8120	MF8108	MF8113	MF8118	MF8109	MF8114
Sample Date:	940707	940707	940707	940706	940706	940706	940707	940707
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	-	<.100	-	-	<.100	-	-
Manganese	mg/L	-	-	<.010	-	-	.012	-	-
Antimony, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Arsenic, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Barium, Total	mg/L	<.010	-	-	<.010	-	-	<.010	-
Beryllium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Boron, Total	mg/L	.124	-	-	<.100	-	-	<.100	-
Calcium, Total	mg/L	1.61	-	-	1.27	-	-	18.0	-
Chromium, Total	mg/L	<.020	-	-	<.020	-	-	<.020	-
Iron, Total	mg/L	<.100	-	-	<.100	-	-	.129	-
Magnesium, Total	mg/L	.564	-	-	<.500	-	-	9.52	-
Manganese, Total	mg/L	.022	-	-	.014	-	-	.015	-
Molybdenum, Total	mg/L	<.020	-	-	<.020	-	-	<.020	-
Nickel, Total	mg/L	<.030	-	-	<.030	-	-	<.030	-
Selenium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Silver, Total	mg/L	<.010	-	-	<.010	-	-	<.010	-
Sodium, Total	mg/L	<1.00	-	-	<1.00	-	-	1.63	-
Thallium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Potassium, Total	mg/L	-	.800	-	-	.600	-	-	<.600
Aluminum, Total	mg/L	-	-	-	-	-	-	<.200	-
Cadmium, Total	mg/L	-	-	-	-	-	-	<.005	-
Copper, Total	mg/L	-	-	-	-	-	-	<.030	-
Lead, Total	mg/L	-	-	-	-	-	-	<.050	-
Zinc, Total	mg/L	-	-	-	-	-	-	<.020	-
Mercury, Total	mg/L	-	-	-	-	-	-	.0003	-

3.7-9-240

Joblink: 811445

DATA SUMMARY REPORT

DATE: 08/23/94

Company: FOTH & VAN DYKE

PAGE: 4

Sample Point ID:	LG-9	SG-6	SG-6	SG-6	SG-E	SG-E	SG-E
ETC Sample Number:	MF8119	MF8106	MF8111	MF8116	MF8107	MF8112	MF8117
Sample Date:	940707	940706	940706	940706	940706	940706	940706
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	<.100	-	-	<.100	-	-	<.100
Manganese	mg/L	<.010	-	-	.011	-	-	<.010
Antimony, Total	mg/L	-	<.005	-	-	<.005	-	-
Arsenic, Total	mg/L	-	<.005	-	-	<.005	-	-
Barium, Total	mg/L	-	<.010	-	-	<.010	-	-
Beryllium, Total	mg/L	-	<.005	-	-	<.005	-	-
Boron, Total	mg/L	-	<.100	-	-	<.100	-	-
Calcium, Total	mg/L	-	23.2	-	-	34.1	-	-
Chromium, Total	mg/L	-	<.020	-	-	<.020	-	-
Iron, Total	mg/L	-	.141	-	-	<.100	-	-
Magnesium, Total	mg/L	-	11.9	-	-	15.4	-	-
Manganese, Total	mg/L	-	.026	-	-	.012	-	-
Molybdenum, Total	mg/L	-	<.020	-	-	<.020	-	-
Nickel, Total	mg/L	-	<.030	-	-	<.030	-	-
Selenium, Total	mg/L	-	<.005	-	-	<.005	-	-
Silver, Total	mg/L	-	<.010	-	-	<.010	-	-
Sodium, Total	mg/L	-	1.71	-	-	2.32	-	-
Thallium, Total	mg/L	-	<.005	-	-	<.005	-	-
Potassium, Total	mg/L	-	-	.640	-	-	.670	-
Aluminum, Total	mg/L	-	-	-	-	-	-	-
Cadmium, Total	mg/L	-	-	-	-	-	-	-
Copper, Total	mg/L	-	-	-	-	-	-	-
Lead, Total	mg/L	-	-	-	-	-	-	-
Zinc, Total	mg/L	-	-	-	-	-	-	-
Mercury, Total	mg/L	-	-	-	-	-	-	-

3.7-9-241

ETC

CHAIN-OF-CUSTODY RECORD

No. 114639

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570

811445

COMPANY FOTH: VANDYKE		FACILITY/SITE CRANDON MINING Co (SW) 930049		NUMBER OF CONTAINERS	FILT. (Y/N)										LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₄ +H ₂ SO ₄			
PROJECT CONTACT RUSS JANESHER		TELEPHONE NO 414-497-2500			PRESERV.													
					ANALYSIS REQUIRED													
SEE ATTACHMENT																		
ITEM NO	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	Source Codes: Well.....(W) Outfall.....(O) Soil.....(S) River/Stream.....(R) Bottom Sediment.....(B) Generation Point.....(G) Surface Impoundment (I) Treatment Facility.....(T) Leachate Collection Sys.....(C) Lake/Ocean.....(L) Other.....(X) Specify _____											SAMPLER OBSERVATIONS	LAB OBSERVATIONS
1			SG-6	9/10/06	1430		7											
2			SG-E		1530		7											
3			LG-7		1700		7											
4			LG-9	9/10/07	1000		7											
5			LG-11		1145		7											
6																		
7																		
8																		
9																		

CHAIN OF CUSTODY CHRONICLE

REMARKS

1.	Shuttle Opened By: (print) <u>SCOTT JANESSEN</u>	Date: <u>7/5/94</u>	Time: <u>0700</u>
	Signature: <u>Scott Janesen</u>	Seal #: <u>70282</u>	Intact: <u>YES</u>
I have received these materials in good condition from the above person			
2.	Name: _____	Signature: _____	
	Date: _____	Time: _____	Remarks: _____
I have received these materials in good condition from the above person			
3.	Name: _____	Signature: _____	
	Date: _____	Time: _____	Remarks: _____
4.	Shuttle Sealed By: (print) <u>SCOTT JANESSEN</u>	Date: <u>7/7/94</u>	Time: <u>1330</u>
	Signature: <u>Scott Janesen</u>	Seal #: <u>70271</u>	Intact: <u>YES</u>

SAMPLER'S SIGNATURE

LAB USE ONLY Opened By: <u>JEFF HANSEN</u>	Date: <u>7-8-94</u>	Time: <u>9:40am</u>
SHUTTLE # <u>122</u>	TEMP. °C <u>1 sm2</u>	SEAL # <u>70220</u>
COND. <u>GOOD</u>		

WHITE: LAB COPY

YELLOW: SAMPLER COPY

PINK: CLIENT COPY

ETC

CHAIN-OF-CUSTODY RECORD

No. 114639

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570						811445	
COMPANY FOTH: VAN DYKE			FACILITY/SITE CRANDON MINING Co (SW) 930049			FILTER (Y/N) PRESERV. ANALYSIS REQUIRED SEE ATTACHMENT	
PROJECT CONTACT RUSS JANESHER			TELEPHONE NO. 414-497-2500				
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	Source Codes: Well.....(W) Outfall.....(O) Soil.....(S) River/Stream.....(R) Bottom Sediment.....(B) Generation Point.....(G) Surface Impoundment (I) Treatment Facility.....(T) Leachate Collection Sys.....(C) Lake/Ocean.....(L) Other.....(X) Specify _____	
1			SG-6	9/1/06	1430	7	
2			SG-E	↓	1530	7	
3			LG-7	↓	1700	7	
4			LG-9	9/1/07	1000	7	
5			LG-11	↓	1145	7	
6							
7							
8							
9							

CHAIN OF CUSTODY CHRONICLE

3. Shuttle Opened By: (print) Scott JANESSEN Date: 7/5/94 Time: 0700

Signature: Scott Janes Seal #: 70282 Intact: YES

I have received these materials in good condition from the above person.

Name: _____ Signature _____

Date: _____ Time: _____ Remarks: _____

2. I have received these materials in good condition from the above person.

Name: _____ Signature _____

Date: _____ Time: _____ Remarks: _____

3. I have received these materials in good condition from the above person.

Name: _____ Signature _____

Date: _____ Time: _____ Remarks: _____

4. Shuttle Sealed By: (print) SCOTT JANESSEN Date: 7/7/94 Time: 1330

Signature: Scott Janes Seal #: 70271 Intact: YES

REMARKS

LAB USE ONLY Opened By: Jeff Wimper Date: 7-8-94 Time: 9:40am

SHUTTLE # N/A TEMP. °C 0.5m5 SEAL # 70271 COND. Good

SAMPLER'S SIGNATURE

BULK CLIENT COPY



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 09833

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT FOTH VAN DYKE				PROJECT TITLE CRANDON MINING Co (SW)			
ADDRESS 2735 S RIDGE RD				PROJECT NO. 730049		P.O. NO.	
CITY GREEN BAY		STATE WI		ZIP 54307		CONTACT RUSS JANESHER	
						PHONE 414-497-2500	

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			PN	PS	PN		
1.	60729	SG-6	9/10/00	1430	SW	GRAB	1	1	1		
2.	60730	SG-E		1530			1	1	1		
3.	60731	LG-7		1700			1	1	1		
4.	60732	LG-9	9/17/7	1000			1	1	1		
5.	60733	LG-11		1145			1	1	1		
6.											
7.											
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE: SW = surface water WW = wastewater GW = groundwater describe others			DW = drinking water TIS = tissue AIR = air PROD = product SOIL = soil SED = sediment			CONTAINER P = plastic G = glass V = glass vial B = plastic bag describe others			PRESERVATIVES & PREPARATION NP = nothing added S = sulfuric acid N = nitric acid Z = zinc acetate OH = sodium hydroxide HA = hydrochloric & ascorbic acid H = hydrochloric acid F = field filtered		
--	--	--	---	--	--	---	--	--	--	--	--

COLLECTED BY (signature) <i>Scott Capron</i>		CUSTODY SEAL NO. (IF ANY) DATE/TIME 7/7/94 1330	
RELINQUISHED BY (signature) <i>Scott Capron</i>		RECEIVED BY (signature) DATE/TIME	
RELINQUISHED BY (signature)		RECEIVED BY (signature) DATE/TIME	
DISPATCHED BY (signature) <i>Scott Capron</i>		METHOD OF TRANSPORT FV0	
		DATE/TIME 7/7/94 1330	
RECEIVED AT NLS BY (signature) <i>Paul Smith</i>		DATE/TIME 7/7/94 1325	
SEAL INTACT? ☐ YES ☐ NO		CONDITION in ice	
SEAL #		TEMP.	
REMARKS & OTHER INFORMATION <i>Delivered</i>			

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY

3.7-9-244

8099584636

183

8099584636



170343557

7/7/94

SCOTT JANSSEN

414 497-2500

707-544-5570

FOTH VAN DYKE / CRANDON MINING

ETC-SANTA ROSA

104 W MADISON

320 TESCONI CIRCLE UNIT 5

CRANDON

WI

54520

SANTA ROSA

CA

95401

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X

X

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REVISION DATE 11/89

014

Scott Janssen

X

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7/7/94

SCOTT JANSSEN

414 497-2500

707-544-5570

FOTH VAN DYKE / CRANDON MINING CO

ETC-SANTA ROSA

104 W. MADISON

320 TESCONI CIRCLE UNIT 5

CRANDON

WI

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SANTA ROSA

CA

95401

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3.7-9-245

REVISION DATE

014

Scott Janssen

X



ANALYST

320 Tesconi Circle

Suite G

Santa Rosa, CA

95401

Telephone

(707) 544-5570

Facsimile

(707) 544-4906

AUGUST 24, 1994

CLIENT: FOTH & VAN DYKE
P.O. BOX 19012
2737 S. RIDGE ROAD
GREEN BAY, WI 54307-9012

ATTN: RUSS JANESHEK

JOBLINK: 811449
PROJECT: CRANDON MINING CO (SW)

ANALYSIS

6010 & 7000 SERIES METALS

CONVENTIONALS: ALKALINITY AS CaCO_3 ; ALKALINITY, HYDROXIDE AS CaCO_3 ;
ALKALINITY, BICARBONATE CaCO_3 ; ALKALINITY, CARBONATE AS CaCO_3 ; AMMONIA AS N; ANIONS;
BIOCHEMICAL OXYGEN DEMAND; CATION AND ANION BALANCE; CATIONS;
CHEMICAL OXYGEN DEMAND (COD); CHLORIDE; CONDUCTIVITY; CYANIDE, TOTAL; FLUORIDE;
HARDNESS AS CaCO_3 ; NITRATE AS N; NITROGEN, TOTAL KJELDAHL (TKN); OIL AND GREASE, (IR);
PH; PHOSPHORUS; PHOSPHORUS AS P, DISSOLVED; SODIUM ABSORPTION RATIO (SAR);
SOLIDS, TOTAL SUSPENDED; SULFATE AS SO_4 ; TOTAL DISSOLVED SOLIDS (TDS); TURBIDITY

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE COLLECTION DATE</u>	<u>DATE RECEIVED BY LAB</u>
MF8148	LG-13	WATER	07-07-94	07-09-94
MF8149	LG-12	WATER	07-07-94	07-09-94
MF8150	LG-15-01	WATER	07-07-94	07-09-94
MF8151	LG-15-02	WATER	07-07-94	07-09-94
MF8152	LG-13	WATER	07-07-94	07-09-94
MF8153	LG-12	WATER	07-07-94	07-09-94
MF8154	LG-15-01	WATER	07-07-94	07-09-94
MF8155	LG-15-02	WATER	07-07-94	07-09-94
MF8156	LG-13	WATER	07-07-94	07-09-94
MF8157	LG-12	WATER	07-07-94	07-09-94
MF8158	LG-15-01	WATER	07-07-94	07-09-94
MF8159	LG-15-02	WATER	07-07-94	07-09-94
MF8160	LG-13	WATER	07-07-94	07-09-94
MF8161	LG-12	WATER	07-07-94	07-09-94
MF8162	LG-15-01	WATER	07-07-94	07-09-94
MF8163	LG-15-02	WATER	07-07-94	07-09-94
MF8774	SHIPPING	NOT APPLICABLE	NOT APPLICABLE	07-28-94
MF9234	BOTTLES	NOT APPLICABLE	NOT APPLICABLE	07-09-94

This report is "PROPRIETARY AND CONFIDENTIAL" and delivered to, and intended for the exclusive use of the above named client only. ETC, a Division of APBI Environmental Sciences Group, Inc. assumes no responsibility or liability for the reliance hereon or use hereof by anyone other than the above named client.

Jennifer L. Roseberry, VP/General Manager

Date

3.7-9-246



FOTH & VAN DYKE
AUGUST 24, 1994
811449

SAMPLE MATRIX: LIQUID

<u>Parameter</u>	<u>EPA Prep Method</u>	<u>EPA Analysis Method</u>
ICP Metals	3015	6010
Antimony	3015	7041
Arsenic	3015	7060
Lead	3015	7421
Potassium*	3010	6010
Selenium	7740	7740
Thallium	3015	7841
Mercury	7470	7470
Alkalinity as CaCO ₃	NA	310.1
Alkalinity, Hydroxide as CaCO ₃	NA	310.1
Bicarbonate as CaCO ₃	NA	310.1
Carbonate Alkalinity as CaCO ₃	NA	310.1
Ammonia as N	350.2	350.2
Anions	‡	‡
Cation and Anion Balance	‡	‡
Cations	‡	‡
Chemical Oxygen Demand	NA	410.4
Chloride	NA	300.0
Conductivity	NA	9050
Total Cyanide	9010	9010
Fluoride	NA	340.2
Hardness as CaCO ₃	NA	130.2
Nitrate as N	NA	300.0
Total Kjeldahl Nitrogen	351.3	351.3
Oil & Grease	413.2	413.2
pH	NA	9040
Phosphorus*	365.2	365.2
Phosphorus as P, Dissolved*	365.2	365.2
Sodium Absorption Ratio	‡	‡
Total Suspended Solids	NA	160.2
Sulfate as SO ₄ *	NA	375.2
Total Dissolved Solids	NA	160.1
Turbidity	NA	180.1
Biochemical Oxygen Demand*	405.1	405.1

* ANALYSIS PERFORMED BY NORTHERN LAKE SERVICE, INC

‡ CALCULATION

ns



FOTH & VAN DYKE
23 AUGUST 1994

EXECUTIVE SUMMARY
ETC JOBLINK 811449

On 09 July 1994 ETC-Santa Rosa received aqueous samples from Foth & Van Dyke via Federal Express. The cooler temperatures were 0°C and 04°C upon receipt at the laboratory. The samples were analyzed as specified on the preceding page.

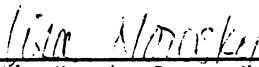
Samples were filtered at the laboratory through a 0.45 µm filter prior to analysis for Iron, Manganese, and Phosphorus; these results reflect dissolved parameters. These parameters were also analyzed without filtration; these results reflect total parameters.

All samples were received past the method-recommended holding time for pH analysis.

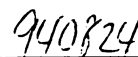
Low level metals analyses were performed by Batelle; Biochemical Oxygen Demand (BOD), Sulfate, Dissolved Phosphorus, Total Phosphorus, and Total Potassium analyses were performed by Northern Lake Services (NLS). Samples were filtered for Dissolved Phosphorus upon receipt at NLS. All results are included herein, with the exception of low level metals; those results will follow in an amended report.

CALCULATIONS:

Results for Sodium Absorption Ratio (Modified SAR), Cations, Anions, and Cation and Anion Balance were obtained by calculation using analytical data. The Cations reflect results for Calcium, Magnesium, Potassium, and Sodium; the Anions reflect results for Chloride, Fluoride, Nitrate, Sulfate, Carbonate, and Bicarbonate.



Lisa Norosky, Program Manager



Date

Joblink: 811427

DATA SUMMARY REPORT

DATE: 08/23/94

PAGE: 1

Company: FOTH & VAN DYKE

Sample Point ID:	SG-19	SG-19	SG-2	SG-2	SG-3	SG-3	SG-30	SG-30
ETC Sample Number:	MF8013	MF8024	MF8015	MF8026	MF8016	MF8027	MF8014	MF8025
Sample Date:	940705	940705	940706	940706	940706	940706	940705	940705
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
pH	std	7.70	-	7.80	-	7.80	-	8.20	-
Turbidity	NTU	1.70	-	5.10	-	2.30	-	9.50	-
Ammonia as N	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Chloride	mg/L	1.16	-	2.20	-	2.25	-	1.09	-
Nitrate as N	mg/L	.719	-	<.500	-	<.500	-	<.500	-
Solids, total suspended	mg/L	<5.00	-	10.0	-	<5.00	-	13.0	-
Total Dissolved Solids (TDS)	mg/L	118	-	131	-	138	-	151	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	<.200	-	.588	-	.616	-	.812	-
Oil and Grease, (IR)	mg/L	<1.01	-	<1.03	-	<1.01	-	<1.01	-
Chemical Oxygen Demand (COD)	mg/L	25.0	-	27.0	-	15.0	-	28.0	-
Conductivity	umhos	182	-	210	-	214	-	234	-
Hardness as CaCO3	mg/L	97.0	-	110	-	108	-	139	-
Fluoride	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Alkalinity as CaCO3	mg/L	92.0	-	99.0	-	102	-	128	-
Alkalinity, Hydroxide as CaCO3	mg/L	0	-	0	-	0	-	0	-
Alkalinity, Bicarbonate CaCO3	mg/L	92.0	-	99.0	-	102	-	128	-
Alkalinity, Carbonate as CaCO3	mg/L	0	-	0	-	0	-	0	-
Sodium Absorption Ratio (SAR)	std	.085	-	.090	-	.089	-	.073	-
Cations	meq/l	2.10	-	2.29	-	2.37	-	2.91	-
Anions	meq/l	1.70	-	1.78	-	1.84	-	2.27	-
Cation and Anion Balance	%	10.6	-	12.5	-	12.6	-	12.2	-
Biochemical Oxygen Demand	mg/L	-	<3.00	-	<3.00	-	<3.00	-	<3.00
Phosphorus	mg/L	-	.054	-	.046	-	.035	-	.096
Phosphorus as P, dissolved	mg/L	-	.033	-	.021	-	.014	-	.058
Sulfate as SO4	mg/L	-	7.10	-	4.70	-	4.90	-	6.90

3.7-9-249

Joblink: 811427

DATA SUMMARY REPORT

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Company: FOTH & VAN DYKE

Sample Point ID:	SG-4	SG-4	SG-5A	SG-5A	SG-AB	SG-AB	SG-CC-01	SG-CC-01
ETC Sample Number:	MF8017	MF8028	MF8018	MF8029	MF8012	MF8023	MF8008	MF8019
Sample Date:	940706	940706	940706	940706	940705	940705	940705	940705
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-	<.020	-	-	-	<.020	-
pH	std	8.00	-	7.60	-	7.70	-	7.70	-
Turbidity	NTU	3.20	-	1.10	-	.900	-	3.90	-
Ammonia as N	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Chloride	mg/L	5.28	-	1.42	-	3.38	-	2.64	-
Nitrate as N	mg/L	<.500	-	<.500	-	.793	-	.732	-
Solids, total suspended	mg/L	8.00	-	<5.00	-	<5.00	-	6.00	-
Total Dissolved Solids (TDS)	mg/L	117	-	149	-	118	-	100	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	.336	-	.392	-	.364	-	.392	-
Oil and Grease, (IR)	mg/L	<1.03	-	<1.04	-	<1.01	-	<1.03	-
Chemical Oxygen Demand (COD)	mg/L	14.0	-	12.0	-	25.0	-	32.0	-
Conductivity	umhos	204	-	247	-	218	-	152	-
Hardness as CaCO3	mg/L	97.0	-	129	-	108	-	86.2	-
Fluoride	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Alkalinity as CaCO3	mg/L	96.0	-	122	-	102	-	76.0	-
Alkalinity, Hydroxide as CaCO3	mg/L	0	-	0	-	0	-	0	-
Alkalinity, Bicarbonate CaCO3	mg/L	96.0	-	122	-	102	-	76.0	-
Alkalinity, Carbonate as CaCO3	mg/L	0	-	0	-	0	-	0	-
Sodium Absorption Ratio (SAR)	std	.154	-	.070	-	.090	-	.091	-
Cations	meq/l	2.16	-	2.66	-	2.32	-	1.62	-
Anions	meq/l	1.84	-	2.15	-	1.90	-	1.46	-
Cation and Anion Balance	%	7.97	-	10.5	-	9.95	-	5.29	-
Biochemical Oxygen Demand	mg/L	-	<3.00	-	<3.00	-	<3.00	-	<3.00
Phosphorus	mg/L	-	.018	-	.037	-	.039	-	.038
Phosphorus as P, dissolved	mg/L	-	.004	-	.018	-	.025	-	.022
Sulfate as SO4	mg/L	-	5.70	-	5.30	-	5.80	-	6.00

3.7-9-250

Joblink: 811427

DATA SUMMARY REPORT

DATE: 08/23/94

Company: FOTH & VAN DYKE

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Sample Point ID:	SG-CC-02	SG-CC-02	SG-V	SG-V	SG-Y	SG-Y
ETC Sample Number:	MF8009	MF8020	MF8011	MF8022	MF8010	MF8021
Sample Date:	940705	940705	940705	940705	940705	940705
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-	<.020	-	<.020	-
pH	std	7.60	-	7.70	-	7.50	-
Turbidity	NTU	4.00	-	3.90	-	2.30	-
Ammonia as N	mg/L	<.100	-	<.100	-	<.100	-
Chloride	mg/L	2.64	-	3.06	-	2.25	-
Nitrate as N	mg/L	.732	-	.756	-	<.500	-
Solids, total suspended	mg/L	<5.00	-	7.00	-	<5.00	-
Total Dissolved Solids (TDS)	mg/L	93.0	-	119	-	69.0	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	.504	-	.420	-	.616	-
Oil and Grease, (IR)	mg/L	<1.03	-	<1.01	-	<1.06	-
Chemical Oxygen Demand (COD)	mg/L	31.0	-	29.0	-	36.0	-
Conductivity	umhos	153	-	205	-	104	-
Hardness as CaCO3	mg/L	82.2	-	106	-	50.1	-
Fluoride	mg/L	<.100	-	<.100	-	<.100	-
Alkalinity as CaCO3	mg/L	70.0	-	98.0	-	48.0	-
Alkalinity, Hydroxide as CaCO3	mg/L	0	-	0	-	0	-
Alkalinity, Bicarbonate CaCO3	mg/L	70.0	-	98.0	-	48.0	-
Alkalinity, Carbonate as CaCO3	mg/L	0	-	0	-	0	-
Sodium Absorption Ratio (SAR)	std	.090	-	.089	-	.096	-
Cations	meq/l	1.65	-	2.20	-	1.12	-
Anions	meq/l	1.34	-	1.83	-	.957	-
Cation and Anion Balance	%	10.1	-	9.18	-	7.67	-
Biochemical Oxygen Demand	mg/L	-	<3.00	-	<3.00	-	<3.00
Phosphorus	mg/L	-	.039	-	.043	-	.047
Phosphorus as P, dissolved	mg/L	-	.023	-	.022	-	.016
Sulfate as SO4	mg/L	-	5.30	-	6.00	-	5.10

3.7-9-251

Joblink: 811449

DATA SUMMARY REPORT

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Company: FOTH & VAN DYKE

PAGE: 1

Sample Point ID:	LG-12	LG-12	LG-13	LG-13	LG-15-01	LG-15-01	LG-15-02	LG-15-02
ETC Sample Number:	MF8149	MF8153	MF8148	MF8152	MF8150	MF8154	MF8151	MF8155
Sample Date:	940707	940707	940707	940707	940707	940707	940707	940707
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
pH	std	6.00	-	6.30	-	5.70	-	5.90	-
Turbidity	NTU	1.30	-	2.00	-	2.10	-	1.50	-
Chloride	mg/L	.981	-	<.500	-	<.500	-	<.500	-
Nitrate as N	mg/L	<.500	-	<.500	-	<.500	-	<.500	-
Solids, total suspended	mg/L	<5.00	-	<5.00	-	<5.00	-	<5.00	-
Total Dissolved Solids (TDS)	mg/L	33.0	-	33.0	-	41.0	-	34.0	-
Oil and Grease, (IR)	mg/L	<1.03	-	<1.02	-	<1.05	-	<1.05	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	.644	-	.700	-	.980	-	.952	-
Chemical Oxygen Demand (COD)	mg/L	21.0	-	20.0	-	33.0	-	42.0	-
Conductivity	umhos	16.2	-	22.0	-	10.7	-	10.7	-
Hardness as CaCO3	mg/L	6.00	-	7.00	-	8.00	-	8.00	-
Alkalinity as CaCO3	mg/L	3.70	-	4.30	-	6.40	-	4.80	-
Alkalinity, Hydroxide as CaCO3	mg/L	0	-	0	-	0	-	0	-
Alkalinity, Bicarbonate CaCO3	mg/L	3.70	-	4.30	-	6.40	-	4.80	-
Alkalinity, Carbonate as CaCO3	mg/L	0	-	0	-	0	-	0	-
Fluoride	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Ammonia as N	mg/L	.672	-	.336	-	.336	-	.213	-
Sodium Absorption Ratio (SAR)	std	0	-	0	-	0	-	0	-
Cations	meq/l	.120	-	.138	-	.056	-	.057	-
Anions	meq/l	.182	-	.189	-	.159	-	.133	-
Cation and Anion Balance	%	-20	-	-20	-	-50	-	-40	-
Biochemical Oxygen Demand	mg/L	-	<3.00	-	<3.00	-	<3.00	-	<3.00
Phosphorus	mg/L	-	.028	-	.033	-	.038	-	.036
Phosphorus as P, dissolved	mg/L	-	.011	-	.010	-	.013	-	.017
Sulfate as SO4	mg/L	-	4.50	-	5.70	-	2.60	-	2.60

3.7-9-252

Joblink: 811449

DATA SUMMARY REPORT

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Company: FOTH & VAN DYKE

Sample Point ID:	LG-12	LG-12	LG-12	LG-13	LG-13	LG-13	LG-15-01	LG-15-01
ETC Sample Number:	MF8149	MF8153	MF8157	MF8148	MF8152	MF8156	MF8150	MF8154
Sample Date:	940707	940707	940707	940707	940707	940707	940707	940707
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	-	.140	-	-	.109	-	-
Manganese	mg/L	-	-	.030	-	-	.026	-	-
Antimony, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Arsenic, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Barium, Total	mg/L	<.010	-	-	.012	-	-	<.010	-
Beryllium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Boron, Total	mg/L	.144	-	-	<.100	-	-	<.100	-
Calcium, Total	mg/L	1.17	-	-	1.76	-	-	1.13	-
Chromium, Total	mg/L	<.020	-	-	<.020	-	-	<.020	-
Iron, Total	mg/L	.118	-	-	.180	-	-	.153	-
Magnesium, Total	mg/L	.500	-	-	.608	-	-	<.500	-
Manganese, Total	mg/L	.027	-	-	.032	-	-	.090	-
Molybdenum, Total	mg/L	<.020	-	-	<.020	-	-	<.020	-
Nickel, Total	mg/L	<.030	-	-	<.030	-	-	<.030	-
Selenium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Silver, Total	mg/L	<.010	-	-	<.010	-	-	<.010	-
Sodium, Total	mg/L	<1.00	-	-	<1.00	-	-	<1.00	-
Thallium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Potassium, Total	mg/L	-	.790	-	-	<.600	-	-	<.600

Sample Point ID:	LG-15-01	LG-15-02	LG-15-02	LG-15-02
ETC Sample Number:	MF8158	MF8151	MF8155	MF8159
Sample Date:	940707	940707	940707	940707
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	.178	-	-	.157
Manganese	mg/L	.092	-	-	.092
Antimony, Total	mg/L	-	<.005	-	-
Arsenic, Total	mg/L	-	<.005	-	-
Barium, Total	mg/L	-	<.010	-	-
Beryllium, Total	mg/L	-	<.005	-	-
Boron, Total	mg/L	-	<.100	-	-

Joblink: 811449

DATA SUMMARY REPORT

DATE: 08/23/94

Company: FOTH & VAN DYKE

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Sample Point ID:	LG-15-01	LG-15-02	LG-15-02	LG-15-02
ETC Sample Number:	MF8158	MF8151	MF8155	MF8159
Sample Date:	940707	940707	940707	940707
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Calcium, Total	mg/L	-	1.14	-	-
Chromium, Total	mg/L	-	<.020	-	-
Iron, Total	mg/L	-	.157	-	-
Magnesium, Total	mg/L	-	<.500	-	-
Manganese, Total	mg/L	-	.092	-	-
Molybdenum, Total	mg/L	-	<.020	-	-
Nickel, Total	mg/L	-	<.030	-	-
Selenium, Total	mg/L	-	<.005	-	-
Silver, Total	mg/L	-	<.010	-	-
Sodium, Total	mg/L	-	<1.00	-	-
Thallium, Total	mg/L	-	<.005	-	-
Potassium, Total	mg/L	-	-	<.600	-

3.7-9-254



CHAIN-OF-CUSTODY RECORD

Form 0019
Field Technical Services
Rev. 08/90

No. 96272

811449

Environmental Testing and Certification Corp. • 284 Raritan Center Parkway • Edison, NJ 08818 • 908-225-6700

COMPANY FOTH: VAN DYKE		FACILITY/SITE CRANDON MINING Co (SW)		NUMBER OF CONTAINERS	FILT. (Y/N) PRESERV. ANALYSIS REQUIRED SEE ATTACHMENT	LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₃ + H ₂ SO ₄		
PROJECT CONTACT RUSS JANESHER		TELEPHONE NO. 414-497-2500						
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	Source Codes: Well (W) Outfall (O) Soil (S) River/Stream (R) Bottom Sediment (B) Generation Point (G) Surface Impoundment (I) Treatment Facility (T) Leachate Collection Sys (C) Lake/Ocean (L) Other (X) Specify LAKE - L	SAMPLER OBSERVATIONS	LAB OBSERVATIONS
1		L	L6-1.3	7/17	1445			
2		L	L6-1.2	↓	1700			
3		L	L6-1.5-0.1	↓	1830			
4		L	L6-1.5-0.2	↓	1830			
5								
6								
7								
8								
9								

CHAIN OF CUSTODY CHRONICLE

1.	Shuttle Opened By: (print) SCOTT JANSEN		Date: 7/7/94	Time: 7/5/94
	Signature: Scott Jansen		Seal #: _____	Intact: YES
I have received these materials in good condition from the above person.				
2.	Name: _____		Signature: _____	
	Date: _____		Time: _____	
	Remarks: _____			
I have received these materials in good condition from the above person.				
3.	Name: _____		Signature: _____	
	Date: _____		Time: _____	
	Remarks: _____			
4.	Shuttle Sealed By: (print) SCOTT JANSEN		Date: 7/7/94	Time: 0900
	Signature: Scott Jansen		Seal #: 70221	Intact: YES
LAB USE ONLY Opened By: Phil Jansen Date: 7/9/94 Time: 1120				
SHUTTLE # 71A TEMP. °C 4 SM2 SEAL # 70221 COND. GOOD				

REMARKS

SAMPLER'S SIGNATURE

Scott Jansen **Joseph J. Ant**



CHAIN-OF-CUSTODY RECORD

Form 0019
Field Technical Services
Rev. 08/90

No. 96272

811449

Environmental Testing and Certification Corp. • 284 Raritan Center Parkway • Edison, NJ 08818 • 908-225-6700

COMPANY FOTH: VAN DYKE		FACILITY/SITE CRANDON MINING CO (SW)		NUMBER OF CONTAINERS	FILT. (Y/N)	PRESERV.	ANALYSIS REQUIRED	SEE ATTACHMENT	LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₄ + H ₂ SO ₄											
PROJECT CONTACT RUSS JANESHER		TELEPHONE NO. 414-497-2500																		
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	Source Codes: Well (W) Outfall (O) Soil (S) River/Stream (R) Bottom Sediment (B) Generation Point (G) Surface Impoundment (I) Treatment Facility (T) Leachate Collection Sys (C) Lake/Ocean (L) Other (X) Specify LAKE - L													SAMPLER (OBSERVATIONS)	LABORATORY (OBSERVATIONS)
1		R	L 6 - 1 3	7/7/94	1445		7													
2		R	L 6 - 1 2		1700		7													
3		L	L 6 - 1 5 - 0 1		1830		7													
4		L	L 6 - 1 5 - 0 2		1830		7													
5																				
6																				
7																				
8																				
9																				

CHAIN OF CUSTODY CHRONICLE

REMARKS

3-Z-9-256	Shuttle Opened By: (print) SCOTT JANSEN Date: 7/7/94 Time: 7/5/94	
	Signature: Scott Jansen Seal #: _____ Intact: YES	
	I have received these materials in good condition from the above person.	
	Name: _____ Signature: _____ Date: _____ Time: _____ Remarks: _____	
2.	Name: _____ Signature: _____ Date: _____ Time: _____ Remarks: _____	
3.	Name: _____ Signature: _____ Date: _____ Time: _____ Remarks: _____	
4.	Shuttle Sealed By: (print) SCOTT JANSEN Date: 7/7/94 Time: 0900	
	Signature: Scott Jansen Seal #: 70274 70217 70221 Intact: YES	
LAB USE ONLY Opened By: Phil Jansen Date: 7/9/94 Time: 1120		
SHUTTLE # N/A TEMP. °C 0 947 SEAL # 70217 COND. GOOD		

SAMPLER'S SIGNATURE

Scott Jansen **Joseph J. Ant**



January 5, 1995

Mr. Russell Janeshek
Foth & Van Dyke
2737 S. Ridge Rd.
Green Bay, WI 54307-9012

Re: Crandon Mining Company Project
Battelle Results for June and July Surface Waters

Dear Mr. Janeshek:

Enclosed are reports on PACE report paper summarizing Battelle results for surface water samples collected in June and July, 1994. The Battelle reports (summary report and raw data) were originally submitted to you on November 21, 1994. In a FAX dated 11/23/94, you requested that PACE submit a summary report on PACE letterhead.

Included in this submittal is an addendum package consisting of raw data pertinent to the results. Please place this information at the end of the package in the submittal dated November 21, 1994.

An electronic deliverable summarizing the results is also included in this submittal.

If you have any questions concerning this submittal, feel free to contact me at (612) 525-3454.

Sincerely,

A handwritten signature in cursive script that reads "Steven R. Crupi".

Steven R. Crupi
Project Manager

Enclosures



REPORT OF LABORATORY ANALYSIS

Foth & Van Dyke & Associates
2737 South Ridge Road
P.O. Box 19012
Green Bay, WI 54307

January 03, 1995
PACE Project Number: 941219507

Attn: Mr. Russell Janeshek

Client Reference: Battelle July Surface Waters

PACE Sample Number:

Date Collected:

Date Received:

Client Sample ID:

Parameter:

Units

MDL

10 0300535	10 0300543	10 0300551
07/05/94	07/05/94	07/05/94
07/12/94	07/12/94	07/12/94
SG-CC-01	SG-CC-02	SG-Y

SUBCONTRACT ANALYSIS

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.20	40.2	37.6	15.2
Cadmium	ug/L	0.003	0.005	0.005	0.003
Chromium	ug/L	0.20	0.52	0.45	0.45
Copper	ug/L	0.030	0.363	0.408	0.374
Lead	ug/L	0.002	0.235	0.252	0.236
Mercury	ng/L	0.10	2.02	2.13	2.48
Zinc	ug/L	0.39	1.43	1.79	1.29



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 2

January 03, 1995
PACE Project Number: 941219507

Client Reference: Battelle July Surface Waters

PACE Sample Number:

Date Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDL

10 0300560	10 0300578	10 0300586
07/05/94	07/05/94	07/05/94
07/12/94	07/12/94	07/12/94
SG-V	SG-AB	SG-19

SUBCONTRACT ANALYSIS

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.20	56.4	9.26	14.0
Cadmium	ug/L	0.003	0.07	0.008	0.005
Chromium	ug/L	0.20	0.59	0.30	0.74
Copper	ug/L	0.030	0.363	0.292	0.201
Lead	ug/L	0.002	0.193	0.111	0.076
Mercury	ng/L	0.10	2.41	1.55	2.17
Zinc	ug/L	0.39	3.21	1.36	1.43



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 3

January 03, 1995
PACE Project Number: 941219507

Client Reference: Battelle July Surface Waters

PACE Sample Number:

10 0300594 10 0300608 10 0300616

Date Collected:

07/05/94 07/06/94 07/06/94

Date Received:

07/12/94 07/12/94 07/12/94

Client Sample ID:

SG-30 SG-2 SG-3

Parameter

Units

MDL

SUBCONTRACT ANALYSIS

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.20	82.3	52.5	22.1
Cadmium	ug/L	0.003	0.024	0.051	0.024
Chromium	ug/L	0.20	0.67	0.45	0.37
Copper	ug/L	0.030	0.392	0.771	0.514
Lead	ug/L	0.002	0.465	0.210	0.141
Mercury	ng/L	0.10	3.4	2.78	2.20
Zinc	ug/L	0.30	7.35	3.36	2.36



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 4

January 03, 1995
PACE Project Number: 941219507

Client Reference: Battelle July Surface Waters

PACE Sample Number:

Date Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDL

10 0300624	10 0300632	10 0300640
07/06/94	07/06/94	07/07/94
07/12/94	07/12/94	07/12/94
SG-6	SG-E	LG-7

SUBCONTRACT ANALYSIS

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.20	8.80	14.9	40.3
Cadmium	ug/L	0.003	ND	0.014	0.058
Chromium	ug/L	0.20	0.45	1.56	0.22
Copper	ug/L	0.030	0.154	0.352	0.510
Lead	ug/L	0.002	0.060	0.074	0.274
Mercury	ng/L	0.10	1.27	1.49	1.77
Zinc	ug/L	0.39	1.07	1.36	10.8



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 5

January 03, 1995
PACE Project Number: 941219507

Client Reference: Battelle July Surface Waters

PACE Sample Number:

Date Collected:

Date Received:

Client Sample ID:

Parameter

10 0300659	10 0300667	10 0300675
07/06/94	07/07/94	07/07/94
07/12/94	07/12/94	07/12/94
LG-11	LG-13	LG-12

Units

MDL

SUBCONTRACT ANALYSIS

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.20	15.5	117	70.4
Cadmium	ug/L	0.003	0.015	0.020	0.023
Chromium	ug/L	0.20	0.30	0.45	0.30
Copper	ug/L	0.030	0.347	0.638	0.505
Lead	ug/L	0.002	0.091	0.823	0.897
Mercury	ng/L	0.10	1.02	2.80	3.79
Zinc	ug/L	0.39	4.78	7.00	5.93



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 6

January 03, 1995
PACE Project Number: 941219507

Client Reference: Battelle July Surface Waters

PACE Sample Number:

10 0300683 10 0300691

Date Collected:

07/07/94 07/07/94

Date Received:

07/12/94 07/12/94

Client Sample ID:

LG-15-01 LG-15-02

Parameter

Units

MDL

SUBCONTRACT ANALYSIS

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.20	37.7	39.2
Cadmium	ug/L	0.003	0.003	0.005
Chromium	ug/L	0.20	0.30	0.22
Copper	ug/L	0.030	0.274	0.195
Lead	ug/L	0.002	0.134	0.075
Mercury	ng/L	0.10	1.80	1.84
Zinc	ug/L	0.39	5.71	0.93

These data have been reviewed and are approved for release.

Steven R. Crupi

Steve Crupi
Project Manager



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 7

FOOTNOTES
for pages 1 through 6

January 03, 1995
PACE Project Number: 941219507

Client Reference: Battelle July Surface Waters

MDL Method Detection Limit
ND Not detected at or above the MDL.

August 1994
Surface Water Laboratory Data



An ETC Laboratory

320 Tesconi Circle

Suite G

Santa Rosa, CA
95401

Telephone
(707) 544-5570

Facsimile
(707) 544-4906

SEPTEMBER 8, 1994

CLIENT: FOTH & VAN DYKE
P.O. BOX 19012
2737 S. RIDGE ROAD
GREEN BAY, WI 54307-9012

ATTN: RUSS JANESHEK

JOB/INK: 811597
PROJECT: S.W. SAMPLING

ANALYSIS

6010 & 7000 SERIES METALS

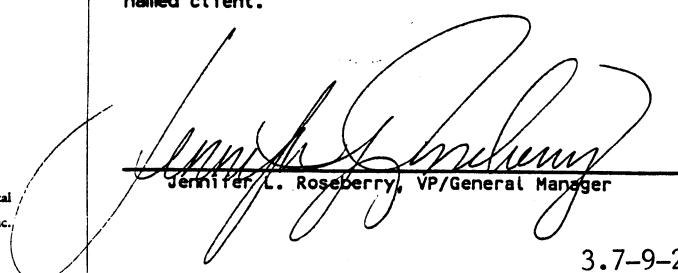
CONVENTIONALS: ALKALINITY AS CaCO_3 ; ALKALINITY, HYDROXIDE AS CaCO_3 ;
ALKALINITY, BICARBONATE CaCO_3 ; ALKALINITY, CARBONATE AS CaCO_3 ; AMMONIA AS N; ANIONS;
BIOCHEMICAL OXYGEN DEMAND; CATION AND ANION BALANCE; CATIONS;
CHEMICAL OXYGEN DEMAND (COD); CHLORIDE; CONDUCTIVITY; CYANIDE, TOTAL; FLUORIDE;
HARDNESS AS CaCO_3 ; NITRATE AS N; NITROGEN, TOTAL KJELDAHL (TKN); OIL AND GREASE, (IR);
PH; PHOSPHORUS; PHOSPHORUS AS P, DISSOLVED; SODIUM ABSORPTION RATIO (SAR);
SOLIDS, TOTAL SUSPENDED; SULFATE AS SO_4 ; TOTAL DISSOLVED SOLIDS (TDS); TURBIDITY

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE COLLECTION DATE</u>	<u>DATE RECEIVED BY LAB</u>
MF9001	SG-CC-01	WATER	08-08-94	08-10-94
MF9002	SG-CC-02	WATER	08-08-94	08-10-94
MF9003	SG-Y	WATER	08-08-94	08-10-94
MF9004	SG-V	WATER	08-08-94	08-10-94
MF9005	SG-AB	WATER	08-08-94	08-10-94
MF9006	SG-19	WATER	08-08-94	08-10-94
MF9007	SG-30	WATER	08-08-94	08-10-94
MF9008	SG-CC-01	WATER	08-08-94	08-10-94
MF9009	SG-CC-02	WATER	08-08-94	08-10-94
MF9010	SG-Y	WATER	08-08-94	08-10-94
MF9011	SG-V	WATER	08-08-94	08-10-94
MF9012	SG-AB	WATER	08-08-94	08-10-94
MF9013	SG-19	WATER	08-08-94	08-10-94
MF9014	SG-30	WATER	08-08-94	08-10-94
MF9015	SG-CC-01	WATER	08-08-94	08-10-94
MF9016	SG-CC-02	WATER	08-08-94	08-10-94
MF9017	SG-Y	WATER	08-08-94	08-10-94
MF9018	SG-V	WATER	08-08-94	08-10-94
MF9019	SG-AB	WATER	08-08-94	08-10-94
MF9020	SG-19	WATER	08-08-94	08-10-94
MF9021	SG-30	WATER	08-08-94	08-10-94

(Continued)

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A division of
APBI Environmental
Sciences Group, Inc.


Jennifer L. Roseberry, VP/General Manager

2/09/08
Date

3.7-9-266



SEPTEMBER 8, 1994

Page 2

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE COLLECTION DATE</u>	<u>DATE RECEIVED BY LAB</u>
MF9022	SG-CC-01	WATER	08-08-94	08-10-94
MF9023	SG-CC-02	WATER	08-08-94	08-10-94
MF9024	SG-Y	WATER	08-08-94	08-10-94
MF9025	SG-V	WATER	08-08-94	08-10-94
MF9026	SG-AB	WATER	08-08-94	08-10-94
MF9027	SG-19	WATER	08-08-94	08-10-94
MF9028	SG-30	WATER	08-08-94	08-10-94
MF9029	SG-2	WATER	08-09-94	08-10-94
MF9030	SG-3	WATER	08-09-94	08-10-94
MF9031	SG-6	WATER	08-09-94	08-10-94
MF9032	SG-2	WATER	08-09-94	08-10-94
MF9033	SG-3	WATER	08-09-94	08-10-94
MF9034	SG-6	WATER	08-09-94	08-10-94
MF9035	SG-2	WATER	08-09-94	08-10-94
MF9036	SG-3	WATER	08-09-94	08-10-94
MF9037	SG-6	WATER	08-09-94	08-10-94
MF9038	SG-2	WATER	08-09-94	08-10-94
MF9039	SG-3	WATER	08-09-94	08-10-94
MF9040	SG-6	WATER	08-09-94	08-10-94
MF9235	BOTTLES	NOT APPLICABLE	NOT APPLICABLE	08-10-94
MF9236	QCCHARGES	NOT APPLICABLE	NOT APPLICABLE	08-10-94
MF9237	SMPLEDEVICE	NOT APPLICABLE	NOT APPLICABLE	08-10-94
MF9289	SHIP	NOT APPLICABLE	NOT APPLICABLE	08-29-94



HARDING LAWSON ASSOCIATES
SEPTEMBER 8, 1994
811597

SAMPLE MATRIX: WATER

<u>Parameter</u>	<u>EPA Prep Method</u>	<u>EPA Analysis Method</u>
ICP Metals	3015	6010
Arsenic	3015	7060
Potassium†	3010	6010
Selenium	3015	7740
Thallium	3015	7841
Alkalinity as CaCO3	NA	310.1
Alkalinity, Hydroxide as CaCO3	NA	310.1
Bicarbonate as CaCO3	NA	310.1
Carbonate Alkalinity as CaCO3	NA	310.1
Ammonia as N	350.2	350.2
Anions	*	*
Cation and Anion Balance	*	*
Cations	*	*
Chemical Oxygen Demand	NA	410.4
Chloride	NA	300.0
Conductivity	NA	9050
Total Cyanide	9010	9010
Fluoride	NA	340.2
Hardness as CaCO3	NA	130.2
Nitrate as N	NA	300.0
Total Kjeldahl Nitrogen	351.3	351.3
Oil & Grease	413.2	413.2
pH	NA	9040
Phosphorus†	365.2	365.2
Phosphorus as P, Dissolved†	365.2	365.2
Sodium Absorption Ratio	*	*
Sulfate as SO4†	NA	375.2
Total Suspended Solids	NA	160.2
Total Dissolved Solids	NA	160.1
Turbidity	NA	180.1
Biochemical Oxygen Demand†	405.1	405.1

† ANALYSIS PERFORMED BY NORTHERN LAKE SERVICE, INC

* CALCULATION

ns



FOTH & VAN DYKE
07 SEPTEMBER 1994

EXECUTIVE SUMMARY
ETC JOBLINK 811597

On 10 August 1994 ETC-Santa Rosa received aqueous samples from Foth & Van Dyke via Federal Express. The cooler temperatures were all 0°C upon receipt at the laboratory. The samples were analyzed as specified on the preceding page.

Samples were filtered at the laboratory through a 0.45 μ m filter prior to analysis for Iron, Manganese, and Phosphorus; these results reflect dissolved parameters. These parameters were also analyzed without filtration; these results reflect total parameters.

All samples were received past the method-recommended holding time for pH analysis.

Low level metals analyses were performed by Batelle; Biochemical Oxygen Demand (BOD), Sulfate, Dissolved Phosphorus, Total Phosphorus, and Total Potassium analyses were performed by Northern Lake Services (NLS). Samples were filtered for Dissolved Phosphorus upon receipt at NLS. All results are included herein, with the exception of low level metals; those results will follow in an amended report.

CALCULATIONS:

Results for Sodium Absorption Ratio (Modified SAR), Cations, Anions, and Cation and Anion Balance were obtained by calculation using analytical data. The Cations reflect results for Calcium, Magnesium, Potassium, and Sodium; the Anions reflect results for Chloride, Fluoride, Nitrate, Sulfate, Carbonate, and Bicarbonate.



Lisa Norosky, Program Manager

940908

Date

Joblink: 811597

DATA SUMMARY REPORT

DATE: 09/07/94

Company: FOTH & VAN DYKE

PAGE: 1

Sample Point ID:	SG-19	SG-19	SG-2	SG-2	SG-3	SG-3	SG-30	SG-30
ETC Sample Number:	MF9006	MF9013	MF9029	MF9032	MF9030	MF9033	MF9007	MF9014
Sample Date:	940808	940808	940809	940809	940809	940809	940808	940808
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Chloride	mg/L	1.05	-	2.03	-	2.06	-	.933	-
Nitrate as N	mg/L	.732	-	.720	-	<.500	-	.717	-
Solids, total suspended	mg/L	<5.00	-	<5.00	-	<5.00	-	6.00	-
Total Dissolved Solids (TDS)	mg/L	120	-	117	-	130	-	147	-
pH	std	7.40	-	7.70	-	7.70	-	8.20	-
Alkalinity as CaCO ₃	mg/L	71.2	-	99.4	-	101	-	116	-
Alkalinity, Hydroxide as CaCO ₃	mg/L	0	-	0	-	0	-	0	-
Alkalinity, Bicarbonate CaCO ₃	mg/L	71.2	-	99.4	-	101	-	116	-
Alkalinity, Carbonate as CaCO ₃	mg/L	0	-	0	-	0	-	0	-
Ammonia as N	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Oil and Grease, (IR)	mg/L	<1.01	-	<1.01	-	<1.02	-	<1.03	-
Conductivity	umhos	144	-	202	-	204	-	235	-
Hardness as CaCO ₃	mg/L	102	-	110	-	106	-	128	-
Chemical Oxygen Demand (COD)	mg/L	37.0	-	23.0	-	22.0	-	20.0	-
Turbidity	NTU	3.00	-	3.30	-	1.10	-	3.20	-
Fluoride	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	.560	-	.308	-	.280	-	.448	-
Sodium Absorption Ratio (SAR)	std	.082	-	.099	-	.094	-	.074	-
Cations	meq/l	1.74	-	2.14	-	2.20	-	2.58	-
Anions	meq/l	1.56	-	1.93	-	1.94	-	2.19	-
Cation and Anion Balance	%	5.37	-	5.26	-	6.28	-	8.14	-
Biochemical Oxygen Demand	mg/L	-	7.00	-	7.00	-	7.00	-	7.00
Phosphorus	mg/L	-	.057	-	.025	-	.009	-	.059
Phosphorus as P, dissolved	mg/L	-	.030	-	.016	-	.011	-	.033
Sulfate as SO ₄	mg/L	-	17.0	-	11.0	-	11.0	-	12.0

3.7-9-270

Joblink: 811597

DATA SUMMARY REPORT

DATE: 09/07/94

Company: FOTH & VAN DYKE

PAGE: 2

Sample Point ID:	SG-6	SG-6	SG-AB	SG-AB	SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02
ETC Sample Number:	MF9031	MF9034	MF9005	MF9012	MF9001	MF9008	MF9002	MF9009
Sample Date:	940809	940809	940808	940808	940808	940808	940808	940808
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Chloride	mg/L	1.12	-	3.05	-	2.39	-	2.32	-
Nitrate as N	mg/L	<.500	-	.744	-	.744	-	.741	-
Solids, total suspended	mg/L	<5.00	-	<5.00	-	<5.00	-	<5.00	-
Total Dissolved Solids (TDS)	mg/L	116	-	125	-	94.0	-	91.0	-
pH	std	7.70	-	7.90	-	7.70	-	7.70	-
Alkalinity as CaCO ₃	mg/L	92.2	-	103	-	73.1	-	74.4	-
Alkalinity, Hydroxide as CaCO ₃	mg/L	0	-	0	-	0	-	0	-
Alkalinity, Bicarbonate CaCO ₃	mg/L	92.2	-	103	-	73.1	-	74.4	-
Alkalinity, Carbonate as CaCO ₃	mg/L	0	-	0	-	0	-	0	-
Ammonia as N	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Oil and Grease, (IR)	mg/L	<1.02	-	<1.03	-	<1.01	-	<1.03	-
Conductivity	umhos	191	-	212	-	156	-	155	-
Hardness as CaCO ₃	mg/L	100	-	120	-	80.0	-	80.0	-
Chemical Oxygen Demand (COD)	mg/L	21.0	-	15.0	-	22.0	-	16.0	-
Turbidity	NTU	.950	-	.850	-	4.00	-	4.60	-
Fluoride	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	.168	-	.252	-	.420	-	.448	-
Sodium Absorption Ratio (SAR)	std	.080	-	.102	-	.101	-	.101	-
Cations	meq/l	2.05	-	2.34	-	1.69	-	1.70	-
Anions	meq/l	1.75	-	2.00	-	1.50	-	1.53	-
Cation and Anion Balance	%	7.92	-	7.95	-	5.67	-	5.24	-
Biochemical Oxygen Demand	mg/L	-	<3.00	-	5.00	-	5.00	-	7.00
Phosphorus	mg/L	-	.015	-	.024	-	.046	-	.040
Phosphorus as P, dissolved	mg/L	-	.005	-	.012	-	.020	-	.014
Sulfate as SO ₄	mg/L	-	10.0	-	10.0	-	11.0	-	11.0

3.7-9-271

Joblink: 811597

DATA SUMMARY REPORT

DATE: 09/07/94

Company: FOTH & VAN DYKE

PAGE: 3

Sample Point ID:	SG-V	SG-V	SG-Y	SG-Y
ETC Sample Number:	MF9004	MF9011	MF9003	MF9010
Sample Date:	940808	940808	940808	940808
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-	<.020	-
Chloride	mg/L	2.56	-	1.88	-
Nitrate as N	mg/L	.730	-	<.500	-
Solids, total suspended	mg/L	<5.00	-	5.00	-
Total Dissolved Solids (TDS)	mg/L	112	-	77.0	-
pH	std	7.80	-	8.00	-
Alkalinity as CaCO ₃	mg/L	94.0	-	52.0	-
Alkalinity, Hydroxide as CaCO ₃	mg/L	0	-	0	-
Alkalinity, Bicarbonate CaCO ₃	mg/L	94.0	-	52.0	-
Alkalinity, Carbonate as CaCO ₃	mg/L	0	-	0	-
Ammonia as N	mg/L	<.100	-	<.100	-
Oil and Grease, (IR)	mg/L	<1.02	-	<1.01	-
Conductivity	umhos	197	-	111	-
Hardness as CaCO ₃	mg/L	114	-	62.0	-
Chemical Oxygen Demand (COD)	mg/L	18.0	-	28.0	-
Turbidity	NTU	1.80	-	5.00	-
Fluoride	mg/L	<.100	-	<.100	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	.448	-	.560	-
Sodium Absorption Ratio (SAR)	std	.099	-	.108	-
Cations	meq/l	2.13	-	1.21	-
Anions	meq/l	1.83	-	1.11	-
Cation and Anion Balance	%	7.46	-	4.06	-
Biochemical Oxygen Demand	mg/L	-	7.00	-	7.00
Phosphorus	mg/L	-	.031	-	.045
Phosphorus as P, dissolved	mg/L	-	.015	-	.020
Sulfate as SO ₄	mg/L	-	10.0	-	10.0

3.7-9-272

Joblink: 811597

DATA SUMMARY REPORT

DATE: 09/07/94

Company: FOTH & VAN DYKE

PAGE: 4

Sample Point ID:	SG-19	SG-19	SG-19	SG-2	SG-2	SG-2	SG-3	SG-3
ETC Sample Number:	MF9006	MF9013	MF9020	MF9029	MF9032	MF9035	MF9030	MF9033
Sample Date:	940808	940808	940808	940809	940809	940809	940809	940809
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	-	.141	-	-	.121	-	-
Manganese	mg/L	-	-	<.010	-	-	<.010	-	-
Antimony, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Arsenic, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Barium, Total	mg/L	.013	-	-	.012	-	-	.012	-
Beryllium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Boron, Total	mg/L	<.100	-	-	<.100	-	-	<.100	-
Calcium, Total	mg/L	18.9	-	-	22.3	-	-	23.1	-
Chromium, Total	mg/L	<.020	-	-	<.020	-	-	<.020	-
Iron, Total	mg/L	.399	-	-	.341	-	-	.320	-
Magnesium, Total	mg/L	8.78	-	-	11.3	-	-	11.6	-
Manganese, Total	mg/L	.052	-	-	.062	-	-	.040	-
Molybdenum, Total	mg/L	<.020	-	-	<.020	-	-	<.020	-
Nickel, Total	mg/L	<.030	-	-	<.030	-	-	<.030	-
Selenium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Silver, Total	mg/L	<.010	-	-	<.010	-	-	<.010	-
Sodium, Total	mg/L	1.72	-	-	2.29	-	-	2.22	-
Thallium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Potassium, Total	mg/L	-	<.600	-	-	<.600	-	-	<.600

Sample Point ID:	SG-3	SG-30	SG-30	SG-30	SG-6	SG-6	SG-6	SG-AB
ETC Sample Number:	MF9036	MF9007	MF9014	MF9021	MF9031	MF9034	MF9037	MF9005
Sample Date:	940809	940808	940808	940808	940809	940809	940809	940808
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	.140	-	-	<.100	-	<.100	-
Manganese	mg/L	<.010	-	-	<.010	-	<.010	-
Antimony, Total	mg/L	-	<.005	-	<.005	-	-	<.005
Arsenic, Total	mg/L	-	<.005	-	<.005	-	-	<.005
Barium, Total	mg/L	-	.010	-	<.010	-	-	.013
Beryllium, Total	mg/L	-	<.005	-	<.005	-	-	<.005
Boron, Total	mg/L	-	<.100	-	<.100	-	-	<.100

3.7-9-273

Joblink: 811597

DATA SUMMARY REPORT

DATE: 09/07/94

Company: FOTH & VAN DYKE

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Sample Point ID:	SG-3	SG-30	SG-30	SG-30	SG-6	SG-6	SG-6	SG-AB
ETC Sample Number:	MF9036	MF9007	MF9014	MF9021	MF9031	MF9034	MF9037	MF9005
Sample Date:	940809	940808	940808	940808	940809	940809	940809	940808
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters	Units
------------	-------

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Calcium, Total	mg/L	-	28.4	-	-	20.1	-	-	24.6
Chromium, Total	mg/L	-	<.020	-	-	<.020	-	-	<.020
Iron, Total	mg/L	-	<.100	-	-	.110	-	-	.174
Magnesium, Total	mg/L	-	13.1	-	-	11.8	-	-	12.2
Manganese, Total	mg/L	-	.011	-	-	.016	-	-	.025
Molybdenum, Total	mg/L	-	<.020	-	-	<.020	-	-	<.020
Nickel, Total	mg/L	-	<.030	-	-	<.030	-	-	<.030
Selenium, Total	mg/L	-	<.005	-	-	<.005	-	-	<.005
Silver, Total	mg/L	-	<.010	-	-	<.010	-	-	<.010
Sodium, Total	mg/L	-	1.91	-	-	1.82	-	-	2.49
Thallium, Total	mg/L	-	<.005	-	-	<.005	-	-	<.005
Potassium, Total	mg/L	-	-	<.600	-	-	<.600	-	-

Sample Point ID:	SG-AB	SG-AB	SG-CC-01	SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02	SG-CC-02
ETC Sample Number:	MF9012	MF9019	MF9001	MF9008	MF9015	MF9002	MF9009	MF9016
Sample Date:	940808	940808	940808	940808	940808	940808	940808	940808
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters	Units
------------	-------

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	<.100	-	-	.214	-	-	.119
Manganese	mg/L	-	<.010	-	-	.015	-	-	<.010
Antimony, Total	mg/L	-	-	<.005	-	-	<.005	-	-
Arsenic, Total	mg/L	-	-	<.005	-	-	<.005	-	-
Barium, Total	mg/L	-	-	.013	-	-	.014	-	-
Beryllium, Total	mg/L	-	-	<.005	-	-	<.005	-	-
Boron, Total	mg/L	-	-	<.100	-	-	<.100	-	-
Calcium, Total	mg/L	-	-	17.7	-	-	17.8	-	-
Chromium, Total	mg/L	-	-	<.020	-	-	<.020	-	-
Iron, Total	mg/L	-	-	.478	-	-	.480	-	-
Magnesium, Total	mg/L	-	-	8.67	-	-	8.71	-	-
Manganese, Total	mg/L	-	-	.078	-	-	.078	-	-
Molybdenum, Total	mg/L	-	-	<.020	-	-	<.020	-	-
Nickel, Total	mg/L	-	-	<.030	-	-	<.030	-	-

Joblink: 811597

DATA SUMMARY REPORT

DATE: 09/07/94

Company: FOTH & VAN DYKE

PAGE: 6

Sample Point ID:	SG-AB	SG-AB	SG-CC-01	SG-CC-01	SG-CC-01	SG-CC-02	SG-CC-02	SG-CC-02
ETC Sample Number:	MF9012	MF9019	MF9001	MF9008	MF9015	MF9002	MF9009	MF9016
Sample Date:	940808	940808	940808	940808	940808	940808	940808	940808
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Selenium, Total	mg/L	-	-	<.005	-	-	<.005	-	-
Silver, Total	mg/L	-	-	<.010	-	-	<.010	-	-
Sodium, Total	mg/L	-	-	2.07	-	-	2.08	-	-
Thallium, Total	mg/L	-	-	<.005	-	-	<.005	-	-
Potassium, Total	mg/L	<.600	-	-	<.600	-	-	<.600	-

Sample Point ID:	SG-V	SG-V	SG-V	SG-Y	SG-Y	SG-Y
ETC Sample Number:	MF9004	MF9011	MF9018	MF9003	MF9010	MF9017
Sample Date:	940808	940808	940808	940808	940808	940808
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	-	.137	-	-	.188
Manganese	mg/L	-	-	<.010	-	-	<.010
Antimony, Total	mg/L	<.005	-	-	<.005	-	-
Arsenic, Total	mg/L	<.005	-	-	<.005	-	-
Barium, Total	mg/L	.014	-	-	.013	-	-
Beryllium, Total	mg/L	<.005	-	-	<.005	-	-
Boron, Total	mg/L	<.100	-	-	<.100	-	-
Calcium, Total	mg/L	22.2	-	-	12.7	-	-
Chromium, Total	mg/L	<.020	-	-	<.020	-	-
Iron, Total	mg/L	.367	-	-	.362	-	-
Magnesium, Total	mg/L	11.2	-	-	6.00	-	-
Manganese, Total	mg/L	.047	-	-	.094	-	-
Molybdenum, Total	mg/L	<.020	-	-	<.020	-	-
Nickel, Total	mg/L	<.030	-	-	<.030	-	-
Selenium, Total	mg/L	<.005	-	-	<.005	-	-
Silver, Total	mg/L	<.010	-	-	<.010	-	-
Sodium, Total	mg/L	2.30	-	-	1.86	-	-
Thallium, Total	mg/L	<.005	-	-	<.005	-	-
Potassium, Total	mg/L	-	<.600	-	-	<.600	-

3.7-9-275

PINK-CLIENT COPY

Scott Jensen

CHAIN-OF-CUSTODY RECORD

No. 114651

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570

81159-

[illegible]

CHAIN OF CUSTODY CHRONICLE

Shuttle Opened By: (print) SCOTT JAUSSEN Date: 8/8/94 Time: 0600
Signature: Scott Jansen Seal #: 70349, 70348 Intact: YES
70351, 70350

I have received these materials in good condition from the above person.

Name: _____ Signature _____

Date: _____ Time: _____ Remarks: _____

I have received these materials in good condition from the above person.

Name: _____ Signature _____

Date: _____ Time: _____ Remarks: _____

Shuttle Sealed By: (print) SCOTT JANUSSEN Date: 8/9/94 Time: _____
Signature: Scott Janssen 70224 70303
70324 70345
Seal: _____ Intact: _____

LAB USE ONLY Opened By: Bill Sasser Date: 8/10/94 Time: 0915
SHUTTLE # N/A TEMP. °C 05M7 SEAL # 70545 COND. Good

REMARKS

SAMPLER'S SIGNATURE

ETC

CHAIN-OF-CUSTODY RECORD

811598

No. 114142

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570										
COMPANY FOTH: VAN DYKE				FACILITY/SITE CRANDOM MINE C 93C049				FILT. (Y/N) N PRESERV. SEE ATTACHMENT ANALYSIS REQUIRED SEE ATTACHMENT		
PROJECT CONTACT RUSS JANESHER				TELEPHONE NO. 414-497-2500						
S.W. Sample										
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	Source Codes: Well.....(W) Outfall.....(O) Soil.....(S) River/Stream.....(R) Bottom Sediment.....(B) Generation Point.....(G) Surface Impoundment (I) Treatment Facility.....(T) Leachate Collection Sys.....(C) Lake/Ocean.....(L) Other.....(X) Specify _____	NUMBER OF CONTAINERS	LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₄ +H ₂ SO ₄		
1		R	SG-2	9/10/09	0810		7			
2		↓	SG-3	↓	1015		7			
3		↓	SG-4	↓	1200		7			
4										
5										
6										
7										
8										
9										
CHAIN OF CUSTODY CHRONICLE								REMARKS		
3. Shuttle Opened By: (print) SCOTT JANSSEN Date: 8/9/94 Time: 0600										
Signature: Scott Janssen Seal #: _____ Intact: YES										
I have received these materials in good condition from the above person.										
Name: _____ Signature: _____										
Date: _____ Time: _____ Remarks: _____										
I have received these materials in good condition from the above person.										
Name: _____ Signature: _____										
Date: _____ Time: _____ Remarks: _____										
4. Shuttle Sealed By: (print) SCOTT JANSSEN Date: 8/9/94 Time: 1330										
Signature: Scott Janssen Seal #: 70229, 70303 Intact: YES										
LAB USE ONLY Opened By: Scott Janssen Date: 8/10/94 Time: 0912										
SHUTTLE # W1 TEMP. °C 0.515 SEAL # 70303 COND. GOOD										
SAMPLER'S SIGNATURE Scott Janssen										

WHITE: LAB COPY

YELLOW: SAMPLER COPY

PINK: CLIENT COPY

CHAIN-OF-CUSTODY RECORD

~~81597~~ 81598

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570										84597 811598			
COMPANY FOTH: VAN DYKE				FACILITY/SITE CRANDON MINING CO 93C049				NUMBER OF CONTAINERS		FILT. (Y/N) N		LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO3 3 - H2SO4 4 - Na2SO4+H2SO4	
PROJECT CONTACT RUSS JANESHEK				TELEPHONE NO. 414-497-2500						PRESERV.			
S.W. Sample										ANALYSIS REQUIRED			
										SEE ATTACHMENT			
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	Source Codes: Well.....(W) Outfall.....(O) Soil.....(S) River/Stream.....(R) Bottom Sediment.....(B) Generation Point.....(G) Surface Impoundment (I) Treatment Facility.....(T) Leachate Collection Sys.....(C) Lake/Ocean.....(L) Other.....(X) Specify _____				SAMPLER OBSERVATIONS		LAB OBSERVATIONS	
1		R	SIG-2	9/10/09	0810								
2		↓	SIG-3	↓	1015								
3		↓	SIG-4	↓	1200								
4													
5													
6													
7													
8													
9													
CHAIN OF CUSTODY CHRONICLE										REMARKS			
3.7-9-280		Shuttle Opened By: (print) SCOTT JANSSEN Date: 8/9/94 Time: 0600											
		Signature: Scott Janssen Seal #: Intact: YES											
2.		I have received these materials in good condition from the above person.											
		Name: Signature											
		Date: Time: Remarks:											
3.		I have received these materials in good condition from the above person.											
		Name: Signature											
		Date: Time: Remarks:											
4.		Shuttle Sealed By: (print) SCOTT JANSSEN Date: 8/9/94 Time: 1330											
		Signature: Scott Janssen Seal #: 70224, 70303, 70344, 70345 Intact: YES											
LAB USE ONLY Opened By: Scott Janssen Date: 8/10/94 Time: 0915										SAMPLER'S SIGNATURE			
SHUTTLE # 70224 TEMP. °C 05M2 SEAL # COND. GOOD										Scott Janssen			



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QUESTIONS? CALL 800-238-5355 TOLL FREE.

AIRBILL
PACKAGE
TRACKING NUMBER

0279374185

41834

0279374185

Date

8/7/94

RECIPIENT'S COPY

From (Your Name) Please Print S. JANSSEN		Your Phone Number (Very Important) (414) 492-2500		To (Recipient's Name) Please Print ETC-SANTA ROSA		Recipient's Phone Number (Very Important) (717) 544-5570	
Company FOTI-VAN DUSE / LANSBORN MENINGEL		Department/Floor No.		Company ETC-SANTA ROSA		Department/Floor No.	
Street Address 104 W. MADISON ST				Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.) 320 TESCOMI CIRCLE UNIT 5			
City CRANFORD		State NJ		City SANTA ROSA		State CA	
ZIP Required 07005		ZIP Required 95401		ZIP Required 95401		ZIP Required 95401	
YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.) 930049						IF HOLD AT FEDEX LOCATION, Print FEDEX Address Here Street Address	
PAYMENT 1 ☐ Bill Sender 2 ☒ Bill Recipient's FedEx Acct. No. 3 ☐ Bill 3rd Party FedEx Acct. No. 4 ☐ Bill Credit Card						City State ZIP Required	
5 ☐ Cash/Check							
4 SERVICES (Check only one box)		5 DELIVERY AND SPECIAL HANDLING (Check services required)		6 PACKAGES WEIGHT YOUR DECLARED VALUE		7 RELEASE Signature: [Signature]	
Priority Overnight (Delivery by next business morning) 11 ☐ OTHER PACKAGING 16 ☐ FEDEX LETTER 12 ☐ FEDEX PAK 13 ☐ FEDEX BOX 14 ☐ FEDEX TUBE		Standard Overnight (Delivery by next business afternoon, No Saturday delivery) 51 ☐ OTHER PACKAGING 56 ☐ FEDEX LETTER 52 ☐ FEDEX PAK 53 ☐ FEDEX BOX 54 ☐ FEDEX TUBE		Weekday Service 1 ☐ HOLD AT FEDEX LOCATION WEEKDAY 2 ☐ DELIVER WEEKDAY Saturday Service 31 ☐ HOLD AT FEDEX LOCATION SATURDAY 3 ☐ DELIVER SATURDAY 9 ☐ SATURDAY PICK-UP Special Handling 4 ☐ DANGEROUS GOODS 6 ☐ DRY ICE 12 ☐ HOLIDAY DELIVERY		Emp. No. Date Federal Express Use Base Charges Declared Value Charge Other 1 Other 2 Total Charges	
Economy Two-Day (Delivery by second business day) 30 ☐ ECONOMY 70 ☐ OVERNIGHT FREIGHT 80 ☐ TWO-DAY FREIGHT		Government Overnight (Restricted for authorized users only) 46 ☐ GOV'T LETTER 41 ☐ GOV'T PACKAGE		DIM SHIPMENT (Chargeable Weight) L x W x H 1 ☐ Regular Stop 3 ☐ Drop Stop 2 ☐ On-Call Stop		Received By: Date/Time Received FedEx Employee Number	
Freight Service (For packages over 150 lbs.) 70 ☐ OVERNIGHT FREIGHT 80 ☐ TWO-DAY FREIGHT		Declared Value Limit \$500. Call for delivery schedule.				REVISION DATE 3/94 PART #137204 FXEM 6/94 FORMAT #158 158 1992-93 FEDEX PRINTED IN U.S.A.	



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AIRBILL
PACKAGE
TRACKING NUMBER

0279374196

41834

0279374196

Date

8/7/94

RECIPIENT'S COPY

From (Your Name) Please Print S. JANSSEN		Your Phone Number (Very Important) (414) 492-2500		To (Recipient's Name) Please Print ETC-SANTA ROSA		Recipient's Phone Number (Very Important) (717) 544-5570	
Company FOTI-VAN DUSE / LANSBORN MENINGEL		Department/Floor No.		Company ETC-SANTA ROSA		Department/Floor No.	
Street Address 104 W. MADISON ST				Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.) 320 TESCOMI CIRCLE UNIT 5			
City CRANFORD		State NJ		City SANTA ROSA		State CA	
ZIP Required 07005		ZIP Required 54500		ZIP Required 95401		ZIP Required 95401	
YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.) 930049						IF HOLD AT FEDEX LOCATION, Print FEDEX Address Here Street Address	
PAYMENT 1 ☐ Bill Sender 2 ☒ Bill Recipient's FedEx Acct. No. 3 ☐ Bill 3rd Party FedEx Acct. No. 4 ☐ Bill Credit Card						City State ZIP Required	
5 ☐ Cash/Check							
4 SERVICES (Check only one box)		5 DELIVERY AND SPECIAL HANDLING (Check services required)		6 PACKAGES WEIGHT YOUR DECLARED VALUE		7 RELEASE Signature: [Signature]	
Priority Overnight (Delivery by next business morning) 11 ☐ OTHER PACKAGING 16 ☐ FEDEX LETTER 12 ☐ FEDEX PAK 13 ☐ FEDEX BOX 14 ☐ FEDEX TUBE		Standard Overnight (Delivery by next business afternoon, No Saturday delivery) 51 ☐ OTHER PACKAGING 56 ☐ FEDEX LETTER 52 ☐ FEDEX PAK 53 ☐ FEDEX BOX 54 ☐ FEDEX TUBE		Weekday Service 1 ☐ HOLD AT FEDEX LOCATION WEEKDAY 2 ☐ DELIVER WEEKDAY Saturday Service 31 ☐ HOLD AT FEDEX LOCATION SATURDAY 3 ☐ DELIVER SATURDAY 9 ☐ SATURDAY PICK-UP Special Handling 4 ☐ DANGEROUS GOODS 6 ☐ DRY ICE 12 ☐ HOLIDAY DELIVERY		Emp. No. Date Federal Express Use Base Charges Declared Value Charge Other 1 Other 2 Total Charges	
Economy Two-Day (Delivery by second business day) 30 ☐ ECONOMY 70 ☐ OVERNIGHT FREIGHT 80 ☐ TWO-DAY FREIGHT		Government Overnight (Restricted for authorized users only) 46 ☐ GOV'T LETTER 41 ☐ GOV'T PACKAGE		DIM SHIPMENT (Chargeable Weight) L x W x H 1 ☐ Regular Stop 3 ☐ Drop Stop 2 ☐ On-Call Stop		Received By: Date/Time Received FedEx Employee Number	
Freight Service (For packages over 150 lbs.) 70 ☐ OVERNIGHT FREIGHT 80 ☐ TWO-DAY FREIGHT		Declared Value Limit \$500. Call for delivery schedule.				REVISION DATE 3/94 PART #137204 FXEM 6/94 FORMAT #158 158 1992-93 FEDEX PRINTED IN U.S.A.	



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AIRBILL
PACKAGE
TRACKING NUMBER

0279374200

0279374200

Date
8/1/94

RECIPIENT'S COPY

From (Your Name) Please Print S. - JANSEN		Your Phone Number (Very Important) (414) 792-500		To (Recipient's Name) Please Print ETC-SANTA ROSA		Recipient's Phone Number (Very Important) (714) 444-5570	
Company FOTH Van Dyke / RANDON MENDING		Department/Floor No.		Company ETC-SANTA ROSA		Department/Floor No.	
Street Address 104 W. MADISON				Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.) 320 TESCONI CIRCLE UNIT 5			
City CRANDON		State WI		City SANTA ROSA		State CA	
ZIP Required 54520		ZIP Required 95401					
YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.) 73C049				IF HOLD AT FEDEX LOCATION, Print FEDEX Address Here Street Address City State ZIP Required			
PAYMENT 1 ☐ Bill Sender 2 ☒ Bill Recipient's FedEx Acct. No. 3 ☐ Bill 3rd Party FedEx Acct. No. 4 ☐ Bill Credit Card 5 ☐ Cash/Check				City State ZIP Required			
4 SERVICES (Check only one box) Priority Overnight (Delivery by next business morning) 11 ☒ OTHER PACKAGING 16 ☐ FEDEX LETTER 12 ☐ FEDEX PAK 13 ☐ FEDEX BOX 14 ☐ FEDEX TUBE Economy Two-Day (Delivery by second business day) 30 ☐ ECONOMY Government Overnight (Restrict for authorized users only) 46 ☐ GOVT LETTER 41 ☐ GOVT PACKAGE Freight Service (For packages over 150 lbs.) 70 ☐ OVERNIGHT FREIGHT 80 ☐ TWO-DAY FREIGHT		5 DELIVERY AND SPECIAL HANDLING (Check services required) 1 ☐ HOLD AT FEDEX LOCATION WEEKDAY (Fill in Section H) 2 ☒ DELIVER WEEKDAY Saturday Service 31 ☐ HOLD AT FEDEX LOCATION SATURDAY (Fill in Section H) 3 ☐ DELIVER SATURDAY (Extra charge) (Not available to all locations) 9 ☐ SATURDAY PICK-UP (Extra charge) Special Handling 4 ☐ DANGEROUS GOODS (Extra charge) 6 ☐ DRY ICE (Dangerous Goods Shipper's Declaration not required) 12 ☐ HOLIDAY DELIVERY (If offered) (Extra charge) DIM SHIPMENT (Chargeable Weight) L x W x H 1 Regular Stop 3 Drop Stop 4 B.O. Stop 5 Station		6 PACKAGES WEIGHT in Pounds Only YOUR DECLARED VALUE (See right) Total Total Total Received At: 1 Regular Stop 3 Drop Stop 4 B.O. Stop 5 Station		Emp. No. Date Federal Express Use ☐ Cash Received ☐ Return Shipment ☐ Third Party ☐ Chg. To Del. ☐ Chg. To Hold Street Address City State Zip Received By: X Date/Time Received FedEx Employee Number REVISION DATE 3/94 PART #137204 FXEM 6/94 FORMAT #158 158 PRINTED IN	



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AIRBILL
PACKAGE
TRACKING NUMBER

0279374211

0279374211

Date
8/1/94

RECIPIENT'S COPY

From (Your Name) Please Print S. - JANSEN		Your Phone Number (Very Important) (414) 792-500		To (Recipient's Name) Please Print ETC-SANTA ROSA		Recipient's Phone Number (Very Important) (714) 444-5570	
Company FOTH Van Dyke / RANDON MENDING		Department/Floor No.		Company ETC-SANTA ROSA		Department/Floor No.	
Street Address 104 W. MADISON				Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.) 320 TESCONI CIRCLE UNIT 5			
City CRANDON		State WI		City SANTA ROSA		State CA	
ZIP Required 54520		ZIP Required 95401					
YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.) 73C049				IF HOLD AT FEDEX LOCATION, Print FEDEX Address Here Street Address City State ZIP Required			
PAYMENT 1 ☐ Bill Sender 2 ☒ Bill Recipient's FedEx Acct. No. 3 ☐ Bill 3rd Party FedEx Acct. No. 4 ☐ Bill Credit Card 5 ☐ Cash/Check				City State ZIP Required			
4 SERVICES (Check only one box) Priority Overnight (Delivery by next business morning) 11 ☒ OTHER PACKAGING 16 ☐ FEDEX LETTER 12 ☐ FEDEX PAK 13 ☐ FEDEX BOX 14 ☐ FEDEX TUBE Economy Two-Day (Delivery by second business day) 30 ☐ ECONOMY Government Overnight (Restrict for authorized users only) 46 ☐ GOVT LETTER 41 ☐ GOVT PACKAGE Freight Service (For packages over 150 lbs.) 70 ☐ OVERNIGHT FREIGHT 80 ☐ TWO-DAY FREIGHT		5 DELIVERY AND SPECIAL HANDLING (Check services required) 1 ☐ HOLD AT FEDEX LOCATION WEEKDAY (Fill in Section H) 2 ☒ DELIVER WEEKDAY Saturday Service 31 ☐ HOLD AT FEDEX LOCATION SATURDAY (Fill in Section H) 3 ☐ DELIVER SATURDAY (Extra charge) (Not available to all locations) 9 ☐ SATURDAY PICK-UP (Extra charge) Special Handling 4 ☐ DANGEROUS GOODS (Extra charge) 6 ☐ DRY ICE (Dangerous Goods Shipper's Declaration not required) 12 ☐ HOLIDAY DELIVERY (If offered) (Extra charge) DIM SHIPMENT (Chargeable Weight) L x W x H 1 Regular Stop 3 Drop Stop 4 B.O. Stop 5 Station		6 PACKAGES WEIGHT in Pounds Only YOUR DECLARED VALUE (See right) Total Total Total Received At: 1 Regular Stop 3 Drop Stop 4 B.O. Stop 5 Station		Emp. No. Date Federal Express Use ☐ Cash Received ☐ Return Shipment ☐ Third Party ☐ Chg. To Del. ☐ Chg. To Hold Street Address City State Zip Received By: X Date/Time Received FedEx Employee Number REVISION DATE 3/94 PART #137204 FXEM 6/94 FORMAT #158 158 PRINTED IN	



USE THIS AIRBILL FOR SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII.
USE THE INTERNATIONAL AIRWAYBILL FOR SHIPMENTS TO PUERTO RICO AND ALL NON U.S. LOCATIONS.
QUESTIONS? CALL 800-238-5355 TOLL FREE.

AIRBILL
PACKAGE
TRACKING NUMBER

0279374233

0279374233

Date

8/10/94

RECIPIENT'S COPY

From (Your Name) Please Print SCOT JANSSEN		Your Phone Number (Very Important) (414) 477-2500		To (Recipient's Name) Please Print FEDEX - SANTA ROSA		Recipient's Phone Number (Very Important) (415) 744-8570	
Company FEDEX - VINCENNA / CRANFORD MAILING CO.		Department/Floor No. 		Company FEDEX - SANTA ROSA		Department/Floor No. 	
Street Address 104 W MADISON				Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.) 104 W MADISON			
City CRANFORD		State NC		City SANTA ROSA		State CA	
ZIP Required 54580				ZIP Required 95404			
YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.) 730049				IF HOLD AT FEDEX LOCATION, Print FEDEX Address Here Street Address City State ZIP Required 			
PAYMENT 1 ☐ Bill Sender 2 ☐ Bill Recipient's FedEx Acct. No. 3 ☐ Bill 3rd Party FedEx Acct. No. 4 ☐ Bill Credit Card 5 ☐ Cash/Check				Emp. No. Date Federal Express Use ☐ Cash Received Base Charges ☐ Return Shipment Declared Value Charge ☐ Third Party ☐ Chg. To Del. ☐ Chg. To Hold Street Address Other City State Zip Other Received By: X Total Charges Date/Time Received FedEx Employee Number REVISION DATE 3/94 PART #137204 FXEM 6/94 FORMAT #158 158 © 1992-93 FEDEX PRINTED IN U.S.A.			
SERVICES (Check only one box) Priority Overnight (Delivery by next business morning) 11 ☐ OTHER PACKAGING 16 ☐ FEDEX LETTER 12 ☐ FEDEX PAK 13 ☐ FEDEX BOX 14 ☐ FEDEX TUBE Economy Two-Day (Delivery by second business day) 30 ☐ ECONOMY Government Overnight (Restricted for authorized users only) 46 ☐ GOVT LETTER 41 ☐ GOVT PACKAGE Freight Service (For packages over 150 lbs.) 70 ☐ OVERNIGHT FREIGHT 80 ☐ TWO-DAY FREIGHT		DELIVERY AND SPECIAL HANDLING (Check services required) 1 ☐ HOLD AT FEDEX LOCATION WEEKDAY (Fill in Section H) 2 ☐ DELIVER WEEKDAY Saturday Service 31 ☐ HOLD AT FEDEX LOCATION SATURDAY (Fill in Section H) 3 ☐ DELIVER SATURDAY (Extra charge) (Not available to all locations) 9 ☐ SATURDAY PICK-UP (Extra charge) Special Handling 4 ☐ DANGEROUS GOODS (Extra charge) 6 ☐ DRY ICE (Dangerous Goods Shipper's Declaration not required) Dry Ice & UN 1845 ☐ X ☐ kg. 904 III 12 ☐ HOLIDAY DELIVERY (If offered) (Extra charge)		PACKAGES 1 60 WEIGHT In Pounds Only Total 1 Total 60 YOUR DECLARED VALUE (See right) Total 1 Total 60 DIM SHIPMENT (Chargeable Weight) ☐ Regular Size ☐ Drop Size Received At Release Signature: Scott Janssen			



An ETC Laboratory

320 Tesconi Circle

Suite G

Santa Rosa, CA
95401

Telephone
(707) 544-5570

Facsimile
(707) 544-4906

SEPTEMBER 8, 1994

CLIENT: FOTH & VAN DYKE
P.O. BOX 19012
2737 S. RIDGE ROAD
GREEN BAY, WI 54307-9012

ATTN: RUSS JANESHEK

JOB LINK: 811599
PROJECT: S.W. SAMPLING

ANALYSIS

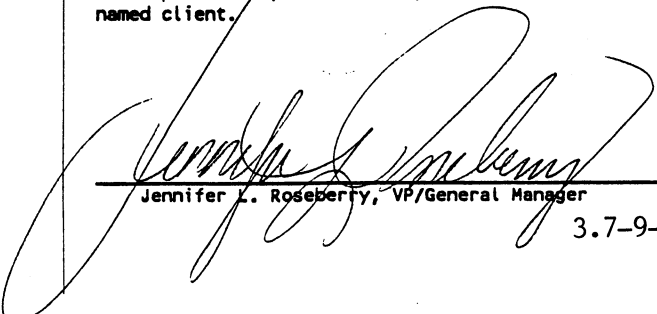
6010 & 7000 SERIES METALS

CONVENTIONALS: ALKALINITY AS CaCO_3 ; ALKALINITY, HYDROXIDE AS CaCO_3 ;
ALKALINITY, BICARBONATE AS CaCO_3 ; ALKALINITY, CARBONATE AS CaCO_3 ; AMMONIA AS N; ANIONS;
BIOCHEMICAL OXYGEN DEMAND; CATION AND ANION BALANCE; CATIONS;
CHEMICAL OXYGEN DEMAND (COD); CHLORIDE; CONDUCTIVITY; CYANIDE, TOTAL; FLUORIDE;
HARDNESS AS CaCO_3 ; NITRATE AS N; NITROGEN, TOTAL KJELDAHL (TKN); OIL AND GREASE, (IR);
PH; PHOSPHORUS; PHOSPHORUS AS P, DISSOLVED; SODIUM ABSORPTION RATIO (SAR);
SOLIDS, TOTAL SUSPENDED; SULFATE AS SO_4 ; TOTAL DISSOLVED SOLIDS (TDS); TURBIDITY

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE COLLECTION DATE</u>	<u>DATE RECEIVED BY LAB</u>
MF9041	SG-E	WATER	08-09-94	08-11-94
MF9042	LG-7	WATER	08-09-94	08-11-94
MF9043	SG-E	WATER	08-09-94	08-11-94
MF9044	LG-7	WATER	08-09-94	08-11-94
MF9047	SG-E	WATER	08-09-94	08-11-94
MF9048	LG-7	WATER	08-09-94	08-11-94
MF9049	LG-11	WATER	08-10-94	08-11-94
MF9050	LG-13	WATER	08-10-94	08-11-94
MF9051	LG-11	WATER	08-10-94	08-11-94
MF9052	LG-13	WATER	08-10-94	08-11-94
MF9053	LG-11	WATER	08-10-94	08-11-94
MF9054	LG-13	WATER	08-10-94	08-11-94
MF9055	LG-11	WATER	08-10-94	08-11-94
MF9056	LG-13	WATER	08-10-94	08-11-94
MF9103	SG-E	WATER	08-09-94	08-11-94
MF9104	LG-7	WATER	08-09-94	08-11-94
MF9238	BOTTLES	NOT APPLICABLE	NOT APPLICABLE	08-11-94
MF9290	SHIP	NOT APPLICABLE	NOT APPLICABLE	08-29-94
MF9292	SHIP	NOT APPLICABLE	NOT APPLICABLE	08-29-94

This report is "PROPRIETARY AND CONFIDENTIAL" and delivered to, and intended for the exclusive use of the above named client only. ETC, a Division of APBI Environmental Sciences Group, Inc. assumes no responsibility or liability for the reliance hereon or use hereof by anyone other than the above named client.

A division of
APBI Environmental
Sciences Group, Inc.


Jennifer L. Roseberry, VP/General Manager

3.7-9-284

9/8/94
Date

SEP 09 1994



HARDING LAWSON ASSOCIATES
SEPTEMBER 8, 1994
811599

SAMPLE MATRIX: WATER

<u>Parameter</u>	<u>EPA Prep Method</u>	<u>EPA Analysis Method</u>
ICP Metals	3015	6010
Arsenic	3015	7060
Potassium†	3010	6010
Selenium	3015	7740
Thallium	3015	7841
Alkalinity as CaCO3	NA	310.1
Alkalinity, Hydroxide as CaCO3	NA	310.1
Bicarbonate as CaCO3	NA	310.1
Carbonate Alkalinity as CaCO3	NA	310.1
Ammonia as N	350.2	350.2
Anions	*	*
Cation and Anion Balance	*	*
Cations	*	*
Chemical Oxygen Demand	NA	410.4
Chloride	NA	300.0
Conductivity	NA	9050
Total Cyanide	9010	9010
Fluoride	NA	340.2
Hardness as CaCO3	NA	130.2
Nitrate as N	NA	300.0
Total Kjeldahl Nitrogen	351.3	351.3
Oil & Grease	413.2	413.2
pH	NA	9040
Phosphorus†	365.2	365.2
Phosphorus as P, Dissolved†	365.2	365.2
Sodium Absorption Ratio	*	*
Sulfate as SO4†	NA	375.2
Total Suspended Solids	NA	160.2
Total Dissolved Solids	NA	160.1
Turbidity	NA	180.1
Biochemical Oxygen Demand†	405.1	405.1

† ANALYSIS PERFORMED BY NORTHERN LAKE SERVICE, INC

* CALCULATION

ns



FOTH & VAN DYKE
07 SEPTEMBER 1994

EXECUTIVE SUMMARY
ETC JOBLINK 811599

On 11 August 1994 ETC-Santa Rosa received aqueous samples from Foth & Van Dyke via Federal Express. The cooler temperatures were both 0°C upon receipt at the laboratory. The samples were analyzed as specified on the preceding page.

Samples were filtered at the laboratory through a 0.45 μm filter prior to analysis for Iron, Manganese, and Phosphorus; these results reflect dissolved parameters. These parameters were also analyzed without filtration; these results reflect total parameters.

All samples were received past the method-recommended holding time for pH analysis.

Low level metals analyses were performed by Batelle; Biochemical Oxygen Demand (BOD), Sulfate, Dissolved Phosphorus, Total Phosphorus, and Total Potassium analyses were performed by Northern Lake Services (NLS). Samples were filtered for Dissolved Phosphorus upon receipt at NLS. All results are included herein, with the exception of low level metals; those results will follow in an amended report.

CALCULATIONS:

Results for Sodium Absorption Ratio (Modified SAR), Cations, Anions, and Cation and Anion Balance were obtained by calculation using analytical data. The Cations reflect results for Calcium, Magnesium, Potassium, and Sodium; the Anions reflect results for Chloride, Fluoride, Nitrate, Sulfate, Carbonate, and Bicarbonate.

Lisa Norosky

Lisa Norosky, Program Manager

940908

Date

Joblink: 811599

DATA SUMMARY REPORT

DATE: 09/07/94

Company: FOTH & VAN DYKE

PAGE: 1

Sample Point ID:	LG-11	LG-11	LG-13	LG-13	LG-7	LG-7	SG-E	SG-E
ETC Sample Number:	MF9049	MF9051	MF9050	MF9052	MF9042	MF9044	MF9041	MF9043
Sample Date:	940810	940810	940810	940810	940809	940809	940809	940809
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-	<.020	-	<.020	-	<.020	-
Chloride	mg/L	1.08	-	.939	-	1.05	-	1.67	-
Nitrate as N	mg/L	.713	-	.714	-	.718	-	.741	-
Ammonia as N	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
pH	std	6.50	-	6.00	-	5.70	-	7.90	-
Alkalinity as CaCO3	mg/L	3.60	-	<2.00	-	2.80	-	138	-
Alkalinity, Hydroxide as CaCO3	mg/L	0	-	0	-	0	-	0	-
Alkalinity, Bicarbonate CaCO3	mg/L	3.60	-	<2.00	-	2.80	-	138	-
Alkalinity, Carbonate as CaCO3	mg/L	0	-	0	-	0	-	0	-
Fluoride	mg/L	<.100	-	<.100	-	<.100	-	<.100	-
Solids, total suspended	mg/L	<5.00	-	<5.00	-	<5.00	-	<5.00	-
Total Dissolved Solids (TDS)	mg/L	13.0	-	24.0	-	31.0	-	163	-
Oil and Grease, (IR)	mg/L	<1.03	-	<1.01	-	<1.12	-	<1.00	-
Conductivity	umhos	19.3	-	20.4	-	17.6	-	286	-
Chemical Oxygen Demand (COD)	mg/L	<10.0	-	15.0	-	10.0	-	<10.0	-
Turbidity	NTU	.750	-	1.30	-	.950	-	.900	-
Hardness as CaCO3	mg/L	6.60	-	7.90	-	<5.00	-	148	-
Sodium Absorption Ratio (SAR)	std	0	-	0	-	0	-	.086	-
Cations	meq/l	.138	-	.152	-	.119	-	3.08	-
Anions	meq/l	.226	-	.246	-	.212	-	2.55	-
Cation and Anion Balance	%	-20	-	-20	-	-30	-	9.45	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	.308	-	.336	-	.280	-	<.200	-
Biochemical Oxygen Demand	mg/L	-	<3.00	-	<3.00	-	<3.00	-	<3.00
Phosphorus	mg/L	-	.010	-	.026	-	.010	-	.019
Phosphorus as P, dissolved	mg/L	-	.004	-	.012	-	.004	-	.010
Sulfate as SO4	mg/L	-	6.00	-	10.0	-	6.00	-	11.0

3.7-9-287

Joblink: 811599

DATA SUMMARY REPORT

DATE: 09/07/94

Company: FOTH & VAN DYKE

PAGE: 2

Sample Point ID:	LG-11	LG-11	LG-11	LG-13	LG-13	LG-13	LG-7	LG-7
ETC Sample Number:	MF9049	MF9051	MF9053	MF9050	MF9052	MF9054	MF9042	MF9044
Sample Date:	940810	940810	940810	940810	940810	940810	940809	940809
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	-	<.100	-	-	<.100	-	-
Manganese	mg/L	-	-	<.010	-	-	.023	-	-
Antimony, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Arsenic, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Barium, Total	mg/L	<.010	-	-	.012	-	-	<.010	-
Beryllium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Boron, Total	mg/L	<.100	-	-	<.100	-	-	<.100	-
Calcium, Total	mg/L	1.51	-	-	1.82	-	-	1.18	-
Chromium, Total	mg/L	<.020	-	-	<.020	-	-	<.020	-
Iron, Total	mg/L	<.100	-	-	.163	-	-	<.100	-
Magnesium, Total	mg/L	.546	-	-	.557	-	-	.524	-
Manganese, Total	mg/L	<.010	-	-	.025	-	-	<.010	-
Molybdenum, Total	mg/L	<.020	-	-	<.020	-	-	<.020	-
Nickel, Total	mg/L	<.030	-	-	<.030	-	-	<.030	-
Selenium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Silver, Total	mg/L	<.010	-	-	<.010	-	-	<.010	-
Sodium, Total	mg/L	<1.00	-	-	<1.00	-	-	<1.00	-
Thallium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Potassium, Total	mg/L	-	.710	-	-	.620	-	-	.650

Sample Point ID:	LG-7	SG-E	SG-E	SG-E
ETC Sample Number:	MF9104	MF9041	MF9043	MF9103
Sample Date:	940809	940809	940809	940809
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	<.100	-	-	.227
Manganese	mg/L	<.010	-	-	<.010
Antimony, Total	mg/L	-	<.005	-	-
Arsenic, Total	mg/L	-	<.005	-	-
Barium, Total	mg/L	-	<.010	-	-
Beryllium, Total	mg/L	-	<.005	-	-
Boron, Total	mg/L	-	<.100	-	-

Joblink: 811599

DATA SUMMARY REPORT

DATE: 09/07/94

Company: FOTH & VAN DYKE

PAGE: 3

Sample Point ID:	LG-7	SG-E	SG-E	SG-E
ETC Sample Number:	MF9104	MF9041	MF9043	MF9103
Sample Date:	940809	940809	940809	940809
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Calcium, Total	mg/L	-	32.9	-	-
Chromium, Total	mg/L	-	<.020	-	-
Iron, Total	mg/L	-	<.100	-	-
Magnesium, Total	mg/L	-	16.0	-	-
Manganese, Total	mg/L	-	<.010	-	-
Molybdenum, Total	mg/L	-	<.020	-	-
Nickel, Total	mg/L	-	<.030	-	-
Selenium, Total	mg/L	-	<.005	-	-
Silver, Total	mg/L	-	<.010	-	-
Sodium, Total	mg/L	-	2.41	-	-
Thallium, Total	mg/L	-	<.005	-	-
Potassium, Total	mg/L	-	-	.790	-

3.7-9-289

ETC

CHAIN-OF-CUSTODY RECORD

811599

No. 114671

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570

COMPANY FOH: VAN DYKE		FACILITY/SITE CRANDON MINING Co S.W.		NUMBER OF CONTAINERS	FILT. (Y/N)	Y	LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₄ +H ₂ SO ₄	
PROJECT CONTACT RUSS JANESHER		TELEPHONE NO. 414-497-2500			PRESERV.			
93C049					ANALYSIS REQUIRED	SEE Attachment		
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	Source Codes: Well.....(W) Outfall.....(O) Soil.....(S) River/Stream.....(R) Bottom Sediment.....(B) Generation Point.....(G) Surface Impoundment (I) Treatment Facility.....(T) Leachate Collection Sys.....(C) Lake/Ocean.....(L) Other.....(X) Specify	SAMPLER OBSERVATIONS	LAB OBSERVATIONS
1			SG-E	9/18/9	1415			
2			LG-7	↓	1600			
3			LG-1.1	9/18/10	0830			
4			LG-1.3	↓	1630			
5								
6								
7								
8								
9								

CHAIN OF CUSTODY CHRONICLE

3.7-9-290	Shuttle Opened By: (print) Scott JANSSEN	Date: 8/8/94	Time: 0600
	Signature: Scott Jansen	Seal #: 70352	Intact: YES
	I have received these materials in good condition from the above person.		
	Name: _____	Signature: _____	
2.	Date: _____	Time: _____	Remarks: _____
I have received these materials in good condition from the above person.			
3.	Name: _____	Signature: _____	
Date: _____	Time: _____	Remarks: _____	
I have received these materials in good condition from the above person.			
4.	Shuttle Sealed By: (print) Scott JANSSEN	Date: 8/10/94	Time: 1300
Signature: Scott Jansen	Seal #: 70346	Intact: YES	
LAB USE ONLY Opened By: Scott Jansen Date: 8/11/94 Time: 0930			
SHUTTLE # N/A TEMP. °C 0342 SEAL # 70388 COND. GOOD			

REMARKS

**LG-11 IS Composite sample ABOVE AND
BELOW THERMOCLINE FOR OIL + GREASE
AND LOW LEVEL METALS**

SAMPLER'S SIGNATURE

Scott Jansen

WHITE LAB COPY

YELLOW SAMPLER COPY

PINK CLIENT COPY



USE THIS AIRBILL FOR SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII.
USE THE INTERNATIONAL AIR WAYBILL FOR SHIPMENTS TO PUERTO RICO AND ALL NON U.S. LOCATIONS.
QUESTIONS? CALL 800-238-5355 TOLL FREE.

AIRBILL
PACKAGE
TRACKING NUMBER

0279374222

0279374222

RECIPIENT'S COPY

From (Your Name) Please Print SCOTT JANSSON		Your Phone Number (Very Important) (414) 497-2500		To (Recipient's Name) Please Print ETC-SANTA ROSA		Recipient's Phone Number (Very Important) (707) 444-5370	
Company ETC-VAN DUSE / CRANDON AIRLIFTING CO		Department/Floor No. 		Company ETC-SANTA ROSA		Department/Floor No. 	
Street Address 164 W MADISON ST				Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.) 300 TESSIE DR			
City CRANDON		State WI		City SANTA ROSA		State CA	
ZIP Required 54520				ZIP Required 95401			
YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.) 930049				IF HOLD AT FEDEX LOCATION, Print FEDEX Address Here 			
PAYMENT 1 ☐ Bill Sender 2 ☒ Bill Recipient's FedEx Acct. No. 3 ☐ Bill 3rd Party FedEx Acct. No. 4 ☐ Bill Credit Card 5 ☐ Cash/Check				City State ZIP Required 			
4 SERVICES (Check only one box)		5 DELIVERY AND SPECIAL HANDLING (Check services required)		6 PACKAGES WEIGHT In Pounds Only		YOUR DECLARED VALUE (See right)	
Priority Overnight (Delivery by next business morning) 11 ☒ OTHER PACKAGING 16 ☐ FEDEX LETTER 12 ☐ FEDEX PAK 13 ☐ FEDEX BOX 14 ☐ FEDEX TUBE		Standard Overnight (Delivery by next business afternoon, no Saturday delivery) 51 ☐ OTHER PACKAGING 56 ☐ FEDEX LETTER 52 ☐ FEDEX PAK 53 ☐ FEDEX BOX 54 ☐ FEDEX TUBE		Weekday Service (Fill in Section H) 1 ☐ HOLD AT FEDEX LOCATION WEEKDAY 2 ☐ DELIVER WEEKDAY Saturday Service (Fill in Section H) 31 ☐ HOLD AT FEDEX LOCATION SATURDAY 3 ☐ DELIVER SATURDAY (Extra charge) (Not available to all locations) 9 ☐ SATURDAY PICK-UP (Extra charge)		Total 1 60	
Economy Two-Day (Delivery by second business day) 30 ☐ ECONOMY		Government Overnight (Restricted for authorized users only) 46 ☐ GOVT LETTER 41 ☐ GOVT PACKAGE		Special Handling 4 ☐ DANGEROUS GOODS (Extra charge) 6 ☐ DRY ICE Dangerous Goods Shipper's Declaration not required		DIM SHIPMENT (Chargeable Weight) L X W H lbs.	
Freight Service (For packages over 150 lbs.) 70 ☐ OVERNIGHT FREIGHT 80 ☐ TWO-DAY FREIGHT				Dry Ice: 9 UN1945 X kg. 904 III 12 ☐ HOLIDAY DELIVERY (if offered) (Extra charge)		Release Signature: 	
*Economy Letter Rate not available. Minimum charge. One pound Economy rate.		*Declared Value Limit \$500. **Call for delivery schedule.				REVISION DATE 3/94 PART #137204 FXEM 6/94 FORMAT 0128 156	



An ETC Laboratory

320 Tesconi Circle

Suite G

Santa Rosa, CA
95401

Telephone
(707) 544-5570

Facsimile
(707) 544-4906

SEPTEMBER 8, 1994

CLIENT: FOTH & VAN DYKE
P.O. BOX 19012
2737 S. RIDGE ROAD
GREEN BAY, WI 54307-9012

ATTN: RUSS JANESHEK

JOBLINK: 811601
PROJECT: S.W. SAMPLING

ANALYSIS

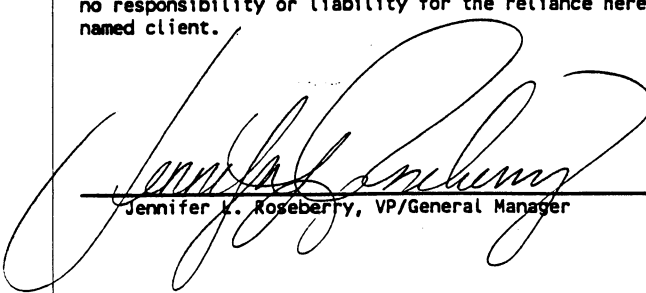
6010 & 7000 SERIES METALS

CONVENTIONALS: ALKALINITY AS CaCO_3 ; ALKALINITY, HYDROXIDE AS CaCO_3 ;
ALKALINITY, BICARBONATE CaCO_3 ; ALKALINITY, CARBONATE AS CaCO_3 ; AMMONIA AS N; ANIONS;
BIOCHEMICAL OXYGEN DEMAND; CATION AND ANION BALANCE; CATIONS;
CHEMICAL OXYGEN DEMAND (COD); CHLORIDE; CONDUCTIVITY; CYANIDE, TOTAL; FLUORIDE;
HARDNESS AS CaCO_3 ; NITRATE AS N; NITROGEN, TOTAL KJELDAHL (TKN); OIL AND GREASE, (IR);
PH; PHOSPHORUS; PHOSPHORUS AS P, DISSOLVED; SODIUM ABSORPTION RATIO (SAR);
SOLIDS, TOTAL SUSPENDED; SULFATE AS SO_4 ; TOTAL DISSOLVED SOLIDS (TDS); TURBIDITY

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE COLLECTION DATE</u>	<u>DATE RECEIVED BY LAB</u>
MF9075	LG-12-01	WATER	08-10-94	08-12-94
MF9076	LG-12-02	WATER	08-10-94	08-12-94
MF9077	LG-15	WATER	08-10-94	08-12-94
MF9078	LG-12-01	WATER	08-10-94	08-12-94
MF9079	LG-12-02	WATER	08-10-94	08-12-94
MF9080	LG-15	WATER	08-10-94	08-12-94
MF9081	LG-12-01	WATER	08-10-94	08-12-94
MF9082	LG-12-02	WATER	08-10-94	08-12-94
MF9083	LG-15	WATER	08-10-94	08-12-94
MF9084	LG-12-01	WATER	08-10-94	08-12-94
MF9085	LG-12-02	WATER	08-10-94	08-12-94
MF9086	LG-15	WATER	08-10-94	08-12-94
MF9239	BOTTLES	NOT APPLICABLE	NOT APPLICABLE	08-12-94
MF9291	SHIP	NOT APPLICABLE	NOT APPLICABLE	08-29-94

This report is "PROPRIETARY AND CONFIDENTIAL" and delivered to, and intended for the exclusive use of the above named client only. ETC, a Division of APBI Environmental Sciences Group, Inc. assumes no responsibility or liability for the reliance hereon or use hereof by anyone other than the above named client.

A division of
APBI Environmental
Sciences Group, Inc.


Jennifer L. Roseberry, VP/General Manager

9/10/94
Date



HARDING LAWSON ASSOCIATES
SEPTEMBER 8, 1994
811601

SAMPLE MATRIX: WATER

<u>Parameter</u>	<u>EPA Prep Method</u>	<u>EPA Analysis Method</u>
ICP Metals	3015	6010
Arsenic	3015	7060
Potassium†	3010	6010
Selenium	3015	7740
Thallium	3015	7841
Alkalinity as CaCO3	NA	310.1
Alkalinity, Hydroxide as CaCO3	NA	310.1
Bicarbonate as CaCO3	NA	310.1
Carbonate Alkalinity as CaCO3	NA	310.1
Ammonia as N	350.2	350.2
Anions	*	*
Cation and Anion Balance	*	*
Cations	*	*
Chemical Oxygen Demand	NA	410.4
Chloride	NA	300.0
Conductivity	NA	9050
Total Cyanide	9010	9010
Fluoride	NA	340.2
Hardness as CaCO3	NA	130.2
Nitrate as N	NA	300.0
Total Kjeldahl Nitrogen	351.3	351.3
Oil & Grease	413.2	413.2
pH	NA	9040
Phosphorus†	365.2	365.2
Phosphorus as P, Dissolved†	365.2	365.2
Sodium Absorption Ratio	*	*
Sulfate as SO4†	NA	375.2
Total Suspended Solids	NA	160.2
Total Dissolved Solids	NA	160.1
Turbidity	NA	180.1
Biochemical Oxygen Demand†	405.1	405.1

† ANALYSIS PERFORMED BY NORTHERN LAKE SERVICE, INC

* CALCULATION

ns



FOTH & VAN DYKE
07 SEPTEMBER 1994

EXECUTIVE SUMMARY
ETC JOBLINK 811601

On 12 August 1994 ETC-Santa Rosa received aqueous samples from Foth & Van Dyke via Federal Express. The cooler temperature was 0°C upon receipt at the laboratory. The samples were analyzed as specified on the preceding page.

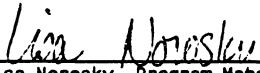
Samples were filtered at the laboratory through a 0.45 μ m filter prior to analysis for Iron, Manganese, and Phosphorus; these results reflect dissolved parameters. These parameters were also analyzed without filtration; these results reflect total parameters.

All samples were received past the method-recommended holding time for pH analysis.

Low level metals analyses were performed by Batelle; Biochemical Oxygen Demand (BOD), Sulfate, Dissolved Phosphorus, Total Phosphorus, and Total Potassium analyses were performed by Northern Lake Services (NLS). Samples were filtered for Dissolved Phosphorus upon receipt at NLS. All results are included herein, with the exception of low level metals; those results will follow in an amended report.

CALCULATIONS:

Results for Sodium Absorption Ratio (Modified SAR), Cations, Anions, and Cation and Anion Balance were obtained by calculation using analytical data. The Cations reflect results for Calcium, Magnesium, Potassium, and Sodium; the Anions reflect results for Chloride, Fluoride, Nitrate, Sulfate, Carbonate, and Bicarbonate.



Lisa Norosky, Program Manager



Date

Joblink: 811601

DATA SUMMARY REPORT

DATE: 09/07/94

Company: FOTH & VAN DYKE

PAGE: 1

Sample Point ID:	LG-12-01	LG-12-01	LG-12-02	LG-12-02	LG-15	LG-15
ETC Sample Number:	MF9075	MF9078	MF9076	MF9079	MF9077	MF9080
Sample Date:	940810	940810	940810	940810	940810	940810
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

CONVENTIONALS (AR55)

Cyanide, Total	mg/L	<.020	-	<.020	-	<.020	-
Chloride	mg/L	.989	-	1.02	-	<.500	-
Nitrate as N	mg/L	.727	-	.739	-	.712	-
Ammonia as N	mg/L	<.100	-	<.100	-	<.100	-
pH	std	5.70	-	5.70	-	5.50	-
Alkalinity as CaCO ₃	mg/L	3.00	-	<2.00	-	2.40	-
Alkalinity, Hydroxide as CaCO ₃	mg/L	0	-	0	-	0	-
Alkalinity, Bicarbonate CaCO ₃	mg/L	3.00	-	<2.00	-	2.40	-
Alkalinity, Carbonate as CaCO ₃	mg/L	0	-	0	-	0	-
Solids, total suspended	mg/L	<5.00	-	<5.00	-	<5.00	-
Total Dissolved Solids (TDS)	mg/L	17.0	-	26.0	-	23.0	-
Oil and Grease, (IR)	mg/L	<1.04	-	<1.02	-	<1.01	-
Conductivity	umhos	15.4	-	15.4	-	11.4	-
Hardness as CaCO ₃	mg/L	6.00	-	6.00	-	6.00	-
Turbidity	NTU	1.80	-	1.40	-	1.60	-
Fluoride	mg/L	<.100	-	<.100	-	<.100	-
Nitrogen, Total Kjeldahl (TKN)	mg/L	.560	-	.504	-	.924	-
Chemical Oxygen Demand (COD)	mg/L	36.0	-	35.0	-	49.0	-
Sodium Absorption Ratio (SAR)	std	0	-	0	-	0	-
Cations	meq/l	.082	-	.075	-	.067	-
Anions	meq/l	.297	-	.270	-	.259	-
Cation and Anion Balance	%	-60	-	-60	-	-60	-
Biochemical Oxygen Demand	mg/L	-	<3.00	-	<3.00	-	<3.00
Phosphorus	mg/L	-	.024	-	.025	-	.037
Phosphorus as P, dissolved	mg/L	-	.015	-	.014	-	.025
Sulfate as SO ₄	mg/L	-	10.0	-	11.0	-	10.0

3.7-9-296

Joblink: 811601

DATA SUMMARY REPORT

DATE: 09/07/94

Company: FOTH & VAN DYKE

PAGE: 2

Sample Point ID:	LG-12-01	LG-12-01	LG-12-01	LG-12-02	LG-12-02	LG-12-02	LG-15	LG-15
ETC Sample Number:	MF9075	MF9078	MF9081	MF9076	MF9079	MF9082	MF9077	MF9080
Sample Date:	940810	940810	940810	940810	940810	940810	940810	940810
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	-	-	.110	-	-	.110	-	-
Manganese	mg/L	-	-	.017	-	-	.015	-	-
Antimony, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Arsenic, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Barium, Total	mg/L	<.010	-	-	<.010	-	-	.011	-
Beryllium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Boron, Total	mg/L	<.100	-	-	<.100	-	-	<.100	-
Calcium, Total	mg/L	1.20	-	-	1.14	-	-	1.34	-
Chromium, Total	mg/L	<.020	-	-	<.020	-	-	<.020	-
Iron, Total	mg/L	.148	-	-	.141	-	-	.171	-
Magnesium, Total	mg/L	<.500	-	-	<.500	-	-	<.500	-
Manganese, Total	mg/L	.017	-	-	.016	-	-	.100	-
Molybdenum, Total	mg/L	<.020	-	-	<.020	-	-	<.020	-
Nickel, Total	mg/L	<.030	-	-	<.030	-	-	<.030	-
Selenium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Silver, Total	mg/L	<.010	-	-	<.010	-	-	<.010	-
Sodium, Total	mg/L	<1.00	-	-	<1.00	-	-	<1.00	-
Thallium, Total	mg/L	<.005	-	-	<.005	-	-	<.005	-
Potassium, Total	mg/L	-	.870	-	-	.710	-	-	<.600

Sample Point ID:	LG-15
ETC Sample Number:	MF9083
Sample Date:	940810
Facility Code:	FVDGRNBCMC

Parameters Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Iron	mg/L	.137
Manganese	mg/L	.101
Antimony, Total	mg/L	-
Arsenic, Total	mg/L	-
Barium, Total	mg/L	-
Beryllium, Total	mg/L	-
Boron, Total	mg/L	-

3.7-9-297

ETC

CHAIN-OF-CUSTODY RECORD

No. 114672

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570						811601		
COMPANY FOTH: VAN DYKE			FACILITY/SITE CRANDON MINING Co / 93C049			NUMBER OF CONTAINERS	FILT. (Y/N) W PRESERV. ANALYSIS REQUIRED SEE ATTACHMENT	LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₄ + H ₂ SO ₄
PROJECT CONTACT RUSS JANESHEK			TELEPHONE NO. 414-497-2500					
S.W. SAMPLING								
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME			
1		R	LG-12-01	9/10/10	1415	Well.....(W) Outfall.....(O)		
2		R	LG-12-02	↓	1415	Soil.....(S) River/Stream.....(R)		
3		R	LG-15	↓	1530	Bottom Sediment.....(B)		
4						Generation Point.....(G)		
5						Surface Impoundment (I)		
6						Treatment Facility.....(T)		
7						Leachate Collection Sys.....(C)		
8						Lake/Ocean.....(L)		
9						Other.....(X)		
						Specify _____		

CHAIN OF CUSTODY CHRONICLE				REMARKS
3	Shuttle Opened By: (print) <u>SCOTT JANSEN</u>	Date: <u>8/8/94</u>	Time: <u>0600</u>	
7	Signature: <u>Scott Jansen</u>	Seal #: <u>71355</u>	Intact: <u>YES</u>	
9	I have received these materials in good condition from the above person.			
298	Name: _____ Signature _____			
	Date: _____ Time: _____	Remarks: _____		
	I have received these materials in good condition from the above person.			
	Name: _____ Signature _____			
	Date: _____ Time: _____	Remarks: _____		
	Shuttle Sealed By: (print) <u>SCOTT JANSEN</u>			
	Date: <u>8/11/94</u>	Time: <u>0900</u>		
	Signature: <u>Scott Jansen</u>	Seal #: <u>70343</u>	Intact: <u>YES</u>	
	LAB USE ONLY Opened By: <u>SCOTT JANSEN</u> Date: <u>8/11/94</u> Time: <u>0950</u>			
	SHUTTLE # <u>W/A</u>	TEMP. °C <u>0.5M3</u>	SEAL # <u>70343</u> COND. <u>GOOD</u>	
SAMPLER'S SIGNATURE <u>Scott Jansen</u>				

WHITE: LAB COPY

YELLOW: SAMPLER COPY

PINK: CLIENT COPY



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1 From (Your Name) Please Print JOHN JANSSEN		2 To (Recipient's Name) Please Print TESCOMI CIRCLE UNIT	
Your Phone Number (Very Important) (414) 497-2500		Recipient's Phone Number (Very Important) (414) 497-2500	
Company W. D. JANSSEN / CARNOON MINING CO.		Company TESCOMI CIRCLE UNIT	
Department/Floor No. 100 W. MADISON		Department/Floor No. CA	
Street Address 100 W. MADISON		Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.) TESCOMI CIRCLE UNIT	
City CRANDON		City SANTA ROSA	
State WI		State CA	
ZIP Required 54501		ZIP Required 95007	
YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice) 930043			
3 PAYMENT 1 ☐ Bill Sender 2 ☒ Bill Recipient's FedEx Acct. No. 3 ☐ Bill 3rd Party 4 ☐ Bill Credit Card		IF HOLD AT FEDEX LOCATION, Print FEDEX Address Here Street Address City State ZIP Required	
5 ☐ Cash/Check		Emp. No. Date Federal Express Use	
4 SERVICES (Check only one box) Priority Overnight (Delivery by next business morning) 11 ☒ OTHER PACKAGING 16 ☐ FEDEX LETTER 12 ☐ FEDEX PAK 13 ☐ FEDEX BOX 14 ☐ FEDEX TUBE Standard Overnight (Delivery by next business morning, no Saturday delivery) 51 ☐ OTHER PACKAGING 56 ☐ FEDEX LETTER 52 ☐ FEDEX PAK 58 ☐ FEDEX BOX 60 ☐ FEDEX TUBE		6 DELIVERY AND SPECIAL HANDLING (Check services required) 1 ☐ HOLD AT FEDEX LOCATION WEEKDAY (Fill in Section H) 2 ☐ DELIVER WEEKDAY Saturday Service 31 ☐ HOLD AT FEDEX LOCATION SATURDAY (Fill in Section H) 3 ☐ DELIVER SATURDAY (Extra charge) (Not available to all locations) 9 ☐ SATURDAY PICK-UP (Extra charge) Special Handling 4 ☐ DANGEROUS GOODS (Extra charge) 6 ☐ DRY ICE (Dangerous Goods Shipper's Declaration not required) Dry Ice, I, UN 1845, X, 1 kg/500, III 12 ☐ HOLIDAY DELIVERY (Extra charge) DIM SHIPMENT (Chargeable Weight) L x W x H 1 ☐ Regular Ship 3 ☐ Drop Box 2 ☐ On-Call Ship 4 ☐ Station	
70 ☐ OVERNIGHT FREIGHT** (Confirmed reservation required) T Delivery commitment may be later in some areas.		80 ☐ TWO-DAY FREIGHT** (Confirmed reservation required) *Declared Value Limit \$500. **Call for delivery schedule.	
8 ☐ CASH RECEIVED ☐ RETURN SHIPMENT ☐ THIRD PARTY ☐ CHG. TO DEL. ☐ CHG. TO HOLD Street Address City State Zip Received By: X Date/Time Received FedEx Employee Number		Base Charges Declared value Charge Other Total Charges REVISION DATE 3/94 PART #137204 FXEM 6/94 FORMAT #158 158 PRINTED IN	
Release Signature: S. H. Carter			



January 9, 1995

Mr. Russell Janeshek
Foth & Van Dyke
2737 S. Ridge Rd.
Green Bay, WI 54307-9012

Re: Crandon Mining Company Project
Battelle Results for August 1994 Surface Waters

Dear Mr. Janeshek:

Enclosed are reports on PACE report paper summarizing Battelle results for surface water samples collected in August, 1994. In a FAX dated 11/23/94 responding to PACE's submittal of the June and July Battelle data, you requested that PACE submit a summary report for these three months on PACE letterhead. An electronic deliverable summarizing the results is also included in this submittal.

The results are not blank corrected. Included in this submittal are sensitivity checks, raw data and data summaries. Direct analysis of water by ICP-MS (without a digestion) was used for Al. For the total recoverable analysis of Cd, Cu and Pb, a preconcentration step was followed by quantification using ICP-MS. Total recoverable mercury was analyzed by cold vapor atomic fluorescence. Zinc and chromium were analyzed by direct GFAA without a digestion.

The detection limit for cadmium in this report is listed as 0.006 µg/L. The detection limit in the June and July reports was reported at 0.002 µg/L. For each batch of samples and because of the sensitive nature of the analyses, Battelle performs a detection limit study using the current batch of reagents and standard solutions. The detection limits are consistent from batch to batch with slight changes noted such as the one mentioned for cadmium.

If you have any questions concerning this submittal, feel free to contact me at (612) 525-3454.

Sincerely,

Steven R. Crupi
Project Manager

Enclosures



REPORT OF LABORATORY ANALYSIS

Foth & Van Dyke & Associates
2737 South Ridge Road
P.O. Box 19012
Green Bay, WI 54307

January 03, 1995
PACE Project Number: 941219509

Attn: Mr. Russell Janeshek

Client Reference: Battelle August Surface Waters

PACE Sample Number:

10 0300730 10 0300756 10 0300764

Date Collected:

08/08/94 08/08/94 08/08/94

Date Received:

08/15/94 08/15/94 08/15/94

Client Sample ID:

SG-CC-01 SG-CC-2 SG-Y

Parameter

Units

MDI

SUBCONTRACT ANALYSIS

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.20	34.0	35.0	17.6
Cadmium	ug/L	0.006	ND	0.006	ND
Chromium	ug/L	0.20	0.34	0.42	0.34
Copper	ug/L	0.030	0.597	0.505	0.598
Lead	ug/L	0.002	0.231	0.218	0.307
Mercury	ng/L	0.10	2.56	2.46	3.60
Zinc	ug/L	0.39	1.56	1.39	3.73



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 2

January 03, 1995
PACE Project Number: 941219509

Client Reference: Battelle August Surface Waters

PACE Sample Number:	10 0300772	10 0300780	10 0300802
Date Collected:	08/08/94	08/08/94	08/08/94
Date Received:	08/15/94	08/15/94	08/15/94
Client Sample ID:	SG-V	SG-AB	SG-19
<u>Parameter</u>	<u>Units</u>	<u>MDL</u>	

SUBCONTRACT ANALYSIS

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.20	23.7	4.5	38.0
Cadmium	ug/L	0.006	0.006	ND	0.014
Chromium	ug/L	0.20	0.42	0.34	0.51
Copper	ug/L	0.030	0.532	0.466	0.406
Lead	ug/L	0.002	0.174	0.060	0.315
Mercury	ng/L	0.10	1.52	1.06	5.60
Zinc	ug/L	0.39	2.69	1.74	5.90



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 3

January 03, 1995
PACE Project Number: 941219509

Client Reference: Battelle August Surface Waters

PACE Sample Number:

10 0300810 10 0300829 10 0300837

Date Collected:

08/08/94 08/09/94 08/09/94

Date Received:

08/15/94 08/15/94 08/15/94

Client Sample ID:

SG-30 SG-2 SG-3

Parameter

Units

MDI

SUBCONTRACT ANALYSIS

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.20	38.9	22.1	11.9
Cadmium	ug/L	0.006	0.006	ND	ND
Chromium	ug/L	0.20	0.76	0.51	0.34
Copper	ug/L	0.030	0.421	0.325	0.515
Lead	ug/L	0.002	0.280	0.146	0.088
Mercury	ng/L	0.10	2.33	2.10	1.95
Zinc	ug/L	0.39	5.60	3.47	5.38



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 4

January 03, 1995
PACE Project Number: 941219509

Client Reference: Battelle August Surface Waters

PACE Sample Number:

10 0300845 10 0300853 10 0300861

Date Collected:

08/09/94 08/09/94 08/09/94

Date Received:

08/15/94 08/15/94 08/15/94

Client Sample ID:

SG-6 SG-E LG-7

Parameter

Units

MDL

SUBCONTRACT ANALYSIS

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.20	8.3	12.5	33.5
Cadmium	ug/L	0.006	ND	ND	0.048
Chromium	ug/L	0.20	0.51	1.35	0.25
Copper	ug/L	0.030	0.299	0.252	0.585
Lead	ug/L	0.002	0.066	0.090	0.445
Mercury	ng/L	0.10	0.80	0.86	1.73
Zinc	ug/L	0.39	3.12	0.95	9.03



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 5

January 03, 1995
PACE Project Number: 941219509

Client Reference: Battelle August Surface Waters

PACE Sample Number:

10 0300870 10 0300888 10 0300896

Date Collected:

08/10/94 08/10/94 08/10/94

Date Received:

08/15/94 08/15/94 08/15/94

Client Sample ID:

LG-11 LG-13 LG-15

Parameter

Units

MDI

SUBCONTRACT ANALYSIS

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.20	11.7	90.4	38.6
Cadmium	ug/L	0.006	0.006	0.015	ND
Chromium	ug/L	0.20	0.34	0.42	0.34
Copper	ug/L	0.030	0.764	0.717	0.318
Lead	ug/L	0.002	0.077	0.687	0.120
Mercury	ng/L	0.10	1.09	2.39	1.29
Zinc	ug/L	0.39	3.30	7.46	4.17



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 6

January 03, 1995
PACE Project Number: 941219509

Client Reference: Battelle August Surface Waters

PACE Sample Number:	10 0300900	10 0300918
Date Collected:	08/10/94	08/10/94
Date Received:	08/15/94	08/15/94
Client Sample ID:	LG-12-01	LG-12-02
<u>Parameter</u>	<u>Units</u>	<u>MDL</u>

SUBCONTRACT ANALYSIS

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.20	62.3	62.0
Cadmium	ug/L	0.006	0.006	0.007
Chromium	ug/L	0.20	0.51	0.68
Copper	ug/L	0.030	3.49	2.97
Lead	ug/L	0.002	0.493	0.518
Mercury	ng/L	0.10	2.82	2.94
Zinc	ug/L	0.39	6.42	7.38

These data have been reviewed and are approved for release.

Steven R. Crupi

Steve Crupi
Project Manager



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 7

FOOTNOTES
for pages 1 through 6

January 03, 1995
PACE Project Number: 941219509

Client Reference: Battelle August Surface Waters

MDL Method Detection Limit
ND Not detected at or above the MDL.

September 1994
Surface Water Laboratory Data



February 17, 1995

Mr. Russell Janeshek
Foth & Van Dyke
2737 S. Ridge Rd.
Green Bay, WI 54307-9012

Re: Crandon Mining Company Project -
September 1994 Surface Water Sampling
Report Update to include Battelle Low Level Metals

Dear Mr. Janeshek:

Enclosed are an updated analytical report, low level metal raw data package and an updated electronic deliverable representing the surface water samples collected in September, 1994. The enclosed summary report and electronic deliverable have been updated from our previous submittal for this event to include low level metals analysis results from Battelle.

This package contains copies of the chain of custody records documenting the transfer of samples to Battelle. The summary report and project narrative received from Battelle is also included in this submittal. Battelle employed EPA Method 200.8 for the ICP metals and cold vapor atomic fluorescence for mercury.

If you have any questions or comments concerning the data submitted, feel free to contact me at (612) 525-3454.

Sincerely,

A handwritten signature in cursive script that reads "Steven R. Crupi".

Steven R. Crupi
Project Manager

Enclosures

October 14, 1994

Mr. Russell Janeshek
Foth & Van Dyke
2737 S. Ridge Rd.
Green Bay, WI 54307-9012

**Re: Crandon Mining Company Project -
September 1994 Surface Water Sampling**

Dear Mr. Janeshek:

Enclosed are the analytical report, raw data package and electronic deliverable representing the samples received on September 8 and 9, 1994. This group of samples represents the September 1994 surface water sampling round. Analysis results in this submittal cover tests performed at PACE and Northern Lake Service. The enclosed summary report and electronic deliverable will be reissued when the results from the Batelle analyses are received and incorporated.

Attached to this letter are copies of the chain of custody records. Also attached to this letter is a table cross referencing the PACE sample identification, the Northern Lake Service Identification and the sampling point identification. Copies of the chain of custody records for samples received at Northern Lake Service (NLS) are also attached to this letter.

Samples were sent to PACE, NLS, and Batelle. A summary of the where each of the analyses were performed follows below.

PACE - Alkalinity, F, Cl, COD, NH₃, TKN, Cyanide, total and dissolved metals (standard detection levels), NO₃, pH, Turbidity

NLS - BOD, TP, Dissolved P, K, SO₄, TSS, TDS, O&G, Hardness

Batelle - Low-level metals (Al, Cd, Cr, Cu, Pb, Hg, Zn)

NLS will be performing the NO₃, pH and Turbidity tests in future surface water sampling events because of holding time problems encountered with the samples being shipped to PACE. Delivering the samples to NLS on the day of collection for these tests will reduce the chance of missed holding times.

OKT 14 1994

September Surface Waters
10/14/94
page 2 of 2

TSS was not conducted for this round because the samples were filtered at NLS prior to an aliquot being taken for this analysis.

Sulfate was not analyzed for eleven samples. The reason the analyses were not conducted is unknown. This omission was discovered on 10/05/94 while reviewing a FAX'd report from NLS. Paul Knuth (NLS) was contacted on 10/06/94 regarding this situation and was uncertain as to the reason for the omission. Bill Scruton (PACE) and I notified you of this situation during a conference call on 10/06/94. The samples affected are listed below.

SG-CC-01	SG-30
SG-CC-02	SG-6
SG-Y	SG-2
SG-V	SG-3
SG-AB	SG-E
SG-19	

The quality control summary for the analyses performed at NLS is included in the NLS raw data submittal.

If you have any questions or comments concerning the data submitted, feel free to contact me at (612) 525-3454.

Sincerely,

Steven R. Crupi

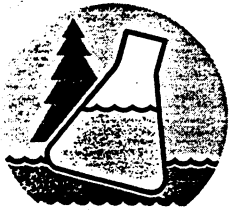
Steven R. Crupi
Project Manager

Attachments/Enclosures

Crandon Mining Company Project -
September 1994 Surface Water Sampling

Sample Cross Reference

<u>Sample ID</u>	<u>PACE ID</u>	<u>NLS ID</u>
SG-CC-01	20860.4	63899
SG-CC-02	20861.2	63900
SG-Y	20862.0	63901
SG-V	20863.9	63902
SG-AB	20864.7	63903
SG-19	20865.5	63904
SG-30	20866.3	63905
SG-6	20867.1	63906
SG-2	20868.0	63907
SG-3	20869.8	63908
SG-E	20870.1	63909
SG-D11	20871.0	-----
SG-D12	20872.8	-----
LG-12	20954.6	64057
LG-11	20955.4	64058
LG-15-01	20952.0	64059
LG-15-02	20953.8	64060
LG-7	20956.2	64055
LG-13	20957.0	64056
SG-D05	20958.9	-----



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 09901

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT FOTH VANDYKE		PROJECT TITLE CRANDON MINING Co. S.W.	
ADDRESS 2737 S. RIDGE RD		PROJECT NO. 93C049	P.O. NO.
CITY GREEN BAY	STATE WI	ZIP 54307	CONTACT RUSS JANESHEU
			PHONE 414-497-2500

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			PNP	PS	RN		
1.	63899	SG-CC-01	9/6/94	0920	S.W.	GRAB	1	1	1		
2.	63900	SG-CC-02		0920			1	1	1		
3.	63901	SG-Y		1130			1	1	1		
4.	63902	SG-Y		1240			1	1	1		
5.	63903	SG-AB		1345			1	1	1		
	63904	SG-19		1500			1	1	1		
7.	63905	SG-30		1530			1	1	1		
8.	63906	SG-6		1645			1	1	1		
9.	63907	SG-2	9/7/94	0815			1	1	1		
10.	63908	SG-3		1000			1	1	1		
11.	63909	SG-E		1130			1	1	1		
12.											

SAMPLE TYPE:

SW = surface water
WW = wastewater
GW = groundwater

DW = drinking water
TIS = tissue
AIR = air

PROD = product
SOIL = soil
SED = sediment

describe others

CONTAINER

P = plastic
G = glass
V = glass vial
B = plastic bag

describe others

PRESERVATIVES & PREPARATION

NP = nothing added
S = sulfuric acid
N = nitric acid
Z = zinc acetate

OH = sodium hydroxide
HA = hydrochloric & ascorbic acid
H = hydrochloric acid

F = field filtered

COLLECTED BY (signature) <i>Scott Jansen</i>		CUSTODY SEAL NO. (IF ANY)		DATE/TIME 9/7/94 1200
RELINQUISHED BY (signature)		RECEIVED BY (signature)		DATE/TIME
RELINQUISHED BY (signature)		RECEIVED BY (signature)		DATE/TIME
DISPATCHED BY (signature) <i>Scott Jansen</i>		METHOD OF TRANSPORT FVD		DATE/TIME 9/7/94 1300
RECEIVED AT NLS BY (signature) <i>[Signature]</i>		DATE/TIME 9-7-94 1300	CONDITION On Ice	TEMP. 0.2°
SEAL INTACT? ☐ YES ☐ NO		REMARKS & OTHER INFORMATION		

- IMPORTANT:**
1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
 2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
 3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

3.7-9-313

DUPLICATE COPY

NORTHERN LAKE SERVICE, INC.

400 NORTH LAKE AVENUE

CRANDON, WI 54520 (715)478-2777

ORDER OF ANALYSIS

RESULTS ORDERED BY:

CHAIN OF CUSTODY RECORD NUMBER:

FOTH: VAN DYKE
RUSS JANESHEK

09901

QUOTATION NUMBER:

ANALYZE FOR DISSOLVED OR TOTAL PARAMETERS?

SEND RESULTS TO:

SEND INVOICE TO:

PAGE

PAGE

Note "L" for low level ICP analysis, and "F" for furnace analysis.

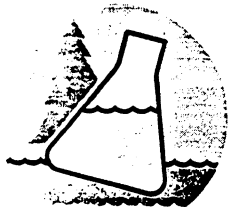
Samples on line #s: 1-11 to be analyzed for the parameters checked below:

- | | | | |
|---|--|---|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☒ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☒ Tot. reactive | ☐ BNAs by 625/8270 |
| ☐ Antimony | ☐ Hardness | ☐ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☒ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☒ B.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☒ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☒ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BNAs |
| ☐ Chloride | ☐ Ammonia | ☐ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☐ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☐ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SDWA) |
| ☐ Color | ☐ Total Organic | ☐ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☒ Oil & Grease | ☐ Turbidity | ☐ PVOCs by 8020 |
| ☐ Copper | ☐ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO+PVOCs |
| | | ☐ Zinc | ☐ DRO-WI Modified |
| | | ☐ Munic.Sludge,WI List | ☐ PAHs by 610LC/8310 |

Samples on line #s: _____ to be analyzed for the parameters checked below:

- | | | | |
|---|--|---|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☐ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☐ Tot. reactive | ☐ BNAs by 625/8270 |
| ☐ Antimony | ☐ Hardness | ☐ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☐ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☐ B.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☐ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☐ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BNAs |
| ☐ Chloride | ☐ Ammonia | ☐ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☐ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☐ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SDWA) |
| ☐ Color | ☐ Total Organic | ☐ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☐ Oil & Grease | ☐ Turbidity | ☐ PVOCs by 8020 |
| ☐ Copper | ☐ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO+PVOCs |
| | | ☐ Zinc | ☐ DRO-WI Modified |
| | | ☐ Munic.Sludge,WI List | ☐ PAHs by 610LC/8310 |

SPECIAL INSTRUCTIONS:



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 10594

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT FOTH: VAN DYKE			PROJECT TITLE CRANDON MINING Co S.W.		
ADDRESS 2737 S. RIDGE RD			PROJECT NO. 93C049		P.O. NO.
CITY GREEN BAY	STATE WI	ZIP 54307	CONTACT RUSS JANESHEK		PHONE

ITEM NO.	NLS LAB NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			P	N	P	P	
1.	164055	LG-7	9/7/94	1630	S.W.	GAB	1	1	1		
2.	164056	LG-13	↓	1400	↓	↓	1	1	1		
3.	164057	LG-12	9/8/94	1130	↓	↓	1	1	1		
4.	164058	LG-11	↓	1000	↓	↓	1	1	1		
5.	164059	LG-15-01	↓	1300	↓	↓	1	1	1		
	164060	LG-15-02	↓	1300	↓	↓	1	1	1		
7.											
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE:

SW = surface water
WW = wastewater
GW = groundwater

DW = drinking water
TIS = tissue
AIR = air

PROD = product
SOIL = soil
SED = sediment

describe others

CONTAINER

P = plastic
G = glass
V = glass vial
B = plastic bag

describe others

PRESERVATIVES & PREPARATION

NP = nothing added
S = sulfuric acid
N = nitric acid
Z = zinc acetate

OH = sodium hydroxide
HA = hydrochloric & ascorbic acid
H = hydrochloric acid

F = field filtered

COLLECTED BY (signatures)

CUSTODY SEAL NO. (IF ANY) DATE/TIME

RELINQUISHED BY (signature)

RECEIVED BY (signature)

DATE/TIME

RELINQUISHED BY (signature)

RECEIVED BY (signature)

DATE/TIME

DISPATCHED BY (signature)

METHOD OF TRANSPORT

DATE/TIME

RECEIVED AT NLS BY (signature)

DATE/TIME

CONDITION

TEMP.

IS INTACT?

☐ YES ☐ NO

SEAL #

REMARKS & OTHER INFORMATION

1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.

2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.

3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

3.7-9-315

DUPLICATE COPY

700 N. LAKESHORE DRIVE, S.W.
30 NORTH LAKE AVENUE
RANDON, WI 54520 (715)478-2777
RESULTS ORDERED BY:

ORDER OF ANALYSIS

FOTH: VAN DYKE
RUSS JANESHEK

SEND RESULTS TO:

PAGE

CHAIN OF CUSTODY RECORD NUMBER:

10594

QUOTATION NUMBER:

ANALYZE FOR DISSOLVED OR TOTAL PARAMETERS?

SEND INVOICE TO:

PAGE

Note "L" for low level ICP analysis, and "F" for furnace analysis.

Samples on line #: 1-6 to be analyzed for the parameters checked below:

- | | | | |
|---|--|---|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☒ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☐ Tot. reactive | ☐ BNAs by 625/8270 |
| ☐ Antimony | ☐ Hardness | ☐ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☒ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☒ S.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☒ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☒ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BNAs |
| ☐ Chloride | ☐ Ammonia | ☒ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☐ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☐ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Turbidity | ☐ -by EPA 524.2 (SDWA) |
| ☐ Color | ☐ Total Organic | ☐ Vanadium | ☐ BTEX by 8020 |
| ☐ Conductivity | ☒ Oil & Grease | ☐ Zinc | ☐ PVOCs by 8020 |
| ☐ Copper | ☐ pH | ☐ Munic.Sludge, WI List | ☐ GRO-WI Modified ☐ GRO+PVOCs |
| | | | ☐ DRO-WI Modified |
| | | | ☐ PAHs by 610LC/8310 |

Samples on line #: to be analyzed for the parameters checked below:

- | | | | |
|---|--|--|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☐ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☐ Tot. reactive | ☐ BNAs by 625/8270 |
| ☐ Antimony | ☐ Hardness | ☐ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☐ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☐ S.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☐ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☐ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BNAs |
| ☐ Chloride | ☐ Ammonia | ☐ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☐ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☐ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Turbidity | ☐ -by EPA 524.2 (SDWA) |
| ☐ Color | ☐ Total Organic | ☐ Vanadium | ☐ BTEX by 8020 |
| ☐ Conductivity | ☐ Oil & Grease | ☐ Zinc | ☐ PVOCs by 8020 |
| ☐ Copper | ☐ pH | ☐ Munic.Sludge, WI List | ☐ GRO-WI Modified ☐ GRO+PVOCs |
| | | | ☐ DRO-WI Modified |
| | | | ☐ PAHs by 610LC/8310 |

SPECIAL INSTRUCTIONS:



CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2737 S. RIDGE Rd
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: RUSS JANESHEK
Bill To: FVD
P.O. # / Billing Reference 93C049
Project Name / No. CRANDON MINING Co S.W.

Pace Client No. 150419
Pace Project Manager WHS
Pace Project No. 940908.508
*Requested Due Date: _____

Sampled By (PRINT): _____

Sampler Signature _____

Date Sampled _____

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.	NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST	REMARKS
						UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	NAOH		
1	SG-CC-01	0920	S.W.	20860.4	5	2	1	1	1	1	SEE ATTACHMENT	
2	SG-CC-02	0920		20861.2	5	2	1	1		1		
3	SG-Y	1130		20862.0	5	2	1	1		1		
4	SG-Y	1240		20863.9	5	2	1	1		1		
5	SG-AB	1345		20864.7	5	2	1	1		1		
6	SG-19	1500		20865.5	5	2	1	1		1		
7	SG-30	1530		20866.3	5	2	1	1		1		
8	SG-6	1645		20867.1	5	2	1	1		1		

COOLER NOS	BAILERS	SHIPMENT OUT / DATE	METHOD RETURNED / DATE	ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
					Scott Carson / FOTH: VAN DYKE	FEB EX	9/7/94	1300
					FEB EX	SMH / PACE	9/8/94	1420

Additional Comments _____

SEE REVERSE SIDE FOR INSTRUCTIONS



101513

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2737 S. RIDGE RD
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: RUSS JANESHER
Bill To: FVO
P.O. # / Billing Reference 93C049
Project Name / No. CRANDON MINING Co S.W.

Pace Client No. 150419
Pace Project Manager WHS
Pace Project No. 940908.S08
*Requested Due Date: _____

Sampled By (PRINT):

SCOTT JANSSEN JOE AUSTIN
Sampler Signature Date Sampled
Scott Janssen 9/7/94

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.	NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST	REMARKS
						UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	NAOH		
1	SG-2	0815	SW	20868.0	5	2	1	1	1		SEE ATTACHMENT	COO ONLY
2	SG-D11			20871.0	1		1		1			
3	SG-3	1000		20869.8	5	2	1	1	1			
4	SG-E	1130		20870.1	5	2	1	1	1			
5												
6												
7												
8												

COOLER NOS.	BAILERS	SHIPMENT OUT / DATE	METHOD RETURNED / DATE	ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
					Scott Janssen / FOTH: VAN DYKE	FED, EX	9/7/94	1300
					FED EX	SMITH / PACE	9/8/94	1420

Additional Comments

ORIGINAL

SEE REVERSE SIDE FOR INSTRUCTIONS



191314

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2737 S. RIDGE Rd
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: RUSS JANESHEKPace Client No. 150419Bill To: FVDPace Project Manager WHSP.O. # / Billing Reference 93C049Pace Project No. 94E9E85D8Project Name / No. CRANDON MINING Co S.W. *Requested Due Date: _____Sampled By (PRINT):
SCOTT JANSEN JOE AUSTINSampler Signature Scott Jansen Date Sampled 9/6/94

NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST	REMARKS
	UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA			
						SEE ATTACHMENT	

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PAGE NO.
1	SG-D12			20872.8
2	SG-2 nd			
3				
4				
5				
6				
7				
8				

COOLER NOS.	BAILERS	SHIPMENT METHOD OUT / DATE	SHIPMENT METHOD RETURNED / DATE	ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
					Scott Jansen / FOTH: VAN DYKE	FED EX	9/7/94	1300
					FED EX	SHIPPER / FIVE	9/8/94	1420

Additional Comments

ORIGINAL

SEE REVERSE SIDE FOR INSTRUCTIONS



181308

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH : VAN DYKE
Address 2737 S. RIDGE Rd
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: RUSS JANESHEK
Bill To: FVO
P.O. # / Billing Reference 93C049
Project Name / No. CRANDON MINING Co S.W.

Pace Client No. 150419
Pace Project Manager WHS
Pace Project No. 940909.502
Requested Due Date: _____

Sampled By (PRINT):

SCOTT JANSSEN

JOE AUSTIN

Sampler Signature

Date Sampled

Scott Jansen

9/8/94

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PAC# NO.	NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST	REMARKS
						UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	NAOH		
1	LG-15-01	1300	SW	20952.0	5	2	1	1	1			
2	LG-15-02	1300		20953.8	5	2	1	1	1			
3	LG-12	1130		20954.6	5	2	1	1	1			
4	LG-11	1000		20955.4	5	2	1	1	1			
5												
6												
7												
8												

COOLER NOS	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
		OUT / DATE	RETURNED / DATE					
					Scott Jansen FOTH: Van Dyke	Joe Austin / PACE	9/9/94	1430

Additional Comments

Joe Austin / PACE
9/9/94 1005

ORIGINAL

SEE REVERSE SIDE FOR INSTRUCTIONS



151312

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2737 S. RIDGE Rd
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: RUSS JANESHEK
Bill To: FVO
P.O. # / Billing Reference 930049
Project Name / No. CRANDON MINING Co S.W.

Pace Client No. 150419
Pace Project Manager WHS
Pace Project No. 940909.502
*Requested Due Date: _____

Sampled By (PRINT):

SCOTT JANSSEN JOE AUSTIN

Sampler Signature

Date Sampled

Scott Janssen 9/7/94

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PAGE NO.	NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST	REMARKS
						UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	NAOH		
1	LG-7	1630	SW	20956.2	5	2	1	1		1	SEE ATTACHMENT	COO only
2	LG-13	1800		20959.0	5	2	1	1		1		
3	SG-DOS	1800		20958.9	1		1					
4												
5												
6												
7												
8												

COOLER NOS.	BAIERS	SHIPMENT OUT / DATE	METHOD RETURNED / DATE	ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
					Scott Janssen FOTH: VAN DYKE		9/8/94	1430

Additional Comments

Shirley Kedge / PACE 9/8/94 10:05

ORIGINAL

SEE REVERSE SIDE FOR INSTRUCTIONS



REPORT OF LABORATORY ANALYSIS

Foth & Van Dyke & Associates
2737 South Ridge Road
P.O. Box 19012
Green Bay, WI 54307

February 17, 1995
PACE Project Number: 940908508

Attn: Mr. Russell Janeshek

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

10 0208604	10 0208612	10 0208620
09/06/94	09/06/94	09/06/94
09:20	09:20	11:30
09/08/94	09/08/94	09/08/94
SG-CC-01	SG-CC-02	SG-Y

Parameter	Units	MDL			
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SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	120	110	98
Solids, Total Suspended			NA	NA	NA
Phosphorus, Soluble	mg/L	0.05	ND	ND	ND
Phosphorus, Total	mg/L	0.05	0.025	0.027	0.034
Oil and Grease	mg/L	1	ND	7.0	6.2
Biochemical Oxygen Demand, 05 Day	mg/L	2	ND	ND	ND
Hardness, Total as Calcium Carbonate	mg/L	5	82	84	64
Potassium	mg/L	1.0	ND	ND	ND

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.20	44.5	44.8	26.1
Cadmium	ug/L	0.006	ND	ND	ND
Chromium	ug/L	0.30	0.565	0.727	0.515
Copper	ug/L	0.030	0.163	0.225	0.270
Lead	ug/L	0.002	0.131	0.133	0.198
Mercury	ng/L	0.10	1.67	1.55	1.33
Zinc	ug/L	0.39	0.969	0.900	1.84

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	76	75	54
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Hydroxide	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	76	75	54
Anions	Meq/L		1.302	1.286	0.941
Antimony	mg/L	0.005	ND	ND	ND
Cation-Anion Balance	%	0.01	10.82	11.20	10.85



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 2

February 17, 1995
PACE Project Number: 940908508

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0208604	10 0208612	10 0208620
Date Collected:	09/06/94	09/06/94	09/06/94
Time Collected:	09:20	09:20	11:30
Date Received:	09/08/94	09/08/94	09/08/94
Client Sample ID:	SG-CC-01	SG-CC-02	SG-Y

Parameter	Units	MDL			
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INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Cations	Meq/L		1.618	1.610	1.171
Chemical Oxygen Demand, Low Level	mg/L	20	23	25	30
Chloride	mg/L	1	2	2	2
Cyanide, Total	mg/L	0.02	ND	ND	ND
Fluoride, Soluble	mg/L	0.1	ND	ND	ND
Iron, dissolved	mg/L	0.050	0.11	0.11	0.062
Manganese, dissolved	mg/L	0.010	ND	ND	ND
Nitrogen, Ammonia	mg/L	0.1	ND	ND	ND
Nitrogen, Kjeldahl	mg/L	0.2	0.8	0.6	1.0
Nitrogen, Nitrate	mg/L	0.5	ND	ND	ND
Sodium Adsorption Ratio			0.099	0.100	0.106
Thallium	mg/L	0.005	ND	ND	ND
Turbidity	NTU	0.5	1.6	1.8	2.5
pH		0.1	7.6	7.5	7.6

METALS BY ICP

Silver	mg/L	0.010	ND	ND	ND
Barium	mg/L	0.010	0.011	0.011	0.010
Beryllium	mg/L	0.010	ND	ND	ND
Calcium	mg/L	1.0	17	17	12
Iron, total	mg/L	0.050	0.37	0.32	0.27
Magnesium	mg/L	0.50	8.3	8.2	6.0
Manganese, total	mg/L	0.010	0.050	0.050	0.050
Sodium	mg/L	1.0	2.0	2.0	1.8
Nickel	mg/L	0.030	ND	ND	ND
Molybdenum	mg/L	0.020	ND	ND	ND
Boron	mg/L	0.20	ND	ND	ND

METALS BY TRACE ICP

Arsenic	mg/L	0.005	ND	0.006	ND
Selenium	mg/L	0.005	ND	ND	ND



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek

Page 3

February 17, 1995

PACE Project Number: 940908508

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

10 0208639 10 0208647 10 0208655

Date Collected:

09/06/94 09/06/94 09/06/94

Time Collected:

12:40 13:45 15:00

Date Received:

09/08/94 09/08/94 09/08/94

Client Sample ID:

SG-V SG-AB SG-19

Parameter

Units

MDI

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	140	140	130
Solids, Total Suspended			NA	NA	NA
Phosphorus, Soluble	mg/L	0.05	ND	ND	0.018
Phosphorus, Total	mg/L	0.05	0.019	0.022	0.035
Oil and Grease	mg/L	1	5.6	6.5	ND
Biochemical Oxygen Demand, 05 Day	mg/L	2	ND	ND	ND
Hardness, Total as Calcium Carbonate	mg/L	5	140	120	86
Potassium	mg/L	1.0	0.69	ND	ND

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.20	24.9	9.26	32.1
Cadmium	ug/L	0.006	ND	ND	ND
Chromium	ug/L	0.30	0.617	0.817	0.358
Copper	ug/L	0.030	0.304	0.177	0.613
Lead	ug/L	0.002	0.0925	0.0524	0.155
Mercury	ug/L	0.10	1.15	0.922	3.27
Zinc	ug/L	0.39	0.795	0.547	2.89

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	99	110	70
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Hydroxide	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	99	110	70
Anions	Meq/L		1.707	0.085	0.029
Antimony	mg/L	0.005	ND	ND	ND
Cation-Anion Balance	%	0.01	9.51	92.73	96.30
Cations	Meq/L		2.066	2.244	1.526
Chemical Oxygen Demand, Low Level	mg/L	20	20	ND	50
Chloride	mg/L	1	3	3	1
Cyanide, Total	mg/L	0.02	ND	ND	ND



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 4

February 17, 1995
PACE Project Number: 940908508

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0208639	10 0208647	10 0208655
Date Collected:	09/06/94	09/06/94	09/06/94
Time Collected:	12:40	13:45	15:00
Date Received:	09/08/94	09/08/94	09/08/94
Client Sample ID:	SG-V	SG-AB	SG-19
Parameter	Units	MDI	

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Fluoride, Soluble	mg/L	0.1	ND	ND	ND
Iron, dissolved	mg/L	0.050	0.13	0.077	0.20
Manganese, dissolved	mg/L	0.010	ND	ND	ND
Nitrogen, Ammonia	mg/L	0.1	ND	ND	ND
Nitrogen, Kjeldahl	mg/L	0.2	0.6	0.6	0.8
Nitrogen, Nitrate	mg/L	0.5	ND	ND	ND
Sodium Adsorption Ratio			0.097	0.105	0.082
Thallium	mg/L	0.005	ND	ND	ND
Turbidity	NTU	0.5	ND	ND	ND
pH		0.1	7.7	7.7	7.3

METALS BY ICP

Silver	mg/L	0.010	ND	ND	ND
Barium	mg/L	0.010	0.011	0.011	0.011
Beryllium	mg/L	0.010	ND	ND	ND
Calcium	mg/L	1.0	21	23	16
Iron, total	mg/L	0.050	0.26	0.16	0.29
Magnesium	mg/L	0.50	11	12	8.0

Manganese, total	mg/L	0.010	0.025	0.025	0.025
Sodium	mg/L	1.0	2.2	2.5	1.6
Nickel	mg/L	0.030	ND	ND	ND
Molybdenum	mg/L	0.020	ND	ND	ND
Boron	mg/L	0.20	ND	ND	ND

METALS BY TRACE ICP

Arsenic	mg/L	0.005	ND	ND	ND
Selenium	mg/L	0.005	ND	ND	ND



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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February 17, 1995
PACE Project Number: 940908508

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0208663	10 0208671	10 0208680
Date Collected:	09/06/94	09/06/94	09/07/94
Time Collected:	15:30	16:45	08:15
Date Received:	09/08/94	09/08/94	09/08/94
Client Sample ID:	SG-30	SG-6	SG-2

Parameter	Units	MDL			
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SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	150	120	150
Solids, Total Suspended			NA	NA	NA
Phosphorus, Soluble	mg/L	0.05	0.019	ND	ND
Phosphorus, Total	mg/L	0.05	0.047	0.017	0.020
Oil and Grease	mg/L	1	ND	ND	ND
Biochemical Oxygen Demand, 05 Day	mg/L	2	ND	ND	ND
Hardness, Total as Calcium Carbonate	mg/L	5	130	100	120
Potassium	mg/L	1.0	ND	0.64	0.61

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.20	106	26.3	25.3
Cadmium	ug/L	0.006	0.00658	ND	ND
Chromium	ug/L	0.30	0.944	0.418	0.558
Copper	ug/L	0.030	0.231	0.190	0.154
Lead	ug/L	0.002	0.245	0.0879	0.0812
Mercury	ng/L	0.10	2.42	1.31	0.982
Zinc	ug/L	0.39	1.93	0.986	0.763

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	120	93	100
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Hydroxide	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	120	93	100
Anions	Meq/L		0.000	1.524	1.695
Antimony	mg/L	0.005	ND	ND	ND
Cation-Anion Balance	%	0.01	99.95	11.97	10.89
Cations	Meq/L		2.484	1.939	2.110
Chemical Oxygen Demand, Low Level	mg/L	20	ND	ND	20
Chloride	mg/L	1	ND	ND	2
Cyanide, Total	mg/L	0.02	ND	ND	ND



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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February 17, 1995
PACE Project Number: 940908508

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0208663	10 0208671	10 0208680
Date Collected:	09/06/94	09/06/94	09/07/94
Time Collected:	15:30	16:45	08:15
Date Received:	09/08/94	09/08/94	09/08/94
Client Sample ID:	SG-30	SG-6	SG-2

Parameter	Units	MDI			
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INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Fluoride, Soluble	mg/L	0.1	ND	ND	ND
Iron, dissolved	mg/L	0.050	ND	0.050	0.16
Manganese, dissolved	mg/L	0.010	ND	ND	ND
Nitrogen, Ammonia	mg/L	0.1	ND	ND	ND
Nitrogen, Kjeldahl	mg/L	0.2	0.6	0.6	0.7
Nitrogen, Nitrate	mg/L	0.5	ND	ND	ND
Sodium Adsorption Ratio			0.092	0.072	0.091
Thallium	mg/L	0.005	ND	ND	ND
Turbidity	NTU	0.5	ND	ND	1.7
pH		0.1	8.0	8.1	7.6

METALS BY ICP

Silver	mg/L	0.010	ND	ND	ND
Barium	mg/L	0.010	0.010	ND	0.011
Beryllium	mg/L	0.010	ND	ND	ND
Calcium	mg/L	1.0	28	19	22
Iron, total	mg/L	0.050	0.28	0.094	0.31
Magnesium	mg/L	0.50	12	11	11
Manganese, total	mg/L	0.010	0.017	ND	0.050
Sodium	mg/L	1.0	2.3	1.6	2.1
Nickel	mg/L	0.030	ND	ND	ND
Molybdenum	mg/L	0.020	ND	ND	ND
Boron	mg/L	0.20	ND	ND	ND

METALS BY TRACE ICP

Arsenic	mg/L	0.005	ND	ND	ND
Selenium	mg/L	0.005	ND	ND	ND



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 7

February 17, 1995
PACE Project Number: 940908508

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0208698	10 0208701	10 0208710
Date Collected:	09/07/94	09/07/94	09/07/94
Time Collected:	10:00	11:30	
Date Received:	09/08/94	09/08/94	09/08/94
Client Sample ID:	SG-3	SG-E	SG-D11
Parameter	Units	MDI	

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	140	170	-
Solids, Total Suspended			NA	NA	-
Phosphorus, Soluble	mg/L	0.05	ND	0.0040	-
Phosphorus, Total	mg/L	0.05	0.016	0.020	-
Oil and Grease	mg/L	1	ND	ND	-
Biochemical Oxygen Demand, 05 Day	mg/L	2	ND	ND	-

Hardness, Total as Calcium Carbonate	mg/L	5	120	150	-
Potassium	mg/L	1.0	0.65	0.75	-

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.20	49.9	29.0	-
Cadmium	ug/L	0.006	ND	ND	-
Chromium	ug/L	0.30	0.713	1.52	-
Copper	ug/L	0.030	0.211	0.148	-
Lead	ug/L	0.002	0.121	0.0703	-
Mercury	ng/L	0.10	1.89	0.877	-
Zinc	ug/L	0.39	1.15	1.19	-

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	100	140	-
Alkalinity, Carbonate	mg/L	5	ND	ND	-
Alkalinity, Hydroxide	mg/L	5	ND	ND	-
Alkalinity, Total as Calcium Carbonate	mg/L	5	100	140	-
Anions	Meq/L		1.667	2.323	-
Antimony	mg/L	0.005	ND	ND	-
Cation-Anion Balance	%	0.01	11.64	11.05	-
Cations	Meq/L		2.106	2.900	-
Chemical Oxygen Demand, Low Level	mg/L	20	ND	ND	ND
Chloride	mg/L	1	1	1	-
Cyanide, Total	mg/L	0.02	ND	ND	-



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 8

February 17, 1995
PACE Project Number: 940908508

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0208698	10 0208701	10 0208710
Date Collected:	09/07/94	09/07/94	09/07/94
Time Collected:	10:00	11:30	
Date Received:	09/08/94	09/08/94	09/08/94
Client Sample ID:	SG-3	SG-E	SG-D11

Parameter	Units	MDI			
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INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Fluoride, Soluble	mg/L	0.1	ND	ND	-
Iron, dissolved	mg/L	0.050	0.12	ND	-
Manganese, dissolved	mg/L	0.010	ND	ND	-
Nitrogen, Ammonia	mg/L	0.1	ND	ND	-
Nitrogen, Kjeldahl	mg/L	0.2	0.6	0.3	-
Nitrogen, Nitrate	mg/L	0.5	ND	ND	-

Sodium Adsorption Ratio			0.087	0.085	-
Thallium	mg/L	0.005	ND	ND	-
Turbidity	NTU	0.5	1.0	ND	-
pH		0.1	7.4	7.7	-

METALS BY ICP

Silver	mg/L	0.010	ND	ND	-
Barium	mg/L	0.010	0.011	ND	-
Beryllium	mg/L	0.010	ND	ND	-
Calcium	mg/L	1.0	22	31	-
Iron, total	mg/L	0.050	0.30	0.087	-
Magnesium	mg/L	0.50	11	15	-

Manganese, total	mg/L	0.010	0.050	ND	-
Sodium	mg/L	1.0	2.0	2.3	-
Nickel	mg/L	0.030	ND	ND	-
Molybdenum	mg/L	0.020	ND	ND	-
Boron	mg/L	0.20	ND	ND	-

METALS BY TRACE ICP

Arsenic	mg/L	0.005	ND	ND	-
Selenium	mg/L	0.005	ND	ND	-



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 9

February 17, 1995
PACE Project Number: 940908508

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0208728
Date Collected:	09/07/94
Date Received:	09/08/94
Client Sample ID:	SG-D12
<u>Parameter</u>	<u>Units</u> <u>MDL</u>

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Chemical Oxygen Demand, Low Level	mg/L	20	38
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These data have been reviewed and are approved for release.

Steven R. Crupi

Steve Crupi
Project Manager



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 10

FOOTNOTES
for pages 1 through 9

February 17, 1995
PACE Project Number: 940908508

Client Reference: Crandon Mining Surface Waters

MDL Method Detection Limit
NA Not analyzed due to laboratory accident.
ND Not detected at or above the MDL.



REPORT OF LABORATORY ANALYSIS

Foth & Van Dyke & Associates
2737 South Ridge Road
P.O. Box 19012
Green Bay, WI 54307

February 17, 1995
PACE Project Number: 940909502

Attn: Mr. Russell Janeshek

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0209520	10 0209538	10 0209546
Date Collected:	09/08/94	09/08/94	09/08/94
Time Collected:	13:00	13:00	11:30
Date Received:	09/09/94	09/09/94	09/09/94
	LG-15-01	LG-15-02	LG-12

Parameter	Units	MDL			
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SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	59	60	30
Solids, Total Suspended			NA	NA	NA
Phosphorus, Soluble	mg/L	0.05	0.0050	0.0080	ND
Phosphorus, Total	mg/L	0.05	0.0090	0.0050	ND
Oil and Grease	mg/L	1	6.4	ND	ND
Biochemical Oxygen Demand, 05 Day	mg/L	2	ND	ND	ND
Hardness, Total as Calcium Carbonate	mg/L	5	6.0	4.0	6.0
Potassium	mg/L	1.0	ND	0.65	0.72

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.20	51.0	53.7	70.2
Cadmium	ug/L	0.006	ND	ND	0.0177
Chromium	ug/L	0.30	0.404	0.342	0.459
Copper	ug/L	0.030	0.250	0.241	0.463
Lead	ug/L	0.002	0.122	0.120	0.651
Mercury	ng/L	0.10	1.26	1.33	2.97
Zinc	ug/L	0.39	3.32	2.53	4.68

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	20	-	-	ND
Alkalinity, Bicarbonate	mg/L	5	ND	ND	-
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Hydroxide	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	ND	ND	ND
Anions	Meq/L		0.000	0.140	0.169
Antimony	mg/L	0.005	ND	ND	ND



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 2

February 17, 1995
PACE Project Number: 940909502

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0209520	10 0209538	10 0209546
Date Collected:	09/08/94	09/08/94	09/08/94
Time Collected:	13:00	13:00	11:30
Date Received:	09/09/94	09/09/94	09/09/94
Client Sample ID:	LG-15-01	LG-15-02	LG-12

Parameter	Units	MDI			
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INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Cation-Anion Balance	%	0.01	99.51	-23.55	-39.41
Cations	Meq/L		0.065	0.086	0.073
Chemical Oxygen Demand, Low Level	mg/L	20	48	48	33
Chloride	mg/L	1	ND	ND	ND
Cyanide, Total	mg/L	0.02	ND	ND	ND
Fluoride, Soluble	mg/L	0.10	ND	ND	ND
Iron, dissolved	mg/L	0.050	0.13	0.11	0.082
Manganese, dissolved	mg/L	0.010	0.073	0.079	0.014
Nitrogen, Ammonia	mg/L	0.1	ND	ND	ND
Nitrogen, Kjeldahl	mg/L	0.2	1.2	0.7	0.7
Nitrogen, Nitrate	mg/L	0.5	ND	ND	ND
Sodium Adsorption Ratio			0	0	0
Thallium	mg/L	0.005	ND	ND	ND
Turbidity	NTU	0.5	1.2	1.1	ND
pH		0.1	5.6	5.4	5.4

METALS BY ICP

Silver	mg/L	0.010	ND	ND	ND
Barium	mg/L	0.010	ND	ND	ND
Beryllium	mg/L	0.010	ND	ND	ND
Calcium	mg/L	1.0	1.3	1.4	1.1
Iron, total	mg/L	0.050	0.16	0.25	0.10
Magnesium	mg/L	0.50	ND	ND	ND
Manganese, total	mg/L	0.010	0.075	0.090	ND
Sodium	mg/L	1.0	ND	ND	ND
Nickel	mg/L	0.030	ND	ND	ND
Molybdenum	mg/L	0.020	ND	ND	ND
Boron	mg/L	0.20	ND	ND	ND

METALS BY TRACE ICP

Arsenic	mg/L	0.005	ND	ND	ND
Selenium	mg/L	0.005	ND	ND	ND



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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February 17, 1995
PACE Project Number: 940909502

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0209554	10 0209562	10 0209570
Date Collected:	09/08/94	09/08/94	09/08/94
Time Collected:	10:00	16:30	14:00
Date Received:	09/09/94	09/09/94	09/09/94
Client Sample ID:	LG-11	LG-7	LG-13
Parameter	Units	MDL	

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	27	42	44
Solids, Total Suspended			NA	NA	NA
Phosphorus, Soluble	mg/L	0.05	ND	ND	ND
Phosphorus, Total	mg/L	0.05	ND	ND	ND
Oil and Grease	mg/L	1	6.0	ND	ND
Biochemical Oxygen Demand, 05 Day	mg/L	2	ND	ND	ND
Hardness, Total as Calcium Carbonate	mg/L	5	8.0	6.0	6.0
Potassium	mg/L	1.0	0.82	0.71	ND

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.20	31.4	36.2	96.0
Cadmium	ug/L	0.006	0.0155	0.0304	0.0144
Chromium	ug/L	0.30	ND	ND	0.460
Copper	ug/L	0.030	0.330	0.345	0.599
Lead	ug/L	0.002	0.248	0.196	0.689
Mercury	ng/L	0.10	1.86	1.96	2.50
Zinc	ug/L	0.39	2.76	8.17	6.22

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	ND	ND	ND
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Hydroxide	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	ND	ND	ND
Anions	Meq/L		0.135	0.133	0.183
Antimony	mg/L	0.005	ND	ND	ND
Cation-Anion Balance	%	0.01	11.64	-26.13	-15.73
Cations	Meq/L		0.171	0.078	0.133
Chemical Oxygen Demand, Low Level	mg/L	20	ND	ND	28
Chloride	mg/L	1	ND	ND	ND
Cyanide, Total	mg/L	0.02	ND	ND	ND



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 4

February 17, 1995
PACE Project Number: 940909502

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

10 0209554 10 0209562 10 0209570

09/08/94 09/08/94 09/08/94

10:00 16:30 14:00

09/09/94 09/09/94 09/09/94

LG-11 LG-7 LG-13

Units

MDL

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Fluoride, Soluble	mg/L	0.10	ND	ND	ND
Iron, dissolved	mg/L	0.050	ND	ND	0.068
Manganese, dissolved	mg/L	0.010	0.086	ND	0.019
Nitrogen, Ammonia	mg/L	0.1	ND	ND	ND
Nitrogen, Kjeldahl	mg/L	0.2	0.6	0.5	0.7
Nitrogen, Nitrate	mg/L	0.5	ND	ND	ND

Sodium Adsorption Ratio

Thallium	mg/L	0.005	0	0	0
Turbidity	NTU	0.5	2.4	ND	1.4
pH		0.1	5.6	5.6	5.8

METALS BY ICP

Silver	mg/L	0.010	ND	ND	ND
Barium	mg/L	0.010	ND	ND	0.015
Beryllium	mg/L	0.010	ND	ND	ND
Calcium	mg/L	1.0	2.1	1.2	1.8
Iron, total	mg/L	0.050	0.49	0.046	0.15
Magnesium	mg/L	0.50	0.55	ND	0.53

Manganese, total	mg/L	0.010	0.12	ND	0.020
Sodium	mg/L	1.0	ND	ND	ND
Nickel	mg/L	0.030	ND	ND	ND
Molybdenum	mg/L	0.020	ND	ND	ND
Boron	mg/L	0.20	ND	ND	ND

METALS BY TRACE ICP

Arsenic	mg/L	0.005	ND	ND	ND
Selenium	mg/L	0.005	ND	ND	ND



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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February 17, 1995
PACE Project Number: 940909502

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0209589		
Date Collected:	09/08/94		
Time Collected:	18:00		
Date Received:	09/09/94		
Client Sample ID:	SG-D05		
Parameter	Units	MDI	

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Chemical Oxygen Demand	mg/L	50	ND
Chemical Oxygen Demand, Low Level	mg/L	20	ND

These data have been reviewed and are approved for release.

Steven R. Crupi

Steve Crupi
Project Manager



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek

FOOTNOTES

February 17, 1995

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for pages 1 through 5

PACE Project Number: 940909502

Client Reference: Crandon Mining Surface Waters

MDL Method Detection Limit
NA Not analyzed due to laboratory accident.
ND Not detected at or above the MDL.

September 1994
Surface Water Laboratory Data
High Flow Sampling Event



REPORT OF LABORATORY ANALYSIS

Foth & Van Dyke & Associates
2737 South Ridge Road
P.O. Box 19012
Green Bay, WI 54307

February 17, 1995
PACE Project Number: 940920502

Attn: Mr. Russell Janeshek

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0219614	10 0219622	10 0219630
Date Collected:	09/16/94	09/16/94	09/16/94
Time Collected:	11:30	12:30	13:00
Date Received:	09/20/94	09/20/94	09/20/94
Client Sample ID:	SG-CC	SG-Y	SG-V

Parameter	Units	MDL			
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SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	110	110	120
Solids, Total Suspended	mg/L	5	ND	ND	ND
Sulfate	mg/L	1.0	24	12	26
Phosphorus, Soluble	mg/L	0.05	ND	ND	ND
Phosphorus, Total	mg/L	0.05	ND	ND	ND
Oil and Grease	mg/L	4.6	ND	4.6	ND
Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	ND	9.0
Hardness, Total as Calcium Carbonate	mg/L	5	MI	MT	MT
Potassium	mg/L	1.0	ND	ND	ND

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.20	92.3	40.0	99.5
Cadmium	ug/L	0.006	0.0237	ND	0.0126
Chromium	ug/L	0.30	0.612	0.495	0.726
Copper	ug/L	0.030	1.10	0.454	0.486
Lead	ug/L	0.002	0.557	0.2	0.316
Mercury	ng/L	0.10	7.18	2.39	7.16
Zinc	ug/L	0.39	5.15	1.65	3.67

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	40	51	35
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Hydroxide	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	40	51	35
Anions	Meq/L		1.212	1.142	1.172
Antimony	mg/L	0.005	ND	ND	ND
Cation-Anion Balance	%	0.01	-11.21	0.32	-9.72



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 10675

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT FOTH VANDYKE		PROJECT TITLE CRANDON MINING Co (G.W.)	
ADDRESS 2737 S. RIDGE		PROJECT NO. 93C049	P.O. NO.
CITY GREEN BAY	STATE WI	ZIP 54307	CONTACT RUSS JANESHEIK
			PHONE 414-497-2500

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			PNP	PS	PN	PG	
1.		SG-CC	9/16/94	1130	S.W.	GRAB	1	1	1	1	
2.		SG-Y		1230			1	1	1	1	
3.		SG-Y		1300			1	1	1	1	
4.		SG-AB		1430			1	1	1	1	
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE:

SW = surface water
WW = wastewater
GW = groundwater

DW = drinking water
TIS = tissue
AIR = air

PROD = product
SOIL = soil
SED = sediment

describe others

CONTAINER

P = plastic
G = glass
V = glass vial
B = plastic bag

describe others

PRESERVATIVES & PREPARATION

NP = nothing added
S = sulfuric acid
N = nitric acid
Z = zinc acetate

OH = sodium hydroxide
HA = hydrochloric & ascorbic acid
H = hydrochloric acid

F = field filtered

COLLECTED BY (signature) Scott O'Connell		CUSTODY SEAL NO. (IF ANY)		DATE/TIME 9/16/94 1515
RELINQUISHED BY (signature)		RECEIVED BY (signature)		DATE/TIME
RELINQUISHED BY (signature)		RECEIVED BY (signature)		DATE/TIME
DISPATCHED BY (signature) Scott O'Connell		METHOD OF TRANSPORT FXD		DATE/TIME

RECEIVED AT NLS BY (signature) W. Cottrell	DATE/TIME 9-16-94 15:15	CONDITION In Ice	TEMP.
SEAL #	REMARKS & OTHER INFORMATION		

Delivered

ET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

CLIENT COPY

NORTHERN LAKE SERVICE, INC.

100 NORTH LAKE AVENUE
GRANDON, WI 54520 (715) 478-2777

ORDER OF ANALYSIS

RESULTS ORDERED BY:	CHAIN. OF. CUSTODY. RECORD: NUMBER:
FVD	10675
Russ JANESHEK	QUOTATION NUMBER:
	ANALYZE FOR DISSOLVED OR TOTAL PARAMETERS?
SEND RESULTS TO:	SEND INVOICE TO:
PACE	PACE

Note "L" for low level ICP analysis, and "F" for furnace analysis.

Samples on line #: 1-4 to be analyzed for the parameters checked below:

- | | | | |
|---|---|---|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☒ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☒ Tot. reactive | ☐ BHAs by 625/8270 |
| ☐ Antimony | ☐ Hardness | ☐ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☒ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☒ B.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☒ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☒ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BHAs |
| ☐ Chloride | ☒ Ammonia | ☒ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☐ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☒ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☒ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SOVA) |
| ☐ Color | ☒ Total Organic | ☐ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☒ Oil & Grease | ☐ Turbidity | ☐ PVOCS by 8020 |
| ☐ Copper | ☐ pH | ☐ Vanadium | ☐ GRO-UI Modified ☐ GRO+PVOCS |
| | | ☐ Zinc | ☐ BRO-UI Modified |
| | | ☐ Munc. Sludge, UI List | ☐ PAHs by 610LC/8310 |

Samples on line #: _____ to be analyzed for the parameters checked below:

- | | | | |
|---|--|--|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☐ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☐ Tot. reactive | ☐ BHAs by 625/8270 |
| ☐ Antimony | ☐ Hardness | ☐ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☐ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☐ B.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☐ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☐ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BHAs |
| ☐ Chloride | ☐ Ammonia | ☐ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☐ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☐ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SOVA) |
| ☐ Color | ☐ Total Organic | ☐ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☐ Oil & Grease | ☐ Turbidity | ☐ PVOCS by 8020 |
| ☐ Copper | ☐ pH | ☐ Vanadium | ☐ GRO-UI Modified ☐ GRO+PVOCS |
| | | ☐ Zinc | ☐ BRO-UI Modified |
| | | ☐ Munc. Sludge, UI List | ☐ PAHs by 610LC/8310 |

3.7-9-341

SPECIAL INSTRUCTIONS:

181388

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2737 S. RIDGE Rd
GREEN BAY WI 54307
Phone 414-497-2500

Report To: RUSS JANESHEK
Bill To: FVD
P.O. # / Billing Reference 930048
Project Name / No. CRANDON MINING Co (S.W.)

Pace Client No. _____
Pace Project Manager _____
Pace Project No. _____

Sampled By (PRINT):
SCOTT JANSEN JOE SUJINSKI
Sampler Signature Scott Jansen Date Sampled 9/16/94

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.	NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST	REMARKS
						UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	NAOH		
1	SG-CC	1130	S.W.		5	2	1	1		1	SEE ATTACHMENT	
2	SG-Y	1230	↓		5	2	1	1		1		
3	SG-V	1300			5	2	1	1		1		
4	SG-AB	1430			5	2	1	1		1		
5												
6												
7												
8												

COOLER NOS.	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
		OUT / DATE	RETURNED / DATE		<u>Scott Jansen</u>		<u>9/18/94</u>	<u>1400</u>

Additional Comments

RAIN EVENT SAMPLING



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 2

February 17, 1995
PACE Project Number: 940920502

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0219614	10 0219622	10 0219630
Date Collected:	09/16/94	09/16/94	09/16/94
Time Collected:	11:30	12:30	13:00
Date Received:	09/20/94	09/20/94	09/20/94
Client Sample ID:	SG-CC	SG-Y	SG-V

Parameter	Units	MDL			
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INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Cations	Meg/L		0.968	1.150	0.964
Chemical Oxygen Demand, Low Level	mg/L	20	58	35	61
Chloride	mg/L	1	2	2	2
Cyanide, Total	ug/L	10	ND	ND	ND
Fluoride, Soluble	mg/L	0.1	ND	ND	ND
Iron, dissolved	mg/L	0.050	0.41	0.11	0.53
Manganese, dissolved	mg/L	0.010	ND	ND	ND
Nitrogen, Ammonia	mg/L	0.2	ND	ND	ND
Nitrogen, Kjeldahl	mg/L	0.2	ND	0.7	0.9
Nitrogen, Nitrate	mg/L	0.042	ND (1)	ND (2)	ND (3)
Sodium Adsorption Ratio			0.092	0.101	0.085
Thallium	mg/L	0.005	ND	ND	ND
pH		0.1	6.5	6.9	6.6

METALS BY ICP

Silver	mg/L	0.010	ND	ND	ND
Barium	mg/L	0.010	0.011	0.012	0.011
Beryllium	mg/L	0.010	ND	ND	ND
Calcium	mg/L	1.0	10	12	10
Iron, total	mg/L	0.050	0.66	0.30	0.74
Magnesium	mg/L	0.50	4.7	5.8	4.7

Manganese, total	mg/L	0.010	0.050	0.059	0.025
Sodium	mg/L	1.0	1.4	1.7	1.3
Nickel	mg/L	0.030	ND	ND	ND
Molybdenum	mg/L	0.020	ND	ND	ND
Boron	mg/L	0.20	ND	ND	ND

METALS BY TRACE ICP

Arsenic	mg/L	0.005	ND	ND	ND
Selenium	mg/L	0.005	ND	ND	ND



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 3

February 17, 1995
PACE Project Number: 940920502

Client Reference: Crandon Mining Surface Waters

PACE Sample Number: 10 0219649
Date Collected: 09/16/94
Time Collected: 14:30
Date Received: 09/20/94
Client Sample ID: SG-AB

<u>Parameter</u>	<u>Units</u>	<u>MDL</u>	
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SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	120
Solids, Total Suspended	mg/L	5	ND
Sulfate	mg/L	1.0	18
Phosphorus, Soluble	mg/L	0.05	ND
Phosphorus, Total	mg/L	0.05	ND
Oil and Grease	mg/L	4.6	5.7

Biochemical Oxygen Demand, 05 Day	mg/L	3	ND
Hardness, Total as Calcium Carbonate	mg/L	5	MI
Potassium	mg/L	1.0	1.0

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.20	49.6
Cadmium	ug/L	0.006	ND
Chromium	ug/L	0.30	0.672
Copper	ug/L	0.030	1.21
Lead	ug/L	0.002	0.139
Mercury	ng/L	0.10	4.28
Zinc	ug/L	0.39	2.17

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	59
Alkalinity, Carbonate	mg/L	5	ND
Alkalinity, Hydroxide	mg/L	5	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	59
Anions	Meq/L		1.399
Antimony	mg/L	0.005	ND
Cation-Anion Balance	%	0.01	0.73
Cations	Meq/L		1.419
Chemical Oxygen Demand, Low Level	mg/L	20	48
Chloride	mg/L	1	2



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 4

February 17, 1995
PACE Project Number: 940920502

Client Reference: Crandon Mining Surface Waters

PACE Sample Number: 10 0219649
Date Collected: 09/16/94
Time Collected: 14:30
Date Received: 09/20/94
Client Sample ID: SG-AB
Parameter Units MDL _____

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Cyanide, Total	ug/L	10	ND
Fluoride, Soluble	mg/L	0.1	ND
Iron, dissolved	mg/L	0.050	0.24
Manganese, dissolved	mg/L	0.010	ND
Nitrogen, Ammonia	mg/L	0.2	ND
Nitrogen, Kjeldahl	mg/L	0.2	0.7
Nitrogen, Nitrate	mg/L	0.042	ND (4)
Sodium Adsorption Ratio			0.086
Thallium	mg/L	0.005	ND
pH		0.1	6.8

METALS BY ICP

Silver	mg/L	0.010	ND
Barium	mg/L	0.010	0.012
Beryllium	mg/L	0.010	ND
Calcium	mg/L	1.0	15
Iron, total	mg/L	0.050	0.36
Magnesium	mg/L	0.50	7.0
Manganese, total	mg/L	0.010	0.050
Sodium	mg/L	1.0	1.6
Nickel	mg/L	0.030	ND
Molybdenum	mg/L	0.020	ND
Boron	mg/L	0.20	ND

METALS BY TRACE ICP

Arsenic	mg/L	0.005	ND
Selenium	mg/L	0.005	ND



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 5

February 17, 1995
PACE Project Number: 940920502

Client Reference: Crandon Mining Surface Waters

These data have been reviewed and are approved for release.

A handwritten signature in cursive script that reads "Steve R. Crupi".

Steve Crupi
Project Manager



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 6

FOOTNOTES
for pages 1 through 5

February 17, 1995
PACE Project Number: 940920502

Client Reference: Crandon Mining Surface Waters

MDL Method Detection Limit

ND Not detected at or above the MDL.

- (1) Analysis conducted by NLS following methods 354.1 and 353.2. The value is a nitrate value corrected for nitrite.
- (2) Analysis conducted by NLS following methods 354.1 and 353.2. The value is a nitrate value corrected for nitrite.
- (3) Analysis conducted by NLS following methods 354.1 and 353.2. The value is a nitrate value corrected for nitrite.
- (4) Analysis conducted by NLS following methods 354.1 and 353.2. The value is a nitrate value corrected for nitrite.

October 1994 Surface Water Laboratory Data



April 8, 1995

Mr. Russell Janeshek
Foth & Van Dyke
2737 S. Ridge Rd.
Green Bay, WI 54307-9012

Re: Crandon Mining Company Project
Battelle Results for October 1994 Surface Waters

Dear Mr. Janeshek:

Enclosed are reports on PACE report paper summarizing Battelle results for surface water samples collected in October, 1994. An electronic deliverable summarizing the results is also included in this submittal. The hardcopy report and diskette are revisions of the previous report and diskette submitted with PACE and NLS data.

A project narrative from Battelle discussing the analytical results is included with this submittal.

The Battelle reporting limits are different than the limits listed in the Surface Water QAP Table 5-2 and different than the limits reported for the September 1994 surface water samples. Battelle performs a method detection limit (MDL) study with each batch (i.e., surface water sampling event) of samples. The intention is to incorporate into the reporting limit any background contributions from the reagents, glassware and instrumentation that may affect the sample results. Because of the sensitivity of the analyses, any amount of trace contamination or interference can have a significant impact on results.

If you have any questions concerning this submittal, feel free to contact me at (612) 525-3454.

Sincerely,

Steven R. Crupi
Project Manager

Enclosures

CHAIN OF CUSTODY

Client: CRANDON MINING Co Scope I.D.: 93C049
 Project: S.W. Sampling F.A.S.K Page: 1 of 2
 Prepared by: SDS Date: 10/3-6/94
 Sampler(s): _____ Date: _____
 (Signature)

No.
of
Con-
tain-
ers

Lab
Numbers

Analysis Required

ALUMINUM
CADMIUM
COPPER
LEAD
MERCURY
ZINC
CHROMIUM

Remarks

0500008

Sta. No.	Date	Time	Comp	Grab	Station Location	Serial Tag Number
38	SG-2	10/3/94	0845	✓	93C049	
39	SG-3	1115	✓			
40	SG-6	1315	✓			
41	SG-E	1515	✓			
42	SG-CC-01	10/4/94	0830	✓		
43	SG-CC-02	0830	✓			
44	SG-Y	1015	✓			
45	SG-V	1115	✓			
46	SG-AB	1300	✓			
47	SG-19	1615	✓			
48	SG-30	1645	✓			
49	LG-7	10/5/94	1100	✓		
50	LG-73	1230	✓			
51	LG-12	1530	✓		93C049	

Signature

Company

Date

Time

Carrier

Relinquished By:

Scott O'Connell

FOYH: VAN DYKE

10/6/94

1200

FED EX

Received By:

Allyson 10/7/94 12:00

Relinquished By:

Received By:

Relinquished By:

Received by Lab:

Remarks:

Foth & Van Dyke

3.7-9-351

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2737 S RIDGE Rd
GREEN BAY, WI 54307
Phone 414 - 497-2500

Report To: RUSS JANESHEK
Bill To: FVO
P.O. # / Billing Reference 930049
Project Name / No. CRANDON MINING Co

Pace Client No. _____
Pace Project Manager _____
Pace Project No. 941005305
*Requested Due Date: _____

Sampled By (PRINT): SCOTT JANSSEN JOE AUSTIN
Sampler Signature _____ Date Sampled 10/3/94

NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST	REMARKS
	UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	NAO ₂ H		
						SEE ATTACHMENT	

3.7-9-353

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PAGE NO.
1	SG-2	0845	S.W.	23171.1
2	SG-3	1115	SW	23172.0
3	SG-4	1200	SW	23181.9
4	SG-5A	1245	SW	23182.7
5	SG-6	1315	SW	23173.8
6	SG-E	1515	SW	23175.4
7				
8				

COOLER NOS.	BAILERS	SHIPMENT METHOD OUT / DATE	RETURNED / DATE	ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
					Scott Janssen	Joe Austin	10/4/94	1500
							10/4/94	1100

Additional Comments



182123

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH VAN DYKE
Address 2737 S. RIDGE Rd
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: RUSS JANESHEK
Bill To: FVD
P.O. # / Billing Reference 93C049
Project Name / No. CRANDON MINING Co

Pace Client No. 150419
Pace Project Manager SRC
Pace Project No. 941006.525
*Requested Due Date: _____

Sampled By (PRINT):
SCOTT JANSSEN JOE AUSTIN
Sampler Signature Scott Janssen Date Sampled 10/4/94

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.	NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST	REMARKS
						UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	NAOH		
1	SG-19	1815	S.W.	3341.4	52	1	1				SEE ATTACHMENT	
2	SG-30	1645	↓	25541.9	52	1	1					
3												
4												
5												
6												
7												
8												

COOLER NOS.	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
		OUT / DATE	RETURNED / DATE					
					<u>Scott Janssen</u>	<u>Jim Janssen / Pace Inc</u>	<u>10/5/94</u>	<u>1330</u>

Additional Comments

SEE REVERSE SIDE FOR INSTRUCTIONS

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VANDYKE
Address 2737 S. RIDGE Rd
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: RUSS JANESHER
Bill To: FVD
P.O. # / Billing Reference 93CO 49
Project Name / No. CRANDON MINING CO S.V.

Pace Client No. _____
Pace Project Manager _____
Pace Project No. 941005305
*Requested Due Date: _____

Sampled By (PRINT):

SCOTT JANSSEN JOE AUSTIN

Sampler Signature

Date Sampled

Scott Janssen 10/4/94

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.	NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST	REMARKS
						UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	NAOH		
1	SG-CC-01	0830	SW	23176.2	5	2	1	1		1	SEE ATTACHMENT	
2	SG-CC-02	0830		23177.0	5	2	1	1		1		
3	SG-Y	1015		23178.9	5	2	1	1		1		
4	SG-V	1100		23179.7	5	2	1	1		1		
5	SG-AB	1300		23180.0	5	2	1	1		1		
6												
7												
8												

COOLER NOS.	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
		OUT / DATE	RETURNED / DATE					
					<u>Scott Janssen</u>	<u>[Signature]</u>	<u>10/4/94</u>	<u>1500</u>
							<u>10/5/94</u>	<u>1100</u>

Additional Comments

SEE REVERSE SIDE FOR INSTRUCTIONS



182125

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2737 S. RIDGE Rd
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: RUSS JANESHEK
Bill To: FVD
P.O. # / Billing Reference 930049
Project Name / No. CRANDON MINING Co

Pace Client No. _____
Pace Project Manager SRC
Pace Project No. 941007.523
*Requested Due Date: _____

Sampled By (PRINT):

SCOTT JANSSEN JOE AUSTIN

Sampler Signature

Date Sampled

Scott Jansen 10/5/94

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.	NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST	REMARKS
						UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	NADH		
1	LG-12	1530	SW	23560-1	5211							
2												
3												
4												
5												
6												
7												
8												

COOLER NOS.	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
		OUT / DATE	RETURNED / DATE					
					<u>Scott Jansen</u>	<u>Scott Jansen</u>	<u>10/6/94</u>	<u>1200</u>
						<u>Scott Jansen</u>	<u>10/6/94</u>	<u>1600</u>

Additional Comments

SEE REVERSE SIDE FOR INSTRUCTIONS

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2737 S. RIDGE Rd
GREEN BAY, WI 54307
Phone 814-497-2500

Report To: RUSS JANESHEK
Bill To: FVD
P.O. # / Billing Reference 93C049
Project Name / No. CARNOON MINING Co

Pace Client No. 150419
Pace Project Manager JRC
Pace Project No. 941006-525
*Requested Due Date: _____

Sampled By (PRINT):

SCOTT JANSEN JOE AUSTIN

Sampler Signature

Date Sampled

Scott Jansen

10/5/94

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PAGE NO.	NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST	REMARKS
						UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	NaOH		
1	LG-9	0815	SW.	23365.0	5	2	1	1	1	1	SEE ATTACHMENT	
2	LG-7	1100	↓	23366.9	5	2	1	1	1	1		
3	LG-13	1230	↓	23367.6	5	2	1	1	1	1		
4												
5												
6												
7												
8												

COOLER NOS.	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
		OUT / DATE	RETURNED / DATE					
					<u>Scott Jansen</u>	<u>Joe Austin</u>	<u>10/5/94</u>	<u>1330</u>
						<u>Joe Austin</u>	<u>10/6/94</u>	<u>20:50</u>

Additional Comments

SEE REVERSE SIDE FOR INSTRUCTIONS



182124

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2737 S. RIDGE Rd
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: RUSS JANESHEK
Bill To: FVD
P.O. # / Billing Reference 930049
Project Name / No. CRANDON MINING Co

Pace Client No. _____
Pace Project Manager SRL
Pace Project No. 941007.523
*Requested Due Date: _____

Sampled By (PRINT):

SCOTT JANSEN JOE AUSTIN
Sampler Signature Date Sampled
Scott Jansen 10/6/94

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.	NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST	REMARKS
						UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	NAOH		
1	LG-11	0830	SW	23557.1	52	1	1					
2	LG-15-01	1030		23558.0	52	1	1					
3	LG-15-02	1030		23559.8	52	1	1					
4												
5												
6												
7												
8												

COOLER NOS.	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
		OUT / DATE	RETURNED / DATE					
					<u>Scott Jansen</u>	<u>Joe Austin</u>	<u>10/6/94</u>	<u>1200</u>

Additional Comments

SEE REVERSE SIDE FOR INSTRUCTIONS



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 10953

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT FOTH: VAN DYKE		PROJECT TITLE CRANDON MINING Co	
ADDRESS 2737 S. RIDGE Rd		PROJECT NO. 93C049	P.O. NO.
CITY GREEN BAY	STATE WI	ZIP 54307	CONTACT RUSS JANESHEK
			PHONE 414-497-2500

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			PNP	PS	PN	GH	
1.	65811	SG-2	10/3/94	0845	S.W.	GRAB	1	1	1	2	
2.	65812	SG-3		1115			1	1	1	2	
3.	65813	SG-4		1200			1	1	1	2	
4.	65814	SG-5A		1245			1	1	1	2	
5.	65815	SG-6		1315			1	1	1	2	
6.											
7.											
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE:
SW = surface water DW = drinking water PROD = product
WW = wastewater TIS = tissue SOIL = soil
GW = groundwater AIR = air SED = sediment
describe others

CONTAINER
P = plastic
G = glass
V = glass vial
B = plastic bag
describe others

PRESERVATIVES & PREPARATION
NP = nothing added OH = sodium hydroxide
S = sulfuric acid HA = hydrochloric & ascorbic acid
N = nitric acid H = hydrochloric acid
Z = zinc acetate
F = field filtered

COLLECTED BY (signature) <i>Scott James</i>	CUSTODY SEAL NO. (IF ANY)	DATE/TIME 10/3/94 1600
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME
DISPATCHED BY (signature) <i>Scott James</i>	METHOD OF TRANSPORT FV0	DATE/TIME 10/3/94 1605

RECEIVED AT NLS BY (signature) <i>Paul K...</i>	DATE/TIME 10/3/94 1600	CONDITION on ice	TEMP.
SEAL INTACT? ☐ YES ☐ NO	SEAL #	REMARKS & OTHER INFORMATION	

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY

RESULTS ORDERED BY:

CHAIN OF CUSTODY RECORD NUMBER:

FVO
RUSS JANESHEK

10953

QUOTATION NUMBER:

ANALYZE FOR DISSOLVED OR TOTAL PARAMETERS?

SEND RESULTS TO:

SEND INVOICE TO:

PAGE

PAGE

Note "L" for low level ICP analysis, and "F" for furnace analysis.

Samples on line #: 1-5 to be analyzed for the parameters checked below:

- | | | | |
|---|--|--|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☒ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☐ Tot. reactive | ☐ 3NAs by 625/8270 |
| ☐ Antimony | ☐ Hardness | ☒ OTs active | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☒ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☒ B.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 3141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☐ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☐ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-3NAs |
| ☐ Chloride | ☐ Ammonia | ☒ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☒ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 3010+3020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 3021 |
| ☐ Cobalt | ☐ Nitrate - Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SDWA) |
| ☐ Color | ☐ Total Organic | ☒ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☒ Oil & Grease | ☒ Turbidity | ☐ PVOCs by 3020 |
| ☐ Copper | ☒ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO-PVOCs |
| | | ☐ Zinc | ☐ DRO-WI Modified |
| | | ☐ Munic.Studge,WI List | ☐ PAHs by 610LC/8310 |

Samples on line #: _____ to be analyzed for the parameters checked below:

- | | | | |
|---|--|---|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☐ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☐ Tot. reactive | ☐ 3NAs by 625/8270 |
| ☐ Antimony | ☐ Hardness | ☐ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☐ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☐ B.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 3141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☐ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☐ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-3NAs |
| ☐ Chloride | ☐ Ammonia | ☐ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☐ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 3010+3020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 3021 |
| ☐ Cobalt | ☐ Nitrate - Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SDWA) |
| ☐ Color | ☐ Total Organic | ☐ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☐ Oil & Grease | ☐ Turbidity | ☐ PVOCs by 3020 |
| ☐ Copper | ☐ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO-PVOCs |
| | | ☐ Zinc | ☐ DRO-WI Modified |
| | | ☐ Munic.Studge,WI List | ☐ PAHs by 610LC/8310 |

SPECIAL INSTRUCTIONS:



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 10961

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT FOTH: VAN DYKE				PROJECT TITLE CRANDON MINING CO									
ADDRESS 2737 S. RIDGE Rd				PROJECT NO. 93C049		P.O. NO.							
CITY GREEN BAY		STATE WI		ZIP 54162		CONTACT RUSS JANESHEK							
PHONE													
ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION DATE TIME		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS		
							PNP	PN	PS	GH			
1.	65871	SG-E	10/3/94	1515	S.W.	GRAB	1	1	1	Z			
2.	65872	SG-CC-01	10/4/94	0830			1	1	1	Z			
3.	65873	SG-CC-02		0830			1	1	1	Z			
4.	65874	SG-Y		1015			1	1	1	Z			
5.	65875	SG-Y		1115			1	1	1	Z			
6.	65876	SG-AB	10/4/94	1300			1	1	1	Z			
7.													
8.													
9.													
10.													
11.													
12.													
SAMPLE TYPE: SW = surface water WW = wastewater GW = groundwater describe others						DW = drinking water TIS = tissue AIR = air PROD = product SOIL = soil SED = sediment		CONTAINER P = plastic G = glass V = glass vial B = plastic bag describe others				PRESERVATIVES & PREPARATION NP = nothing added S = sulfuric acid N = nitric acid Z = zinc acetate OH = sodium hydroxide HA = hydrochloric & ascorbic acid H = hydrochloric acid F = field filtered	

COLLECTED BY (signature) Scott Janeshek		CUSTODY SEAL NO. (IF ANY)		DATE/TIME 10/4/94 1530	
RELINQUISHED BY (signature)		RECEIVED BY (signature)		DATE/TIME	
RELINQUISHED BY (signature)		RECEIVED BY (signature)		DATE/TIME	
DISPATCHED BY (signature) Scott Janeshek		METHOD OF TRANSPORT FVD		DATE/TIME 10/4/94 1530	
RECEIVED AT NLS BY (signature) Cottrell		DATE/TIME 10-04-94 1530		CONDITION On Ice	
SEAL INTACT? ☐ YES ☐ NO		SEAL #		REMARKS & OTHER INFORMATION Hand Delivered	

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY

NORTHERN LAKE SERVICE, INC.

100 NORTH LAKE AVENUE

CRANDON, WI 54520 (715)478-2777

ORDER OF ANALYSIS

RESULTS ORDERED BY:

FOTH: VAN DYKE
RUSS JANESHEIL

CHAIN OF CUSTODY RECORD NUMBER:

10961

QUOTATION NUMBER:

ANALYZE FOR DISSOLVED OR TOTAL PARAMETERS?

SEND RESULTS TO:

PAGE

SEND INVOICE TO:

PAGE

Note "L" for low level ICP analysis, and "F" for furnace analysis.

Samples on line #: 1-6 to be analyzed for the parameters checked below:

- | | | | |
|---|--|---|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☒ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☐ Tot. reactive | ☐ BNAs by 625/8270 |
| ☐ Antimony | ☐ Hardness | ☒ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☒ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☒ B.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☒ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☒ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BNAs |
| ☐ Chloride | ☐ Ammonia | ☒ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☒ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☐ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SDWA) |
| ☐ Color | ☐ Total Organic | ☐ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☒ Oil & Grease | ☒ Turbidity | ☐ PVOCs by 8020 |
| ☐ Copper | ☒ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO+PVOCs |
| | | ☐ Zinc | ☐ DRO-WI Modified |
| | | ☐ Munic.Sludge,WI List | ☐ PAHs by 610LC/8310 |

Samples on line #: _____ to be analyzed for the parameters checked below:

- | | | | |
|---|--|---|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☐ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☐ Tot. reactive | ☐ BNAs by 625/8270 |
| ☐ Antimony | ☐ Hardness | ☐ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☐ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☐ B.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☐ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☐ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BNAs |
| ☐ Chloride | ☐ Ammonia | ☐ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☐ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☐ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SDWA) |
| ☐ Color | ☐ Total Organic | ☐ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☐ Oil & Grease | ☐ Turbidity | ☐ PVOCs by 8020 |
| ☐ Copper | ☐ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO+PVOCs |
| | | ☐ Zinc | ☐ DRO-WI Modified |
| | | ☐ Munic.Sludge,WI List | ☐ PAHs by 610LC/8310 |

SPECIAL INSTRUCTIONS:



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 10959

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT FOTH: VAN DYKE		PROJECT TITLE CRANDON MINING Co	
ADDRESS 2737 S. RIDGE Rd		PROJECT NO. 93C049	P.O. NO.
CITY GREEN BAY	STATE WI	ZIP 54307	CONTACT RUSS JANESHER
			PHONE

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			PNP	BB	PN	GH	
1.	65923	SG-19	10/4/94	1615	SW	GRAB	1	1	1	2	
2.	65924	SG-30	↓	1649	↓	↓	1	1	1	2	
3.	65925	LG-9	10/5/94	0815	↓	↓	1	1	1	2	
4.	65926	LG-7	↓	1100	↓	↓	1	1	1	2	
5.	65927	LG-13	↓	1230	↓	↓	1	1	1	2	
6.											
7.											
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE: SW = surface water WW = wastewater GW = groundwater describe others			DW = drinking water TIS = tissue AIR = air	PROD = product SOIL = soil SED = sediment	CONTAINER P = plastic G = glass V = glass vial B = plastic bag describe others	PRESERVATIVES & PREPARATION NP = nothing added S = sulfuric acid N = nitric acid Z = zinc acetate OH = sodium hydroxide HA = hydrochloric & ascorbic acid H = hydrochloric acid F = field filtered
--	--	--	--	---	---	---

COLLECTED BY (signature) Scott Jensen Joe Austin	CUSTODY SEAL NO. (IF ANY)	DATE/TIME 10/5/94 1300
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME
DISPATCHED BY (signature) Scott Jensen	METHOD OF TRANSPORT FVD	DATE/TIME 10/5/94 1355

RECEIVED AT NLS BY (signature) 10. Cottrell	DATE/TIME 10-05-94 13:55	CONDITION On Ice	TEMP.
SEAL INTACT? ☐ YES ☐ NO	SEAL #	REMARKS & OTHER INFORMATION Hand Delivered	

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY

RESULTS ORDERED BY:

CHAIN OF CUSTODY RECORD NUMBER:

FVD
RUSS JAWESHEK

10959

QUOTATION NUMBER:

ANALYZE FOR DISSOLVED OR TOTAL PARAMETERS?

SEND RESULTS TO:

SEND INVOICE TO:

PACE

PACE

Note "L" for low level ICP analysis, and "F" for furnace analysis.

Samples on line #: 1-5 to be analyzed for the parameters checked below:

- | | | | |
|---|--|---|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☒ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☒ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☐ Tot. reactive | ☐ SWAs by 625/8270 |
| ☐ Antimony | ☒ Hardness | ☐ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☐ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☒ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☒ B.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 3141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☐ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 3150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☐ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-SWAs |
| ☐ Chloride | ☐ Ammonia | ☒ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☒ Nitrate | ☒ Sulfide | ☐ VOCs by EPA 601-602 or 8010-8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 3021 |
| ☐ Cobalt | ☐ Nitrate - Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SQWA) |
| ☐ Color | ☐ Total Organic | ☒ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☒ Oil & Grease | ☒ Turbidity | ☐ PVOCs by 3020 |
| ☐ Copper | ☒ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO-PVOCs |
| | | ☐ Zinc | ☐ GRO-WI Modified |
| | | ☐ Munic.Studge,WI List | ☐ PAHs by 610LC/8310 |

Samples on line #: _____ to be analyzed for the parameters checked below:

- | | | | |
|---|--|---|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☐ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☐ Tot. reactive | ☐ SWAs by 625/8270 |
| ☐ Antimony | ☐ Hardness | ☐ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☐ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☐ B.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 3141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☐ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 3150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☐ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-SWAs |
| ☐ Chloride | ☐ Ammonia | ☐ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☐ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601-602 or 8010-8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 3021 |
| ☐ Cobalt | ☐ Nitrate - Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SQWA) |
| ☐ Color | ☐ Total Organic | ☐ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☐ Oil & Grease | ☐ Turbidity | ☐ PVOCs by 3020 |
| ☐ Copper | ☐ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO-PVOCs |
| | | ☐ Zinc | ☐ GRO-WI Modified |
| | | ☐ Munic.Studge,WI List | ☐ PAHs by 610LC/8310 |

SPECIAL INSTRUCTIONS:



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 10960

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT FOTH: VANDYKE		PROJECT TITLE CRANDON MINING Co	
ADDRESS 2737 S. RIDGE Rd		PROJECT NO. 93C049	P.O. NO.
CITY GREEN BAY	STATE WI	ZIP 54307	CONTACT RUSS JANESHEK
			PHONE 414-497-2500

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			PMP	PS	PN	GH	
1.	65962	LG-12	10/5/94	1530	S.W.	GRAB	1	1	1	2	
2.	65963	LG-11	10/6/94	0830	↓	↓	1	1	1	2	
3.	65964	LG-15-01	↓	1030	↓	↓	1	1	1	2	
4.	65965	LG-15-02	↓	1030	↓	↓	1	1	1	2	
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE: SW = surface water WW = wastewater GW = groundwater describe others			DW = drinking water TIS = tissue AIR = air	PROD = product SOIL = soil SED = sediment	CONTAINER P = plastic G = glass V = glass vial B = plastic bag describe others	PRESERVATIVES & PREPARATION NP = nothing added S = sulfuric acid N = nitric acid Z = zinc acetate OH = sodium hydroxide HA = hydrochloric & ascorbic acid H = hydrochloric acid F = field filtered
--	--	--	--	---	---	--

COLLECTED BY (signature) <i>Scott Jensen</i>	CUSTODY SEAL NO. (IF ANY)	DATE/TIME 10/6/94 1200
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME
DISPATCHED BY (signature) <i>Scott Jensen</i>	METHOD OF TRANSPORT FVD	DATE/TIME 10/6/94 1215

RECEIVED AT NLS BY (signature) <i>D. Cottrell</i>	DATE/TIME 10-06-94 12:15	CONDITION On Ice	TEMP.
SEAL INTACT? ☐ YES ☒ NO	SEAL #	REMARKS & OTHER INFORMATION	

Hand Delivered

- IMPORTANT:**
1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
 2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
 3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY

NORTHERN LAKE SERVICE, INC.

400 NORTH LAKE AVENUE
CRANDON, WI 54520 (715)478-2777

ORDER OF ANALYSIS

RESULTS ORDERED BY:

CHAIN OF CUSTODY RECORD NUMBER:

10960

QUOTATION NUMBER:

ANALYZE FOR DISSOLVED OR TOTAL PARAMETERS?

SEND RESULTS TO:

SEND INVOICE TO:

PACE

PACE

Note "L" for low level ICP analysis, and "F" for furnace analysis.

Samples on line #s: 1-4 to be analyzed for the parameters checked below:

- | | | | |
|---|--|---|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☒ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☐ Tot. reactive | ☐ 3NAs by 625/8270 |
| ☐ Antimony | ☐ Hardness | ☒ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☒ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☒ S.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☒ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☒ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-3NAs |
| ☐ Chloride | ☐ Ammonia | ☒ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☒ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☐ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SDWA) |
| ☐ Color | ☐ Total Organic | ☐ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☒ Oil & Grease | ☒ Turbidity | ☐ PVOCs by 8020 |
| ☐ Copper | ☒ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO-PVOCs |
| | | ☐ Zinc | ☐ GRO-WI Modified |
| | | ☐ Munic.Sludge,WI List | ☐ PAHs by 610LC/8310 |

Samples on line #s: _____ to be analyzed for the parameters checked below:

- | | | | |
|---|--|---|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☐ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☐ Tot. reactive | ☐ 3NAs by 625/8270 |
| ☐ Antimony | ☐ Hardness | ☐ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☐ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☐ S.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☐ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☐ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-3NAs |
| ☐ Chloride | ☐ Ammonia | ☐ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☐ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☐ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SDWA) |
| ☐ Color | ☐ Total Organic | ☐ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☐ Oil & Grease | ☐ Turbidity | ☐ PVOCs by 8020 |
| ☐ Copper | ☐ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO-PVOCs |
| | | ☐ Zinc | ☐ GRO-WI Modified |
| | | ☐ Munic.Sludge,WI List | ☐ PAHs by 610LC/8310 |

SPECIAL INSTRUCTIONS:

3.7-9-366



REPORT OF LABORATORY ANALYSIS

Foth & Van Dyke & Associates
2737 South Ridge Road
P.O. Box 19012
Green Bay, WI 54307

April 08, 1995
PACE Project Number: 941005505

Attn: Mr. Russell Janeshek

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

10 0231711	10 0231720	10 0231738
10/03/94	10/03/94	10/03/94
08:45	11:15	13:15
10/05/94	10/05/94	10/05/94
SG-2	SG-3	SG-6

Parameter	Units	MDL			
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SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	94	88	97
Solids, Total Suspended	mg/L	5	ND	5	ND
Sulfate	mg/L	1.0	13	12	16
Phosphorus, Soluble	mg/L	0.05	ND	ND	ND
Phosphorus, Total	mg/L	0.05	ND	ND	ND
Oil and Grease	mg/L	4.6	ND	ND	ND
Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	ND	ND
Hardness, Total as Calcium Carbonate	mg/L	5	110	100	110
Potassium	mg/L	1.0	ND	ND	ND
Nitrogen, Nitrate	mg/L	0.50	ND	ND	ND
pH		0.1	7.2	7.3	7.1
Turbidity	NTU	0.5	2.6	1.7	1.7

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.60	54.7	34.4	58.2
Cadmium	ug/L	0.0039	ND	ND	0.0079
Chromium	ug/L	0.30	0.74	ND	ND
Copper	ug/L	0.090	6.99	1.48	0.118
Lead	ug/L	0.0035	0.195	0.0877	0.159
Mercury	ng/L	0.085	3.75	1.85	2.73
Zinc	ug/L	0.20	1.87	1.29	1.85

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	80	85	76
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Hydroxide	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	80	85	76

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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April 08, 1995
PACE Project Number: 941005505

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDL

10 0231711	10 0231720	10 0231738
10/03/94	10/03/94	10/03/94
08:45	11:15	13:15
10/05/94	10/05/94	10/05/94
SG-2	SG-3	SG-6

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Anions	Meq/L		1.667	1.728	1.635
Antimony	mg/L	0.005	ND	ND	ND
Cation-Anion Balance	%	0.01	5.40	5.93	3.14
Cations	Meq/L		1.857	1.946	1.741
Chemical Oxygen Demand, Low Level	mg/L	20	23	21	33
Chloride	mg/L	1	3	3	2
Cyanide, Total	ug/L	20	ND	ND	ND
Fluoride, Soluble	mg/L	0.1	ND	ND	ND
Iron, dissolved	mg/L	0.050	0.24	0.21	0.23
Manganese, dissolved	mg/L	0.010	0.018	0.017	0.017
Nitrogen, Ammonia	mg/L	0.1	0.1	ND	ND
Nitrogen, Kjeldahl	mg/L	0.2	0.8	0.4	0.6
Sodium Adsorption Ratio			0.103	0.109	0.072
Thallium	mg/L	0.005	ND	ND	ND

METALS BY ICP

Silver	mg/L	0.010	ND	ND	ND
Barium	mg/L	0.010	0.010	0.011	ND
Beryllium	mg/L	0.01	ND	ND	ND
Calcium	mg/L	1.0	19	20	18
Iron, total	mg/L	0.050	0.37	0.33	0.30
Magnesium	mg/L	0.50	9.6	10	9.2
Manganese, total	mg/L	0.010	0.037	0.037	0.018
Sodium	mg/L	1.0	2.2	2.4	1.5
Nickel	mg/L	0.030	ND	ND	ND
Molybdenum	mg/L	0.020	ND	ND	ND
Boron	mg/L	0.100	ND	ND	ND

METALS BY TRACE ICP

Arsenic	mg/L	0.005	ND	ND	ND
Selenium	mg/L	0.005	ND	ND	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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April 08, 1995
PACE Project Number: 941005505

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0231754	10 0231762	10 0231770
Date Collected:	10/03/94	10/04/94	10/04/94
Time Collected:	15:15	08:30	08:30
Date Received:	10/05/94	10/05/94	10/05/94
Client Sample ID:	SG-E	SG-CC-01	SG-CC-02

<u>Parameter</u>	<u>Units</u>	<u>MDL</u>			
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SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	110	6.0	78
Solids, Total Suspended	mg/L	5	ND	ND	ND
Sulfate	mg/L	1.0	11	19	20
Phosphorus, Soluble	mg/L	0.05	ND	ND	ND
Phosphorus, Total	mg/L	0.05	ND	ND	ND
Oil and Grease	mg/L	4.6	14	8.9	7.6

Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	ND	ND
Hardness, Total as Calcium Carbonate	mg/L	5	150	66	68
Potassium	mg/L	1.0	ND	ND	ND
Nitrogen, Nitrate	mg/L	0.50	ND	ND	ND
pH		0.1	7.4	6.8	6.8
Turbidity	NTU	0.5	1.0	2.8	3.0

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.60	31.1	98.4	105
Cadmium	ug/L	0.0039	ND	ND	ND
Chromium	ug/L	0.30	0.30	ND	ND
Copper	ug/L	0.090	0.193	0.663	0.388
Lead	ug/L	0.0035	0.057	0.360	0.416
Mercury	ng/L	0.085	1.19	4.07	4.14
Zinc	ug/L	0.20	6.66	6.48	3.29

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	140	49	49
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Hydroxide	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	140	49	49
Anions	Meq/L		2.555	0.454	0.475
Antimony	mg/L	0.005	ND	ND	ND
Cation-Anion Balance	%	0.01	8.63	44.20	44.48

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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April 08, 1995
PACE Project Number: 941005505

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:
Date Collected:
Time Collected:
Date Received:
Client Sample ID:
Parameter

10 0231754	10 0231762	10 0231770
10/03/94	10/04/94	10/04/94
15:15	08:30	08:30
10/05/94	10/05/94	10/05/94
SG-E	SG-CC-01	SG-CC-02

Units MDI

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Parameter	Units	MDI	10 0231754	10 0231762	10 0231770
Cations	Meq/L		3.038	1.173	1.235
Chemical Oxygen Demand, Low Level	mg/L	20	ND	41	44
Chloride	mg/L	1	1	2	2
Cyanide, Total	ug/L	20	ND	ND	ND
Fluoride, Soluble	mg/L	0.1	ND	ND	ND
Iron, dissolved	mg/L	0.050	ND	0.66	0.67
Manganese, dissolved	mg/L	0.010	ND	0.030	0.029
Nitrogen, Ammonia	mg/L	0.1	ND	0.1	0.1
Nitrogen, Kjeldahl	mg/L	0.2	0.3	0.9	0.9
Sodium Adsorption Ratio			0.087	0.101	0.104
Thallium	mg/L	0.005	ND	ND	ND

METALS BY ICP

Parameter	Units	MDI	10 0231754	10 0231762	10 0231770
Silver	mg/L	0.010	ND	ND	ND
Barium	mg/L	0.010	ND	ND	0.013
Beryllium	mg/L	0.01	ND	ND	ND
Calcium	mg/L	1.0	32	12	13
Iron, total	mg/L	0.050	0.037	0.78	0.87
Magnesium	mg/L	0.50	16	5.8	5.9

Parameter	Units	MDI	10 0231754	10 0231762	10 0231770
Manganese, total	mg/L	0.010	ND	0.059	0.072
Sodium	mg/L	1.0	2.4	1.7	1.8
Nickel	mg/L	0.030	ND	ND	ND
Molybdenum	mg/L	0.020	ND	ND	ND
Boron	mg/L	0.100	ND	ND	ND

METALS BY TRACE ICP

Parameter	Units	MDI	10 0231754	10 0231762	10 0231770
Arsenic	mg/L	0.005	ND	ND	ND
Selenium	mg/L	0.005	ND	ND	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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April 08, 1995
PACE Project Number: 941005505

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0231789	10 0231797	10 0231800
Date Collected:	10/04/94	10/04/94	10/04/94
Time Collected:	10:15	11:00	13:00
Date Received:	10/05/94	10/05/94	10/05/94
Client Sample ID:	SG-Y	SG-V	SG-AB
Parameter	Units	MDI	

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	50	92	100
Solids, Total Suspended	mg/L	5	ND	ND	ND
Sulfate	mg/L	1.0	21	16	11
Phosphorus, Soluble	mg/L	0.05	ND	ND	ND
Phosphorus, Total	mg/L	0.05	ND	ND	ND
Oil and Grease	mg/L	4.6	7.6	13	ND
Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	ND	ND
Hardness, Total as Calcium Carbonate	mg/L	5	48	90	91
Potassium	mg/L	1.0	ND	ND	1.0
Nitrogen, Nitrate	mg/L	0.50	ND	ND	ND
pH		0.1	6.9	7.0	7.1
Turbidity	NTU	0.5	3.3	1.5	1.0

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.60	60.7	64.6	17.6
Cadmium	ug/L	0.0039	0.0043	ND	0.0042
Chromium	ug/L	0.30	ND	ND	0.45
Copper	ug/L	0.090	0.389	1.55	2.91
Lead	ug/L	0.0035	0.256	0.188	0.154
Mercury	ng/L	0.085	4.55	3.32	1.95
Zinc	ug/L	0.20	2.62	2.31	1.77

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	41	71	79
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Hydroxide	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	41	71	79
Anions	Meq/L		0.552	1.584	1.640
Antimony	mg/L	0.005	ND	ND	ND
Cation-Anion Balance	%	0.01	28.25	4.03	8.22

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek

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April 08, 1995

PACE Project Number: 941005505

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDL

10 0231789	10 0231797	10 0231800
10/04/94	10/04/94	10/04/94
10:15	11:00	13:00
10/05/94	10/05/94	10/05/94
SG-Y	SG-V	SG-AB

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Cations	Meq/L		0.986	1.717	1.934
Chemical Oxygen Demand, Low Level	mg/L	20	46	36	23
Chloride	mg/L	1	4	3	4
Cyanide, Total	ug/L	20	-	ND	ND
Fluoride, Soluble	mg/L	0.1	ND	ND	ND
Iron, dissolved	mg/L	0.050	0.64	0.64	0.22

Manganese, dissolved	mg/L	0.010	0.059	0.031	0.023
Nitrogen, Ammonia	mg/L	0.1	0.2	ND	ND
Nitrogen, Kjeldahl	mg/L	0.2	0.9	0.7	0.6
Sodium Adsorption Ratio			0.104	0.102	0.110
Thallium	mg/L	0.005	ND	ND	ND

METALS BY ICP

Silver	mg/L	0.010	ND	ND	ND
Barium	mg/L	0.010	0.014	0.010	0.010
Beryllium	mg/L	0.01	ND	ND	ND
Calcium	mg/L	1.0	10	18	20
Iron, total	mg/L	0.050	0.82	0.83	0.30
Magnesium	mg/L	0.50	4.8	8.6	9.8

Manganese, total	mg/L	0.010	0.090	0.053	0.040
Sodium	mg/L	1.0	1.6	2.1	2.4
Nickel	mg/L	0.030	ND	ND	ND
Molybdenum	mg/L	0.020	ND	ND	ND
Boron	mg/L	0.100	ND	ND	ND

METALS BY TRACE ICP

Arsenic	mg/L	0.005	ND	ND	ND
Selenium	mg/L	0.005	ND	ND	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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April 08, 1995
PACE Project Number: 941005505

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0231819	10 0231827
Date Collected:	10/03/94	10/03/94
Time Collected:	12:00	12:45
Date Received:	10/05/94	10/05/94
Client Sample ID:	SG-4	SG-5A
<u>Parameter</u>	<u>Units</u>	<u>MDL</u>

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	88	110
Solids, Total Suspended	mg/L	5	ND	ND
Sulfate	mg/L	1.0	9.1	14
Phosphorus, Soluble	mg/L	0.05	ND	ND
Phosphorus, Total	mg/L	0.05	ND	ND
Oil and Grease	mg/L	4.6	ND	6.2
Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	ND
Hardness, Total as Calcium Carbonate	mg/L	5	110	110
Potassium	mg/L	1.0	ND	ND
Nitrogen, Nitrate	mg/L	0.50	ND	ND
pH		0.1	7.7	7.0
Turbidity	NTU	0.5	1.7	0.8

METALS BY ICP

Cadmium	mg/L	0.005	ND	ND
Lead	mg/L	0.050	ND	ND

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	90	94
Alkalinity, Carbonate	mg/L	5	ND	ND
Alkalinity, Hydroxide	mg/L	5	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	90	94
Anions	Meq/L		1.806	1.889
Antimony	mg/L	0.005	ND	ND
Cation-Anion Balance	%	0.01	6.12	5.33
Cations	Meq/L		2.041	2.102
Chemical Oxygen Demand, Low Level	mg/L	20	ND	23
Chloride	mg/L	1	5	2
Cyanide, Total	ug/L	20	ND	ND
Fluoride, Soluble	mg/L	0.1	ND	ND
Iron, dissolved	mg/L	0.050	ND	0.14

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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April 08, 1995
PACE Project Number: 941005505

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0231819	10 0231827
Date Collected:	10/03/94	10/03/94
Time Collected:	12:00	12:45
Date Received:	10/05/94	10/05/94
Client Sample ID:	SG-4	SG-5A
Parameter	Units	MDL

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Manganese, dissolved	mg/L	0.010	ND	0.027
Mercury	ug/L	0.20	ND	ND
Nitrogen, Ammonia	mg/L	0.1	ND	ND
Nitrogen, Kjeldahl	mg/L	0.2	0.5	0.4
Sodium Adsorption Ratio			0.153	0.078
Thallium	mg/L	0.005	ND	ND

METALS BY TRACE ICP

Arsenic	mg/L	0.005	ND	ND
Selenium	mg/L	0.005	ND	ND

METALS BY ICP

Silver	mg/L	0.010	ND	ND
Aluminum	mg/L	0.050	ND	ND
Barium	mg/L	0.010	0.011	0.010
Beryllium	mg/L	0.01	ND	ND
Calcium	mg/L	1.0	21	22
Chromium	mg/L	0.0050	ND	ND

Copper	mg/L	0.030	ND	ND
Iron, total	mg/L	0.050	0.093	0.23
Magnesium	mg/L	0.50	10	11
Manganese, total	mg/L	0.010	0.018	0.067
Sodium	mg/L	1.0	3.4	1.8
Nickel	mg/L	0.030	ND	ND

Zinc	mg/L	0.020	ND	ND
Molybdenum	mg/L	0.020	ND	ND
Boron	mg/L	0.100	ND	ND



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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April 08, 1995
PACE Project Number: 941005505

Client Reference: Crandon Mining Surface Waters

These data have been reviewed and are approved for release.

A handwritten signature in cursive script that reads "Steve R. Crupi".

Steve Crupi
Project Manager



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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FOOTNOTES
for pages 1 through 9

April 08, 1995
PACE Project Number: 941005505

Client Reference: Crandon Mining Surface Waters

MDL Method Detection Limit
ND Not detected at or above the MDL.



REPORT OF LABORATORY ANALYSIS

Foth & Van Dyke & Associates
2737 South Ridge Road
P.O. Box 19012
Green Bay, WI 54307

April 08, 1995
PACE Project Number: 941006525

Attn: Mr. Russell Janeshek

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDL

10 0233650	10 0233668	10 0233676
10/05/94	10/05/94	10/05/94
08:15		12:30
10/06/94	10/06/94	10/06/94
LG-9	LG-7	LG-13

SUBCONTRACT ANALYSIS

METALS BY ICP

Cadmium

Lead

mg/L	0.005	ND	-	-
mg/L	0.050	ND	-	-

INORGANIC ANALYSIS

Solids, Total Dissolved

Solids, Total Suspended

Sulfate

Phosphorus, Soluble

Phosphorus, Total

Oil and Grease

mg/L	5	92	6.0	34
mg/L	5	ND	ND	ND
mg/L	1.0	11	5.7	9.5
mg/L	0.05	ND	ND	ND
mg/L	0.05	ND	ND	ND
mg/L	4.6	ND	ND	ND

Biochemical Oxygen Demand, 05 Day

Hardness, Total as Calcium Carbonate

Potassium

Nitrogen, Nitrate

pH

Turbidity

mg/L	3	ND	ND	ND
mg/L	5 <td>80<td>ND</td><td>10</td></td>	80 <td>ND</td> <td>10</td>	ND	10
mg/L	1.0 <td>ND<td>ND</td><td>ND</td></td>	ND <td>ND</td> <td>ND</td>	ND	ND
mg/L	0.50 <td>ND<td>ND</td><td>ND</td></td>	ND <td>ND</td> <td>ND</td>	ND	ND
mg/L	0.1 <td>7.6<td>5.1<td>5.7</td></td></td>	7.6 <td>5.1<td>5.7</td></td>	5.1 <td>5.7</td>	5.7
NTU	0.5 <td>1.2<td>0.8<td>1.1</td></td></td>	1.2 <td>0.8<td>1.1</td></td>	0.8 <td>1.1</td>	1.1

METALS BY LOW-LEVEL ANALYSES

Aluminum

Cadmium

Chromium

Copper

Lead

Mercury

Zinc

ug/L	0.60	-	65.7	138
ug/L	0.0039	-	0.0422	0.0220
ug/L	0.30	-	ND	ND
ug/L	0.090	-	0.468	0.768
ug/L	0.0035	-	0.399	0.622
ng/L	0.085	-	2.24	2.70
ug/L	0.20	-	21.7	14.9

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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April 08, 1995
PACE Project Number: 941006525

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0233650	10 0233668	10 0233676
Date Collected:	10/05/94	10/05/94	10/05/94
Time Collected:	08:15		12:30
Date Received:	10/06/94	10/06/94	10/06/94
Client Sample ID:	LG-9	LG-7	LG-13

<u>Parameter</u>	<u>Units</u>	<u>MDL</u>			
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INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	77	ND	ND
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Hydroxide	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	77	ND	ND
Anions	Meq/L		1.520	0.119	0.023
Antimony	mg/L	0.005	ND	ND	ND
Cation-Anion Balance	%	0.01	7.78	-19.11	75.33
Cations	Meq/L		1.776	0.081	0.165
Chemical Oxygen Demand, Low Level	mg/L	20	28	ND	23
Chloride	mg/L	1	1	ND	ND
Cyanide, Total	ug/L	20	ND	ND	ND
Fluoride, Soluble	mg/L	0.1	ND	ND	ND
Iron, dissolved	mg/L	0.050	0.086	ND	0.13
Manganese, dissolved	mg/L	0.010	ND	0.013	0.021
Mercury	ug/L	0.20	ND	-	-
Nitrogen, Ammonia	mg/L	0.1	0.1	0.1	ND
Nitrogen, Kjeldahl	mg/L	0.2	0.8	0.6	0.6
Sodium Adsorption Ratio			0.076	0.000	0.000
Thallium	mg/L	0.005	ND	ND	ND

METALS BY TRACE ICP

Arsenic	mg/L	0.005	ND	ND	ND
Selenium	mg/L	0.005	ND	-	ND
Selenium	mg/L	0.006	-	ND	-

METALS BY ICP

Silver	mg/L	0.010	ND	-	-
Aluminum	mg/L	0.050	ND	-	-
Barium	mg/L	0.010	0.012	-	-
Beryllium	mg/L	0.01	ND	-	-
Calcium	mg/L	1.0	18	-	-
Chromium	mg/L	0.0050	ND	-	-

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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April 08, 1995
PACE Project Number: 941006525

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDL

10 0233650	10 0233668	10 0233676
10/05/94	10/05/94	10/05/94
08:15		12:30
10/06/94	10/06/94	10/06/94
LG-9	LG-7	LG-13

INORGANIC ANALYSIS

METALS BY ICP

Parameter	Units	MDL	10 0233650	10 0233668	10 0233676
Copper	mg/L	0.030	ND	-	-
Iron, total	mg/L	0.050	0.12	-	-
Magnesium	mg/L	0.50	9.6	-	-
Manganese, total	mg/L	0.010	0.017	-	-
Sodium	mg/L	1.0	1.6	-	-
Nickel	mg/L	0.030	ND	-	-
Zinc	mg/L	0.020	ND	-	-
Molybdenum	mg/L	0.020	ND	-	-
Boron	mg/L	0.100	ND	-	-

METALS BY ICP

Parameter	Units	MDL	10 0233650	10 0233668	10 0233676
Silver	mg/L	0.010	-	ND	ND
Barium	mg/L	0.010	-	ND	0.016
Beryllium	mg/L	0.01	-	ND	ND
Calcium	mg/L	1.0	-	1.3	2.0
Iron, total	mg/L	0.050	-	0.095	0.17
Magnesium	mg/L	0.50	-	ND	0.60
Manganese, total	mg/L	0.010	-	0.015	0.020
Sodium	mg/L	1.0	-	ND	ND
Nickel	mg/L	0.030	-	ND	ND
Molybdenum	mg/L	0.020	-	ND	ND
Boron	mg/L	0.100	-	ND	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 4

April 08, 1995
PACE Project Number: 941006525

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0233714	10 0233749
Date Collected:	10/04/94	10/04/94
Time Collected:	16:15	16:45
Date Received:	10/06/94	10/06/94
Client Sample ID:	SG-19	SG-30
<u>Parameter</u>	<u>Units</u>	<u>MDL</u>

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	92	110
Solids, Total Suspended	mg/L	5	ND	ND
Sulfate	mg/L	1.0	28	19
Phosphorus, Soluble	mg/L	0.05	ND	ND
Phosphorus, Total	mg/L	0.05	ND	ND
Oil and Grease	mg/L	4.6	12	6.6

Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	ND
Hardness, Total as Calcium Carbonate	mg/L	5	69	100
Potassium	mg/L	1.0	ND	ND
Nitrogen, Nitrate	mg/L	0.50	ND	ND
pH		0.1	6.7	7.2
Turbidity	NTU	0.5	9.9	1.6

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.60	68.4	182
Cadmium	ug/L	0.0039	0.0131	0.0135
Chromium	ug/L	0.30	ND	ND
Copper	ug/L	0.090	0.102	0.319
Lead	ug/L	0.0035	0.221	0.235
Mercury	ng/L	0.085	4.99	2.78
Zinc	ug/L	0.20	4.50	3.80

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	49	91
Alkalinity, Carbonate	mg/L	5	ND	ND
Alkalinity, Hydroxide	mg/L	5	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	49	91
Anions	Meq/L		0.640	1.853
Antimony	mg/L	0.005	ND	ND
Cation-Anion Balance	%	0.01	35.58	8.50

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 5

April 08, 1995
PACE Project Number: 941006525

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0233714	10 0233749
Date Collected:	10/04/94	10/04/94
Time Collected:	16:15	16:45
Date Received:	10/06/94	10/06/94
Client Sample ID:	SG-19	SG-30

<u>Parameter</u>	<u>Units</u>	<u>MDI</u>		
------------------	--------------	------------	--	--

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Cations	Meq/L		1.347	2.198
Chemical Oxygen Demand, Low Level	mg/L	20	69	33
Chloride	mg/L	1	2	1
Cyanide, Total	ug/L	20	ND	ND
Fluoride, Soluble	mg/L	0.1	ND	ND
Iron, dissolved	mg/L	0.050	0.50	0.38
Manganese, dissolved	mg/L	0.010	ND	0.010
Nitrogen, Ammonia	mg/L	0.1	0.1	ND
Nitrogen, Kjeldahl	mg/L	0.2	0.7	0.6
Sodium Adsorption Ratio			0.070	0.076
Thallium	mg/L	0.005	ND	ND

METALS BY TRACE ICP

Arsenic	mg/L	0.005	ND	ND
Selenium	mg/L	0.005	ND	ND

METALS BY ICP

Silver	mg/L	0.010	ND	ND
Barium	mg/L	0.010	0.013	0.013
Beryllium	mg/L	0.01	ND	ND
Calcium	mg/L	1.0	14	24
Iron, total	mg/L	0.050	0.77	0.30
Magnesium	mg/L	0.50	7.2	11

Manganese, total	mg/L	0.010	0.037	0.018
Sodium	mg/L	1.0	1.3	1.8
Nickel	mg/L	0.030	ND	ND
Molybdenum	mg/L	0.020	ND	ND
Boron	mg/L	0.100	ND	ND

Mr. Russell Janeshek
Page 6

April 08, 1995
PACE Project Number: 941006525

Client Reference: Crandon Mining Surface Waters

These data have been reviewed and are approved for release.

Steve R. Crupi

Steve Crupi
Project Manager



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 7

FOOTNOTES
for pages 1 through 6

April 08, 1995
PACE Project Number: 941006525

Client Reference: Crandon Mining Surface Waters

MDL Method Detection Limit
ND Not detected at or above the MDL.



REPORT OF LABORATORY ANALYSIS

Foth & Van Dyke & Associates
2737 South Ridge Road
P.O. Box 19012
Green Bay, WI 54307

April 08, 1995
PACE Project Number: 941007520

Attn: Mr. Russell Janeshek

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDI

10 0235571	10 0235580	10 0235598
10/06/94	10/06/94	10/06/94
08:30	10:30	10:30
10/07/94	10/07/94	10/07/94
LG-11	LG-15-01	LG-15-02

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved

Solids, Total Suspended

Sulfate

Phosphorus, Soluble

Phosphorus, Total

Oil and Grease

mg/L	5	44	46	52
mg/L	5	7	ND	ND
mg/L	1.0	4.0	11	12
mg/L	0.05	ND	ND	ND
mg/L	0.05	ND	ND	ND
mg/L	4.6	4.9	ND	ND

Biochemical Oxygen Demand, 05 Day

Hardness, Total as Calcium Carbonate

Potassium

Nitrogen, Nitrate

pH

Turbidity

mg/L	3	ND	ND	ND
mg/L	5	8.0	8	12
mg/L	1.0	ND	1.4	1.3
mg/L	0.50	ND	ND	ND
	0.1	6.2	5.4	5.5
NTU	0.5	1.1	0.85	0.8

METALS BY LOW-LEVEL ANALYSES

Aluminum

Cadmium

Chromium

Copper

Lead

Mercury

Zinc

ug/L	0.60	17.8	76.3	79.2
ug/L	0.0039	0.0166	0.0063	ND
ug/L	0.30	ND	ND	ND
ug/L	0.090	0.287	0.794	0.280
ug/L	0.0035	0.109	0.251	0.223
ng/L	0.085	0.839	1.64	1.40
ug/L	0.20	2.77	6.64	3.69

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate

Alkalinity, Carbonate

Alkalinity, Hydroxide

Alkalinity, Total as Calcium Carbonate

mg/L	5	ND	5	ND
mg/L	5	ND	ND	ND
mg/L	5	ND	ND	ND
mg/L	5	ND	5	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 2

April 08, 1995
PACE Project Number: 94100752

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0235571	10 0235580	10 0235598
Date Collected:	10/06/94	10/06/94	10/06/94
Time Collected:	08:30	10:30	10:30
Date Received:	10/07/94	10/07/94	10/07/94
Client Sample ID:	LG-11	LG-15-01	LG-15-02

<u>Parameter</u>	<u>Units</u>	<u>MDI</u>			
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INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Anions	Meq/L		0.084	0.312	0.250
Antimony	mg/L	0.005	ND	ND	ND
Cation-Anion Balance	%	0.01	25.97	-47.58	-41.68
Cations	Meq/L		0.142	0.111	0.103
Chemical Oxygen Demand, Low Level	mg/L	20	ND	44	38
Chloride	mg/L	1	ND	ND	ND
Cyanide, Total	ug/L	20	ND	ND	ND
Fluoride, Soluble	mg/L	0.1	ND	ND	ND
Iron, dissolved	mg/L	0.050	ND	0.17	0.17
Manganese, dissolved	mg/L	0.010	ND	0.090	0.076
Nitrogen, Ammonia	mg/L	0.1	ND	0.2	0.1
Nitrogen, Kjeldahl	mg/L	0.2	0.4	1.1	ND
Sodium Adsorption Ratio			0.000	0.000	0.000
Thallium	mg/L	0.005	ND	ND	ND

METALS BY ICP

Silver	mg/L	0.010	ND	ND	ND
Barium	mg/L	0.010	ND	ND	ND
Beryllium	mg/L	0.01	ND	ND	ND
Calcium	mg/L	1.0	1.5	1.5	1.4
Iron, total	mg/L	0.050	ND	0.19	0.21
Magnesium	mg/L	0.50	0.56	ND	ND
Manganese, total	mg/L	0.010	0.020	0.10	0.10
Sodium	mg/L	1.0	ND	ND	ND
Nickel	mg/L	0.030	ND	ND	ND
Molybdenum	mg/L	0.020	ND	ND	ND
Boron	mg/L	0.100	ND	ND	ND

METALS BY TRACE ICP

Arsenic	mg/L	0.005	ND	ND	ND
Selenium	mg/L	0.005	ND	ND	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 3

April 08, 1995
PACE Project Number: 941007523

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0235601
Date Collected:	10/05/94
Time Collected:	15:30
Date Received:	10/07/94
Client Sample ID:	LG-12
<u>Parameter</u>	<u>Units</u> <u>MDI</u>

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	31
Solids, Total Suspended	mg/L	5	ND
Sulfate	mg/L	1.0	10
Phosphorus, Soluble	mg/L	0.05	ND
Phosphorus, Total	mg/L	0.05	ND
Oil and Grease	mg/L	4.6	ND
Biochemical Oxygen Demand, 05 Day	mg/L	3	ND
Hardness, Total as Calcium Carbonate	mg/L	5	12
Potassium	mg/L	1.0	1.9
Nitrogen, Nitrate	mg/L	0.50	ND
pH		0.1	5.4
Turbidity	NTU	0.5	0.7

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.60	76.6
Cadmium	ug/L	0.0039	0.0134
Chromium	ug/L	0.30	ND
Copper	ug/L	0.090	0.675
Lead	ug/L	0.0035	0.667
Mercury	ng/L	0.085	2.44
Zinc	ug/L	0.20	5.41

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	ND
Alkalinity, Carbonate	mg/L	5	ND
Alkalinity, Hydroxide	mg/L	5	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	ND
Anions	Meq/L		0.209
Antimony	mg/L	0.005	ND
Cation-Anion Balance	%	0.01	-27.58

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 4

April 08, 1995
PACE Project Number: 941007523

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0235601
Date Collected:	10/05/94
Time Collected:	15:30
Date Received:	10/07/94
Client Sample ID:	LG-12
<u>Parameter</u>	<u>Units</u> <u>MDI</u>

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Cations	Meq/L		0.118
Chemical Oxygen Demand, Low Level	mg/L	20	21
Chloride	mg/L	1	ND
Cyanide, Total	ug/L	20	ND
Fluoride, Soluble	mg/L	0.1	ND
Iron, dissolved	mg/L	0.050	0.10

Manganese, dissolved	mg/L	0.010	0.013
Nitrogen, Ammonia	mg/L	0.1	ND
Nitrogen, Kjeldahl	mg/L	0.2	0.7
Sodium Adsorption Ratio			0.000
Thallium	mg/L	0.005	ND

METALS BY ICP

Silver	mg/L	0.010	ND
Barium	mg/L	0.010	ND
Beryllium	mg/L	0.01	ND
Calcium	mg/L	1.0	1.4
Iron, total	mg/L	0.050	0.11
Magnesium	mg/L	0.50	ND

Manganese, total	mg/L	0.010	0.014
Sodium	mg/L	1.0	ND
Nickel	mg/L	0.030	ND
Molybdenum	mg/L	0.020	ND
Boron	mg/L	0.100	ND

METALS BY TRACE ICP

Arsenic	mg/L	0.005	ND
Selenium	mg/L	0.005	ND



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 5

April 08, 1995
PACE Project Number: 941007523

Client Reference: Crandon Mining Surface Waters

These data have been reviewed and are approved for release.

Steve R. Crupi

Steve Crupi
Project Manager



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 6

FOOTNOTES
for pages 1 through 5

April 08, 1995
PACE Project Number: 941007523

Client Reference: Crandon Mining Surface Waters

MDL Method Detection Limit
ND Not detected at or above the MDL.

November 1994 Single Event Sampling Surface Water Laboratory Data

December 15, 1994

Mr. Russell Janeshek
Foth & Van Dyke
2737 S. Ridge Rd.
Green Bay, WI 54307-9012

Re: Crandon Mining Company Project -
November 1994 Additional Surface Water Sampling

Dear Mr. Janeshek:

Enclosed are the analytical report, raw data package and electronic deliverable representing the samples received on November 9, 1994. This group of samples represents the November 1994 additional surface water sampling round.

Attached to this letter are copies of the chain of custody records. Also attached to this letter is a table cross referencing the PACE sample identification and the sampling point identification.

A summary of the analyses is given below.

Chloride (EPA 325.1)
Cyanide (EPA 335.2)
pH (EPA 150.1)
NH₃ (EPA 350.2)
Thallium (EPA 279.2)
Antimony (EPA 204.2)
Mercury (EPA 245.1)
ICP Metals (EPA 200.7)

If you have any questions or comments concerning the data submitted, feel free to contact me at (612) 525-3454.

Sincerely,

Steven R. Crupi

Steven R. Crupi
Project Manager

Attachments/Enclosures

Crandon Mining Company Project -
November 1994 Additional Surface Water Sampling

Sample Cross Reference

<u>Sample ID</u>	<u>PAGE ID</u>
SG-WR-3	26754.6
SG-MC	26755.4
SG-NC	26756.2
SG-HC	26757.0
SG-PR	26759.9



Proposal 941103.500
Additional Surface Waters

181391

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2737 S. RIDGE Rd
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: RUSS JANESSEN
Bill To: FVD
P.O. # / Billing Reference 930049
Project Name / No. CARDON MINING Co (SW)

Pace Client No. 150419 SHY
11206 11/14
Pace Project Manager SRC
Pace Project No. 941109.502
Requested Due Date: _____

Sampled By (PRINT):
Scott Janssen GERALT BERG
Sampler Signature Scott Janssen Date Sampled 11/7

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.	NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST	REMARKS
						UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	HAOH		
1	SG-WR-3	0930	SW	26754.6	5	2	1	1				
2	SG-MC	1045		26755.4	5	2	1	1				
3	SG-NC	1130		26756.2	5	2	1	1				
4	SG-HC	1230		26757.0	5	2	1	1				
5	SG-RR	1330		26758.9	5	2	1	1				
6												
7												
8												

COOLER NOS.	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
		OUT / DATE	RETURNED / DATE		<u>Scott Janssen FOTH: Van Dyke</u>	<u>Phil Meyer Pace</u>	<u>11/9/94</u>	<u>0900</u>

Additional Comments

LIMITED LIST FOR NEW SAMPLING SITES

TEMP BLANK = 1.10°C
1.5°C



REPORT OF LABORATORY ANALYSIS

Foth & Van Dyke & Associates
2737 South Ridge Road
P.O. Box 19012
Green Bay, WI 54307

December 15, 1994
PACE Project Number: 941109502

Attn: Mr. Russell Janeshek

Client Reference: Crandon Mining SW Additional

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

10 0267546	10 0267554	10 0267562
11/07/94	11/07/94	11/07/94
09:30	10:45	11:30
11/09/94	11/09/94	11/09/94
SG-WR-3	SG-MC	SG-NC

<u>Parameter</u>	<u>Units</u>	<u>MDL</u>			
METALS BY ICP					
Cadmium	mg/L	0.005	ND	ND	ND
Lead	mg/L	0.050	ND	ND	ND
INORGANIC ANALYSIS					
INDIVIDUAL PARAMETERS					
Antimony	mg/L	0.005	ND	ND	ND
Chloride	mg/L	1	2	4	4
Cyanide, Total	ug/L	20	ND	ND	ND
Mercury	ug/L	0.20	ND	ND	ND
Nitrogen, Ammonia	mg/L	0.1	0.2	0.2	0.2
Thallium	mg/L	0.005	ND	ND	ND
pH		0.1	7.0	7.0	6.1
METALS BY TRACE ICP					
Arsenic	mg/L	0.005	ND	0.006	0.006
Selenium	mg/L	0.005	ND	ND	ND
METALS BY ICP					
Silver	mg/L	0.010	ND	ND	ND
Aluminum	mg/L	0.050	ND	0.16	0.15
Beryllium	mg/L	0.01	ND	ND	ND
Chromium	mg/L	0.0050	ND	ND	ND
Copper	mg/L	0.030	ND	ND	ND
Nickel	mg/L	0.030	ND	ND	ND
Zinc	mg/L	0.020	ND	ND	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 2

December 15, 1994
PACE Project Number: 94110950

Client Reference: Crandon Mining SW Additional

PACE Sample Number:

10 0267570 10 0267589

Date Collected:

11/07/94 11/07/94

Time Collected:

12:30 13:30

Date Received:

11/09/94 11/09/94

Client Sample ID:

SG-HC SG-PR

Parameter

Units

MDI

METALS BY ICP

Cadmium

mg/L

0.005

ND

ND

Lead

mg/L

0.050

ND

ND

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Antimony

mg/L

0.005

ND

ND

Chloride

mg/L

1

3

4

Cyanide, Total

ug/L

20

ND

ND

Mercury

ug/L

0.20

ND

ND

Nitrogen, Ammonia

mg/L

0.1

0.2

0.2

Thallium

mg/L

0.005

ND

ND

pH

0.1

6.3

6.7

METALS BY TRACE ICP

Arsenic

mg/L

0.005

ND

ND

Selenium

mg/L

0.005

ND

0.006

METALS BY ICP

Silver

mg/L

0.010

ND

ND

Aluminum

mg/L

0.050

ND

0.11

Beryllium

mg/L

0.01

ND

ND

Chromium

mg/L

0.0050

ND

ND

Copper

mg/L

0.030

ND

ND

Nickel

mg/L

0.030

ND

ND

Zinc

mg/L

0.020

ND

0.020

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 3

December 15, 1994
PACE Project Number: 941109502

Client Reference: Crandon Mining SW Additional

These data have been reviewed and are approved for release.

Steven R. Crupi

Steve Crupi
Project Manager



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 4

FOOTNOTES
for pages 1 through 3

December 15, 1994
PACE Project Number: 941109501

Client Reference: Crandon Mining SW Additional

MDL Method Detection Limit
ND Not detected at or above the MDL.

November-December 1994 Surface Water Laboratory Data

April 26, 1995

Mr. Russell Janeshek
Foth & Van Dyke
2737 S. Ridge Rd.
Green Bay, WI 54307-9012

Re: Crandon Mining Company Project -
Battelle Results for November/December 1994 Surface Waters

Dear Mr. Janeshek:

Enclosed are reports on PACE report paper summarizing Battelle results for surface water samples collected in November and December, 1994. An electronic deliverable summarizing the results is also included in this submittal. The hardcopy report and diskette are revisions of the previous report and diskette submitted with PACE and NLS data.

The Battelle reporting limits are different than the limits listed in the Surface Water QAP Table 5-2 and different than the limits reported for previous sampling events. Battelle performs a method detection limit (MDL) study with each batch (i.e., surface water sampling event) of samples. The intention is to incorporate into the reporting limit any background contributions from the reagents, glassware and instrumentation that may affect the sample results. Because of the sensitivity of the analyses, any amount of trace contamination or interference can have a significant impact on results.

Included in the raw data package are sensitivity checks, raw data and data summaries. All metals were analyzed for total recoverable metals. For Cd, Cu, and Pb, a preconcentration step was followed by quantification using ICP-MS. Total recoverable mercury was analyzed by cold vapor atomic fluorescence.

The quality control samples included standard reference material (SRM), matrix spikes, and duplicates. The results for SRMs were within 25% of the certified value. Blank spikes and matrix spikes were generally within 75-125% recovery. The recovery of Cr on matrix spike 677-159 was 139% which could be due to contamination during analysis. The concentration of Cr in sample 677-159 was less than three times the detection limit. The percent recovery for several spikes were not calculated because the spiking levels were not

Nov./Dec. 1994 SW
Low Metals Results
4/26/95
Page 2

appropriate considering the detection limit or the concentration of metal in the unspiked sample; thus, these spiking results were coded "SL".

If you have any questions concerning this submittal, feel free to contact me at (612) 525-3454.

Sincerely,

A handwritten signature in cursive script that reads "Steven R. Crupi".

Steven R. Crupi
Project Manager

Enclosures



181396

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FORH: VAN DYKE
Address 2737 S. RIDGE Rd
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: PACE
Bill To: PACE
P.O. # / Billing Reference 93CO49
Project Name / No. CRANDON MINING CO (EN)

Pace Client No. _____
Pace Project Manager _____
Pace Project No. _____
*Requested Due Date: _____

Sampled By (PRINT): SCOTT JANSSEN JOE AUSTIN
Sampler Signature Scott Janssen Date Sampled 11/8/94

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.	NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST										REMARKS
						UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA		AI	cd	CA	CU	Pb	Hg	Zn				
1	SG-2	0800	SW		1						X	X	X	X	X	X					
2	SG-3	1030			1						X	X	X	X	X	X					
3	SG-33	1030			1						X	X	X	X	X	X					
4	SG-6	1145			1						X	X	X	X	X	X					
5	SG-E	1530			1						X	X	X	X	X	X					LEAKED ONLY 200ML
6																					
7																					
8																					

COOLER NOS.	BAILERS	SHIPMENT METHOD	OUT / DATE	RETURNED / DATE	ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
						<u>Scott Janssen</u> <u>FORH: VAN DYKE</u>	<u>Joe Austin</u>	<u>11/14/94</u>	<u>12:00</u>

Additional Comments

500012
ORIGINAL

SEE REVERSE SIDE FOR INSTRUCTIONS

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2227 S. RIDGE Rd
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: PACE
Bill To: PACE
P.O. # / Billing Reference 930049
Project Name / No. CRANDON MENTAL CO (SN)

Pace Client No. _____
Pace Project Manager _____
Pace Project No. _____
*Requested Due Date: _____

Sampled By (PRINT):

SCOTT JANSSEN JOE AUSTIN
Sampler Signature Date Sampled
Scott Janssen 11/8/94

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.	NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST										REMARKS
						UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA		Al	cd	ca	cu	pb	hgs	zn				
1	SG 2	0800	SW		1			1			X	X	X	X	X	X	X				
2	SG 3	1030			1			1			X	X	X	X	X	X	X				
3	SG 33	1030			1			1			X	X	X	X	X	X	X				
4	SG 6	1145			1			1			X	X	X	X	X	X	X				
5	SG-E	1530			1			1			X	X	X	X	X	X	X				LEAKED ONLY 200ML
6																					
7																					
8																					

COOLER NOS.	BAILERS	SHIPMENT METHOD OUT / DATE	RETURNED / DATE	ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
					<u>Scott Janssen</u> <u>FOTH: VAN DYKE</u>	<u>Albert Janssen</u>	<u>11/14/94</u>	<u>12:00</u>

Additional Comments

500013

SEE REVERSE SIDE FOR INSTRUCTIONS

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2737 S. RIDGE RD
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: PACE
Bill To: PACE
P.O. # / Billing Reference 930049
Project Name / No. CRANDON MINING Co

Page Client No. _____
Page Project Manager _____
Page Project No. _____
*Requested Due Date: _____

Sampled By (PRINT): <u>SCOTT JANSSEN</u>				Date Sampled <u>11/9/94</u>				PRESERVATIVES		ANALYSES REQUEST		REMARKS								
Sampler Signature <u>Scott Janssen</u>								UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA									
ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.	NO. OF CONTAINERS															
1	SG-19	0830	SW		1															
2	SG-30	0930			1															
3	LG-7	1430			1															
4	LG-13	1610			1															
5																				
6																				
7																				
8																				

COOLER NOS.	BAILERS	SHIPMENT METHOD OUT / DATE	RETURNED / DATE	ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
					<u>Scott Janssen / FOTH: VAN DYKE</u>	<u>[Signature]</u>	<u>11/14/94</u>	<u>12:00</u>

Additional Comments

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2737 S. RIDGE RD
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: PACE
Bill To: PACE
P.O. # / Billing Reference 93049
Project Name / No. CRANDON MINING Co

Page Client No. _____
Page Project Manager _____
Page Project No. _____
Requested Due Date: _____

Sampled By (PRINT):

SCOTT JANSSEN

Sampler Signature

Scott Janssen

Date Sampled

11/9/94

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.	NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST										REMARKS
						UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA		Al	Co	Ca	Cu	Pb	Hg	Zn				
1	SG-19	0830	SW	22001	1						X	X	X	X	X	X	X				
2	SG-30	0930			1						X	X	X	X	X	X	X				
3	LG-7	1430			1						X	X	X	X	X	X	X				
4	LG-13	1610			1						X	X	X	X	X	X	X				
5																					
6																					
7																					
8																					

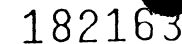
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Additional Comments

500010

ORIGINAL

SEE REVERSE SIDE FOR INSTRUCTIONS



Client FOSTH: VAN DYKE
Address 2737 S. RIDGE Rd
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: PACE

Pace Client No.

Bill To: PALE

Pace Project Manager

P.O. # / Billing Reference 93C049

Pace Project No.

Project Name / No. CLANDON MENINGO (SN) *Requested Due Date: _____

Sampled By (PRINT):

SCOTT JANSSEN JOE AUSTIN

Sampler Signature

Date Sampled

Scott Danese 11/10/94

[illegible]

COOLER NOS.	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
		OUT / DATE	RETURNED / DATE					
					Scott Jensen / FORT VANDYKE	<i>[Signature]</i>	11/14/94	12:00

Additional Comments

500014

ORIGINAL

SEE REVERSE SIDE FOR INSTRUCTIONS

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE

Report To: PACE

Pace Client No. _____

Address 2737 S. RIDGE Rd
GREEN BAY, WI 54307

Bill To: PACE

Pace Project Manager _____

Phone 414-497-2500

P.O. # / Billing Reference 930049

Pace Project No. _____

Project Name / No. CLANDON MENINGO (SN)

Requested Due Date: _____

Sampled By (PRINT):

SCOTT JANSSEN

JOE AUSTIN

Sampler Signature

Date Sampled

Scott Janssen

11/16/94

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.	NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST										REMARKS
						UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA		Al	Co	Ca	Cu	Pb	Hg	Zn				
1	LG-11	0830	SW		1		1				X	X	X	X	X	X	X				
2	LG-12	1000			1		1				X	X	X	X	X	X	X				
3	LG-15-01	1230			1		1				X	X	X	X	X	X	X				
4	LG-15-02	1230			1		1				X	X	X	X	X	X	X				
5																					
6																					
7																					
8																					

COOLER NOS.	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
		OUT / DATE	RETURNED / DATE					
					<u>Scott Janssen / FOTH: VAN DYKE</u>	<u>[Signature]</u>	<u>11/16/94</u>	<u>12:00</u>

Additional Comments

500015



181393

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2737 S. RIDGE Rd
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: RUSS JANESHER
Bill To: FVD
P.O. # / Billing Reference 93C049
Project Name / No. CRANDON MINING Co. (SW)

Pace Client No. 150419
Pace Project Manager SRL
Pace Project No. 9-11109-503
*Requested Due Date: _____

Sampled By (PRINT):

SCOTT JANSSEN JOE AUSTIN

Sampler Signature

Date Sampled

Scott Janssen 11/8/94

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PAGE NO.	NO. O	UNPR	H ₂ SO ₄	HNO ₃	VOA	N/A									REMARKS
											AIKA	FI	CI	COD	TKM	NO ₂	CYAN	TOTA	
1	SG-E	1530	SW.	26869.D	5	2	1	1	1		X	X	X	X	X	X	X		
3.7-9-207																			
4																			
5																			
6																			
7																			
8																			

COOLER NOS.	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
		OUT / DATE	RETURNED / DATE					
					Scott Janssen / FOTH: VAN DYKE 11/9/94 1300	John Meyer / Pace	11/9/94	1530

Additional Comments

ORIGINAL



Surface Sediments
Prep #1

181392

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2737 S. RIDGE Rd
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: FVD
Bill To: FVD
P.O. # / Billing Reference 93C049
Project Name / No. CAANDON MINING Co (SW)

Pace Client No. 150419
Pace Project Manager SRL
Pace Project No. 941109-503
Requested Due Date: _____

Sampled By (PRINT):

SCOTT JANSSEN JOE AUSTIN

Sampler Signature

Date Sampled

Scott Janssen 11/8/94

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PAGE NO.	NO. C	UNPR	H ₂ SO ₄	HNO ₃	VOA	NA											REMARKS
											Alkal	FI	CI	COO	TKN	NO ₂	CYAN	TOTAL	DISS		
1	SG-2	0800	SW	267600	5	2	1	1	1		X	X	X	X	X	X	X	X	X		
2	SG-3	1030	↓	267607	5	2	1	1	1		X	X	X	X	X	X	X	X	X	267607 smth 11/2/7	
3	SG-33	1030		267635	5	2	1	1	1		X	X	X	X	X	X	X	X	X		
4	SG-6	1145		267643	5	2	1	1	1		X	X	X	X	X	X	X	X	X		
5																					
6																					
7																					
8																					

267607 SW 11/8/94

COOLER NOS.	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
		OUT / DATE	RETURNED / DATE					
					<u>Scott Janssen / FOTH: VAN DYKE</u>	<u>Joe Austin / Pace</u>	<u>11/9/94</u>	<u>0900</u>

Additional Comments

Cooler
1/3 = 1.1°C
2/3 = 0.5°C
3/3 = 1.5°C
ORIGINAL

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2737 RIDGE RD
GREEN BAY, WI
Phone 414-497-2500

Report To: RUSS JANESHEK
Bill To: FVD
P.O. # / Billing Reference 93C049
Project Name / No. BRANDON MINING CO (SW)

Pace Client No. 150419
Pace Project Manager SRC
Pace Project No. 94112.S0
*Requested Due Date: _____

Sampled By (PRINT):
SCOTT JANSEN JE AUSTIN
Sampler Signature _____ Date Sampled 11/9/94

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.	NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST										REMARKS
						UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	NaOH											
1	LG-7	1430	SW	27064.4	5	2	1				X	X	X	X	X	X	X	X	X	X	
2	LG-13	1610	↓	27065.2	5	2	1				X	X	X	X	X	X	X	X	X	X	
3																					
4																					
5																					
6																					
7																					
8																					

COOLER NOS.	BAILERS	SHIPMENT METHOD OUT / DATE RETURNED / DATE		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
					Scott Jansen / FOTH: Van Dyke	SMITH / PACE	11/11/94	11:20

Additional Comments



181395

CHAIN-OF-CUSTODY RECORD
Analytical RequestClient FOTH: VANDYKEAddress 2737 S. RIDGE RdGREEN BAY, WI 54307Phone 414-497-2500Report To: RUSS JANESHEKBill To: FVDP.O. # / Billing Reference 93C049Project Name / No. CRANDON MINING Co (SW)Pace Client No. 150419Pace Project Manager SRCPace Project No. 94112-570

Requested Due Date: _____

Sampled By (PRINT):

SCOTT JANSSEN JOE AUSTIN

Sampler Signature

Date Sampled

Scott Janssen 11/10/94

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.	NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST								REMARKS
						UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	NAOH	ALKALINITY	F	Cl	COD	NH ₃	TKN	CYANIDE	TOTAL METALS	
1	LG-11	0830	SW	27060.1	5	2	1	1		1	X	X	X	X	X	X	X	X	
2	LG-12	1000		27061.0	5	2	1	1		1	X	X	X	X	X	X	X	X	
3	LG-15-01	1236		27062.8	5	2	1	1		1	X	X	X	X	X	X	X	X	
4	LG-15-02	1230		27063.6	5	2	1	1		1	X	X	X	X	X	X	X	X	
5																			
6																			
7																			
8																			

COOLER NOS.	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
		OUT / DATE	RETURNED / DATE					
					<u>Scott Janssen / FOTH: VANDYKE</u>	<u>Shuffedge / PACE</u>	<u>11/10/94</u>	<u>19:20</u>

Additional Comments



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 11486

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026416

RETURN THIS FORM WITH SAMPLES.

CLIENT ETH: VANDYKE		PROJECT TITLE CRANDON MINING CO	
ADDRESS 2737 S. RIDGE Rd		PROJECT NO. 93049	P.O. NO.
CITY GREEN BAY	STATE WI	ZIP 54307	CONTACT RUSS JANESHER
			PHONE 414-497-2500

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			PN	PS	PN	K-H	
1.	68024	SG-2	11/8/94	0800	SW	GRAB	1	1	1	2	
2.	68025	SG-3	↓	1030	↓	↓	1	1	1	2	
3.	68026	SG-33	↓	1030	↓	↓	1	1	1	2	
4.	68027	SG-6	↓	1145	↓	↓	1	1	1	2	
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE: SW = surface water WW = wastewater GW = groundwater describe others	DW = drinking water TIS = tissue AIR = air	PROD = product SOIL = soil SED = sediment	CONTAINER P = plastic G = glass V = glass vial B = plastic bag describe others	PRESERVATIVES & PREPARATION NP = nothing added S = sulfuric acid N = nitric acid Z = zinc acetate OH = sodium hydroxide HA = hydrochloric & ascorbic acid H = hydrochloric acid F = field filtered
---	--	---	--	--

COLLECTED BY (signature) <i>Scott Carson</i>		CUSTODY SEAL NO. (IF ANY)		DATE/TIME 11/8/94 1230
RELINQUISHED BY (signature)		RECEIVED BY (signature)		DATE/TIME
RELINQUISHED BY (signature)		RECEIVED BY (signature)		DATE/TIME
DISPATCHED BY (signature) <i>Scott Carson</i>		METHOD OF TRANSPORT F.V.D.		DATE/TIME 11/8/94 1235
RECEIVED AT NLS BY (signature) <i>Tracy Huber</i>		DATE/TIME 11-08-94 12:35		CONDITION
SEAL INTACT? ☒ YES ☐ NO		SEAL #		TEMP. 0.2°
REMARKS & OTHER INFORMATION				

- IMPORTANT:**
1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED
 2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
 3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 11622

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 7210264

RETURN THIS FORM WITH SAMPLES.

CLIENT FOTH VANDYKE				PROJECT TITLE CRANDON MINING CO (SW)							
ADDRESS 2737 S. RIDGE Rd				PROJECT NO. 930049		P.O. NO.					
CITY GREEN BAY		STATE WI		ZIP 54307		CONTACT Russ LANGESEK		PHONE 414-497-2500			
ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			P	NP	PS	PV	
1.	18131	SG-E	11/8/94	1530	SW	GAAB	1	1	1	2	
2.	18132	SG-19	11/8/94	0830	↓	↓	1	1	1	2	
3.	18133	SG-30	↓	0930	↓	↓	1	1	1	2	
4.											
5.											
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9.											
10.											
11.											
12.											
SAMPLE TYPE: SW = surface water DW = drinking water PROD = product WW = wastewater TIS = tissue SOIL = soil GW = groundwater AIR = air SED = sediment describe others						CONTAINER P = plastic NP = nothing added OH = sodium hydroxide G = glass S = sulfuric acid HA = hydrochloric & ascorbic acid V = glass vial N = nitric acid H = hydrochloric acid B = plastic bag Z = zinc acetate describe others F = field filtered					

COLLECTED BY (signature) <i>Scott Hansen</i>		CUSTODY SEAL NO. (IF ANY)		DATE/TIME 11/9/94 1200			
RELINQUISHED BY (signature)		RECEIVED BY (signature)		DATE/TIME			
RELINQUISHED BY (signature)		RECEIVED BY (signature)		DATE/TIME			
DISPATCHED BY (signature) <i>Scott Hansen</i>		METHOD OF TRANSPORT FV0		DATE/TIME 11/9/94 1300			
RECEIVED AT NLS BY (signature) <i>Scott Hansen</i>		DATE/TIME 11-09-94 13:00		CONDITION On Ice		TEMP.	
SEAL INTACT? ☐ YES ☐ NO		SEAL #		REMARKS & OTHER INFORMATION Hand Delivered			

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM MUST BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBE!
2. PLEASE USE ONE LINE PER SAMPLE, NOT PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 11485

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 7210264H

RETURN THIS FORM WITH SAMPLES.

CLIENT <i>FOH: VAN DYKE</i>		PROJECT TITLE <i>CRANDON MINING CO (SW)</i>	
ADDRESS <i>2737 S RIDGE Rd</i>		PROJECT NO. <i>93C049</i>	P.O. NO.
CITY <i>GREEN BAY</i>	STATE <i>WI</i>	ZIP <i>54307</i>	CONTACT <i>RUSS JANESHER</i>
			PHONE <i>414-497-2500</i>

ITEM NO.	NLS LAB NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			PNP	PS	PN	PH	
1.	<i>68235</i>	<i>LG-7</i>	<i>11/9/94</i>	<i>1430</i>	<i>SW</i>	<i>GRAB</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>2</i>	
2.	<i>68236</i>	<i>LG-13</i>	<i>↓</i>	<i>1610</i>	<i>↓</i>		<i>1</i>	<i>1</i>	<i>1</i>	<i>2</i>	
3.	<i>68237</i>	<i>LG-11</i>	<i>11/10/94</i>	<i>0830</i>	<i>↓</i>		<i>1</i>	<i>1</i>	<i>1</i>	<i>2</i>	
4.	<i>68238</i>	<i>LG-12</i>	<i>↓</i>	<i>1000</i>	<i>↓</i>		<i>1</i>	<i>1</i>	<i>1</i>	<i>2</i>	<i>bottles indicate LG-15</i>
5.	<i>68239</i>	<i>LG-15-G1</i>	<i>↓</i>	<i>1230</i>	<i>↓</i>		<i>1</i>	<i>1</i>	<i>1</i>	<i>2</i>	
6.	<i>68240</i>	<i>LG-15-02</i>	<i>↓</i>	<i>1230</i>	<i>↓</i>		<i>1</i>	<i>1</i>	<i>1</i>	<i>2</i>	
7.											
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE: SW = surface water DW = drinking water PROD = product WW = wastewater TIS = tissue SOIL = soil GW = groundwater AIR = air SED = sediment describe others			CONTAINER P = plastic G = glass V = glass vial B = plastic bag describe others	PRESERVATIVES & PREPARATION NP = nothing added OH = sodium hydroxide S = sulfuric acid HA = hydrochloric & ascorbic acid N = nitric acid Z = zinc acetate H = hydrochloric acid F = field filtered
---	--	--	---	---

COLLECTED BY (signature) <i>Scott Janesher Joe Austin</i>		CUSTODY SEAL NO. (IF ANY) DATE/TIME <i>11/10/94 1400</i>	
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME	
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME	
DISPATCHED BY (signature) <i>Scott Janesher</i>	METHOD OF TRANSPORT <i>FVD</i>	DATE/TIME <i>11/10/94 1430</i>	

RECEIVED AT NLS BY (signature) <i>Harry Huber</i>	DATE/TIME <i>11-10-94 14:30</i>	CONDITION	TEMP. <i>0.2°</i>
SEAL INTACT? ☐ YES ☐ NO	SEAL #	REMARKS & OTHER INFORMATION	

- IMPORTANT:**
1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
 2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
 3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY

1/2

194580

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VANDYKE
Address 2737 S. RIDGE RD
GREEN BAY, WI 54307
Phone 414-477-2500

Report To: RUSS JANESHEIL
Bill To: FVD
P.O. # / Billing Reference 73C049
Project Name / No. CRANDON MINING CO (SW)

Pace Client No. 150419
Pace Project Manager SAC
Pace Project No. 941208.512
*Requested Due Date: _____

Sampled By (PRINT):
SCOTT JANSSEN JOE AUSTIN
Sampler Signature Date Sampled
SCOTT JANSSEN 12/5/94

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PAGE NO.	NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST								REMARKS
						UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	NAOH	ALKALINITY	F	CI	COD	NH ₃	TKN	CYANIDE	TOTAL METALS	
1	SG-19		SW	28876.9	5	2	1	1		1	X	X	X	X	X	X	X	X	
2	SG-30			28877.2	5	2	1	1		1	X	X	X	X	X	X	X	X	
3	SG-2			28878.0	5	2	1	1		1	X	X	X	X	X	X	X	X	
4	SG-3			28879.9	5	2	1	1		1	X	X	X	X	X	X	X	X	
5	SG-6			28880.2	5	2	1	1		1	X	X	X	X	X	X	X	X	
6																			
7																			
8																			

6 CONTAINERS REC'D -
EXTRA GN/UNPRES. 10/12/94

COOLER NOS.	BAILERS	SHIPMENT METHOD	ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
		OUT / DATE	RETURNED / DATE	SCOTT JANSSEN / FOTH: VANDYKE 12/7/94 1000	SMITH / PACE	12/8/94	12:00

Additional Comments

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2737 S. RIDGE RD
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: RUSS JANESHEK
Bill To: FVD
P.O. # / Billing Reference 930049
Project Name / No. CRANDON MINING CO (SW)

Pace Client No. 150419
Pace Project Manager SKC
Pace Project No. 941208.512
*Requested Due Date: _____

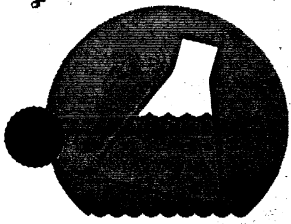
Sampled By (PRINT):
SCOTT JANSSEN JOE AUSTIN
Sampler Signature Scott Janssen Date Sampled 12/6/94

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.	NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST										REMARKS
						UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	NAOH											
1	SG-E-01	0900	SW	28881-0	5	2	1	1		1	ALKALINITY										
3.7-9-416	SG-E-02	0900	↓	28882.9	5	2	1	1		1	F										
4											CL										
5											COO										
6											NH ₃										
7											TKN										
8											CYANIDE										
											TOTAL METALS										
											DISS METALS										

COOLER NOS.	BAILERS	SHIPMENT METHOD OUT / DATE	SHIPMENT METHOD RETURNED / DATE	ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
					Scott Janssen / FOTH: VAN DYKE 12/7/94 1000	J. M. Hodge / PACE	12/8/94	12:00

Additional Comments

SEE REVERSE SIDE FOR INSTRUCTIONS



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 11857

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT FOTH: VAN DYKE		PROJECT TITLE CRANDON MINING CO (S.W.)	
ADDRESS 2737 S. RIDGE Rd		PROJECT NO. 93C049	P.O. NO.
CITY GREEN BAY	STATE WI	ZIP 54307	CONTACT RUSS JANESHEK
			PHONE 414-497-2500

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			GH	PND	PS	PN	
1.		SG-19	12/5/94	0915	SW	GRAB	2	1	1	1	
2.		SG-30		1000			2	1	1	1	
3.		SG-2		1230			2	1	1	1	
4.		SG-3		1430			2	1	1	1	
5.		SG-6		1530			2	1	1	1	
6.		SG-E-01	12/6/94	0900			2	1	1	1	
7.		SG-E-02		0900			2	1	1	1	
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE:

SW = surface water
WW = wastewater
GW = groundwater

DW = drinking water
TIS = tissue
AIR = air

PROD = product
SOIL = soil
SED = sediment

describe others

CONTAINER

P = plastic
G = glass
V = glass vial
B = plastic bag

describe others

PRESERVATIVES & PREPARATION

NP = nothing added
S = sulfuric acid
N = nitric acid
Z = zinc acetate
OH = sodium hydroxide
HA = hydrochloric acid
ascorbic acid
H = hydrochloric acid

F = field note

COLLECTED BY (signature) Scott Jensen	CUSTODY SEAL NO. (IF ANY)	DATE/TIME 12/6/94 1200
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME
DISPATCHED BY (signature) Scott Jensen	METHOD OF TRANSPORT FVD	DATE/TIME 12/6/94 1230

REMARKS & OTHER INFORMATION

- IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM MUST BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED
2. PLEASE USE ONE LINE PER SAMPLE, NOT PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY

NORTHERN LAKE SERVICE, INC.

400 NORTH LAKE AVENUE

CRANDON, WI 54520 (715)478-2777

ORDER OF ANALYSIS

RESULTS ORDERED BY:

FOTH: VAN DYKE
RUSS JANESHEK

CHAIN OF CUSTODY RECORD NUMBER:

11857

QUOTATION NUMBER:

ANALYZE FOR DISSOLVED OR TOTAL PARAMETERS?

SEND RESULTS TO:

PAGE

SEND INVOICE TO:

PAGE

Note "L" for low level ICP analysis, and "F" for furnace analysis.

Samples on line #s: 1-7 to be analyzed for the parameters checked below:

- | | | | |
|---|--|---|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☒ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☐ Tot. reactive | ☐ BNAs by 625/8270 |
| ☐ Antimony | ☒ Hardness | ☐ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☒ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☒ B.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☒ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☐ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BNAs |
| ☐ Chloride | ☐ Ammonia | ☒ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☒ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☐ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SDWA) |
| ☐ Color | ☐ Total Organic | ☐ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☒ Oil & Grease | ☒ Turbidity | ☐ PVOCs by 8020 |
| ☐ Copper | ☒ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO+PVOCs |
| | | ☐ Zinc | ☐ DRO-WI Modified |
| | | ☐ Munic.Sludge,WI List | ☐ PAHs by 610LC/8310 |

Samples on line #s: _____ to be analyzed for the parameters checked below:

- | | | | |
|---|--|---|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☐ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☐ Tot. reactive | ☐ BNAs by 625/8270 |
| ☐ Antimony | ☐ Hardness | ☐ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☐ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☐ B.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☐ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☐ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BNAs |
| ☐ Chloride | ☐ Ammonia | ☐ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☐ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☐ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SDWA) |
| ☐ Color | ☐ Total Organic | ☐ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☐ Oil & Grease | ☐ Turbidity | ☐ PVOCs by 8020 |
| ☐ Copper | ☐ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO+PVOCs |
| | | ☐ Zinc | ☐ DRO-WI Modified |
| | | ☐ Munic.Sludge,WI List | ☐ PAHs by 610LC/8310 |

SPECIAL INSTRUCTIONS:

3.7-9-418



REPORT OF LABORATORY ANALYSIS

Foth & Van Dyke & Associates
2737 South Ridge Road
P.O. Box 19012
Green Bay, WI 54307

April 26, 1995
PACE Project Number: 941109503

Attn: Mr. Russell Janeshek

Client Reference: Crandon Mining (Battelle) Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

10 0267600	10 0267627	10 0267635
11/08/94	11/08/94	11/08/94
08:00	10:30	10:30
11/09/94	11/09/94	11/09/94
SG-2	SG-3	SG-33

Parameter

Units

MDL

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	190	190	170
Solids, Total Suspended	mg/L	5	ND	ND	ND
Sulfate	mg/L	1.0	9.7	9.0	9.2
Phosphorus, Soluble	mg/L	0.05	ND	ND	ND
Phosphorus, Total	mg/L	0.05	ND	ND	ND
Oil and Grease	mg/L	4.6	6.6	ND	ND

Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	ND	ND
Hardness, Total as Calcium Carbonate	mg/L	5	100	100	100
Potassium	mg/L	1.0	ND	ND	ND
Nitrogen, Nitrate	mg/L	0.50	ND	ND	ND
pH		0.1	7.3	7.5	7.7
Turbidity	NTU	0.5	1.7	1.2	1.5

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.30	28.8	18.7	22.4
Cadmium	ug/L	0.006	ND	ND	ND
Chromium	ug/L	0.18	0.50	0.32	0.35
Copper	ug/L	0.006	0.289	0.154	0.236
Lead	ug/L	0.007	0.075	0.053	0.059
Mercury	ng/L	0.1	1.6	0.9	0.8
Zinc	ug/L	0.80	1.91	4.58	1.32

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	95	96	95
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	95	96	95
Anions	Meq/L		1.82	1.82	1.81



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 2

April 26, 1995
PACE Project Number: 941109503

Client Reference: Crandon Mining (Battelle) Surface Waters

PACE Sample Number:	10 0267600	10 0267627	10 0267635
Date Collected:	11/08/94	11/08/94	11/08/94
Time Collected:	08:00	10:30	10:30
Date Received:	11/09/94	11/09/94	11/09/94
Client Sample ID:	SG-2	SG-3	SG-33
Parameter	Units	MDI	

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Antimony	mg/L	0.005	ND	ND	ND
Cation-Anion Balance	%	0.01	3.97	4.42	4.27
Cations	Meq/L		1.97	1.98	1.97
Chemical Oxygen Demand, Low Level	mg/L	10	16	ND	10
Chloride	mg/L	1	2	2	2
Cyanide, Total	ug/L	20	-	-	ND
Fluoride, Soluble	mg/L	0.1	ND	0.1	0.1
Iron, dissolved	mg/L	0.050	0.16	0.073	0.079
Manganese, dissolved	mg/L	0.010	ND	ND	ND
Nitrogen, Ammonia	mg/L	0.1	0.1	ND	0.1
Nitrogen, Kjeldahl	mg/L	0.2	0.7	0.6	0.7
Sodium Adsorption Ratio			0.099	0.099	0.099

Thallium	mg/L	0.005	ND	ND	ND
----------	------	-------	----	----	----

METALS BY ICP

Silver	mg/L	0.010	ND	ND	ND
Barium	mg/L	0.010	0.010	ND	ND
Beryllium	mg/L	0.01	ND	ND	ND
Calcium	mg/L	1.0	21	21	21
Iron, total	mg/L	0.050	0.34	0.29	0.38
Magnesium	mg/L	0.50	10	10	10
Manganese, total	mg/L	0.010	0.054	0.065	0.067
Sodium	mg/L	1.0	2.2	2.2	2.2
Nickel	mg/L	0.030	ND	ND	ND
Molybdenum	mg/L	0.020	ND	ND	ND
Boron	mg/L	0.100	ND	ND	ND

METALS BY TRACE ICP

Arsenic	mg/L	0.005	0.006	ND	ND
Selenium	mg/L	0.005	0.006	ND	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 3

April 26, 1995
PACE Project Number: 941109503

Client Reference: Crandon Mining (Battelle) Surface Waters

PACE Sample Number:		10 0267643	10 0268674	10 0268682
Date Collected:		11/08/94	11/09/94	11/09/94
Time Collected:		11:45	08:30	09:30
Date Received:		11/09/94	11/10/94	11/10/94
Client Sample ID:		SG-6	SG-19	SG-30
Parameter	Units	MDL		

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	160	150	200
Solids, Total Suspended	mg/L	5	ND	ND	ND
Sulfate	mg/L	1.0	7.7	15	12
Phosphorus, Soluble	mg/L	0.05	ND	ND	ND
Phosphorus, Total	mg/L	0.05	ND	ND	ND
Oil and Grease	mg/L	4.6	ND	ND	ND

Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	ND	ND
Hardness, Total as Calcium Carbonate	mg/L	5	ND	84	130
Potassium	mg/L	1.0	ND	ND	ND
Nitrogen, Nitrate	mg/L	0.50	ND	ND	ND
pH		0.1	7.6	7.3	7.6
Turbidity	NTU	0.5	3.3	1.7	0.7

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.30	19.9	61.1	71.9
Cadmium	ug/L	0.006	ND	0.008	0.010
Chromium	ug/L	0.18	0.30	1.24	0.52
Copper	ug/L	0.006	0.101	0.431	0.352
Lead	ug/L	0.007	0.084	0.199	0.158
Mercury	ng/L	0.1	0.7	2.3	0.8
Zinc	ug/L	0.80	3.94	6.58	2.20

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	110	77	120
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	110	77	120
Anions	Meq/L		1.96	0.341	0.251
Antimony	mg/L	0.005	ND	ND	ND
Cation-Anion Balance	%	0.01	3.96	65.35	95.02
Cations	Meq/L		2.13	1.63	9.82



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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April 26, 1995
PACE Project Number: 941109503

Client Reference: Crandon Mining (Battelle) Surface Waters

PACE Sample Number:	10 0267643	10 0268674	10 0268682
Date Collected:	11/08/94	11/09/94	11/09/94
Time Collected:	11:45	08:30	09:30
Date Received:	11/09/94	11/10/94	11/10/94
Client Sample ID:	SG-6	SG-19	SG-30
Parameter	Units	MDI	

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Chemical Oxygen Demand, Low Level	mg/L	10	ND	21	ND
Chloride	mg/L	1	ND	1	ND
Cyanide, Total	ug/L	20	ND	ND	ND
Fluoride, Soluble	mg/L	0.1	0.1	0.1	0.1
ICP Digestion, Dissolved			BNDR	BNDR	BNDR
Iron, dissolved	mg/L	0.050	ND	0.35	0.35
Manganese, dissolved	mg/L	0.010	ND	ND	ND
Nitrogen, Ammonia	mg/L	0.1	ND	ND	0.1
Nitrogen, Kjeldahl	mg/L	0.2	0.6	0.6	0.5
Sodium Adsorption Ratio			0.073	0.084	0.039
Thallium	mg/L	0.005	ND	ND	ND

METALS BY ICP

Silver	mg/L	0.010	ND	ND	ND
Barium	mg/L	0.010	ND	0.010	ND
Beryllium	mg/L	0.01	ND	ND	ND
Calcium	mg/L	1.0	23	17	27
Iron, total	mg/L	0.050	0.21	0.54	0.12
Magnesium	mg/L	0.50	11	8.6	102
Manganese, total	mg/L	0.010	0.018	0.054	0.018
Sodium	mg/L	1.0	1.7	1.7	2.0
Nickel	mg/L	0.030	ND	ND	ND
Molybdenum	mg/L	0.020	ND	ND	ND
Boron	mg/L	0.100	ND	ND	ND

METALS BY TRACE ICP

Arsenic	mg/L	0.005	ND	ND	ND
Selenium	mg/L	0.005	ND	0.006	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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April 26, 1995
PACE Project Number: 941109503

Client Reference: Crandon Mining (Battelle) Surface Waters

PACE Sample Number: 10 0268690
Date Collected: 11/08/94
Time Collected: 15:30
Date Received: 11/10/94
Client Sample ID: SG-E
Parameter Units MDL _____

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	170
Solids, Total Suspended	mg/L	5	ND
Sulfate	mg/L	1.0	8.5
Phosphorus, Soluble	mg/L	0.05	ND
Phosphorus, Total	mg/L	0.05	ND
Oil and Grease	mg/L	4.6	ND

Biochemical Oxygen Demand, 05 Day	mg/L	3	ND
Hardness, Total as Calcium Carbonate	mg/L	5	150
Potassium	mg/L	1.0	ND
Nitrogen, Nitrate	mg/L	0.50	ND
pH		0.1	7.6
Turbidity	NTU	0.5	0.5

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.30	73.3
Cadmium	ug/L	0.006	ND
Chromium	ug/L	0.18	1.47
Copper	ug/L	0.006	0.649
Lead	ug/L	0.007	0.192
Mercury	ng/L	0.1	0.6
Zinc	ug/L	0.80	3.36

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	140
Alkalinity, Carbonate	mg/L	5	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	140
Anions	Meq/L		0.370
Antimony	mg/L	0.005	ND
Cation-Anion Balance	%	0.01	78.17
Cations	Meq/L		3.02



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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April 26, 1995
PACE Project Number: 941109503

Client Reference: Crandon Mining (Battelle) Surface Waters

PACE Sample Number: 10 0268690
Date Collected: 11/08/94
Time Collected: 15:30
Date Received: 11/10/94
Client Sample ID: SG-E
Parameter Units MDL _____

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Chemical Oxygen Demand, Low Level	mg/L	10	ND
Chloride	mg/L	1	2
Cyanide, Total	ug/L	20	ND
Fluoride, Soluble	mg/L	0.1	0.1
ICP Digestion, Dissolved			BNDR
Iron, dissolved	mg/L	0.050	0.058
Manganese, dissolved	mg/L	0.010	ND
Nitrogen, Ammonia	mg/L	0.1	ND
Nitrogen, Kjeldahl	mg/L	0.2	0.3
Sodium Adsorption Ratio			0.086
Thallium	mg/L	0.005	ND

METALS BY ICP

Silver	mg/L	0.010	ND
Barium	mg/L	0.010	ND
Beryllium	mg/L	0.01	ND
Calcium	mg/L	1.0	32
Iron, total	mg/L	0.050	ND
Magnesium	mg/L	0.50	16

Manganese, total	mg/L	0.010	ND
Sodium	mg/L	1.0	2.4
Nickel	mg/L	0.030	ND
Molybdenum	mg/L	0.020	ND
Boron	mg/L	0.100	ND

METALS BY TRACE ICP

Arsenic	mg/L	0.005	ND
Selenium	mg/L	0.005	ND



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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April 26, 1995
PACE Project Number: 941109503

Client Reference: Crandon Mining (Battelle) Surface Waters

These data have been reviewed and are approved for release.

A handwritten signature in cursive script that reads "Steve R. Crupi".

Steve Crupi
Project Manager



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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FOOTNOTES
for pages 1 through 7

April 26, 1995
PACE Project Number: 941109503

Client Reference: Crandon Mining (Battelle) Surface Waters

MDL Method Detection Limit
ND Not detected at or above the MDL.



REPORT OF LABORATORY ANALYSIS

Foth & Van Dyke & Associates
2737 South Ridge Road
P.O. Box 19012
Green Bay, WI 54307

April 26, 1995
PACE Project Number: 941112510

Attn: Mr. Russell Janeshek

Client Reference: Crandon Mining (Battelle) Surface Waters

PACE Sample Number:	10 0270601	10 0270610	10 0270628
Date Collected:	11/10/94	11/10/94	11/10/94
Time Collected:	08:30	10:00	12:30
Date Received:	11/11/94	11/11/94	11/11/94
	LG-11	LG-12	LG-15-01

Parameter	Units	MDL			
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SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	34	54	62
Solids, Total Suspended	mg/L	5	ND	ND	ND
Sulfate	mg/L	1.0	3.6	9.8	11
Phosphorus, Soluble	mg/L	0.05	ND	ND	ND
Phosphorus, Total	mg/L	0.05	ND	ND	ND
Oil and Grease	mg/L	4.6	ND	ND	ND

Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	ND	ND
Hardness, Total as Calcium Carbonate	mg/L	5	6	7	7
Potassium	mg/L	1.0	ND	ND	1.5
Nitrogen, Nitrate	mg/L	0.50	ND	ND	ND
pH		0.1	5.8	5.2	5.5
Turbidity	NTU	0.5	1.3	0.6	1.2

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.30	18.1	85.5	101
Cadmium	ug/L	0.006	0.008	ND	0.008
Chromium	ug/L	0.18	ND	0.34	0.26
Copper	ug/L	0.006	0.306	0.839	0.415
Lead	ug/L	0.007	0.158	0.413	0.210
Mercury	ng/L	0.1	1.0	2.3	1.7
Zinc	ug/L	0.80	2.62	6.14	5.67

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	ND	ND	6
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	ND	ND	6
Anions	Meq/L		0.075	0.205	0.328

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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April 26, 1995
PACE Project Number: 941112510

Client Reference: Crandon Mining (Battelle) Surface Waters

PACE Sample Number:	10 0270601	10 0270610	10 0270628
Date Collected:	11/10/94	11/10/94	11/10/94
Time Collected:	08:30	10:00	12:30
Date Received:	11/11/94	11/11/94	11/11/94
Client Sample ID:	LG-11	LG-12	LG-15-01

<u>Parameter</u>	<u>Units</u>	<u>MDL</u>
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INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Antimony	mg/L	0.005	ND	ND	ND
Cation-Anion Balance	%	0.01	29.31	-28.80	-50.38
Cations	Meq/L		0.138	0.113	0.108
Chemical Oxygen Demand, Low Level	mg/L	10	10	24	45
Chloride	mg/L	1	ND	ND	ND
Cyanide, Total	ug/L	20	ND	ND	ND
Fluoride, Soluble	mg/L	0.1	ND	ND	ND
ICP Digestion, Dissolved			BNDR	BNDR	BNDR
Iron, dissolved	mg/L	0.050	0.055	0.092	0.14
Manganese, dissolved	mg/L	0.010	ND	ND	0.083
Nitrogen, Ammonia	mg/L	0.1	ND	ND	0.2
Nitrogen, Kjeldahl	mg/L	0.2	0.7	0.8	1.3

Sodium Adsorption Ratio			0	0	0
Thallium	mg/L	0.005	ND	ND	ND

METALS BY ICP

Silver	mg/L	0.010	ND	ND	ND
Barium	mg/L	0.010	ND	ND	ND
Beryllium	mg/L	0.01	ND	ND	ND
Calcium	mg/L	1.0	1.5	1.6	1.4
Iron, total	mg/L	0.050	0.073	0.14	0.21
Magnesium	mg/L	0.50	0.52	ND	ND
Manganese, total	mg/L	0.010	0.013	0.011	0.085
Sodium	mg/L	1.0	ND	ND	ND
Nickel	mg/L	0.030	ND	ND	ND
Molybdenum	mg/L	0.020	ND	ND	ND
Boron	mg/L	0.100	ND	ND	ND

METALS BY TRACE ICP

Arsenic	mg/L	0.005	ND	ND	ND
Selenium	mg/L	0.005	ND	0.006	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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April 26, 1995
PACE Project Number: 941112510

Client Reference: Crandon Mining (Battelle) Surface Waters

PACE Sample Number:	10 0270636	10 0270644	10 0270652
Date Collected:	11/10/94	11/09/94	11/09/94
Time Collected:	12:30	14:30	16:10
Date Received:	11/11/94	11/11/94	11/11/94
Client Sample ID:	LG-15-02	LG-7	LG-13
<u>Parameter</u>	<u>Units</u>	<u>MDI</u>	

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	60	51	78
Solids, Total Suspended	mg/L	5	ND	5	ND
Sulfate	mg/L	1.0	11	5.9	11
Phosphorus, Soluble	mg/L	0.05	ND	ND	ND
Phosphorus, Total	mg/L	0.05	ND	ND	ND
Oil and Grease	mg/L	4.6	ND	ND	ND
Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	3	ND
Hardness, Total as Calcium Carbonate	mg/L	5	6	220	8
Potassium	mg/L	1.0	1.6	ND	ND
Nitrogen, Nitrate	mg/L	0.50	ND	ND	ND
pH		0.1	5.5	4.9	5.5
Turbidity	NTU	0.5	1.4	0.7	0.9

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.30	104	122	170
Cadmium	ug/L	0.006	ND	0.034	0.009
Chromium	ug/L	0.18	0.22	0.44	0.28
Copper	ug/L	0.006	0.264	0.355	0.607
Lead	ug/L	0.007	0.156	0.219	0.421
Mercury	ng/L	0.1	1.7	1.8	2.4
Zinc	ug/L	0.80	3.87	13.8	8.67

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	ND	ND	ND
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	ND	ND	ND
Anions	Meq/L		0.230	0.123	0.229
Antimony	mg/L	0.005	ND	ND	ND
Cation-Anion Balance	%	0.01	-36.93	-34.54	-20.65
Cations	Meq/L		0.106	0.060	0.151

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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April 26, 1995
PACE Project Number: 941112510

Client Reference: Crandon Mining (Battelle) Surface Waters

PACE Sample Number:	10 0270636	10 0270644	10 0270652
Date Collected:	11/10/94	11/09/94	11/09/94
Time Collected:	12:30	14:30	16:10
Date Received:	11/11/94	11/11/94	11/11/94
Client Sample ID:	LG-15-02	LG-7	LG-13
<u>Parameter</u>	<u>Units</u>	<u>MDL</u>	

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Chemical Oxygen Demand, Low Level	mg/L	10	42	10	26
Chloride	mg/L	1	ND	ND	ND
Cyanide, Total	ug/L	20	ND	ND	ND
Fluoride, Soluble	mg/L	0.1	ND	ND	ND
ICP Digestion, Dissolved			BNDR	BNDR	BNDR
Iron, dissolved	mg/L	0.050	0.15	0.058	0.24
Manganese, dissolved	mg/L	0.010	0.082	ND	0.018
Nitrogen, Ammonia	mg/L	0.1	0.2	ND	ND
Nitrogen, Kjeldahl	mg/L	0.2	1.7	1.7	1.0
Sodium Adsorption Ratio			0	0	0
Thallium	mg/L	0.005	ND	ND	ND

METALS BY ICP

Silver	mg/L	0.010	ND	ND	ND
Barium	mg/L	0.010	ND	ND	0.016
Beryllium	mg/L	0.01	ND	ND	ND
Calcium	mg/L	1.0	1.3	1.2	2.1
Iron, total	mg/L	0.050	0.26	0.061	0.41
Magnesium	mg/L	0.50	ND	ND	0.56
Manganese, total	mg/L	0.010	0.085	ND	0.018
Sodium	mg/L	1.0	ND	ND	ND
Nickel	mg/L	0.030	ND	ND	ND
Molybdenum	mg/L	0.020	ND	ND	ND
Boron	mg/L	0.100	ND	ND	ND

METALS BY TRACE ICP

Arsenic	mg/L	0.005	ND	ND	ND
Selenium	mg/L	0.005	ND	ND	ND



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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April 26, 1995
PACE Project Number: 941112510

Client Reference: Crandon Mining (Battelle) Surface Waters

These data have been reviewed and are approved for release.

A handwritten signature in cursive script that reads "Steve R. Crupi".

Steve Crupi
Project Manager



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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FOOTNOTES
for pages 1 through 5

April 26, 1995
PACE Project Number: 941112510

Client Reference: Crandon Mining (Battelle) Surface Waters

MDL Method Detection Limit
ND Not detected at or above the MDL.



REPORT OF LABORATORY ANALYSIS

Foth & Van Dyke & Associates
2737 South Ridge Road
P.O. Box 19012
Green Bay, WI 54307

April 26, 1995
PACE Project Number: 941208512

Attn: Mr. Russell Janeshek

Client Reference: Crandon Mining (Battelle) Surface Waters

PACE Sample Number:

Date Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDL

10 0288764	10 0288772	10 0288780
12/05/94	12/05/94	12/05/94
12/08/94	12/08/94	12/08/94
SG-19	SG-30	SG-2

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	150	180	170
Solids, Total Suspended	mg/L	5	10	ND	5
Sulfate	mg/L	1.0	11	10	7.3
Phosphorus, Soluble	mg/L	0.05	ND	ND	ND
Phosphorus, Total	mg/L	0.05	ND	ND	ND
Oil and Grease	mg/L	4.6	ND	ND	ND

Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	ND	ND
Hardness, Total as Calcium Carbonate	mg/L	5	76	120	110
Potassium	mg/L	1.0	ND	ND	ND
Nitrogen, Nitrate	mg/L	0.50	ND	ND	ND
pH		0.1	7.2	7.1	7.3
Turbidity	NTU	0.5	2.3	0.62	1.8

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.30	32.6	57.7	26.9
Cadmium	ug/L	0.006	ND	ND	ND
Chromium	ug/L	0.18	0.54	0.46	0.36
Copper	ug/L	0.006	0.093	0.621	0.161
Lead	ug/L	0.007	0.127	0.171	0.053
Mercury	ng/L	0.1	2.4	1.2	1.2
Zinc	ug/L	0.80	1.47	1.61	1.22

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	71	120	110
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	71	120	110
Anions	Meq/L		1.42	2.18	2.04
Antimony	mg/L	0.005	ND	ND	ND



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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April 26, 1995
PACE Project Number: 941208512

Client Reference: Crandon Mining (Battelle) Surface Waters

PACE Sample Number:	10 0288764	10 0288772	10 0288780
Date Collected:	12/05/94	12/05/94	12/05/94
Date Received:	12/08/94	12/08/94	12/08/94
Client Sample ID:	SG-19	SG-30	SG-2
Parameter	Units	MDI	

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Cation-Anion Balance	%	0.01	1.18	7.43	1.89
Cations	Meq/L		1.46	2.52	2.12
Chemical Oxygen Demand, Low Level	mg/L	10	26	10	13
Chloride	mg/L	1	1	ND	3
Cyanide, Total	ug/L	20	ND	ND	ND
Fluoride, Soluble	mg/L	0.1	ND	ND	ND
Iron, dissolved	mg/L	0.050	0.22	0.094	0.27
Manganese, dissolved	mg/L	0.010	ND	0.014	ND
Nitrogen, Ammonia	mg/L	0.1	0.2	0.2	0.1
Nitrogen, Kjeldahl	mg/L	0.2	0.7	0.8	0.5
Sodium Adsorption Ratio			0.08	0.09	0.10
Thallium	mg/L	0.005	ND	ND	ND

METALS BY ICP

Silver	mg/L	0.010	ND	ND	ND
Barium	mg/L	0.010	ND	ND	ND
Beryllium	mg/L	0.01	ND	ND	ND
Calcium	mg/L	1.0	15	27	22
Iron, total	mg/L	0.050	0.46	0.11	0.30
Magnesium	mg/L	0.50	7.6	13	11
Manganese, total	mg/L	0.010	0.061	0.031	0.042
Sodium	mg/L	1.0	1.6	2.2	2.3
Nickel	mg/L	0.030	ND	ND	ND
Molybdenum	mg/L	0.020	ND	ND	ND
Boron	mg/L	0.100	ND	ND	ND

METALS BY TRACE ICP

Arsenic	mg/L	0.005	ND	ND	ND
Selenium	mg/L	0.005	ND	0.008	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 3

April 26, 1995
PACE Project Number: 941208512

Client Reference: Crandon Mining (Battelle) Surface Waters

PACE Sample Number:	10 0288799	10 0288802	10 0288810
Date Collected:	12/05/94	12/05/94	12/06/94
Time Collected:			09:00
Date Received:	12/08/94	12/08/94	12/08/94
Client Sample ID:	SG-3	SG-6	SG-E-01
Parameter	Units	MDL	

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	180	190	230
Solids, Total Suspended	mg/L	5	6	ND	5
Sulfate	mg/L	1.0	6.6	6.7	7.8
Phosphorus, Soluble	mg/L	0.05	ND	ND	ND
Phosphorus, Total	mg/L	0.05	ND	ND	ND
Oil and Grease	mg/L	4.6	ND	ND	ND
Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	ND	ND
Hardness, Total as Calcium Carbonate	mg/L	5	110	110	150
Potassium	mg/L	1.0	ND	ND	ND
Nitrogen, Nitrate	mg/L	0.50	ND	ND	ND
pH		0.1	7.4	7.6	7.3
Turbidity	NTU	0.5	1.3	2.6	0.6

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.30	27.0	17.2	19.9
Cadmium	ug/L	0.006	ND	ND	ND
Chromium	ug/L	0.18	0.38	0.41	1.22
Copper	ug/L	0.006	0.167	0.110	0.107
Lead	ug/L	0.007	0.071	0.057	0.039
Mercury	ng/L	0.1	1.1	2.0	0.7
Zinc	ug/L	0.80	1.04	1.09	0.95

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	91	110	140
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	91	110	140
Anions	Meq/L		1.71	1.94	2.52
Antimony	mg/L	0.005	ND	ND	ND
Cation-Anion Balance	%	0.01	10.48	9.15	9.45
Cations	Meq/L		2.12	2.33	3.04

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 4

April 26, 1995
PACE Project Number: 941208512

Client Reference: Crandon Mining (Battelle) Surface Waters

PACE Sample Number:	10 0288799	10 0288802	10 0288810
Date Collected:	12/05/94	12/05/94	12/06/94
Time Collected:			09:00
Date Received:	12/08/94	12/08/94	12/08/94
Client Sample ID:	SG-3	SG-6	SG-E-01
Parameter	Units	MDL	

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Chemical Oxygen Demand, Low Level	mg/L	10	13	ND	10
Chloride	mg/L	1	3	ND	2
Cyanide, Total	ug/L	20	ND	ND	ND
Fluoride, Soluble	mg/L	0.1	ND	ND	ND
Iron, dissolved	mg/L	0.050	0.19	ND	ND
Manganese, dissolved	mg/L	0.010	0.016	ND	ND
Nitrogen, Ammonia	mg/L	0.1	ND	ND	ND
Nitrogen, Kjeldahl	mg/L	0.2	0.3	1.3	0.5
Sodium Adsorption Ratio			0.10	0.08	0.09
Thallium	mg/L	0.005	ND	ND	ND

METALS BY ICP

Silver	mg/L	0.010	ND	ND	ND
Barium	mg/L	0.010	ND	ND	ND
Beryllium	mg/L	0.01	ND	ND	ND
Calcium	mg/L	1.0	22	25	32
Iron, total	mg/L	0.050	0.30	0.056	ND
Magnesium	mg/L	0.50	11	12	16
Manganese, total	mg/L	0.010	0.070	0.012	0.016
Sodium	mg/L	1.0	2.2	1.9	2.5
Nickel	mg/L	0.030	ND	ND	ND
Molybdenum	mg/L	0.020	ND	ND	ND
Boron	mg/L	0.100	ND	ND	ND

METALS BY TRACE ICP

Arsenic	mg/L	0.005	ND	ND	ND
Selenium	mg/L	0.005	ND	ND	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek

Page 5

April 26, 1995

PACE Project Number: 941208512

Client Reference: Crandon Mining (Battelle) Surface Waters

PACE Sample Number:	10 0288829
Date Collected:	12/06/94
Time Collected:	09:00
Date Received:	12/08/94
Client Sample ID:	SG-E-02
<u>Parameter</u>	<u>Units</u> <u>MDL</u>

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	230
Solids, Total Suspended	mg/L	5	ND
Sulfate	mg/L	1.0	8.1
Phosphorus, Soluble	mg/L	0.05	ND
Phosphorus, Total	mg/L	0.05	ND
Oil and Grease	mg/L	4.6	ND

Biochemical Oxygen Demand, 05 Day	mg/L	3	ND
Hardness, Total as Calcium Carbonate	mg/L	5	150
Potassium	mg/L	1.0	ND
Nitrogen, Nitrate	mg/L	0.50	ND
pH		0.1	7.2
Turbidity	NTU	0.5	0.6

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.30	23.4
Cadmium	ug/L	0.006	ND
Chromium	ug/L	0.18	1.13
Copper	ug/L	0.006	0.071
Lead	ug/L	0.007	0.019
Mercury	ng/L	0.1	0.6
Zinc	ug/L	0.80	1.00

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	140
Alkalinity, Carbonate	mg/L	5	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	140
Anions	Meq/L		2.52
Antimony	mg/L	0.005	ND
Cation-Anion Balance	%	0.01	7.08
Cations	Meq/L		2.91

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 6

April 26, 1995
PACE Project Number: 941208512

Client Reference: Crandon Mining (Battelle) Surface Waters

PACE Sample Number:	10 0288829
Date Collected:	12/06/94
Time Collected:	09:00
Date Received:	12/08/94
Client Sample ID:	SG-E-02
Parameter	Units MDL

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Chemical Oxygen Demand, Low Level	mg/L	10	ND
Chloride	mg/L	1	2
Cyanide, Total	ug/L	20	ND
Fluoride, Soluble	mg/L	0.1	ND
Iron, dissolved	mg/L	0.050	ND
Manganese, dissolved	mg/L	0.010	ND
Nitrogen, Ammonia	mg/L	0.1	ND
Nitrogen, Kjeldahl	mg/L	0.2	0.4
Sodium Adsorption Ratio			0.09
Thallium	mg/L	0.005	ND

METALS BY ICP

Silver	mg/L	0.010	ND
Barium	mg/L	0.010	ND
Beryllium	mg/L	0.01	ND
Calcium	mg/L	1.0	31
Iron, total	mg/L	0.050	0.088
Magnesium	mg/L	0.50	15
Manganese, total	mg/L	0.010	0.014
Sodium	mg/L	1.0	2.4
Nickel	mg/L	0.030	ND
Molybdenum	mg/L	0.020	ND
Boron	mg/L	0.100	ND

METALS BY TRACE ICP

Arsenic	mg/L	0.005	ND
Selenium	mg/L	0.005	ND



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 7

April 26, 1995
PACE Project Number: 941208512

Client Reference: Crandon Mining (Battelle) Surface Waters

These data have been reviewed and are approved for release.

A handwritten signature in cursive script that reads "Steve R. Crupi".

Steve Crupi
Project Manager



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 8

FOOTNOTES
for pages 1 through 7

April 26, 1995
PACE Project Number: 941208512

Client Reference: Crandon Mining (Battelle) Surface Waters

MDL Method Detection Limit
ND Not detected at or above the MDL.

January 1995 Surface Water Laboratory Data

February 17, 1995

Mr. Russell Janeshek
Foth & Van Dyke
2737 S. Ridge Rd.
Green Bay, WI 54307-9012

Re: Crandon Mining Company Project -
January 1995 Surface Water Sampling

Dear Mr. Janeshek:

Enclosed are the analytical report, raw data package and electronic deliverable representing the samples received on January 6, 1995. This group of samples represents the January 1995 surface water sampling round. Analysis results in this submittal cover tests performed at PACE and Northern Lake Service. The enclosed summary report and electronic deliverable will be reissued when the results from the Battelle analyses are received and incorporated.

Attached to this letter are copies of the chain of custody records. Also attached to this letter is a table cross referencing the PACE sample identification, the Northern Lake Service Identification and the sampling point identification. Copies of the chain of custody records for samples received at Northern Lake Service (NLS) are also attached to this letter.

The alkalinity and cyanide bottles received at PACE contained a skim layer of ice in the bottle. This situation was communicated to you on January 6, 1995. PACE proceeded with the analyses with your concurrence.

Samples were sent to PACE, NLS, and Battelle. A summary of the where each of the analyses were performed follows below.

PACE - Alkalinity, F, Cl, COD, NH3, TKN, Cyanide, total and dissolved metals (standard detection levels)

NLS - BOD, TP, Dissolved P, K, SO4, TSS, TDS, O&G, Hardness, pH, turbidity, nitrate

Battelle - Low-level metals (Al, Cd, Cr, Cu, Pb, Hg, Zn)

FEB 20 1995

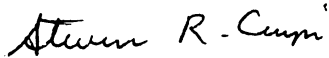
January 1995 Surface Waters
02/17/95
page 2 of 2

Six samples were analyzed for ammonia one day outside of the holding time. The analyst incorrectly calculated the holding time. This situation was communicated to you on February 1, 1995. As per your instructions, ammonia results are not reported for the affected samples (listed below).

SG-30
SG-2
SG-3
SG-6
SG-E-01
SG-E-02

If you have any questions or comments concerning the data submitted, feel free to contact me at (612) 525-3454.

Sincerely,



Steven R. Crupi
Project Manager

Attachments/Enclosures

Crandon Mining Company Project -
January 1995 Surface Water Sampling

Sample Cross Reference

<u>Sample ID</u>	<u>PACE ID</u>	<u>NLS ID</u>
SG-30	190.2	71395
SG-2	191.0	71396
SG-3	192.9	71397
SG-6	194.5	71398
SG-E-01	195.3	71399
SG-E-02	197.0	71400
LG-7-01	201.1	71401
LG-7-02	202.0	71402
LG-11	204.6	71500
LG-13	206.2	71502
LG-12	207.0	71501
LG-15	208.9	71503

Crandon Mining Project

Analysis

Method Identification

NLS

BOD	Standard Methods 5210
Total Phosphorous	EPA 365.2
Dissolved Phosphorous	EPA 365.2
Potassium	EPA 200.7
Sulfate	EPA 375.2
Total Suspended Solids	EPA 160.2
Total Dissolved Solids	EPA 160.1
Oil & Grease	EPA 413.1
Total Hardness	EPA 130.2
Nitrate	EPA 353.2-354.1
pH	EPA 150.1
Turbidity	EPA 180.1

PACE

Alkalinity	EPA 310.1
Fluoride	EPA 340.2
Chloride	EPA 325.1
COD	EPA 410.2
Ammonia	EPA 350.2
TKN	EPA 351.3
Cyanide	EPA 335.2
Total and Dissolved Metals	EPA 279.2 (Tl)
Standard Detect. Level	EPA 204.2 (Sb)
	EPA 245.1 (Hg, Std. Level only)
	EPA 200.7 (All other metals by ICP)

PACE PROJECT NAME: FOTH & VAN DYKE - CRANDON MINING SURFACE WATERS
 PACE PROJECT MANAGER: Steve Crupi

CLOSED DUE 2/03/95

SDG	PROJ. NO.	CLIENT	LAB NO.	FIELD ID	QC	MATRI	DATE	SAMPLED DATE	RECEIVED DATE	ICP ME	ICP TRA	Diss. Fe/Mn	NH3	TL-U	SB-U	FMET ALSS	TKN	F	TCN	CL	NLS	T- ALK	COD- LOW	SAR	CA	AN.	BAL CAT /AN.
190	950106504	FOTH&VD	190.2	SG-30	X	SW	01/03/95	01/06/95	M	M	M	M	M	M	M	B	M	M	M	M	N	M	M	M	M	M	M
190	950106504	FOTH&VD	191.0	SG-2		SW	01/03/95	01/06/95	M	M	M	M	M	M	M	B	M	M	M	M	N	M	M	M	M	M	M
190	950106504	FOTH&VD	192.9	SG-3		SW	01/03/95	01/06/95	M	M	M	M	M	M	M	B	M	M	M	M	N	M	M	M	M	M	M
190	950106504	FOTH&VD	194.5	SG-6		SW	01/03/95	01/06/95	M	M	M	M	M	M	M	B	M	M	M	M	N	M	M	M	M	M	M
190	950106504	FOTH&VD	195.3	SG-E-01		SW	01/03/95	01/06/95	M	M	M	M	M	M	M	B	M	M	M	M	N	M	M	M	M	M	M
190	950106504	FOTH&VD	197.0	SG-E-02		SW	01/03/95	01/06/95	M	M	M	M	M	M	M	B	M	M	M	M	N	M	M	M	M	M	M
190	950106504	FOTH&VD	201.1	LG-7-01		SW	01/04/95	01/06/95	M	M	M	M	M	M	M	B	M	M	M	M	N	M	M	M	M	M	M
190	950106504	FOTH&VD	202.0	LG-7-02		SW	01/04/95	01/06/95	M	M	M	M	M	M	M	B	M	M	M	M	N	M	M	M	M	M	M
190	950106504	FOTH&VD	204.6	LG-11		SW	01/04/95	01/06/95	M	M	M	M	M	M	M	B	M	M	M	M	N	M	M	M	M	M	M
190	950106504	FOTH&VD	206.2	LG-13		SW	01/05/95	01/06/95	M	M	M	M	M	M	M	B	M	M	M	M	N	M	M	M	M	M	M
190	950106504	FOTH&VD	207.0	LG-12		SW	01/05/95	01/06/95	M	M	M	M	M	M	M	B	M	M	M	M	N	M	M	M	M	M	M
190	950106504	FOTH&VD	208.9	LG-15		SW	01/05/95	01/06/95	M	M	M	M	M	M	M	B	M	M	M	M	N	M	M	M	M	M	M

One of the generals must be filtered for the dissolved iron and manganese parameters
 Trace metals are arsenic and selenium
 NLS is a subcontract subset
 T-ALK includes the carbonate and bicarbonate parameters
 DNR the ICP antimony parameter within the FMETALS subset
 FMETALSS is the Battelle subcontract subset

Raw data package is required to include calibrations, sample data, QC sample data, and calib. verif. data

Feel free to contact SRC at extension 3454 if questions! Happy Trails!

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2737 S. RIDGE Rd
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: RUSS JANESHEK
Bill To: FVD
P.O. # / Billing Reference 93C049
Project Name / No. CRANDON MINING Co (SW)

Pace Client No. 150419
Pace Project Manager SRC
Pace Project No. 950106.50
Requested Due Date: _____

Sampled By (PRINT):

SCOTT JANSEN JOE AUSTIN
Sampler Signature Date Sampled
Scott Jansen 1/3/95

Phone 414-477-2500

Sampled By (PRINT): SCOTT JANSSEN JOE AUSTIN

Sampler Signature Scott Janssen

Date Sampled 1/3/95

ITEM NO.

SAMPLE DESCRIPTION

TIME

MATRIX

PACE NO.

NO. OF CONTAINERS

UNPRESERVED

H₂SO₄

HNO₃

VOA

NAOH

PRESERVATIVES

ANALYSES REQUEST

ALKALINITY

F

CL

COD

NH₃

TDN

CYANIDE

TOTAL METALS

DISS METALS

REMARKS

3.7-9-447

1

SG-30

1200

SW

190.2

5

2

1

1

1

X

X

X

X

X

X

X

X

X

2

SG-2

1030

191.0

5

2

1

1

1

X

X

X

X

X

X

X

X

X

3

SG-3

1320

192.9

5

2

1

1

1

X

X

X

X

X

X

X

X

X

4

SG-6

1430

194.5

5

2

1

1

1

X

X

X

X

X

X

X

X

X

5

SG-E-01

1615

195.3

5

2

1

1

1

X

X

X

X

X

X

X

X

X

6

SG-E-02

1615

197.0

5

2

1

1

1

X

X

X

X

X

X

X

X

X

7

8

COOLER NOS.

BAILERS

SHIPMENT METHOD

OUT / DATE

RETURNED / DATE

ITEM NUMBER

RELINQUISHED BY / AFFILIATION

ACCEPTED BY / AFFILIATION

DATE

TIME

Scott Janssen 1/5/94 1400

Smith/pace

1/6/95 1200

COOLER NOS.	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
		OUT / DATE	RETURNED / DATE					
					Scott Jansen 1/5/95 1400	Janet Hodge / PACE	1/6/95	1200

Additional Comments

SEE REVERSE SIDE FOR INSTRUCTIONS

ORIGINAL



200040

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2737 S. RIDGE Rd
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: RUSS JANESHEW
Bill To: FVD
P.O. # / Billing Reference 930049
Project Name / No. CRANDON MINING Co (SW)

Pace Client No. 150419
Pace Project Manager SRL
Pace Project No. 950106.50
*Requested Due Date: _____

Sampled By (PRINT):

SCOTT JANSEN JOE AUSTIN

Sampler Signature

Date Sampled

Scott Jansen1/4/95

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.	NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST	REMARKS
						UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	NAOH		
1	LG-7-01	1030	SW	201.1	5	2	1	1	1	1	ALKALINITY F CL CUO NH3 TKN CYANIDE TOTAL METALS DISS METALS	
2	LG-7-02	1030	↓	202.0	5	2	1	1	1	1		
3	LG-11	1530	↓	204.6	5	2	1	1	1	1		
4												
5												
6												
7												
8												

COOLER NOS.	BAILERS	SHIPMENT METHOD	ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
OUT / DATE	RETURNED / DATE						
				Scott Jansen / FOTH: VAN DYKE 1/5/94 1400	SMJ / PACE	1/4/95	1200

Additional Comments

SEE REVERSE SIDE FOR INSTRUCTIONS

FINAL

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2737 S. RIDGE Rd
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: RUSS JANESHEK
Bill To: FVD
P.O. # / Billing Reference 930049
Project Name / No. CRANDON MINING Co (S.W.)

Pace Client No. 150419
Pace Project Manager SRC
Pace Project No. 950106-504
*Requested Due Date: _____

Sampled By (PRINT):

SCOTT JANSSEN

JOE AUSTIN

Sampler Signature

Date Sampled

Scott Jansen

1/5/95

3.7-9-449

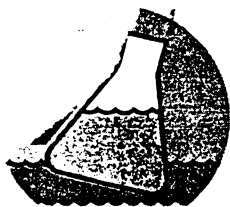
ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.	NO.	UNP	H ₂ S	HNO	VOA	N/A	ALL	F	CI	CO	NH	TI	CH	TO	Q	REMARKS
1	LG-13	1000	SW	206.2	5	2	1	1		1	X	X	X	X	X	X	X	X	X	
2	LG-12	1145	↓	207.0	5	2	1	1		1	X	X	X	X	X	X	X	X	X	
3	LG-15	1245	↓	208.9	5	2	1	1		1	X	X	X	X	X	X	X	X	X	
4																				
5																				
6																				
7																				
8																				

COOLER NOS.	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
		OUT / DATE	RETURNED / DATE					
					<u>Scott Jansen / FOTH: VAN DYKE</u>	<u>Joe Austin / PACE</u>	<u>1/5/94</u>	<u>1200</u>

Additional Comments

SEE REVERSE SIDE FOR INSTRUCTIONS

ORIGINAL



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 12238

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT FOTH VAN DYKE		PROJECT TITLE CRANDON MINING Co. (S.W.)	
ADDRESS 2737 S. RIDGE RD		PROJECT NO. 930049	P.O. NO.
CITY GREEN BAY	STATE WI	ZIP 54307	CONTACT RUSS JANESHEK
			PHONE 414-487-2500

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			PNP	PS	PN	GH	
1.	7139	SG-30	1/3/95	1200	SW	GRAB	1	1	1	2	
2.	7139	SG-2		1030			1	1	1	2	
3.	7139	SG-3		1320			1	1	1	2	
4.	7139	SG-6		1430			1	1	1	2	
5.	7139	SG-E-01		1615			1	1	1	2	
6.	71400	SG-E-02		1615			1	1	1	2	
7.	71401	LG-7-01	1/4/95	1030			1	1	1	2	
8.	71402	LG-7-02		1030			1	1	1	2	
9.											
10.											
11.											
12.											

SAMPLE TYPE:

SW = surface water
WW = wastewater
GW = groundwater

DW = drinking water
TIS = tissue
AIR = air

PROD = product
SOIL = soil
SED = sediment

describe others

CONTAINER

P = plastic
G = glass
V = glass vial
B = plastic bag

describe others

PRESERVATIVES & PREPARATION

NP = nothing added
S = sulfuric acid
N = nitric acid
Z = zinc acetate

OH = sodium hydroxide
HA = hydrochloric & ascorbic acid
H = hydrochloric acid

F = field filtered

COLLECTED BY (signature)

Scott Jensen + Joe Austin

CUSTODY SEAL NO. (IF ANY) DATE/TIME

1/4/95 1340

RELINQUISHED BY (signature)

RECEIVED BY (signature)

DATE/TIME

RELINQUISHED BY (signature)

RECEIVED BY (signature)

DATE/TIME

DISPATCHED BY (signature)

METHOD OF TRANSPORT

DATE/TIME

Scott Jensen

FVD

1/4/95 1340

RECEIVED AT NLS BY (signature)

Carlton

DATE/TIME

11-04-95 1340

CONDITION

On Ice

TEMP

52

SEAL INTACT?

☐ YES

☐ NO

SEAL

REMARKS & OTHER INFORMATION

Hand Delivered

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY

NORTHERN LAKE SERVICE, INC.

400 NORTH LAKE AVENUE

CRANDON, WI 54520 (715)478-2777

RESULTS ORDERED BY:

RUSS JANESHEK
FOTH: VAN DYKE

SEND RESULTS TO:

PAGE

CHAIN OF CUSTODY RECORD NUMBER:

12238

QUOTATION NUMBER:

ANALYZE FOR DISSOLVED OR TOTAL PARAMETERS?

SEND INVOICE TO:

PAGE

Note "L" for low level ICP analysis, and "F" for furnace analysis.

Samples on line #: 1-8 to be analyzed for the parameters checked below:

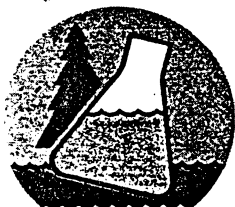
- | | | | |
|---|--|--|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☒ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☐ Tot. reactive | ☐ BNAs by 625/8270 |
| ☐ Antimony | ☒ Hardness | ☒ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☒ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☒ B.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☒ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☒ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BNAs |
| ☐ Chloride | ☐ Ammonia | ☒ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☒ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☐ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SDWA) |
| ☐ Color | ☐ Total Organic | ☒ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☒ Oil & Grease | ☒ Turbidity | ☐ PVOCs by 8020 |
| ☐ Copper | ☒ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO+PVOCs |
| ☒ Lab filt. | | ☐ Zinc | ☐ DRO-WI Modified |
| | | ☐ Munic.Sludge,WI List | ☐ PAHs by 610LC/8310 |

Samples on line #: _____ to be analyzed for the parameters checked below:

- | | | | |
|---|--|---|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☐ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☐ Tot. reactive | ☐ BNAs by 625/8270 |
| ☐ Antimony | ☐ Hardness | ☐ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☐ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☐ B.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☐ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☐ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BNAs |
| ☐ Chloride | ☐ Ammonia | ☐ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☐ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☐ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SDWA) |
| ☐ Color | ☐ Total Organic | ☐ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☐ Oil & Grease | ☐ Turbidity | ☐ PVOCs by 8020 |
| ☐ Copper | ☐ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO+PVOCs |
| | | ☐ Zinc | ☐ DRO-WI Modified |
| | | ☐ Munic.Sludge,WI List | ☐ PAHs by 610LC/8310 |

SPECIAL INSTRUCTIONS:

3.7-9-451



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 11579

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT FOTH: VAN DYKE	PROJECT TITLE CRANDON MINING CO (S.W.)	
ADDRESS 2737 S. RIDGE RD	PROJECT NO. 930049	P.O. NO.
CITY CRANDON GREEN BAY	STATE WI	ZIP 54307
CONTACT RUSS JANESHER (S.W.)		PHONE 414-497-2500

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			PNP	PS	PN	GH	
1.		LG-11	1/4/95	1530	S.W.	GRAB	1	1	1	2	
2.		LG-12	1/5/95	1145			1	1	1	2	
3.		LG-13		1000			1	1	1	2	
4.		LG-15		1245			1	1	1	2	
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE:
SW = surface water DW = drinking water PROD = product
WW = wastewater TIS = tissue SOIL = soil
GW = groundwater AIR = air SED = sediment
describe others

CONTAINER
P = plastic
G = glass
V = glass vial
B = plastic bag
describe others

PRESERVATIVES & PREPARATION
NP = nothing added OH = sodium hydroxide
S = sulfuric acid HA = hydrochloric & ascorbic acid
N = nitric acid
Z = zinc acetate H = hydrochloric acid
F = field filtered

COLLECTED BY (signature) <i>Scott Janesher</i>	CUSTODY SEAL NO. (IF ANY)	DATE/TIME 1/5/94 1430
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME
DISPATCHED BY (signature) <i>Scott Janesher</i>	METHOD OF TRANSPORT FVD	DATE/TIME 1/5/94 1450

RECEIVED AT NLS BY (signature) <i>Nancy Hilde</i>	DATE/TIME 1-5-95	CONDITION A150	ITEM NO. 11579
SEAL INTACT? ☐ YES ☐ NO	SEAL NO.	REMARKS & OTHER INFORMATION	

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY

3.7-9-452

NORTHERN LAKE SERVICE, INC.

400 NORTH LAKE AVENUE
CRANDON, WI 54520 (715)478-2777

ORDER OF ANALYSIS

RESULTS ORDERED BY:

FOTH: VAN DYKE
RUSS JANESHEK

CHAIN OF CUSTODY RECORD NUMBER:

11579

QUOTATION NUMBER:

ANALYZE FOR DISSOLVED OR TOTAL PARAMETERS?

SEND RESULTS TO:

PAGE

SEND INVOICE TO:

PAGE

Note "L" for low level ICP analysis, and "F" for furnace analysis.

Samples on line #s: 1-4 to be analyzed for the parameters checked below:

- | | | | |
|---|--|--|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☒ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☐ Tot. reactive | ☐ BNAs by 625/8270 |
| ☐ Antimony | ☒ Hardness | ☒ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☒ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☒ B.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☒ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☒ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BNAs |
| ☐ Chloride | ☐ Ammonia | ☒ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☒ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☐ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SDWA) |
| ☐ Color | ☐ Total Organic | ☐ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☒ Oil & Grease | ☒ Turbidity | ☐ PVOCs by 8020 |
| ☐ Copper | ☒ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO+PVOCs |
| | | ☐ Zinc | ☐ DRO-WI Modified |
| | | ☐ Munic.Sludge,WI List | ☐ PAHs by 610LC/8310 |

Samples on line #s: _____ to be analyzed for the parameters checked below:

- | | | | |
|---|--|---|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☐ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☐ Tot. reactive | ☐ BNAs by 625/8270 |
| ☐ Antimony | ☐ Hardness | ☐ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☐ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☐ B.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☐ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☐ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BNAs |
| ☐ Chloride | ☐ Ammonia | ☐ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☐ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☐ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SDWA) |
| ☐ Color | ☐ Total Organic | ☐ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☐ Oil & Grease | ☐ Turbidity | ☐ PVOCs by 8020 |
| ☐ Copper | ☐ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO+PVOCs |
| | | ☐ Zinc | ☐ DRO-WI Modified |
| | | ☐ Munic.Sludge,WI List | ☐ PAHs by 610LC/8310 |

SPECIAL INSTRUCTIONS:

3.7-9-453

REPORT OF LABORATORY ANALYSIS

Foth & Van Dyke & Associates
2737 South Ridge Road
P.O. Box 19012
Green Bay, WI 54307

February 08, 1995
PACE Project Number: 950106504

Attn: Mr. Russell Janeshek

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

10 0001902	10 0001910	10 0001929
01/03/95	01/03/95	01/03/95
12:00	10:30	13:20
01/06/95	01/06/95	01/06/95
SG-30	SG-2	SG-3

Parameter	Units	MDL			
-----------	-------	-----	--	--	--

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	140	180	140
Solids, Total Suspended	mg/L	5	7.0	ND	7
Sulfate	mg/L	1.0	8.7	8.0	7.2
Phosphorus, Soluble	mg/L	0.05	ND	ND	ND
Phosphorus, Total	mg/L	0.05	ND	ND	ND
Oil and Grease	mg/L	4.6	ND	ND	ND
Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	ND	ND
Hardness, Total as Calcium Carbonate	mg/L	5	160	130	ND
Potassium	mg/L	1.0	ND	ND	ND
Nitrogen, Nitrate	mg/L	0.50	ND	ND	ND
pH		0.1	7.4	7.1	7.1
Turbidity	NTU	0.5	0.7	1.3	0.9

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	150	120	130
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	150	120	130
Anions	Meq/L		2.64	2.21	2.37
Antimony	mg/L	0.005	ND	ND	ND
Cation-Anion Balance	%	0.01	9.48	10.58	8.28
Cations	Meq/L		3.19	2.74	2.79
Chemical Oxygen Demand, Low Level	mg/L	10	10	10	11
Chloride	mg/L	1	ND	3	3
Cyanide, Total	ug/L	20	ND	ND	ND
Fluoride, Soluble	mg/L	0.1	ND	0.1	0.1
Iron, dissolved	mg/L	0.050	ND	0.12	0.13
Manganese, dissolved	mg/L	0.010	0.012	0.034	0.047

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 2

February 08, 1995
PACE Project Number: 950106504

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:
Date Collected:
Time Collected:
Date Received:
Client Sample ID:
Parameter

10 0001902	10 0001910	10 0001929
01/03/95	01/03/95	01/03/95
12:00	10:30	13:20
01/06/95	01/06/95	01/06/95
SG-30	SG-2	SG-3

Units

MDI

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Nitrogen, Kjeldahl
Sodium Adsorption Ratio
Thallium

mg/L	0.2	0.3	0.4	0.5
		0.09	0.11	0.11
mg/L	0.005	ND	ND	ND

METALS BY TRACE ICP

Arsenic
Selenium

mg/L	0.005	ND	ND	ND
mg/L	0.005	0.005	ND	ND

METALS BY ICP

Silver
Barium
Beryllium
Calcium
Iron, total
Magnesium

mg/L	0.010	ND	ND	ND
mg/L	0.010	ND	0.012	0.012
mg/L	0.01	ND	ND	ND
mg/L	1.0	35	29	30
mg/L	0.050	0.052	0.29	0.33
mg/L	0.50	16	14	14

Manganese, total
Sodium
Nickel
Molybdenum
Boron

mg/L	0.010	0.029	0.049	0.072
mg/L	1.0	2.6	2.9	2.8
mg/L	0.030	ND	ND	ND
mg/L	0.020	ND	ND	ND
mg/L	0.100	ND	ND	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 3

February 08, 1995
PACE Project Number: 950106504

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0001945	10 0001953	10 0001970
Date Collected:	01/03/95	01/03/95	01/03/95
Time Collected:	14:30	16:15	16:15
Date Received:	01/06/95	01/06/95	01/06/95
Client Sample ID:	SG-6	SG-E-01	SG-E-02
<u>Parameter</u>	<u>Units</u>	<u>MDI</u>	

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	150	170	170
Solids, Total Suspended	mg/L	5	ND	5	ND
Sulfate	mg/L	1.0	7.2	9.2	9.2
Phosphorus, Soluble	mg/L	0.05	ND	ND	ND
Phosphorus, Total	mg/L	0.05	ND	ND	ND
Oil and Grease	mg/L	4.6	ND	ND	ND
Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	ND	ND
Hardness, Total as Calcium Carbonate	mg/L	5	130	150	150
Potassium	mg/L	1.0	ND	ND	ND
Nitrogen, Nitrate	mg/L	0.50	ND	ND	ND
pH		0.1	7.9	7.3	7.3
Turbidity	NTU	0.5	1.8	ND	ND

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	130	150	150
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	130	150	150
Anions	Meq/L		2.31	2.71	2.71
Antimony	mg/L	0.005	ND	ND	ND
Cation-Anion Balance	%	0.01	11.24	10.33	9.56
Cations	Meq/L		2.89	3.34	3.28
Chemical Oxygen Demand, Low Level	mg/L	10	ND	ND	ND
Chloride	mg/L	1	1	2	2
Cyanide, Total	ug/L	20	ND	ND	ND
Fluoride, Soluble	mg/L	0.1	0.1	0.1	0.1
Iron, dissolved	mg/L	0.050	ND	ND	ND
Manganese, dissolved	mg/L	0.010	0.017	ND	ND
Nitrogen, Kjeldahl	mg/L	0.2	0.4	0.3	0.4
Sodium Adsorption Ratio			0.08	0.09	0.09
Thallium	mg/L	0.005	ND	ND	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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February 08, 1995
PACE Project Number: 950106504

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:
Date Collected:
Time Collected:
Date Received:
Client Sample ID:
Parameter

10 0001945	10 0001953	10 0001970
01/03/95	01/03/95	01/03/95
14:30	16:15	16:15
01/06/95	01/06/95	01/06/95
SG-6	SG-E-01	SG-E-02

Units

MDI

INORGANIC ANALYSIS

METALS BY TRACE ICP

Parameter	Units	MDI	10 0001945	10 0001953	10 0001970
Arsenic	mg/L	0.005	ND	ND	ND
Selenium	mg/L	0.005	ND	ND	0.005

METALS BY ICP

Parameter	Units	MDI	10 0001945	10 0001953	10 0001970
Silver	mg/L	0.010	ND	ND	ND
Barium	mg/L	0.010	ND	ND	ND
Beryllium	mg/L	0.01	ND	ND	ND
Calcium	mg/L	1.0	31	36	35
Iron, total	mg/L	0.050	ND	ND	ND
Magnesium	mg/L	0.50	15	17	17
Manganese, total	mg/L	0.010	ND	ND	ND
Sodium	mg/L	1.0	2.2	2.7	2.7
Nickel	mg/L	0.030	ND	ND	ND
Molybdenum	mg/L	0.020	ND	ND	ND
Boron	mg/L	0.100	ND	ND	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 5

February 08, 1995
PACE Project Number: 950106504

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDL

10 0002011	10 0002020	10 0002046
01/04/95	01/04/95	01/04/95
10:30	10:30	15:30
01/06/95	01/06/95	01/06/95
LG-7-01	LG-7-02	LG-11

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Parameter	Units	MDL	10 0002011	10 0002020	10 0002046
Solids, Total Dissolved	mg/L	5	28	27	24
Solids, Total Suspended	mg/L	5	ND	7	ND
Sulfate	mg/L	1.0	7.8	7.5	4.3
Phosphorus, Soluble	mg/L	0.05	ND	ND	ND
Phosphorus, Total	mg/L	0.05	ND	ND	ND
Oil and Grease	mg/L	4.6	ND	ND	ND
Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	ND	ND
Hardness, Total as Calcium Carbonate	mg/L	5	6	8	6
Potassium	mg/L	1.0	ND	ND	ND
Nitrogen, Nitrate	mg/L	0.50	ND	ND	ND
pH		0.1	4.9	5.2	5.5
Turbidity	NTU	0.5	0.6	0.6	0.8

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Parameter	Units	MDL	10 0002011	10 0002020	10 0002046
Alkalinity, Bicarbonate	mg/L	5	ND	ND	ND
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	ND	ND	ND
Anions	Meq/L		0.16	0.16	0.09
Antimony	mg/L	0.005	ND	ND	ND
Cation-Anion Balance	%	0.01	0.12	-1.09	26.88
Cations	Meq/L		0.16	0.15	0.16
Chemical Oxygen Demand, Low Level	mg/L	10	26	26	51
Chloride	mg/L	1	ND	ND	ND
Cyanide, Total	ug/L	20	ND	ND	ND
Fluoride, Soluble	mg/L	0.1	ND	ND	ND
Iron, dissolved	mg/L	0.050	ND	ND	ND
Manganese, dissolved	mg/L	0.010	0.014	0.011	ND
Nitrogen, Ammonia	mg/L	0.1	ND (1)	ND	ND
Nitrogen, Kjeldahl	mg/L	0.2	0.6	0.6	0.5
Sodium Adsorption Ratio			0	0	0

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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February 08, 1995
PACE Project Number: 950106504

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDL

10 0002011	10 0002020	10 0002046
01/04/95	01/04/95	01/04/95
10:30	10:30	15:30
01/06/95	01/06/95	01/06/95
LG-7-01	LG-7-02	LG-11

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Thallium

mg/L

0.005

ND

ND

ND

METALS BY TRACE ICP

Arsenic

mg/L

0.005

ND

ND

ND

Selenium

mg/L

0.005

ND

ND

ND

METALS BY ICP

Silver

mg/L

0.010

ND

ND

ND

Barium

mg/L

0.010

ND

0.011

ND

Beryllium

mg/L

0.01

ND

ND

ND

Calcium

mg/L

1.0

1.8

1.7

1.7

Iron, total

mg/L

0.050

0.066

0.074

ND

Magnesium

mg/L

0.50

0.68

0.60

0.59

Manganese, total

mg/L

0.010

ND

ND

ND

Sodium

mg/L

1.0

ND

ND

ND

Nickel

mg/L

0.030

ND

ND

ND

Molybdenum

mg/L

0.020

ND

ND

ND

Boron

mg/L

0.100

ND

ND

ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 7

February 08, 1995
PACE Project Number: 950106504

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDL

10 0002062	10 0002070	10 0002089
01/05/95	01/05/95	01/05/95
10:00	11:45	12:45
01/06/95	01/06/95	01/06/95
LG-13	LG-12	LG-15

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Parameter	Units	MDL	10 0002062	10 0002070	10 0002089
Solids, Total Dissolved	mg/L	5	44	32	62
Solids, Total Suspended	mg/L	5	ND	ND	11
Sulfate	mg/L	1.0	12	9.5	10
Phosphorus, Soluble	mg/L	0.05	ND	ND	ND
Phosphorus, Total	mg/L	0.05	ND	ND	0.09
Oil and Grease	mg/L	4.6	8.3	ND	ND
Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	ND	15
Hardness, Total as Calcium Carbonate	mg/L	5	12	10	14
Potassium	mg/L	1.0	ND	1.0	3.2
Nitrogen, Nitrate	mg/L	0.50	ND	ND	ND
pH		0.1	5.5	4.7	5.8
Turbidity	NTU	0.5	0.9	1.1	3.7

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Parameter	Units	MDL	10 0002062	10 0002070	10 0002089
Alkalinity, Bicarbonate	mg/L	5	ND	ND	10
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	ND	ND	10
Anions	Meq/L		0.25	0.20	0.37
Antimony	mg/L	0.005	ND	ND	ND
Cation-Anion Balance	%	0.01	-3.65	-8.20	-11.31
Cations	Meq/L		0.23	0.17	0.30
Chemical Oxygen Demand, Low Level	mg/L	10	33	43	90
Chloride	mg/L	1	ND	ND	2
Cyanide, Total	ug/L	20	ND	ND	ND
Fluoride, Soluble	mg/L	0.1	ND	ND	ND
Iron, dissolved	mg/L	0.050	0.15	0.15	0.34
Manganese, dissolved	mg/L	0.010	0.025	0.022	0.23
Nitrogen, Ammonia	mg/L	0.1	ND	ND	0.1
Nitrogen, Kjeldahl	mg/L	0.2	0.7	0.8	2.0
Sodium Adsorption Ratio			0	0	0

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 8

February 08, 1995
PACE Project Number: 950106504

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDL

10 0002062	10 0002070	10 0002089
01/05/95	01/05/95	01/05/95
10:00	11:45	12:45
01/06/95	01/06/95	01/06/95
LG-13	LG-12	LG-15

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Thallium

mg/L

0.005

ND

ND

ND

METALS BY TRACE ICP

Arsenic

mg/L

0.005

ND

ND

ND

Selenium

mg/L

0.005

ND

ND

ND

METALS BY ICP

Silver

mg/L

0.010

ND

ND

ND

Barium

mg/L

0.010

0.022

0.013

0.020

Beryllium

mg/L

0.01

ND

ND

ND

Calcium

mg/L

1.0

3.0

2.6

2.9

Iron, total

mg/L

0.050

0.22

0.17

0.50

Magnesium

mg/L

0.50

0.80

0.74

0.71

Manganese, total

mg/L

0.010

0.025

0.026

0.23

Sodium

mg/L

1.0

ND

ND

ND

Nickel

mg/L

0.030

ND

ND

ND

Molybdenum

mg/L

0.020

ND

ND

ND

Boron

mg/L

0.100

ND

ND

ND

These data have been reviewed and are approved for release.

Steve R. Crupi

Steve Crupi
Project Manager

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 9

FOOTNOTES
for pages 1 through 8

February 08, 1995
PACE Project Number: 950106504

Client Reference: Crandon Mining Surface Waters

MDL Method Detection Limit
ND Not detected at or above the MDL.
(1) The spike for samples in project 95106504 was performed on sample 1902 which was later deleted due to analysis outside of holding time. The spike recovery on this sample was 84.6 %.

January-February-March 1995 Surface Water Laboratory Data

June 23, 1995

Mr. Russell Janeshek
Foth & Van Dyke
2737 S. Ridge Rd.
Green Bay, WI 54307-9012

Re: Crandon Mining Company Project -
January, February, March, 1995 SW Samplings
Battelle Trace Metals Data

Dear Mr. Janeshek:

Enclosed are the analytical report, raw data package and electronic deliverable representing the trace metals analyses from Battelle for the January, February and March, 1995, surface water samples. This data set is the last of the work submitted to Battelle for this project. The results are not blank corrected. The analytical report and electronic deliverable does include prior work performed on these samples at PACE and Northern Lake Service. This information was previously submitted to you (minus the Battelle results) along with the associated raw data package.

Attached to this letter are copies of the chain of custody records documenting receipt of the samples at Battelle.

The data package includes sensitivity checks, raw data and data summaries. All metals were analyzed for total recoverable metals. For Cd, Cu and Pb, a preconcentration step was followed by quantification using ICP-MS. Total recoverable mercury was analyzed by cold vapor atomic fluorescence.

The quality control samples include two each of standard reference material (SRM), matrix spikes and duplicates. The results from SRMs were within 25% of the certified value. Blank spikes and matrix spikes were generally within 75-125% recovery. The percent recovery for several spikes were not calculated because the spiking levels were not appropriate considering the detection limit or the concentration of metal in the unspiked sample; thus, these spiking results were coded "SL".

Battelle Data
6/24/95
Page 2

If you have any questions or comments concerning the data submitted,
feel free to contact me at (612) 525-3454.

Sincerely,

Steven R. Crupi

Steven R. Crupi
Project Manager

Attachments/Enclosures

cc: Central File
Login File
Project Manager

SAMPLE LOGIN

DATE: 01/09/95

PROJECT: FOTH & VAN DYKE

SPONSOR CODE	BATTELLE CODE	MATRIX	UNIT	SHELF/ FR#	TRAY/ RM#	BATCH	PARAMETERS REQUESTED	COLLECTION DATE	INITIALS
LG-11	677 FVD*175	WAT	I	1		18	Al, Cd, Cu, Pb, Hg, Zn	01/04/95	AG
LG-13	677 FVD*176	WAT	I	1		18	Al, Cd, Cu, Pb, Hg, Zn	01/04/95	AG
LG-12	677 FVD*177	WAT	I	1		18	Al, Cd, Cu, Pb, Hg, Zn	01/04/95	AG
LG-15	677 FVD*178	WAT	I	1		18	Al, Cd, Cu, Pb, Hg, Zn	01/04/95	AG
SG-30	677 FVD*179	WAT	I	1		18	Al, Cd, Cu, Pb, Hg, Zn	01/04/95	AG
SG-2	677 FVD*180	WAT	I	1		18	Al, Cd, Cu, Pb, Hg, Zn	01/04/95	AG
SG-3	677 FVD*181	WAT	I	1		18	Al, Cd, Cu, Pb, Hg, Zn	01/04/95	AG
SG-E-01	677 FVD*183	WAT	I	1		18	Al, Cd, Cu, Pb, Hg, Zn	01/04/95	AG
SG-E-02	677 FVD*184	WAT	I	1		18	Al, Cd, Cu, Pb, Hg, Zn	01/04/95	AG
LG-07-01	677 FVD*185	WAT	I	1		18	Al, Cd, Cu, Pb, Hg, Zn	01/04/95	AG
LG-07-02	677 FVD*186	WAT	I	1		18	Al, Cd, Cu, Pb, Hg, Zn	01/04/95	AG
SG-6	677 FVD*182	WAT	I	1		18	Al, Cd, Cu, Pb, Hg, Zn	01/04/95	AG

3.7-9-466

COMMENTS:

SAMPLE LOGIN

DATE: 03/08/95

PROJECT: FOTH & VAN DYKE

SPONSOR CODE	BATTELLE CODE	MATRIX	UNIT	SHELF/ FR#	TRAY/ RM#	BATCH	PARAMETERS REQUESTED	COLLECTION DATE	INITIALS
SG-19	677 FVD*187	WAT	I	1	1	19	METALS	02/27/95	AG
SG-30	677 FVD*188	WAT	I	1	1	19	METALS	02/27/95	AG
SG-2	677 FVD*189	WAT	I	1	1	19	METALS	02/27/95	AG
SG-6	677 FVD*190	WAT	I	1	1	19	METALS	02/27/95	AG
SG-E-01	677 FVD*191	WAT	I	1	1	19	METALS	02/28/95	AG
SG-E-02	677 FVD*192	WAT	I	1	1	19	METALS	02/28/95	AG
LG-11	677 FVD*193	WAT	I	1	1	19	METALS	02/28/95	AG
LG-7	677 FVD*194	WAT	I	1	1	19	METALS	03/01/95	AG
LG-13	677 FVD*195	WAT	I	1	1	19	METALS	03/01/95	AG
LG-12	677 FVD*196	WAT	I	1	1	19	METALS	03/01/95	AG
LG-15-01	677 FVD*197	WAT	I	1	1	19	METALS	03/02/95	AG
LG-15-02	677 FVD*198	WAT	I	1	1	19	METALS	03/02/95	AG

3.7-9-467

COMMENTS:

cc: Central File
Login File
Project Manager

SAMPLE LOGIN

DATE: 03/24/95

PROJECT: FOTH & VAN DYKE

SPONSOR CODE	BATTELLE CODE	MATRIX	UNIT	SHELF/ FR#	TRAY/ RM#	BATCH	PARAMETERS REQUESTED	COLLECTION DATE	INITIALS
LG-15-01	677 FVD*199	WAT	I	1	3	20	Al, Cd, Cr, Cu, Pb, Hg, Zn	03/22/95	AG
LG-15-02	677 FVD*200	WAT	I	1	3	20	Al, Cd, Cr, Cu, Pb, Hg, Zn	03/22/95	AG
SG-2	677 FVD*201	WAT	I	1	3	20	Al, Cd, Cr, Cu, Pb, Hg, Zn	03/22/95	AG
SG-E-01	677 FVD*202	WAT	I	1	3	20	Al, Cd, Cr, Cu, Pb, Hg, Zn	03/23/95	AG
SG-E-02	677 FVD*203	WAT	I	1	3	20	Al, Cd, Cr, Cu, Pb, Hg, Zn	03/23/95	AG
LG-11	677 FVD*204	WAT	I	1	3	20	Al, Cd, Cr, Cu, Pb, Hg, Zn	03/20/95	AG
SG-6	677 FVD*205	WAT	I	1	3	20	Al, Cd, Cr, Cu, Pb, Hg, Zn	03/20/95	AG
LG-7	677 FVD*206	WAT	I	1	3	20	Al, Cd, Cr, Cu, Pb, Hg, Zn	03/21/95	AG
LG-13	677 FVD*207	WAT	I	1	3	20	Al, Cd, Cr, Cu, Pb, Hg, Zn	03/21/95	AG
SG-19	677 FVD*208	WAT	I	1	3	20	Al, Cd, Cr, Cu, Pb, Hg, Zn	03/21/95	AG
SG-30	677 FVD*209	WAT	I	1	3	20	Al, Cd, Cr, Cu, Pb, Hg, Zn	03/21/95	AG
LG-12	677 FVD*210	WAT	I	1	3	20	Al, Cd, Cr, Cu, Pb, Hg, Zn	03/22/95	AG
SG-3	677 FVD*211	WAT	I	1	3	20	Al, Cd, Cr, Cu, Pb, Hg, Zn	03/22/95	AG

3.7-9-468

COMMENTS:

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2737 S. RIDGE Rd
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: PACE
Bill To: PACE
P.O. # / Billing Reference 930049
Project Name / No. CRANDON MENTING CO (SW.)

Pace Client No. _____
Pace Project Manager _____
Pace Project No. _____
*Requested Due Date: _____

Sampled By (PRINT):
SCOTT JANSSEN JOE AUSTIN
Sampler Signature Scott Jansen Date Sampled _____

NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST										REMARKS
	UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA		Al	Co	Cd	Cu	Pb	Hg	Zn				
1						X	X	X	X	X	X	X				Low Level METALS TECHNIQUE
2						X	X	X	X	X	X	X				
3						X	X	X	X	X	X	X				
4						X	X	X	X	X	X	X				
5						X	X	X	X	X	X	X				
6						X	X	X	X	X	X	X				
7						X	X	X	X	X	X	X				
8						X	X	X	X	X	X	X				

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.
1	SG-30	11/3/95	SW	
2	SG-2	1030		
3	SG-3	1030		
4	SG-6	1430		
5	SG-E-01	1615		
6	SG-E-02	1615		
7	LG-7-01	1030		
8	LG-7-02	1030		

COOLER NOS.	BAILERS	SHIPMENT METHOD	OUT / DATE	RETURNED / DATE	ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
						Scott Jansen FOTH: VAN DYKE		11/5/95	1400

Additional Comments

SEE REVERSE SIDE FOR INSTRUCTIONS



REPORT OF LABORATORY ANALYSIS

Foth & Van Dyke & Associates
2737 South Ridge Road
P.O. Box 19012
Green Bay, WI 54307

June 23, 1995
PACE Project Number: 950106504

Attn: Mr. Russell Janeshek

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:
Date Collected:
Time Collected:
Date Received:

10 0001902	10 0001910	10 0001929
01/03/95	01/03/95	01/03/95
12:00	10:30	13:20
01/06/95	01/06/95	01/06/95
SG-30	SG-2	SG-3

Parameter	Units	MDL
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SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	140	180	140
Solids, Total Suspended	mg/L	5	7.0	ND	7
Sulfate	mg/L	1.0	8.7	8.0	7.2
Phosphorus, Soluble	mg/L	0.05	ND	ND	ND
Phosphorus, Total	mg/L	0.05	ND	ND	ND
Oil and Grease	mg/L	4.6	ND	ND	ND
Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	ND	ND
Hardness, Total as Calcium Carbonate	mg/L	5	160	130	ND
Potassium	mg/L	1.0	ND	ND	ND
Nitrogen, Nitrate	mg/L	0.50	ND	ND	ND
pH		0.1	7.4	7.1	7.1
Turbidity	NTU	0.5	0.7	1.3	0.9

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.193	41.4	29.6	21.5
Cadmium	ug/L	0.003	0.007	0.003	0.003
Chromium	ug/L	0.050	0.519	0.379	0.373
Copper	ug/L	0.010	0.296	0.661	0.411
Lead	ug/L	0.010	0.162	0.093	0.080
Mercury	ng/L	0.10	1.34	1.48	1.06
Zinc	ug/L	0.152	1.31	0.747	0.827

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	150	120	130
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	150	120	130
Anions	Meq/L		2.64	2.21	2.37



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 2

June 23, 1995
PACE Project Number: 950106504

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDL

10 0001902	10 0001910	10 0001929
01/03/95	01/03/95	01/03/95
12:00	10:30	13:20
01/06/95	01/06/95	01/06/95
SG-30	SG-2	SG-3

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Antimony	mg/L	0.005	ND	ND	ND
Cation-Anion Balance	%	0.01	9.48	10.58	8.28
Cations	Meq/L		3.19	2.74	2.79
Chemical Oxygen Demand, Low Level	mg/L	10	10	10	11
Chloride	mg/L	1	ND	3	3
Cyanide, Total	ug/L	20	ND	ND	ND
Fluoride, Soluble	mg/L	0.1	ND	0.1	0.1
Iron, dissolved	mg/L	0.050	ND	0.12	0.13
Manganese, dissolved	mg/L	0.010	0.012	0.034	0.047
Nitrogen, Kjeldahl	mg/L	0.2	0.3	0.4	0.5
Sodium Adsorption Ratio			0.09	0.11	0.11
Thallium	mg/L	0.005	ND	ND	ND

METALS BY TRACE ICP

Arsenic	mg/L	0.005	ND	ND	ND
Selenium	mg/L	0.005	0.005	ND	ND

METALS BY ICP

Silver	mg/L	0.010	ND	ND	ND
Barium	mg/L	0.010	ND	0.012	0.012
Beryllium	mg/L	0.01	ND	ND	ND
Calcium	mg/L	1.0	35	29	30
Iron, total	mg/L	0.050	0.052	0.29	0.33
Magnesium	mg/L	0.50	16	14	14
Manganese, total	mg/L	0.010	0.029	0.049	0.072
Sodium	mg/L	1.0	2.6	2.9	2.8
Nickel	mg/L	0.030	ND	ND	ND
Molybdenum	mg/L	0.020	ND	ND	ND
Boron	mg/L	0.100	ND	ND	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 3

June 23, 1995
PACE Project Number: 950106504

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDL

10 0001945	10 0001953	10 0001970
01/03/95	01/03/95	01/03/95
14:30	16:15	16:15
01/06/95	01/06/95	01/06/95
SG-6	SG-E-01	SG-E-02

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Parameter	Units	MDL	10 0001945	10 0001953	10 0001970
Solids, Total Dissolved	mg/L	5	150	170	170
Solids, Total Suspended	mg/L	5	ND	5	ND
Sulfate	mg/L	1.0	7.2	9.2	9.2
Phosphorus, Soluble	mg/L	0.05	ND	ND	ND
Phosphorus, Total	mg/L	0.05	ND	ND	ND
Oil and Grease	mg/L	4.6	ND	ND	ND
Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	ND	ND
Hardness, Total as Calcium Carbonate	mg/L	5	130	150	150
Potassium	mg/L	1.0	ND	ND	ND
Nitrogen, Nitrate	mg/L	0.50	ND	ND	ND
pH		0.1	7.9	7.3	7.3
Turbidity	NTU	0.5	1.8	ND	ND

METALS BY LOW-LEVEL ANALYSES

Parameter	Units	MDL	10 0001945	10 0001953	10 0001970
Aluminum	ug/L	0.193	6.98	10.7	14.3
Cadmium	ug/L	0.003	0.003	ND	ND
Chromium	ug/L	0.050	0.255	0.901	0.968
Copper	ug/L	0.010	0.241	0.311	0.238
Lead	ug/L	0.010	0.030	0.039	0.026
Mercury	ug/L	0.10	0.69	0.68	0.623
Zinc	ug/L	0.152	0.640	0.754	2.38

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Parameter	Units	MDL	10 0001945	10 0001953	10 0001970
Alkalinity, Bicarbonate	mg/L	5	130	150	150
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	130	150	150
Anions	Meq/L		2.31	2.71	2.71
Antimony	mg/L	0.005	ND	ND	ND
Cation-Anion Balance	%	0.01	11.24	10.33	9.56
Cations	Meq/L		2.89	3.34	3.28



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 4

June 23, 1995
PACE Project Number: 950106504

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDL

10 0001945	10 0001953	10 0001970
01/03/95	01/03/95	01/03/95
14:30	16:15	16:15
01/06/95	01/06/95	01/06/95
SG-6	SG-E-01	SG-E-02

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Chemical Oxygen Demand, Low Level

Chloride

Cyanide, Total

Fluoride, Soluble

Iron, dissolved

Manganese, dissolved

Nitrogen, Kjeldahl

Sodium Adsorption Ratio

Thallium

mg/L	10	ND	ND	ND
mg/L	1	1	2	2
ug/L	20	ND	ND	ND
mg/L	0.1	0.1	0.1	0.1
mg/L	0.050	ND	ND	ND
mg/L	0.010	0.017	ND	ND
mg/L	0.2	0.4	0.3	0.4
mg/L	0.005	0.08	0.09	0.09
mg/L	0.005	ND	ND	ND

METALS BY TRACE ICP

Arsenic

Selenium

mg/L	0.005	ND	ND	ND
mg/L <td>0.005</td> <td>ND</td> <td>ND</td> <td>0.005</td>	0.005	ND	ND	0.005

METALS BY ICP

Silver

Barium

Beryllium

Calcium

Iron, total

Magnesium

mg/L	0.010	ND	ND	ND
mg/L <td>0.010<td>ND<td>ND<td>ND</td></td></td></td>	0.010 <td>ND<td>ND<td>ND</td></td></td>	ND <td>ND<td>ND</td></td>	ND <td>ND</td>	ND
mg/L <td>0.01<td>ND<td>ND<td>ND</td></td></td></td>	0.01 <td>ND<td>ND<td>ND</td></td></td>	ND <td>ND<td>ND</td></td>	ND <td>ND</td>	ND
mg/L <td>1.0<td>31<td>36<td>35</td></td></td></td>	1.0 <td>31<td>36<td>35</td></td></td>	31 <td>36<td>35</td></td>	36 <td>35</td>	35
mg/L <td>0.050<td>ND<td>ND<td>ND</td></td></td></td>	0.050 <td>ND<td>ND<td>ND</td></td></td>	ND <td>ND<td>ND</td></td>	ND <td>ND</td>	ND
mg/L <td>0.50<td>15<td>17<td>17</td></td></td></td>	0.50 <td>15<td>17<td>17</td></td></td>	15 <td>17<td>17</td></td>	17 <td>17</td>	17

Manganese, total

Sodium

Nickel

Molybdenum

Boron

mg/L	0.010	ND	ND	ND
mg/L <td>1.0</td> <td>2.2</td> <td>2.7</td> <td>2.7</td>	1.0	2.2	2.7	2.7
mg/L <td>0.030</td> <td>ND</td> <td>ND</td> <td>ND</td>	0.030	ND	ND	ND
mg/L <td>0.020</td> <td>ND</td> <td>ND</td> <td>ND</td>	0.020	ND	ND	ND
mg/L <td>0.100</td> <td>ND</td> <td>ND</td> <td>ND</td>	0.100	ND	ND	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 5

June 23, 1995
PACE Project Number: 950106504

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:
Date Collected:
Time Collected:
Date Received:
Client Sample ID:
Parameter

10 0002011	10 0002020	10 0002046
01/04/95	01/04/95	01/04/95
10:30	10:30	15:30
01/06/95	01/06/95	01/06/95
LG-7-01	LG-7-02	LG-11

Units MDL

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Parameter	Units	MDL	10 0002011	10 0002020	10 0002046
Solids, Total Dissolved	mg/L	5	28	27	24
Solids, Total Suspended	mg/L	5	ND	7	ND
Sulfate	mg/L	1.0	7.8	7.5	4.3
Phosphorus, Soluble	mg/L	0.05	ND	ND	ND
Phosphorus, Total	mg/L	0.05	ND	ND	ND
Oil and Grease	mg/L	4.6	ND	ND	ND
Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	ND	ND
Hardness, Total as Calcium Carbonate	mg/L	5	6	8	6
Potassium	mg/L	1.0	ND	ND	ND
Nitrogen, Nitrate	mg/L	0.50	ND	ND	ND
pH		0.1	4.9	5.2	5.5
Turbidity	NTU	0.5	0.6	0.6	0.8

METALS BY LOW-LEVEL ANALYSES

Parameter	Units	MDL	10 0002011	10 0002020	10 0002046
Aluminum	ug/L	0.193	108	118	20.4
Cadmium	ug/L	0.003	0.065	0.013	0.012
Chromium	ug/L	0.050	0.205	0.255	0.131
Copper	ug/L	0.010	0.975	0.137	0.544
Lead	ug/L	0.010	0.369	0.065	0.262
Mercury	ug/L	0.10	2.27	2.55	1.47
Zinc	ug/L	0.152	10.2	9.91	2.38

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Parameter	Units	MDL	10 0002011	10 0002020	10 0002046
Alkalinity, Bicarbonate	mg/L	5	ND	ND	ND
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	ND	ND	ND
Anions	Meq/L		0.16	0.16	0.09
Antimony	mg/L	0.005	ND	ND	ND
Cation-Anion Balance	%	0.01	0.12	-1.09	26.88
Cations	Meq/L		0.16	0.15	0.16

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 6

June 23, 1995
PACE Project Number: 950106504

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0002011	10 0002020	10 0002046
Date Collected:	01/04/95	01/04/95	01/04/95
Time Collected:	10:30	10:30	15:30
Date Received:	01/06/95	01/06/95	01/06/95
Client Sample ID:	LG-7-01	LG-7-02	LG-11

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

	Units	MDI	10 0002011	10 0002020	10 0002046
Chemical Oxygen Demand, Low Level	mg/L	10	26	26	51
Chloride	mg/L	1	ND	ND	ND
Cyanide, Total	ug/L	20	ND	ND	ND
Fluoride, Soluble	mg/L	0.1	ND	ND	ND
Iron, dissolved	mg/L	0.050	ND	ND	ND
Manganese, dissolved	mg/L	0.010	0.014	0.011	ND
Nitrogen, Ammonia	mg/L	0.1	ND (1)	ND	ND
Nitrogen, Kjeldahl	mg/L	0.2	0.6	0.6	0.5
Sodium Adsorption Ratio			0	0	0
Thallium	mg/L	0.005	ND	ND	ND

METALS BY TRACE ICP

Arsenic	mg/L	0.005	ND	ND	ND
Selenium	mg/L	0.005	ND	ND	ND

METALS BY ICP

Silver	mg/L	0.010	ND	ND	ND
Barium	mg/L	0.010	ND	0.011	ND
Beryllium	mg/L	0.01	ND	ND	ND
Calcium	mg/L	1.0	1.8	1.7	1.7
Iron, total	mg/L	0.050	0.066	0.074	ND
Magnesium	mg/L	0.50	0.68	0.60	0.59
Manganese, total	mg/L	0.010	ND	ND	ND
Sodium	mg/L	1.0	ND	ND	ND
Nickel	mg/L	0.030	ND	ND	ND
Molybdenum	mg/L	0.020	ND	ND	ND
Boron	mg/L	0.100	ND	ND	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 7

June 23, 1995
PACE Project Number: 950106504

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDI

10 0002062	10 0002070	10 0002089
01/05/95	01/05/95	01/05/95
10:00	11:45	12:45
01/06/95	01/06/95	01/06/95
LG-13	LG-12	LG-15

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved

Solids, Total Suspended

Sulfate

Phosphorus, Soluble

Phosphorus, Total

Oil and Grease

Biochemical Oxygen Demand, 05 Day

Hardness, Total as Calcium Carbonate

Potassium

Nitrogen, Nitrate

pH

Turbidity

mg/L	5	44	32	62
mg/L	5	ND	ND	11
mg/L	1.0	12	9.5	10
mg/L	0.05	ND	ND	ND
mg/L	0.05	ND	ND	0.09
mg/L	4.6	8.3	ND	ND
mg/L	3	ND	ND	15
mg/L	5	12	10	14
mg/L	1.0	ND	1.0	3.2
mg/L	0.50	ND	ND	ND
	0.1	5.5	4.7	5.8
NTU	0.5	0.9	1.1	3.7

METALS BY LOW-LEVEL ANALYSES

Aluminum

Cadmium

Chromium

Copper

Lead

Mercury

Zinc

ug/L	0.193	199	130	144
ug/L	0.003	0.028	0.021	0.003
ug/L	0.050	0.302	0.342	0.414
ug/L	0.010	1.06	0.879	0.701
ug/L	0.010	0.973	2.18	0.289
ug/L	0.10	3.01	3.67	2.56
ug/L	0.152	7.78	7.89	5.10

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate

Alkalinity, Carbonate

Alkalinity, Total as Calcium Carbonate

Anions

Antimony

Cation-Anion Balance

Cations

mg/L	5	ND	ND	10
mg/L	5	ND	ND	ND
mg/L	5	ND	ND	10
Meq/L		0.25	0.20	0.37
mg/L	0.005	ND	ND	ND
%	0.01	-3.65	-8.20	-11.31
Meq/L		0.23	0.17	0.30

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 8

June 23, 1995
PACE Project Number: 950106504

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0002062	10 0002070	10 0002089
Date Collected:	01/05/95	01/05/95	01/05/95
Time Collected:	10:00	11:45	12:45
Date Received:	01/06/95	01/06/95	01/06/95
Client Sample ID:	LG-13	LG-12	LG-15

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

	Units	MDL	10 0002062	10 0002070	10 0002089
Chemical Oxygen Demand, Low Level	mg/L	10	33	43	90
Chloride	mg/L	1	ND	ND	2
Cyanide, Total	ug/L	20	ND	ND	ND
Fluoride, Soluble	mg/L	0.1	ND	ND	ND
Iron, dissolved	mg/L	0.050	0.15	0.15	0.34
Manganese, dissolved	mg/L	0.010	0.025	0.022	0.23
Nitrogen, Ammonia	mg/L	0.1	ND	ND	0.1
Nitrogen, Kjeldahl	mg/L	0.2	0.7	0.8	2.0
Sodium Adsorption Ratio			0	0	0
Thallium	mg/L	0.005	ND	ND	ND

METALS BY TRACE ICP

	Units	MDL	10 0002062	10 0002070	10 0002089
Arsenic	mg/L	0.005	ND	ND	ND
Selenium	mg/L	0.005	ND	ND	ND

METALS BY ICP

	Units	MDL	10 0002062	10 0002070	10 0002089
Silver	mg/L	0.010	ND	ND	ND
Barium	mg/L	0.010	0.022	0.013	0.020
Beryllium	mg/L	0.01	ND	ND	ND
Calcium	mg/L	1.0	3.0	2.6	2.9
Iron, total	mg/L	0.050	0.22	0.17	0.50
Magnesium	mg/L	0.50	0.80	0.74	0.71
Manganese, total	mg/L	0.010	0.025	0.026	0.23
Sodium	mg/L	1.0	ND	ND	ND
Nickel	mg/L	0.030	ND	ND	ND
Molybdenum	mg/L	0.020	ND	ND	ND
Boron	mg/L	0.100	ND	ND	ND



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 9

June 23, 1995
PACE Project Number: 950106504

Client Reference: Crandon Mining Surface Waters

These data have been reviewed and are approved for release.

Steven R. Crupi

Steve R. Crupi
Project Manager



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 10

FOOTNOTES
for pages 1 through 9

June 23, 1995
PACE Project Number: 950106504

Client Reference: Crandon Mining Surface Waters

MDL Method Detection Limit
ND Not detected at or above the MDL.
(1) The spike for samples in project 95106504 was performed on sample 1902 which was later deleted due to analysis outside of holding time. The spike recovery on this sample was 84.6 %.

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2737 S. RIDGE Rd
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: RUSS JANESHER
Bill To: FOTH: VAN DYKE
P.O. # / Billing Reference 93C049
Project Name / No. CRANDON MINING Co (S.W.)

Page Client No. _____
Page Project Manager _____
Page Project No. 0830384
Requested Due Date: _____

Sampled By (PRINT):

SCOTT JANSEN

JOE AUSTIN

Sampler Signature

Scott Jansen

Date Sampled

2/27/95

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.
1	SG-19	0930	SW	9006.7
2	SG-30	1040	↓	9007.5
3	SG-2	1200	↓	9008.3
4	SG-6	1510	↓	9009.1
5				
6				
7				
8				

NO. OF CONTAINERS	PRESERVATIVES				
	UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	NAOH

ANALYSES REQUEST

ALKALINITY	F	CI	COD	NH ₃	TKN	CYANIDE	TOTAL + Diss Metals
------------	---	----	-----	-----------------	-----	---------	---------------------

REMARKS

COOLER NOS.	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
		OUT / DATE	RETURNED / DATE					
					<u>Scott Jansen FOTH: VAN DYKE</u> <u>3/1/95 1400</u>	<u>[Signature]</u>	<u>3/2/95</u>	<u>1800</u>

Additional Comments

SEE REVERSE SIDE FOR INSTRUCTIONS



207009

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2737 S. RIDGE Rd
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: RUSS JANESHEK
Bill To: FOTH: VAN DYKE
P.O. # / Billing Reference 930049
Project Name / No. CRANDON MINING Co (S.W.)

Pace Client No. _____
Pace Project Manager _____
Pace Project No. 900303504
*Requested Due Date: _____

Sampled By (PRINT):

SCOTT JANSSEN JOE AUSTIN

Sampler Signature

Date Sampled

Scott Janssen 2/28/95

Phone 717 717 2000

Sampled By (PRINT): SCOTT JANSSEN JOE AUSTIN					NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST											REMARKS			
Sampler Signature Scott Janssen						UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	NaOH		ALKALINTY	FL	CL	COO	NH ₃	TAN	CYANIDE	TOTAL DISS METALS	K					
ITEM NO.	SAMPLE DESCRIPTION				TIME	MATRIX	PACE NO.																		
1	SG-E-01				2/28/95 0900	S.W.	4999.9	5	2	1	1														
2	SG-E-02				0900		5000.8	5	2	1	1														
3	LG-11-Composit				1300	-	5001.8	2	1		1														
4	LG-11-10'				1300		5002.4	4	1	1	1														
5	LG-11-30'				1300		5003.2	4	1	1	1														
6	LG-7				2/28/95 0915	S.W.	5004.0	5	2	1	1														
7	LG-13				1200		5005.9	5	2	1	1														
8																									

3.7-9-482

COOLER NOS.	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
		OUT / DATE	RETURNED / DATE					
					<u>Scott Janssen FOTH: VAN DYKE</u>	<u>[Signature]</u>	<u>3/1/95</u>	<u>1400</u>

Additional Comments

SEE REVERSE SIDE FOR INSTRUCTIONS

ORIGINAL

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2737 S. RIDGE RD
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: RUSS JANESHEK
Bill To: FOTH: VAN DYKE
P.O. # / Billing Reference 930049
Project Name / No. RUSS JANESHEK ^{SDJ 3/2/95} ^{CRANDON MINING CO (S.W.)}

Pace Client No. _____
Pace Project Manager _____
Pace Project No. 950303504
Requested Due Date: _____

Sampled By (PRINT): SCOTT JANSEN JOE AUSTIN

Sampler Signature Scott Jansen Date Sampled 3/1/95 3/2/95

3.7-9-483

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.	NO.	UNP	H ₂ SO ₄	HNO ₃	VOA	NH ₄	AL	F	Cl	CO	NH ₃	TKN	CYAN	TOTAL	K	REMARKS
1	LG-12	1530	SW	5292.2	5	2	1	1	1		X	X	X	X	X	X	X	X	X	
2	LG-15-01	1000	↓	5293.0	5	2	1	1	1		X	X	X	X	X	X	X	X	X	
3	LG-15-02	1000	↓	5294.9	5	2	1	1	1		X	X	X	X	X	X	X	X	X	
4																				
5																				
6																				
7																				
8																				

COOLER NOS.	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
		OUT / DATE	RETURNED / DATE					
					Scott Jansen FOTH: VAN DYKE 3/2/95 1300	J. Lee Puer	3/3/95	1500

Additional Comments

ORIGINAL

SEE REVERSE SIDE FOR INSTRUCTIONS



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 15014

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT FOTH: VAN DYKE		PROJECT TITLE CRANDON MINING Co (S.W.)	
ADDRESS 2737 S. RIDGE Rd		PROJECT NO. 93C049	P.O. NO.
CITY GREEN BAY	STATE WI	ZIP 54307	CONTACT RUSS JANESHEK
			PHONE 414-497-2500

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			PNP	PS	PN	GH	
1.	74281	SG-19	2/27/95	0930	S.W.	GRAB	1	1	1	2	
2.	74282	SG-30		1040			1	1	1	2	
3.	74283	SG-2		1200			1	1	1	2	
4.	74284	SG-6		1510			1	1	1	2	
5.	74291	SG-E-01	2/28/95	0900			1	1	1	2	
6.	74292	SG-E-02		0900			1	1	1	2	
7.											
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE:

SW = surface water DW = drinking water PROD = product

WW = wastewater TIS = tissue SOIL = soil

GW = groundwater AIR = air SED = sediment

describe others

CONTAINER

P = plastic NP = nothing added OH = sodium hydroxide

G = glass S = sulfuric acid HA = hydrochloric & ascorbic acid

V = glass vial N = nitric acid H = hydrochloric acid

B = plastic bag Z = zinc acetate F = field filtered

describe others

COLLECTED BY (signature) <i>Scott Ganssen</i>	CUSTODY SEAL NO. (IF ANY)	DATE/TIME 2/28/95
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME
DISPATCHED BY (signature) <i>Scott Ganssen</i>	METHOD OF TRANSPORT FVO	DATE/TIME 2/28/95 1015

RECEIVED AT NLS BY (signature) <i>Scott Ganssen</i>	DATE/TIME 2-28-95	CONDITION	TEMP
SEAL INTACT? ☐ YES ☐ NO	REMARKS & OTHER INFORMATION Hand Delivered		

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY

3.7-9-484

RESULTS ORDERED BY:

FOTH: VAN DYKE
RUSS JANESHEK

CHAIN OF CUSTODY RECORD NUMBER:

15014

QUOTATION NUMBER:

ANALYZE FOR DISSOLVED OR TOTAL PARAMETERS?

SEND INVOICE TO:

PAGE

SEND RESULTS TO:

PAGE

Note "L" for low level ICP analysis, and "F" for furnace analysis.

Samples on line #: 1-6 to be analyzed for the parameters checked below:

- | | | | |
|---|--|---|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☒ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☐ Tot. reactive | ☐ BNAs by 625/8270 |
| ☐ Antimony | ☒ Hardness | ☐ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☐ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☒ B.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☒ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☒ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BNAs |
| ☐ Chloride | ☐ Ammonia | ☒ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☒ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☐ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SDWA) |
| ☐ Color | ☐ Total Organic | ☒ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☒ Oil & Grease | ☒ Turbidity | ☐ PVOCs by 8020 |
| ☐ Copper | ☒ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO+PVOCs |
| | | ☐ Zinc | ☐ DRO-WI Modified |
| | | ☐ Munic.Sludge,WI List | ☐ PAHs by 610LC/8310 |

Samples on line #: _____ to be analyzed for the parameters checked below:

- | | | | |
|---|--|---|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☐ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☐ Tot. reactive | ☐ BNAs by 625/8270 |
| ☐ Antimony | ☐ Hardness | ☐ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☐ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☐ B.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☐ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☐ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BNAs |
| ☐ Chloride | ☐ Ammonia | ☐ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☐ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☐ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SDWA) |
| ☐ Color | ☐ Total Organic | ☐ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☐ Oil & Grease | ☐ Turbidity | ☐ PVOCs by 8020 |
| ☐ Copper | ☐ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO+PVOCs |
| | | ☐ Zinc | ☐ DRO-WI Modified |
| | | ☐ Munic.Sludge,WI List | ☐ PAHs by 610LC/8310 |

SPECIAL INSTRUCTIONS:



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 15118

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT <i>FOTH VAN DYKE</i>		PROJECT TITLE <i>CRANDON MINING CO (S.W.)</i>	
ADDRESS <i>2737 S. RIDGE Rd</i>		PROJECT NO. <i>930049</i>	P.O. NO.
CITY <i>GREEN BAY</i>	STATE <i>WI</i>	ZIP <i>54307</i>	CONTACT <i>RUSS JANESHEK</i>
			PHONE <i>414-497-2500</i>

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			PNP	PS	PN	GH	
1.	<i>74361</i>	<i>LG-11-10'</i>	<i>2/28/95</i>	<i>1300</i>	<i>S.W.</i>	<i>GRAB</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>2</i>	
2.	<i>74362</i>	<i>LG-11-30'</i>	<i>↓</i>	<i>1300</i>	<i>↓</i>	<i>↓</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>2</i>	
3.	<i>74363</i>	<i>LG-7</i>	<i>3/1/95</i>	<i>0915</i>	<i>S.W.</i>	<i>GRAB</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>2</i>	
4.	<i>74364</i>	<i>LG-7-NE</i>	<i>↓</i>	<i>1015</i>	<i>↓</i>	<i>↓</i>	<i>1</i>		<i>1</i>		
5.	<i>74365</i>	<i>LG-13</i>	<i>↓</i>	<i>1200</i>	<i>↓</i>	<i>↓</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>2</i>	
6.											
7.											
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE:

SW = surface water DW = drinking water PROD = product

WW = wastewater TIS = tissue SOIL = soil

GW = groundwater AIR = air SED = sediment

describe others

CONTAINER **PRESERVATIVES & PREPARATION**

P = plastic NP = nothing added OH = sodium hydroxide

G = glass S = sulfuric acid HA = hydrochloric & ascorbic acid

V = glass vial N = nitric acid H = hydrochloric acid

B = plastic bag Z = zinc acetate F = field filtered

describe others

COLLECTED BY (signature) <i>Scott Janeshek</i>		CUSTODY SEAL NO. (IF ANY)		DATE/TIME <i>3/1/95 1320</i>
RELINQUISHED BY (signature)		RECEIVED BY (signature)		DATE/TIME
RELINQUISHED BY (signature)		RECEIVED BY (signature)		DATE/TIME
DISPATCHED BY (signature) <i>Scott Janeshek</i>		METHOD OF TRANSPORT <i>FVD</i>		DATE/TIME <i>3/1/95 1320</i>
RECEIVED AT NLS BY (signature) <i>Jacey Huber</i>		DATE/TIME <i>3-01-95 13:20</i>	CONDITION	TEMP <i>10.2°</i>
SEAL INTACT ☐ YES ☐ NO	SEAL #	REMARKS & OTHER INFORMATION		

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM MUST BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, NOT PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

3.7-9-486

DUPLICATE COPY

NORTHERN LAKE SERVICE, INC.

400 NORTH LAKE AVENUE
CRANDON, WI 54520 (715)478-2777

ORDER OF ANALYSIS

RESULTS ORDERED BY:

CHAIN OF CUSTODY RECORD NUMBER:

FOTH: VANDYKE

RUSS JANESHER

15118

QUOTATION NUMBER:

ANALYZE FOR DISSOLVED OR TOTAL PARAMETERS?

SEND RESULTS TO:

SEND INVOICE TO:

PALC

PALC

Note "L" for low level ICP analysis, and "F" for furnace analysis.

Samples on line #: 1-2-3-5 to be analyzed for the parameters checked below:

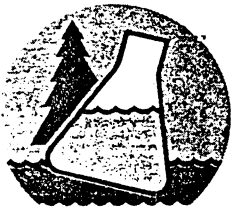
- | | | | |
|---|--|---|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☒ Phosphorus, total x | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☒ Tot. reactive x | ☐ BNAs by 625/8270 |
| ☐ Antimony | ☒ Hardness | ☒ Dis. reactive x | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☐ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☒ B.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☒ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☒ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BNAs |
| ☐ Chloride | ☐ Ammonia | ☐ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☒ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☐ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SDWA) |
| ☐ Color | ☐ Total Organic | ☒ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☒ Oil & Grease | ☒ Turbidity | ☐ PVOCs by 8020 |
| ☐ Copper | ☒ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO+PVOCs |
| | | ☐ Zinc | ☐ DRO-WI Modified |
| | | ☐ Munic.Sludge, WI List | ☐ PAHs by 610LC/8310 |

Samples on line #: 4 to be analyzed for the parameters checked below

- | | | | |
|---|--|--|--|
| ☒ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☐ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☐ Tot. reactive | ☐ BNAs by 625/8270 |
| ☐ Antimony | ☒ Hardness | ☐ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☐ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☐ B.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☐ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☐ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BNAs |
| ☐ Chloride | ☐ Ammonia | ☐ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☐ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☐ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SDWA) |
| ☐ Color | ☐ Total Organic | ☐ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☐ Oil & Grease | ☐ Turbidity | ☐ PVOCs by 8020 |
| ☐ Copper | ☐ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO+PVOCs |
| | | ☐ Zinc | ☐ DRO-WI Modified |
| | | ☐ Munic.Sludge, WI List | ☐ PAHs by 610LC/8310 |

SPECIAL INSTRUCTIONS:

3.7-9-487



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 15017

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT FOTH: VAN DYKE		PROJECT TITLE CRANDON MINING CO (S.W.)	
ADDRESS 2737 S. REDGE RD		PROJECT NO. 93C047	P.O. NO.
CITY GREEN BAY	STATE WI	ZIP 54307	CONTACT RUSS JANESHEIL
			PHONE 414-497-2500

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			PNP	PS	PN	GH	
1.	74501	LG-12	3/2/95	1530	SW	GRAB	1	1	1	2	
2.	74502	LG-15-01	3/2/95	1000	↓	↓	1	1	1	2	
3.	74503	LG-15-02	↓	1000	↓	↓	1	1	1	2	
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE:

SW = surface water
WW = wastewater
GW = groundwater

DW = drinking water
TIS = tissue
AIR = air

PROD = product
SOIL = soil
SED = sediment

describe others

CONTAINER

P = plastic
G = glass
V = glass vial
B = plastic bag

describe others

PRESERVATIVES & PREPARATION

NP = nothing added
S = sulfuric acid
N = nitric acid
Z = zinc acetate

OH = sodium hydroxide
HA = hydrochloric & ascorbic acid
H = hydrochloric acid

F = field filtered

COLLECTED BY (signature)

CUSTODY SEAL NO. (IF ANY) DATE/TIME

Scott Jensen

3/2/95 1200

RELINQUISHED BY (signature)

RECEIVED BY (signature)

DATE/TIME

RELINQUISHED BY (signature)

RECEIVED BY (signature)

DATE/TIME

DISPATCHED BY (signature)

METHOD OF TRANSPORT

DATE/TIME
3/2/95 1215

RECEIVED AT NLS BY (signature)

DATE/TIME

CONDITION

TEMP

Scott Jensen

3-02-95

12:15

SEAL INTACT?

☐ YES ☐ NO

SEAL

REMARKS & OTHER INFORMATION

Hand Delivered

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY

3.7-9-488

NORTHERN LAKE SERVICE, INC.

400 NORTH LAKE AVENUE

CRANDON, WI 54520 (715)478-2777

ORDER OF ANALYSIS

RESULTS ORDERED BY:

CHAIN OF CUSTODY RECORD NUMBER:

RUSS JANESHEK
FOTH: VAN DYKE

15017

QUOTATION NUMBER:

ANALYZE FOR DISSOLVED OR TOTAL PARAMETERS?

SEND RESULTS TO:

SEND INVOICE TO:

PACE

PACE

Note "L" for low level ICP analysis, and "F" for furnace analysis.

Samples on line #s: 1-3 to be analyzed for the parameters checked below:

- ☐ Alkalinity, total
- ☐ Alkalinity, bicarb.
- ☐ Aluminum
- ☐ Antimony
- ☐ Arsenic
- ☐ Barium
- ☐ Beryllium
- ☒ B.O.D.-5
- ☐ Boron
- ☐ Cadmium
- ☐ Calcium
- ☐ C.O.D.
- ☐ Chloride
- ☐ Chromium
- ☐ Chromium, hexavalent
- ☐ Cobalt
- ☐ Coliform, fecal
- ☐ Color
- ☐ Conductivity
- ☐ Copper

- ☐ Cyanide, total
- ☐ Amenable
- ☐ Fluoride
- ☒ Hardness
- ☐ Iron
- ☐ Lead
- ☐ Magnesium
- ☐ Manganese
- ☐ Mercury
- ☐ Molybdenum
- ☐ Nickel
- ☐ Nitrogen, total
- ☐ Ammonia
- ☒ Nitrate
- ☐ Nitrite
- ☐ Nitrate + Nitrite
- ☐ Total Kjeldahl
- ☐ Total Organic
- ☒ Oil & Grease
- ☒ pH

- ☐ Phenols
- ☒ Phosphorus, total
- ☒ Tot. reactive
- ☒ Dis. reactive
- ☒ Potassium No
- ☐ Selenium
- ☐ Silica
- ☐ Silver
- ☐ Sodium
- ☐ Solids, total
- ☒ Tot. dissolved
- ☒ Tot. suspended
- ☒ Sulfate
- ☐ Sulfide
- ☐ Surfactants (MBAS)
- ☐ Thallium
- ☐ Tin
- ☐ T.O.C.
- ☒ Turbidity
- ☐ Vanadium
- ☐ Zinc
- ☐ Munic.Sludge, WI List

- ☐ Acid Extractables by 625/8270
- ☐ Base/Neutral Extractables by 625/8270
- ☐ BNAs by 625/8270
- ☐ Chlorinated Hydrocarbons by 612
- ☐ Haloethers by 611
- ☐ Nitrosamines by 607
- ☐ Pesticides-Organochlorine by 608/8080
- ☐ Pesticides-Organophosphate by 8141
- ☐ PCBs by 608/8080
- ☐ Phenols by GC 604/8040
- ☐ Phenoxy Acid Herbicides by 8150
- ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BNAs
- ☐ TCLP-pesticides/herbicides
- ☐ VOCs by EPA 601+602 or 8010+8020
- ☐ -by EPA 8021
- ☐ -by EPA 624/8240/8260
- ☐ -by EPA 524.2 (SDWA)
- ☐ BTEX by 8020
- ☐ PVOCs by 8020
- ☐ GRO-WI Modified ☐ GRO+PVOCs
- ☐ DRO-WI Modified
- ☐ PAHs by 610LC/8310

Samples on line #s: _____ to be analyzed for the parameters checked below

- ☐ Alkalinity, total
- ☐ Alkalinity, bicarb.
- ☐ Aluminum
- ☐ Antimony
- ☐ Arsenic
- ☐ Barium
- ☐ Beryllium
- ☐ B.O.D.-5
- ☐ Boron
- ☐ Cadmium
- ☐ Calcium
- ☐ C.O.D.
- ☐ Chloride
- ☐ Chromium
- ☐ Chromium, hexavalent
- ☐ Cobalt
- ☐ Coliform, fecal
- ☐ Color
- ☐ Conductivity
- ☐ Copper

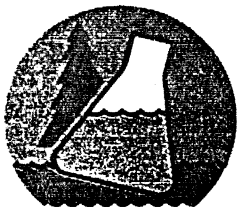
- ☐ Cyanide, total
- ☐ Amenable
- ☐ Fluoride
- ☐ Hardness
- ☐ Iron
- ☐ Lead
- ☐ Magnesium
- ☐ Manganese
- ☐ Mercury
- ☐ Molybdenum
- ☐ Nickel
- ☐ Nitrogen, total
- ☐ Ammonia
- ☐ Nitrate
- ☐ Nitrite
- ☐ Nitrate + Nitrite
- ☐ Total Kjeldahl
- ☐ Total Organic
- ☐ Oil & Grease
- ☐ pH

- ☐ Phenols
- ☐ Phosphorus, total
- ☐ Tot. reactive
- ☐ Dis. reactive
- ☐ Potassium
- ☐ Selenium
- ☐ Silica
- ☐ Silver
- ☐ Sodium
- ☐ Solids, total
- ☐ Tot. dissolved
- ☐ Tot. suspended
- ☐ Sulfate
- ☐ Sulfide
- ☐ Surfactants (MBAS)
- ☐ Thallium
- ☐ Tin
- ☐ T.O.C.
- ☐ Turbidity
- ☐ Vanadium
- ☐ Zinc
- ☐ Munic.Sludge, WI List

- ☐ Acid Extractables by 625/8270
- ☐ Base/Neutral Extractables by 625/8270
- ☐ BNAs by 625/8270
- ☐ Chlorinated Hydrocarbons by 612
- ☐ Haloethers by 611
- ☐ Nitrosamines by 607
- ☐ Pesticides-Organochlorine by 608/8080
- ☐ Pesticides-Organophosphate by 8141
- ☐ PCBs by 608/8080
- ☐ Phenols by GC 604/8040
- ☐ Phenoxy Acid Herbicides by 8150
- ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BNAs
- ☐ TCLP-pesticides/herbicides
- ☐ VOCs by EPA 601+602 or 8010+8020
- ☐ -by EPA 8021
- ☐ -by EPA 624/8240/8260
- ☐ -by EPA 524.2 (SDWA)
- ☐ BTEX by 8020
- ☐ PVOCs by 8020
- ☐ GRO-WI Modified ☐ GRO+PVOCs
- ☐ DRO-WI Modified
- ☐ PAHs by 610LC/8310

SPECIAL INSTRUCTIONS:

3.7-9-489



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 12279

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT FOTH: VAN DYKE		PROJECT TITLE CRANDON MINING CO (S.W.)	
ADDRESS 2737 S. RIDGE Rd		PROJECT NO. 93C049	P.O. NO.
CITY GREEN BAY	STATE WI	ZIP 54307	CONTACT RUSS JANESHER
			PHONE 414-497-2500

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			PN				
77	AV	SG-19	2/27/95	0930	SW	GRAB	1				LOW LEVEL TECHNIQUES
2.		SG-30	↓	1040	↓	↓	1				
3.		SG-2	↓	1200	↓	↓	1				
4.		SG-6	↓	1510	↓	↓	1				
5.		SG-E-01	2/28/95	0900			1				
6.		SG-E-02	↓	0900			1				
7.		LG-11	↓	1300			1				
8.		LG-7	3/1/95	0900			1				
9.		LG-13	↓	1200			1				
10.		LG-12	↓	1530			1				
11.		LG-15-01	3/2/95	1000			1				
77	520	LG-15-02	↓	1000	↓	↓	1				

SAMPLE TYPE:

SW = surface water
WW = wastewater
GW = groundwater

DW = drinking water
TIS = tissue
AIR = air

PROD = product
SOIL = soil
SED = sediment

describe others

CONTAINER

P = plastic
G = glass
V = glass vial
B = plastic bag

describe others

PRESERVATIVES & PREPARATION

NP = nothing added
S = sulfuric acid
N = nitric acid
Z = zinc acetate

OH = sodium hydroxide
HA = hydrochloric & ascorbic acid
H = hydrochloric acid

F = field filtered

COLLECTED BY (signature) Scott Janssen	RECEIVED BY (signature) Joe Austin	CUSTODY SEAL NO. (IF ANY)	DATE/TIME 3/2/95 1300
RELINQUISHED BY (signature)	RECEIVED BY (signature)		DATE/TIME
RELINQUISHED BY (signature)	RECEIVED BY (signature)		DATE/TIME
DISPATCHED BY (signature) Scott Janssen	METHOD OF TRANSPORT FVO		DATE/TIME 3/2/95 1330

RECEIVED AT NLS BY CL	REMARKS & OTHER INFORMATION
SEAL INTACT ☒ YES ☐ NO	

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

3.7-9-490

DUPLICATE COPY



REPORT OF LABORATORY ANALYSIS

Foth & Van Dyke & Associates
2737 South Ridge Road
P.O. Box 19012
Green Bay, WI 54307

June 23, 1995
PACE Project Number: 950303504

Attn: Mr. Russell Janeshek

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0049999	10 0050008	10 0050016
Date Collected:	02/28/95	02/28/95	02/28/95
Time Collected:	09:00	09:00	13:00
Date Received:	03/02/95	03/02/95	03/02/95
Client Sample ID:	SG-E-01	SG-E-02	LG-11-
Parameter	Units	MDI	Composit

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	210	200	-
Solids, Total Suspended	mg/L	5	ND	ND	-
Sulfate	mg/L	1.0	7.2	6.8	-
Phosphorus, Soluble	mg/L	0.05	ND	ND	-
Phosphorus, Total	mg/L	0.05	ND	ND	-
Oil and Grease	mg/L	4.6	ND	ND	-
Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	ND	-
Hardness, Total as Calcium Carbonate	mg/L	5	150	150	-
Nitrogen, Nitrate	mg/L	0.50	ND	ND	-
pH		0.1	7.3	7.2	-
Turbidity	NTU	0.5	0.5	0.6	-

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.193	10.7	10.4	27.2
Cadmium	ug/L	0.003	ND	0.004	0.004
Chromium	ug/L	0.050	0.739	1.17	0.192
Copper	ug/L	0.010	0.157	0.214	0.305
Lead	ug/L	0.010	0.022	0.024	0.127
Mercury	ng/L	0.10	0.54	0.70	1.15
Zinc	ug/L	0.152	0.571	0.658	2.41

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	140	150	-
Alkalinity, Carbonate	mg/L	5	ND	ND	-
Alkalinity, Total as Calcium Carbonate	mg/L	5	140	150	-
Anions	Meq/L		2.50	2.66	-
Antimony	mg/L	0.005	ND	ND	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 2

June 23, 1995
PACE Project Number: 950303504

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0049999	10 0050008	10 0050016
Date Collected:	02/28/95	02/28/95	02/28/95
Time Collected:	09:00	09:00	13:00
Date Received:	03/02/95	03/02/95	03/02/95
Client Sample ID:	SG-E-01	SG-E-02	LG-11-
Parameter	Units	MDL	Composit

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Cation-Anion Balance	%	0.01	7.45	6.53	-
Cations	Meq/L		2.91	3.03	-
Chemical Oxygen Demand, Low Level	mg/L	10	ND	ND	-
Chloride	mg/L	1	2	2	-
Cyanide, Total	ug/L	20	ND	ND	-
Fluoride, Soluble	mg/L	0.1	ND	ND	-
Iron, dissolved	mg/L	0.050	ND	ND	ND
Manganese, dissolved	mg/L	0.010	ND	ND	0.024
Nitrogen, Ammonia	mg/L	0.1	0.1	0.1	-
Nitrogen, Kjeldahl	mg/L	0.2	0.4	0.4	-
Potassium	mg/L	0.60	1.1	0.95	1.2
Sodium Adsorption Ratio			0.08	0.08	-
Thallium	mg/L	0.005	ND	ND	ND
METALS BY ICP					
Silver	mg/L	0.010	ND	ND	ND
Barium	mg/L	0.010	ND	ND	ND
Beryllium	mg/L	0.01	ND	ND	ND
Calcium	mg/L	1.0	31	32	2.4
Iron, total	mg/L	0.050	ND	ND	0.069
Magnesium	mg/L	0.50	15	16	0.89
Manganese, total	mg/L	0.010	ND	ND	0.040
Sodium	mg/L	1.0	2.3	2.2	ND
Nickel	mg/L	0.030	ND	ND	ND
Molybdenum	mg/L	0.020	ND	ND	ND
Boron	mg/L	0.10	ND	ND	ND
METALS BY TRACE ICP					
Arsenic	mg/L	0.005	ND	ND	ND
Selenium	mg/L	0.005	ND	ND	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 3

June 23, 1995
PACE Project Number: 950303504

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDI

10 0050024	10 0050032	10 0050040
02/28/95	02/28/95	03/01/95
13:00	13:00	09:15
03/02/95	03/02/95	03/02/95
LG-11-10'	LG-11-30'	LG-7

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Parameter	Units	5	46	39	41
Solids, Total Dissolved	mg/L	5	ND	ND	ND
Solids, Total Suspended	mg/L	5	ND	ND	ND
Sulfate	mg/L	1.0	4.5	4.7	5.7
Phosphorus, Soluble	mg/L	0.05	ND	ND	ND
Phosphorus, Total	mg/L	0.05	ND	ND	ND
Oil and Grease	mg/L	4.6	ND	ND	ND
Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	ND	ND
Hardness, Total as Calcium Carbonate	mg/L	5	8	7	7
Nitrogen, Nitrate	mg/L	0.50	ND	ND	ND
pH		0.1	5.2	5.3	5.2
Turbidity	NTU	0.5	0.7	0.6	0.6

METALS BY LOW-LEVEL ANALYSES

Parameter	Units	0.193	-	-	111
Aluminum	ug/L	0.193	-	-	111
Cadmium	ug/L	0.003	-	-	0.071
Chromium	ug/L	0.050	-	-	0.281
Copper	ug/L	0.010	-	-	0.719
Lead	ug/L	0.010	-	-	0.267
Mercury	ng/L	0.10	-	-	1.94
Zinc	ug/L	0.152	-	-	10.2

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Parameter	Units	5	5	5	ND
Alkalinity, Bicarbonate	mg/L	5	5	5	ND
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	5	5	ND
Anions	Meq/L	-	-	-	0.12
Antimony	mg/L	0.005	-	-	ND
Cation-Anion Balance	%	0.01	-	-	26.04
Cations	Meq/L	-	-	-	0.20
Chemical Oxygen Demand, Low Level	mg/L	10	17	14	21

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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June 23, 1995
PACE Project Number: 950303504

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDL

10 0050024	10 0050032	10 0050040
02/28/95	02/28/95	03/01/95
13:00	13:00	09:15
03/02/95	03/02/95	03/02/95
LG-11-10'	LG-11-30'	LG-7

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Chloride	mg/L	1	ND	ND	ND
Cyanide, Total	ug/L	20	ND	ND	ND
Fluoride, Soluble	mg/L	0.1	ND	ND	ND
Iron, dissolved	mg/L	0.050	-	-	0.056
Manganese, dissolved	mg/L	0.010	-	-	0.016
Nitrogen, Ammonia	mg/L	0.1	ND	0.2	0.1
Nitrogen, Kjeldahl	mg/L	0.2	0.5	0.6	0.6
Potassium	mg/L	0.60	1.5	1.3	0.78
Sodium Adsorption Ratio			-	-	0
Thallium	mg/L	0.005	-	-	ND

METALS BY ICP

Silver	mg/L	0.010	-	-	ND
Barium	mg/L	0.010	-	-	0.010
Beryllium	mg/L	0.01	-	-	ND
Calcium	mg/L	1.0	-	-	2.2
Iron, total	mg/L	0.050	-	-	0.080
Magnesium	mg/L	0.50	-	-	0.90
Manganese, total	mg/L	0.010	-	-	0.026
Sodium	mg/L	1.0	-	-	ND
Nickel	mg/L	0.030	-	-	ND
Molybdenum	mg/L	0.020	-	-	ND
Boron	mg/L	0.10	-	-	ND

METALS BY TRACE ICP

Arsenic	mg/L	0.005	-	-	ND
Selenium	mg/L	0.005	-	-	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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June 23, 1995
PACE Project Number: 950303504

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0050059	10 0050067	10 0050075
Date Collected:	03/01/95	02/27/95	02/27/95
Time Collected:	12:00	09:30	10:40
Date Received:	03/02/95	03/02/95	03/02/95
Client Sample ID:	LG-13	SG-19	SG-30

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Parameter	Units	MDI	10 0050059	10 0050067	10 0050075
Solids, Total Dissolved	mg/L	5	76	190	170
Solids, Total Suspended	mg/L	5	ND	5	ND
Sulfate	mg/L	1.0	9.0	7.1	6.5
Phosphorus, Soluble	mg/L	0.05	ND	ND	ND
Phosphorus, Total	mg/L	0.05	ND	ND	0.05
Oil and Grease	mg/L	4.6	ND	ND	ND

Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	ND	ND
Hardness, Total as Calcium Carbonate	mg/L	5	12	120	140
Nitrogen, Nitrate	mg/L	0.50	ND	ND	ND
pH		0.1	5.3	7.4	7.3
Turbidity	NTU	0.5	1.5	1.0	ND

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.193	248	9.12	7.71
Cadmium	ug/L	0.003	0.027	0.004	0.004
Chromium	ug/L	0.050	0.615	0.718	0.524
Copper	ug/L	0.010	0.732	0.247	0.229
Lead	ug/L	0.010	1.13	0.073	0.037
Mercury	ng/L	0.10	2.97	0.81	0.59
Zinc	ug/L	0.152	10.5	0.710	0.817

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	5	150	140
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	5	120	140
Anions	Meq/L		0.27	2.12	2.43
Antimony	mg/L	0.005	ND	ND	ND
Cation-Anion Balance	%	0.01	-0.65	5.03	12.79
Cations	Meq/L		0.27	2.34	3.14
Chemical Oxygen Demand, Low Level	mg/L	10	41	ND	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 6

June 23, 1995
PACE Project Number: 950303504

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDL

10 0050059	10 0050067	10 0050075
03/01/95	02/27/95	02/27/95
12:00	09:30	10:40
03/02/95	03/02/95	03/02/95
LG-13	SG-19	SG-30

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Parameter	Units	MDL	10 0050059	10 0050067	10 0050075
Chloride	mg/L	1	ND	ND	ND
Cyanide, Total	ug/L	20	ND	ND	ND
Fluoride, Soluble	mg/L	0.1	ND	ND	ND
Iron, dissolved	mg/L	0.050	0.15	ND	ND
Manganese, dissolved	mg/L	0.010	0.030	ND	ND
Nitrogen, Ammonia	mg/L	0.1	0.1	ND	ND
Nitrogen, Kjeldahl	mg/L	0.2	0.9	0.3	0.4
Potassium	mg/L	0.60	1.5	0.60	1.1
Sodium Adsorption Ratio			0	0.09	0.08
Thallium	mg/L	0.005	ND	ND	ND

METALS BY ICP

Parameter	Units	MDL	10 0050059	10 0050067	10 0050075
Silver	mg/L	0.010	ND	ND	ND
Barium	mg/L	0.010	0.060	0.012	ND
Beryllium	mg/L	0.01	ND	ND	ND
Calcium	mg/L	1.0	3.2	25	34
Iron, total	mg/L	0.050	0.17	0.11	ND
Magnesium	mg/L	0.50	0.85	12	16
Manganese, total	mg/L	0.010	0.026	0.017	0.016
Sodium	mg/L	1.0	ND	2.1	2.4
Nickel	mg/L	0.030	ND	ND	ND
Molybdenum	mg/L	0.020	ND	ND	ND
Boron	mg/L	0.10	ND	ND	ND

METALS BY TRACE ICP

Parameter	Units	MDL	10 0050059	10 0050067	10 0050075
Arsenic	mg/L	0.005	ND	ND	ND
Selenium	mg/L	0.005	ND	ND	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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June 23, 1995
PACE Project Number: 950303504

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0050083	10 0050091	10 0052922
Date Collected:	02/27/95	02/27/95	03/01/95
Time Collected:	12:00	15:10	15:30
Date Received:	03/02/95	03/02/95	03/03/95
Client Sample ID:	SG-2	SG-6	LG-12
Parameter	Units	MDL	

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	160	180	37
Solids, Total Suspended	mg/L	5	ND	ND	ND
Sulfate	mg/L	1.0	4.9	5.4	6.4
Phosphorus, Soluble	mg/L	0.05	ND	ND	ND
Phosphorus, Total	mg/L	0.05	ND	ND	ND
Oil and Grease	mg/L	4.6	ND	ND	ND
Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	ND	ND
Hardness, Total as Calcium Carbonate	mg/L	5	120	130	10
Nitrogen, Nitrate	mg/L	0.50	ND	ND	ND
pH		0.1	7.0	7.4	4.9
Turbidity	NTU	0.5	1.5	ND	2.4

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.193	26.1	3.36	154
Cadmium	ug/L	0.003	ND	ND	0.032
Chromium	ug/L	0.050	0.487	0.436	0.313
Copper	ug/L	0.010	0.232	0.214	0.831
Lead	ug/L	0.010	0.076	0.023	1.87
Mercury	ng/L	0.10	1.14	0.50	3.37
Zinc	ug/L	0.152	0.898	2.69	10.1

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	120	130	ND
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	120	130	ND
Anions	Meq/L		2.16	2.24	0.13
Antimony	mg/L	0.005	ND	ND	ND
Cation-Anion Balance	%	0.01	11.83	4.46	11.26
Cations	Meq/L		2.74	2.45	0.17
Chemical Oxygen Demand, Low Level	mg/L	10	15	ND	53

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 8

June 23, 1995
PACE Project Number: 950303504

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDL

10 0050083	10 0050091	10 0052922
02/27/95	02/27/95	03/01/95
12:00	15:10	15:30
03/02/95	03/02/95	03/03/95
SG-2	SG-6	LG-12

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Chloride	mg/L	1	3	ND	ND
Cyanide, Total	ug/L	20	ND	ND	ND
Fluoride, Soluble	mg/L	0.1	ND	ND	ND
Iron, dissolved	mg/L	0.050	0.072	ND	0.12
Manganese, dissolved	mg/L	0.010	ND	ND	ND
Nitrogen, Ammonia	mg/L	0.1	ND	0.1	0.1
Nitrogen, Kjeldahl	mg/L	0.2	0.4	0.4	1.0
Potassium	mg/L	0.60	0.76	1.6	ND
Sodium Adsorption Ratio			0.10	0.07	0
Thallium	mg/L	0.005	ND	ND	ND

METALS BY ICP

Silver	mg/L	0.010	ND	ND	ND
Barium	mg/L	0.010	0.011	ND	0.020
Beryllium	mg/L	0.01	ND	ND	ND
Calcium	mg/L	1.0	29	27	2.3
Iron, total	mg/L	0.050	0.25	0.031	0.13
Magnesium	mg/L	0.50	14	12	0.65
Manganese, total	mg/L	0.010	0.048	ND	0.026
Sodium	mg/L	1.0	2.7	1.8	ND
Nickel	mg/L	0.030	ND	ND	ND
Molybdenum	mg/L	0.020	ND	ND	ND
Boron	mg/L	0.10	ND	ND	ND

METALS BY TRACE ICP

Arsenic	mg/L	0.005	ND	ND	ND
Selenium	mg/L	0.005	ND	ND	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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June 23, 1995
PACE Project Number: 950303504

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0052930	10 0052949	10 0078727
Date Collected:	03/02/95	03/02/95	By Client
Time Collected:	10:00	10:00	
Date Received:	03/03/95	03/03/95	03/30/95
Client Sample ID:	LG-15-01	LG-15-02	LG-7-NE
<u>Parameter</u>	<u>Units</u>	<u>MDL</u>	

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	46	73	-
Solids, Total Suspended	mg/L	5	ND	6	-
Sulfate	mg/L	1.0	4.9	5.4	-
Phosphorus, Soluble	mg/L	0.05	ND	ND	-
Phosphorus, Total	mg/L	0.05	0.11	0.11	-
Oil and Grease	mg/L	4.6	ND	ND	-
Biochemical Oxygen Demand, 05 Day	mg/L	3	14	14	-
Hardness, Total as Calcium Carbonate	mg/L	5	14	16	-
Nitrogen, Nitrate	mg/L	0.50	ND	ND	-
pH		0.1	5.3	5.3	-
Turbidity	NTU	0.5	8.2	7.4	-

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.193	182	200	-
Cadmium	ug/L	0.003	0.006	0.005	-
Chromium	ug/L	0.050	0.502	0.488	-
Copper	ug/L	0.010	0.907	0.882	-
Lead	ug/L	0.010	0.278	1.54	-
Mercury	ng/L	0.10	3.29	3.13	-
Zinc	ug/L	0.152	5.82	6.84	-

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	15	16	-
Alkalinity, Carbonate	mg/L	5	ND	ND	-
Alkalinity, Total as Calcium Carbonate	mg/L	1.0	-	-	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	15	16	-
Anions	Meq/L		0.40	0.43	-
Antimony	mg/L	0.005	ND SA	ND SA	-
Cation-Anion Balance	%	0.01	-1.75	-7.14	-
Cations	Meq/L		0.39	0.37	-

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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June 23, 1995
PACE Project Number: 950303504

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDI

10 0052930	10 0052949	10 0078727
03/02/95	03/02/95	By Client
10:00	10:00	
03/03/95	03/03/95	03/30/95
LG-15-01	LG-15-02	LG-7-NE

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Chemical Oxygen Demand, Low Level	mg/L	10	95	97	-
Chloride	mg/L	1	2	2	-
Cyanide, Total	ug/L	20	ND	ND	-
Fluoride, Soluble	mg/L	0.1	ND	ND	-
Hardness, Total as Calcium Carbonate	mg/L	1.3	-	-	10
Iron, dissolved	mg/L	0.050	0.40	0.40	-

Manganese, dissolved	mg/L	0.010	0.29	0.29	-
Nitrogen, Ammonia	mg/L	0.1	0.3	0.3	-
Nitrogen, Kjeldahl	mg/L	0.2	2.5	2.6	-
Potassium	mg/L	0.60	5.2	4.8	-
Sodium Adsorption Ratio			0	0	-
Thallium	mg/L	0.005	ND	ND	-

METALS BY ICP

Silver	mg/L	0.010	ND	ND	-
Barium	mg/L	0.010	0.026	0.026	-
Beryllium	mg/L	0.01	ND	ND	-
Calcium	mg/L	1.0	3.7	3.6	-
Iron, total	mg/L	0.050	0.74	0.73	-
Magnesium	mg/L	0.50	0.90	0.88	-

Manganese, total	mg/L	0.010	0.28	0.28	-
Sodium	mg/L	1.0	ND	ND	-
Nickel	mg/L	0.030	ND	ND	-
Molybdenum	mg/L	0.020	ND	ND	-
Boron	mg/L	0.10	ND	ND	-

METALS BY TRACE ICP

Arsenic	mg/L	0.005	ND	ND	-
Selenium	mg/L	0.005	ND	ND	-



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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June 23, 1995
PACE Project Number: 950303504

Client Reference: Crandon Mining Surface Waters

These data have been reviewed and are approved for release.

A handwritten signature in black ink that reads "Steve R. Crupi". The signature is written in a cursive style.

Steve R. Crupi
Project Manager



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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FOOTNOTES
for pages 1 through 11

June 23, 1995
PACE Project Number: 950303504

Client Reference: Crandon Mining Surface Waters

MDL Method Detection Limit
ND Not detected at or above the MDL.
SA A value determined by method of standard addition.

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2737 S. RIDGE Rd
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: FOTH: VAN DYKE
Bill To: FOTH: VAN DYKE
P.O. # / Billing Reference 930049
Project Name / No. CRANDON MINING CO (S.W.)

Pace Client No. _____
Pace Project Manager _____
Pace Project No. 90324512
*Requested Due Date: _____

Sampled By (PRINT):

SCOTT JANSSEN

JOE AUSTIN

Sampler Signature

Date Sampled

Scott Janssen

3/20/95

NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST	REMARKS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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COOLER NOS.		BAILERS		SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
				OUT / DATE	RETURNED / DATE					
							SCOTT JANSSEN FOTH: VAN DYKE 3/23/95 1200	WILLIAM P. HOF	3/24/95	1530

Additional Comments

SEE REVERSE SIDE FOR INSTRUCTIONS



207167

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2737 S. RIDGE Rd
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: RUSS JANESHER

Pace Client No. _____

Bill To: FOTH: VAN DYKE

Pace Project Manager _____

P.O. # / Billing Reference 936049Pace Project No. 990324512Project Name / No. CRANDON MINING Co (S.W.)

*Requested Due Date: _____

Sampled By (PRINT):

SCOTT JANSSENJOE AUSTIN

Sampler Signature

Scott Jansen

Date Sampled

3/21/95

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.	NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST								REMARKS
						UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	NAOH	ALKALINITY	F	CI	COD	NH ₃	THW	CYANIDE	TOTAL METALS	
1	LG-7-2'	0915	S.W.	7205.2	5	2	1	1		1	X	X	X	X	X	X	X	X	
2	LG-7-10'	0915		7206.0	5	2	1	1		1	X	X	X	X	X	X	X	X	
3	LG-13-2'	1415		7207.9	5	2	1	1		1	X	X	X	X	X	X	X	X	
4	LG-13-7'	1415		7208.7	5	2	1	1		1	X	X	X	X	X	X	X	X	
5	SG-19	1545		7209.5	5	2	1	1		1	X	X	X	X	X	X	X	X	
6	SG-30	1630		7210.9	5	2	1	1		1	X	X	X	X	X	X	X	X	
7																			
8																			

COOLER NOS.	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
		OUT / DATE	RETURNED / DATE					
					<u>Scott Jansen</u> <u>FOTH: Van Dyke</u> <u>3/23/95 1200</u>	<u>Wendy</u> <u>3/24/95</u>	<u>3/24/95</u>	<u>1530</u>

Additional Comments

SEE REVERSE SIDE FOR INSTRUCTIONS

ORIGINAL

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2737 S. RIDGE RD
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: RUSS JANESSEN
Bill To: FOTH: VAN DYKE
P.O. # / Billing Reference 930049
Project Name / No. CRANDON MINING CO (S.W.)

Page Client No. _____
Page Project Manager _____
Page Project No. 95032492
*Requested Due Date: _____

Sampled By (PRINT): SCOTT JANESSEN JOE AUSTIN
Sampler Signature Scott Janessen Date Sampled 2/22/95

Sampled By (PRINT):					NO. OF CONTAINERS					PRESERVATIVES					ANALYSES REQUEST					REMARKS
Sampler Signature					Date Sampled					UNPRESERVED					ALKALINITY F Cl COD NH3 TKN CYANIDE TOTAL METALS DISS METALS					
										H2SO4 HNO3 VOA NAOH										
ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.																
1	LG-12-2'	0930	SW	721.7	5	2	1	1	1											
2	LG-12-5'	0930		721.5	5	2	1	1	1											
3	LG-3	1100		721.3	5	2	1	1	1											
4	LG-15-01	1400		721.1	5	2	1	1	1											
5	LG-15-02	1400		721.0	5	2	1	1	1											
6	SG-2	1440		721.6	5	2	1	1	1											
7																				
8																				

COOLER NOS.	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
		OUT / DATE	RETURNED / DATE		<u>Scott Janessen</u> <u>FOTH: VAN DYKE</u>	<u>Ellen Pfl</u>	<u>3/28/95</u>	<u>1200</u>
Additional Comments								

SEE REVERSE SIDE FOR INSTRUCTIONS



207169

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VANDYKE
Address 2737 S. RIDGE Rd
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: RUSS JANESHEIK
Bill To: FOTH: VAN DYKE
P.O. # / Billing Reference 93049
Project Name / No. CRANDON MINING Co (S.W.)

Page Client No. _____
Page Project Manager _____
Page Project No. 950324572
Requested Due Date: _____

Sampled By (PRINT):

SCOTT JANSSEN JOE AUSTIN

Sampler Signature

Date Sampled

SCOTT JANSSEN

3/23/95

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.	NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST								REMARKS
						UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	NAOH	ALKALINITY	F	CL	CO ₂	NH ₃	TKN	CHLORIDE	TOTAL METALS	
1	SG-E-01	6800	SW	7217.6	5	2	1	1	1		X	X	X	X	X	X	X	X	
2	SG-E-02	6800	SW	7218.4	5	2	1	1	1		X	X	X	X	X	X	X	X	
3																			
4																			
5																			
6																			
7																			
8																			

COOLER NOS.	BAILERS	SHIPMENT METHOD	OUT / DATE	RETURNED / DATE	ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
						SCOTT JANSSEN 3/23/95 1200	JOE AUSTIN 3/23/95 1530	3/23/95	1530

Additional Comments

SEE REVERSE SIDE FOR INSTRUCTIONS

ORIGINAL



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 15130

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT <i>FOTH VAN DYKE</i>		PROJECT TITLE <i>CRANDON MINING Co. (S.W.)</i>	
ADDRESS <i>2737 S. RIDGE RD</i>		PROJECT NO. <i>930049</i>	P.O. NO.
CITY <i>GREEN BAY</i>	STATE <i>WI</i>	ZIP <i>54307</i>	CONTACT <i>RUSS JANESHEK</i>
			PHONE <i>414-497-2500</i>

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			PNP	DS	PN	GH	
1.	<i>76166</i>	<i>LG-13-2'</i>	<i>3/21/95</i>	<i>1415</i>	<i>SW.</i>	<i>GRAB</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>2</i>	
2.	<i>76166</i>	<i>LG-13-7'</i>	<i>1</i>	<i>1415</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>2</i>		
3.	<i>76166</i>	<i>SG-19</i>	<i>1</i>	<i>1545</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>2</i>		
4.	<i>76166</i>	<i>SG-30</i>	<i>1</i>	<i>1630</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>2</i>		
5.	<i>76166</i>	<i>LG-12-2'</i>	<i>3/21/95</i>	<i>0930</i>	<i>SW</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>2</i>		
6.	<i>76166</i>	<i>LG-12-5'</i>	<i>1</i>	<i>0930</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>2</i>		
7.	<i>76166</i>	<i>SG-3</i>	<i>1</i>	<i>1100</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>2</i>		
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE: SW = surface water DW = drinking water PROD = product WW = wastewater TIS = tissue SOIL = soil GW = groundwater AIR = air SED = sediment describe others			CONTAINER P = plastic G = glass V = glass vial B = plastic bag describe others	PRESERVATIVES & PREPARATION NP = nothing added OH = sodium hydroxide S = sulfuric acid HA = hydrochloric & ascorbic acid N = nitric acid H = hydrochloric acid Z = zinc acetate F = field filtered
---	--	--	---	---

COLLECTED BY (signature) <i>Scott Janeshek</i>	CUSTODY SEAL NO. (IF ANY)	DATE/TIME <i>3/22/95 1130</i>
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME
DISPATCHED BY (signature) <i>Scott Janeshek</i>	METHOD OF TRANSPORT <i>FVD</i>	DATE/TIME <i>3/22/95 1200</i>

RECEIVED AT NLS BY (signature) <i>Tracy Huber</i>	DATE/TIME <i>3-22-95 12:00</i>	CONDITION <i>OK</i>	TEMP. <i>0.2°</i>
SEAL INTACT? ☐ YES ☐ NO	SEAL #	REMARKS & OTHER INFORMATION	

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

3.7-9-507

DUPLICATE COPY

NORTHERN LAKE SERVICE, INC.

400 NORTH LAKE AVENUE

CRANDON, WI 54520 (715)478-2777

ORDER OF ANALYSIS

RESULTS ORDERED BY:

RUSS JANESHEK
FOTH: VAN DYKE

CHAIN OF CUSTODY RECORD NUMBER:

15130

QUOTATION NUMBER:

ANALYZE FOR DISSOLVED OR TOTAL PARAMETERS?

SEND RESULTS TO:

PAGE

SEND INVOICE TO:

PAGE

Note "L" for low level ICP analysis, and "F" for furnace analysis.

Samples on line #: 1-7 to be analyzed for the parameters checked below:

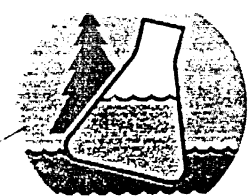
- | | | | |
|---|--|--|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☐ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☒ Tot. reactive | ☐ BNAs by 625/8270 |
| ☐ Antimony | ☒ Hardness | ☐ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☐ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☒ B.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☒ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☐ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BNAs |
| ☐ Chloride | ☐ Ammonia | ☒ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☒ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☐ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SDWA) |
| ☐ Color | ☐ Total Organic | ☐ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☒ Oil & Grease | ☒ Turbidity | ☐ PVOCs by 8020 |
| ☐ Copper | ☒ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO+PVOCs |
| | | ☐ Zinc | ☐ DRO-WI Modified |
| | | ☐ Munic.Sludge,WI List | ☐ PAHs by 610LC/8310 |

Samples on line #: _____ to be analyzed for the parameters checked below:

- | | | | |
|---|--|---|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☐ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☐ Tot. reactive | ☐ BNAs by 625/8270 |
| ☐ Antimony | ☐ Hardness | ☐ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☐ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☐ B.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☐ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☐ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BNAs |
| ☐ Chloride | ☐ Ammonia | ☐ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☐ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☐ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SDWA) |
| ☐ Color | ☐ Total Organic | ☐ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☐ Oil & Grease | ☐ Turbidity | ☐ PVOCs by 8020 |
| ☐ Copper | ☐ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO+PVOCs |
| | | ☐ Zinc | ☐ DRO-WI Modified |
| | | ☐ Munic.Sludge,WI List | ☐ PAHs by 610LC/8310 |

SPECIAL INSTRUCTIONS:

3.7-9-508



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT FOTH: VAN DYKE		PROJECT TITLE CRANDON MINING Co (S.W.)	
ADDRESS 2737 S. RIDGE Rd		PROJECT NO. 932049	P.O. NO.
CITY GREEN BAY	STATE WI	ZIP 54307	CONTACT RUSS JAWESHER
			PHONE 414-477-2500

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			P	N	P	H	
1.		LG-11-5'	3/20/95	1015	S.W.	GRAB	1	1	1	2	
2.		LG-11-33'		1015			1	1	1	2	
3.		LG-24-5'		1430			1	1	1	2	
4.		LG-24-40'		1430			1	1	1	2	
5.		SG-6		1655			1	1	1	2	
6.		LG-7-2'	3/21/95	0735	SW	GRAB	1	1	1	7	
7.		LG-7-10'		0735			1	1	1	2	
8.		LG-7-NE-02	3/21/95	1015			1		1		
9.											
10.											
11.											
12.											

SAMPLE TYPE:
SW = surface water
WW = wastewater
GW = groundwater
describe others

DW = drinking water
TIS = tissue
AIR = air

PROD = product
SOIL = soil
SED = sediment

CONTAINER
P = plastic
G = glass
V = glass vial
B = plastic bag
describe others

PRESERVATIVES & PREPARATION
NP = nothing added
S = sulfuric acid
N = nitric acid
Z = zinc acetate

OH = sodium hydroxide
HA = hydrochloric & ascorbic acid
H = hydrochloric acid
F = field filtered

COLLECTED BY (signature) <i>Scott Jensen</i>	CUSTODY SEAL NO. (IF ANY)	DATE/TIME 3/21/95 1100
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME
DISPATCHED BY (signature) <i>Scott Jensen</i>	METHOD OF TRANSPORT FVD	DATE/TIME 3/21/95 1115

RECEIVED AT NLS BY (signature) <i>Tracy Huber</i>	DATE/TIME 3-21-95 11:15	CONDITION	TEMP 02°
SEAL INTACT ☐ YES ☐ NO	SEAL #	REMARKS & OTHER INFORMATION	

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY

NORTHERN LAKE SERVICE, INC.

400 NORTH LAKE AVENUE
CRANDON, WI 54520 (715)478-2777

ORDER OF ANALYSIS

RESULTS ORDERED BY:

For: YAN DYKE
RUSS JANESHEK

CHAIN OF CUSTODY RECORD NUMBER:

15798

QUOTATION NUMBER:

ANALYZE FOR DISSOLVED OR TOTAL PARAMETERS?

SEND RESULTS TO:

PAGE

SEND INVOICE TO:

PAGE

Note "L" for low level ICP analysis, and "F" for furnace analysis.

Samples on line #: 1-7 to be analyzed for the parameters checked below:

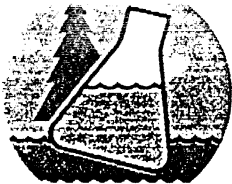
- | | | | |
|---|--|--|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☐ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☒ Tot. reactive | ☐ BNAs by 625/8270 |
| ☐ Antimony | ☒ Hardness | ☒ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☐ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☒ B.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☒ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☒ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BNAs |
| ☐ Chloride | ☐ Ammonia | ☒ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☒ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☐ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SDWA) |
| ☐ Color | ☐ Total Organic | ☒ Turbidity | ☐ BTEX by 8020 |
| ☐ Conductivity | ☒ Oil & Grease | ☐ Vanadium | ☐ PVOCs by 8020 |
| ☐ Copper | ☒ pH | ☐ Zinc | ☐ GRO-WI Modified ☐ GRO+PVOCs |
| | | ☐ Munic.Sludge,WI List | ☐ DRO-WI Modified |
| | | | ☐ PAHs by 610LC/8310 |

Samples on line #: 8 to be analyzed for the parameters checked below:

- | | | | |
|---|--|---|--|
| ☒ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☐ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☐ Tot. reactive | ☐ BNAs by 625/8270 |
| ☐ Antimony | ☒ Hardness | ☐ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☐ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☐ B.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☐ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☐ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BNAs |
| ☐ Chloride | ☐ Ammonia | ☐ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☐ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☐ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SDWA) |
| ☐ Color | ☐ Total Organic | ☐ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☐ Oil & Grease | ☐ Turbidity | ☐ PVOCs by 8020 |
| ☐ Copper | ☐ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO+PVOCs |
| | | ☐ Zinc | ☐ DRO-WI Modified |
| | | ☐ Munic.Sludge,WI List | ☐ PAHs by 610LC/8310 |

SPECIAL INSTRUCTIONS:

3.7-9-510



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 15264

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT <i>FOTH: VAN DYKE</i>			PROJECT TITLE <i>CRANDON MINING CO (S.W.)</i>		
ADDRESS <i>2737 S. RIDGE RD</i>			PROJECT NO. <i>930049</i>		P.O. NO.
CITY <i>GREEN BAY</i>	STATE <i>WI</i>	ZIP <i>54307</i>	CONTACT <i>RUSS JANESHER</i>		PHONE <i>414-497-2500</i>

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			NP	PS	PN	GH	
1.		<i>LG-15-01</i>	<i>3/22/95</i>	<i>1400</i>	<i>SW</i>	<i>GRAB</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>2</i>	
2.		<i>LG-15-02</i>	<i>1</i>	<i>1400</i>			<i>1</i>	<i>1</i>	<i>1</i>	<i>2</i>	
3.		<i>SG-2</i>	<i>1</i>	<i>1440</i>			<i>1</i>	<i>1</i>	<i>1</i>	<i>2</i>	
4.		<i>SG-E-01</i>	<i>3/23/95</i>	<i>0800</i>			<i>1</i>	<i>1</i>	<i>1</i>	<i>2</i>	
5.		<i>SG-E-02</i>	<i>1</i>	<i>0800</i>			<i>1</i>	<i>1</i>	<i>1</i>	<i>Z</i>	
6.											
7.											
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE:

SW = surface water DW = drinking water PROD = product
WW = wastewater TIS = tissue SOIL = soil
GW = groundwater AIR = air SED = sediment

describe others

CONTAINER

P = plastic G = glass V = glass vial B = plastic bag describe others

PRESERVATIVES & PREPARATION

NP = nothing added S = sulfuric acid N = nitric acid Z = zinc acetate describe others

OH = sodium hydroxide HA = hydrochloric & ascorbic acid H = hydrochloric acid

F = field filtered

COLLECTED BY (signature) <i>[Signature]</i>	CUSTODY SEAL NO. (IF ANY)	DATE/TIME <i>3/23/95 1620</i>
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME
DISPATCHED BY (signature) <i>[Signature]</i>	METHOD OF TRANSPORT <i>FVD</i>	DATE/TIME <i>3/23/95 1620-75</i>

RECEIVED AT NLS BY (signature) <i>[Signature]</i>	DATE/TIME <i>3-23-95 10:20</i>	CONDITION <i>100</i>	TEMP.
SEAL INTACT? ☒ YES ☐ NO	SEAL #	REMARKS & OTHER INFORMATION	

- IMPORTANT:**
1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
 2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
 3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY

NORTHERN LAKE SERVICE, INC.

400 NORTH LAKE AVENUE

CRANDON, WI 54520 (715)478-2777

ORDER OF ANALYSIS

RESULTS ORDERED BY:

FOTH: VAN DYKE

RUSS JANESHER

CHAIN OF CUSTODY RECORD NUMBER:

15264

QUOTATION NUMBER:

ANALYZE FOR DISSOLVED OR TOTAL PARAMETERS?

SEND INVOICE TO:

PAGE

SEND RESULTS TO:

PAGE

Note "L" for low level ICP analysis, and "F" for furnace analysis.

Samples on line #: 1-5 to be analyzed for the parameters checked below:

- | | | | |
|---|--|--|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☐ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☒ Tot. reactive | ☐ BNAs by 625/8270 |
| ☐ Antimony | ☒ Hardness | ☒ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☐ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☒ B.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☒ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☒ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BNAs |
| ☐ Chloride | ☐ Ammonia | ☒ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☒ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☐ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SDWA) |
| ☐ Color | ☐ Total Organic | ☒ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☒ Oil & Grease | ☒ Turbidity | ☐ PVOCs by 8020 |
| ☐ Copper | ☒ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO+PVOCs |
| | | ☐ Zinc | ☐ DRO-WI Modified |
| | | ☐ Munic.Sludge,WI List | ☐ PAHs by 610LC/8310 |

Samples on line #: _____ to be analyzed for the parameters checked below:

- | | | | |
|---|--|---|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☐ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☐ Tot. reactive | ☐ BNAs by 625/8270 |
| ☐ Antimony | ☐ Hardness | ☐ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☐ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☐ B.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☐ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☐ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BNAs |
| ☐ Chloride | ☐ Ammonia | ☐ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☐ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☐ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SDWA) |
| ☐ Color | ☐ Total Organic | ☐ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☐ Oil & Grease | ☐ Turbidity | ☐ PVOCs by 8020 |
| ☐ Copper | ☐ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO+PVOCs |
| | | ☐ Zinc | ☐ DRO-WI Modified |
| | | ☐ Munic.Sludge,WI List | ☐ PAHs by 610LC/8310 |

SPECIAL INSTRUCTIONS:

3.7-9-512

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2737 S. RIDGE Rd
GREEN BAY, WI 54307
Phone 414-497-2500

Report To: PACE
Bill To: PACE
P.O. # / Billing Reference 930049
Project Name / No. CRANDON MINING Co (S.W.)

Pace Client No. _____
Pace Project Manager _____
Pace Project No. _____
*Requested Due Date: _____

Sampled By (PRINT): SCOTT JANSSEN JOE AUSTIN
Sampler Signature Scott Janssen Date Sampled 3/20-23/95

NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST										REMARKS
	UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA		AL	CD	CS	CU	PB	Hg	ZN				
1						X	X	X	X	X	X	X				Low Level Techniques Composites
1						X	X	X	X	X	X	X				
1						X	X	X	X	X	X	X				
1						X	X	X	X	X	X	X				
1						X	X	X	X	X	X	X				
1						X	X	X	X	X	X	X				
1						X	X	X	X	X	X	X				
1						X	X	X	X	X	X	X				

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.
2041	LG-11	3/20/95	1015	SW
2052	SG-6	1655		
2063	LG-7	3/21/95	0915	
2074	LG-13	1415		
2085	SG-19	1545		
2096	SG-30	1630		
2107	LG-12	3/22/95	0930	
2118	SG-3	1100		

COOLER NOS.	BAILERS	SHIPMENT METHOD	ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
		OUT / DATE	RETURNED / DATE	Scott Janssen FOTH 3/23/95 1200	MSL 3/24/95 12:00		

Additional Comments



207137

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client FOTH: VAN DYKE
Address 2737 S. RIDGE Rd
GREEN BAY, WI 54307
Phone 414- 497-2500

Report To: PACE
Bill To: PACE
P.O. # / Billing Reference 93C049
Project Name / No. CRANDON MINING Co (S.W.)

Pace Client No. _____
Pace Project Manager _____
Pace Project No. _____
*Requested Due Date: _____

Sampled By (PRINT):

SCOTT JANSSEN JOE AUSTIN

Sampler Signature

Date Sampled

Scott Janssen3/20-23/95

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.	NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST										REMARKS
						UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA		AL	CD	CS	CJ	PC	Hg	N				
199 1	LG-15-01	3/22/95	1400	S.W.	1		1				X	X	X	X	X	X					
200 2	LG-15-02		1400		1		1				X	X	X	X	X	X					
201 3	SG-2		1440		1		1				X	X	X	X	X	X					
102 4	SG-E-01	3/23/95	0800		1		1				X	X	X	X	X	X					
203 5	SG-E-02		0800		1		1				X	X	X	X	X	X					
6																					
7																					
8																					

COOLER NOS.	BAILERS	SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
		OUT / DATE	RETURNED / DATE					
						<u>MSL</u>	<u>3/24/95</u>	<u>12:00</u>

Additional Comments

SEE REVERSE SIDE FOR INSTRUCTIONS

ORIGINAL



REPORT OF LABORATORY ANALYSIS

Foth & Van Dyke & Associates
2737 South Ridge Road
P.O. Box 19012
Green Bay, WI 54307

June 23, 1995
PACE Project Number: 950324512

Attn: Mr. Russell Janeshek

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

10 0072001	10 0072010	10 0072028
03/20/95	03/20/95	03/20/95
10:15	10:15	14:30
03/24/95	03/24/95	03/24/95
LG-11-5	LG-11-33'	LG-24-5'

Units

MDL

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	28	11	130
Solids, Total Suspended	mg/L	5	ND	ND	ND
Sulfate	mg/L	1.0	4.6	4.6	5.0
Phosphorus, Soluble	mg/L	0.05	ND	ND	ND
Phosphorus, Total	mg/L	0.05	ND	ND	ND
Oil and Grease	mg/L	4.6	ND	ND	ND
Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	ND	ND
Hardness, Total as Calcium Carbonate	mg/L	5	6	6	120
Nitrogen, Nitrate	mg/L	0.50	ND	ND	ND
pH		0.1	5.1	5.5	7.5
Turbidity	NTU	0.5	0.6	0.6	1.4

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.193	19.8	-	-
Cadmium	ug/L	0.003	0.017	-	-
Chromium	ug/L	0.050	0.132	-	-
Copper	ug/L	0.010	0.438	-	-
Lead	ug/L	0.010	0.140	-	-
Mercury	ng/L	0.10	1.15	-	-
Zinc	ug/L	0.152	2.33	-	-

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	ND	ND	110
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	ND	ND	110
Anions	Meq/L		0.10	0.10	1.91
Antimony	mg/L	0.005	ND	ND	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 2

June 23, 1995
PACE Project Number: 950324512

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDL

10 0072001	10 0072010	10 0072028
03/20/95	03/20/95	03/20/95
10:15	10:15	14:30
03/24/95	03/24/95	03/24/95
LG-11-5	LG-11-33'	LG-24-5'

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Cation-Anion Balance

Cations

Chemical Oxygen Demand, Low Level

Chloride

Cyanide, Total

Fluoride, Soluble

Iron, dissolved

Manganese, dissolved

Nitrogen, Ammonia

Nitrogen, Kjeldahl

Potassium

Sodium Adsorption Ratio

Thallium

METALS BY ICP

Silver

Barium

Beryllium

Calcium

Iron, total

Magnesium

Manganese, total

Sodium

Nickel

Molybdenum

Boron

METALS BY TRACE ICP

Arsenic

Selenium

Units	MDL	10 0072001	10 0072010	10 0072028
%	0.01	25.20	30.41	12.15
Meq/L	0.16	0.18	2.43	
mg/L	10	13	ND	ND
mg/L	1	ND	ND	ND
ug/L	20	ND	ND	ND
mg/L	0.1	ND	ND	ND
mg/L	0.050	0.050	0.12	ND
mg/L	0.010	0.014	0.67	ND
mg/L	0.1	0.2	ND	0.2
mg/L	0.2	0.4	0.5	0.4
mg/L	0.60	0.73	0.96	0.85
		0	0	0.07
mg/L	0.005	ND	ND	ND
mg/L	0.010	ND	ND	ND
mg/L	0.010	ND	0.12	0.16
mg/L	0.01	ND	ND	ND
mg/L	1.0	1.8	2.0	27
mg/L	0.050	ND	0.16	ND
mg/L	0.50	0.63	0.67	12
mg/L	0.010	0.025	0.057	ND
mg/L	1.0	ND	ND	1.8
mg/L	0.030	ND	ND	ND
mg/L	0.020	ND	ND	ND
mg/L	0.10	ND	ND	ND
mg/L	0.005	0.006	ND	ND
mg/L	0.005	ND	ND	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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June 23, 1995
PACE Project Number: 950324512

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDI

10 0072036	10 0072044	10 0072052
03/20/95	03/20/95	03/21/95
14:30	16:55	09:15
03/24/95	03/24/95	03/24/95
LG-24-40'	SG-6	LG-7-2

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Parameter	Units	MDI	10 0072036	10 0072044	10 0072052
Solids, Total Dissolved	mg/L	5	140	90	22
Solids, Total Suspended	mg/L	5	ND	ND	ND
Sulfate	mg/L	1.0	5.4	5.1	3.0
Phosphorus, Soluble	mg/L	0.05	ND	ND	ND
Phosphorus, Total	mg/L	0.05	0.08	ND	ND
Oil and Grease	mg/L	4.6	ND	ND	ND
Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	ND	ND
Hardness, Total as Calcium Carbonate	mg/L	5	130	100	ND
Nitrogen, Nitrate	mg/L	0.50	ND	ND	ND
pH		0.1	7.3	7.2	4.9
Turbidity	NTU	0.5	2.3	1.5	ND

METALS BY LOW-LEVEL ANALYSES

Parameter	Units	MDI	10 0072036	10 0072044	10 0072052
Aluminum	ug/L	0.193	-	33.8	83.9
Cadmium	ug/L	0.003	-	0.007	0.070
Chromium	ug/L	0.050	-	0.359	0.162
Copper	ug/L	0.010	-	0.430	0.556
Lead	ug/L	0.010	-	0.084	0.404
Mercury	ug/L	0.10	-	3.12	1.94
Zinc	ug/L	0.152	-	1.09	7.94

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Parameter	Units	MDI	10 0072036	10 0072044	10 0072052
Alkalinity, Bicarbonate	mg/L	5	100	77	ND
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	100	77	ND
Anions	Meq/L		1.78	1.37	0.06
Antimony	mg/L	0.005	ND	ND	ND
Cation-Anion Balance	%	0.01	10.35	9.47	-6.45
Cations	Meq/L		2.19	1.65	0.05
Chemical Oxygen Demand, Low Level	mg/L	10	ND	18	13

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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June 23, 1995
PACE Project Number: 950324512

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDL

10 0072036	10 0072044	10 0072052
03/20/95	03/20/95	03/21/95
14:30	16:55	09:15
03/24/95	03/24/95	03/24/95
LG-24-40'	SG-6	LG-7-2

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Parameter	Units	MDL	10 0072036	10 0072044	10 0072052
Chloride	mg/L	1	1	ND	ND
Cyanide, Total	ug/L	20	ND	ND	ND
Fluoride, Soluble	mg/L	0.1	ND	ND	ND
Iron, dissolved	mg/L	0.050	ND	0.085	ND
Manganese, dissolved	mg/L	0.010	ND	0.010	0.019
Nitrogen, Ammonia	mg/L	0.1	0.2	0.1	0.1
Nitrogen, Kjeldahl	mg/L	0.2	0.5	0.4	ND
Potassium	mg/L	0.60	0.72	0.82	ND
Sodium Adsorption Ratio			0.07	0.07	0
Thallium	mg/L	0.005	ND	ND	ND

METALS BY ICP

Parameter	Units	MDL	10 0072036	10 0072044	10 0072052
Silver	mg/L	0.010	ND	ND	ND
Barium	mg/L	0.010	0.024	0.058	0.40
Beryllium	mg/L	0.01	ND	ND	ND
Calcium	mg/L	1.0	24	18	1.1
Iron, total	mg/L	0.050	ND	0.14	0.077
Magnesium	mg/L	0.50	11	8.2	ND
Manganese, total	mg/L	0.010	ND	0.040	0.032
Sodium	mg/L	1.0	1.6	1.4	ND
Nickel	mg/L	0.030	ND	ND	ND
Molybdenum	mg/L	0.020	ND	ND	ND
Boron	mg/L	0.10	ND	ND	ND

METALS BY TRACE ICP

Parameter	Units	MDL	10 0072036	10 0072044	10 0072052
Arsenic	mg/L	0.005	ND	ND	ND
Selenium	mg/L	0.005	ND	ND	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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June 23, 1995
PACE Project Number: 950324512

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0072060	10 0072079	10 0072087
Date Collected:	03/21/95	03/21/95	03/21/95
Time Collected:	09:15	14:15	14:15
Date Received:	03/24/95	03/24/95	03/24/95
Client Sample ID:	LG-7-10'	LG-13-2'	LG-13-7'

<u>Parameter</u>	<u>Units</u>	<u>MDL</u>			
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SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	38	46	42
Solids, Total Suspended	mg/L	5	ND	ND	ND
Sulfate	mg/L	1.0	3.1	4.6	4.9
Phosphorus, Soluble	mg/L	0.05	ND	ND	ND
Phosphorus, Total	mg/L	0.05	ND	ND	ND
Oil and Grease	mg/L	4.6	ND	ND	ND
Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	5	5
Hardness, Total as Calcium Carbonate	mg/L	5	6	8	17
Nitrogen, Nitrate	mg/L	0.50	ND	ND	ND
pH		0.1	5.2	5.7	5.8
Turbidity	NTU	0.5	ND	1.0	1.0

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.193	-	177	-
Cadmium	ug/L	0.003	-	0.151	-
Chromium	ug/L	0.050	-	0.321	-
Copper	ug/L	0.010	-	1.07	-
Lead	ug/L	0.010	-	1.62	-
Mercury	ug/L	0.10	-	2.57	-
Zinc	ug/L	0.152	-	8.26	-

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	ND	ND	5
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	ND	ND	5
Anions	Meq/L		0.06	0.10	0.18
Antimony	mg/L	0.005	ND	ND	0.029
Cation-Anion Balance	%	0.01	39.21	27.69	32.85
Cations	Meq/L		0.15	0.17	0.36
Chemical Oxygen Demand, Low Level	mg/L	10	16	28	32

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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June 23, 1995
PACE Project Number: 95032451

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDL

10 0072060	10 0072079	10 0072087
03/21/95	03/21/95	03/21/95
09:15	14:15	14:15
03/24/95	03/24/95	03/24/95
LG-7-10'	LG-13-2'	LG-13-7'

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Parameter	Units	MDL	10 0072060	10 0072079	10 0072087
Chloride	mg/L	1	ND	ND	ND
Cyanide, Total	ug/L	20	ND	ND	ND
Fluoride, Soluble	mg/L	0.1	ND	ND	ND
Iron, dissolved	mg/L	0.050	0.74	0.10	0.16
Manganese, dissolved	mg/L	0.010	0.031	0.025	0.032
Nitrogen, Ammonia	mg/L	0.1	0.1	0.1	0.1
Nitrogen, Kjeldahl	mg/L	0.2	0.4	0.5	0.7
Potassium	mg/L	0.60	0.92	ND	0.99
Sodium Adsorption Ratio			0	0	0
Thallium	mg/L	0.005	ND	ND	ND

METALS BY ICP

Parameter	Units	MDL	10 0072060	10 0072079	10 0072087
Silver	mg/L	0.010	ND	ND	ND
Barium	mg/L	0.010	0.037	0.22	0.11
Beryllium	mg/L	0.01	ND	ND	ND
Calcium	mg/L	1.0	1.6	2.4	2.5
Iron, total	mg/L	0.050	0.15	0.21	0.29
Magnesium	mg/L	0.50	0.54	0.60	2.6
Manganese, total	mg/L	0.010	0.042	0.040	0.11
Sodium	mg/L	1.0	ND	ND	ND
Nickel	mg/L	0.030	ND	ND	0.11
Molybdenum	mg/L	0.020	ND	ND	ND
Boron	mg/L	0.10	ND	ND	0.20

METALS BY TRACE ICP

Parameter	Units	MDL	10 0072060	10 0072079	10 0072087
Arsenic	mg/L	0.005	ND	ND	ND
Selenium	mg/L	0.005	ND	ND	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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June 23, 1995
PACE Project Number: 950324512

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDL

10 0072095	10 0072109	10 0072117
03/21/95	03/21/95	03/22/95
15:45	16:30	09:30
03/24/95	03/24/95	03/24/95
SG-19	SG-30	LG-12-2'

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Parameter	Units	MDL	10 0072095	10 0072109	10 0072117
Solids, Total Dissolved	mg/L	5	110	160	11
Solids, Total Suspended	mg/L	5	17	ND	ND
Sulfate	mg/L	1.0	8.5	7.6	1.8
Phosphorus, Soluble	mg/L	0.05	ND	0.06	ND
Phosphorus, Total	mg/L	0.05	0.06	0.10	ND
Oil and Grease	mg/L	4.6	ND	ND	ND
Biochemical Oxygen Demand, 05 Day	mg/L	3	5	5	ND
Hardness, Total as Calcium Carbonate	mg/L	5	46	94	8
Nitrogen, Nitrate	mg/L	0.50	ND	ND	ND
pH		0.1	6.9	7.1	4.8
Turbidity	NTU	0.5	4.5	2.1	0.6

METALS BY LOW-LEVEL ANALYSES

Parameter	Units	MDL	10 0072095	10 0072109	10 0072117
Aluminum	ug/L	0.193	49.9	133	110
Cadmium	ug/L	0.003	ND	0.007	0.039
Chromium	ug/L	0.050	0.483	0.821	0.285
Copper	ug/L	0.010	0.313	0.493	0.696
Lead	ug/L	0.010	0.140	0.069	1.07
Mercury	ug/L	0.10	7.95	5.58	2.78
Zinc	ug/L	0.152	2.44	3.85	6.79

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Parameter	Units	MDL	10 0072095	10 0072109	10 0072117
Alkalinity, Bicarbonate	mg/L	5	44	84	ND
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	44	84	ND
Anions	Meq/L		0.95	1.57	0.04
Antimony	mg/L	0.005	ND	ND	ND
Cation-Anion Balance	%	0.01	10.44	10.29	40.03
Cations	Meq/L		1.18	1.92	0.09
Chemical Oxygen Demand, Low Level	mg/L	10	53	32	17

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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June 23, 1995
PACE Project Number: 950324512

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDI

10 0072095	10 0072109	10 0072117
03/21/95	03/21/95	03/22/95
15:45	16:30	09:30
03/24/95	03/24/95	03/24/95
SG-19	SG-30	LG-12-2'

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

	mg/L	1	2	1	ND
Chloride	ug/L	20	ND	ND	ND
Cyanide, Total	mg/L	0.1	ND	ND	ND
Fluoride, Soluble	mg/L	0.050	0.16	0.11	0.059
Iron, dissolved	mg/L	0.010	ND	0.013	0.014
Manganese, dissolved	mg/L	0.1	0.1	0.1	0.1
Nitrogen, Ammonia	mg/L	0.2	0.7	0.7	0.3
Nitrogen, Kjeldahl	mg/L	0.60	0.78	0.66	0.69
Potassium			0.08	0.07	0
Sodium Adsorption Ratio			ND	ND	ND
Thallium	mg/L	0.005	ND	ND	ND

METALS BY ICP

	mg/L	0.010	ND	ND	ND
Silver	mg/L	0.010	0.036	0.20	ND
Barium	mg/L	0.01	ND	ND	ND
Beryllium	mg/L	1.0	12	21	1.4
Calcium	mg/L	0.050	0.56	0.19	0.11
Iron, total	mg/L	0.50	6.1	9.6	ND
Magnesium					
Manganese, total	mg/L	0.010	0.10	0.057	0.034
Sodium	mg/L	1.0	1.3	1.6	ND
Nickel	mg/L	0.030	ND	ND	ND
Molybdenum	mg/L	0.020	ND	ND	ND
Boron	mg/L	0.10	ND	ND	ND

METALS BY TRACE ICP

	mg/L	0.005	ND	ND	ND
Arsenic	mg/L	0.005	ND	ND	ND
Selenium					

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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June 23, 1995
PACE Project Number: 950324512

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDL

10 0072125	10 0072133	10 0072141
03/22/95	03/22/95	03/22/95
09:30	11:00	14:00
03/24/95	03/24/95	03/24/95
LG-12-5'	SG-3	LG-15-01

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Parameter	Units	MDL	10 0072125	10 0072133	10 0072141
Solids, Total Dissolved	mg/L	5	53	97	34
Solids, Total Suspended	mg/L	5	ND	ND	ND
Sulfate	mg/L	1.0	4.2	5.4	ND
Phosphorus, Soluble	mg/L	0.05	ND	ND	ND
Phosphorus, Total	mg/L	0.05	ND	ND	ND
Oil and Grease	mg/L	4.6	ND	ND	ND

Parameter	Units	MDL	10 0072125	10 0072133	10 0072141
Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	12	9
Hardness, Total as Calcium Carbonate	mg/L	5	7	86	ND
Nitrogen, Nitrate	mg/L	0.50	ND	ND	ND
pH		0.1	5.1	7.3	5.4
Turbidity	NTU	0.5	0.9	1.6	2.1

METALS BY LOW-LEVEL ANALYSES

Parameter	Units	MDL	10 0072125	10 0072133	10 0072141
Aluminum	ug/L	0.193	-	43.6	42.6
Cadmium	ug/L	0.003	-	0.007	0.011
Chromium	ug/L	0.050	-	0.451	0.202
Copper	ug/L	0.010	-	0.564	0.495
Lead	ug/L	0.010	-	0.126	0.206
Mercury	ng/L	0.10	-	3.36	2.32
Zinc	ug/L	0.152	-	1.11	3.35

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Parameter	Units	MDL	10 0072125	10 0072133	10 0072141
Alkalinity, Bicarbonate	mg/L	5	ND	75	5
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	ND	75	5
Anions	Meq/L		0.09	1.34	0.08
Antimony	mg/L	0.005	ND	ND	ND
Cation-Anion Balance	%	0.01	22.57	12.36	12.81
Cations	Meq/L		0.14	1.72	0.11
Chemical Oxygen Demand, Low Level	mg/L	10	33	23	29

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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June 23, 1995
PACE Project Number: 950324512

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDL

10 0072125	10 0072133	10 0072141
03/22/95	03/22/95	03/22/95
09:30	11:00	14:00
03/24/95	03/24/95	03/24/95
LG-12-5'	SG-3	LG-15-01

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Parameter	Units	MDL	10 0072125	10 0072133	10 0072141
Chloride	mg/L	1	ND	3	ND
Cyanide, Total	ug/L	20	ND	ND	ND
Fluoride, Soluble	mg/L	0.1	ND	ND	ND
Iron, dissolved	mg/L	0.050	0.18	0.14	0.12
Manganese, dissolved	mg/L	0.010	0.035	ND	0.10
Nitrogen, Ammonia	mg/L	0.1	ND	0.1	0.1
Nitrogen, Kjeldahl	mg/L	0.2	0.5	0.5	0.6
Potassium	mg/L	0.60	ND	0.73	2.0
Sodium Adsorption Ratio			0	0.11	0
Thallium	mg/L	0.005	ND	ND	ND

METALS BY ICP

Parameter	Units	MDL	10 0072125	10 0072133	10 0072141
Silver	mg/L	0.010	ND	ND	ND
Barium	mg/L	0.010	ND	0.052	ND
Beryllium	mg/L	0.01	ND	ND	ND
Calcium	mg/L	1.0	1.9	18	1.1
Iron, total	mg/L	0.050	0.16	0.32	0.13
Magnesium	mg/L	0.50	0.53	8.6	ND
Manganese, total	mg/L	0.010	0.046	0.057	0.12
Sodium	mg/L	1.0	ND	2.2	ND
Nickel	mg/L	0.030	ND	ND	ND
Molybdenum	mg/L	0.020	ND	ND	ND
Boron	mg/L	0.10	ND	ND	ND

METALS BY TRACE ICP

Parameter	Units	MDL	10 0072125	10 0072133	10 0072141
Arsenic	mg/L	0.005	ND	ND	ND
Selenium	mg/L	0.005	ND	ND	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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June 23, 1995
PACE Project Number: 950324512

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDI

10 0072150	10 0072168	10 0072176
03/22/95	03/22/95	03/23/95
14:00	14:40	08:00
03/24/95	03/24/95	03/24/95
LG-15-02	SG-2	SG-E-01

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Parameter	Units	MDI	10 0072150	10 0072168	10 0072176
Solids, Total Dissolved	mg/L	5	17	130	160
Solids, Total Suspended	mg/L	5	ND	ND	ND
Sulfate	mg/L	1.0	ND	5.0	6.9
Phosphorus, Soluble	mg/L	0.05	ND	ND	ND
Phosphorus, Total	mg/L	0.05	ND	ND	ND
Oil and Grease	mg/L	4.6	ND	ND	ND
Biochemical Oxygen Demand, 05 Day	mg/L	3	8	ND	ND
Hardness, Total as Calcium Carbonate	mg/L	5	ND	78	140
Nitrogen, Nitrate	mg/L	0.50	ND	ND	ND
pH		0.1	5.5	7.2	7.4
Turbidity	NTU	0.5	1.9	1.8	1.3

METALS BY LOW-LEVEL ANALYSES

Parameter	Units	MDI	10 0072150	10 0072168	10 0072176
Aluminum	ug/L	0.193	44.0	36.7	40.5
Cadmium	ug/L	0.003	0.007	0.004	ND
Chromium	ug/L	0.050	0.233	0.297	1.01
Copper	ug/L	0.010	0.284	0.577	0.382
Lead	ug/L	0.010	0.099	0.129	0.062
Mercury	ug/L	0.10	2.16	3.27	1.36
Zinc	ug/L	0.152	3.22	0.798	0.892

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Parameter	Units	MDI	10 0072150	10 0072168	10 0072176
Alkalinity, Bicarbonate	mg/L	5	ND	70	140
Alkalinity, Carbonate	mg/L	5	ND	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	ND	70	140
Anions	Meq/L		0	1.34	2.49
Antimony	mg/L	0.005	ND	ND	ND
Cation-Anion Balance	%	0.01	100	12.48	10.36
Cations	Meq/L		0.11	1.72	3.07
Chemical Oxygen Demand, Low Level	mg/L	10	26	23	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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June 23, 1995
PACE Project Number: 950324512

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDL

10 0072150	10 0072168	10 0072176
03/22/95	03/22/95	03/23/95
14:00	14:40	08:00
03/24/95	03/24/95	03/24/95
LG-15-02	SG-2	SG-E-01

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Parameter	Units	MDL	10 0072150	10 0072168	10 0072176
Chloride	mg/L	1	ND	3	2
Cyanide, Total	ug/L	20	ND	ND	ND
Fluoride, Soluble	mg/L	0.1	ND	ND	ND
Iron, dissolved	mg/L	0.050	0.060	0.16	ND
Manganese, dissolved	mg/L	0.010	0.099	ND	ND
Nitrogen, Ammonia	mg/L	0.1	0.1	0.2	ND
Nitrogen, Kjeldahl	mg/L	0.2	0.6	0.4	0.3
Potassium	mg/L	0.60	2.2	1.1	ND
Sodium Adsorption Ratio			0	0.10	0.09
Thallium	mg/L	0.005	ND	ND	ND

METALS BY ICP

Parameter	Units	MDL	10 0072150	10 0072168	10 0072176
Silver	mg/L	0.010	ND	ND	ND
Barium	mg/L	0.010	ND	ND	ND
Beryllium	mg/L	0.01	ND	ND	ND
Calcium	mg/L	1.0	1.1	18	33
Iron, total	mg/L	0.050	0.11	0.37	0.063
Magnesium	mg/L	0.50	ND	8.5	16
Manganese, total	mg/L	0.010	0.12	0.057	ND
Sodium	mg/L	1.0	ND	2.1	2.5
Nickel	mg/L	0.030	ND	ND	ND
Molybdenum	mg/L	0.020	ND	ND	ND
Boron	mg/L	0.10	ND	ND	ND

METALS BY TRACE ICP

Parameter	Units	MDL	10 0072150	10 0072168	10 0072176
Arsenic	mg/L	0.005	ND	ND	ND
Selenium	mg/L	0.005	ND	ND	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 13

June 23, 1995
PACE Project Number: 950324512

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0072184	10 0090352
Date Collected:	03/23/95	03/21/95
Time Collected:	08:00	
Date Received:	03/24/95	03/21/95
Client Sample ID:	SG-E-02	LG-7-NE-02
Parameter	<u>Units</u>	<u>MDI</u>

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	130	-
Solids, Total Suspended	mg/L	5	ND	-
Sulfate	mg/L	1.0	6.3	-
Phosphorus, Soluble	mg/L	0.05	ND	-
Phosphorus, Total	mg/L	0.05	ND	-
Oil and Grease	mg/L	4.6	ND	-
Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	-
Hardness, Total as Calcium Carbonate	mg/L	5	140	8
Nitrogen, Nitrate	mg/L	0.50	ND	-
pH		0.1	7.4	-
Turbidity	NTU	0.5	1.5	-

METALS BY LOW-LEVEL ANALYSES

Aluminum	ug/L	0.193	40.7	-
Cadmium	ug/L	0.003	0.005	-
Chromium	ug/L	0.050	1.06	-
Copper	ug/L	0.010	0.330	-
Lead	ug/L	0.010	0.061	-
Mercury	ug/L	0.10	1.32	-
Zinc	ug/L	0.152	0.716	-

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	140	-
Alkalinity, Carbonate	mg/L	5	ND	-
Alkalinity, Total as Calcium Carbonate	mg/L	5	140	ND
Anions	Meq/L		2.48	-
Antimony	mg/L	0.005	ND	-
Cation-Anion Balance	%	0.01	8.36	-
Cations	Meq/L		2.94	-
Chemical Oxygen Demand, Low Level	mg/L	10	ND	-

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 14

June 23, 1995
PACE Project Number: 950324512

Client Reference: Crandon Mining Surface Waters

PACE Sample Number:	10 0072184	10 0090352
Date Collected:	03/23/95	03/21/95
Time Collected:	08:00	
Date Received:	03/24/95	03/21/95
Client Sample ID:	SG-E-02	LG-7-NE-02
<u>Parameter</u>	<u>Units</u>	<u>MDL</u>

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Chloride	mg/L	1	2	-
Cyanide, Total	ug/L	20	ND	-
Fluoride, Soluble	mg/L	0.1	ND	-
Iron, dissolved	mg/L	0.050	ND	-
Manganese, dissolved	mg/L	0.010	ND	-
Nitrogen, Ammonia	mg/L	0.1	0.1	-
Nitrogen, Kjeldahl	mg/L	0.2	0.2	-
Potassium	mg/L	0.60	ND	-
Sodium Adsorption Ratio			0.09	-
Thallium	mg/L	0.005	ND	-

METALS BY ICP

Silver	mg/L	0.010	ND	-
Barium	mg/L	0.010	ND	-
Beryllium	mg/L	0.01	ND	-
Calcium	mg/L	1.0	32	-
Iron, total	mg/L	0.050	0.091	-
Magnesium	mg/L	0.50	15	-
Manganese, total	mg/L	0.010	ND	-
Sodium	mg/L	1.0	2.4	-
Nickel	mg/L	0.030	ND	-
Molybdenum	mg/L	0.020	ND	-
Boron	mg/L	0.10	ND	-

METALS BY TRACE ICP

Arsenic	mg/L	0.005	ND	-
Selenium	mg/L	0.005	ND	-

Mr. Russell Janeshek
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June 23, 1995
PACE Project Number: 950324512

Client Reference: Crandon Mining Surface Waters

These data have been reviewed and are approved for release.

Steve R. Crupi

Steve R. Crupi
Project Manager



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 16

FOOTNOTES
for pages 1 through 15

June 23, 1995
PACE Project Number: 950324512

Client Reference: Crandon Mining Surface Waters

MDL Method Detection Limit
ND Not detected at or above the MDL.

April 1995 Surface Water Laboratory Data

May 3, 1995

Mr. Russell Janeshek
Foth & Van Dyke
2737 S. Ridge Rd.
Green Bay, WI 54307-9012

Re: Crandon Mining Company Project -
April 1995 Rush Surface Water Sampling

Dear Mr. Janeshek:

Enclosed are the analytical report, raw data package and electronic deliverable representing the samples received on April 13, 1995. Analysis results in this submittal cover tests performed at PACE and Northern Lake Service.

Attached to this letter are copies of the chain of custody records. Also attached to this letter is a table cross referencing the PACE sample identification, the Northern Lake Service Identification and the sampling point identification.

A summary of where each of the analyses were performed follows below.

PACE -	Alkalinity, F, Cl, COD, NH3, TKN, Cyanide, total and dissolved metals (standard detection levels)
NLS -	BOD, TP, Dissolved P, SO4, TSS, TDS, O&G, Hardness, pH, turbidity, nitrate

If you have any questions or comments concerning the data submitted, feel free to contact me at (612) 525-3454.

Sincerely,

Steven R. Crupi

Steven R. Crupi
Project Manager

Attachments/Enclosures

MAY 05 1995

Crandon Mining Company Project -
April 1995 Rush Surface Water Sampling

Sample Cross Reference

<u>Sample ID</u>	<u>PACE ID</u>	<u>NLS ID</u>
WR-HR-01	9355.6	77684
WR-HR-02	9356.4	77685

April 1995 Rush Surface Water Sampling Methods

Alkalinity	310.1
F	340.2
Cl	325.1
COD	410.2
NH3	350.2
TKN	351.3
Cyanide	335.2
Metals	200.7
	279.2 (Tl)
	204.2 (Sb)
	245.1 (Hg)
BOD	ASTM5210
TP	365.2
Diss. P	365.2
SO4	375.2
TSS	160.2
TDS	160.1
O&G	413.1
Hardness	130.2
pH	150.1
turbidity	180.1
nitrate	353.2/354.1

PACE PROJECT NAME: FOTH & VAN DYKE - CRANDON MINING SURFACE WATERS
 PACE PROJECT MANAGER: Steve Crupi
 Project Number: 950413.501

CLOSED DUE 4/17/95 for results and 4/24/95 for Raw Data Package

SDG	CLIENT	LAB NO	FIELD ID	QC	MATRI	SAMPLED DATE	RECEIVED DATE	ICP MET	ICP TRACE	Diss. Fe/Mn	NH3	TL-U	SB-U	TKN	F	TCN	CL	NLS	T-ALK	COD-LOW	SAR	CAT.	AN.	BAL CAT. /AN.
9355	FOTH&VD	9355.6	WR-HR-01		SW	04/12/95	04/13/95	M	M	M	M	M	M	M	M	M	M	N	M	M	M	M	M	M
9355	FOTH&VD	9356.4	WR-HR-02		SW	04/12/95	04/13/95	M	M	M	M	M	M	M	M	M	M	N	M	M	M	M	M	M

NOTE THAT WE HAVE PICKED UP POTASSIUM AS AN ICP ELEMENT. LOOK FOR K-N

Trace metals are arsenic and selenium

NLS is a subcontract subset

T-ALK includes the carbonate and bicarbonate parameters

DNR the ICP antimony parameter within the FMETALS3 subset

Raw data package is required to include calibrations, sample data, QC sample data, and calib. verif. data

3.7-9-535



Rush Surface Waters

207183

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client Foth & Van Dyke
Address 2737 S. Ridge Road
Green Bay, WI 54307
Phone 414-497-2500

Report To: Russ Javeshek
Bill To: FVD
P.O. # / Billing Reference 930049
Project Name / No. Crandon Mining Co.

Pace Client No. _____
Pace Project Manager SRG
Pace Project No. 950403.501
*Requested Due Date: _____

Sampled By (PRINT):

Joseph J Austin

Sampler Signature

Date Sampled

Joseph J Austin 4/12/95

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.	NO. OF CONTAINERS	PRESERVATIVES					ANALYSES REQUEST								REMARKS
						UNPRESERVED	H ₂ SO ₄	HNO ₃	VOA	NADH	ALKALINITY	F	CL	COD	NH ₃	TKN	CYANIDE	TOTAL METALS	
1	WR-HR-01	1345	S.W.	9355.6	5	2	1	1		1	X	X	X	X	X	X	X	X	
2	WR-HR-02	1345	S.W.	9356.4	5	2	1	1		1	X	X	X	X	X	X	X	X	
3																			
4																			
5																			
6																			
7																			
8																			

COOLER NOS.		BAILERS		SHIPMENT METHOD		ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
				OUT / DATE						
							Joseph J. Austin 4/12/95	Steven R. Cuyi 4/13/95	3:36 PM	
Additional Comments immediate turn around * contact Steve Krupic										



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 15544

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT Foth & Van Dyke		PROJECT TITLE Crandon Mine Co (S.W.)	
ADDRESS 2737 S. Ridge Road		PROJECT NO. 930049	P.O. NO.
CITY Green Bay	STATE WI	ZIP 54304	CONTACT Russ Jameshek
		PHONE 715-497-2500	

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME			PV	PS	PN	GT	
1.	17684	WR-HR-01	4/12/95	1345	SW	Grab	1	1	1	2	Immediate turn around
2.	17685	WR-HR-02	4/12/95	1345	SW	Grab	1	1	1	2	"
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE:
 SW = surface water
 WW = wastewater
 GW = groundwater
 DW = drinking water
 TIS = tissue
 AIR = air
 PROD = product
 SOIL = soil
 SED = sediment
 describe others

CONTAINER
 P = plastic
 G = glass
 V = glass vial
 B = plastic bag
 describe others

PRESERVATIVES & PREPARATION
 NP = nothing added
 S = sulfuric acid
 N = nitric acid
 Z = zinc acetate
 OH = sodium hydroxide
 HA = hydrochloric & ascorbic acid
 H = hydrochloric acid
F = field filtered

COLLECTED BY (signature) <i>[Signature]</i>		CUSTODY SEAL NO. (IF ANY) DATE/TIME 4/12/95 1600	
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME	
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME	
DISPATCHED BY (signature) <i>[Signature]</i>	METHOD OF TRANSPORT FUD	DATE/TIME 4/12/95 1600	
RECEIVED AT NLS BY (signature) <i>[Signature]</i>	DATE/TIME 4-12-95	CONDITION IN ICE	TEMP.
SEAL INTACT? ☐ YES ☐ NO	SEAL #	REMARKS & OTHER INFORMATION	

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
 2. PLEASE USE ONE LINE PER SAMPLE. **NOT** PER BOTTLE.
 3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY

3.7-9-537



REPORT OF LABORATORY ANALYSIS

Foth & Van Dyke & Associates
2737 South Ridge Road
P.O. Box 19012
Green Bay, WI 54307

May 03, 1995
PACE Project Number: 950413501

Attn: Mr. Russell Janeshek

Client Reference: Crandon Mining Rush Surface Waters

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

10 0093556	10 0093564
04/12/95	04/12/95
13:45	13:45
04/13/95	04/13/95
WR-HR-01	WR-HR-02

<u>Parameter</u>	<u>Units</u>	<u>MDI</u>		
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SUBCONTRACT ANALYSIS

METALS BY ICP

Lead	mg/L	0.050	ND	ND
------	------	-------	----	----

INORGANIC ANALYSIS

Solids, Total Dissolved	mg/L	5	78	94
Solids, Total Suspended	mg/L	5	ND	ND
Sulfate	mg/L	1.0	5.3	5.3
Phosphorus, Soluble	mg/L	0.05	ND	ND
Phosphorus, Total	mg/L	0.05	0.053	0.06
Oil and Grease	mg/L	4.6	ND	ND
Biochemical Oxygen Demand, 05 Day	mg/L	3	ND	ND
Hardness, Total as Calcium Carbonate	mg/L	5	34	35
Nitrogen, Nitrate	mg/L	0.50	ND	ND
pH		0.1	6.8	6.8
Turbidity	NTU	0.5	3.7	3.8

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Alkalinity, Bicarbonate	mg/L	5	31	30
Alkalinity, Carbonate	mg/L	5	ND	ND
Alkalinity, Total as Calcium Carbonate	mg/L	5	31	30
Anions	Meq/L		0.79	0.77
Antimony	mg/L	0.005	ND	ND
Cation-Anion Balance	%	0.01	7.57	7.67
Cations	Meq/L		0.92	0.90
Chemical Oxygen Demand, Low Level	mg/L	10	25	20
Chloride	mg/L	1	6	6
Cyanide, Total	ug/L	20	ND	ND
Fluoride, Soluble	mg/L	0.1	ND	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 2

May 03, 1995
PACE Project Number: 950413501

Client Reference: Crandon Mining Rush Surface Waters

PACE Sample Number:

10 0093556 10 0093564

Date Collected:

04/12/95 04/12/95

Time Collected:

13:45 13:45

Date Received:

04/13/95 04/13/95

Client Sample ID:

WR-HR-01 WR-HR-02

Parameter

Units

MDL

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Iron, dissolved	mg/L	0.050	0.45	0.45
Manganese, dissolved	mg/L	0.010	0.042	0.042
Mercury	ug/L	0.20	ND	ND
Nitrogen, Ammonia	mg/L	0.1	0.2	0.1
Nitrogen, Kjeldahl	mg/L	0.2	0.5	0.5
Potassium	mg/L	0.60	1.5	1.5
Sodium Adsorption Ratio			0.34	0.31
Thallium	mg/L	0.005	ND	ND

METALS BY TRACE ICP

Arsenic	mg/L	0.005	ND	ND
Selenium	mg/L	0.005	ND	ND

METALS BY ICP

Silver	mg/L	0.010	ND	ND
Aluminum	mg/L	0.050	ND	ND
Barium	mg/L	0.010	ND	ND
Beryllium	mg/L	0.01	ND	ND
Calcium	mg/L	1.0	8.9	8.9
Chromium	mg/L	0.005	ND	ND
Copper	mg/L	0.030	ND	ND
Iron, total	mg/L	0.050	0.77	0.75
Magnesium	mg/L	0.50	2.9	2.9
Manganese, total	mg/L	0.010	0.054	0.064
Sodium	mg/L	1.0	4.5	4.1
Nickel	mg/L	0.030	ND	ND
Zinc	mg/L	0.020	ND	ND
Molybdenum	mg/L	0.020	ND	ND
Boron	mg/L	0.10	ND	ND

Mr. Russell Janeshek
Page 3

May 03, 1995
PACE Project Number: 950413501

Client Reference: Crandon Mining Rush Surface Waters

These data have been reviewed and are approved for release.

Steven R. Crupi

Steve Crupi
Project Manager



REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 4

FOOTNOTES
for pages 1 through 3

May 03, 1995
PACE Project Number: 950413501

Client Reference: Crandon Mining Rush Surface Waters

MDL Method Detection Limit
ND Not detected at or above the MDL.

December 1997 Surface Water Laboratory Data

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

WIS. LAB CERT. NO. 721026460

ANALYTICAL REPORT

PAGE: 1 NLS PROJECT# 38678
NLS CUST# 11932

Client: Foth & Van Dyke Associates
Attn: Russell Janeshek
2737 S. Ridge Road
PO Box 19012
Green Bay, WI 54307

Project Description: Crandon Mining Co. - Surface Water Testing - Scope 93C049
Project Title: 93C049

Sample ID: Creek 19-14 NLS#: 157590
Ref. Line 1 of COC 29495 Description: Creek 19-14
Collected: 12/18/97 Received: 12/18/97 Reported: 02/03/98

Parameter	Result	Units	LOD	LOQ	Method	Analyzed	Lab
Alkalinity, bicarbonate as HCO ₃	230	mg/L	5.8	21	EPA 310.2	12/24/97	721026460
Alkalinity, tot. as CaCO ₃ (unfiltered)	190	mg/L	5.8	21	EPA 310.2	12/24/97	721026460
Alkalinity, carbonate as CaCO ₃	ND	mg/L	1.4	4.8	SM 2320B	12/22/97	721026460
Aluminum, tot. as Al low level	14	ug/L	0.20		EPA 1638	01/05/98	998087420
Arsenic, tot. as As by ICP	ND	ug/L	1.8	6.5	EPA 200.7	01/12/98	721026460
Barium, tot. as Ba by ICP	8.0	ug/L	5.0	5.0	EPA 200.7	01/12/98	721026460
BOD-5 day	ND	mg/L	3.0		SM 5210	12/19/97	721026460
Boron, tot. as B by ICP	ND	ug/L	18	58	EPA 200.7	01/12/98	721026460
Cadmium, tot as Cd low level	ND	ug/L	0.030		EPA 1638	01/05/98	998087420
Calcium, tot. as Ca by ICP	19	mg/L	0.30	0.30	EPA 200.7	01/12/98	721026460
C.O.D. (unfiltered)	22	mg/L	1.4	4.8	EPA 410.1	01/01/98	721026460
Chloride, as Cl (unfiltered)	2.3	mg/L	0.56	2.0	EPA 325.2	12/23/97	721026460
Chlorophyll, all species	see attached				SM 10200H	01/05/98	721026460
Chromium, trivalent as Cr+3	0.15	ug/L	0.010		EPA 1639	12/22/97	998087420
Chromium, hexavalent as Cr+6	0.65	ug/L			Calc.	01/05/98	998087420
Chromium, tot as Cr low level	0.80	ug/L	0.20		EPA 1638	01/05/98	998087420
Color, APHA (true)	50	C.P.U.	5.0		EPA 110.2	12/18/97	721026460
Copper, tot. as Cu low level	0.088	ug/L	0.060		EPA 1638	01/05/98	998087420
Cyanide, tot. (distilled) as CN	ND	mg/L	0.0046	0.016	EPA 335.4	12/23/97	721026460
Fluoride, as F (unfiltered)	0.055	mg/L	0.0058	0.020	EPA 340.1	12/23/97	721026460
Hardness, tot. as CaCO ₃ (calc/unfilt)	86	mg/L	2.0	2.0	EPA 200.7	12/31/97	721026460
Iron, tot. as Fe by ICP	0.061	mg/L	0.015	0.054	EPA 200.7	01/12/98	721026460
Lead, tot. as Pb low level	0.023	ug/L	0.020		EPA 1638	01/05/98	998087420
Manganese, tot. as Mn by ICP	3.6	ug/L	0.11	0.38	EPA 200.7	01/12/98	721026460
Mercury, Low Level as Hg, SUB	0.0013	ug/L	0.000045		EPA 1631	12/30/97	998087420
Additional Comments: Low Level mercury result is blank corrected.							
Molybdenum, tot. as Mo	ND	mg/L	0.0082	0.032	EPA 200.7	01/23/98	721026460

Sample# 157590 results continued on next page.

3.7-9-543

ANALYTICAL REPORT

PAGE: 2 NLS PROJECT# 38678

NLS CUST# 11932

Client: Foth & Van Dyke Associates
Attn: Russell Janeshek
2737 S. Ridge Road
PO Box 19012
Green Bay, WI 54307

Project Description: Crandon Mining Co. - Surface Water Testing - Scope 93C049
Project Title: 93C049

Sample ID: Creek 19-14 NLS#: 157590 (continued)

Ref. Line 1 of COC 29495 Description: Creek 19-14

Collected: 12/18/97 Received: 12/18/97 Reported: 02/03/98

Parameter	Result	Units	LOD	LOQ	Method	Analyzed	Lab
Nitrogen, ammonia as N (unfiltered)	< 0.073 >	mg/L	0.023	0.076	EPA 350.1	12/23/97	721026460
Nitrogen, NO2 + NO3 as N (unfiltered)	< 0.063 >	mg/L	0.031	0.12	EPA 353.2	12/23/97	721026460
Nitrogen, Kjeldahl as N (unfiltered)	< 0.20 >	mg/L	0.074	0.26	EPA 351.2	12/22/97	721026460
Oil & grease (water)	ND	mg/L	7.6	26	EPA 413.1	12/22/97	721026460
pH, lab	7.7	s.u.	1.0		EPA 150.1	12/18/97	721026460
Phosphorus, tot. as P	0.030	mg/L	0.0050	0.0050	EPA 365.2	12/22/97	721026460
Phosphorus, tot. react. as P	0.013	mg/L	0.0021	0.0074	EPA 365.2	12/19/97	721026460
Selenium, tot. as Se by furnace	ND	ug/L	1.6	5.8	EPA 270.2	12/31/97	721026460
Silver, tot. as Ag by ICP	4.4	ug/L	1.1	3.9	EPA 200.7	01/12/98	721026460
Solids, tot. dis. (TDS)	140	mg/L	2.0		EPA 160.1	12/23/97	721026460
Solids, tot. susp. (TSS)	ND	mg/L	1.0		EPA 160.2	12/23/97	721026460
Solids, tot. volatile	7.8	% DWB	2.0		EPA 160.4	01/12/98	721026460
Sulfate, as SO4 (unfiltered)	8.3	mg/L	5.0	5.0	EPA 375.2	12/22/97	721026460
Turbidity	0.99	NTU	0.50		EPA 180.1	12/19/97	721026460
Zinc, total as Zn low level	0.82	ug/L	0.30		EPA 1638	01/05/98	998087420
Lab filtration for TDS	yes				EPA 160.1	12/23/97	721026460
Metals digestion - total (water) ICP	yes				EPA 200.7	12/22/97	721026460
Metals digestion - total (water) furnace	yes				EPA 200.0	12/22/97	721026460
Misc. Sample Prep	yes				EPA 1638	01/23/98	998087420

Values in brackets represent results greater than the LOD but less than the LOQ and are within a region of "Less-Certain Quantitation".
Results greater than the LOQ are considered to be in the region of "Certain Quantitation".

LOD = Limit of Detection
DWB = Dry Weight Basis

LOQ = Limit of Quantitation
NA = Not Applicable

ND = Not Detected
%DWB = (mg/kg DWB)/10000

Steven R. Cungi
Reviewed by:

Authorized by:
R. T. Krueger
Laboratory Manager

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

WIS. LAB CERT. NO. 721026460

ANALYTICAL REPORT

PAGE: 3 NLS PROJECT# 38678

Client: Foth & Van Dyke Associates
Attn: Russell Janeshek
2737 S. Ridge Road
PO Box 19012
Green Bay, WI 54307

NLS CUST# 11932

Project Description: Crandon Mining Co. - Surface Water Testing - Scope 93C049
Project Title: 93C049

Sample ID: Creek 19-14-2 NLS#: 157591
Ref. Line 2 of COC 29495 Description: Creek 19-14-2
Collected: 12/18/97 Received: 12/18/97 Reported: 02/03/98

Parameter	Result	Units	LOD	LOQ	Method	Analyzed	Lab
Alkalinity, bicarbonate as HCO ₃	120	mg/L	5.8	21	EPA 310.2	12/24/97	721026460
Alkalinity, tot. as CaCO ₃ (unfiltered)	97	mg/L	5.8	21	EPA 310.2	12/24/97	721026460
Alkalinity, carbonate as CaCO ₃	ND	mg/L	1.4	4.8	SM 2320B	12/22/97	721026460
Aluminum, tot. as Al low level	10	ug/L	0.20		EPA 1638	01/05/98	998087420
Arsenic, tot. as As by ICP	ND	ug/L	1.8	6.5	EPA 200.7	01/12/98	721026460
Barium, tot. as Ba by ICP	7.7	ug/L	5.0	5.0	EPA 200.7	01/12/98	721026460
BOD-5 day	ND	mg/L	3.0		SM 5210	12/19/97	721026460
Boron, tot. as B by ICP	ND	ug/L	18	58	EPA 200.7	01/12/98	721026460
Cadmium, tot as Cd low level	ND	ug/L	0.030		EPA 1638	01/05/98	998087420
Calcium, tot. as Ca by ICP	19	mg/L	0.30	0.30	EPA 200.7	01/12/98	721026460
C.O.D. (unfiltered)	18	mg/L	1.4	4.8	EPA 410.1	01/01/98	721026460
Chloride, as Cl (unfiltered)	ND	mg/L	0.56	2.0	EPA 325.2	12/23/97	721026460
Chlorophyll, all species	see attached				SM 10200H	01/05/98	721026460
Chromium, trivalent as Cr+3	0.055	ug/L	0.010		EPA 1639	12/22/97	998087420
Chromium, hexavalent as Cr+6	0.45	ug/L			Calc.	01/05/98	998087420
Chromium, tot as Cr low level	0.51	ug/L	0.20		EPA 1638	01/05/98	998087420
Color, APHA (true)	40	C.P.U.	5.0		EPA 110.2	12/18/97	721026460
Copper, tot. as Cu low level	0.078	ug/L	0.060		EPA 1638	01/05/98	998087420
Cyanide, tot. (distilled) as CN	ND	mg/L	0.0046	0.016	EPA 335.4	12/23/97	721026460
Fluoride, as F (unfiltered)	0.054	mg/L	0.0058	0.020	EPA 340.1	12/23/97	721026460
Hardness, tot. as CaCO ₃ (calc/unfilt)	85	mg/L	2.0	2.0	EPA 200.7	12/31/97	721026460
Iron, tot. as Fe by ICP	0.060	mg/L	0.015	0.054	EPA 200.7	01/12/98	721026460
Lead, tot. as Pb low level	ND	ug/L	0.020		EPA 1638	01/05/98	998087420
Manganese, tot. as Mn by ICP	3.1	ug/L	0.11	0.38	EPA 200.7	01/12/98	721026460
Mercury, Low Level as Hg, SUB	0.0012	ug/L	0.000045		EPA 1631	12/30/97	998087420
Additional Comments: Low Level mercury result is blank corrected.							
Molybdenum, tot. as Mo	ND	mg/L	0.0082	0.032	EPA 200.7	01/23/98	721026460

Sample# 157591 results continued on next page.

3.7-9-545

ANALYTICAL REPORT

PAGE: 4 NLS PROJECT# 38678

NLS CUST# 11932

Client: Foth & Van Dyke Associates
Attn: Russell Janeshek
2737 S. Ridge Road
PO Box 19012
Green Bay, WI 54307

Project Description: Crandon Mining Co. - Surface Water Testing - Scope 93C049
Project Title: 93C049

Sample ID: Creek 19-14-2 NLS#: 157591 (continued)
Ref. Line 2 of COC 29495 Description: Creek 19-14-2
Collected: 12/18/97 Received: 12/18/97 Reported: 02/03/98

Parameter	Result	Units	LOD	LOQ	Method	Analyzed Lab
Nitrogen, ammonia as N (unfiltered)	0.15	mg/L	0.023	0.076	EPA 350.1	12/23/97 721026460
Nitrogen, NO2 + NO3 as N (unfiltered)	0.14	mg/L	0.031	0.12	EPA 353.2	12/23/97 721026460
Nitrogen, Kjeldahl as N (unfiltered)	< 0.17 >	mg/L	0.074	0.26	EPA 351.2	12/22/97 721026460
Oil & grease (water)	ND	mg/L	7.8	26	EPA 413.1	12/22/97 721026460
pH, lab	7.7	s.u.	1.0		EPA 150.1	12/18/97 721026460
Phosphorus, tot. as P	0.020	mg/L	0.0050	0.0050	EPA 365.2	12/22/97 721026460
Phosphorus, tot. react. as P	0.013	mg/L	0.0021	0.0074	EPA 365.2	12/19/97 721026460
Selenium, tot. as Se by furnace	ND	ug/L	1.6	5.8	EPA 270.2	12/31/97 721026460
Silver, tot. as Ag by ICP	< 3.0 >	ug/L	1.1	3.9	EPA 200.7	01/12/98 721026460
Solids, tot. dis. (TDS)	140	mg/L	2.0		EPA 160.1	12/23/97 721026460
Solids, tot. susp. (TSS)	ND	mg/L	1.0		EPA 160.2	12/23/97 721026460
Solids, tot. volatile	7.0	% DWB	2.0		EPA 160.4	01/12/98 721026460
Sulfate, as SO4 (unfiltered)	8.5	mg/L	5.0	5.0	EPA 375.2	12/22/97 721026460
Turbidity	0.84	NTU	0.50		EPA 180.1	12/19/97 721026460
Zinc, total as Zn low level	0.82	ug/L	0.30		EPA 1638	01/05/98 998087420
Lab filtration for TDS	yes				EPA 160.1	12/23/97 721026460
Metals digestion - total (water) ICP	yes				EPA 200.7	12/22/97 721026460
Metals digestion - total (water) furnace	yes				EPA 200.0	12/22/97 721026460
Misc. Sample Prep	yes				EPA 1638	01/23/98 998087420

Values in brackets represent results greater than the LOD but less than the LOQ and are within a region of "Less-Certain Quantitation".
Results greater than the LOQ are considered to be in the region of "Certain Quantitation".

LOD = Limit of Detection
DWB = Dry Weight Basis

LOQ = Limit of Quantitation
NA = Not Applicable

ND = Not Detected
%DWB = (mg/kg DWB)/10000

Steven R. Cuyin
Reviewed by:

Authorized by:
R. T. Krueger
Laboratory Manager

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

WIS. LAB CERT. NO. 721026460

ANALYTICAL REPORT

PAGE: 5 NLS PROJECT# 38678

NLS CUST# 11932

Client: Foth & Van Dyke Associates
Attn: Russell Janeshek
2737 S. Ridge Road
PO Box 19012
Green Bay, WI 54307

Project Description: Crandon Mining Co. - Surface Water Testing - Scope 93C049
Project Title: 93C049

Sample ID: Lake 35-7 NLS#: 157592
Ref. Line 3 of COC 29495 Description: Lake 35-7
Collected: 12/18/97 Received: 12/18/97 Reported: 02/03/98

Parameter	Result	Units	LOD	LOQ	Method	Analyzed	Lab
Alkalinity, bicarbonate as HCO ₃	130	mg/L	5.8	21	EPA 310.2	12/24/97	721026460
Alkalinity, tot. as CaCO ₃ (unfiltered)	100	mg/L	5.8	21	EPA 310.2	12/24/97	721026460
Alkalinity, carbonate as CaCO ₃	ND	mg/L	1.4	4.8	SM 2320B	12/22/97	721026460
Aluminum, tot. as Al low level	8.5	ug/L	0.20		EPA 1638	01/05/98	998087420
Arsenic, tot. as As by ICP	ND	ug/L	1.8	6.5	EPA 200.7	01/12/98	721026460
Barium, tot. as Ba by ICP	6.1	ug/L	5.0	5.0	EPA 200.7	01/12/98	721026460
BOD-5 day	4.0	mg/L	2.0		SM 5210	12/19/97	721026460
Boron, tot. as B by ICP	ND	ug/L	18	58	EPA 200.7	01/12/98	721026460
Cadmium, tot as Cd low level	ND	ug/L	0.030		EPA 1638	01/05/98	998087420
Calcium, tot. as Ca by ICP	21	mg/L	0.30	0.30	EPA 200.7	01/12/98	721026460
C.O.D. (unfiltered)	25	mg/L	1.4	4.8	EPA 410.1	01/01/98	721026460
Chloride, as Cl (unfiltered)	ND	mg/L	0.56	2.0	EPA 325.2	12/23/97	721026460
Chlorophyll, all species	see attached				SM 10200H	01/05/98	721026460
Chromium, trivalent as Cr+3	0.039	ug/L	0.010		EPA 1639	12/22/97	998087420
Chromium, hexavalent as Cr+6	0.43	ug/L			Calc.	01/05/98	998087420
Chromium, tot as Cr low level	0.47	ug/L	0.20		EPA 1638	01/05/98	998087420
Color, APHA (true)	80	C.P.U.	10		EPA 110.2	12/18/97	721026460
Copper, tot. as Cu low level	0.11	ug/L	0.060		EPA 1638	01/05/98	998087420
Cyanide, tot. (distilled) as CN	ND	mg/L	0.0046	0.016	EPA 335.4	12/23/97	721026460
Fluoride, as F (unfiltered)	0.058	mg/L	0.0058	0.020	EPA 340.1	12/23/97	721026460
Hardness, tot. as CaCO ₃ (calc/unfilt)	95	mg/L	2.0	2.0	EPA 200.7	12/31/97	721026460
Iron, tot. as Fe by ICP	0.30	mg/L	0.015	0.054	EPA 200.7	01/12/98	721026460
Lead, tot. as Pb low level	0.25	ug/L	0.020		EPA 1638	01/05/98	998087420
Manganese, tot. as Mn by ICP	41	ug/L	0.11	0.38	EPA 200.7	01/12/98	721026460
Mercury, Low Level as Hg, SUB	0.0016	ug/L	0.000045		EPA 1631	12/30/97	998087420
Additional Comments: Low Level mercury result is blank corrected.							
Molybdenum, tot. as Mo	ND	mg/L	0.0082	0.032	EPA 200.7	01/23/98	721026460

Sample# 157592 results continued on next page.

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

WIS. LAB CERT. NO. 721026460

ANALYTICAL REPORT

PAGE: 6 NLS PROJECT# 38678

NLS CUST# 11932

Client: Foth & Van Dyke Associates
Attn: Russell Janeshek
2737 S. Ridge Road
PO Box 19012
Green Bay, WI 54307

Project Description: Crandon Mining Co. - Surface Water Testing - Scope 93C049
Project Title: 93C049

Sample ID: Lake 35-7 NLS#: 157592 (continued)

Ref. Line 3 of COC 29495 Description: Lake 35-7

Collected: 12/18/97 Received: 12/18/97 Reported: 02/03/98

Parameter	Result	Units	LOD	LOQ	Method	Analyzed	Lab
Nitrogen, ammonia as N (unfiltered)	0.39	mg/L	0.023	0.076	EPA 350.1	12/23/97	721026460
Nitrogen, NO ₂ + NO ₃ as N (unfiltered)	< 0.048 >	mg/L	0.031	0.12	EPA 353.2	12/23/97	721026460
Nitrogen, Kjeldahl as N (unfiltered)	0.60	mg/L	0.074	0.26	EPA 351.2	12/22/97	721026460
Oil & grease (water)	ND	mg/L	7.2	24	EPA 413.1	12/22/97	721026460
pH, lab	6.9	s.u.	1.0		EPA 150.1	12/18/97	721026460
Phosphorus, tot. as P	0.010	mg/L	0.0050	0.0050	EPA 365.2	12/22/97	721026460
Phosphorus, tot. react. as P	ND	mg/L	0.0021	0.0074	EPA 365.2	12/19/97	721026460
Selenium, tot. as Se by furnace	ND	ug/L	1.6	5.8	EPA 270.2	12/31/97	721026460
Silver, tot. as Ag by ICP	< 2.9 >	ug/L	1.1	3.9	EPA 200.7	01/12/98	721026460
Solids, tot. dis. (TDS)	160	mg/L	2.0		EPA 160.1	12/23/97	721026460
Solids, tot. susp. (TSS)	1.0	mg/L	1.0		EPA 160.2	12/23/97	721026460
Solids, tot. volatile	12	% DWB	2.0		EPA 160.4	01/12/98	721026460
Sulfate, as SO ₄ (unfiltered)	8.9	mg/L	5.0	5.0	EPA 375.2	12/22/97	721026460
Turbidity	0.69	NTU	0.50		EPA 180.1	12/19/97	721026460
Zinc, total as Zn low level	1.3	ug/L	0.30		EPA 1638	01/05/98	998087420
Lab filtration for TDS	yes				EPA 160.1	12/23/97	721026460
Metals digestion - total (water) ICP	yes				EPA 200.7	12/22/97	721026460
Metals digestion - total (water) furnace	yes				EPA 200.0	12/22/97	721026460
Misc. Sample Prep	yes				EPA 1638	01/23/98	998087420

Values in brackets represent results greater than the LOD but less than the LOQ and are within a region of "Less-Certain Quantitation".
Results greater than the LOQ are considered to be in the region of "Certain Quantitation".

LOD = Limit of Detection
DWB = Dry Weight Basis

LOQ = Limit of Quantitation
NA = Not Applicable

ND = Not Detected
%DWB = (mg/kg DWB)/10000

Steven R. Cuyi
Reviewed by:

Authorized by:
R. T. Krueger
Laboratory Manager

3.7-9-548

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

WIS. LAB CERT. NO. 721026460

ANALYTICAL REPORT

PAGE: 7 NLS PROJECT# 38678

NLS CUST# 11932

Client: Foth & Van Dyke Associates
Attn: Russell Janeshek
2737 S. Ridge Road
PO Box 19012
Green Bay, WI 54307

Project Description: Crandon Mining Co. - Surface Water Testing - Scope 93C049
Project Title: 93C049

Sample ID: Drainage Canal NLS#: 157593
Ref. Line 4 of COC 29495 Description: Drainage Canal
Collected: 12/18/97 Received: 12/18/97 Reported: 02/03/98

Parameter	Result	Units	LOD	LOQ	Method	Analyzed	Lab
Alkalinity, bicarbonate as HCO ₃	150	mg/L	5.8	21	EPA 310.2	12/24/97	721026460
Alkalinity, tot. as CaCO ₃ (unfiltered)	120	mg/L	5.8	21	EPA 310.2	12/24/97	721026460
Alkalinity, carbonate as CaCO ₃	ND	mg/L	1.4	4.8	SM 2320B	12/22/97	721026460
Aluminum, tot. as Al low level	30	ug/L	0.20		EPA 1638	01/05/98	998087420
Arsenic, tot. as As by ICP	ND	ug/L	1.8	6.5	EPA 200.7	01/12/98	721026460
Barium, tot. as Ba by ICP	11	ug/L	5.0	5.0	EPA 200.7	01/12/98	721026460
BOD-5 day	5.0	mg/L	2.0		SM 5210	12/19/97	721026460
Boron, tot. as B by ICP	ND	ug/L	18	58	EPA 200.7	01/12/98	721026460
Cadmium, tot as Cd low level	ND	ug/L	0.030		EPA 1638	01/05/98	998087420
Calcium, tot. as Ca by ICP	25	mg/L	0.30	0.30	EPA 200.7	01/12/98	721026460
C.O.D. (unfiltered)	10	mg/L	1.4	4.8	EPA 410.1	01/01/98	721026460
Chloride, as Cl (unfiltered)	ND	mg/L	0.56	2.0	EPA 325.2	12/23/97	721026460
Chlorophyll, all species	see attached				SM 10200H	01/05/98	721026460
Chromium, trivalent as Cr+3	0.21	ug/L	0.010		EPA 1639	12/22/97	998087420
Chromium, hexavalent as Cr+6	0.38	ug/L			Calc.	01/05/98	998087420
Chromium, tot as Cr low level	0.59	ug/L	0.20		EPA 1638	01/05/98	998087420
Color, APHA (true)	60	C.P.U.	5.0		EPA 110.2	12/18/97	721026460
Copper, tot. as Cu low level	0.063	ug/L	0.060		EPA 1638	01/05/98	998087420
Cyanide, tot. (distilled) as CN	ND	mg/L	0.0046	0.016	EPA 335.4	12/23/97	721026460
Fluoride, as F (unfiltered)	0.066	mg/L	0.0058	0.020	EPA 340.1	12/23/97	721026460
Hardness, tot. as CaCO ₃ (calc/unfilt)	100	mg/L	2.0	2.0	EPA 200.7	12/31/97	721026460
Iron, tot. as Fe by ICP	1.1	mg/L	0.015	0.054	EPA 200.7	01/12/98	721026460
Lead, tot. as Pb low level	0.061	ug/L	0.020		EPA 1638	01/05/98	998087420
Manganese, tot. as Mn by ICP	76	ug/L	0.11	0.38	EPA 200.7	01/12/98	721026460
Mercury, Low Level as Hg, SUB	0.0013	ug/L	0.000045		EPA 1631	12/30/97	998087420
Additional Comments: Low Level mercury result is blank corrected.							
Molybdenum, tot. as Mo	ND	mg/L	0.0082	0.032	EPA 200.7	01/23/98	721026460

Sample# 157593 results continued on next page.

3.7-9-549

ANALYTICAL REPORT

PAGE: 8 NLS PROJECT# 38678

NLS CUST# 11932

Client: Foth & Van Dyke Associates
Attn: Russell Janeshek
2737 S. Ridge Road
PO Box 19012
Green Bay, WI 54307

Project Description: Crandon Mining Co. - Surface Water Testing - Scope 93C049
Project Title: 93C049

Sample ID: Drainage Canal NLS#: 157593 (continued)
Ref. Line 4 of COC 29495 Description: Drainage Canal
Collected: 12/18/97 Received: 12/18/97 Reported: 02/03/98

Parameter	Result	Units	LOD	LOQ	Method	Analyzed	Lab
Nitrogen, ammonia as N (unfiltered)	0.087	mg/L	0.023	0.076	EPA 350.1	12/23/97	721026460
Nitrogen, NO ₂ + NO ₃ as N (unfiltered)	ND	mg/L	0.031	0.12	EPA 353.2	12/23/97	721026460
Nitrogen, Kjeldahl as N (unfiltered)	< 0.24 >	mg/L	0.074	0.26	EPA 351.2	12/22/97	721026460
Oil & grease (water)	ND	mg/L	8.1	27	EPA 413.1	12/22/97	721026460
pH, lab	7.1	s.u.	1.0		EPA 150.1	12/18/97	721026460
Phosphorus, tot. as P	0.030	mg/L	0.0050	0.0050	EPA 365.2	12/26/97	721026460
Phosphorus, tot. react. as P	< 0.0030 >	mg/L	0.0021	0.0074	EPA 365.2	12/19/97	721026460
Selenium, tot. as Se by furnace	ND	ug/L	1.6	5.8	EPA 270.2	12/31/97	721026460
Silver, tot. as Ag by ICP	< 3.6 >	ug/L	1.1	3.9	EPA 200.7	01/12/98	721026460
Solids, tot. dis. (TDS)	170	mg/L	2.0		EPA 160.1	12/23/97	721026460
Solids, tot. susp. (TSS)	ND	mg/L	1.0		EPA 160.2	12/23/97	721026460
Solids, tot. volatile	10	% DWB	2.0		EPA 160.4	01/12/98	721026460
Sulfate, as SO ₄ (unfiltered)	9.3	mg/L	5.0	5.0	EPA 375.2	12/22/97	721026460
Turbidity	2.6	NTU	0.50		EPA 180.1	12/19/97	721026460
Zinc, total as Zn low level	0.59	ug/L	0.30		EPA 1638	01/05/98	998087420
Lab filtration for TDS	yes				EPA 160.1	12/23/97	721026460
Metals digestion - total (water) ICP	yes				EPA 200.7	12/22/97	721026460
Metals digestion - total (water) furnace	yes				EPA 200.0	12/22/97	721026460
Misc. Sample Prep	yes				EPA 1638	01/23/98	998087420

Values in brackets represent results greater than the LOD but less than the LOQ and are within a region of "Less-Certain Quantitation".
Results greater than the LOQ are considered to be in the region of "Certain Quantitation".

LOD = Limit of Detection
DWB = Dry Weight Basis

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%DWB = (mg/kg DWB)/10000

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Laboratory Manager

NORTHERN LAKE SERVICE, INC.
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400 North Lake Avenue - Crandon, WI 54520
Tel:(715)478-2777 Fax:(715)478-3060

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ANALYTICAL REPORT

PAGE: 9 NLS PROJECT# 38678

NLS CUST# 11932

Client: Foth & Van Dyke Associates
Attn: Russell Janeshek
2737 S. Ridge Road
PO Box 19012
Green Bay, WI 54307

Project Description: Crandon Mining Co. - Surface Water Testing - Scope 93C049
Project Title: 93C049

Sample ID: Creek 19-14 Dup NLS#: 160241
Ref. Line 5 of COC 29495 Description: Creek 19-14 Dup
Collected: 12/18/97 Received: 12/18/97 Reported: 02/03/98

Parameter	Result	Units	LOD	LOQ	Method	Analyzed Lab
Aluminum, tot. as Al low level	14	ug/L	0.20		EPA 1638	01/05/98 998087420
Cadmium, tot as Cd low level	ND	ug/L	0.030		EPA 1638	01/05/98 998087420
Chromium, trivalent as Cr+3	0.047	ug/L	0.010		EPA 1639	12/22/97 998087420
Chromium, hexavalent as Cr+6	0.57	ug/L			Calc.	01/05/98 998087420
Chromium, tot as Cr low level	0.62	ug/L	0.20		EPA 1638	01/05/98 998087420
Copper, tot. as Cu low level	0.080	ug/L	0.060		EPA 1638	01/05/98 998087420
Lead, tot. as Pb low level	0.023	ug/L	0.020		EPA 1638	01/05/98 998087420
Mercury, Low Level as Hg, SUB	0.0013	ug/L	0.000045		EPA 1631	12/30/97 998087420
Additional Comments: Low Level mercury result is blank corrected.						
Zinc, total as Zn low level	0.70	ug/L	0.30		EPA 1638	01/05/98 998087420

Values in brackets represent results greater than the LOD but less than the LOQ and are within a region of "Less-Certain Quantitation".
Results greater than the LOQ are considered to be in the region of "Certain Quantitation".

LOD = Limit of Detection
DWB = Dry Weight Basis

LOQ = Limit of Quantitation
NA = Not Applicable

ND = Not Detected
%DWB = (mg/kg DWB)/10000

Steven R. Cury
Reviewed by:

Authorized by:
R. T. Krueger
Laboratory Manager

3.7-9-551

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

WIS. LAB CERT. NO. 721026460

ANALYTICAL REPORT

PAGE: 10 NLS PROJECT# 38678

NLS CUST# 11932

Client: Foth & Van Dyke Associates
Attn: Russell Janeshek
2737 S. Ridge Road
PO Box 19012
Green Bay, WI 54307

Project Description: Crandon Mining Co. - Surface Water Testing - Scope 93C049
Project Title: 93C049

Sample ID: Mercury Blank NLS#: 160242
Ref. Line 6 of COC 29495 Description: Mercury Blank
Collected: 12/18/97 Received: 12/18/97 Reported: 02/03/98

Parameter	Result	Units	LOD	LOQ	Method	Analyzed Lab
Mercury, Low Level as Hg, SUB	0.00023	ug/L	0.000045		EPA 1631	12/30/97 998087420
Additional Comments: Low Level mercury result is blank corrected.						

Values in brackets represent results greater than the LOD but less than the LOQ and are within a region of "Less-Certain Quantitation".
Results greater than the LOQ are considered to be in the region of "Certain Quantitation".

LOD = Limit of Detection
DWB = Dry Weight Basis

LOQ = Limit of Quantitation
NA = Not Applicable

ND = Not Detected
%DWB = (mg/kg DWB)/10000

Steven R. Cuyin
Reviewed by:

Authorized by:
R. T. Krueger
Laboratory Manager

3.7-9-552

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
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WIS. LAB CERT. NO. 721026460

ANALYTICAL REPORT

PAGE: 11 NLS PROJECT# 38678

Client: Foth & Van Dyke Associates
Attn: Russell Janeshek
2737 S. Ridge Road
PO Box 19012
Green Bay, WI 54307

NLS CUST# 11932

Project Description: Crandon Mining Co. - Surface Water Testing - Scope 93C049
Project Title: 93C049

Sample ID: SRM 1643d/1641c NLS#: 160243
Ref. Line 7 of COC 29495 Description: SRM 1643d/1641c
Collected: 12/18/97 Received: 12/18/97 Reported: 02/03/98

Parameter	Result	Units	LOD	LOQ	Method	Analyzed Lab
Aluminum, tot. as Al low level	126 ug/L		0.20		EPA 1638	01/05/98 998087420
	Additional Comments: Certified value is 128 +/- 3.5 ug/L.					
Cadmium, tot as Cd low level	6.45 ug/L		0.030		EPA 1638	01/05/98 998087420
	Additional Comments: Certified value is 6.47 +/- 0.37 ug/L.					
Chromium, tot as Cr low level	18.8 ug/L		0.20		EPA 1638	01/05/98 998087420
	Additional Comments: Certified values is 18.5 +/- 0.20 ug/L.					
Copper, tot. as Cu low level	20.5 ug/L		0.060		EPA 1638	01/05/98 998087420
	Additional Comments: Certified value is 20.5 +/- 3.8 ug/L.					
Lead, tot. as Pb low level	18.1 ug/L		0.020		EPA 1638	01/05/98 998087420
	Additional Comments: Certified value is 18.2 +/- 0.64 ug/L.					
Mercury, Low Level as Hg, SUB	1460 ug/L		0.000045		EPA 1631	12/30/97 998087420
	Additional Comments: Certified value is 1470 +/- 40 ug/L.					
Zinc, total as Zn low level	77.8 ug/L		0.30		EPA 1638	01/05/98 998087420
	Additional Comments: Certified value is 72.5 +/- 0.65 ug/L.					

Values in brackets represent results greater than the LOD but less than the LOQ and are within a region of "Less-Certain Quantitation".
Results greater than the LOQ are considered to be in the region of "Certain Quantitation".

LOD = Limit of Detection
DWB = Dry Weight Basis

LOQ = Limit of Quantitation
NA = Not Applicable

ND = Not Detected
%DWB = (mg/kg DWB)/10000

Steven R. Cuyi
Reviewed by:

Authorized by:
R. T. Krueger
Laboratory Manager

3.7-9-553

NORTHERN LAKE SERVICE, INC.
CHLOROPHYLL RESULTS

CLIENT: Foth & Van Dyke Associates

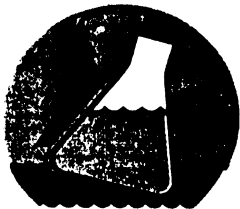
PROJECT TITLE: Crandon Mining

COLLECTION DATE: 12/18/97

<u>NLS</u> <u>#</u>	<u>ID/SITE</u>	<u>CC a</u>	<u>Pheo a</u>	<u>TC a</u>	<u>TC b</u>	<u>TC c</u>
157590	Creek 19-14	0.227	0.250	0.347	0.417	0.727
157591	Creek 19-14-2	0.220	0.242	0.336	0.383	0.908
157592	Lake 35-7	1.99	0.331	2.26	0.030	0.243
157593	Drainage Canal	0.651	0.869	1.17	0.344	0.450

CC a = Corrected Chlorophyll a
Pheo a = Pheophytin a
TC a = Trichromatic Chlorophyll a
TC b = Trichromatic Chlorophyll b
TC c = Trichromatic Chlorophyll c

units = ug/l



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 29495

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT <i>FOTH: VAN DYKE</i>		PROJECT TITLE <i>CMC</i>	
ADDRESS <i>2737 S. RIDGE Rd</i>		PROJECT NO. <i>93C049</i>	P.O. NO.
CITY <i>GREEN BAY</i>	STATE <i>WI</i>	ZIP <i>54307</i>	CONTACT <i>RUSS JANESHER</i>
			PHONE <i>920-477-2500</i>

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE					COLLECTION REMARKS
			DATE	TIME			P	N	V	B	Z	
1.		<i>CREEK 19-14</i>	<i>12/18/97</i>	<i>0900</i>	<i>S.W.</i>	<i>GRAB</i>	<i>2</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>2</i>	
2.		<i>CREEK 19-14-2</i>		<i>0900</i>			<i>2</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>2</i>	
3.		<i>LAKE 35-7</i>		<i>1400</i>			<i>2</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>2</i>	
4.		<i>DRAINAGE CANAL</i>		<i>1130</i>			<i>2</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>2</i>	
5.												
6.												
7.												
8.												
9.												
10.												
11.												
12.												

SAMPLE TYPE: SW = surface water WW = wastewater GW = groundwater describe others	DW = drinking water TIS = tissue AIR = air	PROD = product SOIL = soil SED = sediment	CONTAINER P = plastic G = glass V = glass vial B = plastic bag describe others	PRESERVATIVES & PREPARATION NP = nothing added S = sulfuric acid N = nitric acid Z = zinc acetate OH = sodium hydroxide HA = hydrochloric & ascorbic acid H = hydrochloric acid
---	--	---	--	---

COLLECTED BY (signature) <i>Scott Janesher</i>	<i>Brad Helmondoller</i>	CUSTODY SEAL NO. (IF ANY)	DATE/TIME <i>12/18/97</i>
RELINQUISHED BY (signature)	RECEIVED BY (signature)		DATE/TIME
RELINQUISHED BY (signature)	RECEIVED BY (signature)		DATE/TIME
DISPATCHED BY (signature) <i>Scott Janesher</i>	METHOD OF TRANSPORT <i>FVD</i>		DATE/TIME <i>12/18/97 1420</i>

RECEIVED AT NLS BY (signature) <i>Brad Helmondoller</i>	REMARKS & OTHER INFORMATION <i>Hand delivered</i>
--	--

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

CLIENT COPY

NORTHERN LAKE SERVICE, INC.

400 NORTH LAKE AVENUE

CRANDON, WI 54520 (715)478-2777

ORDER OF ANALYSIS

RESULTS ORDERED BY:	CHAIN OF CUSTODY RECORD NUMBER:
FOTH: VAN DYKE	29443
	QUOTATION NUMBER:
	97874
	ANALYZE FOR DISSOLVED OR TOTAL PARAMETERS?
SEND RESULTS TO:	SEND INVOICE TO:
FOTH: VAN DYKE	FOTH: VAN DYKE

Note "L" for low level ICP analysis, and "F" for furnace analysis.

Samples on line #s: 1-4 to be analyzed for the parameters checked below:

* **ALKALINITY, CARBONATE**

- | | | | |
|---|---|---|--|
| ☒ Alkalinity, total | ☒ Cyanide, total | ☒ Phenols | ☐ Acid Extractables by 625/8270 |
| ☒ Alkalinity, bicarb. | ☒ Amenable | ☒ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☒ Fluoride | ☒ Tot. reactive | ☐ BNAs by 625/8270 |
| ☐ Antimony | ☒ Hardness | ☐ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☒ Arsenic | ☒ Iron | ☐ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☒ Lead | ☒ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☒ B.O.D.-5 | ☒ Manganese | ☒ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☒ Boron | ☒ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☒ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☒ Calcium | ☐ Nickel | ☒ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☒ C.O.D. | ☐ Nitrogen, total | ☒ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BNAs |
| ☒ Chloride | ☒ Ammonia | ☒ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☐ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☒ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8260 |
| ☐ Coliform, fecal | ☒ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SDWA) |
| ☐ Coliform, total | ☐ Total Organic | ☒ T.O.C. | ☐ BTEX by 8020 |
| ☒ Color | ☒ Oil & Grease | ☒ Turbidity | ☐ PVOCs by 8020 |
| ☐ Conductivity | ☒ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO + PVOCs |
| ☐ Copper | ☒ Total Volatile Solids | ☐ Zinc | ☐ DRO-WI Modified |
| ☒ Chlorophyll A | | ☐ Munic.Sludge, WI List | ☐ PAHs by 610LC/8310 |

Samples on line #s: _____ to be analyzed for the parameters checked below:

- | | | | |
|---|--|--|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☐ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☐ Tot. reactive | ☐ BNAs by 625/8270 |
| ☐ Antimony | ☐ Hardness | ☐ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☐ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☐ B.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☐ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☐ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BNAs |
| ☐ Chloride | ☐ Ammonia | ☐ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☐ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☐ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SDWA) |
| ☐ Coliform, total | ☐ Total Organic | ☐ T.O.C. | ☐ BTEX by 8020 |
| ☐ Color | ☐ Oil & Grease | ☐ Turbidity | ☐ PVOCs by 8020 |
| ☐ Conductivity | ☐ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO + PVOCs |
| ☐ Copper | | ☐ Zinc | ☐ DRO-WI Modified |
| | | ☐ Munic.Sludge, WI List | ☐ PAHs by 610LC/8310 |

SPECIAL INSTRUCTIONS: _____



Pacific Northwest Division
Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382

Date 12-18-97

Page 1 of 1

3.7-9-557

BC-1800-192 (07/94)

Appendix 3.7-10

**Sediment Laboratory Data Relating to Samples
Collected October 4-5, 1994**

November 22, 1994

Mr. Russell Janeshek
Foth & Van Dyke
2737 S. Ridge Rd.
Green Bay, WI 54307-9012

**Re: Crandon Mining Company Project -
PACE Project 941008.502**

Dear Mr. Janeshek:

Enclosed are the analytical report, raw data package and electronic deliverable representing the sediment samples received at PACE on October 6, 1994. Analysis results in this submittal cover tests performed at PACE and Northern Lake Services (NLS). The enclosed summary report and electronic deliverable summarize results from both laboratories.

Attached to this letter are copies of the chain of custody records documenting receipt of the samples at PACE. Also attached to this letter is a table cross referencing the PACE sample identification and the sampling point identification.

A summary of where each of the analyses were performed follows below.

PACE -	Metals, TKN, TON, NH ₃ , fluoride, cyanide, chloride
NLS -	Oil & Grease, pH, total solids, total phosphorous, volatile solids

The quality control summary for the analyses performed at NLS is included in the raw data submittal.

The matrix spike and matrix spike duplicate (MS/MSD) recoveries for aluminum and iron are variable negative values. The nature of the recoveries was caused by the high aluminum and iron amounts (2700 ppm and 6200 ppm, respectively) detected in the sample used to prepare the MS/MSD set. These concentrations effectively masked the concentration (100 ppm) of these metals spiked into the sample. Inconsistency in recoveries is a familiar problem with soil matrices, due to difficulties obtaining a homogeneous sample.

Project 941008.502
11/22/94
page 2 of 2

If you have any questions or comments concerning the data submitted,
feel free to contact me at (612) 525-3454.

Sincerely,

Steven R. Crupi

Steven R. Crupi
Project Manager

Attachments/Enclosures

Crandon Mining Company Project -
PACE Project 941008.502

Sample Cross Reference

<u>Sample ID</u>	<u>PACE ID</u>	<u>NLS ID</u>
CMC-SED-A1	23620.9	65928
CMC-SED-D	23621.7	65929
CMC-SED-E	23622.5	65930
CMC-SED-Y	23623.3	65931
CMC-SED-Z	23624.1	65932
CMC-SED-M2	23625.0	65933
CMC-SED-M4	23626.8	65934
CMC-SED-M5	23627.6	65935
CMC-SED-M5 DUP	23628.4	65936
CMC-SED-M3	23629.2	65937
CMC-SED-H	23630.6	65938
CMC-SED-H DUP	23631.4	65939
CMC-SED-I	23632.2	65940
CMC-SED-L	23633.0	65941
CMC-SED-K	23634.9	65942
CMC-SED-G	23635.7	65943

Crandon Mining Company Project -
PACE Project 941008.502

Method Listing

EPA 6010 - Ag, Al, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Mg, Mn, Na, Ni,
Sb, V, Zn, Mo, B

EPA 6010 (Trace ICP) - As, Se, Pb, Tl

EPA 7471 - Mercury

EPA 9250 - Chloride

EPA 9010 - Cyanide

EPA 340.2 - Fluoride

EPA 350.2 - Total Organic Nitrogen

EPA 351.3 - Total Kjeldahl

EPA 350.2 - Ammonia

EPA 9071 - Oil and Grease

EPA 365.2 - Total Phosphorous

EPA 160.3 - Total Solids

EPA 160.4 - Total Volatile Solids

EPA 150.1 - pH



NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

4/4/00 8502

NO. 11039

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 731026460

RETURN THIS FORM WITH SAMPLES.

CLIENT <i>Foth & Van Dyke</i>	PROJECT TITLE <i>Crandon Mining Company</i>			
ADDRESS <i>2737 S. Ridge Rd</i>	PROJECT NO. <i>936049</i>	P.O. NO.		
CITY <i>Green Bay</i>	STATE <i>WI</i>	ZIP <i>54307</i>	CONTACT <i>Russ Jameshek / Jerry Berg</i>	PHONE <i>414-447-2500</i>

ITEM NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
		DATE	TIME							
1.	CMC-SED-A1	10/4/94	845	SED	G	ICE	/	Plastic		23020.9
2.	CMC-SED-D	10/4/94	945	SED	G	ICE				23021.7
3.	CMC-SED-E	10/4/94	1020	SED	G	ICE				23022.5
4.	CMC-SED-Y	10/4/94	1145	SED	G	ICE				23023.3
5.	CMC-SED-Z	10/4/94	1:15	SED	G	ICE				23024.1
6.	CMC-SED-M2	10/4/94	205	SED	G	ICE				23025.0
7.	CMC-SED-M4	10/4/94	245	SED	G	ICE				23026.8
8.	CMC-SED-M5	10/4/94	415	SED	G	ICE				23027.6
9.	CMC-SED-M5DUP	10/4/94	415	SED	G	ICE				23028.4
10.	CMC-SED-M3	10/4/94	500	SED	G	ICE				23029.2
11.	CMC-SED-H	10/5/94	815	SED	G	ICE				23030.6
12.	CMC-SED-HDUP	10/5/94	815	SED	G	ICE				23031.4

SAMPLE TYPE:

SW = surface water
WW = wastewater
GW = groundwater

DW = drinking water
TIS = tissue
AIR = air

PROD = product
SOIL = soil
SED = sediment

describe others

CONTAINER

P = plastic
G = glass
V = glass vial
B = plastic bag

describe others

PRESERVATIVES & PREPARATION

NP = nothing added
S = sulfuric acid
N = nitric acid
Z = zinc acetate

OH = sodium hydroxide
HA = hydrochloric &
ascorbic acid
H = hydrochloric acid

F = field filtered

COLLECTED BY (signature) <i>Bill West</i>	10/5/94 12:40	CUSTODY SEAL NO. (IF ANY)	DATE/TIME
RELINQUISHED BY (signature) <i>Bill West</i>	10/5/94 1240	RECEIVED BY (signature) <i>[Signature]</i>	DATE/TIME 10/6/94 1100
RELINQUISHED BY (signature)		RECEIVED BY (signature)	DATE/TIME
DISPATCHED BY (signature)		METHOD OF TRANSPORT	DATE/TIME

RECEIVED AT NLS BY (signature) <i>[Signature]</i>	DATE/TIME 10-5-94	CONDITION ICE	TEMP.
SEAL INTACT? ☐ YES ☐ NO	SEAL #	REMARKS & OTHER INFORMATION	

- IMPORTANT:** 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

ORIGINAL COPY



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Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520

Tel: (715) 478-2777 • Fax: (715) 478-3060

041008502

NO. 11040

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT <i>Foth & Van Dyke</i>	PROJECT TITLE <i>Crandon Mining Company</i>			
ADDRESS <i>2737 S. Ridge Rd</i>	PROJECT NO. <i>936049</i>	P.O. NO.		
CITY <i>Green Bay</i>	STATE <i>WI</i>	ZIP <i>54307</i>	CONTACT <i>Russ Janeschek / Jany</i>	PHONE <i>414-497-2500</i>

ITEM NO.	NLS LAB NO.	SAMPLE ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
			DATE	TIME							
1.		<i>CMC-SED-I</i>	<i>10/5/94</i>	<i>9:00</i>	<i>SED</i>	<i>G</i>	<i>ICC</i>				<i>23032.2</i>
2.		<i>CMC-SED-L</i>	<i>10/5/94</i>	<i>11:00</i>	<i>SED</i>	<i>G</i>	<i>ICC</i>				<i>23033.0</i>
3.		<i>CMC-SED-K</i>	<i>10/5/94</i>	<i>11:00</i>	<i>SED</i>	<i>G</i>	<i>ICC</i>				<i>23034.9</i>
4.		<i>CMC-SED-G</i>	<i>10/5/94</i>	<i>12:00</i>	<i>SED</i>	<i>G</i>	<i>ICC</i>				<i>23035.7</i>
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE: SW = surface water WW = wastewater GW = groundwater describe others	DW = drinking water TIS = tissue AIR = air	PROD = product SOIL = soil SED = sediment	CONTAINER P = plastic G = glass V = glass vial B = plastic bag describe others	PRESERVATIVES & PREPARATION NP = nothing added S = sulfuric acid N = nitric acid Z = zinc acetate OH = sodium hydroxide HA = hydrochloric & ascorbic acid H = hydrochloric acid F = field filtered
--	--	---	---	--

COLLECTED BY (signature) <i>Bill West</i>	10/5/94 12:40	CUSTODY SEAL NO. (IF ANY)	DATE/TIME
RELINQUISHED BY (signature) <i>Bill West</i>	10/5/94 12:40	RECEIVED BY (signature) <i>[Signature]</i>	DATE/TIME 10/6/94 11:00
RELINQUISHED BY (signature)		RECEIVED BY (signature)	DATE/TIME
DISPATCHED BY (signature)	METHOD OF TRANSPORT	DATE/TIME	

RECEIVED AT NLS BY (signature) <i>Rouven Marten</i>	DATE/TIME 10-5-94	CONDITION FINE	TEMP.
SEAL INTACT? ☐ YES ☐ NO	SEAL #	REMARKS & OTHER INFORMATION	

- IMPORTANT:** 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

ORIGINAL COPY

NORTHERN LAKE SERVICE, INC.

400 NORTH LAKE AVENUE

CRANDCN, WI 54520 (715)478-2777

941008502

ORDER OF ANALYSIS

RESULTS ORDERED BY:

Russ Jameshek / Bill West
T.H. & Vm. Dyke
2737 S Ridge Rd
Green Bay WI 54307

CHAIN OF CUSTODY RECORD NUMBER:

QUOTATION NUMBER:

ANALYZE FOR DISSOLVED OR TOTAL PARAMETERS?

SEND RESULTS TO:

SEND INVOICE TO:

Same

Same

Note "L" for low level ICP analysis, and "F" for furnace analysis.

Samples on line #s: _____ to be analyzed for the parameters checked below:

- | | | | |
|---|---|---|--|
| ☐ Alkalinity, total | ☒ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☒ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☒ Aluminum | ☒ Fluoride | ☐ Tot. reactive | ☐ BNAs by 625/8270 |
| ☒ Antimony | ☐ Hardness | ☐ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☒ Arsenic | ☒ Iron | ☒ Potassium | ☐ Haloethers by 611 |
| ☒ Barium | ☒ Lead | ☒ Selenium | ☐ Nitrosamines by 607 |
| ☒ Beryllium | ☒ Magnesium | ☒ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☐ B.O.D.-5 | ☒ Manganese AND (T.Mn) | ☒ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☒ Mercury | ☒ Sodium | ☐ PCBs by 608/8080 |
| ☒ Cadmium | ☒ Molybdenum | ☒ Solids, total | ☐ Phenols by GC 604/8040 |
| ☒ Calcium | ☒ Nickel | ☐ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☐ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BNAs |
| ☒ Chloride | ☐ Ammonia | ☐ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☒ Chromium | ☐ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☐ Nitrate + Nitrite | ☒ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☒ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SDWA) |
| ☐ Color | ☐ Total Organic | ☐ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☒ Oil & Grease | ☐ Turbidity | ☐ PVOCs by 8020 |
| ☒ Copper | ☒ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO+PVOCs |
| | ☒ Total Volatile Solids | ☒ Zinc | ☐ DRO-WI Modified |
| | | ☐ Munic.Sludge, WI List | ☐ PAHs by 610LC/8310 |

Samples on line #s: _____ to be analyzed for the parameters checked below:

- | | | | |
|---|--|--|--|
| ☐ Alkalinity, total | ☐ Cyanide, total | ☐ Phenols | ☐ Acid Extractables by 625/8270 |
| ☐ Alkalinity, bicarb. | ☐ Amenable | ☐ Phosphorus, total | ☐ Base/Neutral Extractables by 625/8270 |
| ☐ Aluminum | ☐ Fluoride | ☐ Tot. reactive | ☐ BNAs by 625/8270 |
| ☐ Antimony | ☐ Hardness | ☐ Dis. reactive | ☐ Chlorinated Hydrocarbons by 612 |
| ☐ Arsenic | ☐ Iron | ☐ Potassium | ☐ Haloethers by 611 |
| ☐ Barium | ☐ Lead | ☐ Selenium | ☐ Nitrosamines by 607 |
| ☐ Beryllium | ☐ Magnesium | ☐ Silica | ☐ Pesticides-Organochlorine by 608/8080 |
| ☐ B.O.D.-5 | ☐ Manganese | ☐ Silver | ☐ Pesticides-Organophosphate by 8141 |
| ☐ Boron | ☐ Mercury | ☐ Sodium | ☐ PCBs by 608/8080 |
| ☐ Cadmium | ☐ Molybdenum | ☐ Solids, total | ☐ Phenols by GC 604/8040 |
| ☐ Calcium | ☐ Nickel | ☐ Tot. dissolved | ☐ Phenoxy Acid Herbicides by 8150 |
| ☐ C.O.D. | ☐ Nitrogen, total | ☐ Tot. suspended | ☐ TCLP-metals ☐ TCLP-VOCs ☐ TCLP-BNAs |
| ☐ Chloride | ☐ Ammonia | ☐ Sulfate | ☐ TCLP-pesticides/herbicides |
| ☐ Chromium | ☐ Nitrate | ☐ Sulfide | ☐ VOCs by EPA 601+602 or 8010+8020 |
| ☐ Chromium, hexavalent | ☐ Nitrite | ☐ Surfactants (MBAS) | ☐ -by EPA 8021 |
| ☐ Cobalt | ☐ Nitrate + Nitrite | ☐ Thallium | ☐ -by EPA 624/8240/8260 |
| ☐ Coliform, fecal | ☐ Total Kjeldahl | ☐ Tin | ☐ -by EPA 524.2 (SDWA) |
| ☐ Color | ☐ Total Organic | ☐ T.O.C. | ☐ BTEX by 8020 |
| ☐ Conductivity | ☐ Oil & Grease | ☐ Turbidity | ☐ PVOCs by 8020 |
| ☐ Copper | ☐ pH | ☐ Vanadium | ☐ GRO-WI Modified ☐ GRO+PVOCs |
| | | ☐ Zinc | ☐ DRO-WI Modified |
| | | ☐ Munic.Sludge, WI List | ☐ PAHs by 610LC/8310 |

SPECIAL INSTRUCTIONS:

NLS needs to contact Pace & see what parameters are to be done by NLS & which ones by Pace - NLS should send split sample to Pace after extracting what NLS needs

REPORT OF LABORATORY ANALYSIS

Foth & Van Dyke & Associates
2737 South Ridge Road
P.O. Box 19012
Green Bay, WI 54307

November 22, 1994
PACE Project Number: 941008502

Attn: Mr. Russell Janeshek

Client Reference: Crandon Mining Sediments

PACE Sample Number:
Date Collected:
Time Collected:
Date Received:

10 0236209	10 0236217	10 0236225
10/04/94	10/04/94	10/04/94
08:45	09:45	10:20
10/06/94	10/06/94	10/06/94
CMC-SED-A1	CMC-SED-D	CMC-SED-E

<u>Parameter</u>	<u>Units</u>	<u>MDL</u>			
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SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Oil and Grease	mg/kg	200	240	210	460
pH	SU	0.1	7.5	7.5	6.8
Solids, Total	%	0.1	86.6	81.8	22.1
Phosphorus, Total	mg/kg	100	170	140	820
Solids, Total Volatile	mg/kg		7000	3000	261000

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Arsenic	mg/kg	0.40	1.4	1.8	1.4
Boron	mg/kg	10	ND	ND	ND
Chloride	mg/kg	10	20	ND	25
Cyanide, Total	mg/kg	0.5	ND	ND	ND
Fluoride, Soluble	mg/kg	0.5	ND	ND	ND
Lead	mg/kg	0.30	4.4	1.1	2.3
Mercury	mg/kg	0.02	ND	ND	ND
Molybdenum	mg/kg	2.0	ND	ND	ND
Nitrogen, Ammonia	mg/kg	20	33	23	ND
Nitrogen, Kjeldahl	mg/kg	20	260	120	1600
Nitrogen, Total Organic	mg/kg	20	230	97	1600
Selenium	mg/kg	0.50	ND	ND	1.2
Thallium, Trace IPC	mg/kg	1.0	ND	ND	ND

TARGET ANALYTE LIST, METALS

Silver	mg/kg	0.50	ND	ND	ND
Aluminum	mg/kg	3.0	2700	950	710
Barium	mg/kg	0.50	12	13	10
Beryllium	mg/kg	0.50	ND	ND	ND
Calcium	mg/kg	4.0	2000	540	1800

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek

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November 22, 1994

PACE Project Number: 941008502

Client Reference: Crandon Mining Sediments

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDL

10 0236209	10 0236217	10 0236225
10/04/94	10/04/94	10/04/94
08:45	09:45	10:20
10/06/94	10/06/94	10/06/94
CMC-SED-A1	CMC-SED-D	CMC-SED-E

INORGANIC ANALYSIS

TARGET ANALYTE LIST, METALS

Cadmium	mg/kg	0.50	ND	ND	ND
Cobalt	mg/kg	1.0	1.8	ND	ND
Chromium	mg/kg	0.50	15	3.3	4.5
Copper	mg/kg	0.50	6.4	0.56	2.1
Iron	mg/kg	2.0	6200 B	2700 B	2100 B
Potassium	mg/kg	60	180	60	ND
Magnesium	mg/kg	3.0	1900	410	450
Manganese	mg/kg	0.50	56	290	130
Sodium	mg/kg	4.0	28	28	18
Nickel	mg/kg	2.0	3.9	ND	ND
Antimony	mg/kg	5.0	ND	ND	ND
Vanadium	mg/kg	1.0	9.9	3.8	3.5
Zinc	mg/kg	2.0	59 B	8.5 B	15 B

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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November 22, 1994
PACE Project Number: 941008502

Client Reference: Crandon Mining Sediments

PACE Sample Number:	10 0236233	10 0236241	10 0236250
Date Collected:	10/04/94	10/04/94	10/04/94
Time Collected:	11:45	13:15	14:05
Date Received:	10/06/94	10/06/94	10/06/94
Client Sample ID:	CMC-SED-Y	CMC-SED-Z	CMC-SED-M2
<u>Parameter</u>	<u>Units</u>	<u>MDL</u>	

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Oil and Grease	mg/kg	200	250	350	540
pH	SU	0.1	6.3	6.5	6.8
Solids, Total	%	0.1	74.4	46.0	3.0
Phosphorus, Total	mg/kg	100	170	530	750
Solids, Total Volatile	mg/kg		104000	66000	259000

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Arsenic	mg/kg	0.40	0.69	0.89	ND
Boron	mg/kg	10	ND	ND	ND
Chloride	mg/kg	10	ND	29	ND
Cyanide, Total	mg/kg	0.5	ND	ND	ND
Fluoride, Soluble	mg/kg	0.5	ND	ND	ND
Lead	mg/kg	0.30	18	2.2	0.41
Mercury	mg/kg	0.02	ND	ND	ND
Molybdenum	mg/kg	2.0	ND	ND	ND
Nitrogen, Ammonia	mg/kg	20	ND	81	60
Nitrogen, Kjeldahl	mg/kg	20	150	790	900
Nitrogen, Total Organic	mg/kg	20	1500	710	840
Selenium	mg/kg	0.50	ND	0.76	0.63

Thallium, Trace IPC	mg/kg	1.0	ND	ND	ND
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TARGET ANALYTE LIST, METALS

Silver	mg/kg	0.50	ND	ND	ND
Aluminum	mg/kg	3.0	1900	2200	110
Barium	mg/kg	0.50	7.2	14	1.1
Beryllium	mg/kg	0.50	ND	ND	ND
Calcium	mg/kg	4.0	410	1100	280
Cadmium	mg/kg	0.50	ND	ND	ND
Cobalt	mg/kg	1.0	1.6	1.6	ND
Chromium	mg/kg	0.50	4.8	4.8	0.59

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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November 22, 1994
PACE Project Number: 941008502

Client Reference: Crandon Mining Sediments

PACE Sample Number:	10 0236233	10 0236241	10 0236250
Date Collected:	10/04/94	10/04/94	10/04/94
Time Collected:	11:45	13:15	14:05
Date Received:	10/06/94	10/06/94	10/06/94
Client Sample ID:	CMC-SED-Y	CMC-SED-Z	CMC-SED-M2
Parameter	<u>Units</u>	<u>MDL</u>	

INORGANIC ANALYSIS

TARGET ANALYTE LIST, METALS

Copper	mg/kg	0.50	3.2	2.5	ND
Iron	mg/kg	2.0	3500 B	3500 B	130 B
Potassium	mg/kg	60	150	120	ND
Magnesium	mg/kg	3.0	620	780	52
Manganese	mg/kg	0.50	28	82	3.6
Sodium	mg/kg	4.0	15	30	8.0
Nickel	mg/kg	2.0	3.4	1.9	ND
Antimony	mg/kg	5.0	ND	ND	ND
Vanadium	mg/kg	1.0	11	8.0	ND
Zinc	mg/kg	2.0	8.9 B	17 B	3.2 B

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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November 22, 1994
PACE Project Number: 941008502

Client Reference: Crandon Mining Sediments

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDL

10 0236268	10 0236276	10 0236284
10/04/94	10/04/94	10/04/94
14:45	16:15	16:15
10/06/94	10/06/94	10/06/94
CMC-SED-M4	CMC-SED-M5	CMC-SED-M5
		Dup

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Parameter	Units	MDL	10 0236268	10 0236276	10 0236284
Oil and Grease	mg/kg	200	460	600	340
pH	SU	0.1	7.4	6.6	6.7
Solids, Total	%	0.1	71.4	16.9	65.0
Phosphorus, Total	mg/kg	100	250	530	180
Solids, Total Volatile	mg/kg		5000	379000	5700

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Parameter	Units	MDL	10 0236268	10 0236276	10 0236284
Arsenic	mg/kg	0.40	ND	1.4	1.3
Boron	mg/kg	10	ND	ND	ND
Chloride	mg/kg	10	ND	24	23
Cyanide, Total	mg/kg	0.5	ND	ND	ND
Fluoride, Soluble	mg/kg	0.5	ND	ND	ND
Lead	mg/kg	0.30	1.1	1.2	0.81
Mercury	mg/kg	0.02	ND	ND	ND
Molybdenum	mg/kg	2.0	ND	ND	ND
Nitrogen, Ammonia	mg/kg	20	38	82	61
Nitrogen, Kjeldahl	mg/kg	20	260	1300	430
Nitrogen, Total Organic	mg/kg	20	220	1200	370
Selenium	mg/kg	0.50	1.2	ND	0.82

Thallium, Trace IPC

Units	MDL	10 0236268	10 0236276	10 0236284
mg/kg	1.0	ND	ND	ND

TARGET ANALYTE LIST, METALS

Parameter	Units	MDL	10 0236268	10 0236276	10 0236284
Silver	mg/kg	0.50	ND	ND	ND
Aluminum	mg/kg	3.0	750	630	730
Barium	mg/kg	0.50	3.3	15	11
Beryllium	mg/kg	0.50	ND	ND	ND
Calcium	mg/kg	4.0	450	2500	1900
Cadmium	mg/kg	0.50	ND	ND	ND
Cobalt	mg/kg	1.0	ND	ND	ND
Chromium	mg/kg	0.50	3.1	3.0	2.7

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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November 22, 1994
PACE Project Number: 941008502

Client Reference: Crandon Mining Sediments

PACE Sample Number:	10 0236268	10 0236276	10 0236284
Date Collected:	10/04/94	10/04/94	10/04/94
Time Collected:	14:45	16:15	16:15
Date Received:	10/06/94	10/06/94	10/06/94
Client Sample ID:	CMC-SED-M4	CMC-SED-M5	CMC-SED-M5
Parameter	Units	MDL	Dup

INORGANIC ANALYSIS

TARGET ANALYTE LIST, METALS

Copper	mg/kg	0.50	0.96	1.2	1.2
Iron	mg/kg	2.0	1600 B	2300 B	2100 B
Potassium	mg/kg	60	91	72	ND
Magnesium	mg/kg	3.0	380	440	510
Manganese	mg/kg	0.50	14	82	56
Sodium	mg/kg	4.0	17	20	15
Nickel	mg/kg	2.0	ND	1.5	ND
Antimony	mg/kg	5.0	ND	ND	ND
Vanadium	mg/kg	1.0	3.2	3.4	3.1
Zinc	mg/kg	2.0	5.1 B	11 B	9.8 B

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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November 22, 1994
PACE Project Number: 941008502

Client Reference: Crandon Mining Sediments

PACE Sample Number:

Date Collected:

Time Collected:

Date Received:

Client Sample ID:

Parameter

Units

MDI

10 0236292	10 0236306	10 0236314
10/04/94	10/05/94	10/05/94
17:00	08:15	08:15
10/06/94	10/06/94	10/06/94
CMC-SED-M3	CMC-SED-H	CMC-SED-H
		Dup

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Parameter	Units	MDI	10 0236292	10 0236306	10 0236314
Oil and Grease	mg/kg	200	550	390	360
pH	SU	0.1	6.7	5.5	5.5
Solids, Total	%	0.1	63.6	65.6	74.8
Phosphorus, Total	mg/kg	100	150	ND	ND
Solids, Total Volatile	mg/kg		61000	19000	7000

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Parameter	Units	MDI	10 0236292	10 0236306	10 0236314
Arsenic	mg/kg	0.40	1.8	0.74	0.95
Boron	mg/kg	10	ND	ND	ND
Chloride	mg/kg	10	14	22	25
Cyanide, Total	mg/kg	0.5	ND	ND	ND
Fluoride, Soluble	mg/kg	0.5	ND	ND	ND
Lead	mg/kg	0.30	1.7	3.2	2.5
Mercury	mg/kg	0.02	ND	ND	ND
Molybdenum	mg/kg	2.0	ND	ND	ND
Nitrogen, Ammonia	mg/kg	20	54	38	23
Nitrogen, Kjeldahl	mg/kg	20	700	290	180
Nitrogen, Total Organic	mg/kg	20	650	250	160
Selenium	mg/kg	0.50	0.68	0.80	0.60
Thallium, Trace IPC	mg/kg	1.0	ND	ND	ND

TARGET ANALYTE LIST, METALS

Parameter	Units	MDI	10 0236292	10 0236306	10 0236314
Silver	mg/kg	0.50	ND	ND	ND
Aluminum	mg/kg	3.0	1500	2900	1900
Barium	mg/kg	0.50	14	7.9	4.3
Beryllium	mg/kg	0.50	ND	ND	ND
Calcium	mg/kg	4.0	1600	250	160
Cadmium	mg/kg	0.50	ND	ND	ND
Cobalt	mg/kg	1.0	1.5	1.9	1.4
Chromium	mg/kg	0.50	3.4	3.7	2.8

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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November 22, 1994
PACE Project Number: 941008502

Client Reference: Crandon Mining Sediments

PACE Sample Number:	10 0236292	10 0236306	10 0236314
Date Collected:	10/04/94	10/05/94	10/05/94
Time Collected:	17:00	08:15	08:15
Date Received:	10/06/94	10/06/94	10/06/94
Client Sample ID:	CMC-SED-M3	CMC-SED-H	CMC-SED-H
<u>Parameter</u>	<u>Units</u>	<u>MDI</u>	<u>Dup</u>

INORGANIC ANALYSIS

TARGET ANALYTE LIST, METALS

Copper	mg/kg	0.50	3.1	1.6	0.82
Iron	mg/kg	2.0	3500 B	2300 B	1800 B
Potassium	mg/kg	60	170	170	110
Magnesium	mg/kg	3.0	860	420	340
Manganese	mg/kg	0.50	99	61	42
Sodium	mg/kg	4.0	23	30	12
Nickel	mg/kg	2.0	ND	2.4	2.1
Antimony	mg/kg	5.0	ND	ND	ND
Vanadium	mg/kg	1.0	5.6	5.5	4.4
Zinc	mg/kg	2.0	13 B	32 B	30 B

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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November 22, 1994
PACE Project Number: 941008502

Client Reference: Crandon Mining Sediments

PACE Sample Number:	10 0236322	10 0236330	10 0236349
Date Collected:	10/05/94	10/05/94	10/05/94
Time Collected:	09:00	10:00	11:00
Date Received:	10/06/94	10/06/94	10/06/94
Client Sample ID:	CMC-SED-I	CMC-SED-L	CMC-SED-K
<u>Parameter</u>	<u>Units</u>	<u>MDL</u>	

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Oil and Grease	mg/kg	200	590	490	690
pH	SU	0.1	5.2	5.8	6.1
Solids, Total	%	0.1	33.7	59.6	63.2
Phosphorus, Total	mg/kg	100	350	150	100
Solids, Total Volatile	mg/kg		109000	49000	75000

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Arsenic	mg/kg	0.40	0.76	ND	ND
Boron	mg/kg	10	ND	ND	ND
Chloride	mg/kg	10	35	22	-
Chloride	mg/kg	20	-	-	64
Cyanide, Total	mg/kg	0.5	ND	-	ND
Cyanide, Total	mg/kg	1.25	-	ND	-
Fluoride, Soluble	mg/kg	0.5	ND	ND	ND
Lead	mg/kg	0.30	2.6	3.7	1.2
Mercury	mg/kg	0.02	ND	ND	ND
Molybdenum	mg/kg	2.0	ND	ND	ND
Nitrogen, Ammonia	mg/kg	20	88	45	86
Nitrogen, Kjeldahl	mg/kg	20	690	610	1000
Nitrogen, Total Organic	mg/kg	20	600	560	910
Selenium	mg/kg	0.50	1.2	ND	ND
Thallium, Trace IPC	mg/kg	1.0	ND	ND	ND

TARGET ANALYTE LIST, METALS

Silver	mg/kg	0.50	ND	ND	ND
Aluminum	mg/kg	3.0	2100	970	840
Barium	mg/kg	0.50	8.2	8.0	9.2
Beryllium	mg/kg	0.50	ND	ND	ND
Calcium	mg/kg	4.0	160	210	340
Cadmium	mg/kg	0.50	ND	ND	ND
Cobalt	mg/kg	1.0	ND	ND	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
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November 22, 1994
PACE Project Number: 941008502

Client Reference: Crandon Mining Sediments

PACE Sample Number:	10 0236322	10 0236330	10 0236349
Date Collected:	10/05/94	10/05/94	10/05/94
Time Collected:	09:00	10:00	11:00
Date Received:	10/06/94	10/06/94	10/06/94
Client Sample ID:	CMC-SED-I	CMC-SED-L	CMC-SED-K
<u>Parameter</u>	<u>Units</u>	<u>MDL</u>	

INORGANIC ANALYSIS

TARGET ANALYTE LIST, METALS

Chromium	mg/kg	0.50	2.8	1.2	1.3
Copper	mg/kg	0.50	1.6	1.1	0.82
Iron	mg/kg	2.0	1100 B	660 B	210 B
Potassium	mg/kg	60	230	66	75
Magnesium	mg/kg	3.0	250	150	93
Manganese	mg/kg	0.50	20	14	4.3
Sodium	mg/kg	4.0	20	12	11
Nickel	mg/kg	2.0	2.1	ND	ND
Antimony	mg/kg	5.0	ND	ND	ND
Vanadium	mg/kg	1.0	4.5	2.1	1.4
Zinc	mg/kg	2.0	10 B	8.9 B	12 B

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 11

November 22, 1994
PACE Project Number: 941008502

Client Reference: Crandon Mining Sediments

PACE Sample Number:	10 0236357
Date Collected:	10/05/94
Time Collected:	12:00
Date Received:	10/06/94
Client Sample ID:	CMC-SED-G
<u>Parameter</u>	<u>Units</u> <u>MDL</u>

SUBCONTRACT ANALYSIS

INORGANIC ANALYSIS

Oil and Grease	mg/kg	200	950
pH	SU	0.1	6.0
Solids, Total	%	0.1	78.7
Phosphorus, Total	mg/kg	100	ND
Solids, Total Volatile	mg/kg		7000

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Arsenic	mg/kg	0.40	ND
Boron	mg/kg	10	ND
Chloride	mg/kg	10	ND
Cyanide, Total	mg/kg	0.5	ND
Fluoride, Soluble	mg/kg	0.5	ND
Lead	mg/kg	0.30	2.8

Mercury	mg/kg	0.02	ND
Molybdenum	mg/kg	2.0	ND
Nitrogen, Ammonia	mg/kg	20	30
Nitrogen, Kjeldahl	mg/kg	20	200
Nitrogen, Total Organic	mg/kg	20	170
Selenium	mg/kg	0.50	ND

Thallium, Trace IPC	mg/kg	1.0	ND
---------------------	-------	-----	----

TARGET ANALYTE LIST, METALS

Silver	mg/kg	0.50	ND
Aluminum	mg/kg	3.0	400
Barium	mg/kg	0.50	3.5
Beryllium	mg/kg	0.50	ND
Calcium	mg/kg	4.0	84
Cadmium	mg/kg	0.50	ND
Cobalt	mg/kg	1.0	ND
Chromium	mg/kg	0.50	ND

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 12

November 22, 1994
PACE Project Number: 941008502

Client Reference: Crandon Mining Sediments

PACE Sample Number: 10 0236357
Date Collected: 10/05/94
Time Collected: 12:00
Date Received: 10/06/94
Client Sample ID: CMC-SED-G

<u>Parameter</u>	<u>Units</u>	<u>MDL</u>	<u></u>
------------------	--------------	------------	---------

INORGANIC ANALYSIS

TARGET ANALYTE LIST, METALS

Copper	mg/kg	0.50	ND
Iron	mg/kg	2.0	550 B
Potassium	mg/kg	60	ND
Magnesium	mg/kg	3.0	85
Manganese	mg/kg	0.50	52
Sodium	mg/kg	4.0	11
Nickel	mg/kg	2.0	ND
Antimony	mg/kg	5.0	ND
Vanadium	mg/kg	1.0	1.2
Zinc	mg/kg	2.0	5.5 B*

These data have been reviewed and are approved for release.

Steve R. Crupi

Steve Crupi
Project Manager

REPORT OF LABORATORY ANALYSIS

Mr. Russell Janeshek
Page 13

FOOTNOTES
for pages 1 through 12

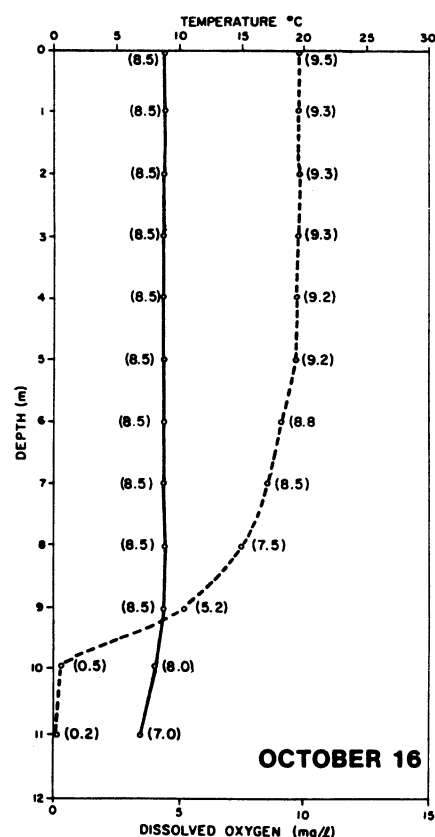
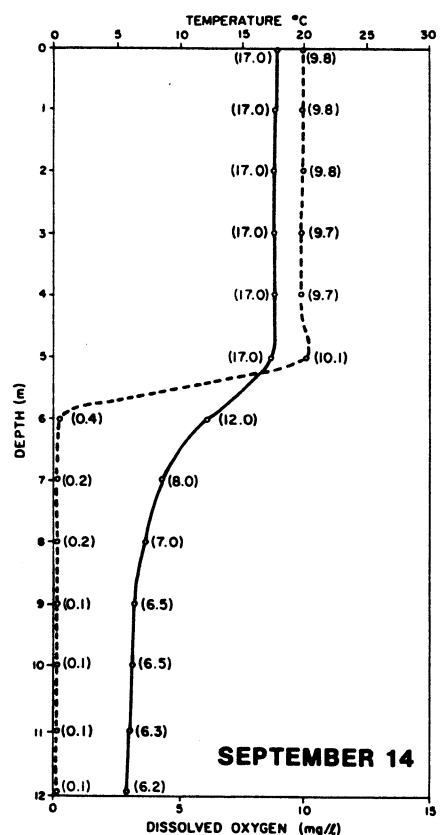
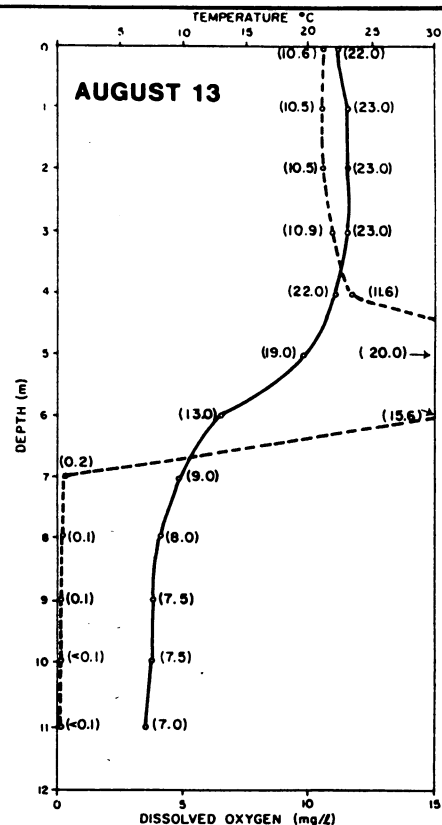
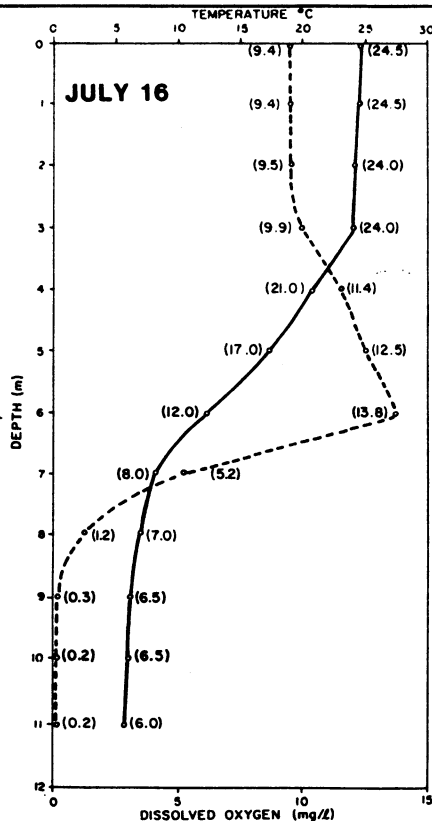
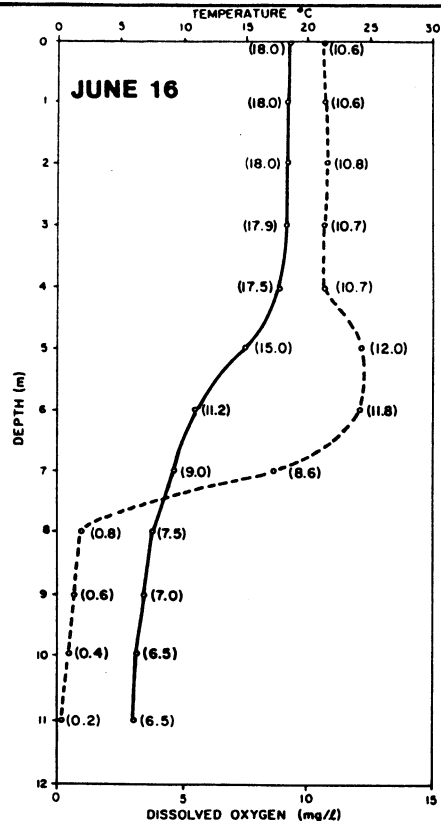
November 22, 1994
PACE Project Number: 941008502

Client Reference: Crandon Mining Sediments

B Analyte is found in the associated blank as well as in the sample.
MDL Method Detection Limit
ND Not detected at or above the MDL.

Appendix 3.7-11

Historical Dissolved Oxygen/Temperature Profiles Measured in Ground Hemlock Lake in 1980 and in Oak Lake in 1977



KEY:

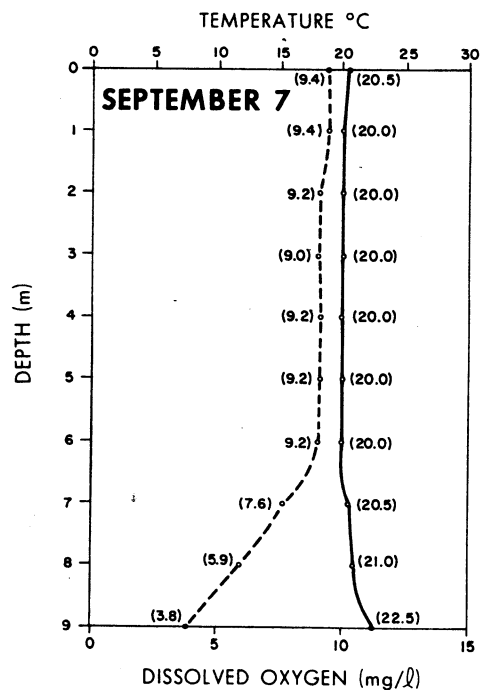
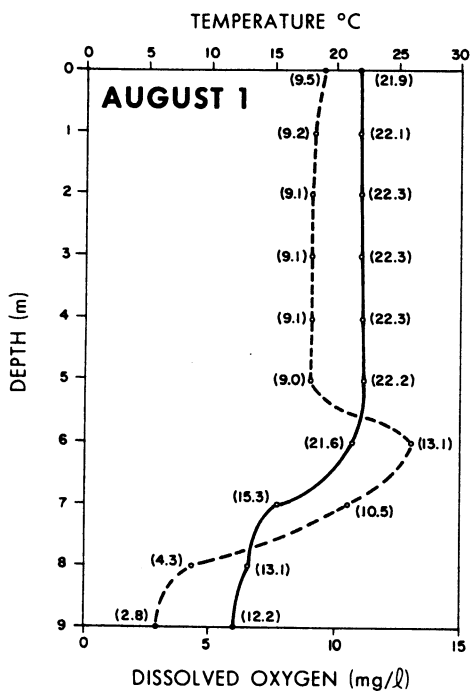
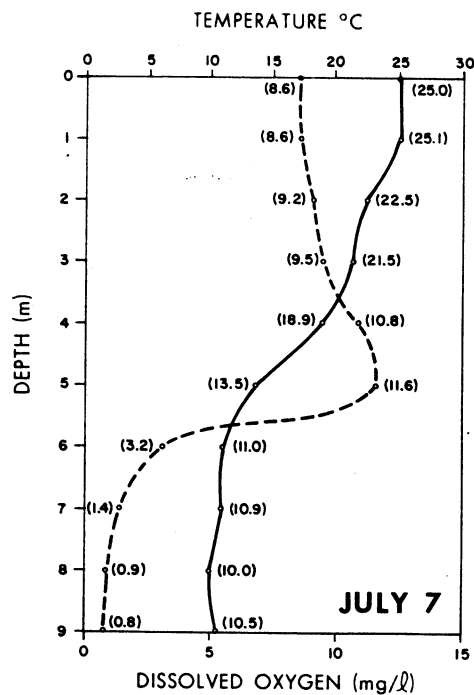
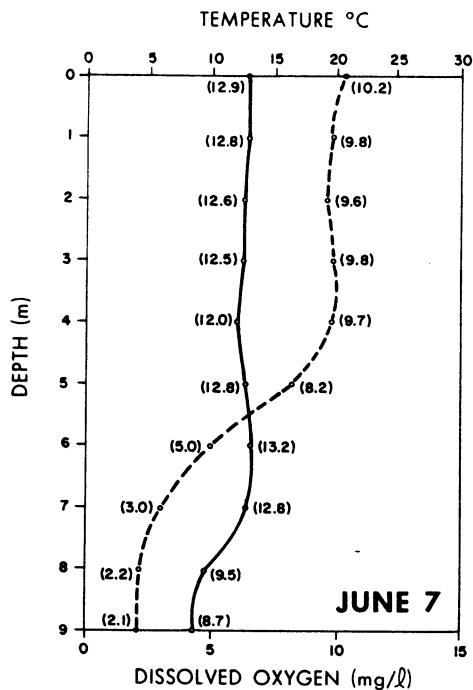
----- DISSOLVED OXYGEN
 ———— TEMPERATURE

EXXON MINERALS COMPANY
 CRANDON PROJECT

DISSOLVED OXYGEN / TEMPERATURE PROFILES
 FOR GROUND HEMLOCK LAKE - STATION GH
 JUNE TO OCTOBER 1980

DAMES & MOORE

FIGURE 2.4-6



KEY:

----- DISSOLVED OXYGEN

——— TEMPERATURE

EXXON MINERALS COMPANY
CRANDON PROJECT

DISSOLVED OXYGEN / TEMPERATURE PROFILES
FOR OAK LAKE - STATION G
JUNE TO SEPTEMBER 1977

DAMES & MOORE

FIGURE 2.4-7

Appendix 3.7-12

Wetland Water Hydrology Evaluation

The information previously contained in Appendix 3.7-12 is included in Appendix 4.2-5.

Appendix 3.8-1

**1994 Laboratory Report For Fish
and Crayfish Analyses**



An ETC Laboratory

320 Tesconi Circle

Suite G

Santa Rosa, CA
95401

Telephone
(707) 544-5570

Facsimile
(707) 544-4906

SEPTEMBER 7, 1994

CLIENT: FOTH & VAN DYKE
P.O. BOX 19012
2737 S. RIDGE ROAD
GREEN BAY, WI 54307-9012

ATTN: RUSS JANESHEK

JOB LINK: 811454
PROJECT: 93C049

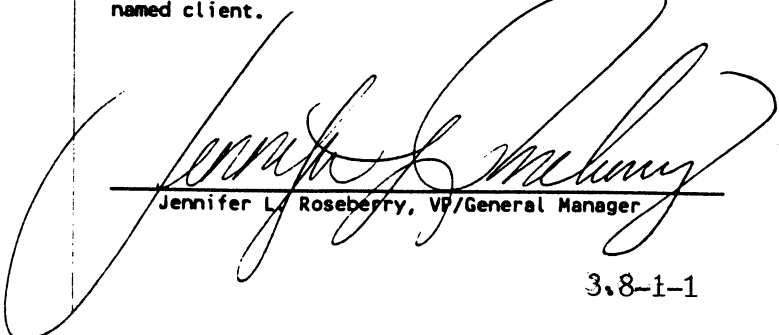
ANALYSIS

6010 & 7000 SERIES METALS

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE COLLECTION DATE</u>	<u>DATE RECEIVED BY LAB</u>
MF8190	CMSGFCC-01	SOLID	05-08-94	06-21-94
MF8191	CMSGFCC-02	SOLID	05-08-94	06-21-94
MF8192	CMSGFCC-03	SOLID	05-08-94	06-21-94
MF8193	CMSGFCC-04	SOLID	05-08-94	06-21-94
MF8194	CMSGFCC-05	SOLID	05-08-94	06-21-94
MF8195	CMSGFCC-06	SOLID	05-08-94	06-21-94
MF8196	CMSGFCC-07	SOLID	05-08-94	06-21-94
MF8197	CMSGFCC-08	SOLID	05-08-94	06-21-94
MF8198	CMSGFCC-09	SOLID	05-08-94	06-21-94
MF8199	CMSGFCC-10	SOLID	05-08-94	06-21-94
MF8200	CMWRF30101	SOLID	05-08-94	06-21-94
MF8201	CMWRF30102	SOLID	05-08-94	06-21-94
MF8202	CMWRF30103	SOLID	05-08-94	06-21-94
MF8203	CMWRF30104	SOLID	05-08-94	06-21-94
MF8204	CMWRF30105	SOLID	05-08-94	06-21-94
MF8205	CMWRF30106	SOLID	05-08-94	06-21-94
MF8206	CMWRF30107	SOLID	05-08-94	06-21-94
MF8207	CMWRF30108	SOLID	05-08-94	06-21-94
MF8208	CMWRF30109	SOLID	05-08-94	06-21-94
MF8209	CMWRF30110	SOLID	05-08-94	06-21-94
MF8210	CM-SGF-CC	SOLID	05-08-94	06-21-94
MF8211	CM-WRF-301	SOLID	05-08-94	06-21-94
MF8212	CMSLF00501	SOLID	05-06-94	06-22-94
MF8213	CMSLF00502	SOLID	05-06-94	06-22-94
MF8214	CMSLF00503	SOLID	05-06-94	06-22-94
MF8215	CMSLF00504	SOLID	05-06-94	06-22-94
MF8216	CMSLF00505	SOLID	05-06-94	06-22-94
MF8217	CMSLF00506	SOLID	05-06-94	06-22-94

(Continued)

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Jennifer L. Roseberry, VP/General Manager

9/10/94
Date

A Division of
APBI Environmental
Sciences Group, Inc.

3.8-1-1



SEPTEMBER 7, 1994

Page 2

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE COLLECTION DATE</u>	<u>DATE RECEIVED BY LAB</u>
MF8218	CMSLF00507	SOLID	05-06-94	06-22-94
MF8219	CMSLF00508	SOLID	05-06-94	06-22-94
MF8220	CMSLF00509	SOLID	05-06-94	06-22-94
MF8221	CMSLF00510	SOLID	05-06-94	06-22-94
MF8222	CMSCF50201	SOLID	05-09-94	06-22-94
MF8223	CMSCF50202	SOLID	05-09-94	06-22-94
MF8224	CMSCF50203	SOLID	05-09-94	06-22-94
MF8225	CMSCF50204	SOLID	05-09-94	06-22-94
MF8226	CMSCF50205	SOLID	05-09-94	06-22-94
MF8227	CMSCF50206	SOLID	05-09-94	06-22-94
MF8228	CMSCF50207	SOLID	05-09-94	06-22-94
MF8229	CMSCF50208	SOLID	05-09-94	06-22-94
MF8230	CMSCF50209	SOLID	05-09-94	06-22-94
MF8231	CMSCF50210	SOLID	05-09-94	06-22-94
MF8232	CMSCF50101	SOLID	05-09-94	06-22-94
MF8233	CMSCF50102	SOLID	05-09-94	06-22-94
MF8234	CMSCF50103	SOLID	05-09-94	06-22-94
MF8235	CMSCF50104	SOLID	05-09-94	06-22-94
MF8236	CMSCF50105	SOLID	05-09-94	06-22-94
MF8237	CMSCF50106	SOLID	05-09-94	06-22-94
MF8238	CMSCF50107	SOLID	05-09-94	06-22-94
MF8239	CMSCF50108	SOLID	05-09-94	06-22-94
MF8240	CMSCF50109	SOLID	05-09-94	06-22-94
MF8241	CMSCF50110	SOLID	05-09-94	06-22-94
MF8242	CM-SLF-005	SOLID	05-06-94	06-22-94
MF8243	CM-SCF-502	SOLID	05-09-94	06-22-94
MF8244	CM-SCF-501	SOLID	05-09-94	06-22-94
MF8245	CM-WRI-100	SOLID	05-10-94	06-22-94
MF8246	CM-WRI-CC	SOLID	05-10-94	06-22-94
MF8247	CM-SCI-501	SOLID	05-11-94	06-22-94
MF8248	CM-SCI-502	SOLID	05-11-94	06-22-94
MF8249	CM-RSI-002	SOLID	05-13-94	06-22-94
MF8250	QC CHARGES	NOT APPLICABLE	NOT APPLICABLE	06-22-94



FOTH & VAN DYKE
SEPTEMBER 7, 1994
811454

SAMPLE MATRIX: SOLID

<u>Parameter</u>	<u>EPA Prep Method</u>	<u>EPA Analysis Method</u>
ICP Metals	200.3	6010
Arsenic	200.3	7060
Lead	200.3	7421
Mercury	7471	7471

ANALYSES PERFORMED BY HAZELTON ENVIRONMENTAL SERVICES INC

ns

FOTH & VAN DYKE
06 SEPTEMBER 1994

EXECUTIVE SUMMARY
ETC JOBLINK 811454

On 21 and 22 June 1994 Hazleton Environmental Services (HES) received fish tissue samples from Foth & Van Dyke. The cooler temperatures were both -0.7°C upon receipt at the laboratory; all samples were received frozen and in good condition. The samples were analyzed by HES as specified on the preceding page.

At the request of Foth & Van Dyke, results are reported on both dry-weight and as-received-weight bases. The dry-weight results are reported on table SR72 of the Data Summary Report (DSR); the as-received-weight results are reported on table AR72 of the DSR. Quantitative Results Data tables show both results on the same page; the dry-weight results are indicated with a Batch # ending in "D". HES chose a CLP-type report for this project; the % solids result for each sample may be obtained from the Form I pages included with the supporting data section of this report.

SAMPLE PREPARATION:

The samples were prepared for digestion in a room used exclusively for the preparation of samples. The samples were thawed slightly, chopped into pieces, and homogenized in an industrial blender under liquid nitrogen. All samples were stored frozen until extraction. One blender blank was prepared for the sample preparation episode for the purpose of detecting possible laboratory contamination. No analyte was detected in the blender blank with the exception of Manganese; this analyte was detected at $2.0\text{ }\mu\text{g/L}$ in the blank. The detection limit for Manganese in water is $0.4\text{ }\mu\text{g/L}$.

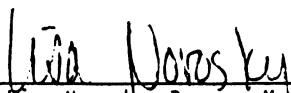
INORGANIC ANALYSIS:

The spike recovery for Lead for the Crayfish tissue matrix is 126 %, slightly above the QC acceptance range of 85 - 125%. Sample CM-WRI-CC was used for the matrix spike sample for quality control batch Q41424. The spike result for Manganese for the same matrix is -304%. This is acceptable because the sample concentration is four times greater than the spike amount added; therefore, the spike does not provide valid recovery data. All relative percent difference (RPD) values for duplicate analyses are within QC acceptance limits, with one exception. The Chromium duplicate sample for the Crayfish tissue matrix has an RPD of 34%; sample CM-WRI-CC was used for the duplicate sample for quality control batch Q41424.

Arsenic results for samples CM-RSI-002, CM-SCI-501, CM-SCI-502, CM-WRI-CC, and CM-WRI-100 were determined by Method of Standard Additions.

Some samples contained unusually high concentrations of Calcium, causing interference in the determination of Chromium, Cobalt, Copper, Manganese, and Zinc. Applicable samples were diluted for proper elucidation of these elements.

NOTE: Because this project does not require CLP protocol, comments made by the subcontract laboratory relating to CLP are not discussed in this executive summary.



Lisa Norosky, Program Manager

940907

Date

Joblink: 811454

DATA SUMMARY REPORT

DATE: 09/01/94

Company: FOTH & VAN DYKE

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Sample Point ID:	CM-RSI-002	CM-SCF-501	CM-SCF-502	CM-SCI-501	CM-SCI-502	CM-SGF-CC	CM-SLF-005	CM-WRF-301
ETC Sample Number:	MF8249	MF8244	MF8243	MF8247	MF8248	MF8210	MF8242	MF8211
Sample Date:	940513	940509	940509	940511	940511	940508	940506	940508
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Arsenic	mg/kg	.610	<.020	<.020	.590	.790	<.020	.030	<.020
Cadmium	mg/kg	<.040	<.040	<.040	<.040	<.040	<.050	.660	<.070
Chromium	mg/kg	.450	.180	.200	.510	.630	.190	.170	.230
Cobalt	mg/kg	<.400	.040	.060	<.400	<.410	<.050	.070	<.070
Copper	mg/kg	11.4	5.20	3.20	11.7	12.4	1.00	2.70	.890
Lead	mg/kg	.080	.110	.040	.160	.100	.020	.070	.100
Manganese	mg/kg	59.5	1.60	2.00	301	270	2.10	.860	1.60
Mercury	mg/kg	.050	-	-	.060	.060	-	-	-
Zinc	mg/kg	26.2	16.8	16.7	18.8	22.0	10.2	14.0	9.70

Sample Point ID:	CM-WRI-100	CM-WRI-CC	CMSCF50101	CMSCF50102	CMSCF50103	CMSCF50104	CMSCF50105	CMSCF50106
ETC Sample Number:	MF8245	MF8246	MF8232	MF8233	MF8234	MF8235	MF8236	MF8237
Sample Date:	940510	940510	940509	940509	940509	940509	940509	940509
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Arsenic	mg/kg	.540	.490	-	-	-	-	-
Cadmium	mg/kg	<.040	<.040	-	-	-	-	-
Chromium	mg/kg	<.380	.720	-	-	-	-	-
Cobalt	mg/kg	<.410	<.400	-	-	-	-	-
Copper	mg/kg	17.3	13.3	-	-	-	-	-
Lead	mg/kg	.780	.110	-	-	-	-	-
Manganese	mg/kg	229	344	-	-	-	-	-
Mercury	mg/kg	.100	.070	.210	.140	.320	.150	.080
Zinc	mg/kg	24.7	29.8	-	-	-	-	.200

Joblink: 811454

DATA SUMMARY REPORT

DATE: 09/01/94

Company: FOTH & VAN DYKE

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Sample Point ID:	CMSCF50107	CMSCF50108	CMSCF50109	CMSCF50110	CMSCF50201	CMSCF50202	CMSCF50203	CMSCF50204
ETC Sample Number:	MF8238	MF8239	MF8240	MF8241	MF8222	MF8223	MF8224	MF8225
Sample Date:	940509	940509	940509	940509	940509	940509	940509	940509
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Arsenic	mg/kg	-	-	-	-	-	-	-
Cadmium	mg/kg	-	-	-	-	-	-	-
Chromium	mg/kg	-	-	-	-	-	-	-
Cobalt	mg/kg	-	-	-	-	-	-	-
Copper	mg/kg	-	-	-	-	-	-	-
Lead	mg/kg	-	-	-	-	-	-	-
Manganese	mg/kg	-	-	-	-	-	-	-
Mercury	mg/kg	.180	.250	.140	.150	.150	.210	.190
Zinc	mg/kg	-	-	-	-	-	-	-

Sample Point ID:	CMSCF50205	CMSCF50206	CMSCF50207	CMSCF50208	CMSCF50209	CMSCF50210	CMMSGFCC-01	CMMSGFCC-02
ETC Sample Number:	MF8226	MF8227	MF8228	MF8229	MF8230	MF8231	MF8190	MF8191
Sample Date:	940509	940509	940509	940509	940509	940509	940508	940508
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Arsenic	mg/kg	-	-	-	-	-	-	-
Cadmium	mg/kg	-	-	-	-	-	-	-
Chromium	mg/kg	-	-	-	-	-	-	-
Cobalt	mg/kg	-	-	-	-	-	-	-
Copper	mg/kg	-	-	-	-	-	-	-
Lead	mg/kg	-	-	-	-	-	-	-
Manganese	mg/kg	-	-	-	-	-	-	-
Mercury	mg/kg	.230	.190	.170	.230	.080	.200	.230
Zinc	mg/kg	-	-	-	-	-	-	-

3.8-1-6

Joblink: 811454

DATA SUMMARY REPORT

DATE: 09/01/94

Company: FOTH & VAN DYKE

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Sample Point ID:	CMSGFCC-03	CMSGFCC-04	CMSGFCC-05	CMSGFCC-06	CMSGFCC-07	CMSGFCC-08	CMSGFCC-09	CMSGFCC-10
ETC Sample Number:	MF8192	MF8193	MF8194	MF8195	MF8196	MF8197	MF8198	MF8199
Sample Date:	940508	940508	940508	940508	940508	940508	940508	940508
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Arsenic	mg/kg	-	-	-	-	-	-	-
Cadmium	mg/kg	-	-	-	-	-	-	-
Chromium	mg/kg	-	-	-	-	-	-	-
Cobalt	mg/kg	-	-	-	-	-	-	-
Copper	mg/kg	-	-	-	-	-	-	-
Lead	mg/kg	-	-	-	-	-	-	-
Manganese	mg/kg	-	-	-	-	-	-	-
Mercury	mg/kg	.350	.120	.210	.170	.380	.190	.220
Zinc	mg/kg	-	-	-	-	-	-	.480

Sample Point ID:	CMSLF00501	CMSLF00502	CMSLF00503	CMSLF00504	CMSLF00505	CMSLF00506	CMSLF00507	CMSLF00508
ETC Sample Number:	MF8212	MF8213	MF8214	MF8215	MF8216	MF8217	MF8218	MF8219
Sample Date:	940506	940506	940506	940506	940506	940506	940506	940506
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Arsenic	mg/kg	-	-	-	-	-	-	-
Cadmium	mg/kg	-	-	-	-	-	-	-
Chromium	mg/kg	-	-	-	-	-	-	-
Cobalt	mg/kg	-	-	-	-	-	-	-
Copper	mg/kg	-	-	-	-	-	-	-
Lead	mg/kg	-	-	-	-	-	-	-
Manganese	mg/kg	-	-	-	-	-	-	-
Mercury	mg/kg	.580	.740	.440	.490	.950	.140	.600
Zinc	mg/kg	-	-	-	-	-	-	.580

Joblink: 811454

DATA SUMMARY REPORT

DATE: 09/01/94.

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Sample Point ID:	CMSLF00509	CMSLF00510	CMWRF30101	CMWRF30102	CMWRF30103	CMWRF30104	CMWRF30105	CMWRF30106
ETC Sample Number:	MF8220	MF8221	MF8200	MF8201	MF8202	MF8203	MF8204	MF8205
Sample Date:	940506	940506	940508	940508	940508	940508	940508	940508
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Arsenic	mg/kg	-	-	-	-	-	-	-
Cadmium	mg/kg	-	-	-	-	-	-	-
Chromium	mg/kg	-	-	-	-	-	-	-
Cobalt	mg/kg	-	-	-	-	-	-	-
Copper	mg/kg	-	-	-	-	-	-	-
Lead	mg/kg	-	-	-	-	-	-	-
Manganese	mg/kg	-	-	-	-	-	-	-
Mercury	mg/kg	.510	.780	.150	.400	.250	.140	.130
Zinc	mg/kg	-	-	-	-	-	-	.410

Sample Point ID:	CMWRF30107	CMWRF30108	CMWRF30109	CMWRF30110
ETC Sample Number:	MF8206	MF8207	MF8208	MF8209
Sample Date:	940508	940508	940508	940508
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Arsenic	mg/kg	-	-	-	-
Cadmium	mg/kg	-	-	-	-
Chromium	mg/kg	-	-	-	-
Cobalt	mg/kg	-	-	-	-
Copper	mg/kg	-	-	-	-
Lead	mg/kg	-	-	-	-
Manganese	mg/kg	-	-	-	-
Mercury	mg/kg	.390	.160	.170	.130
Zinc	mg/kg	-	-	-	-

3.8-1-8

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Sample Point ID:	CM-RSI-002	CM-SCF-501	CM-SCF-502	CM-SCI-501	CM-SCI-502	CM-SGF-CC	CM-SLF-005	CM-WRF-301
ETC Sample Number:	MF8249	MF8244	MF8243	MF8247	MF8248	MF8210	MF8242	MF8211
Sample Date:	940513	940509	940509	940511	940511	940508	940506	940508
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (SR72)

Arsenic	mg/kg	1.90	<.130	<.130	2.10	2.90	<.160	.140	<.130
Cadmium	mg/kg	<.110	<.190	<.200	<.130	<.140	<.310	3.20	<.400
Chromium	mg/kg	1.40	.950	1.10	1.80	2.30	1.20	.840	1.30
Cobalt	mg/kg	<1.20	.220	.340	<1.50	<1.50	<.330	.330	<.430
Copper	mg/kg	34.9	28.0	17.0	42.3	45.4	6.60	13.1	5.20
Lead	mg/kg	.250	.580	.230	.560	.380	.160	.350	.600
Manganese	mg/kg	182	8.40	10.6	1090	989	13.7	4.20	9.30
Mercury	mg/kg	.140	-	-	.210	.230	-	-	-
Zinc	mg/kg	80.2	90.2	87.5	68.1	80.5	66.3	68.2	56.4

Sample Point ID:	CM-WRI-100	CM-WRI-CC	CMSCF50101	CMSCF50102	CMSCF50103	CMSCF50104	CMSCF50105	CMSCF50106
ETC Sample Number:	MF8245	MF8246	MF8232	MF8233	MF8234	MF8235	MF8236	MF8237
Sample Date:	940510	940510	940509	940509	940509	940509	940509	940509
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (SR72)

Arsenic	mg/kg	1.70	1.50	-	-	-	-	-
Cadmium	mg/kg	<.120	<.120	-	-	-	-	-
Chromium	mg/kg	<1.20	2.30	-	-	-	-	-
Cobalt	mg/kg	<1.30	<1.30	-	-	-	-	-
Copper	mg/kg	55.9	41.8	-	-	-	-	-
Lead	mg/kg	2.50	.340	-	-	-	-	-
Manganese	mg/kg	740	1080	-	-	-	-	-
Mercury	mg/kg	.310	.210	.960	.680	1.50	.690	.370
Zinc	mg/kg	80.0	93.8	-	-	-	-	.900

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Sample Point ID:	CMSCF50107	CMSCF50108	CMSCF50109	CMSCF50110	CMSCF50201	CMSCF50202	CMSCF50203	CMSCF50204
ETC Sample Number:	MF8238	MF8239	MF8240	MF8241	MF8222	MF8223	MF8224	MF8225
Sample Date:	940509	940509	940509	940509	940509	940509	940509	940509
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters	Units
------------	-------

EPA METHOD - 6010/7000 SERIES METALS (SR72)

Arsenic	mg/kg	-	-	-	-	-	-	-
Cadmium	mg/kg	-	-	-	-	-	-	-
Chromium	mg/kg	-	-	-	-	-	-	-
Cobalt	mg/kg	-	-	-	-	-	-	-
Copper	mg/kg	-	-	-	-	-	-	-
Lead	mg/kg	-	-	-	-	-	-	-
Manganese	mg/kg	-	-	-	-	-	-	-
Mercury	mg/kg	.790	1.20	.620	.710	.700	1.00	.880
Zinc	mg/kg	-	-	-	-	-	-	.850

Sample Point ID:	CMSCF50205	CMSCF50206	CMSCF50207	CMSCF50208	CMSCF50209	CMSCF50210	CMSCGFCC-01	CMSCGFCC-02
ETC Sample Number:	MF8226	MF8227	MF8228	MF8229	MF8230	MF8231	MF8190	MF8191
Sample Date:	940509	940509	940509	940509	940509	940509	940508	940508
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters	Units
------------	-------

EPA METHOD - 6010/7000 SERIES METALS (SR72)

Arsenic	mg/kg	-	-	-	-	-	-	-
Cadmium	mg/kg	-	-	-	-	-	-	-
Chromium	mg/kg	-	-	-	-	-	-	-
Cobalt	mg/kg	-	-	-	-	-	-	-
Copper	mg/kg	-	-	-	-	-	-	-
Lead	mg/kg	-	-	-	-	-	-	-
Manganese	mg/kg	-	-	-	-	-	-	-
Mercury	mg/kg	1.10	.920	.790	1.20	.360	.940	1.20
Zinc	mg/kg	-	-	-	-	-	-	1.10

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Sample Point ID:	CMSGFCC-03	CMSGFCC-04	CMSGFCC-05	CMSGFCC-06	CMSGFCC-07	CMSGFCC-08	CMSGFCC-09	CMSGFCC-10
ETC Sample Number:	MF8192	MF8193	MF8194	MF8195	MF8196	MF8197	MF8198	MF8199
Sample Date:	940508	940508	940508	940508	940508	940508	940508	940508
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (SR72)

Arsenic	mg/kg	-	-	-	-	-	-	-
Cadmium	mg/kg	-	-	-	-	-	-	-
Chromium	mg/kg	-	-	-	-	-	-	-
Cobalt	mg/kg	-	-	-	-	-	-	-
Copper	mg/kg	-	-	-	-	-	-	-
Lead	mg/kg	-	-	-	-	-	-	-
Manganese	mg/kg	-	-	-	-	-	-	-
Mercury	mg/kg	1.80	.620	1.10	.860	1.90	1.00	1.10
Zinc	mg/kg	-	-	-	-	-	-	2.20

Sample Point ID:	CMSLF00501	CMSLF00502	CMSLF00503	CMSLF00504	CMSLF00505	CMSLF00506	CMSLF00507	CMSLF00508
ETC Sample Number:	MF8212	MF8213	MF8214	MF8215	MF8216	MF8217	MF8218	MF8219
Sample Date:	940506	940506	940506	940506	940506	940506	940506	940506
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (SR72)

Arsenic	mg/kg	-	-	-	-	-	-	-
Cadmium	mg/kg	-	-	-	-	-	-	-
Chromium	mg/kg	-	-	-	-	-	-	-
Cobalt	mg/kg	-	-	-	-	-	-	-
Copper	mg/kg	-	-	-	-	-	-	-
Lead	mg/kg	-	-	-	-	-	-	-
Manganese	mg/kg	-	-	-	-	-	-	-
Mercury	mg/kg	2.80	3.60	2.20	2.40	4.70	.690	3.10
Zinc	mg/kg	-	-	-	-	-	-	2.80

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Sample Point ID:	CMSLF00509	CMSLF00510	CMWRF30101	CMWRF30102	CMWRF30103	CMWRF30104	CMWRF30105	CMWRF30106
ETC Sample Number:	MF8220	MF8221	MF8200	MF8201	MF8202	MF8203	MF8204	MF8205
Sample Date:	940506	940506	940508	940508	940508	940508	940508	940508
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (SR72)

Arsenic	mg/kg	-	-	-	-	-	-	-
Cadmium	mg/kg	-	-	-	-	-	-	-
Chromium	mg/kg	-	-	-	-	-	-	-
Cobalt	mg/kg	-	-	-	-	-	-	-
Copper	mg/kg	-	-	-	-	-	-	-
Lead	mg/kg	-	-	-	-	-	-	-
Manganese	mg/kg	-	-	-	-	-	-	-
Mercury	mg/kg	2.50	3.60	.740	1.90	1.30	.730	.630
Zinc	mg/kg	-	-	-	-	-	-	1.90

Sample Point ID:	CMWRF30107	CMWRF30108	CMWRF30109	CMWRF30110
ETC Sample Number:	MF8206	MF8207	MF8208	MF8209
Sample Date:	940508	940508	940508	940508
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (SR72)

Arsenic	mg/kg	-	-	-	-
Cadmium	mg/kg	-	-	-	-
Chromium	mg/kg	-	-	-	-
Cobalt	mg/kg	-	-	-	-
Copper	mg/kg	-	-	-	-
Lead	mg/kg	-	-	-	-
Manganese	mg/kg	-	-	-	-
Mercury	mg/kg	1.90	.750	.800	.640
Zinc	mg/kg	-	-	-	-

3.8-1-12

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570

COMPANY		FACILITY/SITE		PROJECT CONTACT		TELEPHONE NO	
Futh & Van Dyke		93C049		Bill West/Ross Janeshick		414-497-2500	
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	Source Codes:	ANALYSIS REQUIRED
1		W	CM-RSI-002	4/05/13	12:00	Well.....(W) Outfall.....(O)	Mercury
2		W	CM-SCI-501	4/05/11	9:40	Soil.....(S) River/Stream.....(R)	Manganese
3		W	CM-SCF-502	4/05/11	7:45	Bottom Sediment.....(B)	Zinc
4		W	CM-WRI-100	4/05/10	8:20	Generation Point.....(G)	Cadmium
5		W	CM-WRI-CC	4/05/10	8:20	Surface Impoundment (I)	Copper
6		W	CM-SCF-502	4/05/10	8:20	Treatment Facility.....(T)	Arsenic
7		W	CM-SCF-502	4/05/10	8:20	Laboratory Collection Sys.....(C)	Lead
8		W	CM-SCF-501	4/05/10	8:20	Water/Orphan.....(L)	Cobalt
9		W	CM-SCF-501	4/05/10	8:20	Other.....(X)	Total Chromium

Source Codes: Well.....(W) Outfall.....(O)
Soil.....(S) River/Stream.....(R)
Bottom Sediment.....(B)
Generation Point.....(G)
Surface Impoundment (I)
Treatment Facility.....(T)
Laboratory Collection Sys.....(C)
Water/Orphan.....(L)
Other.....(X)

ANALYSIS REQUIRED: Mercury, Manganese, Zinc, Cadmium, Copper, Arsenic, Lead, Cobalt, Total Chromium

LEGEND FOR PRESERVATIVE
0 - NONE
1 - HCL
2 - HNO₃
3 - H₂SO₄
4 - Na₂SO₄+H₂SO₄

SAMPLER OBSERVATIONS
LAB OBSERVATIONS

3.8-1-13

CHAIN OF CUSTODY CHRONICLE

1.	Shuttle Opened By: (print) _____	Date: _____	Time: _____
	Signature: _____	Seal #: _____	Intact: _____
2.	I have received these materials in good condition from the above person		
	Name: <u>Bill West</u>	Signature: <u>Bill West</u>	
	Date: <u>5/16/94</u>	Time: <u>8:00</u>	Remarks: _____
3.	I have received these materials in good condition from the above person		
	Name: <u>Russell T Janeshick</u>	Signature: <u>Russell T Janeshick</u>	
	Date: <u>5/16/94</u>	Time: <u>0800</u>	Remarks: _____
4.	Shuttle Sealed By: (print) <u>Russell T Janeshick</u>		
	Signature: <u>Russell T Janeshick</u>	Date: <u>5/21/94</u>	Time: <u>0800</u>
	Seal #: _____	Intact: _____	
LAB USE ONLY Opened By: <u>Bristie Broneman</u> Date: <u>6.22.94</u> Time: <u>10:00AM</u>			
SHUTTLE # <u>NA</u> TEMP. °C <u>-0.7</u> SEAL # <u>NA</u> COND. <u>FROZEN</u>			

REMARKS

Frozen 2036 WIF
ETFY
KAB
KAB
6.22.94
40600045-0890
Samples rec'd frozen on ice and in good condition. KAB 6.22.94
Bristie Broneman

SAMPLER'S SIGNATURE

WHITE: LAB COPY

YELLOW: SAMPLER COPY

PINK: CLIENT COPY

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570

COMPANY <i>Fothé Van Dyke</i>		FACILITY/SITE <i>93 Cof9</i>		NUMBER OF CONTAINERS	FILT. (Y/N)	PRESERV.	ANALYSIS REQUIRED	LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₄ +H ₂ SO ₄	SAMPLER OBSERVATIONS	LAB OBSERVATIONS			
PROJECT CONTACT <i>Bill West / Russ Jameshek</i>		TELEPHONE NO <i>914-497-2500</i>											
ITEM NO.	ETC JOB #	SOURCE CODE	SAMPLE POINT								START DATE YY/MM/DD	START TIME	Source:
1		W	CM-SLF-005								<i>10 individual</i>		Soil (W) Outfall.....(O)
2		W	CM-SLF-005	<i>(Perch Fillet)</i>		Soil (S) River/Stream.....(R)							
3						Bottom Sediment.....(B)							
4						Generation Point.....(G)							
5						Surface Impoundment (I)							
6						Treatment Facility.....(T)							
7						Leachate Collection Sys.....(C)							
8						Lake/Ocean.....(L)							
9						Other.....(X)							
						Specify <i>Whole body (W)</i> <i>Tissue</i>							

CHAIN OF CUSTODY CHRONICLE

1.	Shuttle Opened By: (print) _____ Date: _____ Time: _____	
	Signature: _____ Seal #: _____ Intact: _____	
2.	I have received these materials in good condition from the above person	
	Name: <i>Bill West</i> Signature: <i>Bill West</i>	
	Date: <i>5/10/98</i> Time: <i>8:00</i> Remarks: _____	
3.	I have received these materials in good condition from the above person	
	Name: <i>Russell T Jameshek</i> Signature: <i>Russell T Jameshek</i>	
	Date: <i>5/16/98</i> Time: <i>0700</i> Remarks: _____	
4.	Shuttle Sealed By: (print) <i>Russell T Jameshek</i> Date: <i>6/21/98</i> Time: <i>0800</i>	
	Signature: <i>Russell T Jameshek</i> Seal #: _____ Intact: _____	
LAB USE ONLY Opened By: <i>Kristie Breneman</i> Date: <i>6-22-94</i> Time: <i>10:00A</i>		
SHUTTLE # <i>NA</i> TEMP. °C <i>-0.7</i> SEAL # <i>NA</i> COND. <i>FROZEN</i>		

REMARKS

Frozen *WIF*
2036 *ETFV*
2036 *KAB*
KAB
6-22-94 *KAB*
6-22-94
Samples rec'd frozen on ice and in good
condition. *KAB 6-22-94*
Kristie Breneman

SAMPLER'S SIGNATURE

WHITE: LAB COPY

YELLOW: SAMPLER COPY

PINK: CLIENT COPY

ETC

CHAIN-OF-CUSTODY RECORD

COPY

No. 114716

ETC - SANTA ROSA • 320 Tesconi Circle • Santa Rosa, CA 95401 • 707-544-5570

COMPANY <i>Foth & Van Dyke</i>		FACILITY/SITE <i>93C049</i>		PROJECT CONTACT <i>Bill / Russ Jameshek</i>		TELEPHONE NO. <i>414-497-2500</i>		NUMBER OF CONTAINERS	FILT. (Y/N)								LEGEND FOR PRESERVATIVE 0 - NONE 1 - HCL 2 - HNO ₃ 3 - H ₂ SO ₄ 4 - Na ₂ SO ₄ +H ₂ SO ₄ 5. Frozen	
PRESERV.		<i>Mercury</i> <i>Manganese</i> <i>Zinc</i> <i>Cadmium</i> <i>Copper</i> <i>Arsenic</i> <i>Lead</i> <i>Cobalt</i> <i>Total Chromium</i>																
ANALYSIS REQUIRED																		
ITEM NO	ETC JOB #	SOURCE CODE	SAMPLE POINT	START DATE YY/MM/DD	START TIME	Source Codes: Well.....(W) Outfall.....(O) Soil.....(S) River/Stream.....(R) Bottom Sediment.....(B) Generation Point.....(G) Surface Impoundment (I) Treatment Facility.....(T) Leachate Collection Sys.....(C) Lake/Ocean.....(L) Other.....(X) Specify <i>Tissue (Fish)</i>									SAMPLER OBSERVATIONS	LAB OBSERVATIONS		
1		X	CM-SGF-CC	9/05/08	2:00pm		10	✓										
2		X	CM-SGF-CC	9/05/08	2:00pm		1		✓	✓	✓	✓	✓	✓				
3		X	CM-WRF-301	9/05/08	2:00pm		10	✓										
4		X	CM-WRF-301	9/05/08	2:00pm		1		✓	✓	✓	✓	✓	✓				
5																		
6																		
7																		
8																		
9																		

CHAIN OF CUSTODY CHRONICLE

1.	Shuttle Opened By: (print) _____ Date: _____ Time: _____ Signature: _____ Seal #: _____ Intact: _____
2.	I have received these materials in good condition from the above person. Name: <i>Bill Wost</i> Signature <i>Wost</i> Date: <i>6/17/94</i> Time: <i>2:30</i> Remarks: _____
3.	I have received these materials in good condition from the above person. Name: <i>Kristie Breneman</i> Signature <i>Kristie Breneman</i> Date: <i>6/21/94</i> Time: <i>1:00pm</i> Remarks: <i>Samples need frozen in good condition</i>

REMARKS *Samples rec'd frozen, on ice and in good condition*

Analyze each pair of fish filets
as a unit. Should result in 20
analytical results

Analyze livers as one unit. Should
result in 2 analytical results.

FA0207
2036

WIF
ETFV
KAB

3.8-1-15

Appendix 3.8-2

1993/1994 Aquatic Macroinvertebrate Inventory

Appendix 3.8-2 Table 1

1993-1994 Aquatic Macroinvertebrate Inventory Crandon Project

Species	Site Location									
Ephemeroptera	1	2	3	4	5	6	7	8	9	10
Stenonema sp.		N		M	N,M,A	N	N,M,A			
Paraleptophlebia sp.		N				N				
Centroptilum sp.				N		N	N			
Baetisca sp.						N,M	N			
Stenacron sp.						N	N			
Baetis sp.			A	M,A	A	M,A	M,A			
Ameletus sp.							M			
Isonychia sp.			A				N			
Ephemera sp.					A					
Leptophlebiidae	M		A	N	N	M	N,M	M	N,M	N,M
Ephemerellidae		N	M,A							
Ephemeridae				N	M		M			
Siphonuridae										
Megaloptera										
Sialis sp.	A		A	N,A	A			A	N,A	
Nigronia sp.		N	M			A	N,M,A			

3.8-2-1

Appendix 3.8-2 Table 1 (Continued)

Species	Site Location										
Ephemeroptera	11	12	13	14	15	16	17	18	19	20	21
Stenonema sp.											
Paraleptophlebia sp.											
Centropilum sp.											
Baetisca sp.											
Stenacron sp.											
Baetis sp.			M								
Ameletus sp.											
Isonychia sp.											
Ephemera sp.											
Leptophlebiidae	M			N,M			N,A				
Ephemerellidae											
Ephemeridae											
Siphonuridae			A								
Megaloptera											
Sialis sp.	A			N,M	A	N,M,A	M,A				
Nigronia sp.											

3.8-2-2

Appendix 3.8-2 Table 1 (Continued)

Species	Site Location									
Coleoptera	1	2	3	4	5	6	7	8	9	10
Dineutus sp.									N,A	
Optioservus sp.		N	A				N,A			
Stenelmis sp.		N	M,A			N	N,A			
Hydrophilus sp.										
Macronychus glabratus				A						
Stenelmis crenata			A				A			
Gyrinus sp.	A									
Peltodytes sp.										
Dytiscidae				N				M	N	M
Gyrinidae				N			A		M	N,M
Hydroptilidae										M
Elmidae							M			
Diptera										
Atherix sp.		N								
Chaoborus sp.										
Simulium sp.						A				

3.8-2-3

Appendix 3.8-2 Table 1 (Continued)

Species	Site Location										
Coleoptera	11	12	13	14	15	16	17	18	19	20	21
Dineutus sp.		A									
Optioservus sp.											
Stenelmis sp.											
Hydrophilus sp.								A			
Macronychus glabratus											
Stenelmis crenata											
Gyrinus sp.											
Peltodytes sp.						A					
Dytiscidae	M	M,A						M			
Gyrinidae	M			N	N			M			
Hydroptilidae				N	A						
Elmidae											
Diptera											
Atherix sp.											
Chaoborus sp.								A			
Simulium sp.											

3.8-2-4

Appendix 3.8-2 Table 1 (Continued)

Species	Site Location									
Diptera (cont.)	1	2	3	4	5	6	7	8	9	10
Chironomidae	M		A	N	N,M,A	M	N,M,A		N,A	M
Tipulidae		N	A	M		N				
Simuliidae					N		N,A			N
Chaoboridae										
Culicidae										
Stratiomyidae										
Tabanidae	A									
Athericidae		N	A							
Hemiptera										
Lethocerus sp.								A		
Ranatra sp.										
Belostoma sp.										
Corixidae				N		N,M	N,M,A	M	M	N,M
Notonectidae								A		N,M
Nepidae									M	M
Gerridae								M		

3.8-2-5

Appendix 3.8-2 Table 1 (Continued)

Species	Site Location										
Diptera (cont.)	11	12	13	14	15	16	17	18	19	20	21
Chironomidae	M	M	M	N,M	M	N,M, A	N,A	M,A			
Tipulidae				N		N					
Simuliidae											
Chaoboridae								M			
Culicidae								M			
Stratiomyidae					A						
Tabanidae							A				
Athericidae											
Hemiptera											
Lethocerus sp.			A					A			
Ranatra sp.					N	N					
Belostoma sp.				N	A						
Corixidae	M	M		N,M		N		M			
Notonectidae	M		M,A		A			A			
Nepidae											
Gerridae											

3.8-2-6

Appendix 3.8-2 Table 1 (Continued)

Species	Site Location									
Hemiptera (cont.)	1	2	3	4	5	6	7	8	9	10
Belostomatidae						M				
Odonata										
Aeschna sp.	M			N,J	J,A	J	J	M,A		M
Aeschna canadensis								J	A	
Aeschna emerita								A		
Aeschna tuberculifera								J		
Aeschna umbrosa							J			
Anax junius					N			J		
Argia fumipennis violacea										
Arigomphus cornutus	J,A				J	J	J			
Basiaeschna janata	J,A	J	M,J	N,M,J,A	N,M,J,A	M,J	N,J		J,A	J
Boyeria vinosa	A	N	J,A				N,M,JY			
Calopteryx sp.				N,J	N,M	N,M	N,M,J			
Calopteryx aquabilis		J	J	J,A	J,A		J			
Calopteryx maculata		J	J	J	A		J			
Celithemis elisa										J

3.8-2-7

Appendix 3.8-2 Table 1 (Continued)

Species	Site Location										
Hemiptera (cont.)	11	12	13	14	15	16	17	18	19	20	21
Belostomatidae						N					
Odonata											
Aeschna sp.	M	M			M,J,A	N,M	N,A	A			
Aeschna canadensis								A	Y	Y	
Aeschna emerita											
Aeschna tuberculifera										Y	
Aeschna umbrosa						A					
Anax junius		A	A						Y		
Argia fumipennis violacea										Y	
Arigomphus cornutus					J,A	J			J,Y	J,Y	J
Basiaeschna janata		J,A	J		N						
Boyeria vinosa					N,A						
Calopteryx sp.					N,M						
Calopteryx aquabilis										J,Y	J
Calopteryx maculata										J	
Celithemis elisa						J	J			J,Y	

3.8-2-8

Appendix 3.8-2 Table 1 (Continued)

Species	Site Location									
Odonata (cont.)	1	2	3	4	5	6	7	8	9	10
Coenagrion sp				M					M	M
Cordulegaster maculata		J	M,J							
Cordulia shurtleffi								M,J,A	A	N,J,A
Didymops transversa							J			M,J
Dorocordula libera			J					M,J,A		J
Dromogomphus spinosus						N	J,Y			
Enallagma sp.						J		M		
Enallagma ebrium								J		
Enallagma hageni			J							J
Epitheca(Tetragonuria) sp.				J	J				M,J	M,J
Epitheca canis			J,A	A,J			J			
Epitheca cynosura		J	J							
Epitheca princeps			J							
Epitheca spiningera										
Gomphus sp.				M			A			
Gomphus (adelphus or viridifrons)		J				M,J,A	J			
Gomphus exilis	J			J,A	J,A	J	J			

3.8-2-9

Appendix 3.8-2 Table 1 (Continued)

Species	Site Location										
Odonata (cont.)	11	12	13	14	15	16	17	18	19	20	21
Coenagrion sp.	M		M	M				M			
Cordulegaster maculata				N	M,A						
Cordulia shurtleffi	M	M,J			J	J,A		M,J,A	Y	J,Y	
Didymops transversa	J,A										
Dorocordula libera		J				J		J,A	Y	Y	J
Dromogomphus spinosus											
Enallagma Sp.											
Enallagma ebrium											
Enallagma hageni		Y			J	J				Y	J
Epitheca (Tetragonuria) sp.	M,J	J	J,A								
Epitheca canis					N,J					J	
Epitheca cynosura		A							Y	J,Y	
Epitheca princeps									Y	J,Y	
Epitheca spiningera			J,A		J				Y	Y	J
Gomphus sp.											
Gomphus (adelphus or viridifrons)											
Gomphus exilis										J,Y	

3.8-2-10

Appendix 3.8-2 Table 1 (Continued)

Species	Site Location									
Odonata (cont.)	1	2	3	4	5	6	7	8	9	10
Gomphus lineatifrons				M,J	M,J	M,J	J			
Gomphus lividus	M,J A	J	J	J,A	J,A	J,A	M,J			M
Gomphus spicatus				J?		M?			J	J?
Gomphus viridifrons							J			
Gomphus(Gomphus) sp.							N			
Gomphus(Gomphurus) sp.						N	N			
Gomphus(Hylogomphus) sp.				M	M	A	M,J			
Gomphus(Phanogomphus) sp.				N						
Hagenius brevistylus		J	J	M,J,A		N,M,A	J,Y			
Ischnura verticalis			J	N		N	N	M		N,J
Ladona julia			J						J,A	
Lestes eurinus?								J		
Lestes rectangularis										J
Leucorrhinia sp.				J	J			M,J		J
Leucorrhinia frigida									A	
Leucorrhinia glacialis								J		

3.8-2-11

Appendix 3.8-2 Table 1 (Continued)

Species	Site Location										
Odonata (cont.)	11	12	13	14	15	16	17	18	19	20	21
Gomphus lineatifrons											
Gomphus lividus					J	J				Y	
Gomphus spicatus	J,A	J,Y	J						Y	Y	
Gomphus viridifrons											
Gomphus(Gomphus) sp.											
Gomphus(Gomphurus) sp.											
Gomphus(Hylogomphus) sp.											
Gomphus(Phanogomphus) sp.											
Hagenius brevistylus										Y	
Ischnura verticalis					J						
Ladona julia	J	J,Y			N,J	J				J,Y	
Lestes eurinus?											
Lestes rectangularis											
Leucorrhinia sp.					J	J		M,J		J	
Leucorrhinia frigida	A		A			A,J				J,A	
Leucorrhinia glacialis		A									

3.8-2-12

Appendix 3.8-2 Table 1 (Continued)

Species	Site Location									
Odonata (cont.)	1	2	3	4	5	6	7	8	9	10
Leucorrhinia intacta										J
Leucorrhinia proxima										J
Libellula sp.										
Libellula pulchella										
Libellula quadrimaculata	J		J				Y	J		N,J
Macromia illinoiensis				J	J	N,M	J			
Nehalennia irene										
Ophiogomphus sp.			M	M						
Ophiogomphus carolus		N								
Ophiogomphus columbrinus		J	J,A							
Ophiogomphus rupinsulensis		J	J,A							
Somatochlora sp.										
Somatochlora elongata								J		
Somatochlora forcipata										
Somatochlora kennedyi							J			
Somatochlora minor	M,J									
Libellula ludia		J	J	J						

3.8-2-13

Appendix 3.8-2 Table 1 (Continued)

Species	Site Location										
	11	12	13	14	15	16	17	18	19	20	21
Odonata (cont.)											
Leucorrhinia intacta			J		J			A		Y	
Leucorrhinia proxima					J			A		Y	
Libellula sp.			M								
Libellula pulchella					J				Y	J	
Libellula quadrimaculata					J			M	Y	J,Y	J
Macromia illinoensis											
Nehalennia irene					J						
Ophiogomphus sp.											
Ophiogomphus carolus											
Ophiogomphus columbrinus											
Ophiogomphus rupinsulensis											
Somatochlora sp.						N					
Somatochlora elongata					J	A					
Somatochlora forcipata										Y	
Somatochlora kennedyi											
Somatochlora minor					A						
Libellula lydia					J				Y	Y	

3.8-2-14

Appendix 3.8-2 Table 1 (Continued)

Species	Site Location									
Odonata (cont.)	1	2	3	4	5	6	7	8	9	10
Somatochlora walshii										
Somatochlora williamsoni			J				A			J
Stylogomphus albistylus			J							
Stylurus sp.			M							
Stylurus amnicola							J			
Stylurus scudderi		J	J			J	J			
Stylurus spiniceps						J	J			
Sympetrum costiferum							Y			
Sympetrum obtrusum							Y			
Chromagrion conditum										
Amphipoda	M,A	N		N,M,A	N,M,A	N,M	N,M,A	M		
Bivalvia		N		N,A	N	N	N			
Gastropoda				N	N		N			
Oligochaeta		N		N		M	N,M			N
Lepidoptera				N,A						
Decopoda				N	N	N	N			

3.8-2-15

Appendix 3.8-2 Table 1 (Continued)

Species	Site Location										
Odonata (cont.)	11	12	13	14	15	16	17	18	19	20	21
Somatochlora walshii						A			Y	J	
Somatochlora williamsoni						J				J	
Stylogomphus albistylus											
Stylurus sp.											
Stylurus amnicola											
Stylurus scudderi											
Stylurus spiniceps											
Sympetrum costiferum											
Sympetrum obtrusum					J					Y	
Chromagrion conditum						N,J					
Amphipoda	A		M	N	N,M, A	N,M,A	N,A				
Bivalvia					N	N					
Gastropoda							N				
Oligochaeta				N,M	M						
Lepidoptera											
Decapoda											

3.8-2-16

Appendix 3.8-2 Table 1 (Continued)

Species	Site Location									
	1	2	3	4	5	6	7	8	9	10
Hirudinea						N	N,M	M,A	A	
Planarians				N						
Isopoda	M			N	N	N,M,A	N			
Tricoptera										
Nyctiophylax sp.									N	
Hydropsyche sp.		N		N	N	N,A	N,A			
Chematopsyche sp.			A	N,A	N	N,A	N,A			
Mysticides sp.				N						
Triaenodes sp.						N				
Mollana sp.									A	A
Cernotina sp.									N	
Neureclipsis sp.							M			M
Setodes sp.									N	
Brachycentrus sp.							N			
Phryganeidae				N	N	N		M,A	M	N,A

3.8-2-17

Appendix 3.8-2 Table 1 (Continued)

Species	Site Location										
	11	12	13	14	15	16	17	18	19	20	21
Hirudinea											
Planarians											
Isopoda				N,M	N,M,A						
Tricoptera											
Nyctiophylax sp.											
Hydropsyche sp.				N	A						
Chematopsyche sp.											
Mysticides sp.											
Triaenodes sp.											
Mollana sp.	A										
Cernotina sp.				M							
Neureclipsis sp.											
Setodes sp.											
Brachycentrus sp.											
Phryganeidae	M	M,A	M,A	N	N	N	N	M			

3.8-2-18

Appendix 3.8-2 Table 1 (Continued)

Species	Site Location									
Tricoptera (cont.)	1	2	3	4	5	6	7	8	9	10
Limnephilidae	M		M	N,M	N,M	N,M,A	N,M	M,A	N,M,A	N,M,A
Molannidae						M			N,M	N
Polycentropodidae				A						N
Glossosomatidae		N								
Brachycentridae		N	M	N			M			
Hydropsychidae			M,A	M	M	M	M			
Plecoptera										
Paracapnia sp.		N								
Acroneuria sp.		N								
Paragnetina sp.		N								
Chloroperlidae		N								
Perlidae			M,A				M,A			
Perlodidae			M							

3.8-2-19

Appendix 3.8-2 Table 1 (Continued)

Species	Site Location										
	11	12	13	14	15	16	17	18	19	20	21
Tricoptera (cont.)											
Limnephilidae	M,A	M,A	M,A	N,M	N,M,A	N,M,A	N,M,A	M			
Molannidae	M			M							
Polycentropodidae				N							
Glossosomatidae							A				
Brachycentridae											
Hydropsychidae				N	M						
Plecoptera											
Paracapnia sp.				N							
Acroneuria sp.											
Paragnetina sp.											
Chloroperlidae											
Perlidae											
Perlodidae											

3.8-2-20

Appendix 3.8-2 Table 1 (Continued)

Notes:

N = November 93

M = May 94

J = June 94

Y = July 94

A = August 94

Site Location 1 = CMC-AB-SC-250

Site Location 3 = CMC-AB-SC-301

Site Location 5 = CMC-AB-SC-502

Site Location 7 = CMC-AB-SGI-CC

Site Location 9 = CMC-AB-SL-005

Site Location 11 = CMC-AB-DH-005

Site Location 13 = CMC-AB-RS-005

Site Location 15 = CMC-AB-MS-100

Site Location 17 = CMC-AB-HC-100

Site Location 19 = CMC-AB-RR-100

Site Location 21 = CMC-AB-PK-200

Site Location 2 = CMC-AB-SC-300

Site Location 4 = CMC-AB-SC-501

Site Location 6 = CMC-AB-WR-301

Site Location 8 = CMC-AB-SK-005

Site Location 10 = CMC-AB-DL-005

Site Location 12 = CMC-AB-DL-005

Site Location 14 = CMC-AB-12-9

Site Location 16 = CMC-AB-HS-005

Site Location 18 = CMC-AB-PP-005

Site Location 20 = CMC-AB-HL-200

Prepared by: WMW

Checked by: JJA

Appendix 3.8-3

**1994 Tricoptera and Ephemeroptera
Light Trapping Inventory**

Appendix 3.8-3 Table 1

1994 Tricoptera and Ephemeroptera Light Trapping Inventory Crandon Project

Species	Site Location									
Tricoptera	1	2	3	4	5	6	7	8	9	10
Helicopsychidae										
Helocopsyche borealis		X	X	X		X				
Hydroptilidae										
Agraylea multipunctata							X			
Hydroptila jackmanni										X
Hydroptila waubesiana	X									
Orthotrichia cristata	X									
Oxyethira michiganensis						X	X			
Hydropsychidae										
Ceratopsyche morosa	X						X			X
Ceratopsyche slossonae							X	X		
Ceratopsyche sparna		X		X						
Ceratopsyche walkeri		X					X			
Cheumatopsyche campyla	X					X				
Cheumatopsyche gracilis		X								
Cheumatopsyche oxa				X						
Cheumatopsyche pettiti	X			X	X		X			X

3.8-3-1

Appendix 3.8-3 Table 1 (Continued)

Species	Site Location									
Hydropsyche betteni	X		X	X	X	X	X		X	X
Hydropsyche placoda										X
Potamyia flava					X					
Lepidostomatidae										
Lepidostoma bryanti				X	X		X			
Leptoceridae										
Ceraclea arielles	X									X
Ceraclea cancellata	X				X				X	
Ceraclea tarsipunctata	X		X		X					
Ceraclea transversa	X	X	X		X		X			
Leptoerus americanus	X				X	X	X	X	X	X
Mystacides interjecta					X				X	
Mystacides sepulchralis				X	X					
Oecetis avara	X					X				X
Oecetis cinerascens					X					
Oecetis inconspicua	X	X	X	X	X	X	X	X	X	X
Oecetis osteni					X	X		X	X	
Oecetis persimilis	X									
Triaenodes baris					X					

3.8-3-2

Appendix 3.8-3 Table 1 (Continued)

Species	Site Location									
<i>Triaenodes dipsius</i>	X		X		X		X			
<i>Triaenodes ignitus</i>		X		X						
<i>Triaenodes injustus</i>	X					X			X	
<i>Triaenodes marginatus</i>						X	X			
<i>Triaenodes tardus</i>					X					
Limnephilidae										
<i>Anabolia bimaculata</i>							X			
<i>Anabolia consocia</i>			X	X						
<i>Hydatophylax argus</i>				X						
<i>Ptilostomis ocellifera</i>	X	X	X	X	X		X	X	X	
<i>Ptilostomis semifasciata</i>	X		X		X		X	X	X	
Polycentropodidae										
<i>Nyctiophylax affinis</i>	X					X	X			
<i>Nyctiophylax moestus</i>		X	X	X	X		X			
<i>Polycentropus aureolus</i>								X		X
<i>Polycentropus cinereus</i>	X	X			X					X
<i>Polycentropus confusus</i>		X		X						
<i>Polycentropus interruptus</i>	X				X	X	X		X	
<i>Polycentropus pentus</i>							X			

3.8-3-3

Appendix 3.8-3 Table 1 (Continued)

Species	Site Location									
Polycentropus weedi			X			X	X	X		X
Psychomyiidae										
Lype diversa				X						
Psychomyia flavida	X	X					X			X
Seicostomatidae										
Agarodes libalis										X
Caenis latipennis		X								X
Caenis amica	X				X	X	X			X
Caenis youngi						X				X
Caenis sp.									X	
Procloeon sp.		X								X
Procloeon rubropictum					X					
Callibaetis fluctuans	X				X	X	X			
Stenonema modestum		X								
Heptageniidae		X								X
Stenacron interpunctatum	X				X					
Leucrocuta sp.										X
Siphonurus alternatus		X			X		X			
Isonychia sp.					X					

3.8-3-4

Appendix 3.8-3 Table 1 *(Continued)*

X = Species Trapped

Site Location 1 = CMC-AB-SC-500	Site Location 2 = CMC-AB-SC-300
Site Location 3 = CMC-AB-SC-200	Site Location 4 = CMC-AB-OC-200
Site Location 5 = CMC-AB-HL-200	Site Location 6 = CMC-AB-MS-100
Site Location 7 = CMC-AB-HS-005	Site Location 8 = CMC-AB-SK-005
Site Location 9 = CMC-AB-SL-005	Site Location 10 = CMC-AB-SGI-CC
Site Location 11 = CMC-AB-DH-005	Site Location 12 = CMC-AB-DL-005
Site Location 13 = CMC-AB-RS-005	Site Location 14 = CMC-AB-12-9
Site Location 15 = CMC-AB-MS-100	Site Location 16 = CMC-AB-HS-005
Site Location 17 = CMC-AB-HC-100	Site Location 18 = CMC-AB-PP-005
Site Location 19 = CMC-AB-RR-100	Site Location 20 = CMC-AB-HL-200
Site Location 21 = CMC-AB-PK-200	

Prepared by: WMW
Checked by: JJA

3.8-3-5

Appendix 3.8-4

1993/1994 Raw Macroinvertebrate Collection Identification Including Light Trapping Results and Odonata Exuviae and Adult Lists

1949 Hickory Ave.
Florence, AL 35630

Dec. 27, 1993

Bill West
Foth & Van Dyke
2737 Ridge Road
P. O. Box 19012
Green Bay, Wisconsin 54307-9012

Dear Bill:

I have completed the task of searching through the November macroinvertebrate samples and identifying species on WDNR's list of species of special concern. Enclosed are the data sheets.

Note that for each sample I have listed all groups present, but only went to the lowest taxonomic level in groups that contained species of special concern. This looks like it might have taken a lot of time, but it did not because I can identify these insects to the level indicated without keying or examining them under high magnification. I thought it might prove useful if you had a list of what was in the samples besides the groups of special concern. I did not enumerate any of the taxa, but can do so for the species of special concern if you need these data.

In summary, samples that contained Odonata of special concern were: CM-RS; CM-HC; CM-SC-300; CM-SC-501; CM-WR-301; and CM-WR-302.

The only samples containing other groups of special concern were: CM-SC-300, CM-WR-301, and CM-WR-302.

The riffle beetle genus *Stenelmis* (family Elmidae) is large (many species, at least 10 of which occur in Wisconsin). Several are quite common. Your samples contained mostly larvae, but one sample had one adult and another had 3 adults. However, these adults appeared to be females. I did not attempt to key these further as it is best to have males for specific identification. Adult riffle beetles can be collected from the water, but they cling quite tightly to twigs, stems and other debris, so hand picking bottom materials is the best method. I believe also that they are attracted to UV light in the summer. I doubt that we will ever be able to identify larvae to species, so a special effort should be made next summer to get adults if we are to find whether or not *S. douglasensis* or *S. knobeli* are present in the area. The only other genus found containing a species of special concern was the caddisfly *Trienodes*. Adults of this group should be found rather early in the season (May?), and sweeping streamside vegetation and UV light traps are probably the best methods for collecting them. At least 8 species occur in Wis.

The average length of time I spent on a sample was 4 hrs, so the average cost per sample is \$160. Total charge for the 11 samples is \$1760 (invoice enclosed). Several samples were quick and easy, whereas SC-501 and WR-302 took a long time because of all the debris to pick through. Because 1993 is now at end, I was wondering if I will be paid soon for completion of this task?

Please let me know if there is anything else I can do to help you with the report for this part of the work.

Sincerely yours,



Ken Tennesen

Crandon Mine Project

Sample

Common Name (Order)

Family

Genus

CM-SL (11/93)

mayflies (Ephemeroptera)

Leptophlebiidae

not ident. further

alderflies (Megaloptera)

Sialidae

Sialis sp.

caddisflies (Trichoptera)

Leptoceridae

Setodes sp.

"

Limnephilidae

not ident. further

"

Molannidae

not ident. further (empty cases)

"

Polycentropodidae

Nyctiophylax sp.

"

"

Ceratomyza sp.

aquatic beetles (Coleoptera)

Gyrinidae

Dineutus sp.

"

Dytiscidae

not ident. further

aquatic flies (Diptera)

Chironomidae

not ident. further

CM-RS (11/93)

dragonflies (Odonata)

Aeshnidae

Aeshna sp. *

"

Corduliidae

Somatochlora sp. *

damselflies (Odonata)

Coenagrionidae

Chromagrion conditum

aquatic bugs (Hemiptera)

Belostomatidae

Lethocerus sp.

"

Nepidae

Ranatra sp.

"

Corixidae

not ident. further

alderflies (Megaloptera)

Sialidae

Sialis sp.

caddisflies (Trichoptera)

Limnephilidae

not ident. further

"

Phryganeidae

not ident. further

aquatic flies (Diptera)

Chironomidae

not ident. further

"

Tipulidae

not ident. further

scuds (Amphipoda)

not ident. further

clams (Bivalvia)

not ident. further

CM-OL (11/93)

mayflies (Ephemeroptera)

Leptophlebiidae

not ident. further

dragonflies (Odonata)

Corduliidae

Cordulia shurtleffi

"

Libellulidae

Libellula quadrimaculata

damselflies (Odonata)

Coenagrionidae

Ischnura verticalis

aquatic bugs (Hemiptera)

Corixidae

not ident. further

"

Notonectidae

not ident. further

caddisflies (Trichoptera)

Limnephilidae

not ident. further

"

Phryganeidae

not ident. further

"

Polycentropodidae

not ident. further

"

Molannidae

not ident. further (cases only)

aquatic beetles (Coleoptera)

Gyrinidae

not ident. further

aquatic flies (Diptera)

Chironomidae

not ident. further

aquatic worms (Oligochaeta)

not ident. further

CM-HC (11/93)

mayflies (Ephemeroptera)

Leptophlebiidae

not ident. further

dragonflies (Odonata)

Aeshnidae

Aeshna sp. *

caddisflies (Trichoptera)

Limnephilidae

not ident. further

"

Phryganeidae

not ident. further

aquatic flies (Diptera)

Chironomidae

not ident. further

scuds (Amphipoda)

not ident. further

snails (Gastropoda)

not ident. further

CM-SC-300 (11/93)

mayflies (Ephemeroptera)

"

"

stoneflies (Plecoptera)

"

"

"

dragonflies (Odonata)

"

fishflies (Megaloptera)

caddisflies (Trichoptera)

"

aquatic beetles (Coleoptera)

"

aquatic flies (Diptera)

"

aquatic worms (Oligochaeta)

scuds (Amphipoda)

clams (Bivalvia)

CM-SC-501 (11/93)

mayflies (Ephemeroptera)

"

"

dragonflies (Odonata)

"

"

damselflies (Odonata)

"

aquatic bugs (Hemiptera)

alderflies (Megaloptera)

caddisflies (Trichoptera)

"

"

"

"

"

aquatic moths (Lepidoptera) Pyralidae

aquatic beetles (Coleoptera)

"

aquatic flies (Diptera)

crayfish (Decapoda)

scuds (Amphipoda)

pillbugs (Isopoda)

aquatic worms (Oligochaeta)

planarians

clams (Bivalvia)

snails (Gastropoda)

fish

Ephemerellidae

Heptageniidae

Leptophlebiidae

Capniidae

Chloroperlidae

Perlidae

"

Aeshnidae

Gomphidae

Corydalidae

Hydropsychidae

Glossosomatidae

Limnephilidae

Elmidae

"

Athericidae

Tipulidae

not ident. further

Gammaridae

not ident. further

Baetidae

Ephemeridae

Leptophlebiidae

Aeshnidae

"

Gomphidae

Calopterygidae

Coenagrionidae

Corixidae

Sialidae

Brachycentridae

Hydropsychidae

"

Leptoceridae

Limnephilidae

Phryganeidae

not ident. further

Dytiscidae

Gyrinidae

Chironomidae

not ident. further

not ident. further

not ident. further

not ident. further

not ident. further

not ident. further

not ident. further

not ident. further

not ident. further

not ident. further

Stenonema sp.*Paraleptophlebia* sp.*Paracapnia* sp.

not ident. further

Acroneuria sp.*Paragnetina* sp.*Boyeria vinosa**Ophiogomphus carolus* **Nigronia* sp.*Hydropsyche* sp.

not ident. further

not ident. further

Optioservus sp.*Stenelmis* sp. **Atherix* sp.

not ident. further

not ident. further

Centroptilum sp.

not ident. further

not ident. further

Aeshna sp. **Basiaeschna janata**Gomphus* (*Phanogomphus*) sp.*Calopteryx* sp.*Ischnura verticalis*

not ident. further

Sialis sp.

not ident. further

Cheumatopsyche sp.*Hydropsyche* sp.*Mystacides*

not ident. further

not ident. further

not ident. further

not ident. further

not ident. further

CM—SC—502 (11/93)

mayflies (Ephemeroptera)

"

dragonflies (Odonata)

"

damselflies (Odonata)

caddisflies (Trichoptera)

"

"

"

aquatic flies (Diptera)

"

crayfish (Decapoda)

scuds (Amphipoda)

pillbugs (Isopoda)

snails (Gastropoda)

clams (Bivalvia)

Leptophlebiidae

Heptageniidae

Aeshnidae

"

Calopterygidae

Hydropsychidae

"

Limnephilidae

Phryganeidae

Chironomidae

Simuliidae

not ident. further

Gammaridae

not ident. further

not ident. further

not ident. further

not ident. further

Stenonema sp.*Anax junius**Basiaeschna janata**Calopteryx* sp.*Cheumatopsyche* sp.*Hydropsyche* sp.

not ident. further

not ident. further

not ident. further

not ident. further

not ident. further

CM-WR-301 (11.93)

mayflies (Ephemeroptera)

"

"

"

"

dragonflies (Odonata)

"

"

"

damselflies (Odonata)

"

aquatic bugs (Hemiptera)

caddisflies (Trichoptera)

"

"

"

"

aquatic beetles (Coleoptera)

aquatic flies (Diptera)

aquatic worms (Oligochaeta)

crayfish (Decapoda)

scuds (Amphipoda)

pillbugs (Isopoda)

leeches (Hirudinea)

clams (Bivalvia)

Baetidae

Baetiscidae

Heptageniidae

"

Leptophlebiidae

Gomphidae

"

"

Calopterygidae

Coenagrionidae

Corixidae

Hydropsychidae

"

Leptoceridae

Limnephilidae

Phryganeidae

Elmidae

Tipulidae

not ident. further

not ident. further

Gammaridae

not ident. further

not ident. further

not ident. further

Centroptilum sp.*Baetisca* sp.*Stenacron* sp.*Stenonema* sp.*Paraleptophlebia* sp.*Dromogomphus spinosus**Gomphus* (*Gomphurus*) sp.**Hagenius brevistylus**Macromia illinoensis**Calopteryx* sp.*Ischnura verticalis*

not ident. further

Cheumatopsyche sp.*Hydropsyche* sp.*Triaenodes* sp.*

not ident. further

not ident. further

Stenelmis sp.*

not ident. further

not ident. further

CM—WR—302

mayflies (Ephemeroptera)

"

"

"

"

"

dragonflies (Odonata)

"

"

"

damselflies (Odonata)

"

Baetidae

Baetiscidae

Heptageniidae

"

Leptophlebiidae

Oligoneuridae

Aeshnidae

"

Gomphidae

"

Calopterygidae

Coenagrionidae

Centroptilum sp.*Baetisca* sp.*Stenacron* sp.*Stenonema* sp.

not ident. further

Isonychia sp.*Basiaeschna janata**Boyeria vinosa**Gomphus* (*Gomphus*) sp.**Gomphus* (*Gomphurus*) sp.**Calopteryx* sp.*Ischnura verticalis*

aquatic bugs (Hemiptera)	Corixidae	not ident. further
fishflies (Megaloptera)	Corydalidae	<i>Nigronia</i> sp.
caddisflies (Trichoptera)	Brachycentridae	<i>Brachycentrus</i> sp.
"	Hydropsychidae	<i>Cheumatopsyche</i> sp.
"	"	<i>Hydropsyche</i> sp.
"	Limnephilidae	not ident. further
aquatic beetles (Coleoptera)	Elmidae	<i>Optioservus</i> sp.
"	"	<i>Stenelmis</i> sp.*
"	Gyrinidae	not ident. further
aquatic flies (Diptera)	Chironomidae	not ident. further
"	Simuliidae	not ident. further
aquatic worms (Oligochaeta)	not ident. further	
crayfish (Decapoda)	not ident. further	
scuds (Amphipoda)	Gammaridae	not ident. further
pillbugs (Isopoda)	not ident. further	
leeches (Hirudinea)	not ident. further	
clams (Bivalvia)	not ident. further	
snails Gastropoda)	not ident. further	
CM-11-4 (11/93)		
dragonflies (Odonata)	Aeshnidae	<i>Basiaeschna janata</i>
"	"	<i>Boyeria vinosa</i>
"	Corduliidae	<i>Epithea canis</i>
"	Libellulidae	<i>Ladona julia</i>
damselflies (Odonata)	Calopterygidae	<i>Calopteryx</i> sp.
aquatic bugs (Hemiptera)	Nepidae	<i>Ranatra</i> sp.
caddisflies (Trichoptera)	Limnephilidae	not ident. further
"	Phryganeidae	not ident. further
aquatic beetles (Coleoptera)	Gyrinidae	not ident. further
scuds (Amphipoda)	Gammaridae	not ident. further
pillbugs (Isopoda)	not ident. further	
clam (Bivalvia) not ident. further		
CM-12-9 (11/93)		
mayflies (Ephemeroptera)	Leptophlebiidae	not ident. further
dragonflies (Odonata)	Cordulegastridae	<i>Cordulegaster maculata</i>
stoneflies (Plecoptera)	Capniidae	<i>Paracapnia</i> sp.
aquatic bugs (Hemiptera)	Belostomatidae	<i>Belostoma</i> sp.
"	Corixidae	not ident. further
alderflies (Megaloptera)	Sialidae	<i>Sialis</i> sp.
caddisflies (Trichoptera)	Hydropsychidae	<i>Hydropsyche</i> sp.
"	Limnephilidae	not ident. further
"	Phryganeidae	not ident. further
"	Polycentropodidae	not ident. further
aquatic beetles (Coleoptera)	Gyrinidae	not ident. further
"	Hydrophilidae	not ident. further
aquatic flies (Diptera)	Chironomidae	not ident. further
"	Tipulidae	not ident. further
aquatic worms (Oligochaeta)	not ident. further	
scuds (Amphipoda)	Gammaridae	not ident. further
pillbugs (Isopoda)	not ident. further	

* a species (or a genus containing a species) listed by WDNR as a macroinvertebrate of special concern.

Submitted by Kenneth J. Tennnessen, 1949 Hickory Ave., Florence, AL 35630, Dec. 27, 1993.

CRANDON MINE – May 1994

[det. by K. J. Tennessen]

CM-SKI-004 (11 May 1994)

ODONATA

Aeshna sp (possibly interrupta,
tuberculifera, or umbrosa)

Cordulia shurtleffi

Dorocordulia libera

Leucorrhinia spp.

Enallagma sp.

Ischnura verticalis

EPEMEROPTERA

Leptophlebiidae

HEMIPTERA

Corixidae

Gerridae

TRICHOPTERA

Limnephilidae

Phryganeidae

COLEOPTERA

Dytiscidae

AMPHIPODA

Gammarus

HIRUDINEA

CM-DHI-005 (12 May 1994)

ODONATA

Aeshna sp.

Cordulia shurtleffi

Epithea (Tetragoneuria) sp.

Coenagrionidae

EPEMEROPTERA

Leptophlebiidae

HEMIPTERA

Corixidae

Notonectidae

TRICHOPTERA

Limnephilidae

Molannidae

Phryganeidae

COLEOPTERA

Dytiscidae

Gyrinidae

DIPTERA

Chironomidae

CM-SLI-002 (12 May 1994)

ODONATA

Epithea (Tetragoneuria) sp.

Coenagrionidae

EPEMEROPTERA

Leptophlebiidae

HEMIPTERA

Corixidae

Nepidae

TRICHOPTERA

Limnephilidae

Molannidae

Phryganeidae

COLEOPTERA

Gyrinidae

CM-WRI-301 (10 May 1994)

ODONATA

Basiaeschna janata

Gomphus lineatifrons

G. spicatus?

G. sp. (adelphus or viridifrons)

Hagenius brevistylus

Macromia illinoensis

Calopterygidae

EPEMEROPTERA

Baetis

Baetisca

Leptophlebiidae

HEMIPTERA

Belostomatidae

Corixidae

TRICHOPTERA

Hydropsychidae

Limnephilidae

Molannidae

DIPTERA

Chironomidae

AMPHIPODA

Gammarus

ISOPODA

OLIGOCHAETA

CM-HSI-005 (14 May 1994)

ODONATA

Aeshna sp.
Somatochlora elongata

MEGALOPTERA

Sialis

TRICHOPTERA

Limnephilidae

DIPTERA

Chironomidae

AMPHIPODA

Gammarus

CM-WRI-CC (10 May 1994)

ODONATA

Boyeria vinosa
Gomphus (Hylogomphus) sp.
Gomphus lividus
Calopteryx

EPEMEROPTERA

Baetis
Ephemeridae
Leptophlebiidae
Stenonema
Siphonuridae
Ameletus

HEMIPTERA

Corixidae

PLECOPTERA

Perlidae

MEGALOPTERA

Nigronia

TRICHOPTERA

Brachycentridae
Hydropsychidae
Limnephilidae
Polycentropodidae
Neureclipsis

COLEOPTERA

Elmidae

DIPTERA

Chironomidae

AMPHIPODA

Gammarus

HIRUDINEA

OLIGOCHAETA

CM-OLI-002 (10 May 1994)

ODONATA

Aeshna sp.
Gomphus lividus
Didymops transversa
Epithea (Tetragoneuria) sp.
Coenagrionidae

EPEMEROPTERA

Leptophlebiidae

HEMIPTERA

Corixidae
Nepidae
Notonectidae

TRICHOPTERA

Limnephilidae
Polycentropodidae
Neureclipsis

COLEOPTERA

Dytiscidae
Gyrinidae
Hydrophilidae

~~CM-SOI-23~~ **(13 May 1994)**

ODONATA

Coenagrionidae

EPEMEROPTERA

Leptophlebiidae

HEMIPTERA

Corixidae

MEGALOPTERA

Sialis

TRICHOPTERA

Limnephilidae
Molannidae
Polycentropodidae
Cernotina sp.

DIPTERA

Chironomidae

ISOPODA

OLIGOCHAETA

CM-PPI-005 (13 May 1994)

ODONATA

Cordulia shurtleffi
Leucorrhinia sp.
Libellula quadrimaculata
Coenagrionidae

HEMIPTERA

Corixidae

TRICHOPTERA

Limnephilidae
Phryganeidae

COLEOPTERA

Dytiscidae
Gyrinidae

DIPTERA

Chaoboridae
Chironomidae
Culicidae

CM-SCI-501 11 May 1994

ODONATA

Basiaeschna janata
Gomphus lineatifrons
Gomphus (Hygogomphus) sp.
Hagenius brevistylus
Gomphus sp.
Ophiogomphus sp.
Calopterygidae
Coenagrionidae

EPEMEROPTERA

Baetis
Stenonema

TRICHOPTERA

Hydropsychidae
Limnephilidae

DIPTERA

Chironomidae
Tipulidae

AMPHIPODA

Gammarus

CM-SCI-301 (11 May 1994)

ODONATA

Basiaeschna janata
Ophiogomphus sp.
Stylurus sp/
Cordulegaster maculata

EPEMEROPTERA

Ephemerelliidae

PLECOPTERA

Perlidae
Perlodidae

MEGALOPTERA

Nigrionia

TRICHOPTERA

Brachycentridae
Hydropsychidae
Limnephilidae

COLEOPTERA

Elmidae
Stenelmis(2 larvae)

CM-HCI-100 (14 May 1994)

MEGALOPTERA

Sialis

TRICHOPTERA

Limnephilidae

CM-DLI-001 (13 May 1994)

ODONATA

Aeshna sp.
Cordulia shurtleffi

HEMIPTERA

Corixidae

TRICHOPTERA

Limnephilidae
Phryganeidae

COLEOPTERA

Dytiscidae

DIPTERA

Chironomidae

CM-SCI-250 (12 May 1994)

ODONATA

Aeshna sp.
Gomphus lividus
Somatochlora minor

EPEMEROPTERA
Leptophlebiidae

TRICHOPTERA
Limnephilidae

DIPTERA
Chironomidae

AMPHIPODA
Gammarus

ISOPODA

CM-RSI-005 (13 May 1994)

ODONATA

Epitheca (Tetragoneuria) sp.
Libellulidae
Coenagrionidae

EPEMEROPTERA
Baetis

HEMIPTERA
Notonectidae

TRICHOPTERA
Limnephilidae
Phryganeidae

DIPTERA
Chironomidae

AMPHIPODA
Gammarus

CM-MSI-300 (13 May 1994)

ODONATA

Aeshna sp.
Cordulegaster maculata
Calopterygidae

TRICHOPTERA
Hydropsychidae
Limnephilidae

DIPTERA
Chironomidae

AMPHIPODA
Gammarus

ISOPODA
OLIGOCHAETA

CM-SCI-502 (11 May 1994)

ODONATA

Basiaeschna janata
Gomphus lineatifrons
Gomphus sp.
Calopterygidae

EPEMEROPTERA
Ephemeridae
Stenonema

TRICHOPTERA
Hydropsychidae
Limnephilidae

DIPTERA
Chironomidae

AMPHIPODA
Gammarus

SEP 12 1994

FOTH & VAN DYKE

Sept. 7, 1994

Bill West
Foth & Van Dyke
2737 Ridge Rd.
Green Bay, WI 54307

Dear Bill,

Enclosed are the Crandon benthic macroinvertebrate identifications for August. I did not find any species that are on Wisconsin's list of species of special concern in these samples.

I looked at the stonefly nymphs collected in Nov., 1993, at SC-300, that I identified as Chloroperlidae. I did not id. these any further at that time because no species in that family was on the list of special concern. I have gotten them out to examine again, but I need a little more time to id. them to genus; they are not final stage nymphs. They are probably *Alloperla*, a genus unreported for the state. A single female specimen you and I picked up in our light trap samples was of this genus; however, females can not be identified to species (nor can nymphs, only males). No species of *Alloperla* has ever been reported from Wisconsin, and the genus has never been reported either.

Enclosed is a copy of the known distributions of the species of *Alloperla*. I marked the species that might occur in Wisconsin with green; a couple other species also could be there.

Incidentally, the single female adult of *Alloperla* we collected was from Swamp Creek, Swampy Lane, 28 June 1994. I sent it to Dr. Bill Stark, of Mississippi College, for verification, and he has returned the specimen to me.

Let me know if there is any more information you need or if I may be able to answer any questions.

Sincerely yours,



Ken Tennessen

Crandon Mine Benthic Identifications - Aug. 1994

CM-PPI-005

ODONATA:
Dorocordulia libera
Leucorrhinia intacta
Cordulia shurtleffi
Aeshna sp. (early instars)
HEMIPTERA:
Lethocerus
Notonecta
COLEOPTERA:
Hydrophilidae
Hydrophilus
DIPTERA:
Chironomidae
Chaoborus

CM-WRI-301

ODONATA:
Hagenius brevistylus
Gomphus (Hylogomphus) sp.
(F-1 instar)
Gomphus lividus
EPHEMEROPTERA:
Baetis
MEGALOPTERA:
Nigronia
TRICHOPTERA:
Cheumatopsyche
Hydropsyche
Limnephilidae (empty cases)
DIPTERA:
Simulium
ISOPODA

CM-RSI-005

ODONATA:
Anax junius
Epithea (Tetragoneuria) spinigera
Leucorrhinia frigida
EPHEMEROPTERA:
Siphonuridae
HEMIPTERA:
Lethocerus
Notonecta
TRICHOPTERA:
Limnephilidae
Phryganeidae (empty cases)

CM-DHI-005

ODONATA:
Gomphus spicatus
Didymops transversa
Leucorrhinia frigida
MEGALOPTERA:
Sialis

TRICHOPTERA:
Limnephilidae
Molanna (empty cases)

CM-SCI-501

ODONATA:
Basiaeschna janata
Gomphus exilis
Gomphus lividus
Hagenius brevistylus
Epithea (Tetragoneuria) canis
Calopteryx aequabilis
EPHEMEROPTERA:
Baetis
MEGALOPTERA:
Sialis
TRICHOPTERA:
Cheumatopsyche
Polycentropodidae
COLEOPTERA:
Elmidae
Macronychus glabratus
LEPIDOPTERA:
Pyrilidae
DIPTERA:
Chironomidae
AMPHIPODA
Gammaridae
BIVALVIA

CM-SLI-002

ODONATA
Basiaeschna janata
Cordulia shurtleffi
Ladona julia
Leucorrhinia frigida
MEGALOPTERA
Sialis
TRICHOPTERA
Limnephilidae
Mollana (empty cases)

COLEOPTERA

Dineutus
DIPTERA
Chironomidae
HIRUDINEA

CM-DLI-001

ODONATA
Anax junius
Basiaeschna janata
Epithea (Tetragoneuria) cynosura
Leucorrhinia (glacialis?)
TRICHOPTERA
Limnephilidae
Phryganeidae (empty cases)
COLEOPTERA
Dineutus
Dytiscidae

CM-MSI-300

ODONATA
 Aeshna sp.
 Arigomphus cornutus
 Cordulegaster maculata
 Somatochlora minor
 HEMIPTERA
 Belostoma
 Notonecta
 MEGALOPTERA
 Sialis
 TRICHOPTERA
 Limnephilidae
 Hydropsyche
 COLEOPTERA
 Hydrophilidae
 DIPTERA
 Stratiomyidae
 AMPHIPODA
 Gammaridae
 ISOPODA

CM-HCI-100

ODONATA
 Aeshna sp. (umbrosa?)
 EPHEMEROPTERA
 Leptophlebiidae
 MEGALOPTERA
 Sialis
 TRICHOPTERA
 Glossosomatidae (empty cases)
 Limnephilidae
 DIPTERA
 Chironomidae
 Tabanidae
 AMPHIPODA
 Gammaridae

CM-OLI-002

ODONATA
 Cordulia shurtleffi
 TRICHOPTERA
 Limnephilidae (empty cases)
 Molanna (empty cases)
 Phryganeidae (empty cases)

CM-SKI-004

ODONATA
 Aeshna sp.
 Cordulia shurtleffi
 Dorocordulia libera
 HEMIPTERA
 Lethocerus
 Notonecta
 MEGALOPTERA
 Sialis
 TRICHOPTERA
 Limnephilidae (empty cases)

Phryganeidae (empty cases)
 HIRUDINEA

CM-SCI-301

ODONATA
 Boyeria vinosa
 Ophiogomphus colubrinus
 Ophiogomphus rupinsulensis
 EPHEMEROPTERA
 Baetidae - Baetis
 Ephemerellidae
 Oligoneuridae - Isonychia
 Leptophlebiidae
 PLECOPTERA
 Perlidae
 MEGALOPTERA
 Sialis
 TRICHOPTERA
 Cheumatopsyche
 Hydropsyche
 COLEOPTERA
 Elmidae
Optioservus fastiditus
Stenelmis crenata
 Stenelmis sp. (larva)
 DIPTERA
 Athericidae
 Chironomidae
 Tipulidae

CM-SCI-502

ODONATA
 Aeshna
 Basiaeschna janata
 Gomphus exilis
 Gomphus lividus
 Calopteryx aequabilis
 Calopteryx maculata
 EPHEMEROPTERA
 Baetis
 Ephemera
 Stenonema
 MEGALOPTERA
 Sialis
 AMPHIPODA
 Gammaridae

CM-SCI-250

ODONATA
 Basiaeschna janata
 Boyeria vinosa
 Arigomphus cornutus
 Gomphus lividus
 MEGALOPTERA
 Sialis
 COLEOPTERA
 Gyrinus (larva)
 DIPTERA

Tabanidae
AMPHIPODA
Gammaridae
CM-WRI-CC
ODONATA
Gomphus sp. (early instars)
EPHEMEROPTERA
Baetis
Stenonema
PLECOPTERA
Perlidae
HEMIPTERA
Corixidae
MEGALOPTERA
Nigronia
TRICHOPTERA
Cheumatopsyche
Hydropsyche
COLEOPTERA
Gyrinidae
Elmidae
Optioservus fastiditus
Stenelmis crenata
Stenelmis sp. (larvae)
DIPTERA
Chironomidae
Simuliidae
AMPHIPODA
Gammaridae

CM-HSI-CC
ODONATA
Aeshna umbrosa
Somatochlora walshii ?
Cordulia shurtleffi
Leucorrhinia frigida
MEGALOPTERA
Sialis
TRICHOPTERA
Limnephilidae (empty cases)
COLEOPTERA
Peltodytes
DIPTERA
Chironomidae
AMPHIPODA
Gammaridae

Species of Nymphs Examined. *A. caudata*: Arkansas, Oklahoma. *A. delicata*: Alaska. *A. fraterna*: Alaska. *A. hamata*: Arkansas, Missouri. *A. imbecilla*: Pennsylvania, West Virginia. *A. serrata*: Alaska. *A. severa*: Alaska. *Alloperla* sp.: Arkansas, Oregon, several other localities. *A. usa*: West Virginia.

Nymph Biology. Because this genus name has previously been a "catch-all" taxon, and so few species are known in the nymph stage, there is virtually no specific published information on nymphal development or trophic dynamics that can be attributed directly to North American species as now defined. No ecological references were given by Harper & Stewart (1984). Nymphs become fully grown and emerge from April in Mississippi (*A. natchez*, Surdick & Stark 1980) and May–June in the Ozark–Ouachita Mountains of Arkansas and Missouri (*A. hamata*, *A. ouachita*, *A. caudata*, *A. leonarda* [Stark et al. 1983]; B. Poulton & K. Stewart, unpublished data), to June–August in Alaska and Kodiak Island (*A. delicata*, *A. fraterna*, *A. severa*, *A. serrata* [Howe 1981]; K. W. S. & M. Oswood, unpublished data).

North American Species List and Distribution. (1) *A. acadiana* Harper: NW. (2) *A. aracoma* Harper & Kirchner: WV. (3) *A. atlantica* Baumann: CT, GA, IN, MA, MD, ME, MI, MN, NC, NH, NS, NW, NY, ON, PA, QB, SC, TN, VA, VT. (4) *A. banksi* Frison: IL, ME, MI, NS, NY, ON, VA. (5) *A. biserrata* Nelson & Kondratieff: VA. (6) *A. caddo* Poulton & Stewart: AR. (7) *A. caudata* Frison: AR, CT, IL, IN, MA, ME, MO, NE, NS, OH, OK, QB, VA. (8) *A. chandleri* Jewett: CA. (9) *A. chloris* Frison: CT, KY, MA, ME, NY, OH, QB, VA, WV. (10) *A. concolor* Ricker: CT, MA, ME, NE, ON, PA, QB, VA. (11) *A. delicata* Frison: AB, AK, BC, CA, ID, MT, OR. (12) *A. fraterna* Frison: AK, BC, CA, OR, WA. (13) *A. furcula* Surdick: SC. (14) *A. hamata* Surdick: AL, AR, MO. (15) *A. ideii* (Ricker): KY, ME, OH, QB, VA, WV. (16) *A. imbecilla* (Say): IN, KY, NY, OH, QB, VA, WV. (17) *A. leonarda* Ricker: ME, MI, MN, MO, QB. (18) *A. medveda* Ricker: AB, BC, ID, MT, WY, YK. (19) *A. nanina* Banks: GA, NC, NY, SC, TN, VA. (20) *A. natchez* Surdick & Stark: MS. (21) *A. neglecta* Frison: NC, NE, NY, ON, PA, TN, VA. (22) *A. ouachita* Stark & Stewart: AR. (23) *A. pilosa* Needham & Claassen: CO. (24) *A. roberti* Surdick: IL. (25) *A. serrata* Needham & Claassen: AB, AK, BC, ID, MT, WA, WY. (26) *A. severa* (Hagen): AB, AK, BC, CA, CO, ID, MT, NT, NV, OR, UT, WA, WY. (27) *A. usa* Ricker: GA, SC, TN, VA, WV. (28) *A. voinae* Ricker: MA, ME, NS, NY, QB, VT. (29) *A. vostoki* Ricker: NS, NY, PA.

Bisancora Surdick

Type Species. *Bisancora rutriformis* Surdick.

Distribution. Western Nearctic.

Previous Nymph Descriptions and Illustrations. (1) *B. rutriformis*: Stewart & Stanger (1985b; habitus, head–pronotum, right lacinia, left mandible, right foreleg, mesosternum, male dorsal Ab, male ventral Ab, female ventral Ab, cercus).

Nymph Morphology. (*B. rutriformis*). Length 5.0–6.0 mm. Body yellow or tan, with brown pattern, long depressed clothing hairs and erect body hairs. Head with brown patch enclosed within ocellar triangle, extending forward medially on frons; occiput with posterior light brown transverse band; antennae yellow; 2 long setae anterior and posterior to eye and single long seta at anterior corners of frons and outside each lateral ocellus (Fig. 11.3, 11.4A). Lacinia with single, terminal tooth, about 0.25 times total lacinal length; thickset row of long, stout setae below tooth and continuous row of



ventral. (C).
dorsal. (G).
b, marginal

RECEIVED

SEP - 6 1994

FOTH & VAN DYKE

1949 Hickory Ave.
Florence, AL 35630

Aug. 31, 1994

Bill West
Foth & Van Dyke
2737 Ridge Road
P. O. Box 19012
Green Bay, Wisconsin 54307-9012

Dear Bill:

Enclosed are several sets of data. The first set is the list of adult Odonata that we collected during our late June-early July survey. The WDNR has received specimens of all species asterisked on this list (of special concern).

The second data set contains the species identifications of all the Trichoptera adults that we collected during our June/July survey in light trap samples. This turned out to be a monumental task. I have since learned that samples such as we collected can cost up to \$500 each, so we got a heck of a bargain! I say this because we now have a very good data base on this group, and some very useful information to boot. Please check the notes on the last page, especially #4 concerning sampling dates. There was only one species of concern, *Trienodes dipsius*, but this id. is yet to be confirmed by the only expert on the group. Also, there are one or two others to be confirmed, so do not consider the caddisfly list as a final draft.

I received the August benthic samples and have completed the sorting and identifications, but have not yet entered the data in the computer. As soon as I mark the species on WDNR's special concern list and get this entered, I will send you the printout. I also finished identifying the adult Odonata you collected in early August, and have enclosed those data. The only species of special concern was *Aeshna eremita* (which I thought I saw when we were up there together, and was really glad you caught one), and I will forward this specimen (one male) to WDNR.

I have sent 3 invoices for all work I have done so far to Cindy Bateson, as she instructed me during numerous phone conversations concerning my insurance situation. This insurance requirement has been a real tough battle.

Will there be any more work for me this year on the Crandon project?

Sincerely yours,



Ken Tennesen

LIST OF ADULT ODONATA COLLECTED OR OBSERVED AT CRANDON MINE SITE
6/27/94 - 7/1/94

Aeshna canadensis
A. tuberculifera *
Anax junius
Basiaeschna janata
Arigomphus cornutus
Dromogomphus spinosus
Gomphus exilis
G. lividus
G. spicatus
G. lineatifrons *
Hagenius brevistylus
Ophiogomphus colubrinus
O. rupinsulensis
Stylogomphus albistylus *
Stylurus scudleri *
Cordulegaster maculata
Macromia illinoiensis
Cordulia shurtleffi
Dorocordulia libera
Epiptera canis
E. cynosura
E. princeps
E. spinigera
Somatochlora elongata*
S. forcipata *
S. kennedyi *
S. walshii
S. williamsoni
Celithemis elisa
Ladona julia
Leucorrhinia frigida
L. glacialis
L. intacta
L. proxima
Libellula lydia
L. pulchella
L. quadrimaculata
Sympetrum obtrusum
Calopteryx aequabilis
C. maculata
Lestes eurinus ?
L. rectangularis
Argia fumipennis violacea
Chromagrion conditum *
Enallagma ebrium
Enallagma hageni
Ischnura verticalis
Nehalennia irene

* = species listed as of special concern by Wisconsin DNR.

Adult Odonata collected/observed at specific sites:

6/27/94 Swamp Creek, Swampy Lane

Basiaeschna janata

Gomphus lividus

Cordulegaster maculata

Epithea cynosura

Libellula lydia

Calopteryx maculata

Saw *Hagenius brevistylus*, *Calopteryx aequabilis*

6/27/94 Hemlock Creek, Deep Hole Rd. culvert

Arigomphus cornutus

Gomphus exilis

Cordulia shurtleffi

Epithea cynosura

Epithea princeps

Somatochlora walshii

S. williamsoni

Celithemis elisa

Ladona julia

Libellula pulchella

Saw *Epithea canis*, *Leucorrhinia* spp., *Libellula quadrimaculata*, *Calopteryx aequabilis*, *Calopteryx maculata*

6/27/94 Skunk Lake

Aeshna canadensis

A. tuberculifera

Somatochlora elongata

Leucorrhinia glacialis

Enallagma ebrium

Saw *Lestes eurinus* ?

6/27/94 Swamp Creek, between 501 and 502 sites

Gomphus lineatifrons

Leucorrhinia sp.

Saw *Basiaeschna janata*, *Gomphus exilis*, *G. lividus*, *Macromia illinoiensis*, *Calopteryx aequabilis*, *Calopteryx maculata*

6/27/94 Wolf River, Lost Lake Road

Macromia illinoiensis

Saw *Dromogomphus spinosus*, *Gomphus lineatifrons*, *Calopteryx aequabilis*, *Calopteryx maculata*

on Lost Lake Road about 1 mile from river, collected 1 female of *Somatochlora kennedyi*.

6/27/94 Pickerel Creek, N. Rollingstone Lake Road

Arigomphus cornutus

Dorocordulia libera

Epithea spinigera

Enallagma hageni

Saw *Calopteryx aequabilis*, *Libellula quadrimaculata*

6/28/94 Swamp Creek, Swampy Lane
Stylurus scudder (emerging)

6/30/94 Martin Springs, N. Rollingsstone Lake Road
Arigomphus cornutus
Gomphus lividus
Cordulia shurtleffi
Epithea spinigera
Ladona julia
Leucorrhinia intacta
Leucorrhinia proxima
Libellula lydia
L. pulchella
L. quadrimaculata
Sympetrum obtrusum
Enallagma hageni
Ischnura verticalis
Nehalennia irene

6/30/94 Oak Lake
Cordulia shurtleffi
Dorocordulia libera
Somatochlora williamsoni (flying over pond)
Celithemis elisa
Leucorrhinia intacta
L. proxima
Libellula quadrimaculata
Lestes rectangularis (emerging at pond)
Enallagma hageni
Ischnura verticalis

6/30/94 Hoffman Spring
Arigomphus cornutus
Gomphus lividus
Dorocordulia libera
Somatochlora williamsoni
Ladona julia
Leucorrhinia frigida
Leucorrhinia sp.
Chromagrion conditum
Enallagma hageni

6/30/94 Swamp Creek, site 301
Gomphus lividus
Hagenius brevistylus
Ophiogomphus colubrinus
O. rupinsulensis
Stylogomphus albistylus
Cordulegaster maculata
Epithea cynosura
E. princeps
Somatochlora williamsoni
Ischnura verticalis

Saw *Basiaeschna janata*, *Dorocordulia libera*, *Ladona julia*, *Libellula lydia*, *L. quadrimaculata*, *Calopteryx aequabilis*, *Calopteryx maculata*, *Enallagma hageni*

7/1/94 Berry Lane, near Hemlock Creek

Aeshna canadensis
Arigomphus cornutus
Gomphus lividus
G. spicatus
Hagenius brevistylus
Cordulia shurtleffi
Dorocordulia libera
Epithea cynosura
E. spinigera
Ladona julia
Leucorrhinia intacta
L. proxima
Libellula lydia
Sympetrum obtrusum

7/1/94 Hemlock Creek, jct. Deep Hole Road & Berry Lane

Aeshna canadensis
A. tuberculifera
Arigomphus cornutus
Gomphus exilis
G. lividus
G. spicatus
Dorocordulia libera
Epithea cynosura
E. spinigera
E. princeps
Somatochlora forcipata
Celithemis elisa
Ladona julia
Libellula lydia
L. quadrimaculata
Calopteryx aequabilis
Calopteryx maculata
Argia fumipennis violacea
Enallagma hageni

7/1/94 Railroad track, West Shore - Hemlock Lake Road

Aeshna canadensis
Gomphus spicatus
Cordulia shurtleffi
Dorocordulia libera
Epithea cynosura
E. spinigera
Somatochlora walshii
Libellula lydia
L. pulchella
Saw *Anax junius*, *E. princeps*, *L. quadrimaculata*

7/1/94 Duck Lake

Gomphus spicatus
Ladona julia
Enallagma hageni

ADULT ODONATA COLLECTED BY W. M. WEST, JULY-AUG. 1994
CRANDON MINE SITE

Boyeria vinosa	CMC-AB-SGI-CC	7/30/94
Aeshna canadensi	CMC-SLI-001	8/2/94
Boyeria vinosa	CMC-MS-005	8/1/94
Aeshna canadensis	CMC-PPI-002	8/3/94
Aeshna eremita*	CMC-SKI-004	8/3/94
Dromogomphus spinosus	CMC-AB-SGI-CC	7/30/94
Hagenius brevistylus	CMC-AB-SGI-CC	7/30/94
Somatochlora williamsoni	CMC-WRI-CC	8/1/94
Leucorrhinia proxima	CMC-PPI-002	8/3/94
Libellula quadrimaculata	CMC-AB-SGI-CC	7/30/94
Sympetrum costiferum	CMC-AB-SGI-CC	7/30/94
Sympetrum obtrusum	CMC-AB-SGI-CC	7/30/94

* = on Wis. list of species of special concern, to be sent to WDNR.

Trichoptera from Forest and Langlade Counties, Wisconsin during 28-30 June 1994

Taxa	Forest Co. Swamp Cr. station 500	Forest Co. Swamp Cr. Swampy Lane	Forest Co. Swamp Cr. Keith Siding Rd.	Forest Co. Outlet Cr. Keith Siding Rd.	Forest Co. Hemlock Cr. culvert
Helicopsychidae					
<i>Helicopsyche borealis</i>		X	X	X	
Hydroptilidae					
<i>Agraylea multipunctata</i>					
<i>Hydroptila jackmanni</i>					
<i>H. waubesiana</i>	X				
<i>Orthotrichia cristata</i>	X				
<i>Oxyethira michiganensis</i>					
Hydropsychidae					
<i>Ceratopsyche morosa</i>	X				
<i>C. slossonae</i>					
<i>C. sparna</i>		X		X	
<i>C. walkeri</i>		X			
<i>Cheumatopsyche campyla</i>	X				
<i>Ch. gracilis</i>		X			
<i>Ch. oxa</i>				X	
<i>Ch. pettiti</i>	X			X	
<i>Hydropsyche betteni</i>	X		X	X	X
<i>H. placoda</i>			X	X	X
<i>Potamyia flava</i>					X
Lepidostomatidae					
<i>Lepidostoma bryanti</i>				X	X
Leptoceridae					
<i>Ceraclea arielles</i>	X				
<i>C. cancellata</i>	X				
<i>C. tarsipunctata</i>	X				X
<i>C. transversa</i>	X	X	X		X
<i>Leptocerus americanus</i>	X				X
<i>Mystacides interjecta</i>					X
<i>M. sepulchralis</i>					X
<i>Oecetis avara</i>	X			X	X
<i>O. cinerascens</i>					
<i>O. inconspicua</i>	X	X	X	X	X
<i>O. osteni</i>					X
<i>O. persimilis</i>	X				
<i>Triaenodes baris</i>					
<i>T. dipsius</i>	X		X		X
<i>T. ignitus</i>		X		X	
<i>T. injustus</i>	X				
<i>T. marginatus</i>					
<i>T. tardus</i>					
Limnephilidae					X
<i>Anabolia bimaculata</i>					
<i>A. consocia</i>			X	X	
<i>Hydatophylax argus</i>				X	
<i>Limnephilus moestus</i>					
<i>L. ornatus</i>		X	X		
<i>Platycentropus radiatus</i>	X		X		X

Trichoptera from Forest and Langlade Counties, Wisconsin during 28-30 June 1994

Taxa	Forest Co. Swamp Cr. station 500	Forest Co. Swamp Cr. Swampy Lane	Forest Co. Swamp Cr. Keith Siding Rd.	Forest Co. Outlet Cr. Keith Siding Rd.	Forest Co. Hemlock Cr. culvert
Molannidae					
Molanna blenda		X		X	
M. flavicornis	X				
M. tryphena				X	
M. uniophila	X	X	X	X	X
Phyrganeidae					
Agrypnia improba			X		X
A. vestita					
Banksiola crotchii	X	X	X		X
B. doussaria					
Hagenella canadensis				X	
Phryganea cinerea	X		X		X
Ptilostomis ocellifera	X	X	X	X	X
P. semifasciata	X		X		X
Polycentropodidae					
Nyctiophylax affinis	X				
N. moestus		X	X	X	X
Polycentropus aureolus					
P. cinereus	X	X			X
P. confusus		X		X	
P. interruptus	X				X
P. pentus					
P. weedi			X		
Psychomyiidae					
Lype diversa				X	
Psychomyia flavida	X	X			
Sericostomatidae					
Agarodes libalis					
Total Number of Species:	27	16	17	19	26

Trichoptera from Forest and Langlade Counties, Wisconsin during 28-30 June 1994

Taxa	Forest Co. Martin Spr.	Forest Co. Hoffman Spr.	Forest Co. Skunk Lake	Forest Co. L. Sand Lake	Langlade Co. Wolf River Lost Lake Rd.
Helicopsychidae					
Helicopsyche borealis	X				
Hydroptilidae					
Agraylea multipunctata		X			
Hydroptila jackmanni					X
H. waubesiana					
Orthotrichia cristata					
Oxyethira michiganensis	X	X			
Hydropsychidae					
Ceratopsyche morosa		X			X
C. slossonae		X	X		
C. sparna					
C. walkeri		X			
Cheumatopsyche campyla	X				
Ch. gracilis					
Ch. oxa					
Ch. pettiti		X			X
Hydropsyche betteni	X	X		X	X
H. placoda					X
Potamyia flava					
Lepidostomatidae					
Lepidostoma bryanti		X			
Leptoceridae					
Ceraclea arielles					X
C. cancellata				X	
C. tarsipunctata					
C. transversa		X			
Leptocerus americanus	X	X	X	X	X
Mystacides interjecta				X	
M. sepulchralis					
Oecetis avara	X				X
O. cinerascens					
O. inconspicua	X	X	X	X	X
O. osteni	X		X	X	
O. persimilis					
Triaenodes baris					
T. dipsius		X			
T. ignitus					
T. injustus	X			X	
T. marginatus	X	X			
T. tardus					
Limnephilidae					
Anabolia bimaculata		X			
A. consocia					
Hydatophylax argus					
Limnephilus moestus		X			
L. ornatus					
Platycentropus radiatus	X	X		X	

Trichoptera from Forest and Langlade Counties, Wisconsin during 28-30 June 1994

Taxa	Forest Co. Martin Spr.	Forest Co. Hoffman Spr.	Forest Co. Skunk Lake	Forest Co. L. Sand Lake	Langlade Co. Wolf River Lost Lake Rd.
Molannidae					
Molanna blenda		X			
M. flavicornis					
M. tryphena					
M. uniophila		X		X	X
Phryganeidae					
Agrypnia improba	X		X	X	
A. vestita				X	
Banksiola crotchii	X	X	X	X	
B. doussaria		X			
Hagenella canadensis		X			
Phryganea cinerea		X	X		
Ptilostomis ocellifera		X	X	X	
P. semifasciata		X	X	X	
Polycentropodidae					
Nyctiophylax affinis	X	X			
N. moestus		X			
Polycentropus aureolus			X		X
P. cinereus					X
P. confusus					
P. interruptus	X	X		X	
P. pentus		X			
P. weedi	X	X	X		X
Psychomyiidae					
Lype diversa					
Psychomyia flavida		X			X
Sericostomatidae					
Agarodes libalis					X
Total Number of Species:	16	30	11	15	15

NOTES

1. There was only one state listed special category species found in these samples. *Trienodes dipsius* was found in four locations, including two Swamp Creek sites, the Hemlock Creek site, and the Hoffman Spring site. These locations, with the exception of the second Swamp Creek site, exhibited the highest species richness of all sites examined.

2. Several other species identified, not on the state list, are not common. For example, *Polycentropus weedi*, found in five of the ten locations, was in each case represented by one specimen. Generally speaking, this species is not common, and is always collected in low numbers. Several other species of the genus *Polycentropus*, such as *P. aureolus* and *P. interruptus*, are more common than *P. weedi*, but are just as useful as indicators of good water quality.

Among the long-horn caddis (Leptoceridae) most are very common species. However, *Ceraclea arielles* is not taken often. The phryganid *Hagenella canadensis* is also not taken often, and, like *Polycentropus weedi*, is represented by only one specimen at each of two sites.

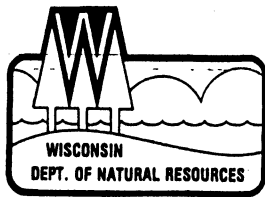
3. With the exception of a few "weed" species (e.g., *Oecetis inconspicua*), most of the 65 species identified from the ten locations are indicators of good to excellent water quality.

4. Some notes of caution. These species represent late spring - early summer taxa. If one were to sample in early spring (late May - early June for Wisconsin), mid-summer, and early fall, the total species richness at each of these locations would increase (in some cases double or triple). This one sampling gives you a basis for rapid assessment, but does not provide a complete picture. The timing was excellent for most of the state listed, special category species, but not for all (e.g., *Arctopsyche* probably comes out earlier, if present). Finally, not all species come to blacklights. The method is hard to beat for collecting most taxa of caddisflies, but does not attract all of them. These caveats aside, the current sampling represents a timely and cost-effective survey for special interest species.

MAYFLY IDENTIFICATIONS BY BOB WALTZ [Nov. 1994]

* = new state record

1. WI, Forest Co., Swamp Creek, Swampy Lane, 6/28/94
 - Baetidae
 - Procloeon* sp.
 - Caenidae
 - Caenis latipennis* Banks
 - Heptageniidae
 - Stenonema modestum* (Banks)
 - Heptageniidae sp. (females)
 - Siphonuridae
 - Siphonurus alternatus* (Say)
2. WI, Forest Co., Hemlock Creek, culvert, 6/29/94
 - Baetidae
 - Callibaetis fluctuans* (Walsh)
 - Procloeon rubropictum* (McDunnough) ? (females)
 - Caenidae
 - Caenis amica* Hagen
 - Heptageniidae
 - Stenacron interpunctatum* (Say)
 - Isonychidae
 - Isonychia* sp (female)
 - Siphonuridae
 - Siphonurus alternatus* (Say)
3. WI, Forest Co., Hoffman Spring, 6/30/94
 - Baetidae
 - Callibaetis fluctuans* (Walsh)
 - Caenidae
 - Caenis amica* Hagen
 - Siphonuridae
 - Siphonurus alternatus* (Say)
4. WI, Forest Co., Martin Springs, 6/28/94
 - Baetidae
 - Callibaetis fluctuans* (Walsh)
 - Caenidae
 - Caenis amica* Hagen
 - Caenis youngi* Roemhild *
5. WI, Forest Co., Swamp Creek 500, 6/29/94
 - Baetidae
 - Callibaetis fluctuans* (Walsh)
 - Caenidae
 - Caenis amica* Hagen
 - Heptageniidae
 - Stenacron interpunctatum* (Say)
6. WI, Langlade Co., Wolf River, Lost Lake Rd., 6/28/94
 - Baetidae
 - Procloeon* sp. (female subimago)
 - Caenidae
 - Caenis amica* Hagen
 - Caenis latipennis* Banks
 - Caenis youngi* Roemhild *
 - Heptageniidae
 - Heptageniidae sp. (female)
 - Leucrocuta* sp. (male subimago)
7. WI, Forest Co., Sand Lake, 6/30/94
 - contents too dehydrated to identify beyond genus (vial cap came off in shipment)
 - Caenidae
 - Caenis* sp.



George Meyer
Secretary

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

101 South Webster Street
Box 7921
Madison, Wisconsin 53707
TELEPHONE 608-266-2621
TELEFAX 608-267-3579
TDD 608-267-6897

October 24, 1994

William M. West
Foth and Van Dyke
2737 S. Ridge Road
P.O. Box 19012
Green Bay, WI 54307-2500

Dear Bill:

Enclosed is a summary of odonate collection resulting from our effort on June 16th of this year. The adult mayflies are being returned to you in a separate parcel.

Becky Isenring of the DNR's Bureau of Endangered Resources is working under my direction on dragonflies on the Saint Croix National Scenic Riverway and will be collecting under my permit (copy attached) in August of this year.

Sincerely,

William A. Smith
Zoologist, Natural Heritage Inventory

cc: John Pohlman - ER/4

10/24/94

3.8-4-28

LAST STATE COUNTY
OBS.
DATE

ODONATA COLLECTION RECORDS FROM SWAMP CREEK AND THE WOLF
RIVER IN THE VICINITY OF THE PROPOSED CRANDON MINE,
COLLECTED BY W.A. SMITH AND W.M. WEST, 16 JUNE, 1994.

TOWN	SEC.	COLLECTOR	NO.	NO.	NO.	EODATA
RANGE			AD.	LA.	EX.	
			COLL.	COLL.	COLL.	

** SITENAME LOST LAKE ROAD

* TAXON AESHNA UMBROSA

1994-06-16 WI LANGLADE

034N011E 24	W.A. SMITH	0	0	1 1	EXUVIAE, VOUCHERED.
	AND W.M.				
	WEST				

* Subsubtotal *

0 0 1

* TAXON ARIGOMPHUS CORNUTUS

1994-06-16 WI LANGLADE

034N011E 24	W.A. SMITH	0	0	4 4	EXUVIAE (1 JUST AN ABDOMEN), ALL
	AND W.M.				VOUCHERED.
	WEST				

* Subsubtotal *

0 0 4

* TAXON BASIAESCHNA JANATA

1994-06-16 WI LANGLADE

034N011E 24	W.A. SMITH	0	0	1 1	EXUVIAE, VOUCHERED.
	AND W.M.				
	WEST				

* Subsubtotal *

0 0 1

* TAXON BOYERIA VINOSA

1994-06-16 WI LANGLADE

034N011E 24	W.A. SMITH	0	0	2 2	EXUVIAE, VOUCHERED.
	AND W.M.				
	WEST				

* Subsubtotal *

0 0 2

* TAXON DROMOGOMPHUS SPINOSUS

1994-06-16 WI LANGLADE

034N011E 24	W.A. SMITH	0	0	1 1	EXUVIAE, VOUCHERED.
	AND W.M. <i>West</i>				

8-4-29

ODONATA COLLECTION RECORDS FROM SWAMP CREEK AND THE WOLF
RIVER IN THE VICINITY OF THE PROPOSED CRANDON MINE,
COLLECTED BY W.A. SMITH AND W.M. WEST, 16 JUNE, 1994.

LAST OBS. DATE	STATE COUNTY	TOWN RANGE	SEC. COLLECTOR	NO. AD. COLL.	NO. LA. COLL.	NO. EODATA EX. COLL.
* Subsubtotal *						
				0	0	1
* TAXON GOMPHUS (GOMPHURUS) LINEATIFRONS						
1994-06-16 WI	LANGLADE	034N011E 24	W.A. SMITH AND W.M. WEST	0	0	4 4 EXUVIAE (1 JUST AN ABDOMEN), ALL VOUCHERED.
* Subsubtotal *						
				0	0	4
* TAXON GOMPHUS (GOMPHUS) VIRIDIFRONS						
1994-06-16 WI	LANGLADE	034N011E 24	W.A. SMITH AND W.M. WEST	0	0	10 10 EXUVIAE, 4 VOUCHERED.
* Subsubtotal *						
				0	0	10
* TAXON GOMPHUS (PHANOGOMPHUS) EXILIS						
1994-06-16 WI	LANGLADE	034N011E 24	W.A. SMITH AND W.M. WEST	0	0	2 2 EXUVIAE, VOUCHERED.
* Subsubtotal *						
				0	0	2
* TAXON GOMPHUS (PHANOGOMPHUS) LIVIDUS						
1994-06-16 WI	LANGLADE	034N011E 24	W.A. SMITH AND W.M. WEST	0	0	2 2 EXUVIAE, VOUCHERED.
* Subsubtotal *						
				0	0	2
* TAXON HAGENIUS BREVISTYLUS						
1994-06-16 WI	LANGLADE	034N011E 24	W.A. SMITH AND W.M. WEST	0	0	5 5 EXUVIAE (1 WAS JUST AN ABDOMEN), 2 vouchered

ODONATA COLLECTION RECORDS FROM SWAMP CREEK AND THE WOLF
RIVER IN THE VICINITY OF THE PROPOSED CRANDON MINE,
COLLECTED BY W.A. SMITH AND W.M. WEST, 16 JUNE, 1994.

LAST OBS. DATE	STATE COUNTY	TOWN RANGE	SEC.	COLLECTOR	NO. AD. COLL.	NO. LA. COLL.	NO. EX. COLL.	EODATA
* Subsubtotal *								
					0	0	5	
* TAXON MACROMIA ILLINOIENSIS								
1994-06-16 WI	LANGLADE	034N011E 24		W.A. SMITH AND W.M. WEST	0	0	1 1	EXUVIAE, VOUCHERED.
* Subsubtotal *								
					0	0	1	
* TAXON STYLURUS AMNICOLA								
1994-06-16 WI	LANGLADE	034N011E 24		W.A. SMITH AND W.M. WEST	0	0	2 2	EXUVIAE, 2 VOUCHERED.
* Subsubtotal *								
					0	0	2	
** Subtotal **								
					0	0	35	
** SITENAME SWAMP CREEK								
* TAXON BOYERIA VINOSA								
1994-06-16 WI	FOREST	035N013E 19		W.A. SMITH AND W.M. WEST	1	0	25 25	EXUVIAE (1 JUST AN ABDOMEN, AND 1 A FAILED EMERGENCE), 2 VOUCHERED. SE4.
* Subsubtotal *								
					1	0	25	
* TAXON GOMPHUS (PHANOGOMPHUS) LIVIDUS								
1994-06-16 WI	FOREST	035N013E 19		W.A. SMITH AND W.M. WEST	1	0	1 1	EXUVIAE, VOUCHERED. SE4. AND 1 ADULT MALE.

ODONATA COLLECTION RECORDS FROM SWAMP CREEK AND THE WOLF
RIVER IN THE VICINITY OF THE PROPOSED CRANDON MINE,
COLLECTED BY W.A. SMITH AND W.M. WEST, 16 JUNE, 1994.

LAST OBS. DATE	STATE COUNTY	TOWN RANGE	SEC.	COLLECTOR	NO. AD.	NO. LA.	NO. EX.	EODATA COLL.
* Subsubtotal *								
					1	0	1	
* TAXON HAGENIUS BREVISTYLUS								
1994-06-16	WI	FOREST	035N013E 19	W.A. SMITH AND W.M. WEST	0	0	1 1	EXUVIAE, VOUCHERED. SE4.
* Subsubtotal *								
					0	0	1	
* TAXON OPHIOGOMPHUS COLUBRINUS								
1994-06-16	WI	FOREST	035N013E 19	W.A. SMITH AND W.M. WEST	0	0	33 33	EXUVIAE, ALL VOUCHERED. SE4.
* Subsubtotal *								
					0	0	33	
* TAXON STYLOGOMPHUS ALBISTYLUS								
1994-06-16	WI	FOREST	035N013E 19	W.A. SMITH AND W.M. WEST	0	0	10 10	EXUVIAE, ALL VOUCHERED. SE4.
* Subsubtotal *								
					0	0	10	
** Subtotal **								
					2	0	70	
*** Total ***								
					2	0	105	

Appendix 3.8-5

1993/1994 Odonata Inventory

Appendix 3.8-5 Table 1

Odonata Inventory 1993/1994 Crandon Project

Species	Site ID	County	Section	T/R	Date	Form	Rank	Number
Aeshna sp.	CMC-AB-HS-005	Forest	26	35N12E	11-11-93	N	S	
					5-14-94	N		
	CMC-AB-HC-100	Forest	26	35N12E	11-11-93	N		
					8-4-94	N		
	CMC-AB-SC-501	Forest	32	35N12E	11-8-93	N		
					6-29-94	E		5
	CMC-AB-SC-502	Forest	32	35N12E	6-29-94	E		1
					8-2-94	N		
	CMC-AB-SK-005	Forest	30	35N13E	5-11-94	N		
					8-3-94	N		
	CMC-AB-DH-005	Forest	5/6	34N13E	5-12-94	N		
	CMC-AB-OL-005	Forest	36	35N12E	5-10-94	N		
	CMC-AB-DL-005	Forest	31/32	35N13E	5-13-94	N		
	CMC-AB-SC-250	Forest	20	35N13E	5-12-94	N		
	CMC-AB-MS-100	Langlade	11	34N12E	5-13-94	N		
					6-2-94	E		
					8-1-94	N		
	CMC-AB-SGI-CC	Langlade	24	34N11E	6-29-94	E		2
	CMC-AB-WR-301	Langlade	13	34N11E	6-29-94	E		MC 4
Aeshna sp.	CMC-AB-PP-005	Forest	26	35N12E	8-3-94	N	S	

3.8-5-1

Appendix 3.8-5 Table 1 (Continued)

Species	Site ID	County	Section	T/R	Date	Form	Rank	Number
Aeshna canadensis	CMC-AB-SK-005	Forest	30	35N13E	6-27-94	A	None	
	CMC-AB-HL-200	Forest	28/32	35N13E	7-1-94	A		
	CMC-AB-RR-100	Forest	27/28	35N13E	7-1-94	A		
	CMC-AB-SL-005	Forest	31/36	35N13E	8-2-94	A		
	CMC-AB-PP-005	Forest	26	35N12E	8-3-94	A		
Aeshna eremita	CMC-AB-SK-005	Forest	30	35N13E	8-3-94	A	S	
Aeshna tuberculifera	CMC-AB-SK-005	Forest	30	35N13E	6-27-94	A	S	
	CMC-AB-HL-200	Forest	28/33	35N13E	7-1-94	A	None	
Aeshna umbrosa	CMC-AB-SGI-CC	Langlade	24	34N11E	6-16-94	E	None	1
	CMC-AB-HS-005	Forest	26	35N12E	8-4-94	N		
Anax junius	CMC-AB-DL-005	Forest	31/32	35N13E	8-3-94	N	None	
	CMC-AB-RS-005	Langlade	11/12/14	34N12E	8-2-94	N		
	CMC-AB-SC-502	Forest	32	35N12E	11-8-93	N		
	CMC-AB-SK-005	Forest	30	35N13E	6-2-94	A		1
	CMC-AB-RR-100	Forest	27/28	35N13E	7-1-94	A		
Argia fumipennis violacea	CMC-AB-HL-200	Forest	28/32	35N13E	7-1-94	A	None	
Arigomphus cornutus	CMC-AB-SC-250	Forest	20	35N13E	6-1-94	E	None	1
					8-1-94	N		
	CMC-AB-SGI-CC	Langlade	24	34N11E	6-4-94	E		
					6-16-94	E		4
	CMC-AB-WR-301	Langlade	13	34N11E	6-29-94	E		1
Arigomphus cornutus					6-4-94	E	None	38

3.8-5-2

Species	Site ID	County	Section	T/R	Date	Form	Rank	Number
	CMC-AB-SC-502	Forest	32	35N12E	6-5-94	E		6
	CMC-AB-HL-200	Forest	28/33	35N13E	6-27-94	A		
					7-1-94	A		
	CMC-AB-PK-200	Langlade	11	34N12E	6-27-94	A		
	CMC-AB-MS-100	Langlade	11	34N12E	6-30-94	A		
					8-1-94	N		
	CMC-AB-HS-005	Forest	26	35N12E	6-30-94	A		
Basiaeshna janata	CMC-AB-SC-501	Forest	32	35N12E	11-8-93	N	None	
					5-11-94	N		
					6-5-94	E		
					6-27-94	A		
					6-29-94	E		6
					8-2-94	N		
	CMC-AB-SC-502	Forest	32	35N12E	11-8-93	N		
					5-11-94	N		
					6-5-94	E		36
					6-27-94	A		
					8-2-94	N		
	CMC-AB-SGI-CC	Langlade	24	34N11E	11-8-93	N		
					6-4-94	E		7
					6-16-94	E		1
Basiaeshna janata					6-29-94	E	None	4

3.8-5-3

Appendix 3.8-5 Table 1 (Continued)

Species	Site ID	County	Section	T/R	Date	Form	Rank	Number
	CMC-AB-MS-100	Langlade	11	34N12E	11-9-93	N		
	CMC-AB-WR-301		13	34N11E	5-10-94	N		
					6-4-94	E		7
	CMC-AB-SC-301	Forest	19	35N13E	5-11-94	N		
					6-30-94	E, A		
	CMC-AB-SC-300	Forest	19	35N13E	6-27-94	A		
					6-28-94	E		MC
	CMC-AB-OL-005	Forest	36	35N12E	6-4-94	E		
	CMC-AB-SC-250	Forest	20	35N13E	6-1-94	E		
					8-1-94	A, N		
	CMC-AB-SL-005	Forest	31/36	35N13E	6-1-94	E		1
					8-3-94	N		
	CMC-AB-DL-005	Forest	31/32	35N13E	6-3-94	E, A		1(A)
					8-3-94	A, N		
	CMC-AB-RS-005	Langlade	11/12/14	34N12E	6-2-94	E		1
Boyeria vinosa	CMC-AB-SC-300	Forest	19	35N13E	11-9-93	N	None	
	CMC-AB-SGI-CC	Langlade	24	34N11E	11-8-93	N		
					5-10-94	N		
					6-16-94	E		2
					6-29-94	E		3
					7-30-94	A		
Boyeria vinosa	CMC-AB-MS-100	Langlade	11	34N12E	11-9-93	N	None	

3.8-5-4

Species	Site ID	County	Section	T/R	Date	Form	Rank	Number
					8-1-94	A		
	CMC-AB-SC-301	Forest	19	35N13E	6-16-94	E		25
	CMC-AB-SC-301		19		6-30-94	E		MC 56
					8-3-94	N		
	CMC-AB-SC-250	Forest	20	35N13E	8-1-94	N		
Calopteryx sp.	CMC-AB-SC-501	Forest	32	35N12E	11-8-93	N	None	
					6-29-94	E		1
	CMC-AB-SC-502	Forest	32	35N12E	11-8-93	N		
	CMC-AB-SGI-CC	Langlade	24	34N11E	11-8-93	N		
					5-10-94	N		
					6-4-94	E		1
	CMC-AB-WR-301	Langlade	13	34N11E	11-9-93	N		
					5-10-94	N		
	CMC-AB-MS-100	Langlade	11	34N12E	11-9-93	N		
					5-13-94	N	None	
Calopteryx aquabilis	CMC-AB-SC-300	Forest	19	35N13E	6-27-94	A	None	
					6-28-94	E		
	CMC-AB-SC-301	Forest	19	35N13E	6-30-94	A		
	CMC-AB-SC-500	Forest	32	35N12E	6-27-94	A		
	CMC-AB-SC-501	Forest	32	35N12E	8-2-94	N		
	CMC-AB-SC-502	Forest	32	35N12E	8-2-94	N		
Calopteryx aquabilis	CMC-AB-SGI-CC	Langlade	24	34N11E	6-27-94	A	None	

3.8-5-5

Appendix 3.8-5 Table 1 (Continued)

Species	Site ID	County	Section	T/R	Date	Form	Rank	Number
	CMC-AB-HL-200	Forest	28/33	35N13E	6-27-94	A		
					7-1-94	A		
	CMC-AB-PK-200	Langlade	11	34N12E	6-27-94	A		
Calopteryx maculata	CMC-AB-SC-300	Forest	19	35N13E	6-27-94	A	None	
					6-28-94	E		
	CMC-AB-SC-301	Forest	19	35N13E	6-30-94	A		
	CMC-AB-SC-501	Forest	32	35N12E	6-27-94	A		
	CMC-AB-SC-502	Forest	32	35N12E	8-2-94	N		
	CMC-AB-HL-200	Forest	28/32	35N13E	6-27-94	A		
					7-1-94	A		
	CMC-AB-SGI-CC	Langlade	24	34N11E	6-27-94	A		
Celithemis elisa	CMC-AB-HS-005	Forest	26	35N12E	6-30-94	E	None	
	CMC-AB-OL-005	Forest	36	35N12E	6-30-94	A		
	CMC-AB-HL-200	Forest	28/33	35N13E	6-27-94	A		
					7-1-94	A		
Chromagrion conditum	CMC-AB-HS-005	Forest	26	35N12E	11-11-93	N	None	
					6-30-94	A		
Cordulegaster maculata	CMC-AB-12-9	Langlade	12	34N12E	11-10-93	N	None	
	CMC-AB-SC-300	Forest	19	35N13E	6-3-94	E	None	
					6-27-94	A		
					6-28-94	E		
Cordulegaster maculata	CMC-AB-SC-301	Forest	19	35N13E	5-11-94	N	None	

3.8-5-6

Appendix 3.8-5 Table 1 (Continued)

Species	Site ID	County	Section	T/R	Date	Form	Rank	Number
					6-30-94	A		
	CMC-AB-MS-100	Langlade	11	34N12E	5-13-94	N		
					8-1-94	N		
<i>Cordulia shurtleffi</i>	CMC-AB-OL-005	Forest	36	35N12E	11-10-93	N	None	
					6-30-94	A		
					8-4-94	N		
	CMC-AB-SK-005	Forest	30	35N13E	5-11-94	N		
					8-3-94	N		
					6-2-94	E		40
	CMC-AB-DH-005	Forest	5/6	34N13E	5-12-94	N		
	CMC-AB-PP-005	Forest	26	35N12E	5-13-94	N		
					6-1-94	E		
					8-3-94	N		
	CMC-AB-DL-005	Forest	31/32	35N13E	5-13-94	N		
					6-3-94	E, A		18(E), 1(A)
	CMC-AB-HL-200	Forest	28/33	35N13E	6-27-94	A		
					7-1-94	A		
	CMC-AB-MS-100	Langlade	11	34N12E	6-30-94	A		
					6-2-94	E		
	CMC-AB-RR-100	Forest	27/28	35N13E	7-1-94	A		
	CMC-AB-SL-005	Forest	31/36	35N13E	8-3-94	N		
<i>Cordulia shurtleffi</i>	CMC-AB-HS-005	Forest	26	35N12E	6-30-94	E	None	

3.8-5-7

Appendix 3.8-5 Table 1 (Continued)

Species	Site ID	County	Section	T/R	Date	Form	Rank	Number
					8-4-94	N	None	
Didymops transversa	CMC-AB-OL-005	Forest	36	35N12E	5-10-94	N	None	
					6-4-94	E		
	CMC-AB-SGI-CC	Langlade	24	34N11E	6-29-94	E		1
Didymops transversa	CMC-AB-DH-005	Forest	5/6	34N13E	6-3-94	E	None	3
					8-2-94	N		
Dorocordula libera	CMC-AB-SK-005	Forest	30	35N13E	5-11-94	N	None	
					6-2-94	E		MC 52
					8-3-94	N		
	CMC-AB-PP-005	Forest	26	35N12E	6-1-94	E		
					8-3-94	N		
	CMC-AB-HS-005	Forest	26	35N12E	6-30-94	E,A		
	CMC-AB-DL-005	Forest	31/32	35N13E	6-3-94	E		5
	CMC-AB-OL-005	Forest	36	35N12E	6-30-94	A		
	CMC-AB-HL-200	Forest	28/33	35N13E	7-1-94	A		
	CMC-AB-RR-100	Forest	27/28	35N13E	7-1-94	A		
	CMC-AB-SC-301	Forest	19	35N13E	6-30-94	A		
	CMC-AB-PK-200	Langlade	11	34N12E	6-27-94	A		

3.8-5-8

Species	Site ID	County	Section	T/R	Date	Form	Rank	Number
Dromogomphus spinosus	CMC-AB-WR-301	Langlade	13	34N11E	11-9-93	N	None	
	CMC-AB-SGI-CC	Langlade	24	34N11E	6-16-94	E		1
					6-27-94	A		
					6-29-94	E		4
					7-30-94	A		
Enallagma sp.	CMC-AB-SK-005	Forest	30	35N13E	5-11-94	N	None	
	CMC-AB-WR-301	Langlade	13	34N11E	6-4-94	E		1
Enallagma ebrium	CMC-AB-SK-005	Forest	30	35N13E	6-27-94	A	None	
Enallagma hageni	CMC-AB-PK-200	Langlade	11	34N12E	6-27-94	A	None	
	CMC-AB-MS-100	Langlade	11	34N12E	6-30-94	A		
	CMC-AB-OL-005	Forest	36	35N12E	6-30-94	A		
	CMC-AB-HS-005	Forest	26	35N12E	6-30-94	A		
	CMC-AB-SC-301	Forest	19	35N13E	6-30-94	A		
	CMC-AB-HL-200	Forest	28/33	35N13E	7-1-94	A		
	CMC-AB-DL-005	Forest	31/32	35N13E	7-1-94	A		
Epitheca(Tetragoneuria)sp.	CMC-AB-DH-005	Forest	5/6	34N13E	5-12-94	N	None	
					6-3-94	E		23
	CMC-AB-SL-005	Forest	31/36	35N13E	5-12-94	N		
					6-1-94	E		MC 181
	CMC-AB-OL-005	Forest	36	35N12E	5-10-94	N		
					6-4-94	E		MC
	CMC-AB-RS-005	Langlade	11/12/14	34N12E	5-13-94	N		

3.8-5-9

Appendix 3.8-5 Table 1 (Continued)

Species	Site ID	County	Section	T/R	Date	Form	Rank	Number
Epitheca canis	CMC-AB-DL-005	Forest	31/32	35N13E	6-3-94	E	None	MC 30
	CMC-AB-SC-502	Forest	32	35N12E	6-5-94	E		3
	CMC-AB-MS-100	Langlade	11	34N12E	11-9-94	N	None	
					6-2-94	E		
					6-30-94	E		
	CMC-AB-SGI-CC	Langlade	24	34N11E	6-4-94	E		
	CMC-AB-SC-501	Forest	32	35N12E	6-29-94	E		1
					8-2-94	N		
	CMC-AB-HL-200	Forest	28/33	35N13E	6-27-94	A		
Epitheca cynosura	CMC-AB-SC-300	Forest	19	35N13E	6-27-94	A	None	
	CMC-AB-HL-200	Forest	28/33	35N13E	6-27-94	A		
					7-1-94	A		
	CMC-AB-SC-301	Forest	19	35N13E	6-30-94	A	None	
	CMC-AB-RR-100	Forest	27/28	35N13E	7-1-94	A		
	CMC-AB-DL-005	Forest	31/32	35N13E	8-3-94	N		
Epitheca princeps	CMC-AB-HL-200	Forest	28/33	35N13E	6-27-94	A	None	
					7-1-94	A		
	CMC-AB-RR-100	Forest	27/28	35N13E	7-1-94	A		
	CMC-AB-SC-301	Forest	19	35N13E	6-30-94	A		
Epitheca spinigera	CMC-AB-MS-100	Langlade	11	34N12E	6-2-94	E	None	
					6-30-94	A		
	CMC-AB-RS-005	Langlade	11/12/14	34N12E	6-2-94	E		MC 301

Appendix 3.8-5 Table 1 (Continued)

Species	Site ID	County	Section	T/R	Date	Form	Rank	Number
Epitheca spinigera	CMC-AB-RS-005	Langlade		34N12E	8-2-94	N	None	
	CMC-AB-PK-200		11		6-27-94	A		
	CMC-AB-HL-200	Forest	28/33	35N13E	7-1-94	A		
	CMC-AB-RR-100	Forest	27/28	35N13E	7-1-94	A		
Gomphus sp.	CMC-AB-SC-502	Forest	32	35N12E	5-11-94	N	None	
	CMC-AB-SGI-CC	Langlade	24	34N11E	8-1-94	N		
Gomphus (adelphus or viridifrons)	CMC-AB-WR-301	Langlade	13	34N11E	5-10-94	N	None	
					6-4-94	E		1
					8-1-94	N		
	CMC-AB-SGI-CC	Langlade	24	34N11E	5-10-94	N		
					6-4-94	E		19
					6-29-94	E		1
	CMC-AB-SC-501	Forest	32	35N12E	5-11-94	N		
	CMC-AB-SC-300	Forest	19	35N13E	6-3-94	E		
Gomphus exilis	CMC-AB-SC-250	Forest	20	35N13E	6-1-94	E	None	
	CMC-AB-SGI-CC	Langlade	24	34N11E	6-4-94	E		MC 27
					6-16-94	E		2
					6-29-94	E		2
	CMC-AB-SC-501	Forest	32	35N12E	6-5-94	E		MC
					6-27-94	A		
					6-29-94	E		MC 32

3.8-5-11

Appendix 3.8-5 Table 1 (Continued)

Species	Site ID	County	Section	T/R	Date	Form	Rank	Number
Gomphus exilis	CMC-AB-SC-501	Forest		35N12E	8-2-94	N	None	
	CMC-AB-WR-301	Langlade	13	34N11E	6-4-94	E		MC 427
					6-29-94	E		4
	CMC-AB-SC-502	Forest	32	35N12E	6-5-94	E		MC 212
					6-27-94	A		
					6-29-94	E		MC 7
					8-2-94	N		
Gomphus exilis	CMC-AB-HL-200	Forest	28/33	35N13E	6-27-94	A	None	
					7-1-94	A		
Gomphus lineatifrons	CMC-AB-WR-301	Langlade	13	34N11E	5-10-94	N	S	
					6-4-94	E		25
					6-29-94	E		1
	CMC-AB-SC-501	Forest	32	35N12E	5-11-94	N		
					6-5-94	E		
					6-27-94	A		
					6-29-94	E		3
	CMC-AB-SC-502	Forest	32	35N12E	5-11-94	N		
					6-5-94	E		15
					6-27-94	A		
					6-29-94	E		2
	CMC-AB-SGI-CC	Langlade	24	34N11E	6-4-94	E		MC 27
					6-16-94	E	S	4

3.8-5-12

Appendix 3.8-5 Table 1 (Continued)

Species	Site ID	County	Section	T/R	Date	Form	Rank	Number
					6-27-94	A		
Gomphus lividus	CMC-AB-SGI-CC	Langlade	24	34N11E	5-10-94	N	None	
					6-4-94	E		3
					6-16-94	E		2
	CMC-AB-OL-005	Forest	36	35N12E	5-10-94	N		
	CMC-AB-SC-250	Forest	20	35N13E	5-12-94	N		
					6-1-94	E		MC
					8-1-94	N		
Gomphus lividus	CMC-AB-SC-300	Forest	19	35N13E	6-3-94	E	None	
					6-27-94	A		
					6-28-94	E		
	CMC-AB-SC-501	Forest	32	35N12E	6-5-94	E		
					6-27-94	A		
					6-29-94	E		1
					8-2-94	N		
	CMC-AB-WR-301	Langlade	13	34N11E	6-4-94	E		2
					8-1-94	N		
	CMC-AB-SC-502	Forest	32	35N12E	6-5-94	E		9
					6-27-94	A		
					8-2-94	N		
	CMC-AB-SC-301	Forest	19	35N13E	6-16-94	E		1
					6-30-94	A		

3.8-5-13

Appendix 3.8-5 Table 1 (Continued)

Species	Site ID	County	Section	T/R	Date	Form	Rank	Number
	CMC-AB-MS-100	Langlade	11	34N12E	6-30-94	A		
	CMC-AB-HS-005	Forest	26	35N12E	6-30-94	A		
	CMC-AB-HL-200	Forest	28/33	35N13E	7-1-94	A		
Gomphus spicatus	CMC-AB-SL-005	Forest	31/36	35N13E	6-1-94	E	None	95
	CMC-AB-DH-005	Forest	5/6	34N13E	6-3-94	E		MC 121
					8-2-94	N		
	CMC-AB-DL-005	Forest	31/32	35N13E	6-3-94	E		
					7-1-94	A		
	CMC-AB-RS-005	Langlade	11/12/14	34N12E	6-2-94	E		1
	CMC-AB-HL-200	Forest	28/33	35N13E	7-1-94	A		
	CMC-AB-RR-100	Forest	27/28	35N13E	7-1-94	A		
?	CMC-AB-WR-301	Langlade	13	34N11E	5-10-94	N		
?	CMC-AB-OL-005	Forest	36	35N12E	6-4-94	E		MC
?	CMC-AB-SC-501	Forest	32	35N12E	6-5-94	E		
Gomphus viridifrons	CMC-AB-SGI-CC	Langlade	24	34N11E	6-16-94	E	S	10
Gomphus (Gomphus) sp.	CMC-AB-SGI-CC	Langlade	24	34N11E	11-8-93	N	S	
Gomphus (Gomphurus) sp.	CMC-AB-SGI-CC	Langlade	24	34N11E	11-8-93	N	S	
	CMC-AB-WR-301	Langlade	13	34N11E	11-9-93	N		
Gomphus (Phanogomphus) sp.	CMC-AB-SC-501	Forest	32	35N12E	11-8-93	N	None	
Hagenius brevistylus	CMC-AB-WR-301	Langlade	13	34N11E	11-9-93	N	None	
					5-10-94	N		
					8-1-94	N		

3.8-5-14

Appendix 3.8-5 Table 1 (Continued)

Species	Site ID	County	Section	T/R	Date	Form	Rank	Number
	CMC-AB-SC-501	Forest	32	35N12E	5-11-94	N		
					6-29-94	E		
					8-2-94	N		
	CMC-AB-SC-300	Forest	19	35N13E	6-27-94	A		
					6-28-94	E		8
	CMC-AB-SGI-CC	Langlade	24	34N11E	6-16-94	E		5
					6-29-94	E		2
					7-30-94	A		
					6-16-94	E		5
	CMC-AB-SC-301	Forest	19	35N13E	6-30-94	A,E		1(E)
Hagenius brevistylus	CMC-AB-HL-200	Forest	28/33	35N13E	7-1-94	A	None	
Ischnura verticalis	CMC-AB-OL-005	Forest	36	35N12E	11-10-93	N	None	
					6-30-94	A		
	CMC-AB-SC-501	Forest	32	35N12E	11-8-93	N		
	CMC-AB-WR-301	Langlade	13	34N11E	11-9-93	N		
	CMC-AB-SGI-CC	Langlade	24	34N11E	11-8-94	N		
	CMC-AB-SK-005	Forest	30	35N13E	5-11-94	N		
	CMC-AB-SC-301	Forest	19	35N13E	6-30-94	A		
	CMC-AB-MS-100	Langlade	11	34N12E	6-30-94	A		
Ladona julia	CMC-AB-MS-100	Langlade	11	34N12E	11-9-93	N	None	
					6-2-94	E		
					6-30-94	A		

3.8-5-15

Appendix 3.8-5 Table 1 (Continued)

Species	Site ID	County	Section	T/R	Date	Form	Rank	Number
	CMC-AB-SL-005	Forest	31/36	35N13E	6-1-94	E		4
					8-3-94	N		
	CMC-AB-DH-005	Forest	5/6	34N13E	6-3-94	A,E		2(E)
	CMC-AB-DL-005	Forest	31/32	35N13E	6-3-94	A,E		1(A)
					7-1-94	A		
	CMC-AB-HL-200	Forest	28/33	35N13E	6-27-94	A		
					7-1-94	A		
	CMC-AB-HS-005	Forest	26	35N12E	6-30-94	A		
	CMC-AB-SC-301	Forest	19	35N13E	6-30-94	A		
Lestes eurinus?	CMC-AB-SK-005	Forest	30	35N13E	6-27-94	A	S	
Lestes rectangularis	CMC-AB-OL-005	Forest	36	35N12E	6-30-94	A	None	
Leucorrhinia sp.	CMC-AB-SK-005	Forest	30	35N13E	5-11-94	N	None	
					6-2-94	E		18
	CMC-AB-PP-005	Forest	26	35N12E	5-13-94	N		
					6-1-94	E		MC
	CMC-AB-MS-100	Langlade	11	34N12E	6-2-94	E		
					6-30-94	E		
	CMC-AB-OL-005	Forest	36	35N12E	6-4-94	E		
	CMC-AB-HL-200	Forest	28/33	35N13E	6-27-94	A		
	CMC-AB-SC-500	Forest	32	35N12E	6-27-94	A		
	CMC-AB-HS-005	Forest	26	35N12E	6-30-94	A		
	CMC-AB-DL-005	Forest	31/32	35N13E	8-3-94	N		

3.8-5-16

Appendix 3.8-5 Table 1 (Continued)

Species	Site ID	County	Section	T/R	Date	Form	Rank	Number
Leucorrhinia frigida	CMC-AB-RS-005	Langlade	11/12/14	34N12E	8-2-94	N	None	
	CMC-AB-DH-005	Forest	5/6	34N13E	8-2-94	N		
	CMC-AB-SL-005	Forest	31/36	35N13E	8-3-94	N		
	CMC-AB-HS-005	Forest	26	35N12E	6-30-94	A		
					8-4-94	N		
Leucorrhinia glacialis	CMC-AB-SK-005	Forest	30	35N13E	6-27-94	A	None	
	CMC-AB-DL-005	Forest	31/32	35N13E	8-3-94	N		
Leucorrhinia intacta	CMC-AB-RS-005	Langlade	11/12/14	34N12E	6-2-94	E	None	1
	CMC-AB-OL-005	Forest	36	35N12E	6-30-94	A		
	CMC-AB-MS-100	Langlade	11	34N12E	6-30-94	A		
	CMC-AB-HL-200	Forest	28/33	35N13E	7-1-94	A		
	CMC-AB-PP-005	Forest	26	35N12E	8-3-94	N	None	
Leucorrhinia proxima	CMC-AB-MS-100	Langlade	11	34N12E	6-30-94	A	None	
	CMC-AB-OL-005	Forest	36	35N12E	6-30-94	A		
	CMC-AB-HL-200	Forest	28/33	35N13E	7-1-94	A		
	CMC-AB-PP-005	Forest	26	35N12E	8-3-94	A		
Libellula lydia	CMC-AB-MS-100	Langlade	11	34N12E	6-2-94	E	None	
					6-30-94	A		
	CMC-AB-SC-501	Forest	32	35N12E	6-29-94	E	None	1
	CMC-AB-SC-300	Forest	19	35N13E	6-27-94	A		
	CMC-AB-SC-301	Forest	19	35N13E	6-30-94	A		
	CMC-AB-HL-200	Forest	28/33	35N13E	7-1-94	A		

3.8-5-17

Appendix 3.8-5 Table 1 (Continued)

Species	Site ID	County	Section	T/R	Date	Form	Rank	Number
	CMC-AB-RR-100	Forest	27/28	35N13E	7-1-94	A		
Libellula pulchella	CMC-AB-HL-200	Forest	28/33	35N13E	6-27-94	A	None	
	CMC-AB-MS-100	Langlade	11	34N12E	6-30-94	A		
	CMC-AB-RR-100	Forest	27/28	35N13E	7-1-94	A		
Libellula quadrimaculata	CMC-AB-OL-005	Forest	36	35N12E	11-10-93	N	None	
					6-30-94	A		
	CMC-AB-PP-005	Forest	26	35N12E	5-13-94	N		
	CMC-AB-HL-200	Forest	28/33	35N13E	6-27-94	A		
					7-1-94	A		
	CMC-AB-SGI-CC	Langlade	24	34N11E	7-30-94	A		
	CMC-AB-PK-200	Langlade	11	34N12E	6-27-94	A		
	CMC-AB-MS-100	Langlade	11	34N12E	6-2-94	E		MC
					6-30-94	A,E		
	CMC-AB-SC-250	Forest	20	35N13E	6-1-94	E		
	CMC-AB-SC-301	Forest	19	35N13E	6-30-94	A		
	CMC-AB-RR-100	Forest	27/28	35N13E	7-1-94	A		
	CMC-AB-SK-005	Forest	30	35N13E	6-2-94	E		7
Macromia illinoiensis	CMC-AB-WR-301	Langlade	13	34N11E	11-9-93	N	None	
					5-10-94	N		
	CMC-AB-SC-501	Forest	32	35N12E	6-27-94	A		
	CMC-AB-SC-502	Forest	32	35N12E	6-5-94	E		2
					6-27-94	A		

3.8-5-18

Appendix 3.8-5 Table 1 (Continued)

Species	Site ID	County	Section	T/R	Date	Form	Rank	Number
	CMC-AB-SGI-CC	Langlade	24	34N11E	6-16-94	E		1
					6-27-94	A	None	
Nehalennia irene	CMC-AB-MS-100	Langlade	11	34N12E	6-30-94	A	None	
Ophiogomphus sp.	CMC-AB-SC-301	Forest	19	35N13E	5-11-94	N	None	
	CMC-AB-SC-501	Forest	32	35N12E	5-11-94	N		
Ophiogomphus carolus	CMC-AB-SC-300	Forest	19	35N13E	11-9-94	N	S	
Ophiogomphus colubrinus	CMC-AB-SC-301	Forest	19	35N13E	6-16-94	E	None	33
					6-30-94	A,E		
					8-3-94	N		
Ophiogomphus rupinsulensis	CMC-AB-SC-300	Forest	19	35N13E	6-3-94	E	None	MC
					6-28-94	E		9
	CMC-AB-SC-301	Forest	19	35N13E	6-30-94	E, A		
					8-3-94	N		
Somatochlora sp.	CMC-AB-HS-005	Forest	26	35N12E	11-11-93	N	S	
Somatochlora elongata	CMC-AB-HS-005	Forest	26	35N12E	5-14-94	N	S	
	CMC-AB-MS-100	Langlade	11	34N12E	6-2-94	E		
	CMC-AB-SK-005	Forest	30	35N13E	6-27-94	A		
Somatochlora forcipata	CMC-AB-HL-200	Forest	28/33	35N13E	7-1-94	A	S	
Somatochlora kennedyi	CMC-AB-SGI-CC	Langlade	24	34N11E	6-27-94	A	S	
Somatochlora minor	CMC-AB-SC-250	Forest	20	35N13E	5-12-94	N	None	
					6-1-94	E		
	CMC-AB-MS-100	Langlade	11	34N12E	8-1-94	N		

3.8-5-19

Appendix 3.8-5 Table 1 (Continued)

Species	Site ID	County	Section	T/R	Date	Form	Rank	Number
Somatochlora walshii	CMC-AB-HL-200	Forest	28/33	35N13E	6-27-94	A	None	
	CMC-AB-RR-100	Forest	27/28	35N13E	7-1-94	A		
	CMC-AB-HS-005	Forest	26	35N12E	8-4-94	N		
Somatochlora williamsoni	CMC-AB-HL-200	Forest	28/33	35N13E	6-27-94	A	None	
	CMC-AB-OL-005	Forest	36	35N12E	6-30-94	A		
	CMC-AB-HS-005	Forest	26	35N12E	6-30-94	A		
	CMC-AB-SC-301	Forest	19	35N13E	6-30-94	A		
	CMC-AB-SGI-CC	Langlade	24	34N11E	8-1-94	A		
Stylogomphus albistylus	CMC-AB-SC-301	Forest	19	35N13E	6-16-94	E	S	10
					6-30-94	A,E		1(E)
Stylurus sp.	CMC-AB-SC-301	Forest	19	35N13E	5-11-94	N	None?	
Stylurus amnicola	CMC-AB-SGI-CC	Langlade	24	34N11E	6-16-94	E	S	2
					6-27-94	E		
					6-29-94	E		7
Stylurus scudderi	CMC-AB-SC-300	Forest	19	35N13E	6-28-94	A,E	S	28(E)
	CMC-AB-SC-301	Forest	19	35N13E	6-30-94	E		1
	CMC-AB-SGI-CC	Langlade	24	34N11E	6-29-94	E		MC 26
	CMC-AB-WR-301	Langlade	13	34N11E	6-29-94	E		3
Stylurus spiniceps	CMC-AB-SGI-CC	Langlade	24	34N11E	6-29-94	E	None	MC 26
	CMC-AB-WR-301	Langlade	13	34N11E	6-29-94	E		3
Sympetrum costiferum	CMC-AB-SGI-CC	Langlade	24	34N11E	7-30-94	A	None	

3.8-5-20

Appendix 3.8-5 Table 1 (Continued)

Species	Site ID	County	Section	T/R	Date	Form	Rank	Number
Sympetrum obtrusum	CMC-AB-MS-100	Langlade	11	34N12E	6-30-94	A	None	
	CMC-AB-HL-200	Forest	28/33	35N13E	7-1-94	A		
	CMC-AB-SGI-CC	Langlade	24	34N11E	7-30-94	A		

A = Adult
 E = Exuviae
 N = Nymph
 S = Species of concern
 MC = Most Common
 ? = Species Not Confirmed

Prepared by: WMW
 Checked by: BDH/JJA

Appendix 3.8-6

**May and June 1994
Fish Inventory**

Appendix 3.8-6 Table 1

May and June 1994 Fish Inventory Crandon Project

Species	Location	Date	Abundance
Brook Trout	CMC-AB-SC-301	May	8
	CMC-AB-SC-501	May	1
	CMC-AB-PK-200	May	5
	CMC-AB-WR-301	May	1
	CMC-AB-SGI-CC	May	2
Muskellunge	CMC-AB-WR-301	June	1
Northern Pike	CMC-AB-SC-501	May	2
	CMC-AB-WR-301	May	5
		June	U
	CMC-AB-SGI-CC	May	1
		June	7
	CMC-AB-RS-005	May	U
	CMC-AB-SL-005	May	2
		June	5
Central Minnow	CMC-AB-SC-501	May	P
	CMC-AB-SC-500	May	P
	CMC-AB-MS-100	May	5
	CMC-AB-RS-005	May	U

3.8-6-1

Appendix 3.8-6 Table 1 (Continued)

Species	Location	Date	Abundance
Brassy Minnow	CMC-AB-SC-501	May	1
	CMC-AB-MS-100	May	1
Common Shiner	CMC-AB-SC-200	May	P
	CMC-AB-SC-301	May	A
	CMC-AB-SC-400	May	A
	CMC-AB-SC-500	May	A
	CMC-AB-SC-501	May	A
	CMC-AB-HL-100	May	A
	CMC-AB-HL-200	May	A
	CMC-AB-MS-100	May	2
	CMC-AB-WR-301	May	A
		June	C
	CMC-AB-SGI-CC	May	P
		June	A
Hornyhead Chub	CMC-AB-SC-301	May	A
	CMC-AB-SC-400	May	P
	CMC-AB-SC-500	May	A
	CMC-AB-SC-501	May	C
	CMC-AB-HL-100	May	P
	CMC-AB-HL-200	May	2
	CMC-AB-SGI-CC	May	5
Golden Shiner	CMC-AB-HL-100	May	C

3.8-6-2

Appendix 3.8-6 Table 1 (Continued)

Species	Location	Date	Abundance
	CMC-AB-HL-200	May	C
	CMC-AB-WR-301	May	1
	CMC-AB-DH-005	May	U
		June	3
	CMC-AB-RS-005	May	U
	CMC-AB-SL-005	June	1
Blacknose Shiner	CMC-AB-HL-100	May	P
	CMC-AB-MS-100	May	P
	CMC-AB-WR-301	May	1
		June	20
	CMC-AB-SGI-CC	June	2
Blackchin Shiner	CMC-AB-SC-501	May	2
	CMC-AB-HL-100	May	P
	CMC-AB-HL-200	May	P
	CMC-AB-MS-100	May	C
	CMC-AB-RS-005	May	U
Finescale Dace	CMC-AB-HL-100	May	1
	CMC-AB-HL-200	May	2
	CMC-AB-MS-100	May	2
N. Redbelly Dace	CMC-AB-MS-100	May	C
Bluntnose Minnow	CMC-AB-SC-400	May	3
	CMC-AB-HL-100	May	A

3.8-6-3

Appendix 3.8-6 Table 1 (Continued)

Species	Location	Date	Abundance
	CMC-AB-MS-100	May	1
	CMC-AB-WR-301	June	1
Fathead Minnow	CMC-AB-SC-301	May	P
	CMC-AB-HL-100	May	P
	CMC-AB-MS-100	May	4
Blacknose Dace	CMC-AB-SC-301	May	C
	CMC-AB-SC-400	May	P
	CMC-AB-HL-100	May	P
Longnose Dace	CMC-AB-SC-301	May	A
Creek Chub	CMC-AB-SC-301	May	C
	CMC-AB-SC-500	May	P
	CMC-AB-SC-501	May	P
	CMC-AB-HL-100	May	C
	CMC-AB-WR-301	May	2
N. Hog Sucker	CMC-AB-WR-301	May	2
		June	2
	CMC-AB-SGI-CC	June	3
White Sucker	CMC-AB-SC-301	May	A
	CMC-AB-SC-400	May	P
White Sucker	CMC-AB-SC-500	May	A
	CMC-AB-SC-501	May	A
	CMC-AB-HL-100	May	P

3.8-6-4

Appendix 3.8-6 Table 1 (Continued)

Species	Location	Date	Abundance
	CMC-AB-HL-200	May	P
	CMC-AB-WR-301	May	A
		June	A
	CMC-AB-SGI-CC	May	C
		June	A
	CMC-AB-RS-005	May	C
Shorthead Redhorse	CMC-AB-SC-400	May	1
	CMC-AB-SC-500	May	P
	CMC-AB-SC-501	May	C
	CMC-AB-WR-301	May	C
		June	C
	CMC-AB-SGI-CC	May	P
		June	C
Brook Stickleback	CMC-AB-SC-200	May	P
	CMC-AB-SC-301	May	5
	CMC-AB-SC-400	May	2
	CMC-AB-HL-100	May	P
	CMC-AB-HL-200	May	C
Brook Stickleback	CMC-AB-MS-100	May	5
Black Bullhead	CMC-AB-SC-500	May	P
	CMC-AB-SC-501	May	2
	CMC-AB-WR-301	May	P

3.8-6-5

Appendix 3.8-6 Table 1 (Continued)

Species	Location	Date	Abundance
		June	2
	CMC-AB-SGI-CC	May	P
		June	2
	CMC-AB-DH-005	May	A
		June	C
	CMC-AB-RS-005	May	C
	CMC-AB-SL-005	May	C
		June	C
Tadpole Madtom	CMC-AB-WR-301	June	1
	CMC-AB-SGI-CC	June	1
Rock Bass	CMC-AB-SC-500	May	P
	CMC-AB-SC-501	May	C
	CMC-AB-HL-100	May	P
	CMC-AB-WR-301	May	P
		June	P
	CMC-AB-SGI-CC	June	C
Pumpkinseed	CMC-AB-WR-301	May	2
Pumpkinseed	CMC-AB-WR-301	June	2
	CMC-AB-SGI-CC	May	9
		June	U
	CMC-AB-DH-005	May	C
		June	2

3.8-6-6

Appendix 3.8-6 Table 1 (Continued)

Species	Location	Date	Abundance
	CMC-AB-RS-005	May	U
	CMC-AB-SL-005	May	2
	CMC-AB-OL-005	June	C
Bluegill	CMC-AB-SC-501	May	1
	CMC-AB-HL-100	May	2
	CMC-AB-WR-301	May	4
		June	C
	CMC-AB-SGI-CC	May	3
		June	U
	CMC-AB-RS-005	May	C
	CMC-AB-SL-005	May	C
		June	C
	CMC-AB-OL-005	June	A
Black Crappie	CMC-AB-WR-301	May	5
		June	4
	CMC-AB-SGI-CC	May	8
Black Crappie	CMC-AB-RS-005	May	U
Smallmouth Bass	CMC-AB-WR-301	May	5
		June	1
	CMC-AB-SGI-CC	May	2
Largemouth Bass	CMC-AB-WR-301	May	1
		June	2

3.8-6-7

Appendix 3.8-6 Table 1 (Continued)

Species	Location	Date	Abundance
	CMC-AB-RS-005	May	C
	CMC-AB-SL-005	May	U
		June	15
	CMC-AB-OL-005	June	13
Iowa Darter	CMC-AB-HL-100	May	1
	CMC-AB-MS-100	May	6
	CMC-AB-RS-005	May	5
Johnny Darter	CMC-AB-SC-400	May	C
	CMC-AB-SC-501	May	P
	CMC-AB-HL-100	May	2
	CMC-AB-WR-301	May	2
		June	1
	CMC-AB-SGI-CC	May	1
		June	5
	CMC-AB-RS-005	May	2
Yellow Perch	CMC-AB-SC-301	May	1
	CMC-AB-SC-400	May	3
	CMC-AB-SC-500	May	C
	CMC-AB-SC-501	May	A
	CMC-AB-HL-100	May	A
	CMC-AB-HL-200	May	C
	CMC-AB-MS-100	May	2

Appendix 3.8-6 Table 1 (Continued)

Species	Location	Date	Abundance
	CMC-AB-WR-301	May	A
		June	A
	CMC-AB-SGI-CC	May	P
		June	4
	CMC-AB-DH-005	May	A
		June	A
	CMC-AB-RS-005	May	C
	CMC-AB-SL-005	May	A
		June	A
	CMC-AB-OL-005	June	A
Walleye	CMC-AB-WR-301	May	10
		June	U
	CMC-AB-SGI-CC	June	3
	CMC-AB-DH-005	May	2
Walleye	CMC-AB-RS-005	May	2
Mottled Sculpin	CMC-AB-SC-301	May	C
	CMC-AB-SC-400	May	P
	CMC-AB-HL-100	May	P
	CMC-AB-PK-200	May	2
	CMC-AB-MS-100	May	7
	CMC-AB-RS-005	May	U
Brown Bullhead	CMC-AB-RS-005	May	C

3.8-6-9

Appendix 3.8-6 Table 1 *(Continued)*

Species	Location	Date	Abundance
	CMC-AB-SL-005	June	C
	CMC-AB-OL-005	June	1
Pearl Dace	CMC-AB-SC-301	May	1

Prepared by: WMW
Checked by: JJA

3.8-6-10

Appendix 3.8-7

1994 Raw Fish Collection Identification Data

29 September 1994
EA Project 12712

RECEIVED

OCT - 6 1994

FOTH & VAN DYKE

Mr. Bill West
Foth & Van Dyke
2737 S. Ridge Road
Green Bay, WI 54307

Dear Bill:

The purpose of this letter is to provide the results from our second sampling trip to the Crandon Project area and provide supporting information regarding effort, methods, locations, etc.

METHODS

Boat electrofishing was conducted on Oak, Deep Hole, and Little Sand lakes, and on the Wolf River. The lakes were sampled at night; the Wolf River during the day. We used a Coffelt Model VVP15 controller and a 4000 watt generator to produce pulsed DC. Output varied depending on conductivity.

Seining was conducted at Oak and Deep Hole lakes and on the Wolf River. Depending on conditions, we used a 30 ft long seine with a 1/8" mesh bag or a 10 ft long straight seine with 1/8" mesh.

EFFORT

Effort varied depending on the size of the waterbody. The entire shoreline of each lake was electrofished. Time spent at each location was as follows:

	<u>Hrs</u>	
	<u>Shock</u>	<u>Seine</u>
Little Sand Lake	3.6	-
Deep Hole Lake	1.8	.7
Oak Lake	0.7	.8
Wolf River, upstream	2.5	.5
Wolf River, downstream	1.5	-

LOCATIONS

Creek 12-9 could not be sampled because access was not permitted. Duck Lake could not be sampled by electrofishing because the lower portion of the road was not suitable for launching our boat. Thus, neither of these areas was sampled in 1994.

Locations sampled were:

Little Sand Lake - Entire perimeter was electrofished.

Deep Hole - The entire perimeter was electrofished. Seining was conducted at the boat ramp and at one other location.

Oak Lake - The entire perimeter was electrofished and seining was conducted near the Exxon access road.

Wolf River - The entire distance from the boat ramp at Post Lake to the confluence with Swamp Creek was electrofished. Several seine hauls were also made within the upstream segment. The area from the confluence to a point about 0.5 miles downstream of the access at Lost Lake Road was also sampled.

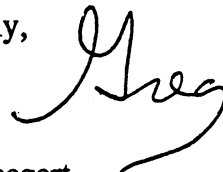
RESULTS

T & E Surveys - No threatened, endangered, or watch list species were collected (Tables 1 and 2). The most diverse fish community was found in the Wolf River, which for the two locations and two trips combined yielded a total of 23 species. Species richness was very low in the three lakes. All fishes collected are typical for NE Wisconsin.

We again attempted to collect yellow perch in the Wolf River downstream of the confluence with Swamp Creek but were again unsuccessful. Thus, I suggest using the white suckers that we collected in May.

If you have any questions, please give me a call.

Sincerely,



Greg Seegert
Project Manager

Table 2. Fishes collected from streams near the Crandon Project in May 1994 and from the Wolf River in May and June 1994.

	Swamp Creek					Hemlock Ck		Pickerel Creek	Creek 11-4	Wolf R			
	Keith Siding Rd	Clearcut	Rt 55	Shallocks bridge	D/st discharge	W. Shore Dr.	Deep Hole Rd			Upstream May	June	Downstream May	June
Brook trout		8		1				5		1		2	
Muskellunge											1		
Northern pike				2						5	U	1	7
Central mudminnow				P	P				5				
Brassy minnow				1					1				
Common shiner	P	A	A	A	A	A	A		2	A	C	P	A
Pearl dace		1											
Hornyhead chub		A	P	C	A	P	2					5	
Golden shiner						C	C			1			
Blacknose shiner						P			P	1	20		2
Blackchin shiner				2		P	P		C				
Finescale dace						1	2		2				
N. redbelly dace									C				
Bluntnose minnow			3			A			1		1		
Fathead minnow		P				P			4				
Blacknose dace		C	P			P							
Longnose dace		A											
Creek chub		C		P	P	C				2			
Northern hog sucker										2	2		3
White sucker		A	P	A	A	P	P			A	A	C	A
Shorthead redhorse			1	C	P					C	C	P	C
Brook stickleback	P	5	2			P	C		5				
Black bullhead				2	P					P	2	P	2
Tadpole madtom											1		1
Rock bass				C	P	P				P	P		C

Table 2 (cont.)

	Swamp Creek					Hemlock Ck		Pickerel Creek	Creek 11-4	Wolf R			
	Keith Siding Rd	Clearcut	Rt 55	Shallocks bridge	D/st discharge	W. Shore Dr.	Deep Hole Rd			Upstream		Downstream	
										May	June	May	June
Pumpkinseed										2	2	9	U
Bluegill				1		2				4	C	3	U
Black crappie										5	4	8	
Smallmouth bass										5	1	2	
Largemouth bass										1	2		
Iowa darter						1			6				
Johnny darter			C	P		2				2	1	1	5
Yellow perch		1	3	A	C	A	C		2	A	A	P	4
Walleye										10	U		3
Mottled sculpin	—	C	P	—	—	P	—	2	7	—	—	—	—
<i>Pumpkin Bullhead</i>													
Total Species	2	12	10	15	9	18	8	2	13	19	19	13	14

Table 1. Fishes collected from lakes near the Crandon Project, May and June 1994.

<u>Species</u>	<u>Deep Hole</u>		<u>Rolling Stone</u>	<u>Little Sand</u>		<u>Oak</u>
	<u>M</u>	<u>I</u>	<u>M</u>	<u>M</u>	<u>I</u>	<u>I</u>
✓ Central mudminnow			U			
✓ Northern pike			U	2	5	
✓ Golden shiner	U*	3	U		1	
✓ Blackchin shiner			U			
✓ White sucker			C			
✓ Black bullhead	A	C	C	C	C	
Brown bullhead			C		C	1
✓ Mottled sculpin			U			
✓ Pumpkinseed	C	2	U	2		C
✓ Bluegill			C	C	C	A
✓ Black crappie			U			
✓ Largemouth bass			C	U	15	13
✓ Iowa darter			5			
✓ Johnny darter			2			
✓ Yellow perch	A	A	C	A	A	A
✓ Walleye	<u>2</u>	—	<u>2</u>	—	—	—
Total Species	<u>5</u>	<u>4</u>	16	<u>6</u>	<u>7</u>	5
	5			8		

* U = Uncommon
C = Common
A = Abundant



17 May 1994
EA Project 12712

Mr. Bill West
Foth & Van Dyke
2737 S. Ridge Road
Green Bay, WI 54307

Dear Bill:

The purpose of this letter is to provide the results from our first sampling trip to the Crandon Project and provide supporting information regarding effort, methods, locations, etc.

METHODS

Boat electrofishing was conducted on Rolling Stone, Deep Hole, and Little Sand lakes, on the Wolf River, and on Swamp Creek from Shallock's bridge to the firelane bridge. The lakes were sampled at night, the streams during the day. We used a Coffelt Model VVP15 controller and a 4000 watt generator to produce pulsed DC. Output varied depending on conductivity.

Pram electrofishing was conducted at Swamp Creek at the "clearcut", Pickerel Creek, Creek 11-4, and Hemlock Creek. Output was controlled by a Coffelt Model VVP2C powered by a 1500 watt generator. Pulsed DC was used at all stations.

Seining was conducted at Oak, Duck, Rolling Stone, and Deep Hole lakes. Depending on conditions, we used a 30 ft long seine with a 1/8" mesh bag or a 10 ft long straight seine with 1/8" mesh. Both seines were used at some locations. Seining was also conducted at each of the stream locations except Pickerel Creek, the upstream Hemlock Creek station, the lower Wolf River location, and the Swamp Creek "clearcut" location.

EFFORT

Effort varied depending on the size of the waterbody. The entire shoreline of Deep Hole and Little Sand lakes was electrofished. Three hours was spent along the perimeter of Rolling Stone Lake, this effort covered about 75% of the shoreline. Time spent at each location was as follows:

	Hrs	
	<u>Shock</u>	<u>Seine</u>
Little Sand Lake	2.2	-
Rolling Stone Lake	3.0	1.5
Deep Hole Lake	1.3	.7
Duck Lake	-	.3
Oak Lake	-	.4
Swamp Creek, Keith Siding	-	.2
Swamp Creek, clearcut	1.1	-
Swamp Creek, Rt 55	-	.3
Swamp Creek, Shallock's bridge	.5	.3
Swamp Creek, downstream	1.6	.4
Hemlock Creek, bridge nearest the lake	1.0	-
Hemlock Creek, Deep Hole Rd	-	.6
Pickrel Creek	.7	-
Creek 11-4	.3	.3
Wolf River, upstream	1.5	.3
Wolf River, downstream	1.5	-

LOCATIONS

Creek 12-9 and Oak Lake (electrofishing) could not be sampled because access was not permitted. Duck Lake could not be sampled by electrofishing because the lower portion of the road was not suitable for launching our boat. Locations sampled were:

Little Sand Lake - Entire perimeter was electrofished.

Rolling Stone Lake - Approximately 3/4 of the perimeter was electrofished. Seining was conducted at six locations spread around the lake.

Deep Hole - The entire perimeter was electrofished. Seining was conducted at the boat ramp and at one other location.

Duck Lake - Seining was conducted near the Exxon access road.

Oak Lake - Seining was conducted near the Exxon access road.

Pickrel Creek - Electrofishing was conducted for ~100m on either side of N. Rolling Stone Lake Road.

Creek 11-4 - Sampling was conducted on both sides of N. Rolling Stone Lake Road.

Hemlock Creek - Electrofishing was conducted on both sides of W. Shore Lane. Seining was conducted downstream of the Deep Hole Road bridge.

Wolf River - The entire distance from the boat ramp at Post Lake to the confluence with Swamp Creek was electrofished. The area from the confluence to a point about 0.5 miles downstream of the access at Lost Lake Road was also sampled.

Swamp Creek - Swamp Creek was sampled at Keith Siding Road (seine only), the "clearcut" (shock only), Rt 55 (seine only); from Shallock's bridge to the discharge area (seine and shock), and the entire distance from the discharge area to the firelane bridge (shock and seine).

RESULTS

T & E Surveys - No threatened, endangered, or watch list species were collected (Tables 1 and 2). The most diverse fish communities were found in Rolling Stone Lake, Hemlock Creek, Swamp Creek, Creek 11-4, and the Wolf River. Species richness was very low in Little Sand and Deep Hole lakes and in Pickerel Creek. The limited effort on Duck and Oak lakes (seining only) yielded no fish. All fishes collected are typical for NE Wisconsin.

Tissue Collections - Ten yellow perch ≥ 6 inches were collected from Swamp Creek (upstream and downstream of the discharge) and from Little Sand Lake. Because of a lack of yellow perch at the downstream Wolf River location, 10 white suckers were collected from each of the Wolf River locations. Length data for all 50 fish collected are appended to this letter.

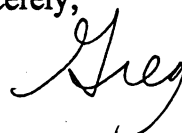
As agreed, analysis of the white suckers will be put on hold until our June trip during which we will attempt again to collect yellow perch from the Wolf River.

TISSUE SURVEY ADD-ON

As you are aware, collection and processing of the fish for tissue analysis for the NOI was not part of the original work scope. The cost for this additional effort is \$3,000. This includes all collections and processing. It also includes making a second effort to collect yellow perch from the Wolf River in June. Please see that our contract is modified to cover this additional effort and cost.

If you have any questions, please give me a call.

Sincerely,



Greg Seegert
Project Manager

Table 1. Fishes collected from lakes near the Crandon Project, May 1994.

<u>Species</u>	<u>Deep Hole</u>	<u>Rolling Stone</u>	<u>Little Sand</u>
Central mudminnow		U	
Northern pike		U	2
Golden shiner	U*	U	
Blackchin shiner		U	
White sucker		C	
Black bullhead	A	C	C
Brown bullhead		C	
Mottled sculpin		U	
Pumpkinseed	C	U	2
Bluegill		C	C
Black crappie		U	
Largemouth bass		C	U
Iowa darter		5	
Johnny darter		2	
Yellow perch	A	C	A
Walleye	<u>2</u>	<u>2</u>	—
Total Species	5	16	6

* U = Uncommon
 C = Common
 A = Abundant

Table 2. Fishes collected from streams near the Crandon Project, May 1994.

	Swamp Creek					Hemlock Ck		Pickerel Creek	Creek 11-4	Wolf R	
	Keith Siding Rd	Clearcut	Rt 55	Shallocks bridge	D/st discharge	W. Shore Dr.	Deep Hole Rd			U	D
Brook trout		8		1				5		1	2
Northern pike				2						5	1
Central mudminnow				P	P				5		
Brassy minnow				1					1		
Common shiner	P	A	A	A	A	A	A		2	A	P
Pearl dace		1									
Hornyhead chub		A	P	C	A	P	2				5
Golden shiner						C	C			1	
Blacknose shiner						P			P	1	
Blackchin shiner				2		P	P		C		
Finescale dace						1	2		2		
N. redbelly dace									C		
Bluntnose minnow			3			A			1		
Fathead minnow		P				P			4		
Blacknose dace		C	P			P					
Longnose dace		A									
Creek chub		C		P	P	C				2	
Northern hog sucker										2	
White sucker		A	P	A	A	P	P			A	C
Shorthead redhorse			1	C	P					C	P
Brook stickleback	P	5	2			P	C		5		
Black bullhead				2	P					P	P
Rock bass				C	P	P				P	
Pumpkinseed										2	9
Bluegill				1		2				4	3

3.8-7-10

Table 2 (cont.)

	<u>Swamp Creek</u>					<u>Hemlock Ck</u>		<u>Pickerel Creek</u>	<u>Creek 11-4</u>	<u>Wolf R</u>	
	<u>Keith Siding Rd</u>	<u>Clearcut</u>	<u>Rt 55</u>	<u>Shallocks bridge</u>	<u>D/st discharge</u>	<u>W. Shore Dr.</u>	<u>Deep Hole Rd</u>			<u>U</u>	<u>D</u>
Black crappie										5	8
Smallmouth bass										5	2
Largemouth bass										1	
Iowa darter						1			6		
Johnny darter			C	P		2				2	1
Yellow perch		1	3	A	C	A	C		2	A	P
Walleye										10	
Mottled sculpin	—	C	P	—	—	P	—	2	7	—	—
Total Species	2	12	10	15	9	18	8	2	13	19	13

Table 3. Lengths of fishes collected near the Crandon Project in May 1994 for liver and tissue analysis.

<u>Little Sand Lake</u>		<u>Length (mm)</u>
Yellow perch	1	164
	2	155
	3	152
	4	157
	5	210
	6	163
	7	153
	8	167
	9	158
	10	170
<u>Swamp Creek</u>		
Yellow perch Upstream	1	178
	2	169
	3	218
	4	171
	5	186
	6	178
	7	170
	8	217
	9	187
	10	182
Downstream	1	159
	2	165
	3	166
	4	172
	5	159
	6	159
	7	165
	8	167
	9	163
	10	158

Table 3 (cont.)

Wolf River

Length (mm)

White sucker

Upstream

1	444
2	336
3	405
4	374
5	303
6	423
7	416
8	348
9	350
10	338

Downstream

1	355
2	379
3	410
4	307
5	368
6	310
7	434
8	355
9	420
10	430

Appendix 3.8-8

Mussel Survey Data

- **September 1994 Helms & Associates report titled *Results of A Mussel Survey Conducted at the Crandon Mining Site***
- **WDNR 1991 Mussel Data**
- **WDNR 1994 Mussel Data**

**RESULTS OF A MUSSEL SURVEY
CONDUCTED AT
THE CRANDON MINING SITE
NEAR
CRANDON, WISCONSIN**

Prepared for

FOTH & VAN DYKE

Green Bay, Wisconsin

Prepared by

**HELMS & ASSOCIATES
Bellevue, Iowa**

September, 1994

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- Table 7. Mussels collected from Pickerel Creek and Rolling Stone Lake during the mine site survey by Helms & Associates.**

Table 1. Species of mussels on the Wisconsin Heritage Inventory listing which were specifically targeted at the Crandon mine site by Helms & Associates.

Target Species	Common Name	Wisconsin Status
<i>Quadrula fragosa</i>	Winged mapleleaf	Endangered
<i>Epioblasma triquetra</i>	Snuffbox	Endangered
<i>Cyclonaias tuberculata</i>	Purple warty back	Endangered
<i>Plethobasus cyphus</i>	Bullhead	Endangered
<i>Simpsonaias ambigua</i>	Salamander mussel	Threatened
<i>Alismidonta viridis</i>	Slippershell	Threatened
<i>Quadrula metanevra</i>	Monkeyface	Threatened
<i>Tritogonia verrucosa</i>	Buckhorn	Threatened
<i>Venustaconcha illipsiformis</i>	Ellipse	Threatened
<i>Leptodea leptodon</i>	Scaleshell	Special Concern
<i>Alismidonta marginata</i>	Elktoe	Special Concern
<i>Anodonta cataracta cataracta</i>	Eastern floater	Special Concern
<i>Anodonta cataracta marginata</i>	Gaspe floater	Special Concern
<i>Elliptio complanata</i>	Atlantic elliptio	Special Concern
<i>Lasmigona compressa</i>	Creek heelsplitter	Special Concern
<i>Pleurobema sintoxia</i>	Round pigtoe	Special Concern

Table 2. Locations sampled for mussels at Crandon Mine Site by Helms & Associates.

No.	Location	Location description	Location code	Legal description (County, Township, Range, Section)
1	Wolf River upstream from Swamp Creek	At outlet from Lower Post Lake	CMC-AB-WRM-100	NW 1/4 Sect. 13, T34N, R11E, Langlade Co., WI
2	Wolf River (Downstream from Swamp Creek)	Access at end of Lost Lake Road	CM-WRM-301	E 1/2 Sect. 24, T34N, R11E, Langlade Co., WI
			CMC-AB-SGI-CC	
3	Swamp Creek	Below mine discharge point	CMC-AB-SCM-502	NW 1/4 Sect. 32, T35N, R12E, Forest Co., WI
4	Swamp Creek	Above mine discharge point	CMC-AB-SCM-501	NW 1/4 Sect. 32, T35N, R12E, Forest Co., WI
5	Swamp Creek	0.5 mi. downstream from Swampy Lane	CMC-AB-SCM-301	SE 1/4 Sect 24, T35N, R12E, Forest Co., WI
6	Swamp Creek	At end of Swampy Lane	CMC-AB-SCM-300	East side SW 1/4, West side SE 1/4 Sect. 19, T35N, R13E, Forest Co., WI
7	Swamp Creek	At confluence with Hemlock Creek	CMC-AB-SCM-250	Center of Sect. 20, T35N, R13E, Forest Co., WI
8	Hemlock Creek	At bridge on Deep Hole Road	CMC-AB-HLM-200	NW 1/4 Sect 33, T35N, R13E, Forest Co., WI
9	Pickrel Creek	At outlet from Rolling Stone Lake	CMC-AB-PCM-200	SW 1/4 Sect. 13, T34N, R12E, Langlade Co., WI
10	Rolling Stone Lake	Several intervals along N, W, & S sides	CMC-AB-RSM-005	Sections 11,12,13,14, T34N, R12E, Langlade Co., WI
11	Creek 12-9	Mouth adjoining Rolling Stone Lake	CMC-AB-129M-005	SW 1/4 Sect. 12, T34N, R12E, Langlade Co., WI
12	Little Sand Lake	Shoreline around N half of lake	CMC-AB-SLM-005	W 1/2 Sect. 31, T35N, R13E, Forest Co., WI
13	Deep Hole Lake	Several intervals along E, N, & W sides	CMC-AB-DHM-005	NE 1/4 Sect. 6, NW 1/4 Sec. 5, T34N, R13E, Forest Co., WI
14	Oak Lake	Spot checks around entire lake	CMC-AB-	NE 1/4, Section 36, T35N, R12E Forest Co., WI
15	Duck Lake	N side, N/S transect, & E side	CMC-AB-DLM-005	SW 1/4 Sect. 31, T35N, R13E, Forest Co., WI

Table 3. Mussels collected at the Crandon Mine Site survey by Helms & Associates.

3.8-8-7

Scientific name	Common name	Wisconsin Status	Number Captured
Alismidonta marginata Say, 1818	Elktoe	Special Concern	3
Anodonta grandis Say, 1829	Giant floater		637
Anodontoides ferussacianus (Lea, 1834)	Cylindrical papershell		23
Fusconia flava (Rafinesque, 1820)	Wabash pigtoe		20
Lampsilis cardium (Rafinesque, 1820)	Plain pocketbook	Special Concern	145
L. siliquoidea (Barnes, 1823)	Fat mucket		209
Lasmigona costata (Rafinesque, 1820)	Fluted shell		18
Lasmigona compressa (Lea, 1829)	Creek heelsplitter		17
Pleurobema sintoxia (Rafinesque, 1820)	Round pigtoe	Special Concern	103
Strophitus undulatus (Say, 1817)	Squawfoot		3
Total			1178

Table 4. Mussels collected from the Wolf River during the Crandon Mine Site survey by Helms & Associates.

			Location	SGI-CC	WRM-301	WRM-100	
			Date	7/30/94	5/10/94	7/30/94	
			Collector	Helms	West	Helms	
		Wisconsin	Method	Diving	Middens	Diving	Number
Scientific name	Common name	Status	Effort (hrs)	4	No Record	2.5	Captured
Alismidonta marginata Say, 1818	Elktoe	Special Concern		3			3
Anodonta grandis Say, 1829	Giant floater			24	6	281	311
Anodontoides ferussacianus (Lea, 1834)	Cylindrical papershell			4			4
Fusconia flava (Rafinesque, 1820)	Wabash pigtoe			*	6	*	6
Lampsilis cardium (Rafinesque, 1820)	Plain pocketbook			92	6	35	133
L. siliquioidea (Barnes, 1823)	Fat mucket			22	3	48	73
Lasmigona costata (Rafinesque, 1820)	Fluted shell			12	3	3	18
Lasmigona compressa (Lea, 1829)	Creek heelsplitter	Special Concern					
Pleurobema sintoxia (Rafinesque, 1820)	Round pigtoe	Special Concern		56	1	4	61
Strophitus undulatus (Say, 1817)	Squawfoot			2			2
Totals				215	25	371	611

* Some wabash pigtoe were included with the round pigtoe

Table 5. Mussels collected from Swamp Creek during the Crandon Mine Site survey by Helms & Associates.

<u>Scientific name</u>	<u>Common name</u>	<u>Wisconsin Status</u>	Location					<u>Number Captured</u>
			Date	8/1/94	8/2/94	7/31/94	7/31/94	9/30/93
			Method	Div/Snork	Diving	Snorkel	Snorkel	Middens
			Effort (hrs)	4	4	4	4	NA
Alismidonta marginata Say, 1818	Elktoe	Special Concern						
Anodonta grandis Say, 1829	Giant floater			7	44			51
Anodontoides ferussacianus (Lea, 1834)	Cylindrical papershell			3	13			1
Fusconia flava (Rafinesque, 1820)	Wabash pigtoe			*	14			14
Lampsilis cardium (Rafinesque, 1820)	Plain pocketbook			9	3			12
L. siliquoidea (Barnes, 1823)	Fat mucket			26	46	2	5	10
Lasmigona costata (Rafinesque, 1820)	Fluted shell							
Lasmigona compressa (Lea, 1829)	Creek heelsplitter	Special Concern		1	10	6		17
Pleurobema sintoxia (Rafinesque, 1820)	Round pigtoe	Special Concern		23	19			42
Strophitus undulatus (Say, 1817)	Squawfoot							
Totals				69	149	8	5	11
								242

* Some wabash pigtoe were included with the round pigtoe

Table 6. Mussels collected from Hemlock Creek during the Crandon Mine Site survey by Helms & Associates.

Scientific name	Common name	Wisconsin Status	Location		Method	Snorkel Effort (hrs)	Snorkel Effort (hrs)	Number Captured
			HLM-200	HLM-200				
			Date 7/29/94	Date 8/4/94				
Alismidonta marginata Say, 1818	Elktoe	Special Concern				2		
Anodonta grandis Say, 1829	Giant floater							
Anodontoides ferussacianus (Lea, 1834)	Cylindrical papershell						2	2
Fusconia flava (Rafinesque, 1820)	Wabash pigtoe							
Lampsilis cardium (Rafinesque, 1820)	Plain pocketbook							
L. siliquioidea (Barnes, 1823)	Fat mucket					3	14	17
Lasmigona costata (Rafinesque, 1820)	Fluted shell							
Lasmigona compressa (Lea, 1829)	Creek heelsplitter	Special Concern						
Pleurobema sintoxia (Rafinesque, 1820)	Round pigtoe	Special Concern						
Strophitus undulatus (Say, 1817)	Squawfoot							
		Totals				3	16	19

Table 7. Mussels collected from Pickerel Creek and Rolling Stone Lake during the Crandon Mine Site survey by Helms & Associates.

		Location		Pickereel Cr.	RSM-005	RSM-005		
		Date	8/5/94	8/2/94	8/5/94			
		Wisconsin	Method	Wading	Wading	Dive/Wade	Number	
<u>Scientific name</u>	<u>Common name</u>	<u>Status</u>	Effort (hrs)	4	NA	10	<u>Captured</u>	
Alismidonta marginata Say, 1818	Elktoe	Special Concern						
Anodonta grandis Say, 1829	Giant floater			111	6	158	164	
Anodontoides ferussacianus (Lea, 1834)	Cylindrical papershell							
Fusconia flava (Rafinesque, 1820)	Wabash pigtoe							
Lampsilis cardium (Rafinesque, 1820)	Plain pocketbook							
L. siliquoidea (Barnes, 1823)	Fat mucket					30	30	
Lasmigona costata (Rafinesque, 1820)	Fluted shell							
Lasmigona compressa (Lea, 1829)	Creek heelsplitter	Special Concern						
Pleurobema sintoxia (Rafinesque, 1820)	Round pigtoe	Special Concern						
Strophitus undulatus (Say, 1817)	Squawfoot			1				
Totals				112	6	188	194	

3.8-8-11

LIST OF FIGURES

Figure 1. Vicinity map.

Figure 2. Locations sampled for mussels.

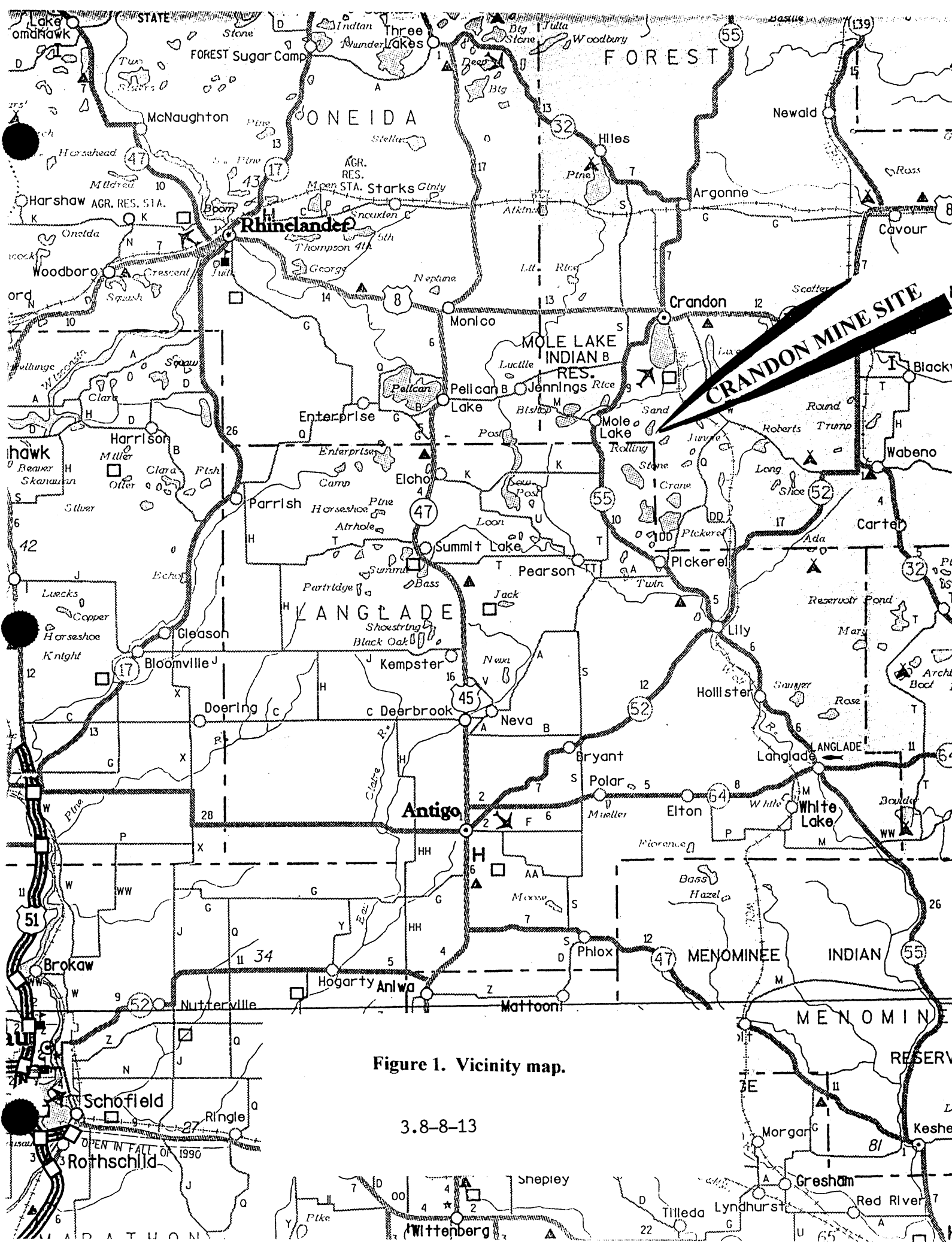


Figure 1. Vicinity map.

3.8-8-13

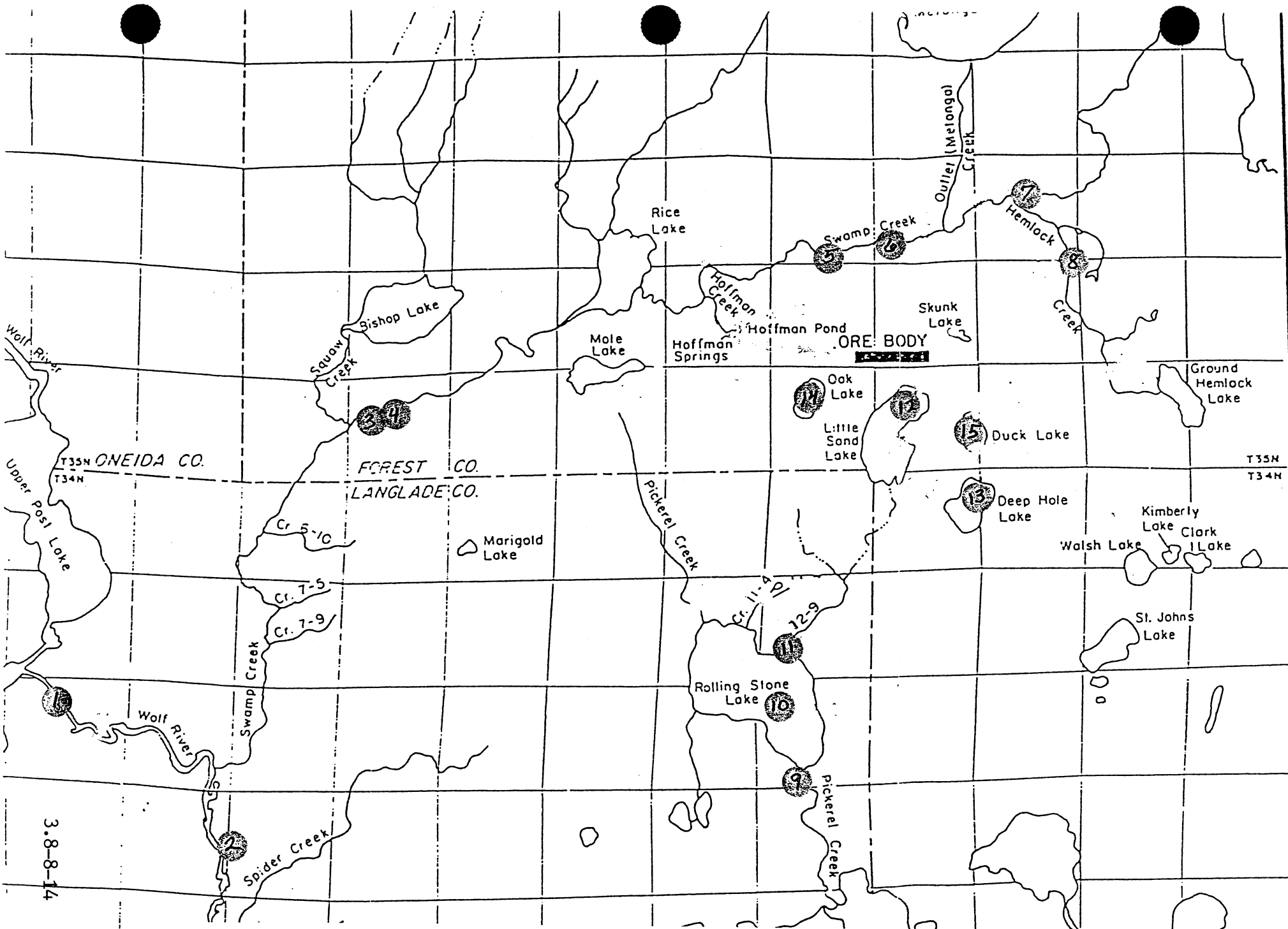


Figure 2. Locations sampled for mussels. Location numbers correspond to numbers on Table 2.

1.0 INTRODUCTION

This report presents the results of a mussel survey conducted at the Crandon Mine Site located south of Crandon, Wisconsin (Figure 1). The Crandon Mine Site is situated within the upper Wolf River drainage basin. Streams that occur in close proximity of the mine make up portions of what is known as the Swamp and Pickerel Creek chains. Both of these chains flow into the Wolf River south of Crandon.

Previous macroinvertebrate studies at this site by Ecological Analysts, Inc. (1978) indicate that only a few species of mussels were encountered in the study area. None of the species currently listed in the Wisconsin Heritage Inventory as Threatened, Endangered, or Special Concern were included. Methods in these previous surveys, however, were not specific to mussels, nor has an extensive search for threatened and endangered species of mussels been conducted within this study area. Mussels classified as threatened and endangered have been found in the lower Wolf River and have the potential to be encountered in the upper Wolf River basin and perhaps in the Swamp Creek and Pickerel Creek Chains as well.

The purpose of the present study was to provide a more detailed qualitative search for naiad mollusks inhabiting the area. Special emphasis was directed to determining the presence or absence of species listed in the Wisconsin Heritage Inventory. Species specifically targeted in this survey are listed in Table 1. Four are Endangered, five are Threatened, and seven are of Special Concern.

The survey was conducted by HELMS & ASSOCIATES during the period July 29 through August 6, 1994. Supplemental shoreline collections from animal middens by Mr. William West of Foth & Van Dyke are included in the data.

2.0 METHODOLOGY

Sampling was conducted at 15 separate locations (Table 2 and Figure 2). Two were in the Wolf River, five on Swamp Creek, one each on Hemlock Creek, Pickerel Creek (below the outlet of Deep Hole Lake), Creek 12 - 9 (where it enters Deep Hole Lake), and five lakes. A variety of habitats were searched within each area sampled. Water clarity enabled a visual search in most areas, however, substrates were also examined by passing the hands through the surface layers to search for buried mussels. Rocks were moved to examine for mussels beneath them. The latter technique was particularly important in searching for the salamander mussel (*Simpsonaias ambigua*) which is reportedly found beneath large flat rocks frequented by its salamander host. Divers were employed to search deeper waters, while snorkeling was conducted in shallow water. Sampling in some areas was also supplemented with wading and visual searching from the surface with or without glass bottomed buckets.

Captured mussels were accumulated and retained in mesh bags until processed. Once a sufficient number was accumulated, they were grouped in lots of 20 for processing which consisted of enumeration by species. Collection effort continued until six consecutive lots of 20 mussels produced no new species. In the event sufficient numbers of mussels could not be collected to accomplish this goal, searching was discontinued after four hours of effort was expended. This sampling strategy was suggested by the Wisconsin DNR.

Processing of mussels commenced soon after they were captured and proceeded quickly to reduce exposure time (Waller, D. L., et. al., 1993). Mussels were kept submersed in ambient water to prevent thermal shock and/or desiccation while being identified and counted. Following processing, they were hand placed back into the substrate in their approximate original position in the river. Mr. David Heath of the Wisconsin DNR assisted in identification, and keys used included Stern (1990), and Burch (1975). Nomenclature followed Turgeon, et. al. (1988). Voucher specimens were retained for each species identified and were submitted to the Wisconsin DNR.

Water temperature and substrate type as well as other pertinent observations were recorded for each sample collection. Copies of original field data sheets are presented as Appendix A.

3.0 RESULTS AND DISCUSSION

This survey resulted in the collection of 1,178 specimens represented by 10 taxa (Table 3). Included were three species that are classified as Special Concern in the Wisconsin Heritage Inventory. No Threatened or Endangered species were encountered.

3.1 Distribution

3.1.1 Wolf River

Mussels were most abundant at the Wolf River sites (Table 4). Diving searches produced the greatest numbers here, and the goal of six grabs of 20 mussels collected without finding additional species was reached at one of the two sites. That collection totaled 371 mussels of six species in 2.5 hours of diving. The high concentration of mussels here was attributed to the presence of the discharge control structure at Lower Post Lake. This structure acts as a barrier for upstream fish movement and consequently functions in concentrating fish that are hosts to the mussels. This area exceeded 10 feet in depth, and substrate consisted of sand and gravel.

The second site, located downstream of Swamp Creek (approximately three miles downstream of the first), produced 215 mussels of nine species in 4 hours of diving. This collection was supplemented by a small collection of shells obtained from middens in May, 1994 by Mr. West. It included 25 individuals of 6 species which were also collected by diving. This site included a small riffle area with a depth of approximately two to three feet

and was dominated by rock of rubble and bolder size. The site also included long stretches of sand and silty sand substrates with few deep holes.

A 12 mile long segment of the River (R. Mi. 180 to 192) in this area was sampled by the Wisconsin Department of Natural Resources in July 1994 (Wisconsin DNR, unpublished records). That survey produced 494 living specimens of 10 different species (Appendix B). Included were two species not collected from the Wolf river in our survey (1 paper pondshell, *Antodonta imbicillis*, and 1 creek heelsplitter). Our survey produced one species not included in the Wisconsin DNR survey (1 living and 2 dead elk toe). Creek heelsplitter and elk toe are listed in the Wisconsin Heritage Inventory as species of Special Concern.

3.1.2 Swamp Creek

Swamp Creek was sampled at 5 locations and mussels were found at all (Table 5). Downstream locations were the most productive. The two downstream locations did not have any barriers obstructing fish moving to and from the Wolf River. These sites were located upstream and downstream of the proposed mine discharge point. The location upstream of the proposed discharge extended to County Road M where Swamp Creek passes through a culvert. A dense concentration of mussels was found in the pool adjoining the downstream side of this culvert crossing. It was also noted that a large, exotic snail was abundant at this location. The diver estimated a density of approximately 10 snails per square foot in some areas.

Elsewhere, mussels tended to be concentrated in the deeper scour holes that were free of aquatic macrophytes. Substrate was primarily sand with silt accumulations in stagnant areas and within beds of vegetation.

The next two upstream locations were swift, shallow, riffle areas bounded by beaver dams. These two sites were searched by snorkeling and with the use of glass bottom buckets. Stones were the dominate substrate feature and many were moved in search of salamander mussels. The stones, however, tended to be round and imbedded into the stream bed making poor habitat for the salamander host. Cavities under larger boulders were difficult to search due to the size and weight of the boulders. Mussels were quite sparse, however, a species of Special Concern (creek heelsplitter) was found. All specimens of this and another species found here, fat mucket, were highly eroded on their exposed surfaces. This suggests the harsh environment presented in this stretch of stream may be a limiting factor in the abundance and species composition of mussels. The presence of beaver dams in this stretch of stream also is suspect in limiting movement of host fish to and from the area.

The remaining location on Swamp Creek was at the mouth of Hemlock Creek. Here, middens were collected during a float trip by Mr. William West of Foth & Van Dyke on September 30, 1993. A second float trip on August 1, 1994 failed to reveal any middens. The first collection of 11 specimens yielded one cylindrical papershell and 10 fat muckets.

This section of stream is more sluggish and is crisscrossed with numerous fallen trees and an occasional beaver dam. Substrate is dominated by peaty debris. Aquatic vegetation is prevalent.

3.1.3 Hemlock Creek

One location on Hemlock Creek was sampled. This was at the bridge (culvert crossing) on Deep Hole Road. Sampling was conducted on both sides of the bridge where substrate consisted primarily of sand with a small amount of peaty debris on the surface. The sand in the stream of water flowing from the culvert was cleaner than in surrounding areas. A short distance upstream or downstream, the stream bed was blanketed with a deep layer of peaty debris making a search for mussels impractical. One small concentration of mussels was located on the downstream side of the bridge. This collection included two specimens of cylindrical papershell and 17 specimens of fat mucket (Table 6).

3.1.4 Pickerel Creek

Pickerel Creek was sampled at its outlet from Rolling Stone Lake. Substrate consisted of sand with some peaty debris along the stream edges outside the main stream flow. Mussels were relatively abundant and easily found by wading. Four hours of effort resulted in the collection of 111 giant floaters and one squaw foot (Table 7).

3.1.5 Rolling Stone Lake

Rolling Stone Lake is a large clear lake with a moderate population of a small number of mussel species. Sampling was conducted by diving and wading the shoreline in areas that had rocky and/or sandy substrates. Areas with dense vegetation or boggy shorelines were not searched. Our catch combined with a few specimens collected incidentally by Mr. West, while sampling benthos, totaled 194 individuals (Table 7). Only two common species were found: giant floater (164 specimens) and fat mucket (30 specimens).

3.1.6 Creek 12-9

Creek 12-9 is a small shallow stream that flows into Rolling Stone Lake from the Northeast. Entry into the mouth was gained by canoe from the lake, but overgrowth completely blocked upstream passage within 100 feet of its mouth. Substrate was a thick layer of peaty debris, and water temperature at the time of observation was 9° C compared to 22° C in the lake. No mussels were observed.

3.1.7 Little Sand Lake

Little Sand Lake is devoid of all mollusks. A diving search supplemented by wading a large portion of the shoreline produced no mussels. It was also noted that there were no fingernail clams, no snails and no crayfish. Fish and insect larvae were observed, and

aquatic vegetation, though present, did not include *Potamogeton*, *Elodea*, etc. which were present in abundance in Rolling Stone Lake. Little Sand Lake drains into Rolling Stone Lake through Creek 12-9.

3.1.8 Deep Hole Lake

Deep Hole Lake is similar to Little Sand Lake in many respects. Our search of sandy, rocky and peaty shorelines and off shore to a depth of approximately 12 feet revealed no mussels, no fingernail clams, no snails and no crayfish. Fish, insects and aquatic macrophytes were similar to those found in Little Sand Lake.

3.1.9 Oak Lake

Oak Lake was again similar to the two previous lakes, differing in that substrate consisted primarily of sand. There were no mussels, no fingernail clams, no snails and no crayfish. Fish and insects were observed and the aquatic macrophyte community appeared to be devoid of *Potamogeton*, *Elodea*, etc.

3.1.10 Duck Lake

Duck Lake is surrounded on three sides by bog. Its substrate consists of peaty debris on all sides except the east shore where rubble and a small amount of sand are covered by a layer of peaty material that thickens with distance from shore. A diving search of the entire eastern (rubble) shoreline, portions of the boggy shoreline and a transect across the lake from north to south revealed no mussels. A small number of fingernail clams were observed.

3.2 Target Species

3.2.1 Target Species Found

Elktoe

Elktoe was found in the Wolf River. One living specimen and two complete dead shells (from middens) were collected from the site downstream of the mouth of Swamp Creek. None were found at the upstream site, and none were found at any of the other sampling locations. Host fish species which include: white sucker, northern hog sucker, shorthead redhorse, rock bass and warmouth.

Creek heelsplitter

Creek heelsplitter was found at three of the four locations sampled in Swamp Creek. Ten were found above the discharge point, one was found below the discharge point, and six were collected one half mile downstream from Swampy Lane. In addition, a survey by the Wisconsin Department of Natural Resources in 1991 produced one specimen in a collection of 494 individuals in the Wolf River downstream of the Post Lake dam. The only known

host for the creek heelsplitter is carp. Habitat reported by Cummings and Mayer (1993) is creeks and the headwaters of small to medium rivers in fine gravel or sand. It is rarely found in large rivers.

Round Pigtoe

Round pigtoe was encountered at both collection sites in the Wolf River and the two downstream sites (above and below the proposed mine discharge) on Swamp Creek. It was relatively common in these areas. Its host is unknown. Habitat reported by Cummings and Mayer (1993) is medium to large rivers in mud, sand, or gravel.

3.2.2 Target Species Not Found

Species Not Expected To Be Found

Threatened and endangered species are usually listed as threatened or endangered in part because they occur in low numbers. Thus the chance of finding them is small. Some of the target species, however, were not expected to be found in this area. The winged maple leaf is both on the state and federal endangered list. Its currently known range in Wisconsin is limited to the St. Croix River (Vaughan, 1993) and does not occur in the project area. Five other species are largely limited to the Mississippi and Ohio River drainages (Cummings and Mayer, 1993). They include: purple warty back, bullhead, monkeyface, buckhorn, and scaleshell. Bullhead has been reported in the lower reaches of the Wolf River (Wisconsin DNR, unpublished records, Appendix C), but this appears to have been an outlier.

Species Which May Not Occur In The Area

The range of snuffbox and ellipse generally lies to the south of the study area (Cummings and Mayer, 1993 and Mathiak, 1979). The snuffbox may not occur in the area. Its range is generally to the south of the study area. Cummings and Mayer (1993) indicate it is widespread but rare throughout the Midwest and occurs in medium to large rivers in clear, gravel rifles. Its host is unknown. The ellipse may or may not occur in the area. Mathiak (1979) found it in 11 counties in Wisconsin, all were south of Green Bay. It is found in small to medium streams in gravel or mixed sand and gravel. Its fish host is unknown.

Species Expected To Occur In The Area

Ranges of other species are known to lap into or near this area, and the reasons for not finding them may be due to low densities. The salamander mussel, slippershell, eastern floater, gaspe floater, and Atlantic elliptio do appear to range over this area but were not found.

Salamander Mussel

Although this appears to be the northern edge of its range, the salamander mussel probably occurs in the area. It has been found elsewhere in the Wolf River (Wisconsin DNR, unpublished records). Its host, *Necturus*, is common in the downstream reaches of the Wolf River, but its presence and/or abundance in the study area is not known. None were collected in the present investigations. The salamander mussel inhabits medium to large rivers on mud or gravel bars and under flat slabs or stones (Cummings and Mayer, 1993).

Slippershell

The slippershell may also occur in the area. It is known from the great lakes drainage as well as the Mississippi and Ohio river drainages, and was reported at a site in the lower Wolf river in 1991 (Wisconsin DNR, unpublished records). It occurs in creeks and the headwaters of large rivers in sand, mud, or fine gravel (Cummings and Mayer, 1993). Host of the slippershell is unknown.

Eastern And Gaspé Floaters

The Eastern and gaspé floaters may occur in the study area. They have five known common fish hosts and a long list of fish that they occasionally parasitize (Appendix D).

Atlantic Elliptio

The Atlantic elliptio mussel is apparently the only species occurring in Wisconsin that is limited to the Atlantic drainage. The study area is within its range and it may occur here. Mathiak (1979), however, reported finding only one specimen, and Baker (1928) found it in only one stream in Wisconsin. It has five known fish hosts (gizzard shad, flathead catfish, white crappie, black crappie, and yellow perch), several of which occur in the study area.

3.2.3 Non-target Species

Giant Floater

In addition to the target species listed above, seven non-target species were collected. The giant floater was the most common and was found in all locations where mussels were present except Hemlock Creek.

Cylindrical Papershell

Cylindrical papershell was found at most sites in small numbers. Being a thin shelled species, it was most often associated with softer substrates. It occurred at five of the 10 sites where mussels were found.

Wabash Pigtoe

Wabash pigtoe was found in the Wolf River sites and the two downstream Swamp Creek sites. It did not occur in samples farther upstream or in any of the lake samples.

Pocketbook

The pocketbook had a distribution similar to that of Wabash pigtoe. It occurred in the Wolf River and the lower two sampling sites of Swamp Creek.

Fat Mucket

Fat mucket was also very common and was collected at all but one site where mussels were present. It was not found in the outlet stream of Rolling Stone Lake.

Fluted shell

The fluted shell was found only in the Wolf River.

Squawfoot

The few specimens of squawfoot were found in the Wolf River and one in Pickerel Creek at the outlet of Rolling Stone Lake.

3.3 Introduced Nuisance Species

Neither zebra mussels (*Dreissena polymorpha*) nor Asiatic clams (*Corbicula fluminea*) were observed in this study.

4.0 SUMMARY

It is apparent from this survey that the Wolf River is the dominant supporting factor determining the mussel community at the Crandon Mine Site. It carried the most abundant and diverse population of unionid mollusks. The more remote from the Wolf River, the fewer individuals and less diverse the mussel community became. This is true of both streams and lakes in the area. The three target species encountered in this survey (all listed as Special Concern) also tended to be found either in the Wolf River or close to it. The reason for this phenomenon may be linked to accessibility of host species, however, chemical and physical factors may contribute as well. Condition of some of the specimens examined certainly indicate a harsh environment that is not conducive to the well being of mollusks. The primary indicator of this is the extreme erosion and pitting observed on many of the specimens.

5.0 REFERENCES

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- Vaughan, P. W. 1993. Winged mapleleaf mussel (*Quadrula fragosa*) draft recovery plan: Technical Agency Draft March 31, 1993. Region 3 U.S. Fish and Wildlife Service, Twin Cities, Minnesota. 59pp.
- Waller, D. L., et. al. 1993. Effects of handling and time out of water on the survival of freshwater mussels. In: Conservation and Management of Freshwater Mussels: Proceedings of a UMRCC Symposium. p 184.

6.0 APPENDICES

Appendix A. Copies of original field data sheets.

Appendix B. WDNR Post Lake dam mussel data. Letter from Mr. David Heath to Mr. William West dated 8 August, 1994.

Appendix C. WDNR Field data sheet for mussel relocation in Wolf River in Shawano County, Wisconsin June, 1991.

Appendix D. Information on host species for mussels listed on the Wisconsin Heritage Inventory provided by The Academy of Natural Sciences.



STATE OF WISCONSIN \ DEPARTMENT OF NATURAL RESOURCES

George E. Meyer
Secretary

North Central District Headquarters

P. O. Box 818
Rhinelander, Wisconsin 54501
TELEPHONE 715-362-7616
TELEFAX 715-369-8932

File Ref:

•Mr William M. West
Scientist, Environmental Process Engineering
Foth & Van Dyke
2737 S. Ridge Road
PO Box 19012
Green Bay WI 54307-9012

DATE: 8 Aug. 1994

--

Re: WDNR Post Lake dam mussel data.

Dear Mr. West:

Per our conversation 5 Aug. 1994, find enclosed computer printouts of freshwater mussel data collected during 1991 from immediately downstream of the Post Lake dam, Wolf River, Langlade, County, Wisconsin and from Post Lake.

Species list, sum live, sum dead for Wolf R. mussels, R. Mi 180 to 192
just downstream of Post Lake dam, all collection methods. WDNR COLLECTION.
OUTPUT DATE: 12:47 Monday, August 8, 1994
COLLECTION DATE : 070591.

OBS	TAXON	SUMLIVE	SUMDEAD
1	Alasmidonta viridis	0	0
2	Anodonta grandis form grandis	305	0
3	Anodonta imbecillis	1	0
4	Anodontoides ferussacianus	11	0
5	Fusconaia flava	67	0
6	Lampsilis siliquoidea	43	0
7	Lampsilis cardium	38	0
8	Lasmigona compressa	1	0
9	Lasmigona costata	21	0
10	Pleurobema sintoxia	3	0
11	Strophitus undulatus undulatus	4	20

Variable	Sum
SUMLIVE	494
SUMDEAD	20

Species list, sum live, sum dead for Wolf R. mussels, R. Mi 192 to 195
from Post Lake, all collection methods. WDNR COLLECTION.

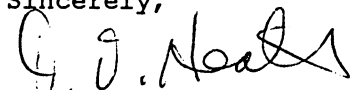
OUTPUT DATE: 12:48 Monday, August 8, 1994

COLLECTION DATE : 070591.

OBS	TAXON	SUMLIVE	SUMDEAD
1	Anodonta grandis form grandis	199	0
2	Anodonta imbecillis	3	0
3	Lampsilis siliquoidea	70	0

Variable	Sum
SUMLIVE	272
SUMDEAD	0

Sincerely,



David J. Heath
FERC Endangered Resources Coordinator

cc: Bill Tans, EA/6
Archie Wilson, NCD-Rhineland
Chuck Pils, ER/4
Ron Eckstein, NCD-Rhineland Ranger Station
Don Helms

wp52\exxon-7.



STATE OF WISCONSIN \ DEPARTMENT OF NATURAL RESOURCES

George E. Meyer
Secretary

North Central District Headquarters
P. O. Box 818
Rhinelander, Wisconsin 54501
TELEPHONE 715-362-7616
TELEFAX 715-369-8932

File Ref:

..Mr. William West
Scientist, Environmental Process Engineering
Foth & Van Dyke
2737 S. Ridge Road
PO Box 19012
Green Bay, WI 54307-9012

DATE: 30 Sept. 1994

--

Re: 29 Sept. Cooperative mussel field work for Crandon Mine project.

Dear Mr. West:

Per your request, below is a summary of freshwater mussel data collected 29 Sept. 1994 from the Wolf River and Swamp Creek by me with your assistance.

Wolf River mile 188.4, T34N, R11E, Sec. 24 NE of NE of SE, off Lost Lake Rd., Langlade County, Wisconsin. Dove with SCUBA about 1.5 hours for the primary purpose of verification of species list and to conduct additional salamander mussel (*Simpsonaias ambigua*, State threatened) search beneath about 30 boulders. Conducted 29 Sept. 1994. Recorded only the species present and did not count or record all mussels encountered although identified underwater about 200 mussels.

Taxon	Number recorded	
	Living	Shells only
<i>Anodontoides ferussacianus</i> (Lea, 1834)	2	2
<i>Lampsilis siliquoidea</i> (Barnes, 1823)	1	1
<i>Lasmigona costata</i> (Rafinesque, 1820)	4	1
<i>Anodonta grandis</i> form <i>grandis</i> Say, 1829	2	0
<i>Alasmidonta marginata</i> Say, 1818	1	0
<i>Fusconaia flava</i> (Rafinesque, 1820)	1	1
<i>Pleurobema coccineum</i> (Conrad, 1834)	1	1
<i>Lasmigona compressa</i> ((Lea, 1829)	2	0
<i>Lampsilis cardium</i> (Rafinesque, 1820)	1	0
<i>Simpsonaias ambigua</i> (Say, 1825)	0	0

Swamp Creek mile 2.1, T34N, R12E, Sec. 7 NW of SE of SW, immediately downstream of CTH K bridge, Langlade County, Wisconsin. Dove with SCUBA about 50 min for the primary purpose of verification of Swamp Creek species list. Conducted 29 Sept. 1994. Recorded all mussel encountered.

Taxon	Number recorded	
	Living	Shells only
<i>Anodontoides ferussacianus</i> (Lea, 1834)	15	0
<i>Lampsilis siliquoidea</i> (Barnes, 1823)	81	0
<i>Fusconaia flava</i> (Rafinesque, 1820)	79	0
✓ <i>Pleurobema coccineum</i> (Conrad, 1834)	10	0
<i>Lampsilis cardium</i> (Rafinesque, 1820)	1	0
<i>Strophitus undulatus</i> (Say, 1817)	1	0
Total	187	0

Sincerely,



David J. Heath
FERC Endangered Resources Coordinator

cc: Bill Tans, WDNR EA/6
Archie Wilson, WDNR NCD-Rhineland
Ron Eckstein, NCD-Ranger Station
Chuck Pils, WDNR-ER/4

Appendix 3.9-1

Pertinent Terrestrial Biology Correspondence



IN REPLY REFER TO:

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Green Bay Field Office
1015 Challenger Court
Green Bay, Wisconsin 54311-8331



RECEIVED

August 20, 1993

AUG 24 1993

Mr. Don Moe
Exxon Coal and Minerals Co.
P.O. Box 1314
Houston, Texas 77251-1314

re: Endangered Species Review
Crandon Project
Forest and Langlade Counties

Dear Mr. Moe:

The U.S. Fish and Wildlife Service (Service) has received your letter dated July 20, 1993, requesting comments on the subject project. Due to staff time constraints and priority work activities we are able to only review your project for potential impacts to federally-listed threatened and endangered species or those proposed for listing. Be advised that other environmental concerns may be associated with this project such as wetland, lake and stream impacts, erosion control needs, and effects on state-listed threatened or endangered species. State or federal permits may be needed as well if lake, stream or wetland impacts will occur. If resource impacts are expected to occur we recommend that you forward this project to the appropriate Wisconsin Department of Natural Resources office for their review.

Please provide us copies of any future review documents that may be associated with this project or of future projects you may be planning that would require Service review. This will allow us to keep our files current. Further comments will be provided as time and work priorities allow.

Federal Threatened and Endangered Species

A review of the information in our files indicates the following federally-listed threatened or endangered species occur in Forest and Langlade Counties:

<u>Classification</u>	<u>Common Name</u>	<u>Scientific Name</u>	<u>Habitat</u>
threatened	bald eagle	<u>Haliaeetus leucocephalus</u>	breeding
endangered	gray wolf	<u>Canis lupus</u>	northern forested areas

Our files indicate that bald eagles are known to occur within the project area. Due to the general nature of the plans submitted for our review, we are unable to determine what, if any, impacts your proposed activities will have on this species. When more specific plans for activities within the project area are formulated, or new information becomes available, the Service should be contacted. If it is determined that proposed projects are subject to federal permits or federal funds are involved, and the project is likely to have an effect on federally-listed threatened or endangered species, consultation should be initiated at that time by the responsible federal agency.

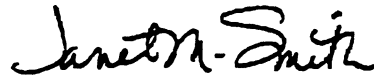
CC: RFS
Wmw
File 93E006
TJW

3.9-1-1

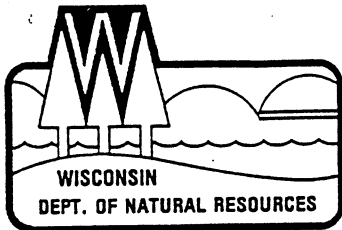
fw

We appreciate the opportunity to respond. Questions pertaining to these comments can be directed to Mr. Joel Trick or Ron Spry of my staff by calling 414-433-3803.

Sincerely,

A handwritten signature in cursive script that reads "Janet M. Smith".

Janet M. Smith
Field Supervisor



George E. Meyer
Secretary

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

101 South Webster Street
Box 7921
Madison, Wisconsin 53707
TELEPHONE 608-266-2621
TELEFAX 608-267-3579
TDD 608-267-6897

RECEIVED

SEP - 7 1993

FOTH & VAN DYKE REPLY REFER TO: 1650

September 2, 1993

Mr. Don Moe
Exxon Coal and Minerals Company
P.O. Box 1314
Houston, TX 77251-1314

SUBJECT: Endangered Resources Information Review (Log Number 93-330)

Dear Mr. Moe:

The Bureau of Endangered Resources has reviewed the project area described in your letter of July 20, 1993 to Ms. Maryann Sumi, Department of Natural Resources Executive Assistant, for Exxon's potential zinc-copper mine near Crandon.

Our Natural Heritage Inventory (NHI) data files contain the following rare species and natural communities information for the mine's "Site Study Area" in the following Sections:

T34N R11E Sections 13, 14, 23-25
T34N R12E Sections 1-24, 30-32
T34N R13E Sections 1-24
T35N R12E Sections 7-36
T35N R13E Sections 16-23, 26-35

Rare species which occur, or have been known to occur, in this area are:

Haliaeetus leucocephalus (bald eagle), a bird listed as Threatened at the Federal and State level, has nests in T34N R12E Sections 2 (NW1/4 SW1/4), 4 (NE1/4 NE1/4), 12 (NW1/4 NW1/4), 14 (NE1/4 SW1/4), 19 (NE1/4 NE1/4), T34N R13E Section 1 (SE1/4 SE1/4), T35N R12E Sections 23 (SW1/4 SW1/4), 28 (SW1/4 SE1/4), and 29 (NW1/4 SW1/4). The observation dates for these occurrence records are 1992, 1992, 1990, 1991, 1992, 1992, 1991, 1991, and 1992, respectively. This species prefers large trees in isolated areas in proximity to large areas of surface water, large complexes of deciduous forest, coniferous forest, wetland, and shrub communities. Large lakes and rivers with nearby tall pine trees are preferred for nesting. The breeding season extends from February through August. Favored wintering and roosting habitat includes wooded valleys near open water and major rivers from December through March.

Pandion haliaetus (osprey), a bird listed as Threatened in Wisconsin, has nests in T34N R12E Sections 19 (NE1/4 SE1/4), 20 (NW1/4 NW1/4 and NE1/4 NW1/4), 24 (SW1/4 SW1/4), 32 (NW1/4 SE1/4), T35N R12E Section 33 (SE1/4 SE1/4), T35N R13E Sections 20 (SE1/4 NW1/4) and 30 (NE1/4 NE1/4). The observation dates for these occurrence records are 1992, 1990, 1990, 1992, 1990, 1992, 1992, and 1990, respectively. This species prefers large trees in isolated areas in proximity to large areas of surface water, large complexes of deciduous forest, coniferous forest, wetland, and shrub communities. Large lakes and rivers with nearby tall pine trees are preferred for nesting. The breeding season extends from late April through August.

Potamogeton confervoides (algal-leaved pondweed), a plant presently under review by the US Fish and Wildlife Service for Federal listing and Threatened in Wisconsin, occurs in T35N R13E Sections 31

and 32 (Duck Lake). The observation date for this occurrence record is 1980. This species prefers acidic lakes and bogs. Fruiting may occur between June through August.

Clemmys insculpta (wood turtle), a turtle listed as Threatened in Wisconsin, occurs in T34N R12E Section 7. The observation date for this occurrence record is 1982. This species prefers deciduous forests and open meadows along moderate- to fast-moving streams and rivers. The breeding season extends from early April through late August.

Calypso bulbosa (Calypso orchid), a plant listed as Threatened in Wisconsin, occurs in T35N R13E Section 19. The observation date for this occurrence record is 1981. This species prefers cold coniferous lowland forests, especially older white cedar stands. Blooming occurs from May through early July.

Botrychium oneidense (blunt-lobed grape fern), a State Special Concern plant, occurs in T35N R13E Section 32. The observation date for this occurrence record is 1979. This species is known from maple-basswood and other moist woodlands in widely distant parts of the state. This fern has been collected in September.

Cypripedium reginae (showy lady's slipper), a State Special Concern plant, has been known to occur in T34N R12E Section 3. The observation for this occurrence record is 1952. This species prefers northern wet and wet-mesic forest communities. Blooming occurs from May through August.

Special Concern (Watch) species are species about which some problem of abundance or distribution is suspected but not yet proved. The main purpose of this category is to focus attention on certain species before they become endangered or threatened.

Natural areas that occur in the Site Study Area are as follows:

Oak Lake natural area

-see description in 1986 EIS

Swamp Creek Cedars natural area

-see description in 1986 EIS

Bur Oak Swamp natural area

-see description in 1986 EIS

Upper Pickerel Creek Cedars and Pines natural area

-see description in 1986 EIS

Pickerel Creek Pines natural area (Langlade County, T34N R12E W1/2 and SW1/4 of Section 23) - This 46-acre site contains a small, undeveloped bog lake surrounded by a black spruce and tamarack-dominated northern wet-forest. The 1982 Natural Areas Inventory report states that adjoining uplands support a northern dry-mesic forest of white and red pines with good reproduction. The uplands have been logged in the past, but there are no signs of disturbance in the wet forest or bog lake. Stunted black spruce and floating bog mats occur near the lake margin.

It is my understanding that the mine "footprint" was surveyed for the nine listed plant species as well as the 32 listed and Special Concern animal species that are noted in the 1986 EIS. It is also my understanding that these surveys did not locate any rare species within the mine's impact area.

As you know, there have been several changes to the NHI "Working List" since 1986 (indeed, I'm not sure that the Heritage program had such a list at that time.) In an effort to compile a list of rare species

potentially occurring in this area I am enclosing a printout from the NHI Vertebrate Characterization Abstract (VCA). This printout includes those species currently tracked by the Heritage program that have ranges encompassing Oneida, Langlade, or Forest Counties that occur in grassland, woodland, forest, or palustrine habitats. Unfortunately, we do not have an analogous database for invertebrates or plants. For the plants, I asked our botanist, June Dobberpuhl, to identify State Threatened and Endangered plants that may occur in the Site Study Area. Because the number of Special Concern plants that potentially occur at the site is so large, I have included only those that the NHI contains records from Langlade, Forest or Oneida Counties. For invertebrates, I asked the Bureau's zoologist, Bill Smith, and lepidopterist, Cathy Bleser, to compile lists of rare species that potentially occur at the site based on habitat information in the information in the EIS. Plant and invertebrate species potentially occurring in the Site Study Area are:

Scientific name	Common name	WI Status	Fed Status
PLANTS			
<i>Ranunculus gmelinii</i> *	Small yellow water-crowfoot	Endangered	
<i>Tiarella cordifolia</i> *	Foamflower	Endangered	
<i>Botrychium mormo</i> *	Goblin fern	Endangered	C2
<i>Potamogeton pulcher</i>	Spotted pondweed	Endangered	
<i>Melica smithii</i>	Smith melic grass	Endangered	
<i>Pyrola minor</i>	Small shinleaf	Endangered	
<i>Botrychium lunaria</i>	Moonwort	Endangered	
<i>Cypripedium arietinum</i> *	Ram's head lady's-slipper	Threatened	
<i>Platanthera flava</i> *	Tubercled orchid	Threatened	
<i>Amerorchis rotundifolia</i> *	Small round-leaved orchis	Threatened	
<i>Viola novae-angliae</i> *	New England violet	Threatened	C2
<i>Potamogeton vaginatus</i> *	Sheathed pondweed	Threatened	
<i>Potamogeton confervoides</i> *	Algal-leaved pondweed	Threatened	C2
<i>Polystichum braunii</i>	Braun's holly fern	Threatened	
<i>Valeriana sitchensis</i> ssp <i>uliginosa</i>	Marsh valerian	Threatened	
<i>Armoracia lacustris</i>	Lake cress	Threatened	C2
<i>Carex formosa</i>	Handsome sedge	Threatened	C2
<i>Carex garberi</i>	Garber's sedge	Threatened	
<i>Carex lenticularis</i>	Shore sedge	Threatened	
<i>Ribes oxycanthoides</i>	Hawthorn-leaved gooseberry	Threatened	
<i>Arethusa bulbosa</i>	Dragon's mouth	Special Concern	
<i>Botrychium ternatum</i> **	Ternate grape fern	Special Concern	
<i>Cardamine pratensis</i> var <i>palustris</i>	Cuckoo flower	Special Concern	
<i>Carex gynocrates</i> **	Northern bog sedge	Special Concern	
<i>Carex tenuiflora</i>	Sparse-flowered sedge	Special Concern	
<i>Carex vaginata</i> **	Sheathed sedge	Special Concern	
<i>Dryopteris expansa</i> **	Spreading wood fern	Special Concern	
<i>Eleocharis robbinsii</i>	Robbins spike-rush	Special Concern	
<i>Epilobium palustre</i> **	Marsh willow-herb	Special Concern	
<i>Leucophysalis grandiflora</i> **	White ground cherry	Special Concern	
<i>Littorella americana</i> **	Plantain shoreweed	Special Concern	
<i>Myriophyllum farwellii</i> **	Farwell's water-milfoil	Special Concern	
<i>Penstemon pallidus</i>	Pale beardtongue	Special Concern	
<i>Platanthera dilatata</i>	White bog orchid	Special Concern	
<i>Platanthera hookeri</i>	Hooker's orchid	Special Concern	
<i>Platanthera orbiculata</i>	Round-leaved orchid	Special Concern	
<i>Polystichum braunii</i> **	Braun's holly fern	Special Concern	
<i>Potamogeton vaseyi</i> **	Vasey's pondweed	Special Concern	
<i>Rhynchospora fusca</i> **	Sooty beakrush	Special Concern	

<i>Simpsonaias ambigua</i>	Salamander mussel	Threatened	C2
<i>Alasmidonta viridis</i>	Slippershell	Threatened	
<i>Quadrula metanevra</i>	Monkeyface	Threatened	
<i>Tritogonia verrucosa</i>	Buckhorn	Threatened	
<i>Venustaconcha ellipsiformis ellipsiformis</i>	Ellipse	Threatened	
<i>Leptodea leptodon</i>	Scaleshell	Special Concern	C2
<i>Alasmidonta marginata</i>	Elktoe	Special Concern	
<i>Anodonta cataracta cataracta</i>	Eastern floater	Special Concern	
<i>Anodonta cataracta marginata</i>	Gaspe floater	Special Concern	
<i>Elliptio complanata</i>	Atlantic elliptio	Special Concern	
<i>Lasmigona compressa</i>	Creek heelsplitter	Special Concern	
<i>Pleurobema sintoxia</i>	Round pigtoe	Special Concern	

MISCELLANEOUS INVERTEBRATES

<i>Anepeorus simplex</i>	A flat-headed mayfly	Endangered	
<i>Stenelmis knobeli</i>	Knobel's riffle beetle	Endangered	
<i>Stenelmis douglasensis</i>	Douglas stenelmis riffle beetle	Special Concern	C2
<i>Dolania americana</i>	American sand burying mayfly	Special Concern	C2
<i>Homoeoneuria ammophila</i> **	A mayfly	Special Concern	
<i>Macdunnoa persimplex</i> **	A mayfly	Special Concern	
<i>Paracloeodes minutum</i> **	A small minnow mayfly	Special Concern	

* = species mentioned in 1986 Environmental Impact Statement

** = species with State ranks of either S1 or S2 (see attached definition sheet)

C2 = candidate, under review for federal listing

Some species listed in the EIS are no longer, or were never, tracked by the Natural Heritage Inventory and are not classified as Endangered, Threatened, or State Special Concern. As such, the Bureau has little information on occurrence locations. These species are:

Cooper's hawk	Common loon
Great blue heron	Common flicker
Eastern bluebird	Vesper sparrow
Field sparrow	Tremblay's salamander
Leopard frog	Fox snake
Garter snake	Red-bellied snake
Fisher	

In addition, several changes in protection statuses may result during the upcoming revision to the Department's Endangered and Threatened Species List. Although it is too early to forecast changes with much certainty, it appears that *Viola novae-angliae* (New-England violet), will be de-listed from State Threatened status and will probably be considered State Special Concern. For the State Special Concern species, I have marked (with "**") those that are ranked by the NHI program as either S1 or S2. These species are defined as either "critically imperiled" or "imperiled" in Wisconsin and are the species most likely to be moved from Special Concern to Threatened or Endangered status. *Cypripedium reginae*, a State Special Concern plant known to occur in the area is ranked S2.

It is possible, indeed probable, that one or more of the species tracked by the Heritage program occur in the mine's Site Study Area. Similarly, it is probable that one or more of the species known to occur in the Site Study Area (i.e. those species listed at the beginning of the letter) also occur elsewhere in the Study Area. Unfortunately, very few surveys have been conducted in this area of the state (none that I am aware of since 1986) and thus it is very likely that our NHI database is incomplete. Therefore, I recommend that qualified

biologists compare Site Study Area conditions with the habitat requirements of the species listed both here and on the attached VCA printout. I recommend that surveys then be conducted for those species for which the Site Study Area contains suitable habitat. If appropriate habitat for a species does not exist in the area then a survey for the species is not warranted. When this information is compiled, then mine construction and operation can be designed to avoid impacts to endangered resources.

It is my understanding that mine operations may affect water quality and quantity in some of the waterbodies near the mine if a mining project is permitted. The experience with Duck Lake, as described in the EIS, highlights the impacts that changes in water quality and quantity can have on sensitive aquatic species. As with terrestrial species, I recommend that waterbodies that may be impacted by mine operations and that contain appropriate habitat for rare aquatic species listed above be surveyed. I am particularly concerned about potential impacts to aquatic resources in this area. For example, Rock Siding Creek, Creek 11-4, Metonga Outlet, and Ground Hemlock Lake appear to contain conditions that may support rare aquatic invertebrates. Also, Oak Lake is a high-quality deep, soft, clear lake and contains an unusually rich assemblage of rosette flora; similarly, the Wolf River is one of the most important riverine complexes in the area. Protecting high-quality aquatic habitats is a Bureau priority.

The Site Study Area contains potential habitat for wolves, bald eagles and osprey. The Bureau closely monitors these species and I am confident that we know of all the locations of these species in the area. Thus, I do not believe it is necessary to conduct additional surveys for these species.

The list of plants and invertebrate and vertebrate animals included here will provide a starting point for the surveys. Please note that this is a list of those species tracked by the NHI that are *most likely* to occur in this area and should not be taken as a definitive list of the only rare species that may occur here. Thus, biologists who conduct these surveys should concentrate, but not limit, their investigation to these species. For your information, enclosed is Wisconsin's *Natural Heritage Inventory (NHI) Working List* which identifies the rare species and natural communities currently tracked in the state.

The specific location of endangered resources is sensitive information that has been provided to you for the analysis and review of this project. Exact locations should not be released or reproduced in any publicly disseminated documents.

I look forward to reviewing the results of the surveys and future interactions with you and the staff at Foth & Van Dyke. Please contact John Pohlman, at (608) 264-6263, if you have any questions about this information.

Sincerely,



Charles M. Pils

Director, Bureau of Endangered Resources

enclosures

cc: Bill Tans - EA/6
 Larry Lynch - SW/3
 Terry McKnight - NCD
 Ken Markart - NCD
 Archie Wilson - NCD
 Cathy Carnes - USFWS-Green Bay, 1015 Challenger Court, Green Bay, WI 54311
 Tim J. Weyenberg - Foth & Van Dyke, P.O. Box 19012, Green Bay, WI 54307-9012
 3.9-1-8

Vertebrate species tracked by the Wisconsin Natural Heritage Inventory (NHI) that have ranges encompassing part or all of Oneida, Langlade, and Forest Counties and which occur in grassland, woodland (hardwood, coniferous and mixed) and forest (hardwood, coniferous and mixed), or palustrine habitats.

Source: NHI's Vertebrate Characterization Abstract file.

Mammals

CANIS LUPUS TIMBER WOLF

STATUS: State-Endangered Federal-Endangered/Threatened

GLOBAL HABITAT: No particular habitat preference. Requires areas with low human population and high prey densities. In Minnesota and Wisconsin, usually in areas with few roads, which increase human access and incompatible land uses.

REPRODUCTIVE HABITAT: Young born in underground burrow abandoned by other mammal or dug by wolf.

STATE HABITAT: Prefers wilderness areas of forests and heavily wooded cut-over lands.

LYNX CANADENSIS LYNX

STATUS: State-Endangered Federal-Candidate, under review

GLOBAL HABITAT: Boreal forests with openings, regenerating mixed forest, rugged outcrops, bogs, and thickets. Will utilize tundra to forage for abundant prey. When inactive, occupies den typically in hollow tree, under stump, or in thick brush.

REPRODUCTIVE HABITAT: Young born in den (see above).

STATE HABITAT: Prefers heavy and dense forests and woodlands.

MARTES AMERICANA PINE MARTEN

STATUS: State-Endangered Federal-none

GLOBAL HABITAT: Usually in dense deciduous, mixed, or (especially) coniferous upland and lowland forest. May use rocky alpine areas. In central Rockies, associated in winter mainly with old-growth forest. When inactive, occupies hole in dead or live tree or stump, abandoned squirrel nest, conifer crown, rock pile, burrow, snow cavity, etc.; uses mainly subnivean sites, often associated with coarse woody debris, in winter.

REPRODUCTIVE HABITAT: Young born in den usually in hollow tree, sometimes in rock den.

STATE HABITAT: Prefers forests and heavy woodland of old, dense conifer growth (cedars, balsam, spruce & hemlock). May wander short distances into brushland & meadows in the summer.

LYNX RUFUS BOBCAT

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Various habitats including decid.-conif. woodl. & forest edge, swamps, brushlands, and areas with thick undergrowth. When inactive, occupies rocky cleft, cave, hollow log, space under fallen tree, etc.; usually changes shelter daily.

REPRODUCTIVE HABITAT: Young born in den in hollow log, under fallen tree, rock shelter, or similar site.

STATE HABITAT: Prefer Alder thickets and coniferous swamps w/ black spruce, white cedar or balsam fir. Uplands are used more extensively where conifer swamps are uncommon, particularly in the southern portion of its range.

SOREX HOYI THOMPSON'S PIGMY SHREW

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Found in a variety of habitats. Appears to prefer grassy openings of boreal forest. Moist habitats are preferred over dry areas.

REPRODUCTIVE HABITAT: Den sites are not well-known.

STATE HABITAT: Prefers moist, log-strewn hemlock woods; damp, grassy paper birch & aspen woods; white pine forests; sphagnum, spruce & tamarack bogs; aspen & sweet fern environments on dry slopes.

SOREX ARCTICUS ARCTIC SHREW

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: May be most commonly found in grass-sedge marshes, wet meadows & other moist openings in & adjacent to boreal forest. Also present, in fewer numbers, in tamarack-spruce bogs and cedar swamps.

REPRODUCTIVE HABITAT: Small globular nests are usually made above ground under logs or other material.

STATE HABITAT: Prefers wet spruce and tamarack swamps or alder or willow marshes; it rarely occurs in more or less open leatherleaf- sphagnum bogs.

Birds

DENDROICA CERULEA CERULEAN WARBLER

STATUS: State-Threatened Federal-C2

GLOBAL HABITAT: Mature deciduous forest, swamps, bottomlands, mixed woodlands near water; stays high in trees. In migration in various forest, woodland, second growth, and scrub habitats; forest canopy, gaps and edges, semi-open areas, usually high in trees. In winter, forest and woodland borders on mountain slopes.

REPRODUCTIVE HABITAT: Nests in tall tree, about 6-18 m up, well out on branch, often near forest opening.

STATE HABITAT: Prefers lowland deciduous forests dominated by mature stands of American elm, cottonwood, & green ash.

BUTEO LINEATUS RED-SHOULDERED HAWK

STATUS: State-Threatened Federal-none

GLOBAL HABITAT: Moist and riverine forest, and in e. North America in wooded swamps, foraging in forest edge and open woodland.

REPRODUCTIVE HABITAT: Nests in large tree, usually in large crotch. Typically nests in large tree in stand of mature trees; understory usually well developed. Often uses nests of previous years. In east, may use nest used previously by barred owl (and vice versa).

STATE HABITAT: Prefers medium-aged to mature lowland deciduous forests (silver maple, American elm, green ash, red oak, basswood, cottonwood, black willow, box-elder, & dogwood).

ACCIPITER GENTILIS NORTHERN GOSHAWK

STATUS: State-Special Concern Federal-Candidate, under review

GLOBAL HABITAT: Deciduous and coniferous forest, forest edge and open woodland, foraging also in cultivated regions; primarily in mountains towards the south. Migrates mostly along ridges and coastlines.

REPRODUCTIVE HABITAT: Nest usually in trees in heavily wooded area; 6-23 m above ground; prefers mature forest. May use same nest in successive years. May use other hawk nest as base.

STATE HABITAT: Prefers mature Northern Hardwood Forests (white birch, sugar maple, hemlock, basswood, and red oak), mixed coniferous forests, and jack pine-oak habitat.

CHLIDONIAS NIGER BLACK TERN

STATUS: State-Special Concern Federal-Candidate, under review

GLOBAL HABITAT: Non-breeding: pelagic as well as along seacoasts, bays, estuaries, lagoons, lakes, and rivers; prefers sheltered offshore waters and bays, comes to shore chiefly during migrations.

REPRODUCTIVE HABITAT: Nests on heap of floating veg., on old muskrat house, old grebe or coot nest, floating wood; in marshes, along sloughs & lakeshores, or in wet meadows. LA: mainly in marshes > 20 ha. Usually returns to previous nesting area.

STATE HABITAT: Prefers large seasonally or semi-permanently flooded freshwater wetlands (swampy marshes or sloughs) that support an abundance of emergent aquatic vegetation & floating vegetative mats. They may nest on floating wood, muskrat lodges, or old grebe nests.

DENDROICA FUSCA BLACKBURNIAN WARBLER

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Coniferous (primarily balsam fir) and mixed forest, open woodland, second growth. In migration in various forest, woodland, scrub, and thicket habitats. In winter in forests and woodlands of mountain slopes; forest canopy and edge, semi-open areas, tall second growth.

REPRODUCTIVE HABITAT: Nests on horizontal branch of conifer, well out from trunk, in site well concealed by foliage or lichen, 2-24 m above ground.

STATE HABITAT: Prefers large tracts of lowland coniferous forests dominated by black spruce, white cedar, and hemlock; black spruce-tamarack bogs and white pine forests.

STRIX NEBULOSA GREAT GRAY OWL

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Dense coniferous & hardwood forest, especially pine, spruce, paper birch, poplar; also second growth, especially near water, foraging in wet meadows; boreal forest & wooded bogs in far north, coniferous forest & meadows in mountains.

REPRODUCTIVE HABITAT: Nests in top of large broken-off tree trunks (especially in south) or in old nests of other large birds (e.g. hawk nest) (especially in north); frequently near bogs or clearings. Nests frequently reused. Same pair often nests in same area in successive years.

STATE HABITAT: Prefers Lowland Coniferous Forests dominated by black spruce, white birch, & green ash.

ASIO OTUS LONG-EARED OWL

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Decid. & evergreen forests, orchards, wooded parks, farm woodlots, river woods, desert oases. Wooded areas for roosting & nesting, open areas for hunting. Often associated with conifers in e. North America, also with deciduous woods near water in West.

REPRODUCTIVE HABITAT: Nests in tree usually in old nest of crow, squirrel, hawk, magpies, herons; sometimes in tree cavity; rarely on ground. In ne. OR, nested in dwarf-mistletoe brooms in Douglas-fir in extensive conifer (grand fir) forest. Apparently commonly nests in same site in successive years. In ID, 4 males nested 0.5-1.5 km from natal site.

STATE HABITAT: Prefers pine forests, pine plantations, and southern deciduous forests (red oak, white oak, Hill's oak, bur oak, big-toothed aspen, sugar maple, basswood, and white ash).

COCCOTHRAUSTES VESPERTINUS EVENING GROSBEAK

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Coniferous (primarily spruce and fir) and mixed coniferous- deciduous woodland, second growth, and occasionally parks; in migration and winter in a variety of forest and woodland habitats, and around human habitation.

REPRODUCTIVE HABITAT: Usually nests in dense foliage of deciduous tree or conifer, 2-21 m above ground.

STATE HABITAT: Prefers extensive stands of black spruce adjacent to water, both deciduous and coniferous forests (especially where box elder and maples retain their fruit), and rural and urban feeding stations.

DENDRAGAPUS CANADENSIS SPRUCE GROUSE

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Coniferous forest, primarily spruce and pine, especially with dense understory of grasses and shrubs. Populations may be highest in earlier stages of post-fire succession. Primarily arboreal.

REPRODUCTIVE HABITAT: Nests on the ground in forests under cover of branches, brush, or other vegetation. The nest is a scrape, lined with twigs, grasses, and leaves.

STATE HABITAT: Prefers lowland Coniferous Forests w/ swampy regions which include white spruce, white cedar, balsam fir, yellow birch, black ash, green ash, tamarack, american elm, & red maple.

CISTOTHORUS PLATENSIS SEDGE WREN

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Grasslands and savanna, especially where wet or boggy, sedge marshes, locally in dry cultivated grainfields. In migration and winter also in brushy grasslands. Sings from exposed perch, otherwise creeps and hops on or near ground in tall sedgy grass or wet tangles at base of shrub.

REPRODUCTIVE HABITAT: Nests low in sedge, grass, or similar herbage, very near ground, or over shallow water.

STATE HABITAT: Prefers northern sedge meadows (dominated by tussock sedge, manna grass, and bluejoint grass), and shrub-carr wetlands. During dry years, they also use alfalfa and timothy fields, managed grasslands, and occasionally old field communities.

OPORORNIS AGILIS CONNECTICUT WARBLER

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Breeds in spruce and tamarack bogs, dry ridges, poplar and aspen woods, moist areas with low shrubby growth, thick undergrowth, or sapling thickets. In thickets of low wet woods or wet meadows in migration. In winter in woodland, forest borders, shrubby clearings.

REPRODUCTIVE HABITAT: Nests on ground, in small hollow, on moss mound in bog, or in grasses or weeds, or at base of shrub.

STATE HABITAT: Prefers large, monotypic tracts of Jack pine & tamarack bogs.

MERGUS SERRATOR RED-BREASTED MERGANSER

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Rivers, ponds, lakes, and coastal areas; winters mainly in estuaries and sheltered bays, less frequently on large inland bodies of water.

REPRODUCTIVE HABITAT: Nests along inland waters, generally on ground on small islands with low vegetative cover, and also near seacoast and occasionally on shores of ocean or on coastal islands.

STATE HABITAT: Prefers large, deep-water permanently flooded wetlands & riverine habitats. Occasionally small groups occur on semi-permanently flooded wetlands during spring migration.

CATHARUS USTULATUS SWAINSON'S THRUSH

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Dense tall shrubbery, coniferous woodland (especially spruce), aspen-poplar forest, second growth, willow and alder thickets. In migration and winter also deciduous forest, open woodland, humid lowland forest, scrub, brush (mostly mid. story or lower but well above ground) commonest in mountains.

REPRODUCTIVE HABITAT: Nests usually in small tree, close to trunk, often 2 m or less above ground; often in conifer, sometimes deciduous tree or shrub (e.g. willow).

STATE HABITAT: Prefers large tracts of lowland coniferous forests dominated by black spruce, balsam fir, and yellow birch. A variety of other deciduous and coniferous communities may also be used.

CIRCUS CYANEUS NORTHERN HARRIER

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Marshes, meadows, grasslands, and cultivated fields. Perches on ground or on stumps or posts. Winter roosts in undisturbed fields or marshes.

REPRODUCTIVE HABITAT: Nests on ground, commonly near low shrubs, in tall weeds or reeds, sometimes in bog; or on top of low bush above water, or on knoll of dry ground, or on higher shrubby ground near water, or in marsh.

STATE HABITAT: Prefers retired cropland (timothy-quackgrass), old field habitat, sedge meadows, & restored prairies. In areas of intensive agriculture, nesting may regularly occur in hayfields of oatfields.

PARUS HUDSONICUS BOREAL CHICKADEE

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Boreal coniferous and mixed forests, muskeg bogs, vicinity of white cedar and hemlock swamps, birches and streamside willows.

REPRODUCTIVE HABITAT: Nests in natural cavities or abandoned woodpecker holes, or in cavity dug by pair in rotten tree stub, usually within 1 m of ground (but up to 3.7 m).

STATE HABITAT: Prefers Lowland Coniferous Forests, often near bogs or muskegs. Indicative tree species include: white spruce, white cedar, balsam fir, yellow birch, black ash, green ash, tamarack, American elm, & red maple.

BUCEPHALA CLANGULA COMMON GOLDENEYE

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Ponds, lakes, rivers and coastal bays, wintering primarily in bays and estuaries, less commonly on rivers and lakes.

REPRODUCTIVE HABITAT: Usually nests near pond, lake, or river, but may nest in woodland up to a mile from water. May nest in natural tree cavity in large hardwood tree, in abandoned woodpecker hole, or nest-box. Often nests in same area in successive years. May "prospect" for future nest sites at end of breeding season.

STATE HABITAT: Prefers large open stretches of rivers that apparently support healthy populations of fishes & invertebrates. During migration they are typically associated w/ large (>20ha) permanent lakes.

COTURNICOPS NOVEBORACENSIS YELLOW RAIL

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Marshes and wet meadows; winters in both freshwater and brackish marshes, as well as in dense, deep grass and grain fields.

REPRODUCTIVE HABITAT: Nests in grassy marshes and wet meadows in freshwater situations. In MI, mainly in CAREX with standing water.

STATE HABITAT: Prefers large Northern Sedge Meadows principally vegetated by foxtail sedge, crested sedge, inland sedge, slender sedge, fox sedge, cattail, manna grass, dark-green bulrush, marsh cinquefoil, marsh milkweed, joe-pye weed, & bedstraw.

DENDROICA TIGRINA CAPE MAY WARBLER

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Open boreal coniferous forest, forest edge, and open woodland; in migration and winter also in various forest, woodland, scrub, and thicket habitats, including mangroves and gardens in PR. Winters in various woodlands, including mangroves, arid mesquite, pines, parklands, and, at times, dense forest.

REPRODUCTIVE HABITAT: Nests high in spruce or fir, 9-18 m up, near trunk on short branches near top of tree.

STATE HABITAT: Prefers various age classes of coniferous habitats & early successional stage deciduous habitats. In residential areas, they are attracted to blossoming apple trees & ornamental spruces.

FALCO COLUMBARIUS MERLIN

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Non-breeding: a wide variety of habitats including marshes, deserts, seacoasts, near coastal lakes and lagoons, open woodlands, fields, etc. May roost in conifers in winter. In se. Montana, breeding males appeared to prefer patchy shrub/grassland habitats for hunting.

REPRODUCTIVE HABITAT: Nests in conifer woodland or wooded prairie (e.g. groves of deciduous trees along rivers), including planted shelterbelts; often near water; in towns in some areas (e.g. Alberta, Manitoba, Saskatchewan). Nests in trees in abandoned crow, magpie, hawk, or squirrel nest; also in natural tree cavity or abandoned woodpecker hole, on bare cliff ledge, or scrape on ground (arctic, heather moor of U.K.). Not infrequently returns to same nesting area in successive years.

STATE HABITAT: Prefers large stands of Lowland Coniferous Forest predominated by quaking aspen, green ash, black spruce, & balsam fir. During migration, they use a variety of both open & forested habitats.

AMMODRAMUS LECONTEII LE CONTE'S SPARROW

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Moist grass or sedge meadows, damp matted grass and shrubby tangles on edges of marshes and bogs, areas of moist or dry, tall, rank grass. In migration and winter also in weedy fields, broomsedge, and cattails.

REPRODUCTIVE HABITAT: Nests on ground or to about 25 cm above ground in drier parts of open marsh, beneath tangles of old dead rushes or where grasses, sedges are thickest.

STATE HABITAT: Prefers extensive stands of Northern Sedge Meadow characterized by manna grass, water sedge, bluejoint grass, rattlesnake grass, & dark green bulrush. They may also use drier upland grasses, primarily timothy, brome grass, & Kentucky bluegrass.

NYCTICORAX NYCTICORAX BLACK-CROWNED NIGHT-HERON

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Marshes, swamps, wooded streams, mangroves, shores of lakes, ponds, lagoons; salt water, brackish, and freshwater situations. Roosts by day in mangroves or swampy woodland.

REPRODUCTIVE HABITAT: Eggs laid in platform nest in groves of trees near coastal marshes or on marine islands, swamps, marsh vegetation, clumps of grass on dry ground, orchards, and in many other situations.

STATE HABITAT: Prefers freshwater wetlands dominated by bulrush & cattail with small groves of alder & willow or other brush.

CARDUELIS PINUS PINE SISKIN

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Forests and woodlands, parks, gardens and yards in suburban areas; in migration and winter in a variety of woodland and forest habitats, partly open situations with scattered trees, open fields, pastures and savanna.

REPRODUCTIVE HABITAT: Often nests half way up a conifer or deciduous tree hidden among outer branches.

STATE HABITAT: Prefers a variety of deciduous and coniferous forest habitats. This species makes extensive use of feeding stations in residential areas.

MERGUS MERGANSER COMMON MERGANSER

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Mostly lakes and rivers; winters primarily on open lakes and rivers and brackish lagoons, rarely in marine coastal situations.

REPRODUCTIVE HABITAT: Nests usually in tree cavities, also on ground and in nest boxes and cliff crevices; generally near clear waters of lakes and rivers in forested regions and mountainous terrain.

STATE HABITAT: Prefers large, deep permanently flooded wetlands & along major rivers.

REGULUS CALENDULA RUBY-CROWNED KINGLET

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Nests in coniferous forests and woodlands. In migration and winter it also inhabits deciduous woodlands, shrubs and thickets and may be found in old fields, gardens, yards and parks.

REPRODUCTIVE HABITAT: Nests in coniferous trees (usually spruce), 1-30 m above ground. Nest usually hangs from stem or twig fork, occasionally it saddles a branch.

STATE HABITAT: Uses a wide range of both deciduous & coniferous communities. Prefers brushy communities, including deciduous clear cuts (quaking aspen, ironwood, hazelnut, sugar maple & basswood), & Lowland Coniferous Forests (black spruce, balsam fir, & yellow birch).

EMPIDONAX FLAVIVENTRIS YELLOW-BELLIED FLYCATCHER

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Damp coniferous forest, swamps, bogs. In migration in various habitats from low scrub to forest; in winter prefers understory of primary or secondary forest, scrubby woodland, and shady clearings, commonly in humid lowland forest and open woodland.

REPRODUCTIVE HABITAT: Nests on or near ground, in side of mossy mound or among roots of upturned tree, usually well hidden in sphagnum moss or growing herbage.

STATE HABITAT: Prefers black spruce-tamarack swamps and a variety of edge habitats.

PERISOREUS CANADENSIS GRAY JAY

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Coniferous and mixed coniferous-deciduous forest (primarily spruce), including open and partly open woodland and around bogs. Often around campgrounds.

REPRODUCTIVE HABITAT: Usually nests in a conifer, 1-9 m (usually 2-3 m) above ground.

STATE HABITAT: Prefers lowland coniferous forests (white spruce, white cedar, balsam fir, yellow birch, ash, tamarack, American elm, and red maple), northern hardwood forests (white birch, sugar maple, hemlock, basswood, red oak, red pine, and white pine), and Jack pine barrens (Jack pine, red pine, Hill's oak, bur oak, big-toothed aspen, and quaking aspen).

VERMIVORA PEREGRINA TENNESSEE WARBLER

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Openings of northern woodland, edges of dense spruce forests, cleared balsam-tamarack bogs, grassy places of open aspen and pines, alder and willow thickets, open deciduous second growth. In migration and winter generally in single species flocks in tops of trees of various woodland types—not typically in continuous mature forest; in winter prefers semi-open, second growth, coffee plantations, gardens.

REPRODUCTIVE HABITAT: Nests in hollow of moss in bog, or on higher level ground or hillside, in thickets or in open at base of grass or shrub.

STATE HABITAT: Prefers Northern Hardwood Forests, Lowland Coniferous Forests, Spruce-Tamarack Bogs, & residential shrubbery.

ANAS ACUTA NORTHERN PINTAIL

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Lakes, rivers, marshes and ponds in grasslands, barrens, dry tundra, open boreal forest or cultivated fields. In migration and winter in both fresh-water and brackish situations; prefers shallow, open freshwater lagoons, marshes, and slough in Costa Rica.

REPRODUCTIVE HABITAT: Most breeding associated with seasonal and semipermanent wetlands. Often nests near freshwater lakes and ponds, but may nest some distance from water. Readily uses stock-watering ponds in ND; uses all sorts of man-made ponds in Quebec. In ND, few broods on ponds of less than 0.2 ha; broods tend to use semipermanent wetlands. Habitat suitability index model assumes that optimum conditions exist for pairs when a minimum of 150 optimum wetlands account for a minimum of 65 ha per 259-ha section in prairie pothole country; optimum conditions for broods when at least 20.2 ha of optimum wetlands are present on a 259-ha section and at least 6 optimum wetlands of at least 0.4 ha are present. May nest under cover of low vegetation or in open. Broods use emergent vegetation for escape cover. Nest is a depression lined with plant material and down.

STATE HABITAT: Prefers seasonally and semi-permanently flooded wetlands that support a lush growth of emergent aquatic vegetation.

PICOIDES ARCTICUS BLACK-BACKED WOODPECKER

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Coniferous forest (primarily spruce and fir), especially windfalls and burned areas with standing dead trees; less frequently in mixed forest, rarely in winter in deciduous woodland

REPRODUCTIVE HABITAT: Nests in hole dug mostly by male in dead or living (generally with dead heart) tree, stump, fence post, or utility pole; usually 0.6-4.6 m above ground, in forest opening, often near water.

STATE HABITAT: Prefers Lowland Coniferous Forests which include white spruce, white cedar, balsam fir, yellow birch, ash, & tamarack. Coniferous trees killed by fire are particularly attractive to this species. Jack Pine Barrens may be used for feeding.

BOTAURUS LENTIGINOSUS AMERICAN BITTERN

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Fresh water bogs, swamps, wet fields, cattail and bulrush marshes, brackish and saltwater marshes and meadows. May be area-dependent; in IA, not observed in marshes <11 ha.

REPRODUCTIVE HABITAT: Eggs laid in platform nest a few inches above water in concealing vegetation; sometimes nest built on ground.

STATE HABITAT: Variable. Prefers seasonally, semi-permanently, and permanently flooded wetlands w/ river bulrush, cattail, softstem bulrush, hardstem bulrush, phragmites and reed canary grass. They occasionally use upland fields (including haylands, oat fields, managed grasslands, and retired croplands); cattail-bulrush marshes, sedge meadows, edges of Black spruce - tamarack bogs, and northern forest bordered lakes.

ANAS RUBRIPES AMERICAN BLACK DUCK

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Wide variety of wetland habitats in both freshwater and marine situations, in and around marshes, swamps, ponds, lakes, bays, estuaries, and tidal flats. As a result of a study of post-fledgling habitat use, recommended maintaining large (30-50 ha) marshes containing dense emergent vegetation near a complex of diverse wetland types.

REPRODUCTIVE HABITAT: Breeding habitat and nest sites very diverse; favors wooded swamps and marshes; usually nests on ground in concealing vegetation. Significant numbers may return to the natal home range to breed.

STATE HABITAT: Prefers large, permanently flooded, forested wetlands dominated by cattail, wild rice, iris, pickerel weed, arrowhead, bladderwort & elodea. These wetlands are slightly acidic. They also use acid bog wetlands & beaver ponds.

AYTHYA AFFINIS LESSER SCAUP

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: During migration and when not breeding, found along coast in sheltered bays, estuaries, and marshes or inland on lakes, ponds, and rivers; on salt water especially if lakes and ponds frozen. In southern winter range, prefers freshwater ponds, lakes, and sloughs with reasonably clear water 1 m or more deep.

REPRODUCTIVE HABITAT: Usually nests near small ponds and lakes, sedge meadows, creeks; in cover 1-2 ft. high, within 46 m of water. Often nest on islands among colonies of gulls or terns.

STATE HABITAT: Prefers small, semipermanent wetlands dominated by cattail, burreed, and coontail.

Fish

MOXOSTOMA VALENCIENNESI GREATER REDHORSE

STATUS: State-Threatened Federal-none

GLOBAL HABITAT: Typically in large streams, big rivers, and lakes; occasionally in moderate size streams. Probably prefers relatively unsilted substrates and clear water.

REPRODUCTIVE HABITAT: Spawns over mixed beds of gravel, sand, and rubble in moderate to swift currents.

STATE HABITAT: Prefers the clear waters of medium- to large-sized rivers, river reservoirs & large lakes at depths of less than 1m over substrates of sand, gravel or boulders.

APHREDODERUS SAYANUS PIRATE PERCH

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Lakes, ponds, marshes, quiet pools, and backwaters of low gradient streams with abundant aquatic plants, organic debris, and other cover. In both clear and turbid water, often over soft bottom.

REPRODUCTIVE HABITAT: Eggs apparently brooded in buccal cavity.

STATE HABITAT: Prefers the quiet waters of oxbows, overflow ponds, sloughs, marshes, ditches, & the pools of low-gradient streams over sand or soft muck w/ brush piles or dense vegetation.

COREGONUS ARTEDI LAKE HERRING

STATUS: State-Special Concern

GLOBAL HABITAT: Deep lakes. Moves into deeper water, to just below thermocline, in summer. Sometimes in large rivers.

REPRODUCTIVE HABITAT: Often spawns in shallow water (1-3 m) over gravel or stony substrate, but also may spawn pelagically in midwater (Great Lakes). Eggs usually deposited on bottom. Spring spawners in Lac des Ecorces, Quebec, deposited eggs in the deeper section (> 20 m) of the lake.
STATE HABITAT: Prefers relatively shallow waters of the Great Lakes & deep inland lakes. In the deep inland lakes they prefer infertile waters.

Herptiles

THAMNOPHIS SAURITUS NORTHERN RIBBON SNAKE

STATUS: State-Endangered Federal-none

GLOBAL HABITAT: Wet meadows, marshes, bogs, ponds, lake shorelines, swamps, and shallow slow streams; also wet or moist forest in some areas. Usually in or near vegetative cover at water's edge. Climbs into low vegetation. Hibernates underground on high ground.

REPRODUCTIVE HABITAT: unknown

STATE HABITAT: Prefers open sphagnum bogs and other permanent water - streams, swamps, lakes and rivers. May be found in low bushes - leatherleaf, blueberry, and cranberry.

CLEMMYS INSCULPTA WOOD TURTLE

STATUS: State-Threatened Federal-none

GLOBAL HABITAT: In streams and wooded areas and fields adjacent to streams in summer. Mostly terrestrial June-Aug. in Pennsylvania, May-Oct. in New Jersey. In streams in spring and fall. Hibernates in banks or bottoms of streams in winter.

REPRODUCTIVE HABITAT: Reproductive activity (courtship, copulation) aquatic. Eggs laid in open sunny areas in well-drained, sandy or gravelly soil.

STATE HABITAT: Prefer forested areas along fast-moving streams. During the summer they forage in deciduous forests & open meadows adjacent to rivers.

EMYDOIDEA BLANDINGII BLANDING'S TURTLE

STATUS: State-Threatened Federal-none

GLOBAL HABITAT: Marshes, ponds, swamps, bogs, lake shallows, backwater sloughs, shallow slow-moving rivers; waters with soft bottom and aquatic vegetation. Often leaves water and walks over-land. Hibernates in mud or debris at bottom of water; in Wisconsin, moved from shallower wetlands and ponds to overwinter in adjacent deeper ponds.

REPRODUCTIVE HABITAT: Eggs laid in sandy soil in upland area. In Michigan, nests were 2-1115 m (avg. 135 m) from the nearest water; most females returned to same general nesting area each year; nesting area usually was not immediately adjacent to female's marsh habitat. In Wisconsin, nested usually in grassland, average of 168 m from water and average of 620 m from non-nesting activity center.

STATE HABITAT: Prefers open grassy marshes, mesic prairies, backwater sloughs, prairie potholes, shallow slow-moving rivers & shallow lakes. The vast marshes along the lower WI River provide excellent habitat.

DIADOPHIS PUNCTATUS EDWARDSII NORTHERN RINGNECK SNAKE

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Moist habitats: forest, woodland, grassland, chaparral, near streams in arid regions. Often near abandoned buildings and in junk piles in wooded areas. Secretive; hides under-ground, in logs, or under surface cover during day.

REPRODUCTIVE HABITAT: Eggs laid underground or under logs or rocks. Often nests communally.

STATE HABITAT: Prefers moist deciduous forests and woodlands. May be found under rocks bark, fallen trees, or underground. They do not generally inhabit river bottoms or prairies.

RANA PALUSTRIS PICKEREL FROG

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Vicinity of cool clear streams and ponds in north; warm, turbid swamps in parts of south. Disperses from water's edge into fields and woods in some regions. When inactive, hides at bottom of water body or in caves in some areas.

REPRODUCTIVE HABITAT: Eggs laid and larvae develop in woodland ponds, bog ponds, streams, sloughs, and flooded ditches.

STATE HABITAT: Prefer cool, densely canopied mesic forests w/ quartzite formations near cold spring water. They remain close to bodies of water throughout the summer.

RANA CATESBELANA BULLFROG

STATUS: State-Special Concern Federal-none

GLOBAL HABITAT: Ponds, swamps, lakes, reservoirs, marshes; also brackish ponds in HI; stream margins and irrigation ditches; sometimes temporary waters 100s of meters from permanent water. Winters at bottom of pool. May disperse from water in wet weather.

REPRODUCTIVE HABITAT: Eggs laid and larvae develop in permanent slow- or non-flowing bodies of water.

STATE HABITAT: May be found along any permanent body of water - lakes, ponds, rivers & creeks. Permanent water is needed since the tadpoles require 2 years to develop.

In addition, the following species has been proposed for State Special Concern status:

HEMIDACTYLUM SCUTATUM FOUR-TOED SALAMANDER

Thomas A. Rocheleau
Dept. of Entomology
University of Wisconsin-Madison
840 Russell Labs
1630 Linden Drive
Madison, WI 53706

Dec. 12, 1994

Kathy Bleser
Dept. of Natural Resources
Bureau of Endangered Resources
101 S. Webster St.
Madison, WI

Dear Kathy:

This is the list of Lepidoptera species which I have recorded from Mole Lake, WI. Also included is a map of the area that I have surveyed. In regards to the map, the area enclosed in red labeled Area 1 is the major site. All species on the list have been found in this area. In addition the Bog Copper (*epixanthe*) has also been found at Bishop Lake (not on the map) and the main area that I have found for the West Virginia White is along the dirt road between Little Sand L. and Deep Hole L. The X's within Area 1 indicate the locations where I have light trapped. The circle within Area 1 is where the orchids are located. This is the only place that I have seen the orchids so far, but I have seen pitcher plants and sundews in other parts of the bog. The best guess that I can make as to the species of orchid is Dragonmouth orchid (*Arethusa bulbosa*).

Les Ferge was kind enough to print up the list for me and to make a note of wetland and bog species. Les also stated that one-third of the state listed species of butterflies, Geometridae, and Noctuidae occur here and that the area contains a unique combination of forest, wetland, and barrens species. There are over 440 species reported for this small area alone.

This is mainly a species list, without much other detail or information. If you are interested in going into this further, Les and I are willing to do so. I hope this survey is useful and helps in planning the management for the area.

Sincerely,

Thomas A. Rocheleau
Thomas A. Rocheleau

BUTTERFLIES OF THE MOLE LAKE AREA - FOREST COUNTY WISCONSIN

Recorded by Tom Rocheleau

MONA No.	SPECIES NAME	DATE	YEAR	COMMENT
	HESPERIIDAE			
3945	Erynnis icelus (Scudder & Burgess)	May 26	1989	
3945	Erynnis icelus (Scudder & Burgess)	May 30	1988	
3947	Erynnis icelus (Scudder & Burgess)	May 26	1989	
3947	Erynnis juvenalis (Fabricius)	May 26	1990	
3947	Erynnis juvenalis (Fabricius)	June 01	1988	
3982	Erynnis juvenalis (Fabricius)	May 30	1989	
4012	Carterocephalus palaemon mandan (Edwards)	July 01	1988	
4020	Thymelicus lineola (Ochsenheimer)	August 05	1993	
4020	Hesperia comma laurentina (Lyman)	August 10	1992	
4020	Hesperia comma laurentina (Lyman)	August 20	1994	
4020	Hesperia comma laurentina (Lyman)	September 02	1994	
4020	Hesperia comma laurentina (Lyman)	June 24	1994	
4041	Polites themistocles (Latreille)	June 24	1991	
4043	Polites mystic (Edwards)	June 27	1989	
4043	Polites mystic (Edwards)	July 01	1988	
4043	Polites mystic (Edwards)	July 08	1994	
4043	Polites mystic (Edwards)	June 24	1988	
4049	Atalopedes campestris (Boisduval)	July 08	1994	
4051	Atrytone logan (Edwards)	July 08	1988	
4059	Poanes hobomok (Harris)	May 30	1994	wetland
4077	Euphyes bimaculata (Grote & Robinson)	June 24	1988	
4078	Euphyes vestris metacomet (Harris)	July 08	1989	
	PAPILIONIDAE			
4176.1	Pterourus canadensis (Rothschild & Jordan)	May 26	1989	
	PIERIDAE			
4195	Pieris napi oleracea Harris	May 26	1991	
4195	Pieris napi oleracea Harris	June 21	1993	
4195	Pieris napi oleracea Harris	July 08	1994	
4196	Pieris virginensis Edwards	May 19	1989	
4196	Pieris virginensis Edwards	May 26	1988	
4209	Colias philodice Godart	July 08	1994	
4210	Colias eurytheme Boisduval	September 02	1991	
	LYCAENIDAE			
4249	Feniseca tarquinius (Fabricius)	May 21	1991	
4249	Feniseca tarquinius (Fabricius)	June 27	1988	
4249	Feniseca tarquinius (Fabricius)	August 05	1991	bog obligate
4260	Epidemia epixanthe (Boisduval & LeConte)	June 27	1994	
4260	Epidemia epixanthe (Boisduval & LeConte)	July 31	1993	
4260	Epidemia epixanthe (Boisduval & LeConte)	August 10	1988	bog obligate
4261	Epidemia dorcus (Kirby)	July 08	1994	
4275	Harkenclerus titus (Fabricius)	July 31	1991	
4322	Incisalia augustinus (Westwood)	May 21	1989	
4322	Incisalia augustinus (Westwood)	May 26	1988	
4361	Everes comyntas (Godart)	July 08	1989	
4363	Celastrina argiolus ladon (Cramer)	May 26	1988	
4376	Plebejus saepiolus (Boisduval)	July 08	1989	
	NYMPHALIDAE			
4423	Polygonia faunus (Edwards)	May 26	1989	
4429	Polygonia progne (Cramer)	May 26	1988	
4429	Polygonia progne (Cramer)	July 08	1988	

MONA No.	SPECIES NAME	DATE	YEAR	COMMENT
4429	<i>Polygonia progne</i> (Cramer)	September 17	1988	
4430	<i>Nymphalis vaughalli</i> (Bdv. & LeConte)	July 08	1988	
4430	<i>Nymphalis vaughalli</i> (Bdv. & LeConte)	September 17	1988	
4432	<i>Nymphalis antiopa</i> (Linnaeus)	July 08	1988	
4433	<i>Aglais milberti</i> (Godart)	September 17	1988	
4440	<i>Junonia coenia</i> (Hubner)	July 31	1994	
4450	<i>Speyeria cybele</i> (Fabricius)	June 24	1994	
4451	<i>Speyeria aphrodite</i> (Fabricius)	July 08	1993	
4459	<i>Speyeria atlantis</i> (Edwards)	June 24	1994	
4463	<i>Clossiana eunomia dawsoni</i> (Barnes & McD.)	June 12	1994	bog obligate wetland
4464	<i>Clossiana selene</i> (Denis & Schiffmuller)	May 30	1988	
4464	<i>Clossiana selene</i> (Denis & Schiffmuller)	July 08	1988	
4464	<i>Clossiana selene</i> (Denis & Schiffmuller)	August 05	1988	
4465	<i>Clossiana bellona</i> (Fabricius)	May 21	1991	
4465	<i>Clossiana bellona</i> (Fabricius)	May 26	1989	
4465	<i>Clossiana bellona</i> (Fabricius)	May 30	1988	
4465	<i>Clossiana bellona</i> (Fabricius)	September 17	1988	
4481.1	<i>Phyciodes selenis</i> (Kirby)	May 30	1988	
4481.1	<i>Phyciodes selenis</i> (Kirby)	June 24	1994	
4481.1	<i>Phyciodes selenis</i> (Kirby)	July 08	1988	
4490	<i>Charicryx nycteis</i> (Doubleday)	May 30	1988	
4522	<i>Basilarchia arthemis arthemis</i> (Drury)	June 24	1994	
4523	<i>Basilarchia archippus</i> (Cramer)	June 24	1994	
4523	<i>Basilarchia archippus</i> (Cramer)	July 10	1972	
SATYRIDAE				
4568.1	<i>Eriodia anthedon</i> (A. H. Clark)	August 20	1992	
4568.3	<i>Satyroides eurydice eurydice</i> (Linnaeus)	June 27	1991	wetland
4568.3	<i>Satyroides eurydice eurydice</i> (Linnaeus)	June 24	1994	
4583	<i>Coenonympha tullia inornata</i> Edwards	June 24	1994	
4583	<i>Coenonympha tullia inornata</i> Edwards	July 08	1993	
DANAIDAE				
4614	<i>Danaus plexippus</i> (Linnaeus)	September 02	1994	

MOTHS OF THE MOLE LAKE AREA - FOREST COUNTY WISCONSIN
Recorded by Tom Rocheleau

MONA No.	SPECIES NAME	DATE	YEAR	COMMENT
HEPIALIDAE				
18	<i>Sthenopsis argenteomaculatus</i> (Harr.)	July 09	1975	wetland
19	<i>Sthenopsis purpureascens</i> (Pack.)	July 01	1989	wetland
20	<i>Sthenopsis quadriguttatus</i> (Gr.)	July 08	1988	wetland
COSSIDAE				
2694	<i>Prionoxystus macmurtrei</i> (Guer.)	June 07	1991	
2694	<i>Prionoxystus macmurtrei</i> (Guer.)	June 12	1994	
THYATIRIDAE				
6235	<i>Habrosyne scripta</i> (Grosse)	May 30	1988	
6235	<i>Habrosyne scripta</i> (Grosse)	June 01	1990	
6237	<i>Pseudothyatira cymatophoroides</i> (Gn.)	July 08	1988	
6240	<i>Euthyatira pudens</i> (Gn.)	May 19	1994	
DREPANIDAE				
6251	<i>Drepana arcuata</i> Wlk.	May 28	1994	
6251	<i>Drepana arcuata</i> Wlk.	May 30	1988	
6251	<i>Drepana arcuata</i> Wlk.	July 08	1988	
6252	<i>Drepana bilineata</i> (Pack.)	May 28	1994	
6252	<i>Drepana bilineata</i> (Pack.)	May 30	1988	
6252	<i>Drepana bilineata</i> (Pack.)	June 01	1990	
6255	<i>Oreta rosea</i> (Wlk.)	July 08	1988	
6255	<i>Oreta rosea</i> (Wlk.)	July 08	1993	
GEOMETRIDAE				
6273	<i>Itame pustularia</i> (Gn.)	July 08	1988	
6282	<i>Itame argillacearia</i> (Pack.)	July 01	1989	
6290	<i>Itame loricaria</i> (Evers.)	July 08	1988	
6292	<i>Itame exhausicata</i> (Wlk.)	July 08	1988	
6326	<i>Semiothisa aemulataria</i> (Wlk.)	July 08	1993	
6339	<i>Semiothisa transitaria</i> (Wlk.)	July 08	1988	
6339	<i>Semiothisa transitaria</i> (Wlk.)	July 08	1993	
6341.1	<i>Semiothisa</i> n. sp. Fgn. (nr. <i>bicolorata</i>)	July 08	1988	
6342	<i>Semiothisa bisignata</i> (Wlk.)	July 08	1993	
6343	<i>Semiothisa sexmaculata</i> (Pack.)	May 30	1988	
6343	<i>Semiothisa sexmaculata</i> (Pack.)	July 08	1993	
6343	<i>Semiothisa sexmaculata</i> (Pack.)	August 05	1988	
6344	<i>Semiothisa signaria dispuncta</i> (Wlk.)	June 01	1990	
6344	<i>Semiothisa signaria dispuncta</i> (Wlk.)	July 08	1988	
6347	<i>Semiothisa pinistrobata</i> (Fgn.)	May 30	1988	
6347	<i>Semiothisa pinistrobata</i> (Fgn.)	July 08	1988	
6350	<i>Semiothisa submarmorata</i> (Wlk.)	July 08	1988	
6351	<i>Semiothisa oweni</i> (Swett)	May 30	1988	
6351	<i>Semiothisa oweni</i> (Swett)	May 31	1991	
6351	<i>Semiothisa oweni</i> (Swett)	July 08	1993	
6361	<i>Semiothisa orillata</i> (Wlk.)	May 30	1988	
6429	<i>Orthofidonia exornata</i> (Wlk.)	May 30	1988	
6436	<i>Ematurga amitaria</i> (Gn.)	May 31	1989	
6570	<i>Aethalura intertexta</i> (Wlk.)	May 30	1988	
6570	<i>Aethalura intertexta</i> (Wlk.)	June 01	1990	
6582	<i>Anacamptodes vellivolata</i> (Hulst)	June 01	1990	
6588	<i>Iridopsis larvaria</i> (Gn.)	June 24	1994	

MONA No.	SPECIES NAME	DATE	YEAR	COMMENT
6588	<i>Indopsis larvaria</i> (Gn.)	July 08	1993	
6597.3	<i>Hypagyrtis piniata</i> (Pack.)	July 08	1983	
6621	<i>Melanolophia signataria</i> (Wlk.)	May 19	1994	
6621	<i>Melanolophia signataria</i> (Wlk.)	May 30	1988	
6621	<i>Melanolophia signataria</i> (Wlk.)	June 01	1990	
6637	<i>Eufidonia convergaria</i> (Wlk.)	May 28	1994	
6637	<i>Eufidonia convergaria</i> (Wlk.)	May 30	1988	
6637	<i>Eufidonia convergaria</i> (Wlk.)	June 01	1990	
6639	<i>Eufidonia discospilata</i> (Wlk.)	June 12	1994	
6640	<i>Biston betularia cognataria</i> (Gn.)	July 08	1993	
6651	<i>Lycia ursaria</i> (Wlk.)	May 06	1994	
6651	<i>Lycia ursaria</i> (Wlk.)	May 21	1990	
6666	<i>Lomographa semiclarata</i> (Wlk.)	May 19	1994	
6666	<i>Lomographa semiclarata</i> (Wlk.)	May 28	1989	
6667	<i>Lomographa vestaliata</i> (Gn.)	May 21	1990	
6667	<i>Lomographa vestaliata</i> (Gn.)	June 01	1990	
6668	<i>Lomographa glomeraria</i> (Grt.)	May 26	1989	
6668	<i>Lomographa glomeraria</i> (Grt.)	May 30	1988	
6668	<i>Lomographa glomeraria</i> (Grt.)	June 01	1990	
6677	<i>Cabera erythemaria</i> Gn.	July 08	1993	
6678	<i>Cabera variolaria</i> (Grt.)	July 08	1993	
6726	<i>Euchlaena obtusaria</i> (Hbn.)	July 08	1993	
6728	<i>Euchlaena effecta</i> (Wlk.)	July 08	1993	
6734	<i>Euchlaena marginaria</i> (Minot)	May 30	1988	
6734	<i>Euchlaena marginaria</i> (Minot)	June 01	1990	
6739	<i>Euchlaena iranica</i> (B. & McD.)	July 08	1993	
6755	<i>Pero morisonaria</i> (Hy. Edw.)	May 30	1988	
6755	<i>Pero morisonaria</i> (Hy. Edw.)	June 01	1990	
6763	<i>Nacophora quernaria</i> (J. E. Smith)	June 07	1991	
6796	<i>Campaea perlata</i> (Gn.)	July 08	1993	
6804	<i>Petrophora subaequaria</i> (Wlk.)	May 19	1994	
6804	<i>Petrophora subaequaria</i> (Wlk.)	May 30	1988	
6804	<i>Petrophora subaequaria</i> (Wlk.)	June 01	1990	
6806	<i>Tacparia atropunctata</i> (Pack.)	May 19	1994	
6806	<i>Tacparia atropunctata</i> (Pack.)	June 01	1990	
6807	<i>Tacparia detersata</i> (Gn.)	May 30	1988	
6807	<i>Tacparia detersata</i> (Gn.)	June 01	1990	
6812	<i>Homochlodes fritillaria</i> (Gn.)	June 01	1990	
6812	<i>Homochlodes fritillaria</i> (Gn.)	June 12	1994	
6812	<i>Homochlodes fritillaria</i> (Gn.)	July 08	1993	
6818	<i>Selenia kentaria</i> (G. & R.)	May 26	1989	
6818	<i>Selenia kentaria</i> (G. & R.)	June 01	1990	
6819	<i>Metanema inatomaria</i> Gn.	July 08	1993	
6820	<i>Metanema determinata</i> Wlk.	May 21	1991	
6822	<i>Metarranthis duaria</i> (Gn.)	May 21	1991	
6822	<i>Metarranthis duaria</i> (Gn.)	May 30	1988	
6822	<i>Metarranthis duaria</i> (Gn.)	June 01	1990	
6825	<i>Metarranthis indeclinata</i> (Wlk.)	May 30	1988	
6837	<i>Probole alienaria</i> H.-S.	May 28	1989	
6837	<i>Probole alienaria</i> H.-S.	June 01	1990	
6840	<i>Plagodis serinaria</i> H.-S.	May 30	1988	
6840	<i>Plagodis serinaria</i> H.-S.	June 01	1990	

MONA No.	SPECIES NAME	DATE	YEAR	COMMENT
6843	<i>Plagodis fervidaria</i> (H.-S.)	May 28	1994	
6844	<i>Plagodis alcoolaria</i> (Gn.)	June 01	1990	
6863	<i>Caripeta divisata</i> Wlk.	July 08	1988	
6867	<i>Caripeta angustiorata</i> Wlk.	July 08	1993	
6884	<i>Besma endropiaria</i> (G. & R.)	June 01	1990	
6888	<i>Lambdina fiscellaria</i> (Gn.)	September 02	1994	
6898	<i>Cingilia catenaria</i> (Drury)	September 01	1990	
6898	<i>Cingilia catenaria</i> (Drury)	September 02	1994	
6898	<i>Cingilia catenaria</i> (Drury)	September 04	1993	
6898	<i>Cingilia catenaria</i> (Drury)	September 17	1988	
6906	<i>Nepytia canosaria</i> (Wlk.)	August 05	1988	
6912	<i>Sicya macularia</i> (Harr.)	July 08	1988	
6912	<i>Sicya macularia</i> (Harr.)	July 31	1994	
6941	<i>Eusarca confusaria</i> Hbn.	July 08	1988	
6963	<i>Tetracis crocallata</i> Gn.	June 01	1990	
6964	<i>Tetracis cachexiata</i> Gn.	June 01	1990	
6965	<i>Eugonobapta nivosaria</i> (Gn.)	July 08	1988	
6966	<i>Eutrapela clemataria</i> (J. E. Smith)	May 30	1988	
6966	<i>Eutrapela clemataria</i> (J. E. Smith)	June 01	1990	
6982	<i>Prochoerodes transversata</i> (Drury)	July 31	1994	
7048	<i>Nemoria mimosaria</i> (Gn.)	May 28	1989	
7048	<i>Nemoria mimosaria</i> (Gn.)	May 30	1988	
7058	<i>Synchlora aerata</i> (F.)	July 08	1993	
7084	<i>Hethemia pistasciaria</i> (Gn.)	May 30	1988	
7139	<i>Cyclophora pendulinaria</i> (Gn.)	May 19	1994	
7139	<i>Cyclophora pendulinaria</i> (Gn.)	August 05	1988	
7159	<i>Scopula limboundata</i> (Haw.)	July 08	1993	
7169	<i>Scopula inductata</i> (Gn.)	July 08	1988	
7169	<i>Scopula inductata</i> (Gn.)	July 08	1993	
7187	<i>Dysstroma truncata traversata</i> (Kellcott)	September 02	1994	
7203	<i>Eulithis molliculata</i> (Wlk.)	September 02	1994	
7206	<i>Eulithis explanata</i> (Wlk.)	July 08	1988	
7206	<i>Eulithis explanata</i> (Wlk.)	July 31	1994	
7206	<i>Eulithis explanata</i> (Wlk.)	August 05	1988	
7208	<i>Eulithis serrataria</i> (B. & McD.)	August 10	1993	
7229	<i>Hydriomena perfracta</i> Swett	May 28	1994	
7229	<i>Hydriomena perfracta</i> Swett	June 01	1990	
7235	<i>Hydriomena divisaria</i> (Wlk.)	May 21	1991	
7236	<i>Hydriomena renuciata</i> (Wlk.)	May 30	1988	
7236	<i>Hydriomena renuciata</i> (Wlk.)	June 01	1990	
7237	<i>Hydriomena transfigurata manitoba</i> B. & McD.	June 01	1990	
7290	<i>Coryphista meadii</i> (Pack.)	May 19	1994	
7292	<i>Hydria prunivorata</i> (Fgn.)	July 08	1988	
7293	<i>Rheumaptera hastata gothicata</i> (Gn.)	May 21	1991	
7307	<i>Mesoleuca ruficillata</i> (Gn.)	May 30	1988	
7307	<i>Mesoleuca ruficillata</i> (Gn.)	June 01	1990	
7329	<i>Anticlea vasiliata</i> Gn.	June 01	1990	
7330	<i>Anticlea multiferata</i> (Wlk.)	May 28	1994	
7388	<i>Xanthorhoe ferrugata</i> (Cl.)	May 30	1988	
7388	<i>Xanthorhoe ferrugata</i> (Cl.)	August 05	1988	
7394	<i>Epirhoe alternata</i> (Muller)	July 08	1993	
7399	<i>Euphyia unangulata intermediata</i> (Gn.)	May 30	1988	

MONA No.	SPECIES NAME	DATE	YEAR	COMMENT
7399	<i>Euphyia unangulata intermediata</i> (Gn.)	July 31	1994	
7637	<i>Cladara limitaria</i> (Wlk.)	May 19	1994	
7637	<i>Cladara limitaria</i> (Wlk.)	June 01	1990	
7639	<i>Cladara atroliterata</i> (Wlk.)	May 19	1994	
7639	<i>Cladara atroliterata</i> (Wlk.)	May 26	1989	
7639	<i>Cladara atroliterata</i> (Wlk.)	June 01	1990	
7640	<i>Lobophora nivigerata</i> Wlk.	May 26	1989	
7640	<i>Lobophora nivigerata</i> Wlk.	May 30	1988	
7640	<i>Lobophora nivigerata</i> Wlk.	June 01	1990	
7640	<i>Lobophora nivigerata</i> Wlk.	July 08	1993	
LASIOCAMPIDAE				
7670	<i>Tolyte vellea</i> (Stoll)	September 02	1994	
7673	<i>Tolyte laticis</i> (Fitch)	September 02	1994	
7687	<i>Phyllodesma americana</i> (Harr.)	May 30	1988	
7687	<i>Phyllodesma americana</i> (Harr.)	July 08	1988	
SATURNIIDAE				
7757	<i>Antheraea polyphemus</i> (Cram.)	May 30	1988	
7758	<i>Actias luna</i> (L.)	May 21	1991	
7767	<i>Hyalophora cecropia</i> (L.)	May 30	1988	
7768	<i>Hyalophora columbia</i> (S. I. Smith)	May 30	1988	tamarack bogs
7768	<i>Hyalophora columbia</i> (S. I. Smith)	May 31	1991	
SPHINGIDAE				
7784	<i>Dolba hyloeus</i> (Drury)	July 08	1988	
7786	<i>Ceratomia amyntor</i> (Geyer)	June 01	1990	
7786	<i>Ceratomia amyntor</i> (Geyer)	July 08	1993	
7807	<i>Sphinx canadensis</i> Bdv.	July 01	1989	
7807	<i>Sphinx canadensis</i> Bdv.	August 20	1992	
7809	<i>Sphinx kalmiae</i> J. E. Smith	July 01	1989	
7810	<i>Sphinx gordius</i> Cram.	May 21	1990	
7810	<i>Sphinx gordius</i> Cram.	May 30	1988	
7810	<i>Sphinx gordius</i> Cram.	June 01	1990	
7817	<i>Lapara bombycoides</i> Wlk.	May 30	1988	
7817	<i>Lapara bombycoides</i> Wlk.	July 08	1993	
7817	<i>Lapara bombycoides</i> Wlk.	July 09	1985	
7821	<i>Smerinthus jamaicensis</i> (Drury)	May 30	1988	
7821	<i>Smerinthus jamaicensis</i> (Drury)	July 08	1988	
7822	<i>Smerinthus cerisyi</i> Kby.	May 30	1988	
7822	<i>Smerinthus cerisyi</i> Kby.	June 27	1974	
7824	<i>Paonias excaecatus</i> (J. E. Smith)	May 30	1988	
7824	<i>Paonias excaecatus</i> (J. E. Smith)	June 27	1974	
7825	<i>Paonias myops</i> (J. E. Smith)	May 31	1991	
7827	<i>Laothoe juglandis</i> (J. E. Smith)	May 30	1988	
7828	<i>Pachysphinx modesta</i> (Harr.)	May 31	1991	
7828	<i>Pachysphinx modesta</i> (Harr.)	June 01	1990	
7828	<i>Pachysphinx modesta</i> (Harr.)	June 27	1974	
7855	<i>Hemaris diffinis</i> (Bdv.)	July 08	1988	
7885	<i>Darapsa myron</i> (Cram.)	June 27	1974	
7886	<i>Darapsa pholus</i> (Cram.)	May 30	1988	
7886	<i>Darapsa pholus</i> (Cram.)	June 01	1990	
NOTODONTIDAE				
7895	<i>Clostera albocincta</i> Fitch	May 28	1994	
7895	<i>Clostera albocincta</i> Fitch	June 01	1990	

MONA No.	SPECIES NAME	DATE	YEAR	COMMENT
7895	<i>Clostera albosigma</i> Fitch	July 08	1988	
7895	<i>Clostera albosigma</i> Fitch	August 10	1993	
7900	<i>Clostera brucei</i> (Hy. Edw.)	June 24	1994	
7901	<i>Clostera apicalis</i> (Wlk.)	May 28	1994	
7901	<i>Clostera apicalis</i> (Wlk.)	June 01	1990	
7917	<i>Hyperaeschra georgica</i> (H.-S.)	May 30	1988	
7921	<i>Peridea ferruginea</i> (Pack.)	May 30	1988	
7921	<i>Peridea ferruginea</i> (Pack.)	July 08	1988	
7922	<i>Pheosia rimosa</i> Pack.	May 30	1988	
7924	<i>Odontosia elegans</i> (Str.)	May 30	1988	
7924	<i>Odontosia elegans</i> (Str.)	July 08	1993	
7928	<i>Notodonta simplaria</i> Graef	May 28	1994	
7928	<i>Notodonta simplaria</i> Graef	May 30	1988	
7928	<i>Notodonta simplaria</i> Graef	June 07	1991	
7929	<i>Nerice bidentata</i> Wlk.	May 30	1988	
7930	<i>Ellida caniplaga</i> (Wlk.)	June 01	1990	
7931	<i>Gluphisia septentrionis</i> Wlk.	May 19	1994	
7931	<i>Gluphisia septentrionis</i> Wlk.	May 30	1988	
7931	<i>Gluphisia septentrionis</i> Wlk.	June 01	1990	
7931	<i>Gluphisia septentrionis</i> Wlk.	September 17	1988	
7933	<i>Gluphisia avimacula</i> Hudson	June 01	1990	
7936	<i>Furcula borealis</i> (Guer.-Meneville)	June 07	1991	
7936	<i>Furcula borealis</i> (Guer.-Meneville)	July 08	1993	
7939	<i>Furcula occidentalis</i> (Lint.)	May 30	1988	
7941	<i>Furcula modesta</i> (Hudson)	May 19	1994	
7941	<i>Furcula modesta</i> (Hudson)	May 30	1988	
7941	<i>Furcula modesta</i> (Hudson)	June 01	1990	
7942	<i>Cerura scitisscripta</i> Wlk.	May 30	1988	
7953	<i>Symmerista leucitys</i> Franc.	May 31	1991	
7994	<i>Heterocampa guttivitta</i> (Wlk.)	May 21	1990	
8005	<i>Schizura ipomoeae</i> Doubleday	July 08	1993	
8007	<i>Schizura unicomis</i> (J. E. Smith)	June 01	1990	
8007	<i>Schizura unicomis</i> (J. E. Smith)	June 12	1994	
8007	<i>Schizura unicomis</i> (J. E. Smith)	July 08	1993	
8007	<i>Schizura unicomis</i> (J. E. Smith)	August 05	1988	
8009	<i>Schizura apicalis</i> (G. & R.)	June 01	1990	
8011	<i>Schizura leptinoides</i> (Grt.)	June 24	1994	
8011	<i>Schizura leptinoides</i> (Grt.)	July 08	1993	
	ARCTIIDAE			
8043	<i>Eilema bicolor</i> (Grt.)	July 08	1988	
8043	<i>Eilema bicolor</i> (Grt.)	August 10	1993	
8045.1	<i>Crambidia pallida</i> Pack.	August 05	1988	
8051	<i>Crambidia casta</i> (Pack.)	August 05	1988	
8089	<i>Hypoprepia miniata</i> (Koy.)	June 01	1990	
8121	<i>Holomelina aurantiaca</i> (Hbn.)	July 08	1988	
8131	<i>Estigmene acrea</i> (Drury)	May 26	1984	
8134	<i>Spilosoma congrua</i> Wlk.	June 01	1990	
8134	<i>Spilosoma congrua</i> Wlk.	June 12	1994	
8134	<i>Spilosoma congrua</i> Wlk.	July 08	1988	
8140	<i>Hyphantria cunea</i> (Drury)	May 21	1991	
8140	<i>Hyphantria cunea</i> (Drury)	June 01	1990	
8140	<i>Hyphantria cunea</i> (Drury)	July 08	1993	

MONA No.	SPECIES NAME	DATE	YEAR	COMMENT
8156	<i>Phragmatobia fuliginosa</i> (L.)	May 30	1988	
8156	<i>Phragmatobia fuliginosa</i> (L.)	July 08	1988	
8158	<i>Phragmatobia assimilans</i> Wlk.	May 21	1991	
8158	<i>Phragmatobia assimilans</i> Wlk.	May 21	1993	
8158	<i>Phragmatobia assimilans</i> Wlk.	May 26	1984	
8158	<i>Phragmatobia assimilans</i> Wlk.	May 28	1994	
8158	<i>Phragmatobia assimilans</i> Wlk.	June 01	1990	
8162	<i>Platartia parthenos</i> (Harr.)	July 04	1972	
8162	<i>Platartia parthenos</i> (Harr.)	July 08	1988	
8162	<i>Platartia parthenos</i> (Harr.)	July 08	1988	
8166	<i>Arctia caja</i> (L.)	July 08	1988	
8166	<i>Arctia caja</i> (L.)	July 31	1994	
8166	<i>Arctia caja</i> (L.)	August 10	1993	
8196	<i>Grammia parthenice</i> (Koy.)	August 05	1988	
8196	<i>Grammia parthenice</i> (Koy.)	August 10	1993	
8197	<i>Grammia virgo</i> (L.)	July 08	1988	
8199	<i>Grammia arge</i> (Drury)	August 05	1988	
8214	<i>Lophocampa maculata</i> Harr.	May 31	1991	
8214	<i>Lophocampa maculata</i> Harr.	July 08	1988	
8214	<i>Lophocampa maculata</i> Harr.	July 08	1993	
8230	<i>Cynia tenera</i> Hbn.	July 08	1993	
8231	<i>Cynia oregonensis</i> (Stretch)	May 30	1988	
8231	<i>Cynia oregonensis</i> (Stretch)	July 08	1993	
8231	<i>Cynia oregonensis</i> (Stretch)	August 05	1988	
NOCTUIDAE				
Subfamily Hermininae				
8322	<i>Idia americalis</i> (Gn.)	July 08	1988	
8322	<i>Idia americalis</i> (Gn.)	July 31	1994	
8322	<i>Idia americalis</i> (Gn.)	August 11	1990	
8345	<i>Zanclognatha laevigata</i> (Grt.)	July 08	1988	
8351	<i>Zanclognatha cruralis</i> (Gn.)	July 08	1993	
8353	<i>Zanclognatha ochreipennis</i> (Grt.)	July 08	1988	
8353	<i>Zanclognatha ochreipennis</i> (Grt.)	August 10	1993	
8357	<i>Macrochilo absorptalis</i> Wlk.	July 08	1993	welland
8364	<i>Phalaenostola larentioides</i> Grt.	July 08	1988	
8364	<i>Phalaenostola larentioides</i> Grt.	August 05	1988	
8384.1	<i>Renia flavipunctalis</i> (Gey.)	August 11	1990	
8397	<i>Palthis angulalis</i> (Hbn.)	May 30	1988	
8397	<i>Palthis angulalis</i> (Hbn.)	June 01	1990	
Subfamily Rivuliinae				
8404	<i>Rivula propinqualis</i> Gn.	July 08	1993	
Subfamily Hypeninae				
8442	<i>Bomolocha baltimoralis</i> (Gn.)	May 30	1988	
8444	<i>Bomolocha palparia</i> (Wlk.)	July 08	1993	
8446	<i>Bomolocha deceptalis</i> (Wlk.)	May 30	1988	
8446	<i>Bomolocha deceptalis</i> (Wlk.)	May 31	1991	
8446	<i>Bomolocha deceptalis</i> (Wlk.)	June 01	1990	
8446	<i>Bomolocha deceptalis</i> (Wlk.)	August 20	1992	
8452	<i>Bomolocha edictalis</i> (Wlk.)	July 08	1988	
8455	<i>Lomanaltes eductalis</i> (Wlk.)	July 08	1993	
Subfamily Catocalinae				
8555	<i>Scoliopteryx libatrix</i> (L.)	July 21	1983	

MONA No.	SPECIES NAME	DATE	YEAR	COMMENT
8694	<i>Zale aeruginosa</i> (Gn.)	May 26	1989	
8694	<i>Zale aeruginosa</i> (Gn.)	May 30	1988	
8697	<i>Zale minerea</i> (Gn.)	May 26	1984	
8697	<i>Zale minerea</i> (Gn.)	May 28	1994	
8697	<i>Zale minerea</i> (Gn.)	May 30	1988	
8703	<i>Zale duplicata</i> (Bethune)	May 30	1988	
8703	<i>Zale duplicata</i> (Bethune)	June 01	1990	
8704	<i>Zale helata</i> (Sm.)	May 30	1988	
8704	<i>Zale helata</i> (Sm.)	June 01	1990	
8713	<i>Zale lunifera</i> (Hbn.)	May 19	1994	
8713	<i>Zale lunifera</i> (Hbn.)	May 26	1989	
8713	<i>Zale lunifera</i> (Hbn.)	June 01	1990	
8716	<i>Zale unilineata</i> (Grt.)	May 28	1994	
8727	<i>Parallelia bistriaris</i> Hbn.	May 30	1988	
8738	<i>Caenurgina crassiuscula</i> (Haw.)	May 30	1988	
8739	<i>Caenurgina erechtea</i> (Cram.)	August 05	1988	
8775	<i>Catocala antinympha</i> (Hbn.)	July 31	1994	
8775	<i>Catocala antinympha</i> (Hbn.)	August 05	1988	
8801	<i>Catocala ilia</i> (Cram.)	July 08	1988	
8802	<i>Catocala cerogama</i> Gn.	August 05	1988	
8803	<i>Catocala relictia</i> Wik.	August 05	1988	
8803	<i>Catocala relictia</i> Wik.	September 02	1994	
8803	<i>Catocala relictia</i> Wik.	September 04	1993	
8805	<i>Catocala unijuga</i> Wik.	August 05	1988	
8805	<i>Catocala unijuga</i> Wik.	August 20	1982	
8805	<i>Catocala unijuga</i> Wik.	September 02	1994	
8817	<i>Catocala briseis</i> Edw.	July 31	1994	
8821	<i>Catocala semirelictia</i> Grt.	August 05	1988	
8833	<i>Catocala concubens</i> Wik.	July 31	1994	
8833	<i>Catocala concubens</i> Wik.	August 05	1988	
8833	<i>Catocala concubens</i> Wik.	September 02	1994	
	Subfamily Plusiinae			
8881	<i>Abrostola urentis</i> Gn.	July 08	1993	
8896	<i>Diachrysia aeroides</i> (Grt.)	July 08	1988	
8896	<i>Diachrysia aeroides</i> (Grt.)	July 08	1993	
8896	<i>Diachrysia aeroides</i> (Grt.)	August 10	1993	
8897	<i>Diachrysia balluca</i> Gey.	July 08	1988	
8897	<i>Diachrysia balluca</i> Gey.	July 08	1993	
8897	<i>Diachrysia balluca</i> Gey.	August 10	1993	
8899	<i>Pseudeva purpurigera</i> (Wik.)	July 08	1993	
8904	<i>Chrysanympha formosa</i> (Grt.)	July 08	1993	
8905	<i>Eosphropteryx thyatyroides</i> (Gn.)	August 05	1988	wetland
8908	<i>Autographa precatonis</i> (Gn.)	June 01	1990	
8911	<i>Autographa bimaculata</i> (Steph.)	July 08	1988	
8912	<i>Autographa mappa</i> (G. & R.)	June 07	1991	
8912	<i>Autographa mappa</i> (G. & R.)	June 24	1994	
8912	<i>Autographa mappa</i> (G. & R.)	July 08	1993	
8923	<i>Autographa ampla</i> (Wik.)	June 24	1994	
8923	<i>Autographa ampla</i> (Wik.)	July 08	1993	
8924	<i>Anagrapha falcifera</i> (Kby.)	May 28	1994	
8924	<i>Anagrapha falcifera</i> (Kby.)	May 30	1988	
8926	<i>Syngrapha octoscripta</i> (Grt.)	July 08	1993	

MONA No.	SPECIES NAME	DATE	YEAR	COMMENT
8927	<i>Syngrapha epigaea</i> (Grt.)	September 02	1994	
8939	<i>Syngrapha viridisigma</i> (Grt.)	August 05	1988	
8942	<i>Syngrapha rectangula</i> (Kby.)	June 27	1991	
8942	<i>Syngrapha rectangula</i> (Kby.)	July 08	1993	
8942	<i>Syngrapha rectangula</i> (Kby.)	August 05	1988	
8945	<i>Syngrapha montana</i> (Pack.)	June 01	1988	bog obligate
8946	<i>Syngrapha microgamma</i> (Hbn.)	June 12	1994	bog obligate
8946	<i>Syngrapha microgamma</i> (Hbn.)	June 24	1994	
8950	<i>Plusia pulnami</i> Grt.	May 30	1988	wetland
8950	<i>Plusia pulnami</i> Grt.	July 08	1993	
8952	<i>Plusia contexta</i> Grt.	July 08	1993	wetland
Subfamily Sarrorthripinae				
8970	<i>Baileya ophthalmica</i> (Gn.)	May 30	1988	
8975	<i>Nycteola frigidana</i> (Wlk.)	May 19	1994	
8975	<i>Nycteola frigidana</i> (Wlk.)	September 02	1994	
Subfamily Acontiinae				
9048	<i>Lithacodia muscosula</i> (Gn.)	July 08	1993	
9053	<i>Psuedeustrotia cameola</i> (Gn.)	May 30	1988	
9055.1	<i>Mafiattha synochitis</i> (G. & R.)	July 08	1988	
9065	<i>Leuconycta diphteroides</i> (Gn.)	May 30	1988	
Subfamily Pantheinae				
9177	<i>Panthea acronyctoides</i> (Wlk.)	June 07	1991	
9177	<i>Panthea acronyctoides</i> (Wlk.)	July 08	1993	
9177	<i>Panthea acronyctoides</i> (Wlk.)	August 05	1988	
9182	<i>Panthea furcilla</i> (Pack.)	May 28	1994	
9182	<i>Panthea furcilla</i> (Pack.)	June 01	1990	
9189	<i>Colocasia propinquinella</i> (Grt.)	May 31	1991	
9189	<i>Colocasia propinquinella</i> (Grt.)	June 01	1990	
9193	<i>Raphia frater</i> Grt.	May 30	1988	
9193	<i>Raphia frater</i> Grt.	May 31	1991	
Subfamily Acronictinae				
9200	<i>Acronicta americana</i> (Harr.)	May 30	1988	
9200	<i>Acronicta americana</i> (Harr.)	June 01	1990	
9203	<i>Acronicta dactylina</i> Grt.	May 31	1991	
9203	<i>Acronicta dactylina</i> Grt.	July 08	1993	
9205	<i>Acronicta lepusculina</i> Gn.	May 30	1988	
9205	<i>Acronicta lepusculina</i> Gn.	June 01	1990	
9205	<i>Acronicta lepusculina</i> Gn.	June 12	1994	
9207	<i>Acronicta innotata</i> Gn.	May 30	1988	
9207	<i>Acronicta innotata</i> Gn.	May 31	1991	
9207	<i>Acronicta innotata</i> Gn.	June 01	1990	
9211	<i>Acronicta tritona</i> (Hbn.)	May 21	1991	
9212	<i>Acronicta grisea</i> Wlk.	May 30	1988	
9212	<i>Acronicta grisea</i> Wlk.	May 31	1991	
9212	<i>Acronicta grisea</i> Wlk.	June 01	1990	
9212	<i>Acronicta grisea</i> Wlk.	July 08	1993	
9221	<i>Acronicta funeralis</i> G. & R.	June 01	1990	
9226	<i>Acronicta superans</i> Gn.	May 31	1991	
9226	<i>Acronicta superans</i> Gn.	June 01	1990	
9226	<i>Acronicta superans</i> Gn.	July 01	1989	
9227	<i>Acronicta laetifica</i> Sm.	May 30	1988	
9227	<i>Acronicta laetifica</i> Sm.	May 31	1991	

MONA No.	SPECIES NAME	DATE	YEAR	COMMENT
9229	<i>Acronicta hesta</i> Gn.	May 31	1991	
9229	<i>Acronicta hesta</i> Gn.	June 01	1990	
9236	<i>Acronicta morula</i> G. & R.	May 21	1991	
9236	<i>Acronicta morula</i> G. & R.	June 01	1990	
9238	<i>Acronicta lobeliae</i> Gn.	May 30	1988	
9241	<i>Acronicta fragilis</i> (Gn.)	May 28	1994	
9241	<i>Acronicta fragilis</i> (Gn.)	May 31	1991	
9241	<i>Acronicta fragilis</i> (Gn.)	June 01	1990	
9257	<i>Acronicta impleta</i> Wlk.	May 30	1988	
9257	<i>Acronicta impleta</i> Wlk.	June 01	1990	
9257	<i>Acronicta impleta</i> Wlk.	June 12	1994	
9259	<i>Acronicta noctivaga</i> Grt.	May 19	1994	
9259	<i>Acronicta noctivaga</i> Grt.	May 30	1988	
9259	<i>Acronicta noctivaga</i> Grt.	June 01	1990	
9261	<i>Acronicta impressa</i> Wlk.	July 08	1993	
9261	<i>Acronicta impressa</i> Wlk.	August 05	1988	
9261	<i>Acronicta impressa</i> Wlk.	August 10	1993	
9261	<i>Acronicta impressa</i> Wlk.	August 20	1992	
9272	<i>Acronicta obliqua</i> (J. E. Smith)	June 01	1990	
9272	<i>Acronicta obliqua</i> (J. E. Smith)	June 12	1994	
9272	<i>Acronicta obliqua</i> (J. E. Smith)	June 24	1994	
9272	<i>Acronicta obliqua</i> (J. E. Smith)	July 08	1993	
9286	<i>Harrisimemna trisignata</i> (Wlk.)	May 30	1988	
9286	<i>Harrisimemna trisignata</i> (Wlk.)	July 08	1988	
Subfamily Amphipyryinae				
9326	<i>Apamea verbascoidea</i> (Gn.)	July 08	1988	
9331	<i>Apamea cristata</i> (Grt.)	July 08	1993	
9333	<i>Apamea lignicolora</i> (Gn.)	July 08	1988	
9333	<i>Apamea lignicolora</i> (Gn.)	July 31	1994	
9341	<i>Apamea vultuosa</i> (Grt.)	June 24	1994	
9348	<i>Apamea amputatrix</i> (Fitch)	July 08	1988	
9351	<i>Apamea alia</i> (Gn.)	July 08	1988	
9351	<i>Apamea alia</i> (Gn.)	July 08	1993	
9360	<i>Apamea impulsiva</i> (Gn.)	July 08	1993	
9362	<i>Apamea remissa indocilis</i> (Wlk.)	July 08	1993	
9364	<i>Apamea sordens</i> (Hufn.)	June 01	1990	
9365	<i>Apamea lateritia</i> (Hufn.)	July 08	1993	
9367	<i>Apamea dubitans</i> (Wlk.)	July 08	1993	
9382	<i>Apamea devastator</i> (Brace)	August 05	1988	
9382	<i>Apamea devastator</i> (Brace)	August 10	1993	
9396	<i>Eremobina claudens</i> (Wlk.)	August 20	1992	
9404	<i>Oligia modica</i> (Gn.)	August 10	1993	
9408	<i>Oligia exhausta</i> (Sm.)	July 08	1988	
9416	<i>Oligia minuscula</i> (Morr.)	September 02	1994	bog obligate
9419	<i>Oligia mactata</i> (Gn.)	September 02	1994	
9420	<i>Oligia illocata</i> (Wlk.)	September 02	1994	
9420	<i>Oligia illocata</i> (Wlk.)	September 04	1993	
9420	<i>Oligia illocata</i> (Wlk.)	September 17	1988	
9427	<i>Meropleon diversicolor</i> (Morr.)	September 17	1988	wetland
9429	<i>Lemmeria digitalis</i> (Grt.)	September 17	1988	wetland
9431	<i>Parastichtis suspecta</i> (Hbn.)	July 08	1988	
9437	<i>Chortodes inquinata</i> (Gn.)	July 31	1994	wetland

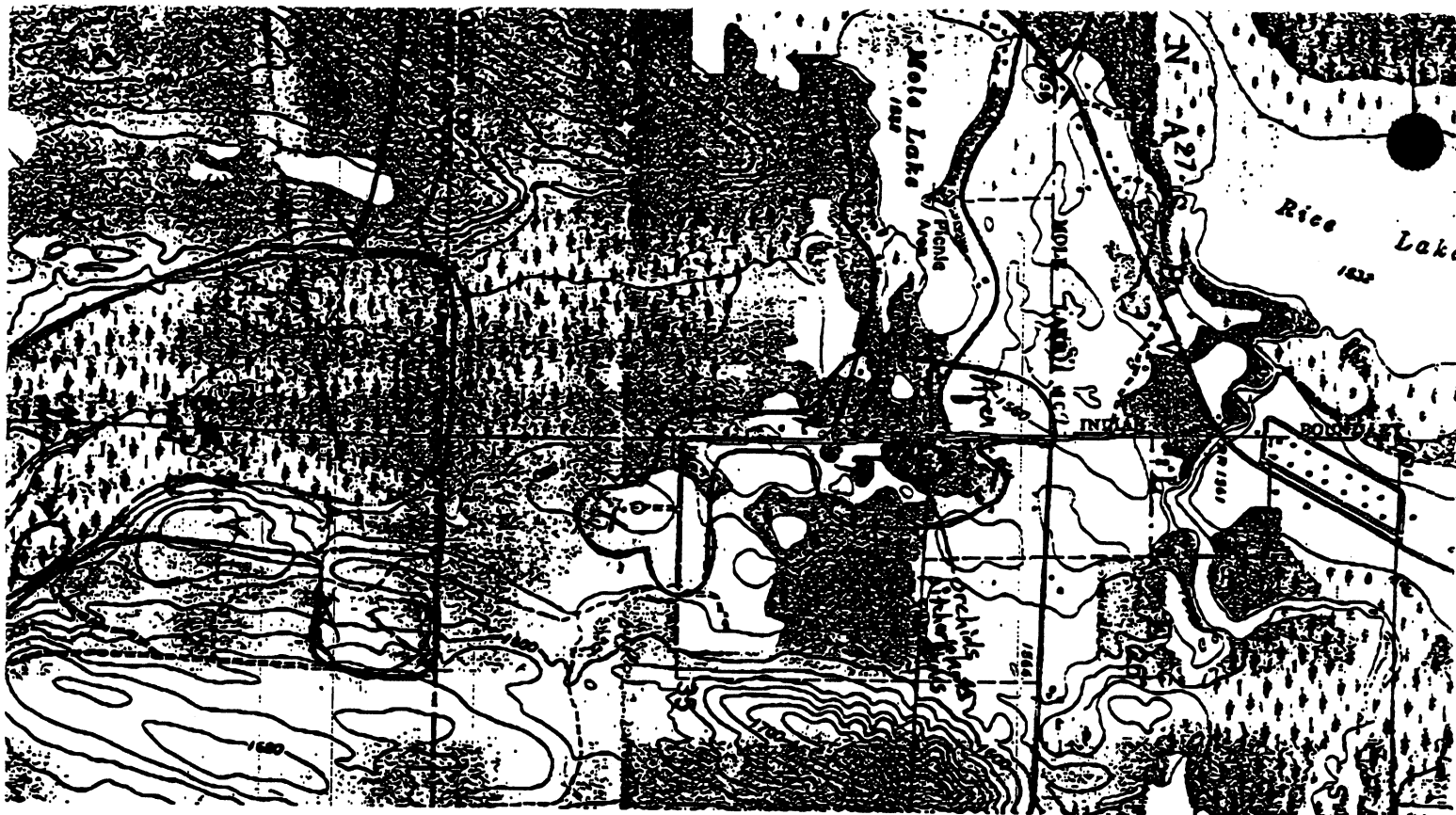
MONA No.	SPECIES NAME	DATE	YEAR	COMMENT
9437	<i>Chortodes inquinata</i> (Gn.)	August 10	1993	
9452	<i>Macronoctua onusta</i> Grt.	September 17	1988	
9453	<i>Celaena reniformis</i> (Grt.)	August 05	1988	
9453	<i>Celaena reniformis</i> (Grt.)	September 02	1994	
9453	<i>Celaena reniformis</i> (Grt.)	September 04	1993	
9453	<i>Celaena reniformis</i> (Grt.)	September 17	1988	
9454	<i>Amphipoea velata</i> (Wlk.)	September 02	1994	
9456	<i>Amphipoea interoceanica</i> (Sm.)	September 02	1994	
9457	<i>Amphipoea americana</i> (Speyer)	September 04	1993	
9478	<i>Papaipema leucostigma</i> (Harr.)	September 02	1994	
9480	<i>Papaipema pterisii</i> Bird	August 05	1988	
9480	<i>Papaipema pterisii</i> Bird	September 02	1994	
9480	<i>Papaipema pterisii</i> Bird	September 17	1988	
9483	<i>Papaipema inquaesita</i> (G. & R.)	September 17	1988	
9493	<i>Papaipema appassionata</i> (Harv.)	September 02	1994	bog obligate
9514	<i>Hydraecia micacea</i> (Esp.)	July 31	1994	
9514	<i>Hydraecia micacea</i> (Esp.)	August 10	1993	
9523	<i>Bellura gortynoides</i> Wlk.	June 01	1990	wetland
9545	<i>Euplexia benesimilis</i> McD.	May 30	1988	
9545	<i>Euplexia benesimilis</i> McD.	June 12	1994	
9545	<i>Euplexia benesimilis</i> McD.	June 24	1994	
9545	<i>Euplexia benesimilis</i> McD.	July 08	1993	
9546	<i>Phlogophora iris</i> Gn.	May 30	1988	
9546	<i>Phlogophora iris</i> Gn.	June 12	1994	
9547	<i>Phlogophora periculosa</i> Gn.	August 05	1988	
9547	<i>Phlogophora periculosa</i> Gn.	August 10	1993	
9547	<i>Phlogophora periculosa</i> Gn.	August 20	1992	
9548	<i>Conservula anodonta</i> (Gn.)	July 08	1993	bogs
9549	<i>Enargia decolor</i> (Wlk.)	August 05	1988	
9549	<i>Enargia decolor</i> (Wlk.)	September 01	1993	
9549	<i>Enargia decolor</i> (Wlk.)	September 02	1994	
9550	<i>Enargia infumata</i> (Grt.)	August 05	1988	
9555	<i>Ipimorpha pleunectusa</i> Grt.	July 31	1994	
9555	<i>Ipimorpha pleunectusa</i> Grt.	August 05	1988	
9555	<i>Ipimorpha pleunectusa</i> Grt.	August 20	1992	
9556	<i>Chytonix palliatricula</i> (Gn.)	June 01	1990	
9578	<i>Hyppa xylinoides</i> (Gn.)	May 28	1994	
9578	<i>Hyppa xylinoides</i> (Gn.)	May 30	1988	
9578	<i>Hyppa xylinoides</i> (Gn.)	June 24	1994	
9578	<i>Hyppa xylinoides</i> (Gn.)	July 08	1988	
9578	<i>Hyppa xylinoides</i> (Gn.)	August 05	1988	
9631	<i>Callopietria mollissima</i> (Gn.)	June 01	1990	
9633	<i>Callopietria cordata</i> (Ljungh)	July 08	1988	
9637	<i>Magusa orbifera</i> (Wlk.)	August 05	1988	
9637	<i>Magusa orbifera</i> (Wlk.)	September 17	1988	
9638	<i>Amphipyra pyramidoides</i> Gn.	August 05	1988	
9639	<i>Amphipyra tragopoginis</i> (Cl.)	July 31	1994	
9647	<i>Athetis miranda</i> (Grt.)	July 08	1993	
9664	<i>Balsa labecula</i> (Grt.)	June 01	1990	
9664	<i>Balsa labecula</i> (Grt.)	June 12	1994	
9678	<i>Elaphria versicolor</i> (Grt.)	July 08	1993	
9681	<i>Elaphria festivoides</i> (Gn.)	June 01	1990	

MONA No.	SPECIES NAME	DATE	YEAR	COMMENT
9696	<i>Condica vecors</i> (Gn.)	May 30	1988	
	Subfamily Cuculliinae			
9874	<i>Xylena curvimacula</i> (Morr.)	May 06	1994	
9874	<i>Xylena curvimacula</i> (Morr.)	May 19	1994	
9878	<i>Lithomoia gemmana</i> (Morr.)	September 02	1994	
9878	<i>Lithomoia gemmana</i> (Morr.)	September 04	1993	
9884	<i>Litholomia napaea</i> (Morr.)	May 06	1994	
9888	<i>Lithophane inominata</i> (Sm.)	May 19	1994	
9889	<i>Lithophane petulca</i> Grt.	May 06	1994	
9891	<i>Lithophane amanda</i> (Sm.)	May 19	1994	
9902	<i>Lithophane baileyi</i> Grt.	September 17	1988	
9917	<i>Lithophane fagina</i> Morr.	May 06	1994	
9917	<i>Lithophane fagina</i> Morr.	May 19	1994	
9928	<i>Lithophane thaxteri</i> Grt.	May 06	1994	
9930	<i>Pyreferra citomba</i> Franc.	May 06	1994	
9936	<i>Eupsilia morrisoni</i> (Grt.)	May 06	1994	
9947	<i>Epiglaea apiala</i> (Grt.)	September 02	1994	
9947	<i>Epiglaea apiala</i> (Grt.)	September 04	1993	
9952	<i>Eucirroedia pampina</i> (Gn.)	September 02	1994	
9952	<i>Eucirroedia pampina</i> (Gn.)	September 17	1988	
9957	<i>Sunira bicolorago</i> (Gn.)	September 02	1994	
9957	<i>Sunira bicolorago</i> (Gn.)	September 17	1988	
9961	<i>Anathix ralla</i> (G. & R.)	September 02	1994	
9962	<i>Anathix puta</i> (G. & R.)	September 02	1994	
9962	<i>Anathix puta</i> (G. & R.)	September 17	1988	
9965	<i>Xanthia togata</i> (Esp.)	September 17	1988	
9976	<i>Platypolia anceps</i> (Steph.)	September 04	1993	
9979	<i>Xylotype capax</i> (Grt.)	September 02	1994	
9989	<i>Sutyna privata</i> (Wlk.)	September 02	1994	
9989	<i>Sutyna privata</i> (Wlk.)	September 04	1993	
9998	<i>Brachylomia algens</i> (Grt.)	September 02	1994	
10005	<i>Feralia jocosu</i> (Gn.)	May 19	1994	
10008	<i>Feralia comstocki</i> (Grt.)	May 19	1994	
10008	<i>Feralia comstocki</i> (Grt.)	May 26	1989	
10008	<i>Feralia comstocki</i> (Grt.)	May 30	1988	
10008	<i>Feralia comstocki</i> (Grt.)	June 01	1990	
10021	<i>Copivaleria grotei</i> (Morr.)	May 19	1994	
10057	<i>Apharetra purpurea</i> McD.	July 31	1994	
10194	<i>Cucullia lucifuga</i> (D. & S.)	May 30	1988	
10200	<i>Cucullia asteroides</i> Gn.	July 08	1988	
10200	<i>Cucullia asteroides</i> Gn.	July 08	1993	
10200	<i>Cucullia asteroides</i> Gn.	August 05	1988	
	Subfamily Hadeninae			
10223	<i>Discestra trifolia</i> (Hufn.)	May 21	1991	
10265	<i>Sideridis rosea</i> (Harv.)	May 21	1991	
10265	<i>Sideridis rosea</i> (Harv.)	May 30	1988	
10272	<i>Mamestra cunialis</i> (Sm.)	May 30	1988	
10275	<i>Polia nimbose</i> (Gn.)	July 08	1988	
10275	<i>Polia nimbose</i> (Gn.)	July 08	1993	
10275	<i>Polia nimbose</i> (Gn.)	July 31	1994	
10276	<i>Polia imbrifera</i> (Gn.)	July 08	1988	
10280	<i>Polia purpurissata</i> (Grt.)	August 05	1988	

MONA No.	SPECIES NAME	DATE	YEAR	COMMENT
10280	<i>Polia purpurissata</i> (Grt.)	August 10	1993	
10280	<i>Polia purpurissata</i> (Grt.)	August 20	1992	
10292	<i>Melanchra adjuncta</i> (Gn.)	May 30	1988	
10292	<i>Melanchra adjuncta</i> (Gn.)	May 31	1991	
10292	<i>Melanchra adjuncta</i> (Gn.)	July 08	1993	
10295	<i>Melanchra assimilis</i> (Morr.)	May 21	1991	
10295	<i>Melanchra assimilis</i> (Morr.)	June 12	1994	
10295	<i>Melanchra assimilis</i> (Morr.)	July 08	1988	
10295	<i>Melanchra assimilis</i> (Morr.)	July 08	1993	
10296	<i>Lacanobia nevadae</i> (Grt.)	June 12	1994	
10300	<i>Spirameter grandis</i> (Gn.)	May 30	1988	
10300	<i>Spirameter grandis</i> (Gn.)	June 07	1991	
10300	<i>Spirameter grandis</i> (Gn.)	July 08	1993	
10301	<i>Spirameter lutra</i> (Gn.)	June 01	1990	
10301	<i>Spirameter lutra</i> (Gn.)	June 07	1991	
10301	<i>Spirameter lutra</i> (Gn.)	July 08	1993	
10302	<i>Trichordestra rugosa</i> (Morr.)	May 30	1988	bog obligate
10302	<i>Trichordestra rugosa</i> (Morr.)	June 12	1994	
10302	<i>Trichordestra rugosa</i> (Morr.)	July 08	1993	
10303	<i>Trichordestra tacoma</i> (Stkr.)	May 28	1994	
10303	<i>Trichordestra tacoma</i> (Stkr.)	May 30	1988	
10303	<i>Trichordestra tacoma</i> (Stkr.)	June 01	1990	
10304	<i>Trichordestra legitima</i> (Grt.)	July 08	1993	
10307	<i>Trichordestra legitima</i> (Grt.)	July 08	1988	
10307	<i>Trichordestra legitima</i> (Grt.)	July 08	1993	
10370	<i>Lacinipolia lustralis</i> (Grt.)	June 12	1994	
10370	<i>Lacinipolia lustralis</i> (Grt.)	June 24	1994	
10370	<i>Lacinipolia lustralis</i> (Grt.)	July 08	1993	
10405	<i>Lacinipolia lorea</i> (Gn.)	July 08	1993	
10406	<i>Lacinipolia olivacea</i> (Morr.)	July 31	1994	
10406	<i>Lacinipolia olivacea</i> (Morr.)	August 05	1988	
10406	<i>Lacinipolia olivacea</i> (Morr.)	September 02	1994	
10406	<i>Lacinipolia olivacea</i> (Morr.)	September 17	1988	
10431	<i>Faronta diffusa</i> (Wlk.)	August 05	1988	
10436	<i>Aletia oxygala</i> (Grt.)	July 08	1993	
10436	<i>Aletia oxygala</i> (Grt.)	July 31	1994	
10436	<i>Aletia oxygala</i> (Grt.)	August 10	1993	
10438	<i>Pseudaletia unipuncta</i> (Haw.)	May 21	1990	
10438	<i>Pseudaletia unipuncta</i> (Haw.)	August 05	1988	
10438	<i>Pseudaletia unipuncta</i> (Haw.)	August 10	1993	
10446.1	<i>Leucania lapidaria</i> (Grt.)	July 31	1994	
10446.1	<i>Leucania lapidaria</i> (Grt.)	August 10	1993	
10447	<i>Leucania commoides</i> Gn.	July 08	1993	
10447	<i>Leucania commoides</i> Gn.	August 10	1993	
10449	<i>Leucania insueta</i> Gn.	June 12	1994	
10449	<i>Leucania insueta</i> Gn.	July 08	1993	
10462	<i>Leucania pseudargyria</i> Gn.	July 08	1988	wetland
10490	<i>Orthosia revicta</i> (Morr.)	May 06	1994	
10490	<i>Orthosia revicta</i> (Morr.)	May 26	1984	
10490	<i>Orthosia revicta</i> (Morr.)	May 26	1989	
10490	<i>Orthosia revicta</i> (Morr.)	May 30	1988	
10491	<i>Orthosia alurina</i> (Sm.)	July 08	1993	

MONA No.	SPECIES NAME	DATE	YEAR	COMMENT
10495	<i>Orthosia hibisci</i> (Gn.)	May 06	1994	
10501	<i>Crocigrapha normani</i> (Grt.)	May 30	1988	
10501	<i>Crocigrapha normani</i> (Grt.)	June 01	1990	
10501	<i>Crocigrapha normani</i> (Grt.)	June 12	1994	
10501	<i>Crocigrapha normani</i> (Grt.)	July 01	1990	
10513	<i>Egira dolosa</i> (Grt.)	May 19	1994	
10513	<i>Egira dolosa</i> (Grt.)	May 21	1991	
10513	<i>Egira dolosa</i> (Grt.)	June 01	1990	
10518	<i>Achatia distincta</i> Hbn.	May 19	1994	
10518	<i>Achatia distincta</i> Hbn.	June 01	1990	
10520	<i>Morrisonia evicta</i> (Grt.)	May 26	1989	
10520	<i>Morrisonia evicta</i> (Grt.)	June 01	1990	
10521.1	<i>Morrisonia latex</i> (Gn.)	June 01	1990	
10521.1	<i>Morrisonia latex</i> (Gn.)	June 24	1994	
10524	<i>Nephelodes minians</i> Gn.	August 05	1988	
10563	<i>Protorthodes oviduca</i> (Gn.)	May 21	1990	
10563	<i>Protorthodes oviduca</i> (Gn.)	May 30	1988	
10563	<i>Protorthodes oviduca</i> (Gn.)	May 31	1991	
10567	<i>Ulolonche culea</i> (Gn.)	June 01	1990	
10585	<i>Orthodes crenulata</i> (Butler)	June 24	1994	
10585	<i>Orthodes crenulata</i> (Butler)	July 08	1993	
10587	<i>Orthodes cynica</i> Gn.	May 30	1988	
10587	<i>Orthodes cynica</i> Gn.	June 01	1990	
10587	<i>Orthodes cynica</i> Gn.	June 24	1994	
10589.1	<i>Orthodes goodelli</i> (Grt.)	June 01	1990	
10627	<i>Tricholita signata</i> (Wlk.)	July 31	1994	
10627	<i>Tricholita signata</i> (Wlk.)	August 05	1988	
10627	<i>Tricholita signata</i> (Wlk.)	August 10	1993	
	Subfamily Noctuidae			
10651	<i>Agrotis venerabilis</i> Wlk.	September 02	1994	
10651	<i>Agrotis venerabilis</i> Wlk.	September 04	1993	
10659	<i>Agrotis volubilis</i> Harv.	May 30	1988	
10659	<i>Agrotis volubilis</i> Harv.	June 12	1994	
10674	<i>Feltia subgothica</i> (Haw.)	August 05	1988	
10676	<i>Feltia herilis</i> (Grt.)	August 05	1988	
10705	<i>Euxoa messoria</i> (Harr.)	September 02	1994	
10715	<i>Euxoa scandens</i> (Riley)	July 08	1993	
10731	<i>Euxoa auxiliaris</i> (Grt.)	May 31	1991	
10755	<i>Euxoa declarata</i> (Wlk.)	September 04	1993	
10891	<i>Ochropleura plecta</i> (L.)	May 30	1988	
10891	<i>Ochropleura plecta</i> (L.)	July 08	1993	
10915	<i>Peridroma saucia</i> (Hbn.)	May 06	1994	
10917	<i>Diarsia rubifera</i> (Grt.)	June 24	1994	
10917	<i>Diarsia rubifera</i> (Grt.)	July 08	1993	
10917	<i>Diarsia rubifera</i> (Grt.)	August 10	1993	
10919	<i>Diarsia jucunda</i> (Wlk.)	July 08	1993	
10928	<i>Graphiphora augur haruspica</i> (Grt.)	July 31	1994	
10928	<i>Graphiphora augur haruspica</i> (Grt.)	August 10	1993	
10929	<i>Eurois occulta</i> (L.)	August 10	1993	
10929	<i>Eurois occulta</i> (L.)	September 02	1994	
10930	<i>Eurois astricta</i> Morr.	July 31	1994	
10930	<i>Eurois astricta</i> Morr.	August 05	1988	

MONA No.	SPECIES NAME	DATE	YEAR	COMMENT
10930	<i>Eurois stricta</i> Morr.	August 10	1993	
10942	<i>Xestia c-nigrum adela</i> Franc.	July 08	1988	
10942	<i>Xestia c-nigrum adela</i> Franc.	July 08	1993	
10942.1	<i>Xestia dolosa</i> Franc.	July 08	1993	
10943	<i>Xestia normaniana</i> (Grt.)	August 05	1988	
10943	<i>Xestia normaniana</i> (Grt.)	August 20	1992	
10944	<i>Xestia smithii</i> (Snell.)	August 05	1988	
10947	<i>Xestia oblata</i> (Morr.)	June 24	1994	
10947	<i>Xestia oblata</i> (Morr.)	July 08	1993	bogs
10950	<i>Xestia bicarnea</i> (Grt.)	August 05	1988	
10951	<i>Xestia tenuicula</i> (Morr.)	July 31	1994	
10954	<i>Xestia bugrai</i> Kocak	September 02	1994	
10968	<i>Xestia badicollis</i> (Grt.)	September 02	1994	
10970	<i>Xestia youngii</i> (Sm.)	September 02	1994	bogs
10988	<i>Eugraphe subrosea</i> (Steph.)	September 02	1994	wetland
10992	<i>Paradiarsia littoralis</i> (Pack.)	July 08	1993	
10993	<i>Hemipachnobia subporphyrea</i> (Wlk.)	June 24	1994	bog obligate
10994	<i>Cerastis tenebrifera</i> (Wlk.)	May 19	1994	
10994	<i>Cerastis tenebrifera</i> (Wlk.)	June 12	1994	
10996	<i>Metalepsis salicarum</i> (Wlk.)	May 06	1994	
11000	<i>Anaplectoides prasina</i> (D. & S.)	July 08	1993	
11000	<i>Anaplectoides prasina</i> (D. & S.)	July 31	1994	
11000	<i>Anaplectoides prasina</i> (D. & S.)	August 20	1992	
11001	<i>Anaplectoides pressus</i> (Grt.)	July 08	1993	
11006	<i>Protolampra brunneicollis</i> (Grt.)	August 10	1993	
11006	<i>Protolampra brunneicollis</i> (Grt.)	September 02	1994	
11008	<i>Eueretagrotis perattenta</i> (Grt.)	July 08	1993	
11009	<i>Eueretagrotis attenta</i> (Grt.)	July 08	1988	
11009	<i>Eueretagrotis attenta</i> (Grt.)	July 08	1993	
11010	<i>Heptagrotis phyllophora</i> (Grt.)	July 08	1988	
11010	<i>Heptagrotis phyllophora</i> (Grt.)	July 08	1993	
11010	<i>Heptagrotis phyllophora</i> (Grt.)	August 05	1988	
11012	<i>Cryptocala acadiensis</i> (Bethune)	July 08	1988	wetland
11012	<i>Cryptocala acadiensis</i> (Bethune)	July 31	1994	
	Subfamily Heliothinae			
11064	<i>Pynhia exprimens</i> (Wlk.)	June 07	1991	
11064	<i>Pynhia exprimens</i> (Wlk.)	July 08	1988	
11068	<i>Helicoverpa zea</i> (Boddie)	September 17	1988	
11072	<i>Heliothis phloxiphagus</i> G. & R.	June 01	1990	



STOPPED

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DATE: April 18, 1995

APR 27 1995

FILE REF: 1650

TO: Jim Addis
Steve Miller

FROM: Chuck Pils

SUBJECT: Lepidoptera occurring near proposed Crandon mine site

Cathy Bleser received a list of approximately 450 lepidoptera (~10% butterflies, ~90% moths) collected by Tom Rocheleau near the proposed Crandon mine site. The collections occurred within and adjacent to the project area as identified in Crandon Mining Company's (CMC) *Work Plan for endangered and threatened species investigations*. A copy of Tom's December 12, 1994 letter, along with the species list, is attached. There is no associated qualitative and quantitative data (e.g. population size and trends, reproductive condition, habitat preferences, species associates, etc.) available with this list.

ISSUE

For many of the species Tom collected in the Crandon area (but especially the moths), BER has little, if any, information about their status, condition, distribution, numbers, etc. in Wisconsin. The information we do have is contained within the Natural Heritage Inventory (NHI) database where most of the occurrences of butterflies and moths are from private collectors. Les Ferge has been our Bureau's primary advisor on lepidopteran issues and is clearly the state's preeminent source and interpreter of butterfly and moth data. The NHI lepidopteran Working List has been developed under his and others' counsel. Although we had enough information in the past to support listing of two moths (silphium borer moth and phlox moth - both Endangered), only six other moths are currently on our Special Concern list (compared to 46 butterflies). Special Concern species are species about which some problem of abundance or distribution is suspected but not yet proved. Few moths are represented on the Special Concern List because insufficient data is available to conclude that there might be a problem. Clearly, our moth database is early in its evolution leaving us with little ability to interpret the information presented in Tom's list. This lack of baseline data presents the DNR with a decision to make: of what use is Tom's list in the Department's review of the proposed mine?

BACKGROUND

As CMC was developing its Notice of Intent and Scope of Study, BER provided CMC with information on known occurrences of rare species in the vicinity of the proposed mine (there were seven). In addition to these species, our biologists also developed a list of rare species (from the NHI Working List) that they believed might occur within the project area if habitat conditions were suitable (in total, another 104 species). All of the species presented to CMC are on our NHI Working List. We did not ask CMC to conduct surveys for taxa where we would have little ability to interpret the results (e.g. moths, beetles, nematodes, non-vascular plants, etc.)

We did have adequate information on ten butterflies (all Special Concern species) to conclude that they may occur in the project area if habitat conditions are appropriate. We asked for, and CMC completed this past summer, surveys for these butterfly species. They recorded 43 species,

including four of the ten species we noted. Interestingly, they also located one State-Endangered and two Special Concern species that we did not expect they would find. A list of rare butterflies that Tom and CMC collected, as well as those species we noted to CMC, is attached. We did not ask that CMC conduct any surveys for moths.

John Pohlman recently talked with Tom and Les to gather some background information. Tom works for the UW-Madison Entomology Department and has collected butterflies and moths around the state as an avocation for many years. He has collected in the Crandon area for about the last ten years (I believe his uncle has a cabin near the proposed mine site.) This list represents the largest number of lepidopteran species collected in any one area of Wisconsin and comprises one-third of the lepidopteran species ever recorded in our state. [I believe the second largest collection from a single area is approximately 330 species from Jackson County near Black River Falls.] Three moth species collected represent state records, one of which is not considered native. Seven (7) Special Concern species (all butterflies) were collected. *However, no state or federally Endangered or Threatened species, nor any species under consideration for listing, were recorded.* Tom collected a voucher specimen of all species recorded. Some of these vouchers have been submitted to the UW Entomology collection, the rest remain in Tom's personal collection. Les and George Balogh (an expert on the Geometridae) have confirmed the identification of nearly all of the 450 species.

Les attributes such a large number of species collected in one area to two factors: (1) a diverse mosaic of habitat types (wetlands, forests, and barrens-like openings) in close proximity to one another, and (2) the impressive level and persistence of Tom's survey effort. Les believes that other areas around the state that have similar habitat diversity would probably contain similar levels of lepidopteran diversity. He believes this area is probably "above average" in lepidopteran diversity and estimates, based upon his professional judgement, that Tom's collection represents approximately 75-90% of the species that occur in the area. He also suspects that future survey work will probably show that the two native species that are new records for Wisconsin, and possibly several other species on Tom's list, are indeed rare (although it is too early to assess whether they would warrant listing as Threatened or Endangered.)

Given the habitat conditions surveyed, Les is not surprised that many of the species were collected - most are quite "ordinary". However, for some species that Tom collected, not enough information is available on their status, condition, distribution, and basic biology, to determine whether they are truly rare. Gathering this level of information would require starting with a regional or national investigation of museum, private, and university collections. A high level of coordinated, statewide sampling surveys would probably also be necessary. As a start, Les has offered to review the list and, using best professional judgement and his personal collection, identify the approximately dozen species he suspects may be rare and worthy of additional research. The review of collections and their interpretation would be a large task that only a small number of experts would be qualified to conduct - two names come to mind: Les and Dale Schweitzer, a lepidopterist working for TNC's Eastern Regional Office.

CONCLUSIONS

As with other issues facing the Bureau, we must base our decision making on sound scientific evidence. In those instances where we have inadequate baseline data on a species group to assess actual rarity of species, I believe information on the occurrences of these species should only be referenced in the description and assessment of a project area's flora and fauna. Until we have adequate information on a species group to make scientifically sound assessments of rarity, I do not believe it is appropriate to consider these species as unique resources in regulatory decision-making.

With our current level of understanding of moths in the state and our current expertise in the Bureau, we cannot conclude that any species presented in Tom's list are actually rare. Thus, there is no reason for CMC to provide the department with information on whether any moths that Tom recorded occur within the proposed mine's impact area. If, in the future, we have access to information that enables the department to assess actual rarity of moths, then we could evaluate the impacts to rare moth species from proposed or existing projects. This level of information would also allow BER and the DNR to pursue listing of species as appropriate.

BER does not have any resources to divert to actively build the moth database. Its development, like the databases for many other invertebrate species groups, will depend in large part on the contributions of private collectors. It may be a slow process, but I'm confident that in the not-too-distant future enough information on moths will be consolidated into the NHI database on the condition, status, and ecology of moths to identify species that warrant specific survey work. These surveys will determine actual rarity in the state and will provide the necessary information to support listing (and regulatory) decisions.

RECOMMENDED ACTIONS

- (1) Write to Tom thanking him for his impressive survey work and ask to add his information to our data files.
- (2) Given the extended time period needed to prepare and review information to support an application for the proposed mine, CMC was previously notified that there may be changes in the Endangered and Threatened Species List. Write to CMC notifying them of our decision and reiterate that in the future we may be presented with information that allows us to assess the proposed mine's impacts to moths. CMC may or may not wish to be involved in assembling additional moth information.
- (3) Contact Les Ferge and take him up on his offer to narrow this list to species he believes are relatively rare. I am unsure whether we would need to contract with him to have this work done.
- (4) Reference this list of lepidoptera in the Environmental Impact Statement in the description of the area's biota.

If this is an appropriate course of action, please advise so I can follow through as necessary.

cc: Bill Tans - EA/6
 Archie Wilson - NCD
 Larry Lynch - SW/3
 Jim Christensen - LC/5
 Chuck Hammer - LC/5
 Betty Les - ER/4
 Cathy Bleser - ER/4
 John Pohlman - ER/4

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APR 19 1985

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MOTHS collected near proposed Crandon Mine
3/30/95

<u>Scientific name</u>	<u>Common name</u>	<u>Tom R. list</u>	<u>BER* list</u>	<u>CMC list</u>	<u>Status</u>
<i>Boloria (Clossiana) eunomia</i>	Bog fritillary		X		SC
<i>Boloria (Clossiana) freija</i>	Freija fritillary		X		SC
<i>Boloria (Clossiana) frigga</i>	Frigga fritillary		X		SC
<i>Coenonympha tullia</i>	Inornate ringlet	X	X	X	1
<i>Erebia discaidalis</i>	Red-disked alpine		X		SC
<i>Euphyes bimacula</i>	Two-spotted skipper	X			SC
<i>Euphyes dion</i>	Dion skipper		X		SC
<i>Feniseca tarquinius</i>	Harvester			X	SC
<i>Hesperia comma</i>	Laurentian skipper	X			SC
<i>Lycaeides idas nabokovi</i>	Northern blue			X	END
<i>Lycaena (Epidema) dorcas</i>	Dorcas copper	X	X	X	SC
<i>Lycaena (Epidema) epixanthe</i>	Bog copper	X	X	X	SC
<i>Oeneis jutta ascerta</i>	Jutta arctic		X		SC
<i>Phyciodes batesii</i>	Tawny crescent spot			X	SC
<i>Pieris virginiensis</i>	West Virginia white	X	X	X	SC
<i>Plebejus saepiolus</i>	Saepiolus blue	X			2
<i>Satyrrium (Harkenclenus) titus</i>	Coral hairstreak	X			SC
<i>Satyrodes eurydice</i>	Eyed brown			X	3

* = BER provided a list to CMC of species we suspected might occur in the area if habitat conditions suitable (see September 2, 1993 letter to Don Moe)

1 = may remove from Special Concern list in 1995

2 = may add to Special Concern list in 1995

3 = BER tracks a subspecies (*S.e. fumosa*), unsure whether this is what CMC collected

DATE: October 12, 1994

TO: George Meyer - AD/5
John Fryatt - AD/5
John Pohlman - ER/4
Tom Meyer - ER/4
June Dobberpuhl - ER/4
Archie Wilson - NCD

Maryann Sumi - AD/5
Charles Hammer - LC/5
Chuck Pils - ER/4
Larry Lynch - SW/3
Bob Grefe - SW/3
Ron Eckstein - NCD

FROM: Bill Tans - EA/6 *B.T.*

SUBJECT: For Your Information: Goblin Fern, a Wisconsin Endangered Plant, Discovered at the Crandon Mining Company Project Site

Introduction

Goblin Fern, *Botrychium mormo*, is an endangered plant in Wisconsin and a species that also has been proposed for review by the U.S. Fish and Wildlife Service for potential federal status. During field searches in 1994, botanists working for Foth & Van Dyke, the chief environmental consultant for the Crandon Mining Company, located a significant number of populations of Goblin Fern on and adjacent to its proposed mining site in Forest County. The purpose of this memorandum is to alert you to these discoveries, evaluate their significance and identify appropriate responses and future actions.

Goblin Fern

Goblin Fern is a tiny and very inconspicuous fern growing to a height of from several centimeters to about 12 centimeters tall. See the attached photograph taken by Dr. James Peck from an Ashland County site he discovered. It occurs almost exclusively in second growth northern hardwood forests of sugar maple and basswood ranging across northern Michigan, northern Wisconsin and northern Minnesota. Map 1 shows its entire distribution based on the counties in which it is known.

Goblin Fern is very difficult to find in its native habitat. Some of the smaller Goblin Fern plants, with stems 1-2 mm thick, barely protrude from beneath the leaf litter. According to those who have repeatedly observed Goblin Fern in its native habitat, the plants may not even emerge from beneath the forest floor leaf litter during dry periods, and to find it under those circumstances, one must scrape away the litter to see the dwarfed, pale plants. In addition, it apparently emerges in late summer and is not visible for much of the growing season. At the Crandon Mining Company project site all the populations were found between mid-August and mid-October, but then leaf fall made further searching impossible.

Goblin Fern was recognized and formally described as a new species in 1981 by Warren H. Wagner of the University of Michigan, who had observed it for many years in the field before that. It was added to Wisconsin's endangered species list in April 1985 based on the lack of current and historical collections. Certainly its small size, late emergence and recent description all have contributed to our overall lack of knowledge about this tiny member of our native flora.

In Wisconsin, Goblin Fern was known from three historical sites where it was collected in 1915, 1938 and 1951, and three modern collections of 1979 to 1993 prior to the discoveries near Crandon. Attempts to relocate Goblin Fern at the three historical sites have failed. See Map 2 for its Wisconsin distribution.

During 1994, Mark Jaunzems, Gary Fewless and other botanists searching the Crandon Mining Company project site discovered Goblin Fern in 14 new locations in Forest and adjacent Langlade Counties. These locations are separated by 1,000 feet or more in all but one instance, where two locations are about 500 feet apart. The three other sites lie 10-17 miles in a northerly direction from the proposed mine site, within the Nicolet National Forest. These are the first collections of Goblin Fern in that National Forest.

Status in Other States

Goblin Fern has been collected from eight sites in seven counties in Michigan. All of the collections were between 1951 and 1956, and there is no information on the plant's current status at these sites. The Michigan Natural Features Inventory staff has not had funds to search the historical Goblin Fern sites to determine whether it remains at the sites. In Minnesota, Goblin Fern is known from 7 counties, although its presence has been documented recently at only four sites. In both states, Goblin Fern is a special concern species, although it has been recommended for threatened status in Minnesota.

In all three states there is considerable interest in finding new sites for Goblin Fern, particularly within the national forests. This new information from Wisconsin should be particularly useful to those searching for the species.

Goblin Fern at the Proposed Mine Site

Although Department staff and consultants spent a great number of field days in the 1980's on the proposed site when Exxon proposed a mining project there, Goblin Fern was not found. I attribute this to the fern's small size and inconspicuous habit, but also because only a few specialists in the state even knew about the plant then. It had just recently been described in the scientific literature. In addition, the emphasis of the earlier biological studies was to produce a complete list of species present, while the current focus was on finding rare, threatened or endangered species. When Goblin Fern was officially added to the state's endangered species list in 1985, most of the biological inventory work on site had been completed.

Several of the populations of Goblin Fern in the project area occur in or adjacent to the proposed tailings management area, which if developed would destroy the Goblin Fern habitat. This area was targeted for intensive botanical searches first, and the search was subsequently expanded to comparable habitats within a several mile radius after the first populations were found. No

populations were found in the mine/mill area. In total, about 104 plants were observed at all sites.

Several specimens from the sites were collected, particularly if they appeared to be dying back or had been stepped on by animals or otherwise injured. Specimens will be maintained at both the University of Wisconsin-Madison and Green Bay herbaria. For further information, contact Gary Fewless, at UW-Green Bay (414-465-2243).

Significance of the Populations

The presence of a newly discovered population of any state endangered plant species is significant; the discovery of 14 new populations in several townships is even more significant. It is obvious that Goblin Fern is more widespread than anyone previously thought, particularly in Forest County, and the discovery raises a lot of additional questions. In how many additional sites might we find Goblin Fern in Lincoln, Vilas, Oneida, Florence or Marinette Counties, for example, each of which contain comparable habitat preferred by the plant, if qualified botanists searched next summer and fall?

U.S. Forest Service personnel in the Chequamegon National Forest have searched for several years for Goblin Fern within the Forest Service lands with only limited success. They have found two sites in Taylor County and one in Ashland County. In contrast, the focused search in the vicinity of the proposed mine during a relatively brief period has been highly successful. How many more populations of this plant will be located is uncertain, but it is clear that an intensive, coordinated search in 1995 is necessary and desirable.

In my opinion, it is likely that Goblin Fern is often overlooked and may be under-collected. Certainly this was true in the project site prior to 1994. Only a handful of botanists in Wisconsin have ever seen and searched for Goblin Fern. It will be very interesting to see if any additional populations will be found next season during organized searching in the appropriate habitat.

Regulatory Implications

The mining law (in section 144.81(18)(a), Wisconsin Statutes) and Chapter NR 132, Wisconsin Administrative Code, (Metallic Mineral Mining) address endangered species in almost identical fashion by defining what is an "unsuitable" mining site for surface mines (emphasis added). In s. 132.03 (25), an unsuitable area means:

"...that the land proposed for surface mining is not suitable for such activity because the surface mining activity itself may reasonably be expected to destroy or irreparably damage either of the following: (a) Habitat required for survival of species of vegetation or wildlife as designated in Ch. NR 27, if such endangered species cannot be firmly reestablished elsewhere."

Because the proposal is for an underground mine, it would be argued that the above language in the mining law would not apply in this case.

Chapter NR 182, Regulation of Metallic Mining Wastes, also applies to the proposed project, and section NR 182.07, **Location criteria**, also addresses this issue, stating that a mining waste site cannot be constructed in an area that is unsuitable (along with other locational criteria, such as within 1,000 feet of a lake) except if an exemption is granted under s. NR 182.19. It goes on further to state: "In addition to s. 144.81(18)(a), Stats., the presence of endangered and threatened species as designated by the department under s. 29.415, Stats., shall be considered."

It is not explicitly stated how we would evaluate the presence of endangered and threatened species. One way would be based on the criteria that if the habitat is required for the survival of the species in Wisconsin, or if the species cannot be firmly reestablished elsewhere, then the proposed waste site could not be approved.

The presence of threatened or endangered species also would be used during the review of alternative locations for a potential waste disposal site. Section NR 182.08(2)(k)2 states "In order to minimize the total adverse environmental impact, a viable site shall be chosen that would result in the least total overall adverse environmental impact."

Follow-up Action

I recommend the following actions in view of the significant populations of this endangered plant in and around the proposed tailings management area:

1. DNR will request that Crandon Mining Company conduct focused searches for additional Goblin Fern populations in a multi-county region. This would contribute to our knowledge base on the plant's status in the region. DNR would assist in planning and conducting this work.
2. The Crandon Mining Company should evaluate the potential effects on populations of Goblin Fern in the tailings management area should the project be approved as proposed.
3. The Crandon Mining Company, in conjunction with DNR, should develop strategies to avoid, reduce or mitigate the loss of known populations of Goblin Fern from the proposed mining site.

I will be discussing these issues with Department staff and company representatives and following through with them this winter. If you have any comments or suggestions, please contact me to discuss them. Thank you.

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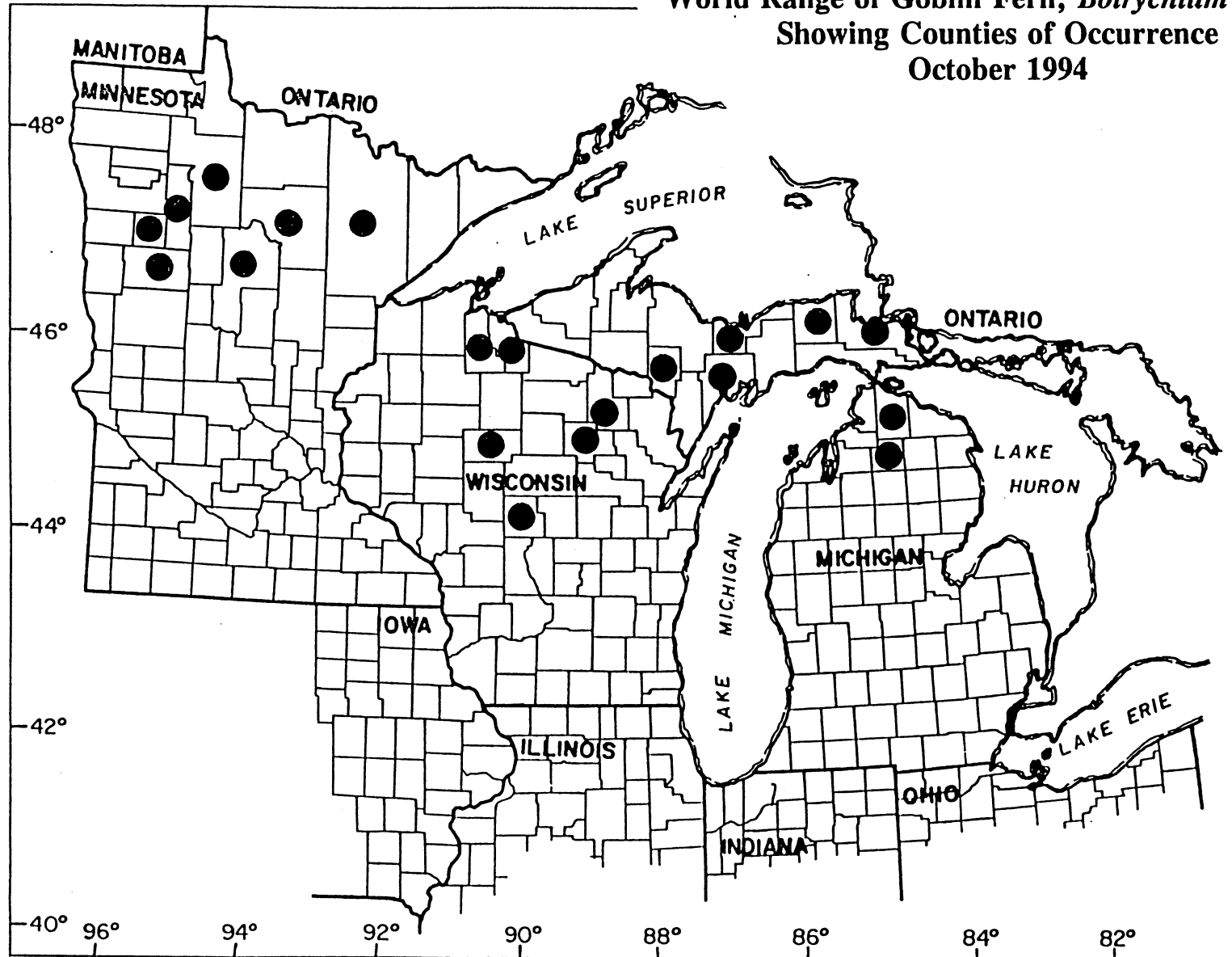
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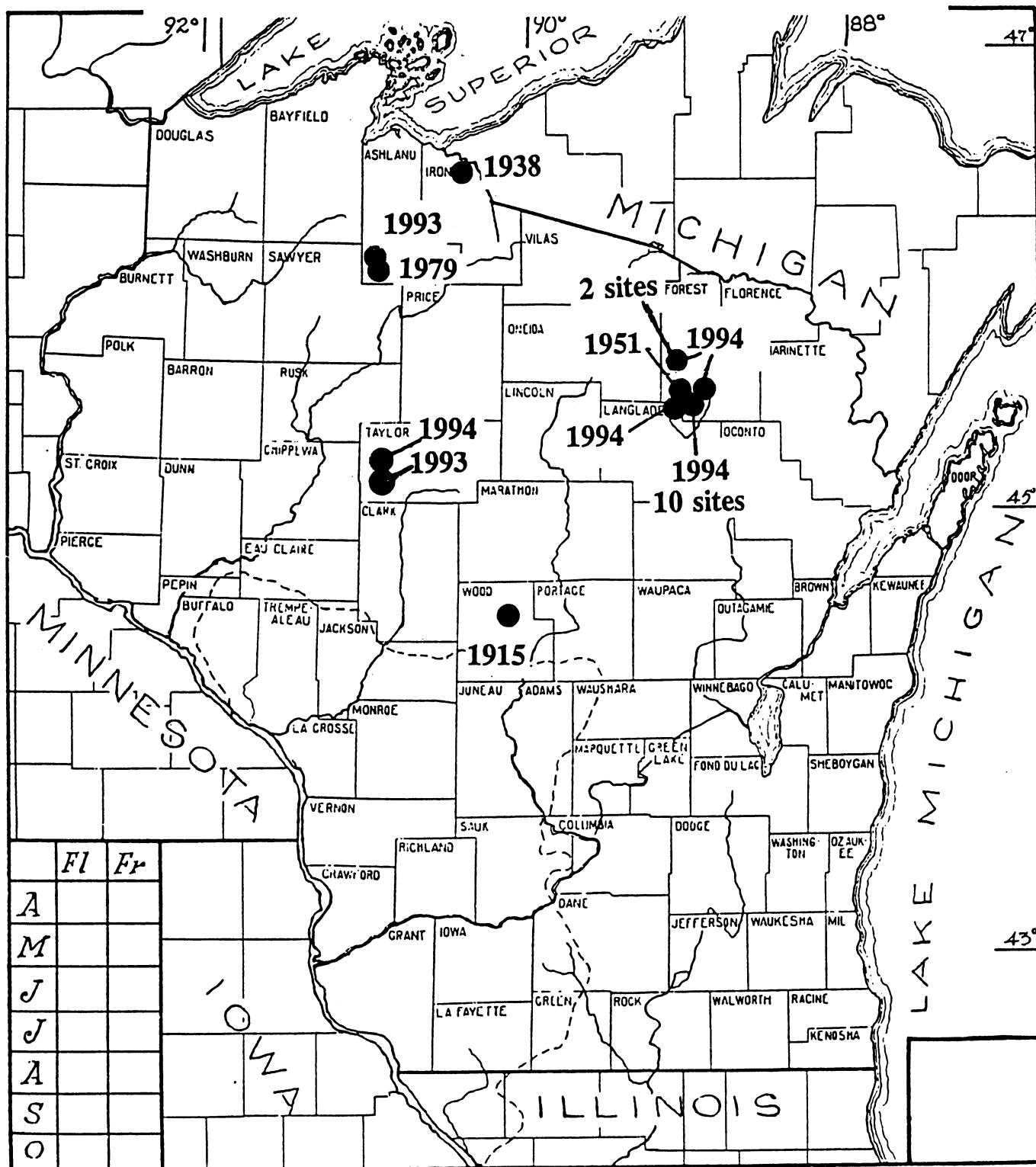
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cc: Betty Les - ER/4
George Albright - EA/6
Bob Roden - EA/6
Laura Sutherland - Justice

Map 1.
World Range of Goblin Fern, *Botrychium mormo*
Showing Counties of Occurrence
October 1994



Map 2.
Wisconsin Range of Goblin Fern, *Botrychium mormo*
Showing Collection Sites
October 1994



Year Indicates Collection Date



Fig. 2. The Goblin Fern, a new *Botrychium* being described by Warren H. Wagner, was recently discovered in Ashland County (by J. H. Peck in 1979). It is characterized by its reduced, fleshy appearance, deeply embedded sporangia, greatly reduced sterile segment, late appearance (July), and late spore release (October). It frequents maple-basswood forests with humus-rich soils in Michigan, Minnesota, and Wisconsin.

Wisconsin Natural Heritage Working List

The Wisconsin Natural Heritage Working List contains species known or suspected to be rare in the state and natural communities native to Wisconsin. It includes species legally designated as "Endangered" and "Threatened" as well as species in the advisory "Special Concern" category. Most of the species and natural communities on the list are actively tracked and we encourage data submissions on them. This list is meant to be dynamic--it is constantly changing as new information regarding the biological status of species becomes available. The Natural Heritage Program welcomes your input on any aspect of this list. Wisconsin's extirpated species list is at the end. **Changes from the previous list (09/94) are bolded.**

Key

ELCODE: Unique 10 character code for each element (plant, animal, or natural community). Those preceded by an asterisk are not actively tracked at this time, but data are being collected.

Scientific Name: Scientific name used by the Wisconsin Natural Heritage Inventory Program.

Common Name: Standard, contrived, or agreed upon common names.

Global Rank: Global element rank. Refer to the Rank Definition Sheet.

State Rank: State element rank. Refer to the Rank Definition Sheet.

USESA Status: Federal protection status designated by the Office of Endangered Species, U.S. Fish and Wildlife Service indicating the biological status of a species in the United States. LE = listed endangered; LT = listed threatened; LELT = listed endangered in part of its range, threatened in a different part; PE = proposed endangered; PT = proposed threatened; PEPT = proposed endangered, threatened; C1 = candidate for federal listing (as published in the Federal Register); C2 = species the US F&WS is concerned about, but for which there is no formal recognition (not published in the Federal Register); 3A = former candidate, rejected because of presumed extinction; 3B = former candidate, rejected because its considered a synonym or hybrid; 3C = former candidate, rejected because more common or adequately protected. Note that in February 1996, the US F&WS redefined 'candidate species' (C1, C2, 3A, 3B, & 3C categories). The old categories are still used on this working list because they remain a part of the data system. However, the definitions reflect the new treatment of the categories by the US F&WS

WI Status: Protection category designated by the Wisconsin DNR. END = Endangered; THR = Threatened; SC = Special Concern.

WDNR and federal regulations regarding Special Concern species range from full protection to no protection. The current level of protection is indicated as follows: SC/P = fully protected; SC/N = no laws regulating use, possession, or harvesting; SC/H = take regulated by establishment of open and closed seasons; SC/FL = federally protected as endangered or threatened, but not so designated by WDNR; SC/M = fully protected by federal and state laws under the Migratory Bird Act.

Special Concern species are those species about which some problem of abundance or distribution is suspected but not yet proved. The main purpose of this category is to focus attention on certain species before they become threatened or endangered.

Global & State Element Rank Definitions Wisconsin Natural Heritage Inventory Program

Global Element Ranks:

- G1 =** Critically imperiled globally because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.
- G2 =** Imperiled globally because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.
- G3 =** Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g., a single state or physiographic region) or because of other factors making it vulnerable to extinction throughout its range; in terms of occurrences, in the range of 21 to 100.
- G4 =** Apparently globally secure, though it may be quite rare in parts of its range, especially at the periphery.
- G5 =** Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.
- GH =** Of historical occurrence throughout its range, i.e., formerly part of the established biota, with the expectation that it may be rediscovered.
- GU =** Possibly in peril range-wide, but its status is uncertain. More information is needed.
- GX =** Believed to be extinct throughout its range (e.g. Passenger pigeon) with virtually no likelihood that it will be rediscovered.
- G? =** Not ranked.

Species with a questionable taxonomic assignment are given a "Q" after the global rank.

Subspecies and varieties are given subranks composed of the letter "T" plus a number or letter. The definition of the second character of the subrank parallels that of the full global rank. (Examples: a rare subspecies of a rare species is ranked G1T1; a rare subspecies of a common species is ranked G5T1.)

State Element Ranks

- S1 =** Critically imperiled in Wisconsin because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extirpation from the state.
- S2 =** Imperiled in Wisconsin because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extirpation from the state.
- S3 =** Rare or uncommon in Wisconsin (21 to 100 occurrences).
- S4 =** Apparently secure in Wisconsin, with many occurrences.
- S5 =** Demonstrably secure in Wisconsin and essentially ineradicable under present conditions.
- SA =** Accidental (occurring only once or a few times) or casual (occurring more regularly although not every year); a few of these species (typically long-distance migrants such as some birds and butterflies) may have even bred on one or more of the occasions when they were recorded.
- SE =** An exotic established in the state; may be native elsewhere in North America.
- SH =** Of historical occurrence in Wisconsin, perhaps having not been verified in the past 20 years, and suspected to be still extant. Naturally, an element would become SH without such a 20-year delay if the only known occurrence were destroyed or if it had been extensively and unsuccessfully looked for.

- SN = Regularly occurring, usually migratory and typically nonbreeding species for which no significant or effective habitat conservation measures can be taken in Wisconsin. This category includes migratory birds and bats which do not breed in Wisconsin but pass through twice a year or may remain in the winter (or, in a few cases, the summer) and certain lepidoptera which regularly migrate to Wisconsin where they reproduce, but then completely die out every year with no return migration. Species in this category are so widely and unreliably distributed during migration or in winter that no small set of sites could be set aside with the hope of significantly furthering their conservation.
- SZ = Not of significant conservation concern in Wisconsin, invariably because there are no definable occurrences in the state, although the taxon is native and appears regularly in the state. An SZ rank will generally be used for long-distance migrants whose occurrence during their migrations are too irregular (in terms of repeated visitation to the same locations), transitory, and dispersed to be reliably identified, mapped, and protected. Typically, the SZ rank applies to a nonbreeding population.
- SR = Reported from Wisconsin, but without persuasive documentation which would provide a basis for either accepting or rejecting the report. Some of these are very recent discoveries for which the program hasn't yet received first-hand information; others are old, obscure reports that are hard to dismiss because the habitat is now destroyed.
- SRF = Reported falsely (in error) from Wisconsin but this error is persisting in the literature.
- SU = Possibly in peril in the state, but their status is uncertain. More information is needed.
- SX = Apparently extirpated from the state.

State Ranking of Long-distance Migrant Animals:

Ranking long distance aerial migrant animals presents special problems relating to the fact that their nonbreeding status (rank) may be quite different from their breeding status, if any, in Wisconsin. In other words, the conservation needs of these taxa may vary between seasons. In order to present a less ambiguous picture of a migrant's status, it is necessary to specify whether the rank refers to the breeding (B) or nonbreeding (N) status of the taxon in question. (e.g. S2B, S5N).

ELCODE	Scientific Name	Common Name	Global Rank	State Rank	US ESA Status	WI Status
RARE MAMMALS						
AMALC03010	<i>Alces alces</i>	moose	G5	S1		SC/P
AMAJA01030	<i>Canis lupus</i>	timber wolf	G4	S1	LELT	END
AMABA04010	<i>Cryptotis parva</i>	least shrew	G5	SH		SC/N
AMAJH01024	<i>Felis concolor schorgeri</i>	Wisconsin puma	G4T3	SH	C2	SC/N
AMAEB03040	<i>Lepus townsendii</i>	white-tailed jackrabbit	G5	S1S2		SC/HS
*AMAJH03010	<i>Lynx canadensis</i>	lynx	G5	SA	C2	END
*AMAJH03020	<i>Lynx rufus</i>	bobcat	G5	S4		SC/HS
AMAJF01010	<i>Martes americana</i>	pine marten	G5	S3		END
AMAFF11140	<i>Microtus ochrogaster</i>	prairie vole	G5	SU		SC/N
AMAFF11150	<i>Microtus pinetorum</i>	northern pine mouse	G5	SU		SC/N
AMACC01150	<i>Myotis septentrionalis</i>	eastern long-eared myotis	G4	S4		SC/N
AMACC01100	<i>Myotis sodalis</i>	Indiana bat	G2	SA	LE	SC/FL
AMAFH02010	<i>Napaeozapus insignis</i>	woodland jumping mouse	G5	S3?		SC/N
AMACC03020	<i>Pipistrellus subflavus</i>	eastern pipistrelle	G5	S3S4		SC/N
AMAFF02030	<i>Reithrodontomys megalotis</i>	western harvest mouse	G5	SU		SC/N
AMABA01190	<i>Sorex arcticus</i>	arctic shrew	G5	SU		SC/N
*AMABA01180	<i>Sorex fumeus</i>	smokey shrew	G5	SRF		SC/N
AMABA01250	<i>Sorex hoyi</i>	pigmy shrew	G5	SU		SC/N
AMABA01150	<i>Sorex palustris</i>	water shrew	G5	S3?		SC/N
AMAFB05120	<i>Spermophilus franklinii</i>	Franklin's ground squirrel	G5	SU		SC/N
AMAJF05010	<i>Spilogale putorius</i>	spotted skunk	G5	SH		SC/N
RARE BIRDS						
*ABNKC12040	<i>Accipiter cooperii</i>	Cooper's Hawk	G4	S2N,S4B		SC/M
ABNKC12060	<i>Accipiter gentilis</i>	Northern Goshawk	G5	S2N,S2S3B	C2	SC/M
ABNCA04010	<i>Aechmophorus occidentalis</i>	Western Grebe	G5	SAB,SZN		SC/M
ABPBXA0050	<i>Ammodramus caudatus</i>	Sharp-tailed Sparrow	G5	S1B,SZN		SC/M
ABPBXA0030	<i>Ammodramus henslowii</i>	Henslow's Sparrow	G4	S2S3B,SZN	C2	SC/M
ABPBXA0040	<i>Ammodramus leconteii</i>	Le Conte's Sparrow	G4?	S2B,SZN		SC/M
ABPBXA0020	<i>Ammodramus savannarum</i>	Grasshopper Sparrow	G5	S3B,SZN		SC/M
ABNJB10110	<i>Anas acuta</i>	Northern Pintail	G5	S3B,SZN		SC/M
ABNJB10180	<i>Anas americana</i>	American Wigeon	G5	SUB,SZN		SC/M
*ABNJB10130	<i>Anas discors</i>	Blue-winged Teal	G5	S3S4B,SZN		SC/M
ABNJB10040	<i>Anas rubripes</i>	American Black Duck	G4	S2N,S3B		SC/M
ABNSB13040	<i>Asio flammeus</i>	Short-eared Owl	G5	S1B,SZN		SC/M
ABNSB13010	<i>Asio otus</i>	Long-eared Owl	G5	S2S3B,SZN		SC/M
ABNJB11070	<i>Aythya affinis</i>	Lesser Scaup	G5	S1B,SZN		SC/M
ABNJB11030	<i>Aythya americana</i>	Redhead	G5	S2B,SZN		SC/M
ABNJB11020	<i>Aythya valisineria</i>	Canvasback	G5	S2S3B,S?N		SC/M
ABNNF06010	<i>Bartramia longicauda</i>	Upland Sandpiper	G5	S2B,SZN		SC/M
ABNGA01020	<i>Botaurus lentiginosus</i>	American Bittern	G4	S3B,SZN		SC/M
ABNGA07010	<i>Bubulcus ibis</i>	Cattle Egret	G5	S1B,SZN		SC/M
ABNJB18010	<i>Bucephala clangula</i>	Common Goldeneye	G5	S2B,SZN		SC/M
ABNKC19030	<i>Buteo lineatus</i>	Red-shouldered Hawk	G5	S1N,S3S4B		THR
ABPBY06030	<i>Carduelis pinus</i>	Pine Siskin	G5	S1B,SZN		SC/M
ABNGA05010	<i>Casmerodius albus</i>	Great Egret	G5	S1B,SZN		THR
*ABPBJ18080	<i>Catharus fuscescens</i>	Veery	G5	S3S4B,SZN		SC/M
ABPBJ18100	<i>Catharus ustulatus</i>	Swainson's Thrush	G5	S2B,SZN		SC/M
ABNNM10020	<i>Chlidonias niger</i>	Black Tern	G4	S3B,SZN	C2	SC/M
ABPBX96010	<i>Chondestes grammacus</i>	Lark Sparrow	G5	S2B,SZN		SC/M
ABNKC11010	<i>Circus cyaneus</i>	Northern Harrier	G5	S2N,S3B		SC/M
ABPBY09020	<i>Coccothraustes vespertinus</i>	Evening Grosbeak	G5	S2B,SZN		SC/M
ABNME01010	<i>Coturnicops noveboracensis</i>	Yellow Rail	G4	S1B,SZN		SC/M
ABNJB02030	<i>Cygnus buccinator</i>	Trumpeter Swan	G4	S1B,SZN	C2NL	END
ABNLC09010	<i>Dendragapus canadensis</i>	Spruce Grouse	G5	S1S2B,S1S2N		SC/M
ABPBX03050	<i>Dendroica caerulescens</i>	Black-throated Blue Warbler	G5	S3B,SZN		SC/M
ABPBX03240	<i>Dendroica cerulea</i>	Cerulean Warbler	G4	S2S3B,SZN	C2	THR
ABPBX03130	<i>Dendroica dominica</i>	Yellow-throated Warbler	G5	S1B,SZN		END
ABPBX03180	<i>Dendroica kirtlandii</i>	Kirtland's Warbler	G1	SAN	LE	SC/M
ABPBX03040	<i>Dendroica tigrina</i>	Cape May Warbler	G5	S3B,SZN		SC/M
*ABPBXA9010	<i>Dolichonyx oryzivorus</i>	Bobolink	G5	S3S4B,SZN		SC/M
ABNGA06030	<i>Egretta thula</i>	Snowy Egret	G5	S1B,SZN		SC/M
ABPAE33010	<i>Empidonax flaviventris</i>	Yellow-bellied Flycatcher	G5	S2B,SZN		SC/M

ELCODE	Scientific Name	Common Name	Global Rank	State Rank	US ESA WI Status	Status
ABPAE33020	<i>Empidonax virens</i>	Acadian Flycatcher	G5	S2S3B,SZN		THR
ABNKD06030	<i>Falco columbarius</i>	Merlin	G4	S3B,S2N		SC/M
ABNKD06070	<i>Falco peregrinus</i>	Peregrine Falcon	G4	S1B,S1N	E/SA	END
ABNME13010	<i>Gallinula chloropus</i>	Common Moorhen	G5	S3B,SZN		SC/M
*ABNBA01030	<i>Gavia immer</i>	Common Loon	G5	S4		SC/M
*ABNKC10010	<i>Haliaeetus leucocephalus</i>	Bald Eagle	G4	S2N,S3S4B	LELT	THR
ABPBX08010	<i>Helmitheros vermivorus</i>	Worm-eating Warbler	G5	S1B,SZN		END
ABPBX24010	<i>Icteria virens</i>	Yellow-breasted Chat	G5	S1B,SZN		SC/M
ABPBXB9070	<i>Icterus spurius</i>	Orchard Oriole	G5	S3B,SZN		SC/M
ABNGA02010	<i>Ixobrychus exilis</i>	Least Bittern	G5	S3B,SZN		SC/M
ABPBR01030	<i>Lanius ludovicianus</i>	Loggerhead Shrike	G4G5	S1B,SZN	C2	END
ABNNM03210	<i>Larus marinus</i>	Great Black-backed Gull	G5	SAB,SZN		SC/M
ABNNM03030	<i>Larus minutus</i>	Little Gull	G5	S1?B,SZN		SC/M
ABNNM03050	<i>Larus philadelphia</i>	Bonaparte's Gull	G5	SAB,SZN		SC/M
*ABNME03040	<i>Laterallus jamaicensis</i>	Black Rail	G4?	SR	C2	SC/M
*ABNYF04040	<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	G5	S3BSZN		SC/M
ABNJB21010	<i>Mergus merganser</i>	Common Merganser	G5	S3B,SZN		SC/M
ABNJB21020	<i>Mergus serrator</i>	Red-breasted Merganser	G5	S3B,SZN		SC/M
ABNGA13010	<i>Nyctanassa violacea</i>	Yellow-crowned Night-Heron	G5	S1B,SZN		THR
ABNGA11010	<i>Nycticorax nycticorax</i>	Black-crowned Night-Heron	G5	S2B,SZN		SC/M
ABPBX11020	<i>Oporornis agilis</i>	Connecticut Warbler	G4	S3B,SZN		SC/M
ABPBX11010	<i>Oporornis formosus</i>	Kentucky Warbler	G5	S2B,SZN		THR
ABNKC01010	<i>Pandion haliaetus</i>	Osprey	G5	S3S4B,SZN		THR
ABPAW01060	<i>Parus hudsonicus</i>	Boreal Chickadee	G5	S3B,SZN		SC/M
ABNLC13030	<i>Pedioecetes phasianellus</i>	Sharp-tailed Grouse	G4	S2B,S2N		SC/M
ABNFC01010	<i>Pelecanus erythrorhynchos</i>	American White Pelican	G3	SAB,S1N		SC/M
ABPAV01010	<i>Perisoreus canadensis</i>	Gray Jay	G5	S3B,SZN		SC/M
ABNNF20010	<i>Phalaropus tricolor</i>	Wilson's Phalarope	G5	S2B,SZN		SC/M
ABNYF07090	<i>Picoides arcticus</i>	Black-backed Woodpecker	G5	S2B,SZN		SC/M
ABNCA03020	<i>Podiceps grisegena</i>	Red-necked Grebe	G5	S1B,SZN		END
*ABPBX95010	<i>Poocetes gramineus</i>	Vesper Sparrow	G5	S3S4B,SZN		SC/M
*ABPAU01010	<i>Progne subis</i>	Purple Martin	G5	S4S5,SZN		SC/M
ABPBX07010	<i>Protonotaria citrea</i>	Prothonotary Warbler	G5	S3B,SZN		SC/M
ABNME05020	<i>Rallus elegans</i>	King Rail	G4Q	S2B,SZN		SC/M
*ABPBX05020	<i>Regulus calendula</i>	Ruby-crowned Kinglet	G5	S3B,SZN		SC/M
ABPBX10030	<i>Seturus motacilla</i>	Louisiana Waterthrush	G5	S3B,SZN		SC/M
ABPBX65010	<i>Spiza americana</i>	Dickcissel	G4	S3B,SZN		SC/M
*ABPBX94050	<i>Spizella pusilla</i>	Field Sparrow	G5	S3S4B,SZN		SC/M
ABNNM08020	<i>Sterna caspia</i>	Caspian Tern	G5	S1B,S2N		END
ABNNM08090	<i>Sterna forsteri</i>	Forster's Tern	G5	S2B,SZN		END
ABNNM08070	<i>Sterna hirundo</i>	Common Tern	G5	S1B,S2N	C2NL	END
ABNSB12040	<i>Strix nebulosa</i>	Great Gray Owl	G5	S1B,SZN		SC/M
*ABPBXB2020	<i>Sturnella magna</i>	Eastern Meadowlark	G5	S4		SC/M
ABPBXB2030	<i>Sturnella neglecta</i>	Western Meadowlark	G5	S3S4B,SZN		SC/M
*ABNSB07010	<i>Surnia ulula</i>	Northern Hawk Owl	G5	SAB		SC/M
*ABPBG06130	<i>Thryothorus ludovicianus</i>	Carolina Wren	G5	SA		SC/M
ABNLC13010	<i>Tympanuchus cupido</i>	Greater Prairie-Chicken	G4	S2B,S2N		THR
*ABPAE52050	<i>Tyrannus verticalis</i>	Western Kingbird	G5	SAB,SZN		SC/M
ABNSA01010	<i>Tyto alba</i>	Barn Owl	G5	S1B,S1N		END
*ABPBX01030	<i>Vermivora chrysoptera</i>	Golden-winged Warbler	G4	S4?		SC/M
ABPBX01040	<i>Vermivora peregrina</i>	Tennessee Warbler	G5	S1B,SZN		SC/M
*ABPBX01060	<i>Vermivora ruficapilla</i>	Nashville Warbler	G5	S4?		SC/M
ABPBW01110	<i>Vireo bellii</i>	Bell's Vireo	G5	S2B,SZN		THR
ABPBW01020	<i>Vireo griseus</i>	White-eyed Vireo	G5	SA?B,SZN		SC/M
*ABPBW01230	<i>Vireo philadelphicus</i>	Philadelphia Vireo	G5	SUB,SZN		SC/M
ABPBX16010	<i>Wilsonia citrina</i>	Hooded Warbler	G5	S2B,SZN		THR
*ABPBX16020	<i>Wilsonia pusilla</i>	Wilson's Warbler	G5	SUB,SZN		SC/M

RARE REPTILES AND AMPHIBIANS

AAABC01011	<i>Acris crepitans blanchardi</i>	Blanchard's cricket frog	G5T5	S1		END
ARAAG01020	<i>Apalone mutica</i>	midland smooth softshell turtle	G5	S3		SC/H
ARADB02010	<i>Carphophis amoenus</i>	western worm snake	G5	S1?		SC/N
ARAAD02020	<i>Clemmys insculpta</i>	wood turtle	G4	S3		THR
ARADE02040	<i>Crotalus horridus</i>	timber rattlesnake	G5	S2S3		SC/N
ARADB10013	<i>Diadophis punctatus amnyi</i>	prairie ringneck snake	G5T5	SU		SC/N

ELCODE	Scientific Name	Common Name	Global Rank	State Rank	US ESA Status	WI Status
ARADB10014	<i>Diadophis punctatus edwardsii</i>	northern ringneck snake	G5T5	S3?		SC/N
ARADB13030	<i>Elaphe obsoleta</i>	black rat snake	G5	S2S3		SC/N
ARAAD04010	<i>Emydoidea blandingii</i>	Blanding's turtle	G4	S3	C2	THR
*ARAAD05080	<i>Graptemys pseudogeographica</i>	false map turtle	G5	S4	C2	SC/H
AAAAD08010	<i>Hemidactylum scutatum</i>	four-toed salamander	G5	SU		SC/N
ARACB02010	<i>Ophisaurus attenuatus</i>	western slender glass lizard	G5	S2		END
ARADB26010	<i>Pituophis melanoleucus</i>	bull snake	G5	S3S4		SC/N
AAABH01070	<i>Rana catesbeiana</i>	bullfrog	G5	S3S4		SC/H
*AAABH01160	<i>Rana palustris</i>	pickerel frog	G5	S3S4		SC/H
ARADB27040	<i>Regina septemvittata</i>	queen snake	G5	S1		END
ARADE03010	<i>Sistrurus catenatus</i>	eastern massasauga rattlesnake	G4	S2	C2	END
ARAAD08020	<i>Terrapene ornata</i>	ornate box turtle	G5	S2		END
ARADB36020	<i>Thamnophis butleri</i>	Butler's garter snake	G5	S2		SC/N
ARADB36090	<i>Thamnophis proximus</i>	western ribbon snake	G5	S1?		END
ARADB36120	<i>Thamnophis sauritus</i>	northern ribbon snake	G5	S1?		END

RARE FISH

AFCOA01020	<i>Acipenser fulvescens</i>	lake sturgeon	G3	S3	C2	SC/H
AFCFA01030	<i>Alosa chrysochloris</i>	skipjack herring	G5	S1		END
AFCEA01010	<i>Anguilla rostrata</i>	American eel	G5	S3		SC/N
AFCLB01010	<i>Aphredoderus sayanus</i>	pirate perch	G5	S3		SC/N
AFCJB05010	<i>Clinostomus elongatus</i>	redside dace	G5	S3?		SC/N
AFCHA01020	<i>Coregonus artedii</i>	lake herring	G5	S3		SC/N
AFCHA01050	<i>Coregonus hoyi</i>	bloater	G3	S3?		SC/H
AFCHA01070	<i>Coregonus kiyi</i>	kiyi	G3	S3	C2	SC/H
AFCHA01120	<i>Coregonus reighardi</i>	shortnose cisco	G1Q	SH	C2	SC/H
AFCHA01140	<i>Coregonus zenithicus</i>	shortjaw cisco	G3	S3?	C2	SC/H
AFCQC01010	<i>Crystallaria asprella</i>	crystal darter	G3	S1	3C	END
AFCJC04010	<i>Cycleptus elongatus</i>	blue sucker	G3	S3	C2	THR
AFCJB49140	<i>Cyprinella lutrensis</i>	red shiner	G5	S1?		SC/N
AFCJB50050	<i>Erimystax x-punctatus</i>	gravel chub	G5	S1S2		END
AFCJC05020	<i>Erimyzon sucetta</i>	lake chubsucker	G5	S3?		SC/N
AFCQC02020	<i>Etheostoma asprigene</i>	mud darter	G5	S3		SC/N
AFCQC02120	<i>Etheostoma chlorosomum</i>	bluntnose darter	G5	S1		END
AFCQC02B60	<i>Etheostoma clarum</i>	western sand darter	G3G4	S3?		SC/N
AFCQC02450	<i>Etheostoma microperca</i>	least darter	G5	S3		SC/N
AFCNB04060	<i>Fundulus diaphanus</i>	banded killifish	G5	S3?		SC/N
AFCNB04250	<i>Fundulus dispar</i>	starhead topminnow	G4	S2		END
AFCGA01010	<i>Hiodon alosoides</i>	goldeye	G5	S2		END
AFBAA01040	<i>Ichthyomyzon gagei</i>	southern brook lamprey	G5	S1		SC/N
AFCJC07030	<i>Ictiobus niger</i>	black buffalo	G5	S2?		THR
AFCQB11080	<i>Lepomis megalotis</i>	longear sunfish	G5	S2		THR
AFCJB51040	<i>Luxilus chrysocephalus</i>	striped shiner	G5	S1		END
AFCJB52080	<i>Lythrurus umbratilis</i>	redfin shiner	G5	S3		THR
AFCJB53010	<i>Macrhybopsis aestivalis</i>	speckled chub	G5	S2S3		THR
AFCJB53040	<i>Macrhybopsis storeriana</i>	silver chub	G5	SU		SC/N
AFCJC10040	<i>Moxostoma carinatum</i>	river redhorse	G4	S2S3		THR
AFCJC10070	<i>Moxostoma duquesnei</i>	black redhorse	G5	S1		SC/N
AFCJC10170	<i>Moxostoma valenciennesi</i>	greater redhorse	G3	S2S3	C2	THR
AFCJB28050	<i>Notropis amnis</i>	pallid shiner	G4	S2		END
AFCJB28080	<i>Notropis anogenus</i>	pugnose shiner	G3	S2S3		THR
AFCJB28680	<i>Notropis nubilus</i>	Ozark minnow	G5	S2		THR
AFCJB28950	<i>Notropis texanus</i>	weed shiner	G5	S3		SC/N
AFCJB28C40	<i>Notropis wickliffi</i>	channel shiner	G?	SU		SC/N
AFCKA02250	<i>Noturus exilis</i>	slender madtom	G5	S2		END
AFCJB55010	<i>Opsopoeodus emiliae</i>	pugnose minnow	G5	S3?		SC/N
AFCQC04090	<i>Percina evides</i>	gilt darter	G4	S2		THR
AFCAB01010	<i>Polyodon spathula</i>	paddlefish	G4	S2?	C2	THR
AFCHA03020	<i>Prosopium coulteri</i>	pygmy whitefish	G5	S3?		SC/N
AFCHA05030	<i>Salvelinus fontinalis</i>	coaster brook trout	G5	S1?		SC/H

(includes only the anadromous population of brook trout native to the Great Lakes drainage basin)

RARE MUSSELS AND CLAMS

*IMBIV01020	<i>Actinonaias ligamentina</i>	mucket	G5	S4		SC/H
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ELCODE	Scientific Name	Common Name	Global Rank	State Rank	US ESA Status	WI Status
IMBIV02040	<i>Alasmodonta marginata</i>	elktoe	G5	S4	C2	SC/H
IMBIV02110	<i>Alasmodonta viridis</i>	slippershell mussel	G4	S2		THR
IMBIV54010	<i>Anodonta cataraacta cataraacta</i>	eastern floater	G5T5	SU		SC/H
IMBIV04130	<i>Anodonta suborbiculata</i>	flat floater	G4	S1S2		SC/H
IMBIV06010	<i>Arcidens confragosus</i>	rock pocketbook	G3	S1S2		THR
IMBIV08010	<i>Cumberlandia monodonta</i>	spectacle case	G2G3	S1	C2	END
IMBIV09010	<i>Cyclonaias tuberculata</i>	purple wartyback	G5	S1		END
IMBIV13010	<i>Ellipsaria lineolata</i>	butterfly	G4	S2		END
IMBIV14060	<i>Elliptio complanata</i>	eastern elliptio	G5	S3		SC/H
IMBIV14080	<i>Elliptio crassidens</i>	elephant ear	G5	S1		END
IMBIV16190	<i>Epioblasma triquetra</i>	snuffbox	G3	S1	C2	END
IMBIV17060	<i>Fusconaia ebena</i>	ebony shell	G4	S1		END
IMBIV21100	<i>Lampsilis higginsii</i>	Higgins' eye	G1	S1	LE	END
IMBIV21242	<i>Lampsilis teres anodontoides</i>	yellow sandshell	G5T7Q	S1		END
IMBIV21241	<i>Lampsilis teres teres</i>	slough sandshell	G5T7Q	S1		END
*IMBIV22020	<i>Lasmigona compressa</i>	creek heelsplitter	G5	S3S4		SC/H
*IMBIV26020	<i>Ligumia recta</i>	black sandshell	G5	S3		SC/H
IMBIV29020	<i>Megalanaia nervosa</i>	washboard	G5	S3		SC/H
IMBIV51060	<i>Pisidium cruciatum</i>	ornamented peaclam	GU	SU		SC/H
IMBIV34030	<i>Plethobasus cyphus</i>	bullhead	G3	S1		END
*IMBIV35250	<i>Pleurobema pyramdatum</i>	pyramid pigtoe	G2G3	SR	C2	SC/H
IMBIV35070	<i>Pleurobema sintoxia</i>	round pigtoe	G3G4	S3		SC/H
IMBIV39050	<i>Quadrula fragosa</i>	winged mapleleaf	G1	S1	LE	END
IMBIV39080	<i>Quadrula metanevra</i>	monkeyface	G3	S2		THR
IMBIV39090	<i>Quadrula nodulata</i>	wartyback	G3	S1S2		THR
IMBIV41010	<i>Simpsonaias ambigua</i>	salamander mussel	G2	S2S3	C2	THR
IMBIV44010	<i>Tritogonia verrucosa</i>	buckhorn	G4	S2		THR
*IMBIV55010	<i>Uterbackia imbecillis</i>	paper pondshell	G5	S4		SC/H
IMBIVA4010	<i>Venustaconcha elliptiformis</i>	ellipse	G3	S2		THR
IMBIV47060	<i>Villosa iris</i>	rainbow shell	G4	S1		END

RARE BUTTERFLIES AND MOTHS

*IILEP80080	<i>Amblyscirtes hegou</i>	pepper and salt skipper	G5	SU		SC/N
*IILEP70012	<i>Atrytone arogos iowa</i>	iowa skipper	G4T4	SR		SC/N
IILEP79010	<i>Atrytonopsis hianna</i>	dusted skipper	G4	S2?		SC/N
IILEP7020	<i>Boloria eunomia</i>	bog fritillary	G5	S3		SC/N
IILEP7100	<i>Boloria freija</i>	Freija fritillary	G5	S2		SC/N
IILEP7050	<i>Boloria frigga</i>	Frigga fritillary	G5	S2		SC/N
IILEP7130	<i>Boloria titania</i>	purple lesser fritillary	G5	SU		SC/N
IILEPH2060	<i>Calephelis mutica</i>	swamp metalmark	G4	S1		THR
IILEY89730	<i>Catocala abbreviatella</i>	abbreviated underwing moth	G4	S2S3		SC/N
IILEY89070	<i>Catocala coelebs</i>	old maid underwing moth	G4	SU		SC/N
IILEY89520	<i>Catocala semirelictia</i>	semirelict underwing moth	G4	SU		SC/N
IILEY89750	<i>Catocala whitneyi</i>	Whitney's underwing moth	G3G4	S2S3		SC/N
IILEP9130	<i>Chlosyne gorgone</i>	Gorgone checker spot	G4	S3		SC/N
*IILEPN6030	<i>Coenonympha tullia</i>	inornate ringlet	G5	S3S4		SC/N
*IILEPA8140	<i>Colias interior</i>	pink-edged sulphur	G5	S4?		SC/N
IILEYKP090	<i>Copalepharon longipenne</i>	a noctuid moth	G?	S1?		SC/N
IILEPN8060	<i>Erebia discoidalis</i>	red-disked alpine	G5	S2S3		SC/N
IILEP37150	<i>Erynnis baptisiae</i>	wild indigo dusky wing	G5	S2S3		SC/N
IILEP37140	<i>Erynnis lucilius</i>	columbine dusky wing	G4	S2		SC/N
IILEP37100	<i>Erynnis martialis</i>	mottled dusky wing	G4	S2		SC/N
IILEP37170	<i>Erynnis persius</i>	Persius dusky wing	G4	S2		SC/N
IILEU2F150	<i>Euchlaena milnei</i>	a looper moth	GU	SU	C2	SC/N
IILEP77090	<i>Euphyes bimacula</i>	two-spotted skipper	G4	S2S3		SC/N
*IILEP77060	<i>Euphyes conspicuus</i>	black dash	G4	S3S4		SC/N
IILEP77030	<i>Euphyes dion</i>	Dion skipper	G4	S3		SC/N
*IILEPF9020	<i>Everes amyntula</i>	western tailed blue	G5	SU		SC/N
IILEYJE050	<i>Faronta rubripennis</i>	pink-streak	G3G4	SU		SC/N
*IILEPB9010	<i>Feniseca tarquinius</i>	harvester	G4	S3		SC/N
IILEY2R220	<i>Grammia oithona</i>	Oithona tiger moth	G4	S2		SC/N
IILEY2R260	<i>Grammia phyllira</i>	Phyllira tiger moth	G4	S2		SC/N
*IILEW0M040	<i>Hemileuca maia</i>	buck moth	G4	SRF		SC/N
IILEW0M050	<i>Hemileuca nevadensis</i>	buck moth	G?	S3?		SC/N
IILEP65030	<i>Hesperia comma</i>	Laurentian skipper	G5	S2		SC/N

ELCODE	Scientific Name	Common Name	Global Rank	State Rank	US ESA Status	WI Status
IILEP65063	<i>Hesperia leonardus leonardus</i>	Leonard's skipper	G4T4	S3		SC/N
IILEP65062	<i>Hesperia leonardus pawnee</i>	Leonard's Pawnee skipper	G4T4?	S2		SC/N
IILEP65100	<i>Hesperia metea</i>	cobweb skipper	G4G5	S2		SC/N
IILEP65050	<i>Hesperia ottoe</i>	Ottoe skipper	G3?	S2		SC/N
IILEPE7050	<i>Incisalia henrici</i>	Henry's elfin	G5	S2		SC/N
IILEPE7040	<i>Incisalia irus</i>	frosted elfin	G4Q	S1		THR
IILEPG501B	<i>Lycaeides idas nabokovi</i>	northern blue butterfly	G5TU	S1		END
IILEPG5021	<i>Lycaeides melissa samuelis</i>	Karner blue butterfly	G5T2	S2S3	LE	SC/N
IILEPC1120	<i>Lycaena dorcas</i>	dorcas copper	G4	S2		SC/N
IILEPC1110	<i>Lycaena epixanthe</i>	bog copper	G4G5	S2S3		SC/N
IILEPC1040	<i>Lycaena xanthoides</i>	great copper	G5	S2		SC/N
IILEY45030	<i>Macrochilo bivittata</i>	an owl moth	GU	S3		SC/N
IILEYBK050	<i>Meropleon ambifusca</i>	Newman's brocade	GU	S3		SC/N
IILEPE4090	<i>Mitoura grynea</i>	olive hairstreak	G5	S3		SC/N
IILEP57010	<i>Oarisma poweshiek</i>	Poweshiek skipperling	G2G3	S1		END
IILEPP1040	<i>Oeneis chryxus</i>	brown arctic	G5	S2?		SC/N
IILEPP1090	<i>Oeneis jutta</i>	jutta arctic	G5	S3		SC/N
IILEYC0450	<i>Papaipema beeriana</i>	liatris borer moth	G3	SU		SC/N
IILEYC0350	<i>Papaipema silphii</i>	silphium borer moth	G3G4	S2S3		END
*IILEPB1010	<i>Phoebis sennae</i>	cloudless sulphur	G5	SA		SC/N
IILEPK3040	<i>Phyciodes batesii</i>	tawny crescent spot	G3G4	S3	C2	SC/N
IILEY5L010	<i>Phytometra erestiana</i>	Ernestine's moth	G4	SU		SC/N
*IILEPA2010	<i>Pieris napi</i>	mustard white	G5	S4		SC/N
IILEPA2020	<i>Pieris virginensis</i>	West Virginia white	G4	S2		SC/N
IILEPG6010	<i>Plebejus saepiolus</i>	greenish blue	G5	SU		SC/N
IILEP73010	<i>Poanes massasoit</i>	mulberry wing	G4	S3		SC/N
IILEP73070	<i>Poanes viator</i>	broad-winged skipper	G5	S3		SC/N
IILEP68010	<i>Pompeius verna</i>	little glassy wing	G5	S1?		SC/N
IILEP71010	<i>Problema byssus</i>	byssus skipper	G3G4	S1?		SC/N
IILEYFN010	<i>Psestraglaea carnosa</i>	pink swallow	G3G4	SU		SC/N
IILEY85030	<i>Ptichodis bistrigata</i>	southern ptichodis	GU	SU		SC/N
IILEPD4080	<i>Satyrium caryaeorum</i>	hickory hairstreak	G4?	S2		SC/N
IILEPN0012	<i>Satyroides eurydice fumosa</i>	smokey eyed brown	G5T3T4	S2	3C	SC/N
IILEYMP130	<i>Schinia indiana</i>	phlox moth	GU	S2?	C2	END
IILEPJ6040	<i>Speyeria idalia</i>	regal fritillary	G3	S1	C2	THR

RARE DRAGONFLIES

IIDO014030	<i>Aeshna clepsydra</i>	mottled darner	G4	S2		SC/N
IIDO014060	<i>Aeshna eremita</i>	lake darner	G5	S3		SC/N
IIDO014110	<i>Aeshna mutata</i>	spatterdock darner	G3G4	S1		SC/N
IIDO014180	<i>Aeshna tuberculifera</i>	black-tipped darner	G4	S2S3		SC/N
IIDO014200	<i>Aeshna verticalis</i>	green-striped darner	G5	S2S3		SC/N
IIDO075010	<i>Archilestes grandis</i>	great spreadwing	G5	S2		SC/N
IIDO068030	<i>Argia plana</i>	highland dancer	G5	S2		SC/N
IIDO081060	<i>Arigomphus submedianus</i>	jade clubtail	G5	S1S2		SC/N
IIDO081070	<i>Arigomphus villosipes</i>	unicorn clubtail	G5	S2		SC/N
IIDO078010	<i>Chromagrion conditum</i>	aurora damselfly	G5	S3		SC/N
IIDO070020	<i>Coenagrion interrogatum</i>	subarctic bluet	G5	S2		SC/N
IIDO003020	<i>Cordulegaster diastatops</i>	delta-spotted spiketail	G5	S1S2		SC/N
IIDO003070	<i>Cordulegaster obliqua</i>	arrowhead spiketail	G4	S3		SC/N
IIDO071280	<i>Enallagma anna</i>	river bluet	G5	S2		SC/N
IIDO071120	<i>Enallagma basidens</i>	double-striped bluet	G5	S2		SC/N
IIDO071040	<i>Enallagma traviatum</i>	slender bluet	G5	S1S2		SC/N
IIDO071070	<i>Enallagma vernale</i>	Gloyd's bluet	G4Q	S1		SC/N
IIDO019010	<i>Epiaeschna heros</i>	swamp darner	G5	S2S3		SC/N
IIDO020020	<i>Gomphaeschna furcillata</i>	harlequin darner	G5	S2		SC/N
IIDO008110	<i>Gomphurus externus</i>	plains clubtail	G5	S2		SC/N
IIDO008140	<i>Gomphurus lineatifrons</i>	splendid clubtail	G4	S3		SC/N
IIDO008210	<i>Gomphurus ventricosus</i>	skillet clubtail	G3	S3		SC/N
IIDO008310	<i>Gomphus grasilinellus</i>	pronghorned clubtail	G5	S2		SC/N
*IIDO008380	<i>Gomphus quadricolor</i>	rapids clubtail	G3G4	S4		SC/N
IIDO008460	<i>Gomphus viridifrons</i>	green-faced clubtail	G3	S3		SC/N
IIDO066020	<i>Hetaerina titia</i>	dark rubyspot	G5	S1S2		SC/N
IIDO079010	<i>Ischnura hastata</i>	citrine forktail	G5	S2		SC/N
IIDO072020	<i>Ischnura kellicotti</i>	lilypad forktail	G5	S1		SC/N

ELCODE	Scientific Name	Common Name	Global Rank	State Rank	US ESA Status	WI Status
IODO72030	<i>Ischnura posita</i>	fragile forktail	G5	S2S3		SC/N
IODO67060	<i>Lestes eurinus</i>	amber-winged spreadwing	G4	S3		SC/N
IODO67010	<i>Lestes inaequalis</i>	elegant spreadwing	G5	S3		SC/N
IODO67090	<i>Lestes vigilax</i>	swamp spreadwing	G5	S3		SC/N
IODO45060	<i>Libellula cyanea</i>	white-spangled skimmer	G5	S2		SC/N
IODO45090	<i>Libellula incesta</i>	slaty skimmer	G5	S2		SC/N
IODO45160	<i>Libellula semifasciata</i>	painted skimmer	G5	SH		SC/N
IODO45170	<i>Libellula vibrans</i>	great blue skimmer	G5	SH		SC/N
IODO26100	<i>Macromia taeniolata</i>	royal river cruiser	G5	S1		SC/N
IODO50010	<i>Nannothemis bella</i>	elfin skimmer	G4	S3		SC/N
IODO22010	<i>Nasiaeschna pentacantha</i>	cyrano darner	G5	S3		SC/N
IODO31030	<i>Neurocordulia molesta</i>	smoky shadowfly	G3	S2		SC/N
IODO31070	<i>Neurocordulia yamaskanensis</i>	Stygian shadowfly	G5	S2S3		SC/N
IODO12020	<i>Ophiogomphus anomalus</i>	extra-striped snaketail	G2	S1	C2	END
IODO12040	<i>Ophiogomphus aspersus</i>	brook snaketail	G3G4	SR		SC/N
IODO12060	<i>Ophiogomphus carolus</i>	riffle snaketail	G5	S3		SC/N
IODO12090	<i>Ophiogomphus howei</i>	pygmy snaketail	G3	S3	C2	END
IODO12180	<i>Ophiogomphus susbehcha</i>	Saint Croix snaketail	G1G2	S1	C2	SC/N
IODO32040	<i>Somatochlora cingulata</i>	lake emerald	G5	S1		SC/N
IODO32050	<i>Somatochlora elongata</i>	ski-tailed emerald	G5	S2S3		SC/N
IODO32060	<i>Somatochlora ensigera</i>	lemon-faced emerald	G4	S1		SC/N
IODO32080	<i>Somatochlora forcipata</i>	forcipate emerald	G5	S2S3		SC/N
IODO32090	<i>Somatochlora franklini</i>	delicate emerald	G5	S2		SC/N
IODO32110	<i>Somatochlora hineana</i>	Hine's emerald	G2	S1	LE	SC/N
IODO32130	<i>Somatochlora incurvata</i>	warpaint emerald	G3	S1		SC/N
IODO32140	<i>Somatochlora kennedyi</i>	Kennedy's emerald	G5	S3		SC/N
IODO32230	<i>Somatochlora tenebrosa</i>	clamp-tipped emerald	G5	S2		SC/N
IODO11010	<i>Stylogomphus albistylus</i>	least clubtail	G5	S3		SC/N
*IODO80010	<i>Stylurus amnicola</i>	riverine clubtail	G3G4	S3		SC/N
IODO80050	<i>Stylurus notatus</i>	elusive clubtail	G3G4	S2S3	C2	SC/N
IODO80070	<i>Stylurus plagiatius</i>	russet-tipped clubtail	G5	S2		SC/N
IODO80090	<i>Stylurus scudderi</i>	zebra clubtail	G3	S3		SC/N
IODO61050	<i>Sympetrum danae</i>	black meadowhawk	G5	S3		SC/N
IODO64040	<i>Tramea carolina</i>	violet-masked glider	G5	S2		SC/N
*IODO64060	<i>Tramea onusta</i>	red-mantled glider	G5	S3		SC/N
IODO34010	<i>Williamsonia fletcheri</i>	ebony bog haunter	G3G4	S1		SC/N

MISCELLANEOUS RARE INVERTEBRATES

IIEPH14010	<i>Acanthametropus pecatonica</i>	Pecatonica river mayfly	G1G2	S1	C2	END
IIEPH08010	<i>Aflexia rubramura</i>	red-tailed prairie leafhopper	G7	S1	C2	SC
IICOL52020	<i>Agabus canadensis</i>	a predaceous diving beetle	G7	SU		SC
IICOL52030	<i>Agabus confusus</i>	a predaceous diving beetle	G7	SU		SC
IICOL52040	<i>Agabus gagates</i>	a predaceous diving beetle	G7	SU		SC
IITRI33090	<i>Agapetus hessi</i>	a glossosomatid caddisfly	G7	SU		SC
IITRI15030	<i>Anabolia rossi</i>	a northern casemaker caddisfly	G7	SU		SC
IIEPH19010	<i>Anepeorus simplex</i>	a flat-headed mayfly	G3G5	S1		END
IIPLE1M010	<i>Attaneuria ruralis</i>	a stonefly	G7	SU		SC
IIEPH17010	<i>Caenis youngi</i>	a caenid mayfly	G3	SU		SC
IHEM29010	<i>Cenocorixa dakotensis</i>	a water boatman	G7	SU		SC
IICOL02105	<i>Cicindela hirticollis rhodensis</i>	beach-dune tiger beetle	G5T4	S3		SC
IICOL02250	<i>Cicindela lepida</i>	little white tiger beetle	G4	S3		SC
IICOL02211	<i>Cicindela limbalis transversa</i>	a tiger beetle	G5T5	S1		SC
IICOL02220	<i>Cicindela macra</i>	a tiger beetle	G5	S2		SC
IICOL02231	<i>Cicindela patruela huberi</i>	a tiger beetle	G3T2	S2		SC
IICOL02232	<i>Cicindela patruela patruela</i>	a tiger beetle	G3T3	S3		SC
*IICOL02320	<i>Cicindela splendida</i>	a tiger beetle	G5	S3S4		SC
IMGAS13030	<i>Columella simplex</i>	high spire column	G4G5	S3		SC
IICOL85010	<i>Copelatus chevrolati</i>	a predaceous diving beetle	G7	SU		SC
ICMAL06040	<i>Crangonyx gracilis</i>	a side-swimmer	G7	SU		SC
ICMAL06110	<i>Crangonyx richmondensis</i>	a side-swimmer	G7	SU		SC
IMGAS54030	<i>Discus catskillensis</i>	angular disc	G3G5	SU		SC
IIEPH02010	<i>Dolania americana</i>	American sand burying mayfly	G7	S1	C2	SC
IICOL5A040	<i>Dubiraphia robusta</i>	robust dubiraphian riffle beetle	G1G3	S1	C2	SC
IICOL76010	<i>Dytiscus alaskanus</i>	a predaceous diving beetle	G7	SU		SC
*IMGAS94040	<i>Euchemotrema hubrichti</i>	carinate pillsnail	G7	SR	C2	SC

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*IIHOM07010	<i>Euklasmus harti</i>	a derbid plant hopper	G?	SR		SC
*ICMAL15120	<i>Fallicambarus fodiens</i>	a crayfish	G5	SR		SC
IMGAS15060	<i>Gastrocopta corticaria</i>	bark snaggletooth	G4G5	S3		SC
IMGAS15130	<i>Gastrocopta procera</i>	wing snaggletooth	G4G5	S2?		THR
IMGAS71030	<i>Guppya sterkii</i>	brilliant granule	G4G5	S3		SC
IICOL5N020	<i>Haliphus fasciatus</i>	a crawling water beetle	G?	SU		SC
IICOL5N030	<i>Haliphus tortilipenis</i>	a crawling water beetle	G?	SU		SC
IMGAS50190	<i>Helicodiscus singleyanus</i>	smooth coil	G4G5	S3		SC
IMGAS03010	<i>Hendersonia occulta</i>	cherrystone drop	G4	SU		THR
IIEPH03030	<i>Homoeoneuria ammophila</i>	an oligoneurid mayfly	G4G5	S1S2		SC
IICOL77010	<i>Hydrocanthus iricolor</i>	a burrowing water beetle	G?	SU		SC
IICOL78010	<i>Hydrochara leechi</i>	a water scavenger beetle	G?	SU		SC
*IIPLE2P010	<i>Hydroperla crosbyi</i>	a stonefly	G?	SR		SC
IICOL55090	<i>Hydroporus hybridus</i>	a predaceous diving beetle	G?	SU		SC
IICOL55110	<i>Hydroporus pseudovillisi</i>	a predaceous diving beetle	G?	S1S2		SC
IICOL38070	<i>Hygrotus marklini</i>	a predaceous diving beetle	G?	S1S2		SC
IICOL38060	<i>Hygrotus sylvanus</i>	sylvan hygrotus diving beetle	G1	S1	C2	SC
IICOL79010	<i>Ilybius subaeneus</i>	a predaceous diving beetle	G?	SU		SC
IITRI01030	<i>Lepidostoma libum</i>	a bizarre caddisfly	G?	S1?		SC
IITRI01040	<i>Lepidostoma vemale</i>	a bizarre caddisfly	G?	SU		SC
IICOL6T010	<i>Liodessus cantralli</i>	Cantrall's bog beetle	G?	SU		SC
IICOL83010	<i>Lioporeus triangularis</i>	a predaceous diving beetle	G?	SU		SC
IIEPH46010	<i>Litobranchea recurvata</i>	an ephemerid mayfly	G?	SU		SC
IICOLD4010	<i>Longitarsus subrufus</i>	a chrysomelid beetle	G?	S3?		SC
IIEPH30010	<i>Macdunnosa persimilis</i>	a heptageniid mayfly	G?	S1?		SC
IICOL80010	<i>Matus ovatus</i>	a predaceous diving beetle	G?	SU		SC
IICOLA0010	<i>Megacephala virginica</i>	Virginia big-headed tiger beetle	G5	S1		SC
IHORT01020	<i>Melanoplus flavidus</i>	blue-legged grasshopper	G?	S1?		SC
IHORT88010	<i>Mermiria bivittata</i>	mermiria grasshopper	G?	S2S3		SC
IIEPH31010	<i>Metretopus borealis</i>	a metretopodid mayfly	G?	S1S2		SC
IICHEM30010	<i>Microvelia albonotata</i>	a broad-shouldered water strider	G?	SU		SC
IICHEM30020	<i>Microvelia fontalis</i>	a broad-shouldered water strider	G?	SU		SC
IICOLA2010	<i>Nicrophorus americanus</i>	giant carrion beetle	G1	SH	LE	END
IHORT41010	<i>Orchelimum delicatum</i>	delicate meadow katydid	G?	S2?		SC
IICOL81010	<i>Oreodytes scitulus</i>	a predaceous diving beetle	G?	SU		SC
IHORT37010	<i>Orphulella pelidna</i>	spotted-winged grasshopper	G?	S1?		SC
IITRI42110	<i>Oxyethira anabola</i>	a caddisfly	G?	SU		SC
IIEPH22010	<i>Paracloeodes minutus</i>	a small minnow mayfly	G?	S1?		SC
IIEPH32010	<i>Parametopus chilifer</i>	a primitive minnow mayfly	G?	S1?		SC
IIEPH13020	<i>Pentagenia vittigera</i>	an ephemerid mayfly	G4G5	S2?		SC
IMGAS21010	<i>Planogyra asteriscus</i>	eastern flat-whorl	G?	SU		SC
ICMAL14310	<i>Procambarus gracilis</i>	prairie crayfish	G5	S2?		SC/R
IIEPH04020	<i>Pseudiron centralis</i>	a heptageniid mayfly	G?	S3		SC
IHORT39010	<i>Psindia fenestralis</i>	sand locust	G?	S1S2		SC
IMGAS47070	<i>Punctum vitreum</i>	glass spot	G4G5	S1?		SC
IICOL82010	<i>Rhantus sericans</i>	a predaceous diving beetle	G?	S2?		SC
IICHEM31010	<i>Slaterobius quadristriata</i>	a seed bug	G?	SU		SC
IIPLE0S010	<i>Soyedina vallicularia</i>	a stonefly	G?	S1		SC
IIEPH20010	<i>Spinadis wallacei</i>	Wallace's deepwater mayfly	G?	SU	C2	END
IICOL5F020	<i>Stenelmis douglasensis</i>	Douglas stenelmis riffle beetle	G1G3	SU	C2	SC
IICOL5F040	<i>Stenelmis knobeli</i>	Knobel's riffle beetle	G1G3	S1		END
IHORT56030	<i>Stethophyma lineata</i>	striped sedge grasshopper	G?	SU		SC
IMGAS81040	<i>Striatura milium</i>	fine-ribbed striate	G4	S3		SC
IMGAS24010	<i>Strobilops aeneus</i>	bronze pinecone	G5	S3		SC
ICMAL05580	<i>Stygobromus putealis</i>	Wisconsin well amphipod	G1?	S1S2	C2	SC
IICHEM32010	<i>Trepobates knighti</i>	a water strider	G?	SU		SC
IITRI2F070	<i>Trianaodes dipsius</i>	a long-horned casemaker caddisfly	G?	SU		SC
IHORT36010	<i>Trimerotropis huroniana</i>	Lake Huron locust	G2	S2?	C2	SC
IMGASE5110	<i>Valvata winnebagoensis</i>	flanged valvata	G?	SU		SC
*IMGAS20370	<i>Vertigo brierensis</i>	briarton pleistocene snail	G1	SR	C2	SC
IMGAS20150	<i>Vertigo gouldi</i>	variable vertigo	G4G5	S3		SC
IMGAS20380	<i>Vertigo hubrichti</i>	Midwest pleistocene vertigo	G2	S1	C2	END
IMGAS20430	<i>Vertigo iowensis</i>	Iowa pleistocene vertigo	G2	SU	C2	SC
IMGAS20200	<i>Vertigo milium</i>	blade vertigo	G5	S3		SC
IMGAS20230	<i>Vertigo nylanderii</i>	deep-throated vertigo	G?	SU		SC
IMGAS20390	<i>Vertigo occulta</i>	occult vertigo	HYB	S1	C2	END

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ITTRI78010	<i>Wormaldia moesta</i>	a caddisfly	G?	SU		SC
IIPLEOF010	<i>Zealeuctra narfi</i>	a rolled-winged winter stonefly	G?	S1		SC
IMGAS85050	<i>Zonitoides limatulus</i>	dull gloss	G?	SU		SC
IMGAS23010	<i>Zoogenetes harpa</i>	boreal top	G?	SU		SC

RARE VASCULAR PLANTS

PDRAN01070	<i>Aconitum noveboracense</i>	northern wild monkshood	G3	S1S2	LT	THR
PDFUM02010	<i>Adlumia fungosa</i>	climbing fumitory	G4	S3		SC
PDADO01010	<i>Adoxa moschatellina</i>	musk-root	G5	S2		THR
PDSCR010B0	<i>Agalinis gattingeri</i>	roundstem foxglove	G4	S2		THR
PDSCR010T0	<i>Agalinis skinneriana</i>	pale false foxglove	G3	S1	C2	END
PDLAM03070	<i>Agastache nepetoides</i>	yellow giant hyssop	G5	S2		THR
PDROS03060	<i>Agrimonia parviflora</i>	swamp agrimony	G5	S1		SC
PMORC01010	<i>Amerorchis rotundifolia</i>	round-leaved orchis	G5	S1		THR
PDRAN04030	<i>Anemone caroliniana</i>	Carolina anemone	G5	S1		END
PDRAN040E6	<i>Anemone multifida</i> var <i>hudsoniana</i>	early anemone	G5T5Q	S1		END
PDBRA06171	<i>Arabis missouriensis</i> var <i>deamii</i>	Deam's rockcress	G5T3T4	S3	C2	SC
PDBRA061W0	<i>Arabis shortii</i>	Short's rockcress	G5	S2		SC
PMORC04010	<i>Arethusa bulbosa</i>	swamp-pink	G4	S3		SC
PMPOA0K0C0	<i>Aristida dichotoma</i>	Shinnery three-awned grass	G5	S1		SC
PDBRA07010	<i>Armoracia lacustris</i>	lake-cress	G4?	S1	3C	END
PDAST0S0H0	<i>Artemisia dracunculus</i>	dragon wormwood	G5	S2		SC
PDAST0S0L0	<i>Artemisia frigida</i>	prairie sagebrush	G5?	S3?		SC
PDASC022A0	<i>Asclepias lanuginosa</i>	wooly milkweed	G4?	S1S2		THR
PDASC021D0	<i>Asclepias ovalifolia</i>	dwarf milkweed	G3G5	SU		SC
PDASC021J0	<i>Asclepias purpurascens</i>	purple milkweed	G4G5	S2		END
PDASC021X0	<i>Asclepias sullivantii</i>	prairie milkweed	G5	S2		THR
PPASP02100	<i>Asplenium pinnatifidum</i>	lobed spleenwort	G4	S1		THR
PPASP021K0	<i>Asplenium trichomanes</i>	maidenhair spleenwort	G5	S3		SC
PPASP02250	<i>Asplenium viride</i>	green spleenwort	G5	S1		END
PDAST0T170	<i>Aster furcatus</i>	forked aster	G3G4	S1S2	C2	THR
PDFAB0F0D0	<i>Astragalus alpinus</i>	alpine milkvetch	G5	S1		END
PDFAB0F2G0	<i>Astragalus crassicaupus</i>	ground-plum	G5	S2		END
PDFAB0F5U0	<i>Astragalus neglectus</i>	Cooper's milkvetch	G3G4	S1	C2	END
PDFAB0G0P0	<i>Baptisia tinctoria</i>	yellow wild-indigo	G5	SA?		SC
PDGEN01040	<i>Bartonia virginica</i>	yellow screwstem	G5	S3		SC
PDSCR09030	<i>Besseyia bullii</i>	kitten tails	G3	S3	3C	THR
PPOPH010W0	<i>Botrychium campestre</i>	prairie dunewort	G2	S1		SC
PPOPH01080	<i>Botrychium lunaria</i>	moonwort grape-fern	G5	S1		END
PPOPH010R0	<i>Botrychium minganense</i>	Mingan's moonwort	G4	S2		SC
PPOPH010N0	<i>Botrychium mormo</i>	little goblin moonwort	G2	S1	C2	END
PPOPH010C0	<i>Botrychium oneidense</i>	blunt-lobe grape-fern	G3G4	S2		SC
PPOPH010P0	<i>Botrychium rugulosum</i>	rugulose grape-fern	G3	S2		SC
PPOPH01140	<i>Botrychium spatulatum</i>	spoon-leaf moonwort	G3G4	S1		SC
PDASTD7040	<i>Cacalia muehlenbergii</i>	great indian-plantain	G4	S2		SC
PDASTD7060	<i>Cacalia tuberosa</i>	prairie indian plantain	G4G5	S2		THR
PDBRA0F020	<i>Cakile edentula</i>	American sea-rocket	G5	S3		SC
PMPOA17171	<i>Calamagrostis stricta</i> ssp <i>inexpansa</i>	New England northern reedgrass	G5T5	SU		SC
PMPOA17172	<i>Calamagrostis stricta</i> ssp <i>stricta</i>	northern reedgrass	G5T5	SU		SC
PDLAM08010	<i>Calamintha arkansana</i>	low calamint	G5	S2		SC
PMPOA18052	<i>Calamovilfa longifolia</i> var <i>magna</i>	sand reed-grass	G5TU	S2		THR
PDMAL0A080	<i>Callirhoe triangulata</i>	clustered poppy-mallow	G3G5	S2S3		SC
PDCLL01030	<i>Callitriche hermaphroditica</i>	autumnal water-starwort	G5	S2		SC
PDCLL01040	<i>Callitriche heterophylla</i>	large water-starwort	G5	S2		SC
PDRAN06020	<i>Caltha natans</i>	floating marsh-marigold	G4G5	S1		END
PDONA02040	<i>Calylophus serrulatus</i>	yellow evening primrose	G5	S3		SC
PMORC0D010	<i>Calypso bulbosa</i>	fairy slipper	G5	S2		THR
PMLIL0E050	<i>Camassia scilloides</i>	wild hyacinth	G4G5	S1		END
PDBRA0K1A0	<i>Cardamine maxima</i>	large toothwort	G5Q	S1		SC
PDBRA0K0Z0	<i>Cardamine pratensis</i>	cuckoo flower	G5	S3		SC
PMCYP03130	<i>Carex artilecta</i>	dry woods sedge	G5	S1		SC
PMCYP03140	<i>Carex assiniboinensis</i>	assiniboine sedge	G4G5	S2		SC
PMCYP031F0	<i>Carex backii</i>	rocky mountain sedge	G4	S2		SC
PMCYP032G0	<i>Carex capillaris</i>	hair-like sedge	G5	S1		SC
PMCYP032J0	<i>Carex careyana</i>	Carey's sedge	G5	S1		THR

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PMCYP03300	<i>Carex concinna</i>	beautiful sedge	G4G5	S1		THR
PMCYP03360	<i>Carex crawei</i>	Crawe sedge	G5	S2		SC
PMCYP033B0	<i>Carex crus-corvi</i>	ravenfoot sedge	G5	S1		END
PMCYP033D0	<i>Carex cumulata</i>	clustered sedge	G4?	S2		SC
PMCYP034F0	<i>Carex exilis</i>	coast sedge	G5	S1		THR
PMCYP034X0	<i>Carex folliculata</i>	long sedge	G4G5	S2S3		SC
PMCYP034Y0	<i>Carex formosa</i>	handsome sedge	G4	S1	C2	THR
PMCYP03520	<i>Carex garberi</i>	elk sedge	G4	S1		THR
PMCYP035C0	<i>Carex gracilescens</i>	slender sedge	G5?	SH		SC
PMCYP035K0	<i>Carex gynocrates</i>	northern bog sedge	G5	S2		SC
PMCYP036Z0	<i>Carex laevivaginata</i>	smooth-sheath sedge	G5	S1		SC
PMCYP037A0	<i>Carex lenticularis</i>	shore sedge	G5	S1		THR
PMCYP037L1	<i>Carex livida</i> var <i>radiculis</i>	livid sedge	G5T5	S2		SC
PMCYP037P0	<i>Carex longii</i>	greenish-white sedge	G5	S1		SC
PMCYP037T0	<i>Carex lupuliformis</i>	false hop sedge	G3G4	S1		END
PMCYP039D1	<i>Carex media</i>	intermediate sedge	G5	S1		END
PMCYP038H0	<i>Carex michauxiana</i>	Michaux sedge	G5	S1		THR
PMCYP03A01	<i>Carex pallescens</i> var <i>neogaea</i>	pale sedge	G5T?Q	S1		SC
PMCYP03B10	<i>Carex prasina</i>	drooping sedge	G4	S2S3		THR
PMCYP03BK0	<i>Carex richardsonii</i>	Richardson sedge	G4	S3		SC
PMCYP03C60	<i>Carex schweinitzii</i>	Schweinitz's sedge	G3	S1	C2	SC
PMCYP03D00	<i>Carex straminea</i>	straw sedge	G5	SH		SC
PMCYP03D70	<i>Carex suberecta</i>	prairie straw sedge	G4	S1		SC
PMCYP03DD0	<i>Carex swanii</i>	swan sedge	G5	SH		SC
PMCYP03DE0	<i>Carex sychnocephala</i>	many-headed sedge	G4	S2		SC
PMCYP03DL0	<i>Carex tenuiflora</i>	sparse-flowered sedge	G5	S3		SC
PMCYP03DT0	<i>Carex torreyi</i>	Torrey sedge	G4	S1		SC
PMCYP03E90	<i>Carex vaginata</i>	sheathed sedge	G5	S1		SC
PDFAB491P0	<i>Cassia marilandica</i>	Maryland senna	G5	S1		SC
PMPOA19010	<i>Catabrosa aquatica</i>	brook grass	G5	S1		END
PDCER01040	<i>Ceratophyllum echinatum</i>	prickly hornwort	G5Q	S2		SC
PDAP10K020	<i>Chaerophyllum procumbens</i>	spreading chervil	G5	S1		SC
PDAST2E140	<i>Cirsium flodmanii</i>	Flodman thistle	G5	S2		SC
PDAST2E1C0	<i>Cirsium hillii</i>	Hill's thistle	G3	S2	C2	THR
PDAST2E2A0	<i>Cirsium pitcheri</i>	dune thistle	G3	S2	LT	THR
PDRAN080J0	<i>Clematis occidentalis</i>	purple clematis	G5	S3		SC
PDLAM0C010	<i>Collinsonia canadensis</i>	Canada horse-balm	G5	SH		END
PMCOM03052	<i>Commelina erecta</i> var <i>deamiana</i>	narrow-leaved dayflower	G5T?	S2		SC
PDAP10P010	<i>Conioselinum chinense</i>	hemlock parsley	G5	SH		END
PMORC0M030	<i>Corallorrhiza odontorhiza</i>	autumn coral-root	G5	S3		SC
PDAST2L0F1	<i>Coreopsis lanceolata</i> var <i>lanceolata</i>	sand coreopsis	G5T?	SU		SC
PDFAB160E0	<i>Crotalaria sagittalis</i>	arrow-headed rattle-box	G5	S1		SC
PMORC0Q020	<i>Cypripedium arietinum</i>	ram's-head lady's-slipper	G3	S1	3C	THR
PMORC0Q050	<i>Cypripedium candidum</i>	small white lady's-slipper	G4	S3	3C	THR
PMORC0Q090	<i>Cypripedium parviflorum</i>	small yellow lady's-slipper	G5Q	S2S3		SC
PMORC0Q0D0	<i>Cypripedium reginae</i>	showy lady's-slipper	G4	S2S3		SC
PDFAB1A1Q0	<i>Dalea villosa</i>	silky prairie-clover	G5	S2		SC
PDSCR0L010	<i>Dasistoma macrophylla</i>	mullein foxglove	G4	SH		SC
PMPOA22050	<i>Deschampsia cespitosa</i>	tufted hairgrass	G5	S3		SC
PMPOA22090	<i>Deschampsia flexuosa</i>	crinkled hairgrass	G5	S3		SC
PDFAB1D090	<i>Desmodium canescens</i>	hoary tick-treefoil	G5	SU		SC
PMPOA23010	<i>Diarrhena americana</i>	American beakgrass	G5	S1		END
PDLYT04010	<i>Didiplis diandra</i>	water-purslane	G5	S2		SC
PDRUB0H071	<i>Diodia teres</i> var <i>teres</i>	buttonweed	G5T?	S1		SC
PPDRY090C0	<i>Diplazium pycnocarpon</i>	glade fern	G5	S2		SC
PDPR1030H0	<i>Dodecatheon radicum</i>	jewelled shooting star	G?	S4		SC
PDBRA11070	<i>Draba arabisans</i>	rock whitlow-grass	G4	S1		SC
PDBRA112Q0	<i>Draba lanceolata</i>	lanceolate whitlow-cress	G3G5	S1		END
PDDRO02010	<i>Drosera anglica</i>	English sundew	G5	SH		THR
PDDRO02060	<i>Drosera linearis</i>	slenderleaf sundew	G4	S1		THR
PPDRY0A070	<i>Dryopteris clintoniana</i>	Clinton woodfern	G5Q	SH		SC
PPDRY0A0A0	<i>Dryopteris expansa</i>	spreading woodfern	G5	S1		SC
PPDRY0A0B0	<i>Dryopteris filix-mas</i>	male fern	G5	S1		SC
PPDRY0A0C2	<i>Dryopteris fragrans</i> var <i>remotiuscula</i>	fragrant fern	G5T?	S2		SC
PDAST38040	<i>Echinacea pallida</i>	pale-purple coneflower	G4G5	S2S3		THR
PMALI02030	<i>Echinodorus rostratus</i>	erect burhead	G5	SU		SC

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PDAST3A020	<i>Eclipta alba</i>	yerba de tajo	G?	S1		SC
PDELTO2090	<i>Elatine triandra</i>	longstem water-wort	G5	SU		SC
PMCYP09220	<i>Eleocharis compressa</i>	flat-stemmed spike-rush	G4	SU		SC
PMCYP090M0	<i>Eleocharis engelmannii</i>	Engelmann spike-rush	G5	S2		SC
PMCYP09180	<i>Eleocharis nitida</i>	slender spike-rush	G3G4	S1		SC
PMCYP091A0	<i>Eleocharis olivacea</i>	capitate spikerush	G5	S2		SC
PMCYP091J0	<i>Eleocharis quadrangulata</i>	squarestem spikerush	G4	SH		END
PMCYP091K0	<i>Eleocharis quinqueflora</i>	few-flower spikerush	G5	S2		SC
PMCYP091N0	<i>Eleocharis robbinsii</i>	Robbins spikerush	G4G5	S3		SC
PMCYP091P0	<i>Eleocharis rostellata</i>	beaked spikerush	G5	S2		THR
PMCYP091Z0	<i>Eleocharis wolfii</i>	wolf spikerush	G4G5	S1	C2	SC
PMPOA2H0S3	<i>Elymus lanceolatus ssp psammophilus</i>	thickspike	G7T?	S2		THR
PDONA060R0	<i>Epilobium palustre</i>	marsh willow-herb	G5	S2		SC
PDONA060X0	<i>Epilobium strictum</i>	downy willow-herb	G5?	S2S3		SC
PPEQU010S0	<i>Equisetum palustre</i>	marsh horsetail	G5	S2		SC
PPEQU010B0	<i>Equisetum variegatum</i>	variegated horsetail	G5	S3		SC
PDAPI0Y010	<i>Erigenia bulbosa</i>	harbinger-of-spring	G5	SH		END
PDAST3P1T1	<i>Eupatorium sessilifolium var brittonianum</i>	upland boneset	G5T?	S3		SC
PDEUP0Q0B0	<i>Euphorbia commutata</i>	wood spurge	G5	SH		SC
PDEUP0Q1H0	<i>Euphorbia obtusata</i>	bluntleaf spurge	G5	SH		SC
PDEUP0D1Z0	<i>Euphorbia polygonifolia</i>	seaside spurge	G5?	S2		SC
PMPOA2V0M0	<i>Festuca occidentalis</i>	western fescue	G5	S1S2		THR
PMPOA2V0P0	<i>Festuca paradoxa</i>	cluster fescue	G5	SH		SC
PMCYP0B0G0	<i>Fimbristylis puberula</i>	hairy fimbriatylis	G5	S1		END
PDOL040F0	<i>Fraxinus quadrangulata</i>	blue ash	G5	S1		THR
PMCYP0C040	<i>Fuirena pumila</i>	dwarf umbrella-sedge	G4	S1		END
PDRUB0N1P0	<i>Galium palustre</i>	marsh bedstraw	G5	SU		SC
PDGEN060Z0	<i>Gentiana alba</i>	yellow gentian	G4	S2		THR
PDGEN08080	<i>Gentianopsis procera</i>	lesser fringed gentian	G5	S3		SC
PDSAN04010	<i>Geocaulon lividum</i>	northern comandra	G5	S1		END
PDROS0S081	<i>Geum macrophyllum var perincisum</i>	large-leaved avens	G5T?	S4		SC
PDFAB1W020	<i>Glycyrrhiza lepidota</i>	wild licorice	G5	S2		SC
PDAST44090	<i>Gnaphalium helleri</i>	catfoot	G4G5	SU		SC
PDAST440G3	<i>Gnaphalium obtusifolium var saxicola</i>	cliff cudweed	G5T1T3	S1S2	C2	SC
PDASTDP030	<i>Gnaphalium sylvaticum</i>	woodland cudweed	G5	S1		SC
PMORC17010	<i>Goodyera oblongifolia</i>	giant rattlesnake-plantain	G5?	SU		SC
PPDRY0D050	<i>Gymnocarpium jessoense</i>	northern oak fern	G5	SH		SC
PPDRY0D060	<i>Gymnocarpium robertianum</i>	limestone oak fern	G5	S2		SC
PDFAB1X010	<i>Gymnocladus dioicus</i>	Kentucky coffee-tree	G5	S3		SC
PDRUB0W060	<i>Hedyotis caerulea</i>	innocence	G5	S3		SC
PDMAL0H0R2	<i>Hibiscus moscheutos ssp moscheutos</i>	swamp rose mallow	G5T?	S1		SC
PDVIO02020	<i>Hybanthus concolor</i>	green violet	G5	SH		SC
PDRAN0F010	<i>Hydrastis canadensis</i>	golden-seal	G4	S3S4	3C	SC
PDCLU031H0	<i>Hypericum sphaerocarpum</i>	roundfruit St. John's-wort	G5	S2		THR
PMIRI090H0	<i>Iris lacustris</i>	dwarf lake iris	G3	S2	LT	THR
PDBER05010	<i>Jeffersonia diphylla</i>	twingleaf	G5	S2		SC
PDJUG02030	<i>Juglans cinerea</i>	butternut	G3G4	S3?	C2	SC
PMJUN011S0	<i>Juncus marginatus</i>	grassleaf rush	G5	SU		SC
PMJUN012N0	<i>Juncus stygius</i>	moor rush	G5	S1		END
PMJUN01340	<i>Juncus vaseyi</i>	Vasey rush	G3G5	S1		SC
PDFAB27090	<i>Lespedeza leptostachya</i>	prairie bush-clover	G2	S1	LT	END
PDFAB270F0	<i>Lespedeza violacea</i>	violet bush-clover	G5	S2S3		SC
PDFAB270G0	<i>Lespedeza virginica</i>	slender bush-clover	G5	S2		THR
PDBRA1N110	<i>Lesquerella ludoviciana</i>	silver bladderpod	G5	S1		THR
PDSOL0E010	<i>Leucophysalis grandiflora</i>	large-flowered ground-cherry	G3G4	S2		SC
PDAST5X0M2	<i>Liatris punctata var nebraskana</i>	dotted blazing star	G4G5TU	S1S2		END
PDAST5X0T0	<i>Liatris spicata</i>	marsh blazing star	G5	S2S3		SC
PMORC1N010	<i>Listera auriculata</i>	auricled twayblade	G3	S1	3C	END
PMORC1N050	<i>Listera convallarioides</i>	broad-leaved twayblade	G5	S1		THR
PDBOR0L080	<i>Lithospermum latifolium</i>	American gromwell	G3G5	S2		SC
PDPLN01010	<i>Littorella americana</i>	American shore-grass	G5	S2		SC
PDGFR030F0	<i>Lonicera involucrata</i>	fly honeysuckle	G4G5	S1		SC
PPLYC010S0	<i>Lycopodium porophyllum</i>	rock clubmoss	G4	S3		SC
PPLYC010X0	<i>Lycopodium selago</i>	fir clubmoss	G5	S1		SC
PMORC1R010	<i>Malaxis brachypoda</i>	white Adder's-mouth	G4	S2	C2	SC
PMLIL1E010	<i>Medeola virginiana</i>	indian cucumber-root	G5	S3		SC

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PMPOA3X0D0	<i>Melica nitens</i>	three-flower melic grass	G5	SH		SC
PMPOA3X0F0	<i>Melica smithii</i>	Smith melic grass	G4	S1		END
PDCAR0G070	<i>Mimuartia dawsonensis</i>	rock stitchwort	G5	S2		SC
PDCAR0H020	<i>Moehringia macrophylla</i>	large-leaved sandwort	G4	S1		END
PMPOA481G0	<i>Muhlenbergia richardsonis</i>	soft-leaf muhly	G5	S1		SC
PDBOR0P080	<i>Myosotis laxa</i>	small forget-me-not	G5	S2		SC
PDHAL04050	<i>Myriophyllum farwellii</i>	Farwell's water-milfoil	G5	S2		SC
PDMAL0X010	<i>Napaea dioica</i>	glade mallow	G3?	S3	3C	SC
PDAST6P020	<i>Nothocalais cuspidata</i>	prairie false-dandelion	G5	S2		SC
PDBOR0S020	<i>Onosmodium hispidissimum</i>	marbleseed	G4	S2?		SC
PPOPH020B0	<i>Ophioglossum vulgatum</i>	Adder's-tongue	G5	S3		SC
PDCAC0D0H0	<i>Opuntia fragilis</i>	brittle prickly-pear	G4G5	S3		THR
PDORO04060	<i>Orobanche fasciculata</i>	clustered broomrape	G4	S1		THR
PDORO04070	<i>Orobanche ludoviciana</i>	Louisiana broomrape	G5	S1		SC
PDORO040F0	<i>Orobanche uniflora</i>	one-flowered broomrape	G5	S3		SC
PMPOA4J030	<i>Oryzopsis canadensis</i>	Canada mountain-ricegrass	G5	S1		SC
PDAPI1K010	<i>Osmorhiza chilensis</i>	Chilean sweet cicely	G5	S3		SC
PDFAB2X041	<i>Oxytropis campestris var chartacea</i>	Fassett's locoweed	G5?T1	S1	LT	END
PDARA09010	<i>Panax quinquefolius</i>	American ginseng	G4	S4	3C	SC
PMPOA4K2Y0	<i>Panicum wilcoxianum (Dichanthelium wilcoxianum)</i>	Wilcox panic grass	G5	S2		SC
PDSAX0P090	<i>Parnassia palustris</i>	marsh grass-of-parnassus	G5	S1		THR
PDSAX0P0A0	<i>Parnassia parviflora</i>	small-flower grass-of-parnassus	G4	S1		END
PDAST6V060	<i>Parthenium integrifolium</i>	American fever-few	G5	S2		THR
PPADI0H020	<i>Pellaea atropurpurea</i>	purple-stem cliff-brake	G5	S3		SC
PMARA0E010	<i>Peltandra virginica</i>	green arrow-arum	G5	S1		SC
PDSCR1L330	<i>Penstemon hirsutus</i>	hairy beardtongue	G4	S2		SC
PDSCR1L4J0	<i>Penstemon pallidus</i>	pale beardtongue	G5	S3		SC
PDSCR1L6D0	<i>Penstemon tubaeiflorus</i>	tube penstemon	G5	SU		SC
PDAST71040	<i>Petasites sagittatus</i>	arrow-leaved sweet-coltsfoot	G4	S2		THR
PPTHE02020	<i>Phegopteris hexagonoptera</i>	broad beech fern	G5	S2S3		SC
PDPLM0D0A0	<i>Phlox bifida</i>	cleft phlox	G5?	S1		SC
PDPLM0D0T2	<i>Phlox glaberrima ssp interior</i>	smooth phlox	G7?T	S1S2		END
PDLNT01090	<i>Pinguicula vulgaris</i>	common butterwort	G5	S1		END
PDPLN02090	<i>Plantago cordata</i>	heart-leaved plantain	G3	S1	3C	END
PMORC1Y070	<i>Platanthera dilatata</i>	leafy white orchid	G5	S3		SC
PMORC1Y082	<i>Platanthera flava var herbiola</i>	pale green orchid	G4T4Q	S1	3C	THR
PMORC1Y0A0	<i>Platanthera hookeri</i>	Hooker orchid	G5	S3		SC
PMORC1Y0F0	<i>Platanthera leucophaea</i>	prairie white-fringed orchid	G2	S1	LT	END
PMORC1Y0K0	<i>Platanthera orbiculata</i>	large roundleaf orchid	G5?	S2S3		SC
PDPLT01020	<i>Platanus occidentalis</i>	sycamore	G5	S2		SC
PMPOA4Z1W0	<i>Poa paludigena</i>	bog bluegrass	G3	S1	C2	THR
PDCPP08030	<i>Polanisia jamesii</i>	James cristatella	G5	SU		SC
PDPLM0E0F4	<i>Polemonium occidentale ssp lacustre</i>	western Jacob's ladder	G5?T1Q	S1	C2	SC
PDPGL020E0	<i>Polygala cruciata</i>	crossleaf milkwort	G5	S2		SC
PDPGL020P0	<i>Polygala incarnata</i>	pink milkwort	G5	S1		END
PPDRY0R010	<i>Polystichum acrostichoides</i>	Christmas fern	G5	S2		SC
PPDRY0R040	<i>Polystichum braunii</i>	Braun's holly-fern	G5	S2		THR
PDAPI1U010	<i>Polytaenia nuttallii</i>	prairie parsley	G5	S2		THR
PMPOT03180	<i>Potamogeton capillaceus</i>	water-thread pondweed	G?	SU		SC
PMPOT03050	<i>Potamogeton confervoides</i>	algae-like pondweed	G5	S1	C2	THR
PMPOT030W0	<i>Potamogeton pulcher</i>	spotted pondweed	G5	S1		END
PMPOT03140	<i>Potamogeton vaginatus</i>	sheathed pondweed	G5	S1		THR
PMPOT03150	<i>Potamogeton vaseyi</i>	Vasey's pondweed	G4	S2		SC
PDAST7K040	<i>Prenanthes aspera</i>	rough rattlesnake-root	G4?	S1		END
PDAST7K080	<i>Prenanthes crepidinea</i>	nodding rattlesnake-root	G3G5	S1		END
PDPRI080D0	<i>Primula mistassinica</i>	bird's-eye primrose	G5	S3S4	3C	SC
PMCYP0N3A0	<i>Psilocarya scirpoides</i>	long-beaked baldrush	G4	S1		THR
PDFAB5L040	<i>Psoralea argophylla</i>	silvery scurf pea	G5	SH		SC
PDFAB5L0B0	<i>Psoralea esculenta</i>	pomme-de-prairie	G5	S3		SC
PDRUT0F020	<i>Ptelea trifoliata</i>	wafer-ash	G5	S2		SC
PDMON07010	<i>Pterospora andromedea</i>	giant pinedrops	G5	S1		END
PDPYR04060	<i>Pyrola minor</i>	lesser wintergreen	G5	S1		END
PDFAG051P0	<i>Quercus palustris</i>	pin oak	G5	SU		SC
PDRAN0L0Q0	<i>Ranunculus cymbalaria</i>	seaside crowfoot	G5	S2		END
PDRAN0L112	<i>Ranunculus gmelinii var hookeri</i>	small yellow water crowfoot	G5TU	S1		END
PDRAN0L1G0	<i>Ranunculus lapponicus</i>	Lapland buttercup	G5	S1		SC

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PDRHA0C092	<i>Rhamnus lanceolata</i> var <i>glabrata</i>	lanced-leaved buck-thorn	G4G5TU	S2		SC
PDMLS0H0B0	<i>Rhexia virginica</i>	Virginia meadow-beauty	G5	S2		SC
PDERI150G0	<i>Rhododendron lapponicum</i>	Lapland azalea	G5	S1		END
PDANA08010	<i>Rhus aromatica</i>	fragrant sumac	G5	S2		SC
PMCYP0N0U0	<i>Rhynchospora fusca</i>	brown beakrush	G4G5	S2		SC
PDGRO020N0	<i>Ribes hudsonianum</i>	northern black currant	G5	S2		SC
PDGRO02180	<i>Ribes oxycanthoides</i>	Canada gooseberry	G5	S1		THR
PDR0S1K7W0	<i>Rubus uniformis</i>	uniform bramble	G?	SH		SC
PDACA0J080	<i>Ruellia humilis</i>	hairy wild-petunia	G5	S1		END
PMALI04040	<i>Sagittaria calycina</i>	long-lobe arrowhead	G5	SH		SC
PDSAL020U0	<i>Salix cordata</i>	sand dune willow	G5	S1		END
PDSAL02260	<i>Salix pellita</i>	satiny willow	G5	S1		SC
PDSAL022B0	<i>Salix planifolia</i>	tea-leaved willow	G5	S1		SC
PDSAL022N0	<i>Salix sericea</i>	silky willow	G5	S2		SC
PMCYP0Q061	<i>Scirpus cespitosus</i>	tussock bulrush	G5T?	S2S3		END
PMCYP0Q0Q0	<i>Scirpus georgianus</i>	Georgia bulrush	G5	SU		SC
PMCYP0Q0R0	<i>Scirpus hallii</i>	Hall's bulrush	G2	SH	C2	SC
PMCYP0Q140	<i>Scirpus pallidus</i>	pale bulrush	G5	SH		SC
PMCYP0Q1J0	<i>Scirpus torreyi</i>	Torrey's bulrush	G5?	S2S3		SC
PMCYP0R0K0	<i>Scleria reticularis</i>	reticulated nutrush	G5	S1		END
PMCYP0R0R0	<i>Scleria triglomerata</i>	whip nutrush	G5	S1		SC
PMCYP0R0S0	<i>Scleria verticillata</i>	low nutrush	G5	S2		SC
PDLAM1U100	<i>Scutellaria ovata</i>	heart-leaved skullcap	G5	S3S4		SC
PDLAM1U111	<i>Scutellaria parvula</i> var <i>parvula</i>	small skullcap	G4T?	S1		END
PPSEL01110	<i>Selaginella selaginoides</i>	low spike-moss	G5	S1		END
PDAST8H0U0	<i>Senecio congestus</i>	marsh ragwort	G5	SH		SC
PDAST8H1R0	<i>Senecio indecorus</i>	plains ragwort	G5	S1		SC
PDAST8H2F0	<i>Senecio plattensis</i>	prairie ragwort	G5	SU		SC
PDCAR0U120	<i>Silene nivea</i>	snowy campion	G4?	S2		SC
PDCAR0U220	<i>Silene virginica</i>	fire pink	G5	S1		SC
PMIRI0D030	<i>Sisyrinchium angustifolium</i>	pointed blue-eyed-grass	G4?	SH		SC
PDAST8P080	<i>Solidago caesia</i>	bluestem goldenrod	G5	S2		END
PDAST8P180	<i>Solidago ohioensis</i>	Ohio goldenrod	G4	S3		SC
PDAST8P1R0	<i>Solidago sciaphila</i>	shadowy goldenrod	G4?	S3		SC
PDAST8P2U2	<i>Solidago simplex</i> var <i>gillmanii</i> (=s. <i>spathulata</i>)	dune goldenrod	G5T?	S2	C2	THR
PMSFA01070	<i>Sparganium glomeratum</i>	northern bur-reed	G5	S1		SC
PMLIL1X010	<i>Streptopus amplexifolius</i>	white mandarin	G5	SU		SC
PDSAX0X040	<i>Sullivantia sullivantii</i>	kidney-leaved sullivantia	G3Q	S3S4	3C	SC
PDPOR080G0	<i>Talinum rugospermum</i>	prairie fame-flower	G3G4	S3S4	C2	SC
PDAST92015	<i>Tanacetum huronense</i>	Lake Huron tansy	G3Q	S1		END
PGTXA01020	<i>Taxus canadensis</i>	Canadian yew	G5	SU		SC
PDRAN0M0J0	<i>Thalictrum revolutum</i>	waxleaf meadowrue	G5	S2		SC
PDRAN0M0Q0	<i>Thalictrum venulosum</i>	veined meadowrue	G5	S1		SC
PDAP128010	<i>Thaspium barbinode</i>	hairy-jointed meadow-parsnip	G5	S1		END
PDAP128033	<i>Thaspium trifoliatum</i> var <i>flavum</i>	purple meadow-parsnip	G5T5	S2		SC
PPTHE051L0	<i>Thelypteris simulata</i>	bog fern	G5	S2		SC
PDSAX10010	<i>Tiarella cordifolia</i>	heart-leaved foam-flower	G5	S1		END
PMLIL1Y030	<i>Tofieldia glutinosa</i>	sticky false-asphodel	G5	S3		THR
PMJCG02030	<i>Triglochin maritimum</i>	common bog arrow-grass	G5	S3		SC
PMJCG02040	<i>Triglochin palustre</i>	slender bog arrow-grass	G5	S3		SC
PMLIL200L0	<i>Trillium nivale</i>	snow trillium	G4	S2		THR
PMLIL200R0	<i>Trillium recurvatum</i>	reflexed trillium	G5	S3		SC
PMORC2F050	<i>Triphora trianthophora</i>	nodding pogonia	G4	S2		SC
PMPOA69080	<i>Trisetum melicoides</i>	purple false oats	G3G4	S1		SC
PMPOA690C0	<i>Trisetum spicatum</i>	narrow false oats	G5	S2		THR
PDLNT02070	<i>Utricularia geminiscapa</i>	hidden-fruited bladderwort	G4G5	S3		SC
PDLNT020G0	<i>Utricularia purpurea</i>	purple bladderwort	G5	S3		SC
PDLNT020K0	<i>Utricularia resupinata</i>	northeastern bladderwort	G4	S2S3		SC
PDERI18060	<i>Vaccinium cespitosum</i>	dwarf huckleberry	G5	S1		END
PDERI18121	<i>Vaccinium vitis-idaea</i> ssp <i>minus</i>	mountain cranberry	G5T4T5	S1		END
PDVAL030J0	<i>Valeriana sitchensis</i> ssp <i>uliginosa</i>	marsh valerian	G4G5T4	S1		THR
PDCPR07040	<i>Viburnum cassinoides</i>	northern wild-raisin	G5	S2		SC
PDCPR07070	<i>Viburnum edule</i>	squashberry	G5	S1		END
PDCPR070J0	<i>Viburnum prunifolium</i>	smooth black-haw	G5	S2		SC
PDVIO040L0	<i>Viola fimbriatula</i>	sand violet	G5	S1		END
PDVIO04180	<i>Viola novae-angliae</i>	New England violet	G3Q	S4	3C	THR

ELCODE	Scientific Name	Common Name	Global Rank	State Rank	US ESA WI Status	Status
PDVIO041X0	<i>Viola rostrata</i>	long-spur violet	G5	S2		SC
PPDRY0U081	<i>Woodsia oregana</i> var <i>cathcartiana</i>	Oregon woodsia (tetraploid)	G5T1?	S1	C2	SC

RARE BRYOPHYTES - DRAFT

NBMUS05010	<i>Amblyodon dealbatus</i>	a moss	G3G5	S1		SC
NBHEP04052	<i>Anastrophyllum minutum</i> var <i>minutum</i>	a liverwort	G5T5	S1		SC
NBANT01040	<i>Anthoceros macounii</i>	a hornwort	G?	S1S2		SC
NBANT01060	<i>Anthoceros punctatus</i>	a hornwort	G5	S1S2		SC
NBMUS0N020	<i>Aulacomnium androgynum</i>	a moss	G5	S2		SC
NBMUS0V010	<i>Blindia acuta</i>	a moss	G5	S1		SC
NBMUS0Z060	<i>Brachythecium calcareum</i>	a moss	G1G3	S3		SC
NBMUS1B010	<i>Buxbaumia aphylla</i>	bug-on-a-stick	G2G3	S1		SC
NBMUS1F060	<i>Calliergon richardsonii</i>	a moss	G2G3	S3		SC
NBMUS1F0A0	<i>Calliergon trifarium</i>	a moss	G5	S1		SC
NBHEP0M010	<i>Calypogeia fissa</i>	a liverwort	G5	S1		SC
NBHEP0M060	<i>Calypogeia sphagnicola</i>	a liverwort	G5	S1		SC
NBHEP0P050	<i>Cephalozia lacinulata</i>	a liverwort	G?	S1		SC
NBHEP0Q050	<i>Cephaloziella divaricata</i>	a liverwort	G5	S1		SC
NBHEP0Q0H5	<i>Cephaloziella rubella</i> var <i>sullivantii</i>	a liverwort	G5T3?Q	S1		SC
NBMUS28010	<i>Dicranella cerviculata</i>	a moss	G?	S1		SC
NBMUS280A1	<i>Dicranella schreberiana</i> var <i>robusta</i>	a moss	G5T?	S1		SC
NBMUS2G020	<i>Ditrichum flexicaule</i>	a moss	G5	S1		SC
NBMUS2J0J0	<i>Drepanocladus simplicissimus</i>	a moss	G1	S1		SC
NBMUS2M070	<i>Encalypta procera</i>	extinguisher moss	G4G5	S2		SC
NBMUS2N010	<i>Entodon brevisetus</i>	a moss	G3?	S4?		SC
NBMUS2X060	<i>Fontinalis flaccida</i>	a water moss	G4G5	S1		SC
NBMUS2X0F0	<i>Fontinalis sphagnifolia</i>	a water moss	G3G5	S2		SC
NBHEP1A0L0	<i>Frullania selwyniana</i>	a liverwort	G?	S1		SC
NBMUS2Z010	<i>Funaria americana</i>	a moss	G2G3	S3?		SC
NBMUS32120	<i>Grimmia pulvinata</i>	a moss	G4G5	S1?		SC
NBMUS32160	<i>Grimmia teretinervis</i>	a moss	G3G5	S2		SC
NBMUS3U010	<i>Hyopbila involuta</i>	a moss	G4G5	S2		SC
NBMUS3X010	<i>Isopterygiopsis muelleriana</i>	a moss	G5	S1		SC
NBMUS97010	<i>Jaffuellobryum raii</i>	a moss	G4?	S2		SC
NBMUS97020	<i>Jaffuellobryum wrightii</i>	a moss	G3G4	S2		SC
NBHEP1P030	<i>Jungermannia confertissima</i>	a liverwort	G?	S1		SC
NBHEP1P040	<i>Jungermannia crenuliformis</i>	a liverwort	G4	S1		SC
NBHEP1P061	<i>Jungermannia exsertifolia</i> ssp <i>cordifolia</i>	a liverwort	G5T?	S1		SC
NBHEP1P080	<i>Jungermannia gracillima</i>	a liverwort	G5	S1		SC
NBHEP1Q020	<i>Kurzia setacea</i>	a liverwort	G4G5	S1		SC
NBMUS4B020	<i>Leucodon julaceus</i>	a moss	G5	S2		SC
NBHEP1Y030	<i>Lophozia ascendens</i>	a liverwort	G4	S1		SC
NBHEP1Y060	<i>Lophozia bicrenata</i>	a liverwort	G5	S1		SC
NBHEP1Y0M0	<i>Lophozia longidens</i>	a liverwort	G5?	S1		SC
NBHEP1Y0X3	<i>Lophozia ventricosa</i> var <i>longiflora</i>	a liverwort	G5T3T5	S1		SC
NBHEP1Y0X5	<i>Lophozia ventricosa</i> var <i>silvicola</i>	a liverwort	G5T5	S1		SC
NBHEP20050	<i>Mannia triandra</i>	a liverwort	G3G4	S1		SC
NBMUS4P020	<i>Micromitrium megalosporum</i>	a moss	G4	S2		SC
NBHEP28020	<i>Moerckia hibernica</i>	a liverwort	G5	S1		SC
NBHEP29010	<i>Mylia anomala</i>	a liverwort	G5	S1		SC
NBANT02020	<i>Notothylas orbicularis</i>	a hornwort	G?	S1S2		SC
NBMUS8D010	<i>Oxystegus spiralis</i>	a moss	G1	S1		SC
NBHEP2F010	<i>Pallavicinia hyellii</i>	a liverwort	G?	S1		SC
NBMUS5E030	<i>Physcomitrium hookeri</i>	a moss	G2G4	S2		SC
NBMUS5E040	<i>Physcomitrium immersum</i>	a moss	G2G4	S2		SC
NBMUS5K030	<i>Platydictya minutissima</i>	a moss	G3	S3		SC
NBMUS5R060	<i>Pogonatum urnigerum</i>	a moss	G5	S2		SC
NBMUS5S050	<i>Pohlia carnea</i>	a moss	G?	S2		SC
NBMUS5S0E0	<i>Pohlia lescuriana</i>	a moss	G3?	S2		SC
NBMUS63010	<i>Pterigynandrum filiforme</i>	a moss	G4G5	S1		SC
NBMUS6B010	<i>Racomitrium aciculare</i>	a moss	G5	S1		SC
NBMUS6B070	<i>Racomitrium heterostichum</i>	a moss	G5	S1		SC
NBHEP2Z030	<i>Riccia beyrichiana</i>	a liverwort	G5	S1?		SC
NBHEP2Z080	<i>Riccia cavernosa</i>	a liverwort	G5	S1?		SC
NBHEP2Z0E0	<i>Riccia frostii</i>	a liverwort	G?	S1?		SC

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NBHEP220M0	<i>Riccia sorocarpa</i>	a liverwort	G5	S1?	SC
NBHEP220N0	<i>Riccia sullivantii</i>	a liverwort	G?	S1?	SC
NBHEP33070	<i>Scapania carinthiaca</i>	a liverwort	G?	S1	SC
NBHEP330B0	<i>Scapania cuspiduligera</i>	a liverwort	G?	S1	SC
NBHEP330C0	<i>Scapania degenii</i>	a liverwort	G?	S1	SC
NBHEP330Y0	<i>Scapania saxicola</i>	a liverwort	G?	S1	SC
NBHEP330Z0	<i>Scapania scandica</i>	a liverwort	G?	S1	SC
NBHEP33160	<i>Scapania umbrosa</i>	a liverwort	G?	S1	SC
NBMUS6P010	<i>Schistostega pennata</i>	luminous moss	G4G5	S1	SC
NBMUS6R010	<i>Schwetschkeopsis fabronia</i>	a moss	G5	S1?	SC
NBMUS6V010	<i>Scorpidium scorpioides</i>	a moss	G4G5	S1	SC
NBMUS6X010	<i>Seligeria calcarea</i>	a moss	G3G4	S1	SC
NBMUS6X030	<i>Seligeria donniana</i>	a moss	G4G5	S1	SC
NBMUS6Z1Q0	<i>Sphagnum andersonianum</i>	a peat moss	G3?	S2	SC
NBMUS6Z240	<i>Sphagnum nitidum</i>	a peat moss	G?	S2	SC
NBMUS6Z0X0	<i>Sphagnum platyphyllum</i>	a peat moss	G5	S1S2	SC
NBMUS6Z0Z0	<i>Sphagnum pulchrum</i>	a peat moss	G5	S2	SC
NBMUS71010	<i>Splachnum ampullaceum</i>	a moss	G5	S2	SC

NATURAL COMMUNITIES

CPSHR052WI	<i>Alder thicket</i>	alder thicket	G4	S4	NA
CTGEO085WI	<i>Algific talus slope</i>	algific talus slope	G2	S1	NA
CTGEO087WI	<i>Alkaline bedrock glade</i>	alkaline bedrock glade		S1	NA
CTGEO092WI	<i>Beach</i>	beach	G3	S2	NA
CTGEO086WI	<i>Bedrock glade</i>	bedrock glade		S2	NA
CTGEO097WI	<i>Bedrock shore</i>	bedrock shore		S3	NA
CPSHR053WI	<i>Bog relict</i>	bog relict	G3	S3	NA
CPHER065WI	<i>Boreal (rich) fen</i>	boreal fen		S2	NA
CTFOR040WI	<i>Boreal forest</i>	boreal forest	G3?	S2	NA
CTHER080WI	<i>Bracken grassland</i>	bracken grassland	G3	S2	NA
CPHER064WI	<i>Calcareous fen</i>	calcareous fen	G3	S3	NA
CTSAV008WI	<i>Cedar glade</i>	cedar glade		S4	NA
CPHER066WI	<i>Coastal plain marsh</i>	coastal plain marsh	GU	S1	NA
CTGEO093WI	<i>Cobble beach</i>	cobble beach		S1	NA
CTHER070WI	<i>Dry prairie</i>	dry prairie	G3	S3	NA
CTHER072WI	<i>Dry-mesic prairie</i>	dry-mesic prairie	G3	S2	NA
CPHER056WI	<i>Emergent aquatic</i>	emergent aquatic	G4	S4	NA
CLEPH390WI	<i>Ephemeral pond</i>	ephemeral pond		SU	NA
CPFOR024WI	<i>Floodplain forest</i>	floodplain forest	G3?	S3	NA
CPFOR025WI	<i>Forested seep</i>	forested seep		S2	NA
CPFOR039WI	<i>Hardwood swamp</i>	hardwood swamp	G4	S3	NA
CTFOR035WI	<i>Hemlock relict</i>	hemlock relict	G4	S2	NA
CPHER068WI	<i>Interdunal wetland</i>	interdunal wetland	G2?	S1	NA
CTGEO091WI	<i>Interior beach</i>	interior beach			NA
CTGEO094WI	<i>Lake dune</i>	lake dune	G3	S2	NA
CLDRA340WI	<i>Lake--deep, hard, drainage</i>	lake--deep, hard, drainage	GU	S3	NA
CLSEE342WI	<i>Lake--deep, hard, seepage</i>	lake--deep, hard, seepage	GU	S2	NA
CLDRA344WI	<i>Lake--deep, soft, drainage</i>	lake--deep, soft, drainage	GU	S1	NA
CLSEE346WI	<i>Lake--deep, soft, seepage</i>	lake--deep, soft, seepage	GU	SU	NA
CLSEE347WI	<i>Lake--deep, soft, seepage (sterile)</i>	lake--deep, soft, seepage (sterile)	GU	S3	NA
CLBOG360WI	<i>Lake--hard bog</i>	lake--hard bog	GU	S2	NA
CLMER376WI	<i>Lake--meromictic</i>	lake--meromictic	GU	S1	NA
CLOXB374WI	<i>Lake--oxbow</i>	lake--oxbow		SU	NA
CLDRA348WI	<i>Lake--shallow, hard, drainage</i>	lake--shallow, hard, drainage	GU	SU	NA
CLSEE350WI	<i>Lake--shallow, hard, seepage</i>	lake--shallow, hard, seepage	GU	SU	NA
CLDRA352WI	<i>Lake--shallow, soft, drainage</i>	lake--shallow, soft, drainage	GU	S3	NA
CLSEE354WI	<i>Lake--shallow, soft, seepage</i>	lake--shallow, soft, seepage	GU	S4	NA
CLBOG362WI	<i>Lake--soft bog</i>	lake--soft bog	GU	S4	NA
CLUNI380WI	<i>Lake--unique</i>	lake--unique		SU	NA
CTFOR041WI	<i>Mesic cedar forest</i>	mesic cedar forest	GU	S1	NA
CTHER074WI	<i>Mesic prairie</i>	mesic prairie	G2	S1	NA
CTFOR030WI	<i>Northern dry forest</i>	northern dry forest	G3?	S3	NA
CTFOR032WI	<i>Northern dry-mesic forest</i>	northern dry-mesic forest	G4	S3	NA
CTFOR034WI	<i>Northern mesic forest</i>	northern mesic forest	G4	S4	NA
CPHER060WI	<i>Northern sedge meadow</i>	northern sedge meadow	G4	S3	NA

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CPFOR038WI	<i>Northern wet forest</i>	northern wet forest	G4	S4		NA
CPFOR036WI	<i>Northern wet-mesic forest</i>	northern wet-mesic forest	G3?	S3S4		NA
CPFOR037WI	<i>Northern wet-mesic forest (white pine)</i>	northern wet-mesic forest (white pine)	G2?	S2		NA
CTSAV002WI	<i>Oak barrens</i>	oak barrens	G2?	S2		NA
CTSAV004WI	<i>Oak opening</i>	oak opening	G1	S1		NA
CTFOR010WI	<i>Oak woodland</i>	oak woodland		S1?		NA
CPSHR054WI	<i>Open bog</i>	open bog	G4	S4		NA
CTGEO082WI	<i>Open cliff</i>	open cliff		S4		NA
CPSHR055WI	<i>Patterned peatland</i>	patterned peatland		S1		NA
CTSAV006WI	<i>Pine barrens</i>	pine barrens	G3	S2		NA
CTFOR033WI	<i>Pine relict</i>	pine relict	G4	S2		NA
CRHER069WI	<i>Poor fen</i>	poor fen		S3		NA
CTMIX088WI	<i>Sand barrens</i>	sand barrens		SU		NA
CTHER073WI	<i>Sand prairie</i>	sand prairie		S2		NA
CTGEO084WI	<i>Shaded cliff</i>	shaded cliff		S4		NA
CPHER067WI	<i>Sedge fen</i>	sedge fen		S2		NA
CPSHR050WI	<i>Shrub-carr</i>	shrub-carr		S4		NA
CTFOR012WI	<i>Southern dry forest</i>	southern dry forest	G4	S3		NA
CTFOR014WI	<i>Southern dry-mesic forest</i>	southern dry-mesic forest	G4	S3		NA
CPFOR022WI	<i>Southern hardwood swamp</i>	southern hardwood swamp	G3?	S2?		NA
CTFOR016WI	<i>Southern mesic forest</i>	southern mesic forest	G3?	S3		NA
CPHER062WI	<i>Southern sedge meadow</i>	southern sedge meadow	G3?	S3		NA
CLSPR375WI	<i>Spring lake</i>	spring lake		S3		NA
CLSPR370WI	<i>Spring pond</i>	spring pond	GU	S3		NA
CRSPR302WI	<i>Springs and spring runs, hard</i>	springs and spring runs, hard	GU	S4		NA
CRSPR304WI	<i>Springs and spring runs, soft</i>	springs and spring runs, soft		SU		NA
CRSTR310WI	<i>Stream—fast, hard, cold</i>	stream—fast, hard, cold	GU	S4		NA
CRSTR312WI	<i>Stream—fast, hard, warm</i>	stream—fast, hard, warm		SU		NA
CRSTR314WI	<i>Stream—fast, soft, cold</i>	stream—fast, soft, cold	GU	SU		NA
CRSTR316WI	<i>Stream—fast, soft, warm</i>	stream—fast, soft, warm		SU		NA
CRSTR320WI	<i>Stream—slow, hard, cold</i>	stream—slow, hard, cold		SU		NA
CRSTR322WI	<i>Stream—slow, hard, warm</i>	stream—slow, hard, warm		SU		NA
CRSTR324WI	<i>Stream—slow, soft, cold</i>	stream—slow, soft, cold		SU		NA
CRSTR326WI	<i>Stream—slow, soft, warm</i>	stream—slow, soft, warm		SU		NA
CPHER058WI	<i>Submergent aquatic</i>	submergent aquatic		SU		NA
CPFOR042WI	<i>Tamarack fen</i>	tamarack fen	G3	S3		NA
CPHER078WI	<i>Wet prairie</i>	wet prairie	G3	SU		NA
CPHER076WI	<i>Wet-mesic prairie</i>	wet-mesic prairie	G2	S2		NA

OBATH000WI	<i>Bat hibernaculum</i>	bat hibernaculum		S3		NA
ORKER000WI	<i>Bird rookery</i>	bird rookery		SU		NA
OHIBE000WI	<i>Herp hibernaculum</i>	herp hibernaculum		SU		NA
OMBCS000WI	<i>Migratory bird concentration site</i>	migratory bird concentration site		SU		NA
OMUSSELBED	<i>Mussel bed</i>	mussel bed		S3?		NA

WISCONSIN'S EXTIRPATED SPECIES

MAMMALS

AMALE01010	<i>Bison bison</i>	bison	G4	SX		
AMAJF03010	<i>Gulo gulo</i>	wolverine	G4	SX		
AMALC04010	<i>Rangifer tarandus</i>	caribou	G5	SX		
AMALC04011	<i>Rangifer tarandus caribou</i>	woodland caribou	G5T3	SX	LEC2	

BIRDS

ABNNB03070	<i>Charadrius melodus</i>	piping plover	G3	SXB,S1N	LELT	END
ABNQA05010	<i>Conuropsis carolinensis</i>	Carolina parakeet	GX	SX		
ABNPB05010	<i>Ectopistes migratorius</i>	passenger pigeon	GX	SX		
*ABNKD06071	<i>Falco peregrinus anatum</i>	American Peregrine Falcon	G4T3	SX	LE	END
ABNNF07070	<i>Numenius americanus</i>	long-billed curlew	G5	SXB,SZN	3C	
ABPBG07010	<i>Thryomanes bewickii</i>	Bewick's wren	G5	SXB,SZN		END

FISH

AFCHA01060	<i>Coregonus johannae</i>	deepwater cisco	GX	SX	3A	
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ELCODE	Scientific Name	Common Name	Global Rank	State Rank	US ESA WI Status	Status
AFCHA01100	<i>Coregonus nigripinnis</i>	blackfin cisco	GXQ	SX		
AFCHA01101	<i>Coregonus nigripinnis nigripinnis</i>	blackfin cisco	GXQTXQ	SX	3A	
AFCJC05010	<i>Erimyzon oblongus</i>	creek chubsucker	G5	SX		
AFCJB28230	<i>Notropis buchanani</i>	ghost shiner	G5	SX		
AFCJB28310	<i>Notropis chalybaeus</i>	ironcolor shiner	G5	SX		
DRAGONFLIES						
IIODO26080	<i>Macromia pacifica</i>	gilded river cruiser	G4	SX		SC/N
MUSSELS						
IMBIV24020	<i>Leptodea leptodon</i>	scaleshell	G2G3	SX	C2	SC/H
IMBIV37030	<i>Potamilus capax</i>	fat pocketbook	G1	SX	LE	SC/FL
PLANTS						
PDASC02150	<i>Asclepias meadii</i>	Mead's milkweed	G2	SX	LT	
PDSCR0H0J0	<i>Collinsia verna</i>	spring blue-eyed mary	G5	SX		
PMCYP090N0	<i>Eleocharis equisetoides</i>	horse-tail spikerush	G4	SX		
PDSCR01130	<i>Tomanthera auriculata</i>	earleaf foxglove	G2	SX	C2	SC

Appendix 3.9-2

Example Terrestrial Biology Survey Forms

Mammal Survey Form

Transect

(continued from reverse)

Site: _____

Date: _____

Observer(s): _____

Record the following measurements for all CARNIVORES encountered:

Distance	Habitat	Pattern	Stride	½ Stride	Straddle	Print Length		Print Width		Notes	Species ?
						Front	Back	Front	Back		
		1									
		2									
		1									
		2									
		1									
		2									
		1									
		2									
		1									
		2									
		1									
		2									
		1									
		2									
		1									
		2									

Species Code	
RF	R.Fox
CO	Coyote
WO	Wolf
DO	D.Dog
BC	Bobcat
DC	D.Cat
MA	Marten
FI	Fisher
LT	L.T. Weasel
ER	Ermine
MI	Mink
OT	R.Otter
SK	Skunk
RA	Raccoon
OP	Opossum

Habitat Codes	
A	Aspen
H	Hardwoods
UC	Upland Conifer
LC	Lowland Conifer
B	Bog
F	Open Field
M	Marsh
S	Shrub Swamp

Pattern	
A	
B	
C	
D	
E	
F	
G	

Mammal Survey Form

Transect

Site: _____

Date: _____

Observer(s): _____

Start Time	End Time	Photo Code	Direction (N = 0°)	Snow Depth		F°	Wind Speed /Direction	Sky Condition	Notes
				General	New				

For each 50 m interval, *estimate* the number of tracks for the common species listed below:

Interval(m)	Deer	Hare	Small Mammal	Squirrel	Carnivores		Habitat Type	Notes
1 - 50								
51 - 100								
101 - 150								
151 - 200								
201 - 250								
251 - 300								
301 - 350								
351 - 400								
401 - 450								
451 - 500								
Total								

Record the following measurements for all CARNIVORES encountered:

Distance	Habitat	Pattern	Stride	½ Stride	Straddle	Print Length		Print Width		Notes	Species ?
						Front	Back	Front	Back		
		1									
		2									
		1									
		2									
		1									
		2									
		1									
		2									
		1									
		2									

(more entries on reverse? yes: _____ no: _____)

Bird Point Census Form

		Time		
Site	Date	Start	End	Observer(s)

Wind

- 1 = 0-3 mph
- 2 = 4-7 mph
- 3 = 8-12 mph
- 4 = > 12 mph

Sky

- 0 = clear (<5% clouds)
- 1 = partly cloudy
- 2 = mostly cloudy
- 3 = overcast
- 4 = raining

Temperature

--	--

Start

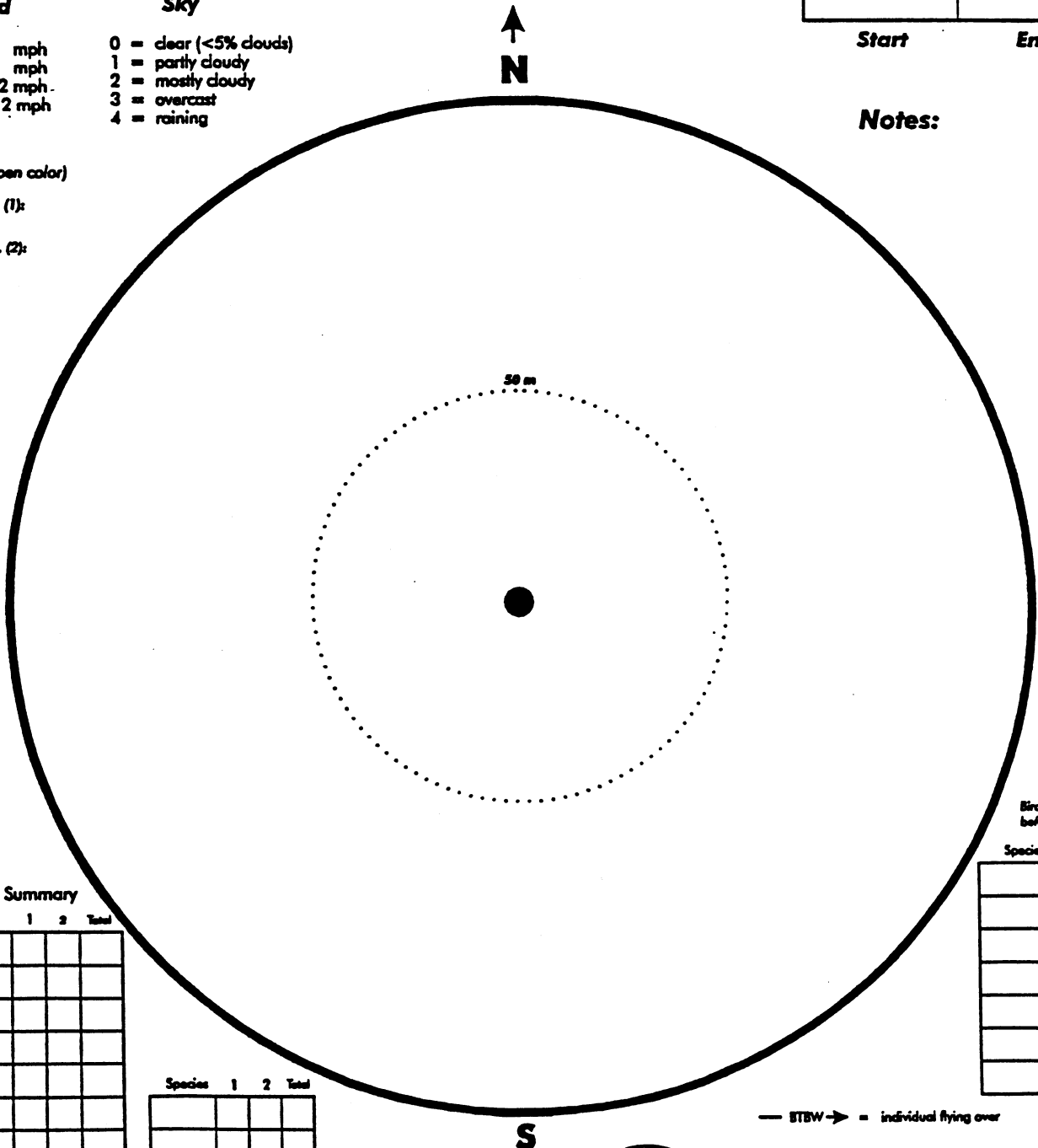
End

Notes:

(indicate pen color)

1st 5 min. (1):

2nd 5 min. (2):



Census Summary

Species	1	2	Total

Species 1 2 Total

Birds encountered before / after count

Species #

— BTBW —> = individual flying over

(BTBW) = individual singing

BTBW = individual calling only

BTBW BTBW = contemporaneous contact w/ 2 different individuals

BTBW —> BTBW = movement of same individual

Bird Vocalization Survey

<i>Date</i>	<i>Site</i>	<i>Time Begin</i>	<i>Time End</i>	<i>Observer(s)</i>	<i>Notes</i>

Wind: 0 = 0-3 mph

1 = 4-7 mph

2 = 8-12 mph

3 = > 12 mph

Sky: 0 = clear

1 = partly cloudy

2 = mostly cloudy

3 = overcast

4 = raining

Weather notes (moon, wind variability, etc.):

<i>Time</i>	<i>Target Species</i>	<i>Response</i>
	5 minute listening period	

TURTLE DATA SHEET

DATE:	TRAP #:	SITE NAME:
SPECIES:		
WEIGHT:		LENGTH:
SEX:		AGE (# rings):
NOTCH NUMBER:		RECAPTURE ?
MISC (scars, marks, etc.):		

TURTLE DATA SHEET

DATE:	TRAP #:	SITE NAME:
SPECIES:		
WEIGHT:		LENGTH:
SEX:		AGE (# rings):
NOTCH NUMBER:		RECAPTURE ?
MISC (scars, marks, etc.):		

Appendix 3.9-3
Plant Collection List

1994 and 1995 Plant Collection List Crandon Project

<u>Species</u>	<u>#</u>	<u>Species</u>	<u>#</u>
Abies balsamea	2	Betula allegheniensis	1
Acer negundo	1	Betula papyrifera	1
Acer rubrum	1	Betula pumila	1
Acer saccharinum	1	Bidens cernua	1
Acer saccharum	1	Bidens tripartita	1
Acer spicatum	1	Botrychium dissectum	7
Achillea millefolium	1	Botrychium lanceolatum	3
Acorus calamus	1	Botrychium matricariaefolium	8
Actaea alba	1	Botrychium mormo	7
Actaea rubra	2	Botrychium multifidum	10
Adiantum pedatum	1	Botrychium oncidense	4
Agrimonia gryposepala	1	Botrychium simplex	1
Agrimonia striata	1	Botrychium virginianum	1
Agropyron repens	1	Brachyelytrum erectum	2
Agrostis hyemalis	1	Brasenia schreberi	4
Agrostis perennans	1	Brassica kaber	1
Alisma plantago-aquatica	1	Bromus ciliatus	1
Allium tricoccum	2	Bromus inermis	1
Alnus rugosa	1	Calamagrostis canadensis	1
Alopecurus aequalis	1	Calla palustris	1
Ambrosia artemisiifolia	1	Callitriche verna	5
Amelanchier laevis	1	Caltha palustris	1
Amphicarpa bracteata	3	Campanula aparinoides	1
Anaphalis margaritacea	1	Campanula rapunculoides	1
Andromeda glaucophylla	3	Capsella bursa-pastoris	1
Anemone quinquefolia	1	Cardamine pensylvanica	4
Anemone virginiana	2	Carex arctata	2
Antennaria neglecta	1	Carex assiniboinensis	3
Apocynum androsaemifolium	1	Carex bebbii	1
Arabis glabra	1	Carex blanda	1
Aralia hispida	2	Carex brunnescens	2
Aralia nudicaulis	1	Carex canescens	2
Aralia racemosa	1	Carex castanea	1
Arceuthobium pusillum	1	Carex communis	4
Arctium minus	1	Carex comosa	3
Arethusa bulbosa	2	Carex cordorhiza	1
Arisaema triphyllum	1	Carex crawfordii	1
Aronia melanocarpa	1	Carex crinita	2
Asclepias exaltata	1	Carex deflexa	2
Asclepias incarnata	2	Carex deweyana	1
Asparagus officinalis	1	Carex disperma	1
Aster ciliolatus	1	Carex gracillima	1
Aster hesperius	1	Carex gynocrates	6
Aster junciformis	1	Carex hystericina	1
Aster lateriflorus	1	Carex interior	4
Aster macrophyllus	1	Carex intumescens	1
Aster puniceus	1	Carex lacustris	3
Aster sagittifolius	2	Carex lasiocarpa	2
Aster simplex	1	Carex leptalea	1
Aster umbellatus	1	Carex leptonervia	2
Athyrium filix-femina	1	Carex limosa	2
Barbarea vulgaris	1	Carex lupulina	1
Berteroa incana	1	Carex normalis	1
		Carex oligosperma	2

<u>Species</u>	<u>#</u>	<u>Species</u>	<u>#</u>
Carex pauciflora	2	Cryptotaenia canadensis	1
Carex pauperula	2	Cynoglossum boreale	2
Carex peckii	2	Cypripedium acaule	1
Carex pedunculata	1	Cypripedium pubescens	1
Carex pensylvanica	2	Cystopteris bulbifera	2
Carex plantaginea	1	Cystopteris fragilis	1
Carex pseudo-cyperus	1	Dactylis glomerata	1
Carex retrorsa	3	Danthonia spicata	1
Carex rostrata	7	Decodon verticillatus	2
Carex rugosperma	2	Dentaria diphylla	1
Carex stipata	1	Dentaria laciniata	1
Carex stricta	2	Dianthus armeria	1
Carex tenuiflora	4	Dianthus deltoides	1
Carex trisperma	2	Dicentra canadensis	1
Carex tuckermanii	2	Dicentra cucullaria	1
Carex vaginata	7	Diervilla lonicera	1
Carex vesicaria	3	Dirca palustris	1
Carex woodii	1	Drosera intermedia	2
Carpinus caroliniana	1	Drosera rotundifolia	3
Carum carvi	1	Dryopteris carthusiana	1
Caulophyllum thalictroide	1	Dryopteris cristata	1
Cerastium vulgatum	1	Dryopteris intermedia	2
Ceratophyllum demersum	7	Dulichium arundinaceum	3
Chamaedaphne calyculata	2	Echinochloa crusgalli	1
Chelone glabra	2	Elatine minima	2
Chenopodium album	1	Elatine triandra	1
Chimaphila umbellata	1	Eleocharis acicularis	2
Chrysanthemum leucanthem	1	Eleocharis erythropoda	2
Chrysosplenium americanum	2	Eleocharis intermedia	4
Cicuta bulbifera	1	Eleocharis obtusa	2
Cicuta maculata	1	Eleocharis smallii	6
Cinna latifolia	2	Elodea canadensis	6
Circaea alpina	1	Elymus virginicus	1
Circaea quadrisulcata	2	Epigaea repens	1
Cirsium arvense	1	Epilobium angustifolium	1
Cirsium discolor	1	Epilobium ciliatum	2
Cirsium muticum	1	Epilobium coloratum	3
Cirsium palustre	1	Epilobium leptophyllum	4
Cirsium vulgare	1	Epilobium palustre	3
Claytonia caroliniana	1	Equisetum arvense	2
Clematis virginiana	2	Equisetum fluviatile	1
Clintonia borealis	1	Equisetum hyemale	1
Comandra umbellata	1	Equisetum palustre	2
Comptonia peregrina	1	Equisetum scirpoides	1
Conopholis americana	1	Equisetum sylvaticum	1
Conyza canadensis	1	Equisetum variegatum	2
Coptis trifolia	1	Eragrostis pectinacea	1
Corallorrhiza maculata	1	Eragrostis poaeoides	1
Corallorrhiza trifida	1	Erigeron annuus	2
Cornus alternifolia	1	Erigeron strigosus	1
Cornus canadensis	1	Eriocaulon septangulare	7
Cornus rugosa	2	Eriophorum angustifolium	2
Cornus stolonifera	2	Eriophorum gracile	2
Corylus americana	1	Eriophorum spissum	1
Corylus cornuta	2	Eriophorum tenellum	1

<u>Species</u>	<u>#</u>	<u>Species</u>	<u>#</u>
Eriophorum virginicum	3	Juncus bufonius	1
Eriophorum viridi-carinatum	3	Juncus canadensis	1
Erysimum cheiranthoides	1	Juncus effusus	3
Eupatorium maculatum	1	Juncus nodosus	2
Eupatorium perfoliatum	1	Juncus pelocarpus	4
Euphorbia cyparissias	1	Juncus tenuis	2
Festuca obtusa	1	Kalmia polifolia	1
Fragaria vesca	1	Lactuca biennis	3
Fragaria virginiana	1	Laportea canadensis	1
Fraxinus americana	1	Larix laricina	1
Fraxinus nigra	2	Ledum groenlandicum	1
Fraxinus pennsylvanica	1	Leersia oryzoides	2
Galeopsis tetrahit	2	Lemna minor	1
Galium asprellum	1	Lemna trisulca	1
Galium labradoricum	2	Linaria vulgaris	1
Galium lanceolatum	2	Lindernia dubia	1
Galium obtusum	2	Linnaea borealis	1
Galium trifidum	3	Liparis loeselii	1
Galium triflorum	1	Listera cordata	2
Gaultheria hispidula	1	Lobelia dortmanna	5
Gaultheria procumbens	1	Lobelia inflata	1
Gentiana rubricaulis	3	Lobelia siphilitica	1
Geum aleppicum	1	Lolium perenne	1
Geum allepicum	1	Lonicera canadensis	1
Geum canadense	1	Lonicera dioica	2
Glyceria borealis	1	Lonicera hirsuta	1
Glyceria canadensis	3	Lonicera villosa	7
Glyceria grandis	1	Ludwigia palustris	2
Glyceria striata	1	Luzula acuminata	1
Gnaphalium obtusifolium	1	Lychnis alba	1
Gnaphalium uliginosum	2	Lycopodium annotinum	2
Goodyera repens	3	Lycopodium clavatum	1
Gratiola neglecta	3	Lycopodium complanatum	1
Gymnocarpium dryopteris	1	Lycopodium lucidulum	1
Halenia deflexa	1	Lycopodium obscurum	1
Hamamelis virginiana	1	Lycopus americanus	3
Helianthus giganteus	1	Lycopus uniflorus	2
Hepatica americana	1	Lysimachia ciliata	1
Heracium scabrum	1	Lysimachia terrestris	2
Heracleum lanatum	1	Lysimachia thyrsiflora	2
Heteranthera dubia	3	Lythrum salicaria	1
Hieracium aurantiacum	1	Maianthemum canadense	1
Hieracium canadense	1	Malaxis unifolia	2
Hydrocotyle umbellata	1	Malus pumila	1
Hydrophyllum virginianum	1	Matricaria matricarioide	1
Hypericum majus	2	Matteuccia struthiopteris	1
Hypericum pyramidatum	1	Medicago lupulina	1
Hystrix patula	1	Melampyrum lineare	2
Ilex verticillata	2	Melilotus alba	1
Impatiens biflora	1	Mentha arvensis	2
Iris versicolor	1	Menyanthes trifoliata	1
Isoetes echinospora	2	Mimulus glabratus	2
Isoetes macrospora	2	Mimulus ringens	1
Juglans cinerea	1	Mitchella repens	1
Juncus brevicaudatus	8	Mitella diphylla	1
		Mitella nuda	2

<u>Species</u>	<u>#</u>	<u>Species</u>	<u>#</u>
Monarda fistulosa	1	Poa pratensis	2
Moneses uniflora	1	Poa saltuensis	2
Monotropa hypopithys	1	Pogonia ophioglossoides	1
Monotropa uniflora	1	Polygala paucifolia	1
Myosotis arvensis	1	Polygonatum pubescens	2
Myrica asplenifolia	1	Polygonum achoreum	1
Myrica gale	2	Polygonum aviculare	1
Myriophyllum exalbescens	3	Polygonum cilinode	1
Myriophyllum tenellum	7	Polygonum convolvulus	1
Najas flexilis	5	Polygonum hydropiper	1
Nasturtium officinale	3	Polygonum lapathifolium	3
Nemopanthus mucronatus	1	Polygonum natans	2
Nuphar variegatum	3	Polygonum persicaria	1
Nymphaea tuberosa	1	Polygonum punctatum	2
Onoclea sensibilis	1	Polygonum sagittatum	1
Oryzopsis asperifolia	1	Polypodium vulgare	1
Oryzopsis pungens	1	Populus balsamifera	1
Osmorhiza claytoni	1	Populus grandidentata	1
Osmunda cinnamomea	1	Populus tremuloides	1
Osmunda claytoniana	1	Potamogeton alpinus	6
Osmunda regalis	1	Potamogeton amplifolius	3
Ostrya virginiana	1	Potamogeton berchtoldii	9
Oxalis acetosella	1	Potamogeton confervoides	4
Oxalis fontana	1	Potamogeton epihydrus1	1
Oxalis stricta	1	Potamogeton foliosus	2
Panax quinquefolium	2	Potamogeton gramineus	2
Panax trifolium	1	Potamogeton illinoensis	1
Panicum capillare	1	Potamogeton natans	6
Panicum latifolium	1	Potamogeton nodosus	2
Parthenocissus quinquefolius	2	Potamogeton oakesianus	4
Penthorum sedoides	1	Potamogeton obtusifolius	3
Petasites frigidus	2	Potamogeton pectinatus	5
Phalaris arundinacea	2	Potamogeton richardsonii	7
Phleum pratense	1	Potamogeton robbinsii	2
Phryma leptostachya	1	Potamogeton spirillus	1
Physocarpus opulifolius	1	Potamogeton zosteriformis	8
Picea glauca	1	Potentilla argentea	1
Picea mariana	1	Potentilla norvegica	1
Pilea fontana	2	Potentilla palustris	2
Pilea pumila	1	Potentilla recta	1
Pinus banksiana	1	Prenanthes alba	1
Pinus resinosa	1	Prunella vulgaris	1
Pinus strobus	1	Prunus pensylvanica	2
Plantago lanceolata	1	Prunus serotina	1
Plantago major	1	Prunus virginiana	3
Plantago rugelii	1	Pteridium aquilinum	1
Platanthera clavellata	2	Puccinellia pallida	1
Platanthera hyperborea	2	Pyrola asarifolia	1
Platanthera obtusata	2	Pyrola elliptica	1
Platanthera psycodes	1	Pyrola secunda	1
Poa alsodes	2	Pyrola virens	1
Poa annua	1	Quercus ellipsoidalis	1
Poa compressa	1	Quercus macrocarpa	1
Poa palustris	2	Quercus rubra	1

<u>Species</u>	<u>#</u>	<u>Species</u>	<u>#</u>
Ranunculus abortivus	1	Scirpus torreyi	1
Ranunculus acris	1	Scirpus validus	6
Ranunculus gmelinii	1	Scutellaria galericulata	2
Ranunculus longirostris	4	Scutellaria lateriflora	1
Ranunculus pensylvanicus	3	Senecio aureus	2
Ranunculus recurvatus	1	Senecio pauperculus	1
Ranunculus reptans	1	Setaria glauca	1
Rhamnus alnifolius	1	Silene cucubalus	1
Rhus radicans	1	Silphium perfoliatum	1
Rhus typhina	1	Sisyrinchium montanum	3
Rhynchospora alba	3	Sium suave	1
Ribes americanum	2	Smilacina racemosa	1
Ribes cynosbati	3	Smilacina trifolia	1
Ribes glandulosum	2	Smilax ecirrata	2
Ribes hirtellum	2	Smilax hispida	1
Ribes hudsonianum	1	Smilax illinoensis	1
Ribes lacustre	1	Solanum dulcamara	1
Ribes triste	1	Solanum nigrum	1
Rorippa islandica	2	Solidago canadensis	1
Rosa blanda	1	Solidago flexicaulis	1
Rubus allegheniensis	1	Solidago gigantea	1
Rubus pubescens	1	Solidago graminifolia	1
Rubus setosus	1	Solidago juncea	1
Rubus strigosus	1	Solidago nemoralis	1
Rudbeckia hirta	1	Solidago uliginosa	2
Rumex acetosella	1	Sonchus arvensis	1
Rumex crispus	1	Sonchus uliginosus	1
Rumex obtusifolius	1	Sorbus americana	1
Rumex orbiculatus	1	Sparganium americanum	2
Sagittaria cuneata	4	Sparganium androcladum	1
Sagittaria graminea	1	Sparganium angustifolium	5
Sagittaria latifolia	7	Sparganium chlorocarpum	7
Sagittaria rigida	2	Sparganium eurycarpum	3
Salix bebbiana	2	Sparganium fluctuans	5
Salix candida	1	Sparganium minimum	2
Salix discolor	2	Spergula arvensis	1
Salix fragilis	1	Spergularia rubra	1
Salix humilis	2	Spiraea alba	2
Salix lucida	3	Spiraea tomentosa	3
Salix nigra	1	Spirodela polyrhiza	1
Salix pedicellaris	7	Stachys hispida	1
Salix petiolaris	7	Stellaria aquatica	1
Salix pyrifolia	6	Stellaria calycantha	4
Sambucus pubens	1	Stellaria graminea	1
Sanguinaria canadensis	1	Stellaria longifolia	2
Sanicula marilandica	1	Stellaria media	1
Sarracenia purpurea	1	Streptopus roseus	1
Satureja vulgaris	1	Tanacetum vulgare	1
Saxifraga pensylvanica	1	Taraxacum officinale	1
Scheuchzeria palustris	2	Taxus canadensis	8
Schizachne purpurascens	1	Thalictrum dasycarpum	2
Scirpus acutus	2	Thalictrum dioicum	1
Scirpus atrovirens	1	Thelypteris palustris	2
Scirpus cyperinus	2	Thelypteris phegopteris	2
Scirpus subterminalis	4		

<u>Species</u>	<u>#</u>	<u>Species</u>	<u>#</u>
Thuja occidentalis	1	Waldsteinia fragarioides	1
Tilia americana	1	Zizania aquatica	3
Tragopogon dubius	1		
Triadenum fraseri	2		
Trientalis borealis	1		
1Trifolium agrarium	1		
Trifolium campestre	1		
Trifolium dubium	1		
Trifolium hybridum	1		
Trifolium pratense	1		
Trifolium procumbens	1		
Trifolium repens	1		
Trillium cernuum	1		
Trillium grandiflorum	1		
Tsuga canadensis	1		
Ulmus americana	1		
Ulmus thomasi	1		
Urtica dioica	2		
Utricularia cornuta	1		
Utricularia intermedia	2		
Utricularia resupinata	4		
Utricularia vulgaris	8		
Uvularia grandiflora	1		
Vaccinium angustifolium	1		
Vaccinium caespitosum	1		
Vaccinium macrocarpon	2		
Vaccinium myrtilloides	1		
Vaccinium oxycoccos	1		
Vaccinium vitis-idaea	2		
Vallisneria americana	5		
Verbascum thapsus	1		
Verbena hastata	1		
Verbena urticifolia	1		
Veronica americana	1		
Veronica officinalis	1		
Veronica peregrina	1		
Veronica scutellata	4		
Veronica serpyllifolia	1		
Viburnum acerifolium	1		
Viburnum lentago	2		
Viburnum rafinesquianum	1		
Viburnum trilobum	2		
Vicia americana	1		
Vicia sativa	1		
Viola adunca	1		
Viola blanda	1		
Viola canadensis	1		
Viola conspersa	1		
Viola cucullata	4		
Viola macloskeyi	4		
Viola pubescens	1		
Viola renifolia	3		
Viola selkirkii	1		
Viola sororia	1		

Prepared by: GF
Reviewed by: RFS

Appendix 3.9-4

Terrestrial Vegetation Tissue Sample Laboratory Results



An ETC Laboratory

320 Tesconi Circle

Suite G

Santa Rosa, CA

95401

Telephone

(707) 544-5570

Facsimile

(707) 544-4906

SEPTEMBER 7, 1994

CLIENT: FOTH & VAN DYKE
P.O. BOX 19012
2737 S. RIDGE ROAD
GREEN BAY, WI 54307-9012

ATTN: RUSS JANESHEK

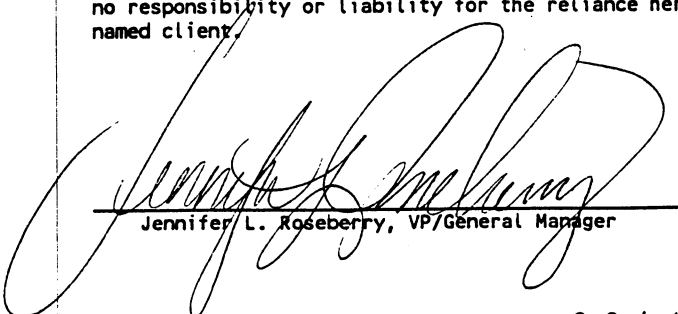
JOB LINK: 811510
PROJECT: CMC TERRESTRIAL BIO 93C049

ANALYSIS

6010 & 7000 SERIES METALS

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE COLLECTION DATE</u>	<u>DATE RECEIVED BY LAB</u>
MF8608	CMC-TBN-BF	SOLID	06-29-94	07-06-94
MF8609	CMC-TBN-RR	SOLID	06-29-94	07-06-94
MF8610	CMC-TBN-PS	SOLID	06-29-94	07-06-94
MF8611	CMC-TBW-BF	SOLID	06-29-94	07-06-94
MF8612	CMC-TBW-RR	SOLID	06-29-94	07-06-94
MF8613	CMC-TBW-PS	SOLID	06-29-94	07-06-94
MF8614	CMC-TBS-BF	SOLID	06-29-94	07-06-94
MF8615	CMC-TBS-RR	SOLID	06-29-94	07-06-94
MF8616	CMC-TBS-PS	SOLID	06-29-94	07-06-94
MF8617	QC CHARGES	NOT APPLICABLE	NOT APPLICABLE	07-06-94

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Jennifer L. Roseberry, VP/General Manager

9/10/94
Date

A division of
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Sciences Group, Inc.

3.9-4-1



FOTH & VAN DYKE
SEPTEMBER 7, 1994
811510

SAMPLE MATRIX: SOLID

<u>Parameter</u>	<u>EPA Prep Method</u>	<u>EPA Analysis Method</u>
ICP Metals	200.3	6010
Arsenic	200.3	7060
Lead	200.3	7421
Mercury	7471	7471

ANALYSES PERFORMED BY HAZELTON ENVIRONMENTAL SERVICES INC

ns



FOTH & VAN DYKE
06 SEPTEMBER 1994

EXECUTIVE SUMMARY
ETC JOBLINK 811510

On 06 July 1994 Hazleton Environmental Services (HES) received terrestrial plant tissue samples from Foth & Van Dyke. The samples were received at the laboratory on ice. The samples were analyzed by HES as specified on the preceding page.

At the request of Foth & Van Dyke, results are reported on both dry-weight and as-received-weight bases. The dry-weight results are reported on table SR72 of the Data Summary Report (DSR); the as-received-weight results are reported on table AR72 of the DSR. Quantitative Results Data tables show both results on the same page; the dry-weight results are indicated with a Batch # ending in "D". HES chose a CLP-type report for this project; the % solids result for each sample may be obtained from the Form I pages included with the supporting data section of this report.

SAMPLE PREPARATION:

The samples were prepared for digestion in a room used exclusively for the preparation of samples. The samples were thawed slightly, chopped into pieces, and homogenized in an industrial blender under liquid nitrogen. All samples were stored frozen until extraction. One blender blank was prepared for the sample preparation episode for the purpose of detecting possible laboratory contamination. No analyte was detected in the blender blank.

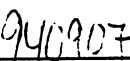
INORGANIC ANALYSIS:

All relative percent difference (RPD) values for duplicate analyses are within QC acceptance limits, with one exception. The Lead duplicate sample has an RPD of 76%; sample CMC-TBN-BF was used for the duplicate sample for quality control batch Q41602.

NOTE: Because this project does not require CLP protocol, comments made by the subcontract laboratory relating to CLP are not discussed in this executive summary.



Lisa Norosky, Program Manager



Date

Joblink: 811510

DATA SUMMARY REPORT

DATE: 09/02/94

Company: FOTH & VAN DYKE

PAGE: 1

Sample Point ID:	CMC-TBN-BF	CMC-TBN-PS	CMC-TBN-RR	CMC-TBS-BF	CMC-TBS-PS	CMC-TBS-RR	CMC-TBW-BF	CMC-TBW-PS
ETC Sample Number:	MF8608	MF8610	MF8609	MF8614	MF8616	MF8615	MF8611	MF8613
Sample Date:	940629	940629	940629	940629	940629	940629	940629	940629
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Arsenic	mg/kg	<.020	.030	<.020	.030	<.020	.130	.190	<.120
Cadmium	mg/kg	.190	.170	.160	.190	.190	.180	.180	.210
Chromium	mg/kg	.210	.250	.230	.200	.230	.220	.180	.210
Cobalt	mg/kg	<.040	<.040	<.040	.050	<.040	<.040	.040	<.040
Copper	mg/kg	1.00	2.10	1.80	2.20	1.60	2.70	1.50	4.10
Lead	mg/kg	.070	.170	.320	.100	.100	.160	.130	.270
Manganese	mg/kg	78.4	67.2	52.9	104	58.8	87.2	122	81.0
Mercury	mg/kg	<.030	<.030	<.040	<.040	<.040	<.040	<.040	<.040
Zinc	mg/kg	11.4	8.60	11.4	11.4	9.50	11.8	11.2	9.30

Sample Point ID:	CMC-TBW-RR
ETC Sample Number:	MF8612
Sample Date:	940629
Facility Code:	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Arsenic	mg/kg	.020
Cadmium	mg/kg	.210
Chromium	mg/kg	.220
Cobalt	mg/kg	<.040
Copper	mg/kg	1.60
Lead	mg/kg	.110
Manganese	mg/kg	155
Mercury	mg/kg	<.040
Zinc	mg/kg	13.1

3.9-4-4

Joblink: 811510

DATA SUMMARY REPORT

DATE: 09/02/94

Company: FOTH & VAN DYKE

PAGE: 2

Sample Point ID:	CMC-TBN-BF	CMC-TBN-PS	CMC-TBN-RR	CMC-TBS-BF	CMC-TBS-PS	CMC-TBS-RR	CMC-TBW-BF	CMC-TBW-PS
ETC Sample Number:	MF8608	MF8610	MF8609	MF8614	MF8616	MF8615	MF8611	MF8613
Sample Date:	940629	940629	940629	940629	940629	940629	940629	940629
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters Units

EPA METHOD - 6010/7000 SERIES METALS (SR72)

Arsenic	mg/kg	<.080	.090	<.090	.110	<.080	.450	.650	<.400
Cadmium	mg/kg	.660	.550	.560	.640	.650	.620	.610	.670
Chromium	mg/kg	.730	.830	.810	.680	.790	.740	.630	.690
Cobalt	mg/kg	<.140	<.130	<.140	.160	<.140	<.140	.140	<.130
Copper	mg/kg	3.60	6.90	6.20	7.30	5.40	9.10	5.20	13.3
Lead	mg/kg	.230	.560	1.10	.350	.350	.550	.460	.890
Manganese	mg/kg	270	224	185	349	201	296	422	265
Mercury	mg/kg	<.120	<.110	<.120	<.130	<.140	<.130	<.120	<.110
Zinc	mg/kg	39.1	28.8	39.7	38.2	32.4	40.0	38.7	30.5

Sample Point ID:	CMC-TBW-RR
ETC Sample Number:	MF8612
Sample Date:	940629
Facility Code:	FVDGRNBCMC

Parameters Units

EPA METHOD - 6010/7000 SERIES METALS (SR72)

Arsenic	mg/kg	.080
Cadmium	mg/kg	.690
Chromium	mg/kg	.720
Cobalt	mg/kg	<.130
Copper	mg/kg	5.40
Lead	mg/kg	.350
Manganese	mg/kg	513
Mercury	mg/kg	<.120
Zinc	mg/kg	43.3

3.9-4-5

SEP 2, 1994

TABLE 1: QUANTITATIVE RESULTS DATA

EPA METHOD - 6010/7000 SERIES METALS (SR72)

Chain of Custody Data Required for ETC Data Management Summary Reports

MF8608 FOTH & VAN DYKE

FVDGRNBCMC S CMC-TBN-BF 940629

811510

ETC Sample No.

Company

Facility Sample Point Date

Joblink

Compound	Results				Prep Date	Analysis Date	
	Sample Concen. mg/kg	Report DL mg/kg	Blank Concen. mg/kg	Batch #			
Arsenic	ND	.02	ND	Q41602	940808	940809	
Cadmium	.19	.04	ND	Q41602	940718	940721	
Chromium	.21	.04	ND	Q41602	940718	940721	
Cobalt	ND	.04	ND	Q41602	940718	940721	
Copper	1.0	.04	ND	Q41602	940718	940721	
Lead	.07	.02	ND	Q41602	940718	940801	
Manganese	78.4	.004	ND	Q41602	940718	940721	
Mercury	ND	.03	ND	Q41602	940721	940721	
Zinc	11.4	.02	ND	Q41602	940718	940721	
Arsenic	ND	.08	ND	Q41602D			
Cadmium	.66	.13	ND	Q41602D			
Chromium	.73	.13	ND	Q41602D			
Cobalt	ND	.14	ND	Q41602D			
Copper	3.6	.12	ND	Q41602D			
Lead	.23	.08	ND	Q41602D			
Manganese	270	.01	ND	Q41602D			
Mercury	ND	.12	ND	Q41602D			
Zinc	39.1	.06	ND	Q41602D			

3.9-4-6

SEP 7, 1994

TABLE 1: QUANTITATIVE RESULTS DATA

EPA METHOD - 6010/7000 SERIES METALS (SR72)

Chain of Custody Data Required for ETC Data Management Summary Reports

MF8609	FOTH & VAN DYKE	FVDGRNBCMC S CMC-TBN-RR 940629	811510
ETC Sample No.	Company	Facility Sample Point	Date Joblink

Compound	Results						
	Sample Concn. mg/kg	Report DL mg/kg	Blank Concn. mg/kg	Batch #	Prep Date	Analysis Date	
Arsenic	ND	.02	ND	Q41602	940808	940809	
Cadmium	.16	.04	ND	Q41602	940718	940721	
Chromium	.23	.04	ND	Q41602	940718	940721	
Cobalt	ND	.04	ND	Q41602	940718	940721	
Copper	1.8	.04	ND	Q41602	940718	940721	
Lead	.32	.02	ND	Q41602	940718	940801	
Manganese	52.9	.004	ND	Q41602	940718	940721	
Mercury	ND	.04	ND	Q41602	940721	940721	
Zinc	11.4	.02	ND	Q41602	940718	940721	
Arsenic	ND	.09	ND	Q41602D			
Cadmium	.56	.13	ND	Q41602D			
Chromium	.81	.13	ND	Q41602D			
Cobalt	ND	.14	ND	Q41602D			
Copper	6.2	.12	ND	Q41602D			
Lead	1.1	.08	ND	Q41602D			
Manganese	185	.01	ND	Q41602D			
Mercury	ND	.12	ND	Q41602D			
Zinc	39.7	.06	ND	Q41602D			

3.9-4-7

SEP 2, 1994

TABLE 1: QUANTITATIVE RESULTS DATA

EPA METHOD - 6010/7000 SERIES METALS (SR72)

Chain of Custody Data Required for ETC Data Management Summary Reports

MF8610 FOTH & VAN DYKE

FVDGRNBCMC S CMC-TBN-PS 940629

B11510

ETC Sample No.

Company

Facility Sample Point Date

Joblink

Compound	Results						
	Sample Concen. mg/kg	Report DL mg/kg	Blank Concen. mg/kg	Batch #	Prep Date	Analysis Date	
Arsenic	.03	.02	ND	Q41602	940808	940809	
Cadmium	.17	.04	ND	Q41602	940718	940721	
Chromium	.25	.04	ND	Q41602	940718	940721	
Cobalt	ND	.04	ND	Q41602	940718	940721	
Copper	2.1	.04	ND	Q41602	940718	940721	
Lead	.17	.02	ND	Q41602	940718	940801	
Manganese	67.2	.004	ND	Q41602	940718	940721	
Mercury	ND	.03	ND	Q41602	940721	940721	
Zinc	8.6	.02	ND	Q41602	940718	940721	
Arsenic	.09	.08	ND	Q41602D			
Cadmium	.55	.12	ND	Q41602D			
Chromium	.83	.12	ND	Q41602D			
Cobalt	ND	.13	ND	Q41602D			
Copper	6.9	.12	ND	Q41602D			
Lead	.56	.08	ND	Q41602D			
Manganese	224	.01	ND	Q41602D			
Mercury	ND	.11	ND	Q41602D			
Zinc	28.8	.06	ND	Q41602D			

3.9.4-8

TABLE 1: QUANTITATIVE RESULTS DATA
EPA METHOD - 6010/7000 SERIES METALS (SR72)

SEP 2, 1994

Chain of Custody Data Required for ETC Data Management Summary Reports			
MF8611	FOTH & VAN DYKE	FVDGRNBCMC S CMC-TBW-BF 940629	811510
ETC Sample No.	Company	Facility Sample Point	Date Joblink

Compound	Results				Prep Date	Analysis Date	
	Sample Concn. mg/kg	Report DL mg/kg	Blank Concn. mg/kg	Batch #			
Arsenic	.19	.12	ND	Q41602	940808	940809	
Cadmium	.18	.04	ND	Q41602	940718	940721	
Chromium	.18	.04	ND	Q41602	940718	940721	
Cobalt	.04	.04	ND	Q41602	940718	940721	
Copper	1.5	.04	ND	Q41602	940718	940721	
Lead	.13	.02	ND	Q41602	940718	940801	
Manganese	122	.004	ND	Q41602	940718	940721	
Mercury	ND	.04	ND	Q41602	940721	940721	
Zinc	11.2	.02	ND	Q41602	940718	940721	
Arsenic	.65	.41	ND	Q41602D			
Cadmium	.61	.13	ND	Q41602D			
Chromium	.63	.13	ND	Q41602D			
Cobalt	.14	.14	ND	Q41602D			
Copper	5.2	.12	ND	Q41602D			
Lead	.46	.08	ND	Q41602D			
Manganese	422	.01	ND	Q41602D			
Mercury	ND	.12	ND	Q41602D			
Zinc	38.7	.06	ND	Q41602D			

3.9-4-9

TABLE 1: QUANTITATIVE RESULTS DATA

EPA METHOD - 6010/7000 SERIES METALS (SR72)

Chain of Custody Data Required for ETC Data Management Summary Reports

MF8612 FOTH & VAN DYKE

FVDGRNBCMC S CMC-TBW-RR 940629

811510

ETC Sample No.

Company

Facility Sample Point Date

Joblink

Compound	Results						
	Sample Concen. mg/kg	Report DL mg/kg	Blank Concen. mg/kg	Batch #	Prep Date	Analysis Date	
Arsenic	.02	.02	ND	Q41602	940808	940809	
Cadmium	.21	.04	ND	Q41602	940718	940721	
Chromium	.22	.04	ND	Q41602	940718	940721	
Cobalt	ND	.04	ND	Q41602	940718	940721	
Copper	1.6	.04	ND	Q41602	940718	940721	
Lead	.11	.02	ND	Q41602	940718	940801	
Manganese	155	.004	ND	Q41602	940718	940721	
Mercury	ND	.04	ND	Q41602	940721	940721	
Zinc	13.1	.02	ND	Q41602	940718	940721	
Arsenic	.08	.08	ND	Q41602D			
Cadmium	.69	.12	ND	Q41602D			
Chromium	.72	.12	ND	Q41602D			
Cobalt	ND	.13	ND	Q41602D			
Copper	5.4	.12	ND	Q41602D			
Lead	.35	.08	ND	Q41602D			
Manganese	513	.01	ND	Q41602D			
Mercury	ND	.12	ND	Q41602D			
Zinc	43.3	.06	ND	Q41602D			

3.9-4-10

SEP 2, 1994

TABLE 1: QUANTITATIVE RESULTS DATA

EPA METHOD - 6010/7000 SERIES METALS (SR72)

Chain of Custody Data Required for ETC Data Management Summary Reports

MF8613 FOTH & VAN DYKE

FVDGRNBCMC S CMC-TBW-PS 940629

811510

ETC Sample No.

Company

Facility Sample Point Date

Joblink

Compound	Results				Prep Date	Analysis Date	
	Sample Concen. mg/kg	Report DL mg/kg	Blank Concen. mg/kg	Batch #			
Arsenic	ND	.12	ND	Q41602	940808	940809	
Cadmium	.21	.04	ND	Q41602	940718	940721	
Chromium	.21	.04	ND	Q41602	940718	940721	
Cobalt	ND	.04	ND	Q41602	940718	940721	
Copper	4.1	.04	ND	Q41602	940718	940721	
Lead	.27	.02	ND	Q41602	940718	940801	
Manganese	81.0	.004	ND	Q41602	940718	940721	
Mercury	ND	.04	ND	Q41602	940721	940721	
Zinc	9.3	.02	ND	Q41602	940718	940721	
Arsenic	ND	.40	ND	Q41602D			
Cadmium	.67	.12	ND	Q41602D			
Chromium	.69	.12	ND	Q41602D			
Cobalt	ND	.13	ND	Q41602D			
Copper	13.3	.12	ND	Q41602D			
Lead	.89	.08	ND	Q41602D			
Manganese	265	.01	ND	Q41602D			
Mercury	ND	.11	ND	Q41602D			
Zinc	30.5	.06	ND	Q41602D			

3.9-4-11

TABLE 1: QUANTITATIVE RESULTS DATA

EPA METHOD - 6010/7000 SERIES METALS (SR72)

SEP 2, 1994

Chain of Custody Data Required for ETC Data Management Summary Reports

MF8614 FOTH & VAN DYKE FVDGRNBCMC S CMC-TBS-BF 940629 811510
ETC Sample No. Company Facility Sample Point Date Joblink

Compound	Results						
	Sample Concen. mg/kg	Report DL mg/kg	Blank Concen. mg/kg	Batch #	Prep Date	Analysis Date	
Arsenic	.03	.02	ND	Q41602	940808	940809	
Cadmium	.19	.04	ND	Q41602	940718	940721	
Chromium	.20	.04	ND	Q41602	940718	940721	
Cobalt	.05	.04	ND	Q41602	940718	940721	
Copper	2.2	.04	ND	Q41602	940718	940721	
Lead	.10	.02	ND	Q41602	940718	940801	
Manganese	104	.004	ND	Q41602	940718	940721	
Mercury	ND	.04	ND	Q41602	940721	940721	
Zinc	11.4	.02	ND	Q41602	940718	940721	
Arsenic	.11	.08	ND	Q41602D			
Cadmium	.64	.13	ND	Q41602D			
Chromium	.68	.13	ND	Q41602D			
Cobalt	.16	.14	ND	Q41602D			
Copper	7.3	.12	ND	Q41602D			
Lead	.35	.08	ND	Q41602D			
Manganese	349	.01	ND	Q41602D			
Mercury	ND	.13	ND	Q41602D			
Zinc	38.2	.06	ND	Q41602D			

3.9-4-12

SEP 2, 1994

TABLE 1: QUANTITATIVE RESULTS DATA

EPA METHOD - 6010/7000 SERIES METALS (SR72)

Chain of Custody Data Required for ETC Data Management Summary Reports

MF8615 FOTH & VAN DYKE

FVDGRNBCMC S CMC-TBS-RR 940629

811510

ETC Sample No.

Company

Facility Sample Point Date

Joblink

Compound	Results				Prep Date	Analysis Date	
	Sample Concen. mg/kg	Report DL mg/kg	Blank Concen. mg/kg	Batch #			
Arsenic	.13	.12	ND	Q41602	940808	940809	
Cadmium	.18	.04	ND	Q41602	940718	940721	
Chromium	.22	.04	ND	Q41602	940718	940721	
Cobalt	ND	.04	ND	Q41602	940718	940721	
Copper	2.7	.04	ND	Q41602	940718	940721	
Lead	.16	.02	ND	Q41602	940718	940801	
Manganese	87.2	.004	ND	Q41602	940718	940721	
Mercury	ND	.04	ND	Q41602	940721	940721	
Zinc	11.8	.02	ND	Q41602	940718	940721	
Arsenic	.45	.42	ND	Q41602D			
Cadmium	.62	.13	ND	Q41602D			
Chromium	.74	.13	ND	Q41602D			
Cobalt	ND	.14	ND	Q41602D			
Copper	9.1	.12	ND	Q41602D			
Lead	.55	.08	ND	Q41602D			
Manganese	296	.01	ND	Q41602D			
Mercury	ND	.13	ND	Q41602D			
Zinc	40.0	.06	ND	Q41602D			

3.94-13

TABLE 1: QUANTITATIVE RESULTS DATA

EPA METHOD - 6010/7000 SERIES METALS (SR72)

SEP 2, 1994

Chain of Custody Data Required for ETC Data Management Summary Reports

MF8616 FOTH & VAN DYKE FVDGRNBCMC S CMC-TBS-PS 940629 811510
 ETC Sample No. Company Facility Sample Point Date Joblink

3.9-4-14

Compound	Results						
	Sample Concen. mg/kg	Report DL mg/kg	Blank Concen. mg/kg	Batch #	Prep Date	Analysis Date	
Arsenic	ND	.02	ND	Q41602	940808	940809	
Cadmium	.19	.04	ND	Q41602	940718	940721	
Chromium	.23	.04	ND	Q41602	940718	940721	
Cobalt	ND	.04	ND	Q41602	940718	940721	
Copper	1.6	.04	ND	Q41602	940718	940721	
Lead	.10	.02	ND	Q41602	940718	940801	
Manganese	58.8	.004	ND	Q41602	940718	940721	
Mercury	ND	.04	ND	Q41602	940721	940721	
Zinc	9.5	.02	ND	Q41602	940718	940721	
Arsenic	ND	.08	ND	Q41602D			
Cadmium	.65	.13	ND	Q41602D			
Chromium	.79	.13	ND	Q41602D			
Cobalt	ND	.14	ND	Q41602D			
Copper	5.4	.12	ND	Q41602D			
Lead	.35	.08	ND	Q41602D			
Manganese	201	.01	ND	Q41602D			
Mercury	ND	.14	ND	Q41602D			
Zinc	32.4	.06	ND	Q41602D			

TABLE 1: QUALITY ASSURANCE DATA

EPA METHOD - 6010/7000 SERIES METALS (SR72)

SEP 2, 1994

Chain of Custody Data Required for ETC Data Management Summary Reports
See Below
ETC Batch No.

Compound	QC Blank and Spiked Data			QC Matrix Spike			QC Duplicate			Batch #
	Blank Concen. mg/kg	Concen. Added mg/kg	† Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	† Recov	First mg/kg	Second mg/kg	RPD	
Arsenic	ND	16.6	91	ND	7.88	97	ND	ND	0	Q41602
Cadmium	ND	.5	120	.1916	.50	102	.1916	.1898	.9	Q41602
Chromium	ND	0	-	.2117	1.99	100	.2117	.2151	2	Q41602
Cobalt	ND	0	-	ND	4.97	97	ND	ND	0	Q41602
Copper	ND	160.0	99	1.0468	2.49	99	1.0468	1.0298	2	Q41602
Lead	ND	.2	250	.068	3.92	96	.068	.1512	76	Q41602
Manganese	ND	10.5	94	78.4379	4.97	99	78.4379	80.2788	2	Q41602
Mercury	ND	.8	88	ND	.19	100	ND	ND	0	Q41602
Zinc	ND	127.0	92	11.3886	4.97	95	11.3886	11.6670	2	Q41602

3.9-4-15



525 Science Drive
Madison, Wisconsin 53711
Telephone 608-232-3300
Facsimile 608-233-0502

Chain of Custody Record and Analysis Request

Enclose with samples and send to:

HES, Inc.

Attn: Sample Entry

515 Science Drive, Madison, Wisconsin 53711

Project No.

93049

Project Name

CMC TERRESTRIAL BIO

Samplers (signature):

LR Shy

For HES use only

Condition: Cold Storage: WIR

Acct. # 2036 Abbrev. ETFY

Smpl Rec'd JUL 06 1994 LMK

Date Colored 7-7-94

LIMS # 40700217-22

Company Name and Address (Please Type or Print)

FOTH & VAN DYKE
2737 S Ridge Rd
GREEN BAY WI 54307

Name of Submitter

Phone No.

414 497 2500

Send Reports To:

Russ JANESHEK

Send Invoice To:

ETC - Santa Rosa

Date Sent

5 July 94

Purchase Order No.

Sample Code	Date	Time	Matrix ¹	Sample Description ²
-------------	------	------	---------------------	---------------------------------

CMC-TBN-BF	6/29/94		PLANT	BALSAM FIR Comp. S
CMC-TBN-RR	6/29		PLANT	RED RASBERRY Comp. S
CMC-TBN-PS	6/29		PLANT	PENN. SEDGE Comp. S
CMC-TBW-BF	6/29		PLANT	BALSAM FIR Comp. N
CMC-TBW-RR	6/29		PLANT	RED RASBERRY Comp. N
CMC-TBW-PS	6/29		PLANT	PENN. SEDGE Comp. N
CMC-TBS-BF	6/29		PLANT	BALSAM FIR Comp. W
CMC-TBS-RR	6/29		PLANT	RED RASBERRY Comp. W
CMC-TBS-PS	6/29		PLANT	PENN. SEDGE Comp. W

Number of Containers

Analysis Requested

ZINC	MANGANESE	CADMIUM	COPPER	ARSENIC	LEAD	MERCURY	COBALT	TOTAL CHROMIUM
------	-----------	---------	--------	---------	------	---------	--------	----------------

Remarks

I hereby certify that I received, properly handled, and disposed of these samples as noted above:

Relinquished By (Signature)

Relinquished By (Signature)

Relinquished By (Signature)

Date/Time

7/5/94 0730

Date/Time

7/5/94 1115

Date/Time

7-6-94 1000

Received By (Signature)

7/5/94 0730

Received By (Signature)

Received By (Signature)

Lynn Rodler

Remarks (HES use only)

Samples rec'd on ice - LMK



An ETC Laboratory

320 Tesconi Circle

Suite G

Santa Rosa, CA
95401

Telephone
(707) 544-5570

Facsimile
(707) 544-4906

SEPTEMBER 7, 1994

CLIENT: FOTH & VAN DYKE
P.O. BOX 19012
2737 S. RIDGE ROAD
GREEN BAY, WI 54307-9012

ATTN: RUSS JANESHEK

JOB LINK: 811534
PROJECT: 93C049 CRANDON MINING

ANALYSIS

6010 & 7000 SERIES METALS

<u>SAMPLE NUMBER</u>	<u>SAMPLE POINT</u>	<u>SAMPLE MATRIX</u>	<u>SAMPLE COLLECTION DATE</u>	<u>DATE RECEIVED BY LAB</u>
MF8712	CMCABSC501	SOLID	07-20-94	07-22-94
MF8713	CMCABSC502	SOLID	07-20-94	07-22-94
MF8714	CMCABWR301	SOLID	07-20-94	07-22-94
MF8715	CMCABWR302	SOLID	07-20-94	07-22-94
MF8716	CMCABSC	SOLID	07-20-94	07-22-94
MF8717	CMCABSC55	SOLID	07-20-94	07-22-94
MF8718	QC CHARGES	NOT APPLICABLE	NOT APPLICABLE	07-22-94

This report is "PROPRIETARY AND CONFIDENTIAL" and delivered to, and intended for the exclusive use of the above named client only. ETC, a Division of APBI Environmental Sciences Group, Inc. assumes no responsibility or liability for the reliance hereon or use hereof by anyone other than the above named client.



FOTH & VAN DYKE
SEPTEMBER 7, 1994
811534

SAMPLE MATRIX: SOLID

<u>Parameter</u>	<u>EPA Prep Method</u>	<u>EPA Analysis Method</u>
ICP Metals	200.3	6010
Arsenic	200.3	7060
Lead	200.3	7421
Mercury	7471	7471

ANALYSES PERFORMED BY HAZELTON ENVIRONMENTAL SERVICES INC

ns



FOTH & VAN DYKE
06 SEPTEMBER 1994

EXECUTIVE SUMMARY
ETC JOBLINK 811534

On 22 July 1994 Hazleton Environmental Services (HES) received aquatic plant tissue samples from Foth & Van Dyke. The samples were received at the laboratory on ice. The samples were analyzed by HES as specified on the preceding page.

At the request of Foth & Van Dyke, results are reported on both dry-weight and as-received-weight bases. The dry-weight results are reported on table SR72 of the Data Summary Report (DSR); the as-received-weight results are reported on table AR72 of the DSR. Quantitative Results Data tables show both results on the same page; the dry-weight results are indicated with a Batch # ending in "D". HES chose a CLP-type report for this project; the % solids result for each sample may be obtained from the Form I pages included with the supporting data section of this report.

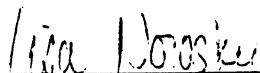
SAMPLE PREPARATION:

The samples were prepared for digestion in a room used exclusively for the preparation of samples. The samples were thawed slightly, chopped into pieces, and homogenized in an industrial blender under liquid nitrogen. All samples were stored frozen until extraction. One blender blank was prepared for the sample preparation episode for the purpose of detecting possible laboratory contamination. No analyte was detected in the blender blank with the exception of Manganese; this analyte was detected at 2.0 $\mu\text{g/L}$ in the blank. The detection limit for Manganese in water is 0.4 $\mu\text{g/L}$.

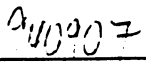
INORGANIC ANALYSIS:

The Arsenic result for sample CMC-AB-SC-502 was determined by Method of Standard Additions.

NOTE: Because this project does not require CLP protocol, comments made by the subcontract laboratory relating to CLP are not discussed in this executive summary.



Lisa Norosky, Program Manager



Date

Joblink: 811534

DATA SUMMARY REPORT

DATE: 09/02/94

Company: FOTH & VAN DYKE

PAGE: 1

Sample Point ID:	CMCABSC	CMCABSC501	CMCABSC502	CMCABSC55	CMCABWR301	CMCABWR302
ETC Sample Number:	MF8716	MF8712	MF8713	MF8717	MF8714	MF8715
Sample Date:	940720	940720	940720	940720	940720	940720
Facility Code:	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC	FVDGRNBCMC

Parameters

Units

EPA METHOD - 6010/7000 SERIES METALS (AR72)

Arsenic	mg/kg	<.020	.070	.380	.090	.030	.050
Cadmium	mg/kg	.140	<.040	<.040	<.040	<.040	<.040
Chromium	mg/kg	.080	.110	.110	.150	.110	.130
Cobalt	mg/kg	<.040	<.040	<.040	<.040	<.040	<.040
Copper	mg/kg	.980	.830	.270	.410	3.30	.440
Lead	mg/kg	.210	.110	.040	.090	.180	.060
Manganese	mg/kg	21.2	94.5	122	80.7	53.5	125
Mercury	mg/kg	<.040	<.040	<.040	<.040	<.040	<.040
Zinc	mg/kg	6.00	2.10	3.30	1.80	3.70	3.10

EPA METHOD - 6010/7000 SERIES METALS (SR72)

Arsenic	mg/kg	<.140	.720	2.90	.770	.220	.510
Cadmium	mg/kg	.830	<.370	<.290	<.330	<.280	<.370
Chromium	mg/kg	.480	1.10	.810	1.30	.840	1.30
Cobalt	mg/kg	<.240	<.400	<.310	<.360	<.300	<.400
Copper	mg/kg	5.90	8.10	2.10	3.70	24.4	4.40
Lead	mg/kg	1.30	1.10	.340	.780	1.30	.570
Manganese	mg/kg	128	918	924	721	396	1230
Mercury	mg/kg	<.220	<.350	<.290	<.320	<.280	<.380
Zinc	mg/kg	36.3	20.8	25.1	15.7	27.2	30.8

3.9-4-20

TABLE 1: QUANTITATIVE RESULTS DATA
EPA METHOD - 6010/7000 SERIES METALS (SR72)

SEP 2, 1994

Chain of Custody Data Required for ETC Data Management Summary Reports

MF8712 FOTH & VAN DYKE

FVDGRNBCMC S CMCABSC501 940720

811534

ETC Sample No.

Company

Facility Sample Point Date

Joblink

Compound	Results						
	Sample Concen. mg/kg	Report DL mg/kg	Blank Concen. mg/kg	Batch #	Prep Date	Analysis Date	
Arsenic	.07	.02	ND	Q41603	940808	940810	
Cadmium	ND	.04	ND	Q41603	940808	940809	
Chromium	.11	.04	ND	Q41603	940808	940809	
Cobalt	ND	.04	ND	Q41603	940808	940809	
Copper	.83	.04	ND	Q41603	940808	940809	
Lead	.11	.02	ND	Q41603	940808	940810	
Manganese	94.5	.004	.013	Q41603	940808	940809	
Mercury	ND	.04	ND	Q41603	940811	940811	
Zinc	2.1	.02	ND	Q41603	940808	940809	
Arsenic	.72	.24	ND	Q41603D			
Cadmium	ND	.37	ND	Q41603D			
Chromium	1.1	.37	ND	Q41603D			
Cobalt	ND	.40	ND	Q41603D			
Copper	8.1	.35	ND	Q41603D			
Lead	1.1	.24	ND	Q41603D			
Manganese	918	.04	ND	Q41603D			
Mercury	ND	.35	ND	Q41603D			
Zinc	20.8	.16	ND	Q41603D			

3.9-4-21

TABLE 1: QUANTITATIVE RESULTS DATA

EPA METHOD - 6010/7000 SERIES METALS (SR72)

Chain of Custody Data Required for ETC Data Management Summary Reports

MF8713 FOTH & VAN DYKE

FVDGRNBCMC S CMCABSC502 940720

B11534

ETC Sample No.

Company

Facility Sample Point Date

Joblink

Compound	Results						
	Sample Concn. mg/kg	Report DL mg/kg	Blank Concn. mg/kg	Batch #	Prep Date	Analysis Date	
Arsenic	.38	.02	ND	Q41603	940808	940810	
Cadmium	ND	.04	ND	Q41603	940808	940809	
Chromium	.11	.04	ND	Q41603	940808	940809	
Cobalt	ND	.04	ND	Q41603	940808	940809	
Copper	.27	.04	ND	Q41603	940808	940809	
Lead	.04	.02	ND	Q41603	940805	940810	
Manganese	122	.004	.013	Q41603	940808	940809	
Mercury	ND	.04	ND	Q41603	940811	940811	
Zinc	3.3	.02	ND	Q41603	940808	940809	
Arsenic	2.9	.19	ND	Q41603D			
Cadmium	ND	.29	ND	Q41603D			
Chromium	.81	.29	ND	Q41603D			
Cobalt	ND	.31	ND	Q41603D			
Copper	2.1	.27	ND	Q41603D			
Lead	.34	.19	ND	Q41603D			
Manganese	924	.03	ND	Q41603D			
Mercury	ND	.29	ND	Q41603D			
Zinc	25.1	.13	ND	Q41603D			

3.9-4-22

TABLE 1: QUANTITATIVE RESULTS DATA EPA METHOD - 6010/7000 SERIES METALS (SR72)

Chain of Custody Data Required for ETC Data Management Summary Reports					
MF8714	FOTH & VAN DYKE	FVDGRNBCMC S CMCABWR301	940720	811534	
ETC Sample No.	Company	Facility	Sample Point	Date	Joblink

Compound	Results				Prep Date	Analysis Date	
	Sample Concen. mg/kg	Report DL mg/kg	Blank Concen. mg/kg	Batch #			
Arsenic	.03	.02	ND	Q41603	940808	940810	
Cadmium	ND	.04	ND	Q41603	940808	940809	
Chromium	.11	.04	ND	Q41603	940808	940809	
Cobalt	ND	.04	ND	Q41603	940808	940809	
Copper	3.3	.04	ND	Q41603	940808	940809	
Lead	.18	.02	ND	Q41603	940808	940810	
Manganese	53.5	.004	.013	Q41603	940808	940809	
Mercury	ND	.04	ND	Q41603	940811	940811	
Zinc	3.7	.02	ND	Q41603	940808	940809	
Arsenic	.22	.18	ND	Q41603D			
Cadmium	ND	.28	ND	Q41603D			
Chromium	.84	.28	ND	Q41603D			
Cobalt	ND	.30	ND	Q41603D			
Copper	24.4	.27	ND	Q41603D			
Lead	1.3	.18	ND	Q41603D			
Manganese	396	.03	ND	Q41603D			
Mercury	ND	.28	ND	Q41603D			
Zinc	27.2	.13	ND	Q41603D			

3.9-4-23

SEP 2, 1994

TABLE 1: QUANTITATIVE RESULTS DATA

EPA METHOD - 6010/7000 SERIES METALS (SR72)

Chain of Custody Data Required for ETC Data Management Summary Reports

MF8715 FOTH & VAN DYKE

FVDGRNBCMC S CMCABWR302 940720

811534

ETC Sample No.

Company

Facility Sample Point Date

Joblink

Compound	Results						
	Sample Concen. mg/kg	Report DL mg/kg	Blank Concen. mg/kg	Batch #	Prep Date	Analysis Date	
Arsenic	.05	.02	ND	Q41603	940808	940810	
Cadmium	ND	.04	ND	Q41603	940808	940809	
Chromium	.13	.04	ND	Q41603	940808	940809	
Cobalt	ND	.04	ND	Q41603	940808	940809	
Copper	.44	.04	ND	Q41603	940808	940809	
Lead	.06	.02	ND	Q41603	940808	940810	
Manganese	125	.004	.013	Q41603	940808	940809	
Mercury	ND	.04	ND	Q41603	940811	940811	
Zinc	3.1	.02	ND	Q41603	940808	940809	
Arsenic	.51	.24	ND	Q41603D			
Cadmium	ND	.37	ND	Q41603D			
Chromium	1.3	.37	ND	Q41603D			
Cobalt	ND	.40	ND	Q41603D			
Copper	4.4	.35	ND	Q41603D			
Lead	.57	.24	ND	Q41603D			
Manganese	1230	.04	ND	Q41603D			
Mercury	ND	.38	ND	Q41603D			
Zinc	30.8	.17	ND	Q41603D			

3.9-4-24

TABLE 1: QUANTITATIVE RESULTS DATA

EPA METHOD - 6010/7000 SERIES METALS (SR72)

SEP 2, 1994

Chain of Custody Data Required for ETC Data Management Summary Reports

MF8716 FOTH & VAN DYKE FVDGRNBCMC S CMCABSC 940720 811534
 ETC Sample No. Company Facility Sample Point Date Joblink

Compound	Results						
	Sample Concen. mg/kg	Report DL mg/kg	Blank Concen. mg/kg	Batch #	Prep Date	Analysis Date	
Arsenic	ND	.02	ND	Q41603	940808	940810	
Cadmium	.14	.04	ND	Q41603	940808	940809	
Chromium	.08	.04	ND	Q41603	940808	940809	
Cobalt	ND	.04	ND	Q41603	940808	940809	
Copper	.98	.04	ND	Q41603	940808	940809	
Lead	.21	.02	ND	Q41603	940808	940810	
Manganese	21.2	.004	.013	Q41603	940808	940809	
Mercury	ND	.04	ND	Q41603	940811	940811	
Zinc	6.0	.02	ND	Q41603	940808	940809	
Arsenic	ND	.14	ND	Q41603D			
Cadmium	.83	.22	ND	Q41603D			
Chromium	.48	.22	ND	Q41603D			
Cobalt	ND	.24	ND	Q41603D			
Copper	5.9	.21	ND	Q41603D			
Lead	1.3	.14	ND	Q41603D			
Manganese	128	.02	ND	Q41603D			
Mercury	ND	.22	ND	Q41603D			
Zinc	36.3	.10	ND	Q41603D			

3.9-4-25

SEP 2, 1994

TABLE 1: QUANTITATIVE RESULTS DATA

EPA METHOD - 6010/7000 SERIES METALS (SR72)

Chain of Custody Data Required for ETC Data Management Summary Reports

MF8717 FOTH & VAN DYKE

FVDGRNBCMC S CMCABSC55 940720

811534

ETC Sample No.

Company

Facility Sample Point Date

Joblink

Compound	Results						
	Sample Concen. mg/kg	Report DL mg/kg	Blank Concen. mg/kg	Batch #	Prep Date	Analysis Date	
Arsenic	.09	.02	ND	Q41603	940808	940810	
Cadmium	ND	.04	ND	Q41603	940808	940809	
Chromium	.15	.04	ND	Q41603	940808	940809	
Cobalt	ND	.04	ND	Q41603	940808	940809	
Copper	.41	.04	ND	Q41603	940808	940809	
Lead	.09	.02	ND	Q41603	940808	940810	
Manganese	80.7	.004	.013	Q41603	940808	940809	
Mercury	ND	.04	ND	Q41603	940811	940811	
Zinc	1.8	.02	ND	Q41603	940808	940809	
Arsenic	.77	.21	ND	Q41603D			
Cadmium	ND	.33	ND	Q41603D			
Chromium	1.3	.33	ND	Q41603D			
Cobalt	ND	.36	ND	Q41603D			
Copper	3.7	.32	ND	Q41603D			
Lead	.78	.21	ND	Q41603D			
Manganese	721	.04	ND	Q41603D			
Mercury	ND	.32	ND	Q41603D			
Zinc	15.7	.15	ND	Q41603D			

3.9-4-26

TABLE 1: QUALITY ASSURANCE DATA
EPA METHOD - 6010/7000 SERIES METALS (SR72)

SEP 2, 1994

Chain of Custody Data Required for ETC Data Management Summary Reports

See Below

ETC Batch No.

Compound	QC Blank and Spiked Data			QC Matrix Spike			QC Duplicate			Batch #
	Blank Concen. mg/kg	Concen. Added mg/kg	† Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	† Recov	First mg/kg	Second mg/kg	RPD	
Arsenic	ND	16.6	82	.087	7.77	95	.087	.063	33	Q41603
Cadmium	ND	.5	80	ND	.50	94	ND	ND	0	Q41603
Chromium	ND	0	-	.1510	1.98	89	.1510	.1464	3	Q41603
Cobalt	ND	0	-	ND	4.96	88	ND	ND	0	Q41603
Copper	ND	160.0	93	.4119	2.48	89	.4119	.4093	.6	Q41603
Lead	ND	.2	100	.087	3.88	111	.087	.097	11	Q41603
Manganese	.013	10.5	86	80.7069	4.96	68	80.7069	82.8882	3	Q41603
Mercury	ND	.8	100	ND	.20	111	ND	ND	0	Q41603
Zinc	ND	127.0	79	1.7614	4.96	84	1.7614	1.8097	3	Q41603

3.9-4-27

Appendix 3.9-5
Turtle Trapping Results

Table 1. Turtle Marking Summary, Crandon Project 1994.

Painted Turtles Number Codes (Starting at Head)

ID# (1)	Site	Trap #	Sex
0-1	Ground Hemlock Lake (A	*	F
0-2	L.Sand Lake (Adj. To)	*	F
0-4	Z17 Wetland	7	F
0-7	Skunk Lake	4	F
0-8	Skunk Lake (Adj. To)	*	F
0-9	Skunk Lake	3	M
0-10	Deep Hole Lake	10	F
0-11	Deep Hole Lake	9	M
0-12	Z12 Wetland	7	F
1-0	Z12 Wetland	7	F
1-1	L. Sand Lake	15	F
1-2	Hemlock Creek	12	F
1-3	Skunk Lake	4	F
1-4	Z22 Wetland	1	M
1-7	Duck Lake	19	F
1-8	Duck Lake	19	F
1-9	Skunk Lake	4	F
1-10	Skunk Lake (Adj. To)	*	F
1-11	Deep Hole Lake	8	F
1-12	Z2 Wetland	2	M
2-0	Mole Lake	17	M
2-1	Z22 Wetland (Adj. To)	*	F
2-1	Duck Lake	20	M
2-2	Swamp Creek (Mole Lake	5	F
2-3	L.Sand Lake	15	F
2-4	F18 Wetland (Adj. To)	*	F
2-7	F25 Wetland (Adj. To)	*	F
2-8	F25 Wetland (Adj. To)	*	F
2-9	Deep Hole Lake (Adj. To)	*	F
2-10	Swamp Creek (Discharge	16	F
2-11	Swamp Creek *Discharge	16	F
2-12	Z17 Wetland	7	M
3-0	Skunk Lake	4	M
3-1	Swamp Creek (Discharge	16	F
3-2	Skunk Lake	3	M
3-3	Z17 Wetland	7	M
3-4	Transect 38	*	F
3-7	Z17 Wetland	7	F
3-8	Z17 Wetland	7	F
3-9	Z17 Wetland	7	M
3-10	Skunk Lake	3	F
3-11	Deep Hole Lake	10	M
3-12	Deep Hole Lake	11	F
4-0	Skunk Lake	3	M
4-1	Deep Hole Lake	8	M
4-2	Skunk Lake	3	M
4-3	Skunk Lake	3	M
4-4	Skunk Lake	3	F
4-7	Swamp Creek (Mole Lake	5	F
4-7	Z2 Wetland	2	F
4-8	Swamp Creek (Discharge	16	M
4-8	Deep Hole Lake	9	M
4-10	L.Sand Lake	15	F
4-11	Deep Hole Lake	9	M
4-12	Deep Hole Lake	8	M
7-0	Z2 Wetland	2	M
7-1	Z17 Wetland	7	F
7-2	Z17 Wetland	7	F
7-3	Z17 Wetland	7	F
7-4	Swamp Creek Hwy 55 (Ad	*	F
7-8	Mole Lake	18	F
7-9	Mole Lake	17	M
7-10	Mole Lake	18	F
7-11	Mole Lake	17	M
7-7	Swamp Creek Hwy 55 (Ad	*	F
8-0	Z17 Wetland	7	M
8-2	Mole Lake	17	M
8-3	Mole Lake	17	M
8-4	Mole Lake	17	M
9-0	Z17 Wetland	7	F
10-0	Z22 Wetland	1	F
12-0	Duck Lake	20	F
4/2-0	Deep Hole Lake	10	F
4/3-0	Deep Hole Lake	9	F

Common Snapping Turtle (Starting at Tail)

ID#	Site	Trap #	Sex
0-1	Z22 Wetland (Adj. To)	*(2)	F
0-2	Swamp Creek (Discharge	16	M
0-3	Swamp Creek (Mole Lake)	6	M
0-4	Z22 Wetland	1	F
0-5	Mole Lake	17	F
0-8	Mole Lake	18	F
0-9	Skunk Lake	4	M
1-0	Hemlock Creek	12	M
1-2	Swamp Creek (Discharge	16	M
1-3	Swamp Creek (Discharge	16	M
1-4	Deep Hole Lake	10	M
1/2-0	L.Sand Lake	15	M
2-0	Skunk Lake	3	F
2-1	Mole Lake	17	M
2-1	Deep Hole Lake	11	F
3-0	Duck Lake	19	M
4-0	Swamp Creek (County K)	*	F
5-0	Swamp Creek (Discharge	16	F
9-0	Z2 Wetland	2	F

Recaptures

ID#	Site	Species	Trap #	Sex
0-4	Z22 Wetland	Snappin	1	F
2-1	Z17 Wetland	Painted	7	M
2-2	Swamp Creek (Mole L	Painted	6	F
4/3-0	Deep Hole Lake	Painted	9	F
7-10	Mole Lake	Painted	17	F

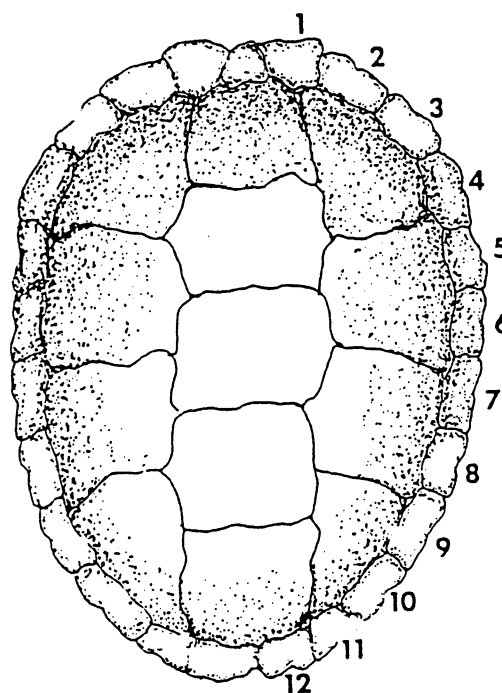


Diagram code scheme for turtles

Each number 1-12 represents a filed marginal scute from either side of the turtles carapace.

Example code 2-1 would represent filed marginal scute #2 on the left side and #1 on the right side of the carapace.

In this scheme the painted turtle code start at the head and snapping turtle start at the tail.

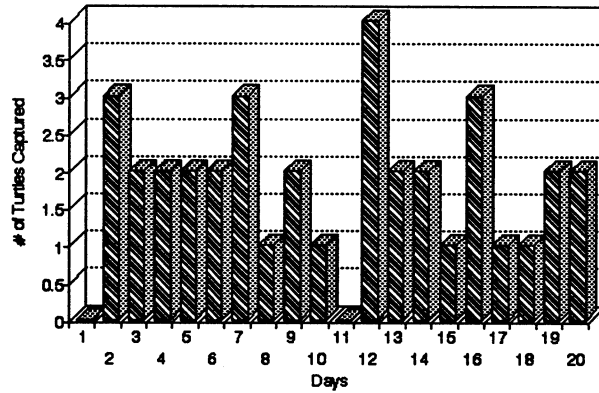
(1) Each captured turtle was marked with a unique series of notches on the marginal scutes.

(*) Incidental captures by hand.

Figure 1. Painted and Snapping Turtle Numbers by Day of Capture, Crandon Project

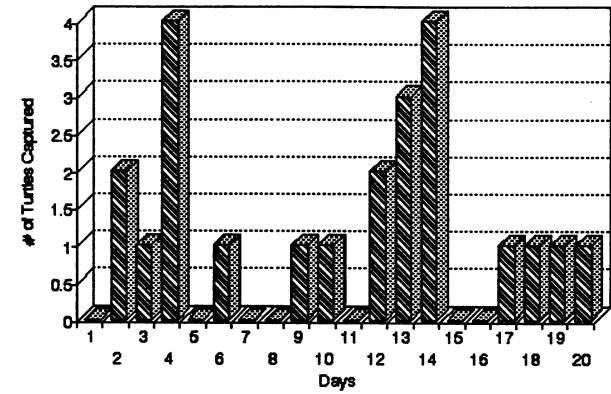
June 1994

Female Painted Turtle Captures by Day



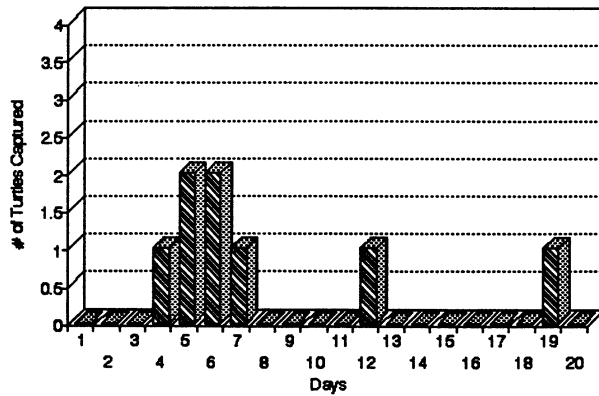
June 1994

Male Painted Turtle Captures by Day



June 1994

Female Snapping Turtle Captures by Day



June 1994

Male Snapping Turtle Captures by Day

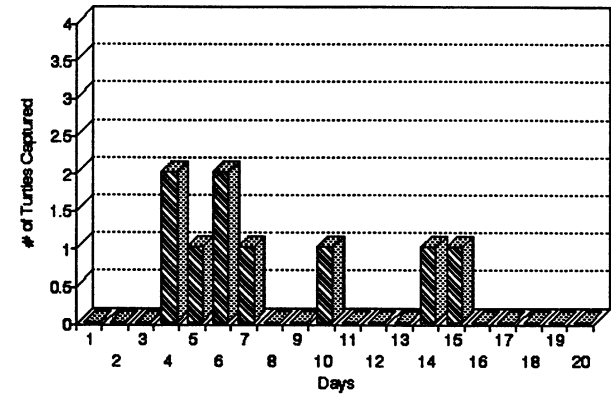
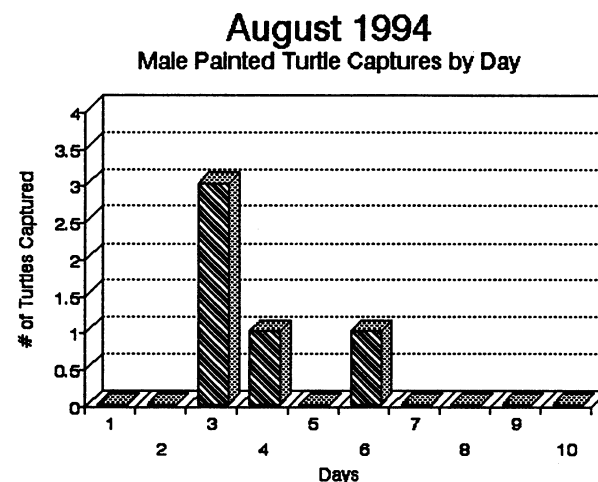
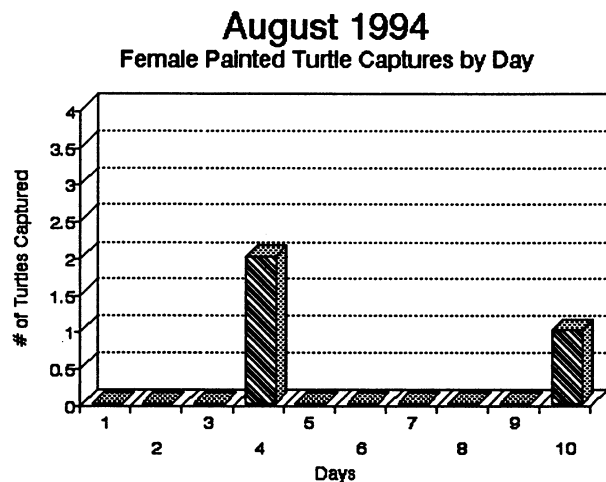
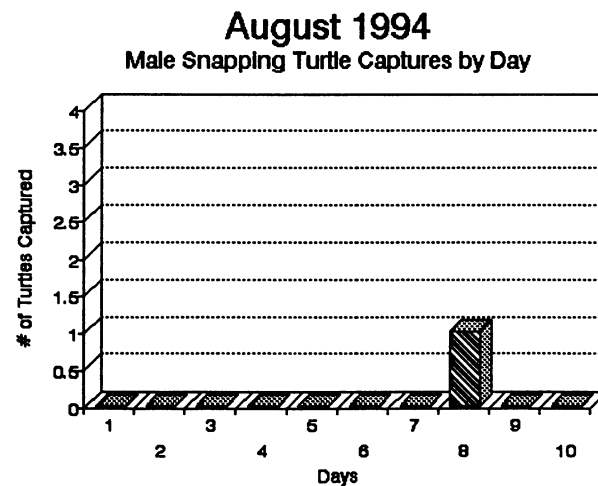


Figure 1.(cont.) Painted and Snapping Turtle Numbers by Day of Capture, Crandon Project



Note: June data incorporates all 20 hoop traps from the first trapping period, May 31st.-June-9th., with 18 hoop traps set in the second trapping period, June 14-June 23. August data incorporates only 2 traps from August 15-24.



Appendix 3.9-6

Summary of Small Mammal Trapping Results

Table 1
Pitfall Trap Capture Totals

SPECIES	1B'	1P ²	2B	2P	3B	3P	4B	4P	5B	5P	6B	6P	7B	7P	8B	8P	9B	9P	TOTAL	%	EXTRA ³
<i>Blarina brevicauda</i>		2															1		3		
<i>Sorex arcticus</i>		1	1	1			1	2		1			2						9		
<i>Sorex cinereus</i>	15	19	18	15	19	22	18	30	6	6	24	20	44	31	7	3	7	10	314		4
<i>Sorex hoyi</i>	1	2	2	2	2	3		1						1	2				16		
<i>Sorex palustris</i>		1							1										2		1
<i>Condylura cristata</i>								1	1										2		2
<i>Mustela nivalis</i>																			0		1
<i>Peromyscus leucopus</i>						1		1				1	1						4		
<i>Peromyscus maniculatus</i>																3			3		
<i>Peromyscus sp.</i>																			0		
<i>Clethrionomys gapperi</i>	2	1	1	1	1	8	2	3	1	3	4	6		2		1	4	1	41		
<i>Microtus pennsylvanicus</i>		1	2	2	3	3		4	13	27	3	3	1	3	1	1	1		68		4
<i>Synaptomys cooperi</i>	1	2			4	3	2	5	1	1	3	1	4	5	1		1		34		1
<i>Napaeozapus insignis</i>					2	1	1							1					5		
<i>Zapus hudsonius</i>	3	2	9	19	4	3	5	4	3	2	2		1	5	1	1		2	66		8
TOTAL	22	31	33	40	35	44	29	51	26	40	36	31	53	48	12	9	14	13	567		21

Table 1 (Continued)

SPECIES	10B	10P	11B	11P	12B	12P	13B	13P	14B	14P	15B	15P	16B	16P	17B	17P	18B	18P	TOTAL	%	EXTRA ³
<i>Blarina brevicauda</i>																1			1		
<i>Sorex arcticus</i>	2		5	4	2	1	1			1	2	4							22		
<i>Sorex cinereus</i>	14	5	17	12	19	8	5	3	6	2	4	3	5	3	8	3	15	3	135		
<i>Sorex hoyi</i>			3	1	3	1			2						1		1		12		
<i>Sorex palustris</i>					2														2		
<i>Condylura cristata</i>									1										1		
<i>Mustela nivalis</i>																			0		
<i>Peromyscus leucopus</i>																2			2		
<i>Peromyscus maniculatus</i>													1						1		
<i>Peromyscus sp.</i>																			0		
<i>Clethrionomys gapperi</i>	1		4	1						1			1		2	3	3	1	17		
<i>Microtus pennsylvanicus</i>					1	2					1	1			3				8		
<i>Synaptomys cooperi</i>	1					1			1			1			1				5		
<i>Napaeozapus insignis</i>															2	4			6		
<i>Zapus hudsonius</i>					4				1	1					2	2	1		11		
TOTAL	18	5	25	21	32	13	6	3	11	5	7	9	7	3	19	15	20	4	223		

¹"B" indicates that the pitfall was located along a barrier.²"P" indicates that the pitfall was not located along a barrier.³EXTRA = water shrew, one night set at Duck Lake.

Table 2

Pitfall Trap Capture Phenology

DATE	BLBR	SOAR	SOCI	SOHO	SOPA	COCR	MUNI	PELE	PEMA	PESP	CLGA	HIPE	SYCO	MAIN	ZAHU	Total
5/09/94															1	1
5/20/94			1													1
5/21/94																0
5/22/94																0
5/23/94																0
5/24/94			1													1
5/25/94																0
5/26/94												1			1	2
5/27/94																0
5/28/94												1				1
5/29/94																0
5/30/94																0
5/31/94															4	4
6/01/94			1		1						1	4			11	18
6/02/94																0
6/03/94												3	2		2	7
6/04/94																0
6/05/94			1													1
6/06/94															1	1
6/07/94									1			5	1		4	11
6/08/94																0
6/09/94			1										3		2	6
6/10/94																0
6/11/94																0
6/12/94																0
6/13/94			20					1	1		6	3	1	1	15	48
6/14/94																0
6/15/94																0
6/16/94																0
6/17/94			13								2	5	4			24
6/18/94																0
6/19/94																0
6/20/94																0
6/21/94			6								1	4				11
6/22/94		1	5									4			2	12
6/23/94																0
6/24/94			10	2								2				14
6/25/94																0
6/26/94																0
6/27/94																0
6/28/94		1	5	2		1						2	2			13
6/29/94			4	1		1			1			11	4			22
6/30/94		1	5								1		1			8
7/01/94																0
7/02/94																0
7/03/94		1	8									2	2		2	15
7/04/94																0
7/05/94					1	1		1			2		1		1	7
7/06/94			2		1						2				1	6
7/07/94																0
7/08/94																0
7/09/94	1		4	1				1			2	3	3			15

Table 2 (Continued)

DATE	BLBR /	SOAR	SOCI	SOHO	SOPA	COCR	MUNI	PELE	PENA	PESP	CLGA	MIPE	SYCO	NAIN	IAHU	Total
7/10/94																0
7/11/94																0
7/12/94			8	1			1				6				5	21
7/13/94			9								3	1	2		2	17
7/14/94																0
7/15/94			7	1										1	1	10
7/16/94																0
7/17/94			15								1		1		2	19
7/18/94																0
7/19/94	1		9	2							2	2			3	19
7/20/94			13								2	2			1	18
7/21/94																0
7/22/94																0
7/23/94			4	1								2				7
7/24/94			7													7
7/25/94																0
7/26/94		1	6								1	3				11
7/27/94			4									1			1	6
7/28/94																0
7/29/94																0
7/30/94																0
7/31/94																0
8/01/94		1	46	1							4	9	3	1	2	67
8/02/94																0
8/03/94			14	3							2		1		1	21
8/04/94		1	32	1							3	1		1		39
8/05/94																0
8/06/94			2										1			3
8/07/94		8	20	1				1			5	5	1	1	2	44
8/08/94		1	14								1		1	1		18
8/09/94	1	1	11											1	1	15
8/10/94		3	33		2	1					3	1			6	49
8/11/94		1	9									1	1			12
8/12/94																0
8/13/94																0
8/14/94																0
8/15/94		2	48	6				1			4	2	2	4	7	76
8/16/94		3	19	1							1		1			25
8/17/94			3													3
8/18/94		3	21	2									2		3	31
8/19/94		1	5						1							7
8/20/94	1		5					1			1				1	9
8/21/94				1												1
8/22/94											2					2
8/23/94																0
8/24/94		1	2	1												4
8/25/94																0
8/26/94																0
8/27/94																0
8/28/94																0
8/29/94																0
8/30/94																0
8/31/94																0

Table 2 (Continued)

DATE	BLBR ¹	SOAR	SOCI	SOHO	SOPA	COCR	MUNI	PELE	PEMA	PESP	CLGA	MIPE	SYCO	NAIN	ZAHU	Total
10/23/94						1										1
	4	31	453	28	5	5	1	6	4	0	58	80	40	11	85	811

- ¹ BLBR = *Blarina brevicauda*
 SOAR = *Sorex arctica*
 SOCI = *Sorex cinereus*
 SOHO = *Sorex hoyi*
 SOPA = *Sorex palustris*
 COCR = *Condylura cristata*
 MUNI = *Mustela nivalis*
 PELE = *Peromyscus leucopus*
 PEMA = *Peromyscus maniculatus*
 PESP = *Peromyscus species*
 CLGA = *Clethrionomys gapperi*
 MIPE = *Microtus pennsylvanicus*
 SYCO = *Synaptomys cooperi*
 NAIN = *Napaeozapus insignis*
 ZAHU = *Zapus hudsonius*

Table 3

Combination Trap Capture Results at Pitfall Sites

Site 1				Site 3			Site 11			Site 17			Total
Species ¹	1 Museum s.	1 Mouse tr.	1 Live trap	3 Museum s.	3 Mouse tr.	3 Live trap	11 Museum s.	11 Mouse tr.	11 Live trap	17 Museum s.	17 Mouse tr.	17 Live trap	
Bb				1		2	1						4
Sa													0
Sc				3	4	1		1					9
Sh													0
Sp													0
Cc													0
Me						4							4
Gv													0
Ts													0
Pl					1					7	12	4	24
Pm							3	1	2	1			7
Ps					1		1						2
Cg		1		1			5	6	2	5	5		25
Mp								1			1		2
Sy													0
Ni										1	2		3
Zh		1					1	2			1		5
TOTAL		2		5	6	7	11	11	4	14	21	4	85

- ¹ Bb = *Blarina brevicauda*
 Sa = *Sorex arctica*
 Sc = *Sorex cinereus*
 Sh = *Sorex hoyi*
 So = *Sorex palustris*
 Cc = *Condylura cristata*
 Me = *Mustela nivalis*
 Gv = *Glaucomys volans*
 Ts = *Tamias striatus*
 Pl = *Peromyscus leucopus*
 Pm = *Peromyscus maniculatus*
 Ps = *Peromyscus species*
 Cg = *Clethrionomys gapperi*
 Mp = *Microtus pennsylvanicus*
 Sy = *Synaptomys cooperi*
 Ni = *Napaeozapus insignis*
 Zh = *Zapus hudsonius*

Table 4
Combination Trap Site Phenology

DATE	Bb ¹	Sa	Sc	Sh	Sp	Cc	Me	Gv	Ts	Pl	Pm	Ps	Cg	Mp	Sy	Ni	Zh	TOTAL
8/09/94							1						2					3
8/10/94							1			2	2		1					6
8/11/94			1				1			2	1		4				1	10
8/12/94													2					2
8/13/94			1							5	1	1	1				1	10
8/14/94										1	1	1	1					4
8/15/94										2			1			1		4
8/16/94	1									1			3			1	1	6
8/17/94										1			1					2
8/18/94										2			1	1			2	6
8/19/94	1									1			1					3
8/20/94										1								1
8/21/94	1		2				1			1			1					6
8/22/94			3							2	1		2					8
8/23/94	1		2							2	1		4	1				9
8/24/94										1						1		2
	4	0	9	0	0	0	4	0	0	24	7	2	25	2	0	3	4	85

- ¹ Bb = *Blarina brevicauda*
 Sa = *Sorex arctica*
 Sc = *Sorex cinereus*
 Sh = *Sorex hoyi*
 So = *Sorex palustris*
 Cc = *Condylura cristata*
 Me = *Mustela nivalis*
 Gv = *Glaucomys volans*
 Ts = *Tamias striatus*
 Pl = *Peromyscus leucopus*
 Pm = *Peromyscus maniculatus*
 Ps = *Peromyscus species*
 Cg = *Clethrionomys gapperi*
 Mp = *Microtus pennsylvanicus*
 Sy = *Synaptomys cooperi*
 Ni = *Napaeozapus insignis*
 Zh = *Zapus hudsonius*

Table 5

Capture Totals for Mammal Snap Trap Transect A

SITES	Bb ¹	Sa	Sc	Sh	Sp	Cc	Me	Gv	Ts	Pl	Pm	Ps	Cg	Mp	Sy	Ni	Zh	TOTAL INDV.	TOTAL SPEC.
1			4										1				1	6	3
2			1							4	2							7	3
3										4	2		1	1				8	5
4			1							2	1		2					6	4
5			2							2		2	5					11	4
6										1			3					4	2
7			2							2			4					8	3
8			4										3					7	2
9			1							3			2					6	3
10			3					1		8	1							13	4
11										4		1	3					8	3
12			2										7					9	2
13	2		1							1			1			2		7	5
14			1								1	1	2					5	4
15			3							1	1	1						6	4
16										2								2	1
17			1								1	1	4					7	4
18			1															1	1
19	3							1		1		1	5					11	5
20			1							1	1		1			2	3	9	6
21			5							1		1				2	5	14	5
22			3							1			4	1		3	3	15	6
23										2	1						2	5	3
24			3							4			1			1	1	10	6
25										2	8		2			1	1	14	5
26			1							1	1		2			1		6	5
27	1		1							1	1						3	7	5
28											2		1			4	1	8	4
29	1												1				8	10	3
30	2		4													3	4	13	4
31			5														6	11	2
32	1		1	1						1			4			1	3	12	7
33			5	1						2	2		1			2	1	14	7
10 0 56 2 0 0 0 0 2 0 51 25 8 60 2 0 22 42 280																			

- ¹ Bb = *Blarina brevicauda*
 Sa = *Sorex arctica*
 Sc = *Sorex cinereus*
 Sh = *Sorex hoyi*
 So = *Sorex palustris*
 Cc = *Condylura cristata*
 Me = *Mustela nivalis*
 Gv = *Glaucomys volans*
 Ts = *Tamias striatus*
 Pl = *Peromyscus leucopus*
 Pm = *Peromyscus maniculatus*
 Ps = *Peromyscus species*
 Cg = *Clethrionomys gapperi*
 Mp = *Microtus pennsylvanicus*
 Sy = *Synaptomys cooperi*
 Ni = *Napaeozapus insignis*
 Zh = *Zapus hudsonius*

Table 6

Capture Phenology for Mammal Snap Trap Transect A

Date	Bb ¹	Sa	Sc	Sh	Sp	Cc	Me	Gv	Ts	Pl	Pm	Ps	Cg	Mp	Sy	Ni	Zh	Total
8/04/94										1	3		2	1		2	1	10
8/05/94	1		1							2	3		5			1	2	15
8/06/94			1							4	2		9				3	19
8/07/94			2					1		1	6	1	4			1		16
8/08/94			3							1	2		6			1	8	21
8/09/94			8							6			6			3	4	27
8/10/94	1		6							5			5			3	3	23
8/11/94			11							5		1	5			1	2	25
8/12/94	1		3	1						3			3			3	2	16
8/13/94	1		5							5	3		3			3	1	21
8/14/94	3		3							7	2	1	4			2	6	28
8/15/94	1		2							4	1	1	1			1	1	12
8/16/94	1		3	1						3	1	2	5	1			2	19
8/17/94			2					1		3		1	1			1	3	12
8/18/94	1		6							1	2	1	1				4	16
	10	0	56	2	0	0	0	2	0	51	25	8	60	2	0	22	42	280

- ¹ Bb = *Blarina brevicauda*
 Sa = *Sorex arctica*
 Sc = *Sorex cinereus*
 Sh = *Sorex hoyi*
 So = *Sorex palustris*
 Cc = *Condylura cristata*
 Me = *Mustela nivalis*
 Gv = *Glaucomys volans*
 Ts = *Tamias striatus*
 Pl = *Peromyscus leucopus*
 Pm = *Peromyscus maniculatus*
 Ps = *Peromyscus species*
 Cg = *Clethrionomys gapperi*
 Mp = *Microtus pennsylvanicus*
 Sy = *Synaptomys cooperi*
 Ni = *Napaeozapus insignis*
 Zh = *Zapus hudsonius*

Table 7

Capture Totals for Mammal Snap Trap Transect B

SITES	Bb ¹	Sa	Sc	Sh	Sp	Cc	Me	Gv	Ts	Pl	Pm	Ps	Cg	Mp	Sy	Ni	Zh	TOTAL INDV.	TOTAL SPEC.
1											4		7					11	2
2			4						1	1	2							8	4
3			8										1					9	2
4			6								2	2	2					12	4
5			5							2						1		8	3
6			10						1	1								12	3
7			8															8	1
8										3								3	1
9			2							1	1					1		5	4
10	1		2							5	2							10	4
11			3								2							5	2
12			7						1	1								9	3
13			5															5	1
14			3										2					5	2
15			5									1	3					9	3
16			8								1							9	2
17			3														1	4	2
18			10														1	11	2
19			2							1								3	2
20			7														1	8	2
21		1	1	1													2	5	4
22			8										2			1	1	12	4
23			3								1		1					5	3
24			1							3			2					6	3
25			2													5		7	2
26			2										4			2		8	3
27			7							1			1			1		10	4
28	1		1							1			3			1		7	5
29			2							1	1		2			3		9	5
30			4									1				1		6	3
31			5								1		1					7	3
32			2							2			1			1		6	4
33			3							4	2	2	6					17	5
2 1 139 1 0 0 0 0 0 3 27 19 8 36 0 0 17 6 259																			

- ¹ Bb = *Blarina brevicauda*
 Sa = *Sorex arctica*
 Sc = *Sorex cinereus*
 Sh = *Sorex hoyi*
 So = *Sorex palustris*
 Cc = *Condylura cristata*
 Me = *Mustela nivalis*
 Gv = *Glaucomys volans*
 Ts = *Tamias striatus*
 Pl = *Peromyscus leucopus*
 Pm = *Peromyscus maniculatus*
 Ps = *Peromyscus species*
 Cg = *Clethrionomys gapperi*
 Mp = *Microtus pennsylvanicus*
 Sy = *Synaptomys cooperi*
 Ni = *Napaeozapus insignis*
 Zh = *Zapus hudsonius*

Table 8

Capture Phenology for Mammal Snap Trap Transect B

Date	Bb ¹	Sa	Sc	Sh	Sp	Cc	Me	Gv	Ts	Pl	Pm	Ps	Cg	Mp	Sy	Ni	Zh	Total
8/05/94	1										2		1			2		6
8/06/94			2								3		1					6
8/07/94			3						1	1	4		3			3	2	17
8/08/94			3						1	5	4	1	1			2		17
8/09/94		1	8							2	2	2	5			3	1	24
8/10/94			17							5		2	5					29
8/11/94			17						1	2		2	4			2		28
8/12/94	1		7							3			3			3	1	18
8/13/94			16							3	1		1			2	1	24
8/14/94			13	1						3	1		1					19
8/15/94			18							1			2					21
8/16/94			10															10
8/17/94			10										3				1	14
8/18/94			4								1	1	3					9
8/19/94			11							2	1		3					17
	2	1	139	1	0	0	0	0	3	27	19	8	36	0	0	25	6	259

- ¹ Bb = *Blarina brevicauda*
 Sa = *Sorex arctica*
 Sc = *Sorex cinereus*
 Sh = *Sorex hoyi*
 So = *Sorex palustris*
 Cc = *Condylura cristata*
 Me = *Mustela nivalis*
 Gv = *Glaucomys volans*
 Ts = *Tamias striatus*
 Pl = *Peromyscus leucopus*
 Pm = *Peromyscus maniculatus*
 Ps = *Peromyscus species*
 Cg = *Clethrionomys gapperi*
 Mp = *Microtus pennsylvanicus*
 Sy = *Synaptomys cooperi*
 Ni = *Napaeozapus insignis*
 Zh = *Zapus hudsonius*

Appendix 3.9-7

**Report on the 1994/1995 Survey for
Botrychium mormo in Northeastern Wisconsin**

Foth & Van Dyke Memorandum

October 7, 1996

TO: Jerry Sevick, Foth & Van Dyke

CC: Don Moe, Crandon Mining Company
Master File

FR: Gary Fewless, University of Wisconsin - Green Bay *GF*
Ron Steg, Resource Management Group, Inc. *RS*

RE: Report on the 1994/1995 Survey for *Botrychium mormo* in Northeastern Wisconsin

A search for rare vascular plants was conducted in 1994 on the proposed Crandon Mining Company project site near Crandon in Forest County, Wisconsin. During the course of that study several populations of *Botrychium mormo* Wagner (Goblin Fern) were found on the project's TMA site, on adjacent properties, and in the Nicolet National forest within the general area of the project site. *Botrychium mormo* is a Wisconsin Endangered species and is considered a concern species (category "C2") at the federal level by the U.S. Fish and Wildlife Service.

The discovery of a substantial number of new populations of *B. mormo* in 1994 was unexpected and posed questions regarding the rarity of this species in Wisconsin. Subsequently, further surveys were conducted in 1995 over a broader area as a contribution toward a better understanding of the status of this species. This report summarizes the findings of both the 1994 and 1995 surveys. Some implications for the life history and population biology of *B. mormo* are inferred from observations made during this study and from the literature.

Botrychium mormo

Botrychium mormo Wagner, the "Goblin Fern", is a very small and inconspicuous plant (Figure 1). Indeed it went largely unnoticed until the second half of the twentieth century, and was not officially published as a valid species until 1981 (Wagner & Wagner, 1981).

Each *B. mormo* plant consists of a single stem with one small leaf (trochophore) and a small spore-bearing branch (sporophore). In general they are pale green and appear to be very succulent. Individual plants vary considerably in size although most Wisconsin plants observed in this study have been less than 8 cm tall and many were in the 2 to 5 cm range. The abundant leaf litter on the forest floor at many sites further diminishes the apparent height of the plants. In fact, many plants are completely covered by the leaf litter in early summer, and some researchers believe that plants can remain buried throughout the growing season. The supporting hypothesis contends that *B. mormo* has a strong fungal association which permits it to survive even though covered by the leaf layer and unable to photosynthesize (Johnson-Groh and Farrar, 1994).

Preferred habitat for *B. mormo* is rich mesic forest dominated by sugar maple, basswood and sometimes beech (Wagner & Wagner, 1993). Although plants at known sites have been observed by early June, most plants reach maximum size and are most detectable in August and September.

B. mormo is known only from Wisconsin, Minnesota and Michigan (Figure 2) and published accounts of frequency and abundance are scarce. Prior to the 1994 survey it was known from five counties in Wisconsin, of which only three sites in two counties were known to be active with a total of 27 individuals (Trick, 1994). In 1994 and 1995, three additional sites for *B. mormo* in Taylor County were reported by Chequamegon National Forest botanists (Tans, 1996). Other than the Wisconsin populations, *B. mormo* was known from seven counties (Beltrami, St. Louis, Itaska, Cass, Polk, Clearwater, and Mahnomem Counties) in Minnesota, with 53 separate "colonies" or populations according to John Casson of the Chippewa National Forest (Tans, 1996), and from eight sites in seven counties in Michigan of which the current status was largely unknown (Tans, 1994).

Methods

In 1994 a survey was conducted for all rare vascular plants on and near the proposed Crandon Project site in Forest County, Wisconsin (Foth and Van Dyke, 1995). Various portions of the rare plant survey were timed to coordinate with the period of highest detectability for each species and early survey work focused on identifying appropriate habitats for each species. A list provided by the Wisconsin Department of Natural Resources (WDNR) identified *Botrychium mormo* as one of the rare plant species known to exist within the general area of the proposed project site and, based on known habitat preferences, several sites within the study area were identified as likely habitat for *B. mormo*. These sites were searched in August of 1994 and several populations were found. When other survey work on the project site was completed near the end of August, the *B. mormo* searches were extended into adjacent areas and several additional sites were found. All populations within individual sites were marked with flagging tape, their locations were recorded and noted on U.S.G.S. topographical maps, and most of the individual plants were marked with small, brightly colored plastic markers. As a matter of convention, individual sites have been typically labeled numerically (e.g., 1, 2, 3, etc.). Populations within individual sites have been typically labeled by the year they were found (e.g., 94-01, 94-02, etc.). Each site had at least one population of *B. mormo* consisting of one or more plants. At some sites, multiple individual groups of *B. mormo* were found that were far enough apart not to be considered part of the same population, yet not far enough apart to be considered separate sites. In these instances, an alphanumeric suffix (e.g., 94-09A, 94-09B, etc.) was used to distinguish the separate populations within the site. During the winter of 1994/1995, evaluation of the information concerning the new discoveries in 1994 led to a decision by Crandon Mining Company to further investigate the distribution of *B. mormo* in northeastern Wisconsin in 1995.

The 1994 *B. mormo* populations on and near the proposed project site (populations 1994-01 through 1994-11) were relocated and monitored periodically during 1995. In late September, populations 94-3, 94-4, 94-10, and 950824B were carefully examined, with William Tans and Archie Wilson of the Wisconsin Department of Natural Resources. Fifty-two individual plants of *B. mormo* were marked with aluminum wire and numbered tags and the location of each plant was recorded relative to two permanent polyvinyl chloride reference posts at each site. This procedure will allow more accurate monitoring of these populations if it is necessary.

The 1995 surveys were designed to identify other populations of *B. mormo* in the region around the Crandon Project site and focused on as yet unexplored portions of Forest County and the adjacent counties of Florence, Marinette, Oconto, Langlade, Oneida and Vilas, which is referred to as the primary study area. Limited surveys were also conducted in Gogebic and Iron Counties in Michigan. The primary study area is shown in Figure 3. Surveys began by identifying the areas of best habitat within the specified area, based primarily on experience gained with the populations found in 1994. The surveys focused on public lands, especially the Nicolet National Forest, although county and state lands were also included in the search. Based in part on the previous experiences of team botanists and in part on Nicolet National Forest GIS maps which identified larger tracts of northern hardwood forests, areas of appropriate habitat were identified and mapped by visual surveys conducted along forest roads during June and July. In August a search of these areas was begun.

The search team included a core of six botanists including four of those from the 1994 survey. This team was joined by biologists of Foth and Van Dyke, the WDNR, Nicolet National Forest and the U.S. Fish and Wildlife Service for a portion of the survey work. The searches began with eye training at known sites to develop familiarity with the habitat and with the appearance of the species. Individual areas were then carefully searched by arranging the botanists in a line and systematically walking slowly back and forth across the area until the intended area was covered. An effort was made to strike a balance in walking speed which provided a good likelihood of finding the plants, while allowing a reasonably large area to be searched.

For each area searched, a name was assigned, the location was recorded, the general habitat type was noted and a list of all vascular plant species noted was kept. If *B. mormo* plants were found, the immediate area was then searched more thoroughly to assess the number of visible individuals present. Generally team members did not try to uncover buried individuals or to discover additional individuals by removing the leaf litter. Because the goal was to investigate the distribution of this species in northeastern Wisconsin, the team did not attempt to exhaustively search the entire area of available habitat at each location, but rather once a population had been found and documented, the team moved to search another area.

For each new population the site was marked with flagging tape and colored plastic markers were placed at each individual *B. mormo* plant, for future reference. A list of vascular plant species within one meter of any *B. mormo* plant and a list of species within three meters of any *B. mormo* plant was also recorded. If broken or partially eaten plants were noted they were salvaged for herbarium vouchers. Vouchers of *B. mormo* from the 1994 field work were annotated by W.H. Wagner, Jr. The 1995 vouchers are awaiting annotation by Dr. Wagner.

In addition to the botanical surveys, a limited soil survey was conducted in 1995 near eight of the *B. Mormo* populations that were located in 1994 (i.e., populations 1994-01, -03, -04, -05, -06, -09, -10, -11). At each population, at least one hand auger boring was advanced to a depth of 24 inches, or refusal. The soils were characterized with respect to color, texture and structure, moisture and organic content, and evidence of mottling. The focus of this soil survey was to begin to develop an understanding of the soil characteristics in the immediate vicinity of active *B. mormo* populations.

Results

The 1994 survey on and near the Crandon Project site discovered 16 new populations of *B. mormo* at 15 sites in eight sections and in two counties, Forest and Langlade. A total of 116

individual plants were noted. One of the 1994 sites (#7) did not produce any visible *B. mormo* plants in 1995.

In 1995 approximately 160 areas with high potential for *B. mormo* in six counties in Wisconsin and two counties in the upper peninsula of Michigan were identified. Ninety-three of those areas were searched and *B. mormo* was found at 27 new sites, including the first county records for Marinette, Oconto and Florence Counties in Wisconsin and Gogebic County in Michigan. A total of 30 new populations with 480 plants were noted at the new sites and two new populations were noted at Site #12 which was originally found in 1994. Figure 4 shows the general location of the new sites identified in 1995 as well as those identified in 1994.

Of the 32 new populations identified in 1995 there was an average of approximately 15 plants per population. Nineteen populations had fewer than ten plants each (including 13 populations of one or two plants each), six populations had ten to 19 plants each, and seven populations had more than 20 plants (the largest population was 123 plants). Together with the 16 populations found in 1994 a total of 48 new populations were identified in this study. Another Michigan population (site 950816A) represented by a single plant was reported by one of the team botanists from work done in 1994, apart from this project.

In general, the habitat within which the new *B. mormo* sites were discovered in 1994 and 1995 is mesic forest dominated by Sugar Maple (*Acer saccharum*) with Basswood (*Tilia americana*) regularly scattered throughout. The canopy was generally full or nearly full and the understory and ground layer (in August) were typically very open. Forests of the 1994 sites revisited in spring of 1995 appeared to have abundant growth of spring ephemerals and it is likely that the new sites are similar in that regard.

Other deciduous tree species on the *B. mormo* sites were typical of mesic forest in this region, including White Ash (*Fraxinus americana*), Black Cherry (*Prunus serotina*), Ironwood (*Ostrya virginiana*), Yellow Birch (*Betula alleghaniensis*), White Birch (*B. papyrifera*), Red Oak (*Quercus rubra*), and sometimes a few Beech (*Fagus grandiflora*), Largetooth Aspen (*Populus grandidentata*) and Trembling Aspen (*P. tremuloides*). Conifers were not present in significant numbers, although some stands had a few scattered Eastern Hemlock (*Tsuga canadensis*) and/or Balsam Fir (*Abies balsamea*).

The trees in the forests containing *B. mormo* were "second growth" and often of relatively small diameter, but they were generally the most mature areas available. The understory was sparse and the commonest shrubs were Leatherwood (*Dirca palustris*), Gooseberry (*Ribes cynosbati*) and Red-berried Elder (*Sambucus pubens*). Although the *B. mormo* plants often had few very close associates, common groundlayer species (visible in August) in the vicinity included Twisted Stalk (*Streptopus roseus*), Solomon's Seal (*Polygonatum pubescens*), Sweet Cicely (*Osmorhiza claytoni*), Canada May Flower (*Maianthemum canadense*), Lady Fern (*Athyrium filix-femina*), Wild Sarsaparilla (*Aralia nudicaulis*), Pennsylvania sedge (*Carex pensylvanica*), Blue Cohosh (*Caulophyllum thalictroides*), Oak Fern (*Gymnocarpium dryopteris*) and seedlings of *Acer saccharum*.

Monitoring of the 1994 sites in the spring of 1995 suggests that spring ephemerals can be abundant in these forests and Spring Beauty (*Claytonia caroliniana*), Dutchman's Breeches (*Dicentra cucullaria*), Bellwort (*Uvularia grandiflora*), Common Trillium (*Trillium grandiflorum*), and Bloodroot (*Sanguinaria canadensis*) seemed to be common.

Many of the populations of *B. mormo* appeared to be associated with the "tip-up mounds" which are a common feature of the mesic forest. The soils in the vicinity of the *B. mormo* sites were generally covered by a well-developed layer of matted, dead (mostly *Acer saccharum*) leaves from the previous year. Based on soil samples from eight of the 15 sites discovered in 1994, a 3- to 4.5-inch layer of damp, loose, organic topsoil containing abundant roots and woody debris was found below the leaf mat. This layer was generally underlain by a gray colored silty clay or sandy clay layer one-half to four inches thick which, in turn, was generally underlain by a light gray silt or silty sand layer and brown silts, sands and clays.

Discussion

Clearly, the results of the 1994/1995 surveys indicate that *B. mormo* is more common in northeastern Wisconsin than was previously believed. Previous low estimates reflect the plant's very small size and the relatively small number of person hours dedicated to the task, considering its difficulty. Also, the number of individuals at any site can be very small. In some cases only one plant was found, despite intensive searching. Such sites are very difficult to find and it seems likely that many sites have and will continue to escape detection. Even where the plants are found to be more numerous they are usually very localized in distribution. Therefore only a very small portion of the area which appears suitable to support this species is actually occupied by visible plants.

Accounts from other botanists who have worked with this plant suggest that population size at any site can vary dramatically from one year to the next (Casson, et al., 1994). Apparently dry years produce very few visible plants and there may be other variables which affect yearly abundance of plants. This variability in number of visible plants can contribute to the difficulty of finding new populations. Some populations may be overlooked if that site is surveyed in a year in which populations are small. Given the large area of potential habitat and the limited resources to search for this species it is likely that a site once searched unsuccessfully could be searched again at a different time and some populations found. For example, site #7 from the 1994 survey consisted of two small plants which were clearly marked, but neither reappeared in 1995 despite repeated searches. This site could not have been found during 1995.

Also, there is some question as to the implications of a low population year in terms of the stability of the species on any given site. If a low number of individuals represents a period during which most plants survive under the leaf litter and then reappear during subsequent years then it may be difficult to find that population, but it suggests a certain level of stability. If the low number of individuals represents mortality of a large part of a population then there are questions concerning long term survival of this species through these periods of low numbers. That is especially true if the reproductive potential and dispersal ability of the species are limited.

Given the unsuccessful efforts of previous attempts (including those of some members of this team) to identify new populations at other locations it is possible that the conditions of the last two years were highly conducive to the growth of this species. It is worth noting that even within a year in which plants are easily visible, the season of the search is important. On sites monitored during 1994 and 1995 it was obvious that some plants emerged early, but senesced or were otherwise absent from the site later. Such plants would not have been noted in a late search. Other plants emerged very late (some in late September and early October in 1994) and would not have been found even during an August search. For populations of small size it seems possible that an occupied site could be searched in a good year and still go unnoticed if the

seasonal timing is wrong. Clearly, locating new *B. mormo* populations will never be very easy or precise.

Given the cryptic nature of this fern, its very local distribution and its reported tendency to vary dramatically in population size from one year to the next, it is likely that the true size of the population of *B. mormo* in Wisconsin will never be known with any degree of certainty. However, the difficulty of finding new populations and the likelihood that some unknown, but probably significant proportion of individuals can remain hidden at any given time suggests that the number of populations and the number of individuals is higher than the record of observation to date indicates.

The main objective of this study was to identify new populations of *B. mormo* in northeastern Wisconsin. Efforts, therefore, were focused on searching the best habitats that could be found based on experiences from the 1994 survey, on published accounts, and on personal communications with other botanists. In general, the habitat type on which the 1994 and 1995 surveys were focused is that of moist, relatively mature mesic forests of mostly *Acer saccharum* with full canopy and open understory with a well developed layer of decaying leaves on the soil surface.

Based on the habitat surveys performed in the early summer of 1995, the largest areas of appropriate habitat in northeastern Wisconsin (consistent with the discovery of the new populations of *B. mormo*) are located in Forest and Florence Counties of Wisconsin (Figure 4). Similar habitat was also noted in Gogebic County in the upper peninsula of Michigan. The area of habitat in the other counties in this study area was more restricted. Only one population was found in northern Oconto County and two populations in northwestern Marinette County. *B. mormo* was not found in Oneida or Vilas Counties where much of the habitat that was searched either contained a large component of coniferous species or appeared too dry. However, the search for habitat was not thorough in these areas due to time constraints and it is possible that some areas of appropriate habitat are present in these counties.

There are a number of important aspects of the life history of *B. mormo* which are not yet understood. In particular, it is important to know if the smaller populations survive low parts of the population cycle and how readily this species can colonize new sites. The small size of most populations suggests that sexual reproduction is somewhat limited and perhaps that dispersal is also limited.

Even if the Wisconsin population of *B. mormo* is actually several times as large as is currently known, the total number of individuals is still modest and some populations are represented by a single individual or just a few individuals. If, as it appears to be, this is a high point in the cycle of abundance of *B. mormo*, it is difficult to assess what will happen during low points in the cycle.

Some of the small *Botrychium* forest species such as *B. matricariaefolium* (Daisy-leaved Moonwort) appear to benefit from small scale disturbance. The effect of forest management and successional status of the forest on the success of *B. mormo* is not known. The fact that many of the *B. mormo* populations have been found on the sides of tip up mounds and the associated depressions suggests that at least this level of small scale disturbance is beneficial.

On the other hand, the habitat characteristics of full canopy, open understory and presence of a well developed mat of dead maple leaves on the forest floor are characteristics of mature forests. It is possible that *B. mormo* is a species which is limited in reproductive potential and is currently

persisting in isolated pockets from a time in which the northern forest was less fragmented and on the whole more mature than it is today. It is not possible to easily test this hypothesis since so little is known of the reproductive ecology of this species and because mature sugar maple dominated forests are virtually non-existent in northeastern Wisconsin.

Literature Cited

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Foth & Van Dyke			
REVISED	DATE	BY	DESCRIPTION
CHECKED BY:		JKS	DATE: SEPT. '96
APPROVED BY:		RFS	DATE: SEPT. '96
APPROVED BY:		GWS	DATE: SEPT. '96

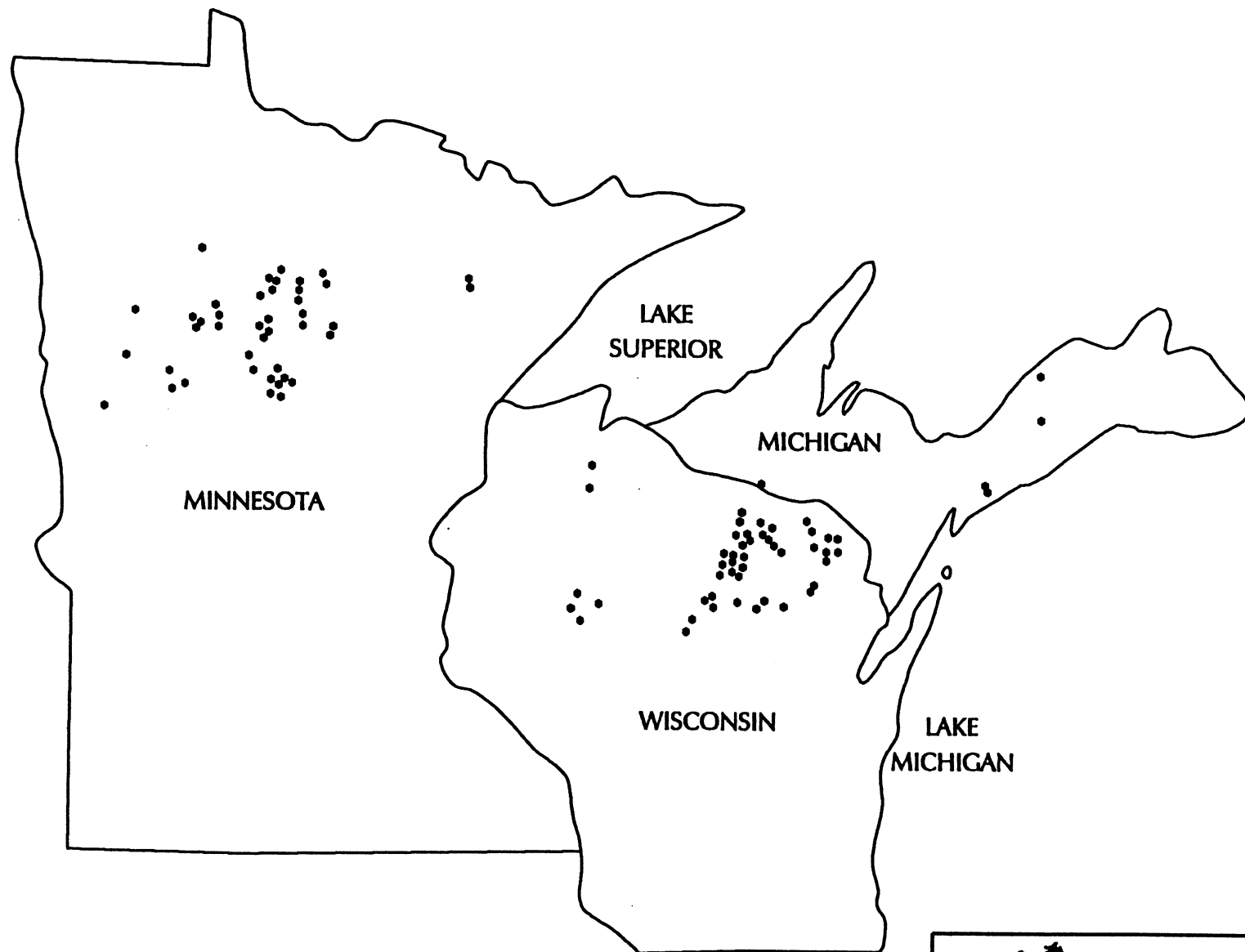


Crandon Mining Company

FIGURE 1
BOTRYCHIUM MORMO

Scale: NO SCALE Date: SEPTEMBER, 1996
Prepared By: Foth & Van Dyke By: JRB2

3.9-7-10



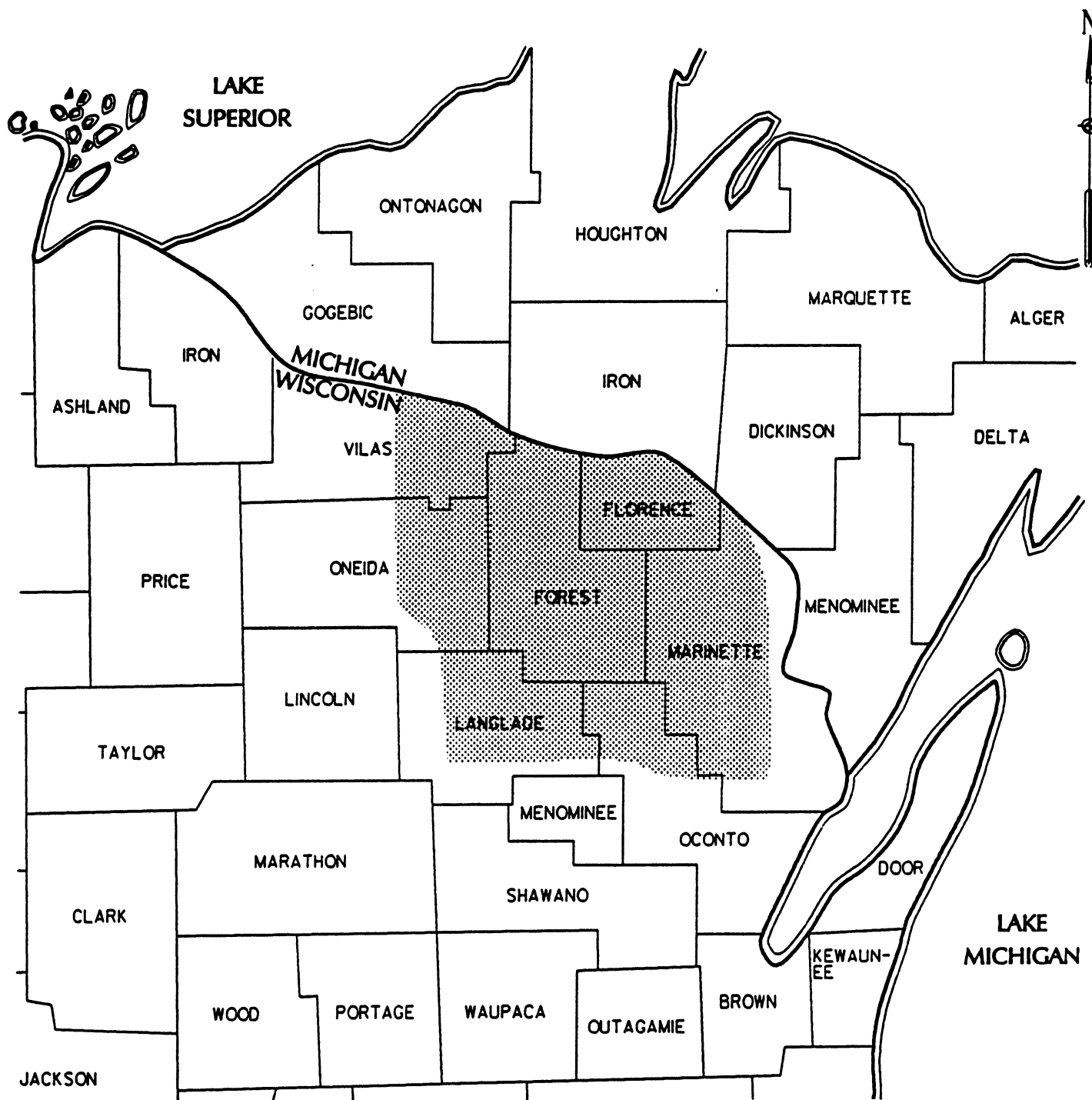
SOURCE: WDNR

Foth & Van Dyke			
REVISED	DATE	BY	DESCRIPTION
CHECKED BY:		JKS	DATE: SEPT.'96
APPROVED BY:		RFS	DATE: SEPT.'96
APPROVED BY:		GWS	DATE: SEPT.'96



FIGURE 2
LOCATIONS OF KNOWN COLONIES OF GOBLIN FERN
(BOTRYCHIUM MORMO)

Scale: NOT TO SCALE	Date: SEPTEMBER, 1996
Prepared By: Foth & Van Dyke	By: JR82



PRIMARY STUDY AREA

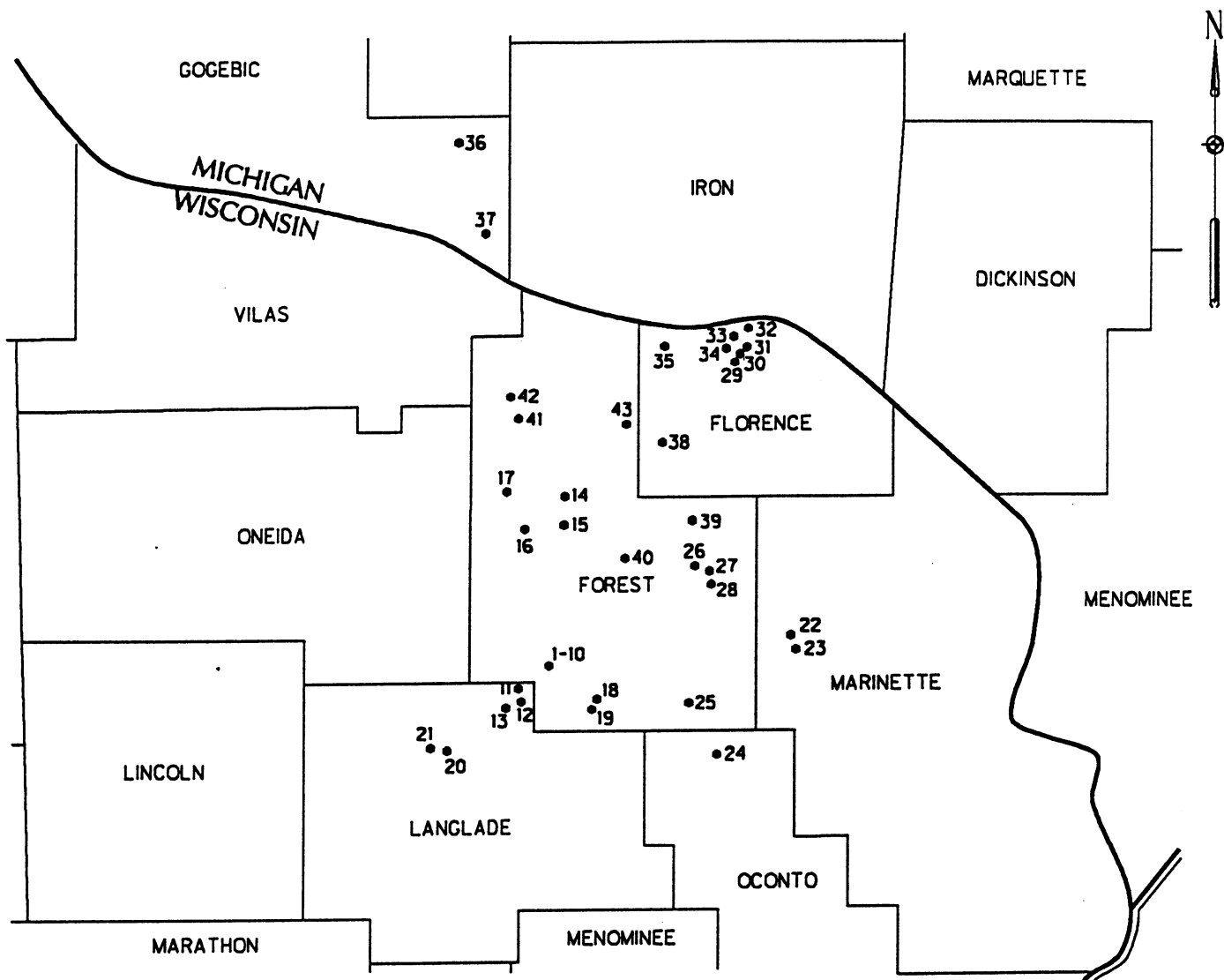
Foth & Van Dyke			
REVISED	DATE	BY	DESCRIPTION
CHECKED BY:		JKS	DATE: SEPT. '96
APPROVED BY:		RFS	DATE: SEPT. '96
APPROVED BY:		GWS	DATE: SEPT. '96



Crandon Mining Company

FIGURE 3
PRIMARY STUDY AREA

Scale: 1" = ~30 MILES Date: SEPTEMBER, 1996
Prepared By: Foth & Van Dyke By: JR82



NOTE: THE NUMBERS SHOWN ON THIS FIGURE REPRESENT THE FOLLOWING SITES:

1-10 - 1994-01, 1994-02, 1994-03, 1994-04, 1994-05, 1994-06, 1994-07, 1994-08, 1994-10, 1994-11.

11 - 1994-09A

12 - 1994-09C, 1994-09D, 950824E, 950824F

13 - 950824A, 950824B, 950824C, 950824D

14 - 950829B

15 - 1994-12

16 - 1994-13

17 - 1994-14

18 - 950803C

19 - 950810A

20 - 950805A

21 - 950902A

22 - 950808B

23 - 950808C

24 - 950809A

25 - 950810C

26 - 950811C

27 - 950811D

28 - 950811A

29 - 950814B

30 - 950831A

31 - 950831B

32 - 950831C

33 - 950830F

34 - 950830D

35 - 950814D*

36 - 950816A*

37 - 950823B

38 - 950822F

39 - 950824C

40 - 950824I

41 - 950825A

42 - 950825B

43 - 950822A

* - SITE IDENTIFIED APART FROM CMC WORK.

Foth & Van Dyke			
REVISED	DATE	BY	DESCRIPTION
CHECKED BY:		JKS	DATE: SEPT. '96
APPROVED BY:		RFS	DATE: SEPT. '96
APPROVED BY:		GWS	DATE: SEPT. '96

 Crandon Mining Company	
FIGURE 4 LOCATION OF OBSERVED BOTRYCHIUM MORMO	
Scale: 1" = ~18 MILES	Date: SEPTEMBER, 1996
Prepared By: Foth & Van Dyke	By: JRB2

Appendix 3.10-1

Relevant Technical Memoranda and Regulatory Agency Correspondence

DATE: September 15, 1994

FILE REF: 1600

TO: Bill Tans- EA/6

FROM: Dave Siebert- EA/6 *DS*

SUBJECT: Crandon Mine Proposal- Wetland delineation verification

On September 8, 1994, you, Tom Portle (SW/3), and I accompanied Dave Ballman of the Corps of Engineers on a site visit to look at recent delineation work done by Foth and Van Dyke. Ron Steg, from Foth and Van Dyke, led the tour to the delineation sites. The purpose of the visit was for the Corps to review the delineation work and to "verify" its accuracy.

It is my understanding that in the early 80's wetlands on and near the site were delineated and mapped. WDNR staff field evaluated the determinations and were satisfied with the mapped boundaries. Since that time, the federal government has adopted formal manuals for delineation of jurisdictional wetlands (the 1987 Corps Manual is the one in use now). As such, Dave Ballman requested that the mining company re-delineate the wetlands using the latest methodology.

The Corps and Crandon Mining Co. came to an agreement that rather than re-delineate all the wetlands, they would do the work for a representative subset of wetlands first. Foth and Van Dyke selected 5 wetland areas (shown on the attached map), representing approximately 25% of the total wetland acreage to be affected by the proposed project, and proceeded to flag the boundaries.

The next step will be to survey in the boundaries and overlay that data with the original delineation work. Based on the results of that exercise, the Corps will decide whether the delineation under the 87 Manual is close to the previous work, whether the "error" observed should be applied to the total acreage figures for the project (i.e. if the total acreage now delineated is greater than the previous work by 5%, then add 5% to the total acres originally proposed to be affected), or whether future delineation work will be necessary. It is my opinion that this approach seems reasonable.

During the site visit, we looked at boundary flagging for wetlands F64, F65, M3, #5, and P2. Based on the site visit, it is my opinion that the delineation work was acceptable. There were a few areas, for example F65, where the wetland area contained numerous small "islands" of upland. To be conservative and to avoid the need to flag and survey "out" the upland islands, Foth and Van Dyke included these areas within the wetland boundary.

The delineation work for these 5 sites was technically sound. I look forward to reviewing the overlay mapping to compare this delineation work with that done in the early 80's.

Attachment

cc: Don Moe- Crandon Mining Co.
Dave Ballman- COE- St. Paul



Crandon Mining Company

January 9, 1995

7 N. BROWN ST., 3RD FLOOR
RHINELANDER, WI 54501-3161

Dave Siebert
Wisconsin Department of Natural Resources
101 South Webster Street
P.O. Box 7921
Madison, WI 53707-7921

Dear Mr. Siebert:

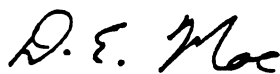
RE: Crandon Project - Wetland Mapping

This is a follow-up to the November 11, 1994 letter regarding a previously unmapped wetland in the southeast quarter of the northeast quarter of Section 25, T35N, R12E. A wetland assessment was conducted at that location by Ron Steg of Foth & Van Dyke on November 17, 1994. An area of 0.26 acres of wetland was delineated according to the guidelines in the 1987 *Corps of Engineers Wetland Delineation Manual*. This wetland is located in an opening in an aspen stand upgradient and parallel to an old logging road likely constructed approximately 10 to 15 years ago. The vegetation is dominated by wool grass (*Scirpus cyperinus*) and Canada blue joint grass (*Calamagrostis canadensis*). This small transitional wetland is located in a natural swale with mineral soils underlain by a layer of tight clay below a depth of approximately 12 to 18 inches. The old logging road appears to have impeded the natural flow through this swale resulting in slightly more moisture than may have previously existed at this site prior to logging the area.

The location and delineation of the 0.26 acre wetland in relation to other nearby project delineated wetlands is shown on Figure 1. The 0.26 acre wetland is referred to as wetland 22 on the figure. Wetland field data sheets are provided in Attachment 1. Wetland 22 will be included in all future Crandon Mining Company wetland mapping, and will be considered in the Crandon Project environmental review process.

Please feel free to call me at (715) 365-1450 or Mr. Steg at (414) 497-2500 if you have any questions or comments.

Sincerely,



Don Moe
Technical/Permitting Manager

DM:jcp

Attachment

cc w/attach.:

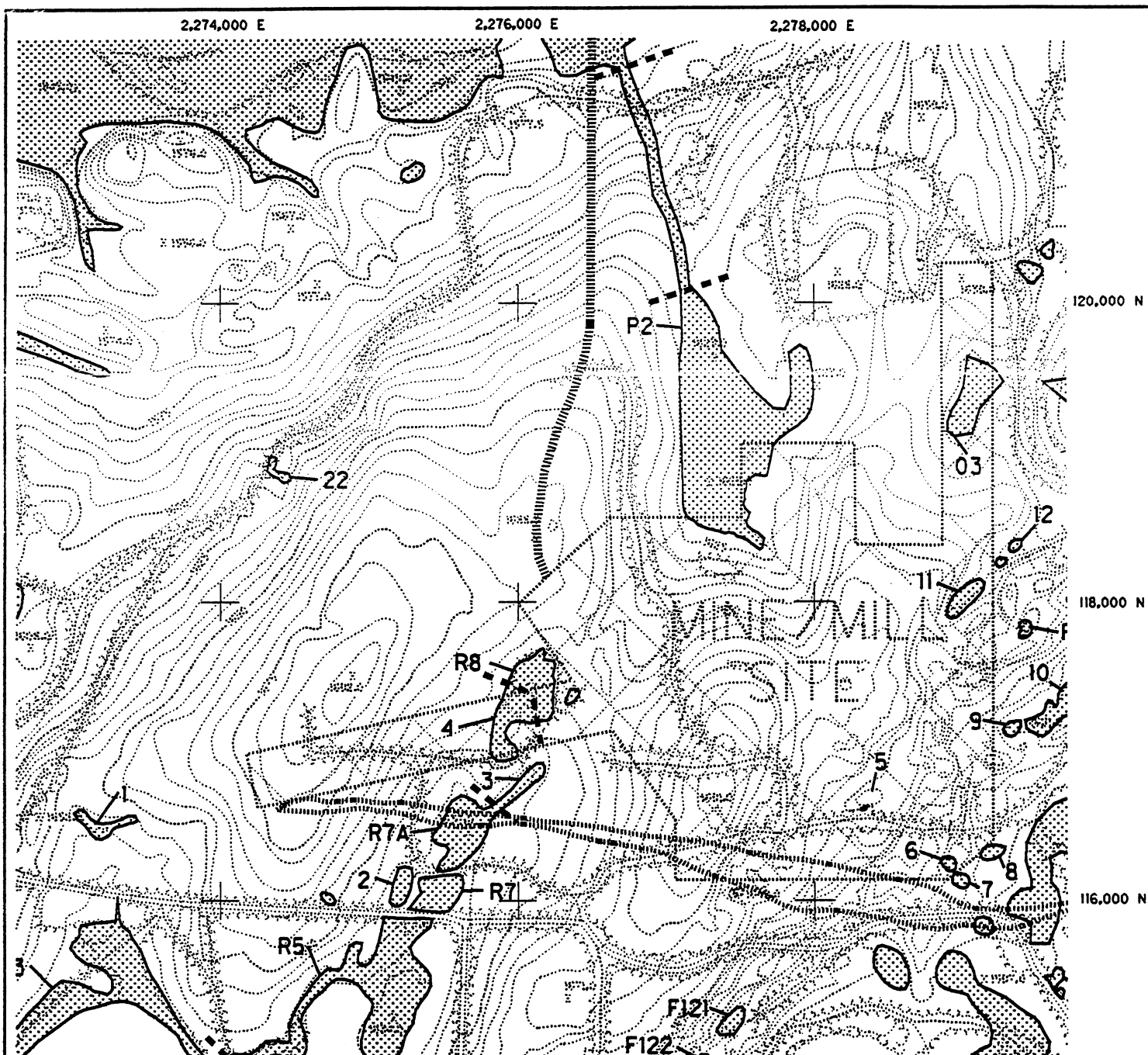
Bill Tans, WDNR
Archie Wilson, WDNR
Larry Lynch, WDNR
Robert Jaeger, Bureau of Indian Affairs
Al Milham, Forest County Potawatomi
Arlyn Ackley, Sokaogon Chippewa Community
Glen Miller, Menominee Indian Tribe of Wisconsin
M. Catherine Condon, Greene, Meyer & McElroy
David Kee, USEPA-Air Division (A18J)
David Ballman, USCOE
Jerry Sevic, Foth & Van Dyke
Tim Weyenberg, Foth & Van Dyke
Garret Hollands, Fugro-McClelland

RHINELANDER BUSINESS OFFICE
7 N. BROWN ST., 3RD FLOOR
RHINELANDER, WI 54501-3161
TEL.: (715) 365-1450 FAX: (715) 365-1457



3.10-1-2

CRANDON FIELD OFFICE
P.O. BOX 336 104 W. MADISON
CRANDON, WI 54520-0336
TEL.: (715) 478-3393 FAX: (715) 478-3641



LEGEND

P2 WETLAND IDENTIFICATION

--- WETLAND DIVIDER

WETLANDS MAPPING BASED ON NORMANDEAU ASSOCIATES, INC. AND INTERDISCIPLINARY ENVIRONMENTAL PLANNING, INC., 1982 AND INTERDISCIPLINARY ENVIRONMENTAL PLANNING, INC., 1983

NOTES:

1. APPROXIMATE SITE AREA: PART OF SECTION 25 T35N, R12E, TOWN OF NASHVILLE AND PART OF SECTIONS 29, 30 AND 32, T35N, R12E, TOWN OF LINCOLN, FOREST COUNTY, WISCONSIN.
2. TOPOGRAPHIC BASE MAP DIGITIZED FROM 1" = 1000' SCALE, 5' CONTOUR INTERVAL MAP PREPARED BY AERO-METRIC ENGINEERING, INC., SHEBOYGAN, WISCONSIN, DATE OF PHOTOGRAPHY APRIL 28, 1976.
3. HORIZONTAL DATUM BASED ON WISCONSIN STATE PLANE COORDINATE SYSTEM - NORTH ZONE.
4. VERTICAL DATUM BASED ON MEAN SEA LEVEL DATUM. CONTOUR INTERVAL IS FIVE FEET.
5. COUNTY AND TOWNSHIP LINES DIGITIZED FROM 7.5' SERIES USGS MAPS.



Foth & Van Dyke

REVISED	DATE	BY	DESCRIPTION
CHECKED BY:		JKS	DATE: JAN.'95
APPROVED BY:		RFS	DATE: JAN.'95
APPROVED BY:		GWS	DATE: JAN.'95



Crandon Mining Company

**FIGURE 1
WETLAND MAP**

Scale: 1" = 1000'	Date: DEC. 1994
Prepared By: Foth & Van Dyke	By: JRB

Attachment 1
Wetland Field Data Sheets

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Project Site	Date: 11/17/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg	State: WI
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Wetland ID: 22
Is the site significantly disturbed (Atypical Situation)? Yes ☐ No ☒	Transect ID:
Is the area a potential Problem Area? Yes ☐ No ☒ (If needed, explain on reverse.)	Plot ID: 1C

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Rubus trigosus</i>	herb	FACW-	9.		
2. <i>R. allegheniensis</i>	herb	FACU+	10.		
3. <i>Populus balsamifera</i>	tree	FACW	11.		
4. <i>Betula papyrifera</i>	tree	FACU+	12.		
5. <i>Abies balsamea</i>	tree	FACW	13.		
6. <i>Tilia americana</i>	tree	FACU	14.		
7.			15.		
8.			16.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). < 50% * = dominant species					
Remarks:					

HYDROLOGY

Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: ☐ Water Stained/Silt Covered Leaves ☐ Drift Lines ☐ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☐ Exposed Roots ☐ Periodically Flooded Channels/Depressions
Field Observations: Depth of Surface Water <u>NA</u> (in.) Depth of Free Water in Pit <u>NA</u> (in.) Depth of Saturated Soil <u>NA</u> (in.)	
Remarks: no indicators	

Map Unit Name * (Series and Phase):	Drainage Class: * Field Observations Confirm Mapped Type? Yes No															
Profile Description: <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Depth (inches)</th> <th style="text-align: center;">Matrix Color (Munsel Notation)</th> <th style="text-align: center;">Mottle Colors (Munsel Notation)</th> <th style="text-align: center;">Mottle Abundance</th> <th style="text-align: center;">Soil Texture/ Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0-4"</td> <td style="text-align: center;">10 YR 2/3</td> <td></td> <td style="text-align: center;">None</td> <td style="text-align: center;">Loam</td> </tr> <tr> <td style="text-align: center;">4-18"</td> <td style="text-align: center;">10 YR 4/3</td> <td></td> <td style="text-align: center;">None</td> <td style="text-align: center;">Sand</td> </tr> </tbody> </table>		Depth (inches)	Matrix Color (Munsel Notation)	Mottle Colors (Munsel Notation)	Mottle Abundance	Soil Texture/ Type	0-4"	10 YR 2/3		None	Loam	4-18"	10 YR 4/3		None	Sand
Depth (inches)	Matrix Color (Munsel Notation)	Mottle Colors (Munsel Notation)	Mottle Abundance	Soil Texture/ Type												
0-4"	10 YR 2/3		None	Loam												
4-18"	10 YR 4/3		None	Sand												
Hydric Soil Indicators: <table style="width: 100%; border-collapse: collapse;"> <tr> <td>☐ Histosol</td> <td>☐ Concretions</td> </tr> <tr> <td>☐ Histic Epipedon</td> <td>☐ High Organic Content in Surface Layer in Sandy Soil</td> </tr> <tr> <td>☐ Sulfidic Odor</td> <td>☐ Organic Streaking in Sandy Soil</td> </tr> <tr> <td>☐ Aquic Moisture Regime</td> <td>☐ Listed on Local Hydric Soils List</td> </tr> <tr> <td>☐ Reducing Conditions</td> <td>☐ Listed on National Hydric Soils List</td> </tr> <tr> <td>☐ Gleyed or Low Chroma</td> <td>☐ Other (Explain in Remarks)</td> </tr> </table>		☐ Histosol	☐ Concretions	☐ Histic Epipedon	☐ High Organic Content in Surface Layer in Sandy Soil	☐ Sulfidic Odor	☐ Organic Streaking in Sandy Soil	☐ Aquic Moisture Regime	☐ Listed on Local Hydric Soils List	☐ Reducing Conditions	☐ Listed on National Hydric Soils List	☐ Gleyed or Low Chroma	☐ Other (Explain in Remarks)			
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☐ Reducing Conditions	☐ Listed on National Hydric Soils List															
☐ Gleyed or Low Chroma	☐ Other (Explain in Remarks)															
Remarks: bright soil, sandy, no hydric indicators																

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes No Wetland Hydrology Present? Yes No Hydric Soils Present? Yes No	Is this Sampling Point Within a Wetland? Yes No
Remarks:	

* Forest County soil survey not complete.

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Project Site	Date: 11/17/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg	State: WI
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Wetland ID: 22
Is the site significantly disturbed (Atypical Situation)? Yes ☐ No ☒	Transect ID:
Is the area a potential Problem Area? Yes ☐ No ☒ (If needed, explain on reverse.)	Plot ID: 1B

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Rubus trigosus</i>	herb	FACW-	9.		
2. <i>Lycopodium obscurum</i>	herb	FACU	10.		
3. <i>Acer saccharum</i>	tree	FACU	11.		
4. <i>Rubus allegheniensis</i>	herb	FACU+	12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). < 25% * = dominant species					
Remarks:					

HYDROLOGY

_____ Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: ☐ Water Stained/Silt Covered Leaves ☐ Drift Lines ☐ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☐ Exposed Roots ☐ Periodically Flooded Channels/Depressions
Field Observations: Depth of Surface Water <u>NA</u> (in.) Depth of Free Water in Pit <u>NA</u> (in.) Depth of Saturated Soil <u>NA</u> (in.)	
Remarks: sloping topography, no hydrology indicators	

Map Unit Name * (Series and Phase):	Drainage Class: * Field Observations Confirm Mapped Type? Yes No															
Profile Description: <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Depth (inches)</th> <th style="text-align: center;">Matrix Color (Munsel Notation)</th> <th style="text-align: center;">Mottle Colors (Munsel Notation)</th> <th style="text-align: center;">Mottle Abundance</th> <th style="text-align: center;">Soil Texture/ Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0-4"</td> <td style="text-align: center;">10 YR 2/3</td> <td></td> <td style="text-align: center;">None</td> <td style="text-align: center;">Loam</td> </tr> <tr> <td style="text-align: center;">4-18"</td> <td style="text-align: center;">10 YR 4/3</td> <td></td> <td style="text-align: center;">None</td> <td style="text-align: center;">Sand</td> </tr> </tbody> </table>		Depth (inches)	Matrix Color (Munsel Notation)	Mottle Colors (Munsel Notation)	Mottle Abundance	Soil Texture/ Type	0-4"	10 YR 2/3		None	Loam	4-18"	10 YR 4/3		None	Sand
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0-4"	10 YR 2/3		None	Loam												
4-18"	10 YR 4/3		None	Sand												
Hydric Soil Indicators: <table style="width: 100%;"> <tr> <td>☐ Histosol</td> <td>☐ Concretions</td> </tr> <tr> <td>☐ Histic Epipedon</td> <td>☐ High Organic Content in Surface Layer in Sandy Soil</td> </tr> <tr> <td>☐ Sulfidic Odor</td> <td>☐ Organic Streaking in Sandy Soil</td> </tr> <tr> <td>☐ Aquic Moisture Regime</td> <td>☐ Listed on Local Hydric Soils List</td> </tr> <tr> <td>☐ Reducing Conditions</td> <td>☐ Listed on National Hydric Soils List</td> </tr> <tr> <td>☐ Gleyed or Low Chroma</td> <td>☐ Other (Explain in Remarks)</td> </tr> </table>		☐ Histosol	☐ Concretions	☐ Histic Epipedon	☐ High Organic Content in Surface Layer in Sandy Soil	☐ Sulfidic Odor	☐ Organic Streaking in Sandy Soil	☐ Aquic Moisture Regime	☐ Listed on Local Hydric Soils List	☐ Reducing Conditions	☐ Listed on National Hydric Soils List	☐ Gleyed or Low Chroma	☐ Other (Explain in Remarks)			
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☐ Aquic Moisture Regime	☐ Listed on Local Hydric Soils List															
☐ Reducing Conditions	☐ Listed on National Hydric Soils List															
☐ Gleyed or Low Chroma	☐ Other (Explain in Remarks)															
Remarks: no hydric indicators																

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes <u>No</u> Wetland Hydrology Present? Yes <u>No</u> Hydric Soils Present? Yes <u>No</u>	Is this Sampling Point Within a Wetland? Yes <u>No</u>
Remarks: marginal, transitional, disturbed	

* Forest County soil survey not complete.

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Project Site	Date: 11/17/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg	State: WI

Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Wetland ID: 22
Is the site significantly disturbed (Atypical Situation)? Yes ☐ No ☒	Transect ID:
Is the area a potential Problem Area? Yes ☐ No ☒ (If needed, explain on reverse.)	Plot ID: 1A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Scirpus cyperinus</i> *	herb	OBL	9.		
2. <i>Calamagrostis canadensis</i> *	herb	OBC	10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). 100% * = dominant species

Remarks: small area of wetland vegetation within an opening in young aspen stand

HYDROLOGY

Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: ☐ Water Stained/Silt Covered Leaves ☐ Drift Lines ☐ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☐ Exposed Roots ☒ Periodically Flooded Channels/Depressions
Field Observations: Depth of Surface Water <u>2</u> (in.) Depth of Free Water in Pit <u> </u> (in.) Depth of Saturated Soil <u> </u> (in.)	
Remarks: old logging road appears to have impeded flow through natural drainage swale	

Map Unit Name * (Series and Phase):	Drainage Class: * Field Observations Confirm Mapped Type? Yes No
---	--

Profile Description:				
Depth (inches)	Matrix Color (Munsel Notation)	Mottle Colors (Munsel Notation)	Mottle Abundance	Soil Texture/ Type
0-4"	10 YR 3/3		None	Sandy Loam
4-12"	10 YR 4/3	10 YR 6/6	Minor	Loam
12-18"	10 YR 5/1	10 YR 6/6	Moderate	Stiff Clay

Hydric Soil Indicators:	
☐ Histosol ☐ Histic Epipedon ☐ Sulfidic Odor ☐ Aquic Moisture Regime ☐ Reducing Conditions ☒ Gleyed or Low Chroma	☐ Concretions ☐ High Organic Content in Surface Layer in Sandy Soil ☐ Organic Streaking in Sandy Soil ☐ Listed on Local Hydric Soils List ☐ Listed on National Hydric Soils List ☐ Other (Explain in Remarks)

Remarks:	area appears to be underlain by a stiff clay at a depth of ≈ 12-18 inches
-----------------	---

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes No Wetland Hydrology Present? ☒ Yes No Hydric Soils Present? ☒ Yes No	Is this Sampling Point Within a Wetland? ☒ Yes No
Remarks: very small, marginal, disturbed site	

* Forest County soil survey not complete.

Appendix 3.10-2

Description of Wetland Functional Models

PREFACE

The information presented in this appendix addresses the specific assumptions that were used by the investigators to arrive at the various element weights and condition weights illustrated on Table E-1 through E-10. The precedence for assigning numerical wetland element values to assess wetland functions was established by Golet and Larson (1974) and expanded by Reppert et al. (1979). These authors followed established environmental planning principles such as those put forth by McHarg (1969). This approach has been used in numerous Environmental Impact Statements for state and Federal agencies.

The models apply to all wetlands, with only one exception. The Shoreline Protection function model (Table E-5) only applies to those wetlands which border on a lake or stream. Many wetlands in the study area do not border on a lake or stream and have no shoreline protection function.

DESCRIPTION OF WETLAND FUNCTIONAL MODELS

1.0 BIOLOGICAL FUNCTION MODEL

The Biological Function Model was based on the wildlife habitat models developed by Fried (1973) and Golet and Larson (1974) and has been modified to address the specific considerations presented under "Biological Functions" in NR 132.06 of the Wisconsin Administrative Code (Table E-1). The elements that comprise this model were selected to evaluate those wetland features known to determine "the kinds, numbers and relative abundance" of animal species, "wildlife production and use", "short- and long-term importance of the wetlands to both aquatic and terrestrial species" and "specialized wetland functions essential for an organism to complete its life cycle requirements such as cover, spawning, feeding and the like." In general, life form (growth form or habit) and arrangement of the vegetation were the most important considerations in this model. Classical works by MacArthur and MacArthur (1961) and Weller and Spatcher (1965) have demonstrated the key role of vegetation in determining wildlife production and variety. Porter (1981) recognized the key role that the wetland-upland transition zone played in wildlife habitat.

Vegetative density was used as an expression of biomass, which served as an indicator of "net primary production of plant communities." Pratt and Andrews (1981) indicated that wetlands are naturally very productive habitats often nutrient sinks, and that their biomass represents a large potential energy source. Other elements were less directly used; surface water connection, for example, was an indicator of the "kinds and amount of organic material transported to other aquatic systems as a potential energy

Table E-1. Biological Function Model.

Elements	Element Weight	Condition Weight	Conditions
Unique Fisheries ^a	NA ^b	NA	Present
		NA	Not Present
Presence of Endangered or Threatened Species ^a	NA	NA	Present
		NA	Not Present
Dominant Wetland Class	5	1	Stream or brookside wetland
		0	Open fresh water
		4	Deep fresh marsh (aquatic bed)
		5	Shallow fresh marsh
		5	Yearly flooded floodplain
		2	Wet meadow
		4	Shrub swamp
		2	Wooded swamp (deciduous)
		4	Wooded swamp (coniferous)
		3	Bog
Number of Wetland Classes (Richness)	4	5	>5
		4	4
		3	3
		2	2
		1	1
Number of Wetland Subclasses (Richness)	3	5	>10
		4	6-9
		3	4-5
		2	2-3
		1	1
Vegetative Interspersion	4	3	High
		2	Moderate
		1	Low

^a = Preemptive Factors^b = Not applicable

Table E-1. (continued)

Elements	Element Weight	Condition Weight	Conditions
Surrounding Habitat	3	3	>90% of two or more of listed types
		2	50-90% of one or more: 90% of one
		1	<50% of one ore more of listed
Water/Cover Ratio (Cover Typed)	3	4	26-75% scattered
		2	26-75% peripheral
		3	75% or <25% scattered
		1	100% cover: >75% or <25% peripheral
Number of Plant Species (Vegetative Species Richness)	2	1	Low
		2	Medium
		3	High
Proportion of Wildlife Food Plants	1	1	Low
		2	Moderate
		3	High
Vegetative Density	2	3	High
		2	Moderate
		1	Low
Wetland Juxtaposition	3	3	Highly favorable
		2	Moderately favorable
		0	Unfavorable
Hydrological Position (Groundwater Connection)	2	1	Perched wetland
		4	Water table wetland
		3	Water table/artesian wetland
		3	Artesian wetland
Water Level Fluctuation	1	2	Low
		1	Vernal pool
		0	High

Table E-1. (continued)

Elements	Element Weight	Condition Weight	Conditions
Surface Water Connection	1	1	Connected to a small stream
		2	Connected to a river
		3	Connected to a lake
		4	Connected to a combination
		0	Not connected
Percent Wetland Bordering on Open Water	4	1	<33%
		2	34-66%
		3	67-100%
		0	Does not border
Size	5	3	Large $\geq$ 4.6 acres
		2	Medium 1.1-4.5 acres
		<u>1</u>	Small $\leq$ 1.0 acres
		Range 29-158	
		Mean	93

source for consumer organisms in those systems." In aggregate, the elements of this model constituted an evaluation system designed to assess the maximum potential of a wetland for biological production and variety. Each of these elements is described in Table E-1.

1.1 PREEMPTIVE FACTORS

Wetlands bordering a water body that supports unique commercial or recreational fisheries, or which provide habitat for or are frequented by threatened or endangered species were immediately identified for more thorough analysis.

1.2 DOMINANT WETLAND CLASS

As a result of the important role vegetation life form plays in determining wildlife habitat value, Dominant Wetland Class was accorded a weighting of five. Some wetland classes have a higher value than others for wildlife species diversity and production rate because of the differences in vegetative life form and water depth and permanence. Shallow marsh, for example, was one of the most valuable classes because of the habitat provided for nesting birds and various mammals, particularly muskrats. This class was also assigned a value of five. Yearly flooded floodplain was also a very valuable class because of its importance as nesting habitat for many wetland animals, particularly waterfowl, and from its importance as a waterfowl feeding area during migration. This class was also assigned a value of five. A steep-sided stream or brookside wetland, on the other hand was one of the least valuable classes because of the poor development of wetland

functions essential for an organism to complete its life cycle requirements; therefore, this class was assigned a value of one. The weights assigned to the remaining classes in this element are presented in Table E-1.

1.3 NUMBER OF WETLAND CLASSES (RICHNESS)

As the number of wetland classes increases so does the variety of plant life forms which, in turn, increases the potential for wildlife species diversity (Weller and Spatcher, 1965). This was one of the most important wetland features in determining kinds, numbers and relative abundances of wildlife species, and wildlife production and use; therefore, this element was assigned a weight of four. The weight assigned to the condition increased or decreased depending on the number of wetland classes comprising the wetland (Table E-1).

1.4 NUMBER OF WETLAND SUBCLASSES (RICHNESS)

This element was a refinement of "Number of Wetland Classes" in assessing the potential for wildlife species diversity. As the number of subclasses increases so do those features important in the life cycles of many wildlife species, such as cover and food, which increases the kinds and numbers of wildlife that can be supported in an area. Differences among subclasses are probably less important than differences among classes with respect to increases in wildlife habitat variety (Golet and Larson, 1974); therefore this element was assigned a weight of three. The weight assigned to the condition increased or decreased depending on the number of subclasses present (Table E-1).

1.5 VEGETATIVE INTERSPERSION

As stated above, wildlife density and species diversity are primarily a function of vegetative life form variety and arrangement. Since most species of wildlife require more than one life form of vegetation, wildlife population density and species diversity were closely related to the length and number of different kinds of edge. As vegetative interspersation increases, wildlife production and use, and overall biological production improves. Because of its importance in the model, this element was accorded a weight of 4. The conditions were weighted on a descending scale from high to low (Table E-1).

1.6 SURROUNDING HABITAT

The habitat surrounding a wetland is an important factor affecting its wildlife production since the life cycle requirement of many species is satisfied partly in wetlands and partly in uplands. Many waterfowl and other wildlife depend upon surroundings such as hay fields, corn, and oak forests for food and nesting cover. The nature of the surrounding habitat also determines which upland wildlife are likely to utilize the wetland. Marshes, for example, provide cover for pheasants and cottontail rabbits. Uplands also provide a buffer against human disturbance, a frequent deterrent to successful breeding, and wetlands bordered by agriculture, forest land and abandoned open land have a higher wildlife support capacity than those surrounded by industry, housing or outdoor recreation. Based on its role in determining the importance of a wetland to both aquatic and terrestrial species this element was assigned a weight of 3. The listed types in the three conditions refer to agriculture, forest land and abandoned open land (Table E-1).

1.7 WATER/COVER RATIO (COVER TYPE)

The relative proportion of vegetative cover and open water in a wetland is a very important factor affecting the kinds, numbers and relative abundance of wildlife species. Investigators have found that maximum numbers and species diversity of wetland wildlife occurred where a water/cover ratio of 50:50 was attained (Weller and Spatcher, 1965). Wetlands having nearly total cover or total open water were less valuable than wetlands with nearly equal proportions of each. The degree of water/cover interspersion was also an important factor affecting value. Scattered cover, or cover interspersed with water was a more valuable condition than peripheral cover or water because of the greater edge which results (Delacour, 1964). Based on its role in determining wildlife production and use, this element was assigned a weight of 3. The weight assigned to the condition was related to both the ratio of cover to open water and the degree of interspersion (Table E-1).

1.8 PLANT SPECIES VARIETY

As the number of different plant species in a wetland increases, so also does the species diversity of invertebrate fauna supported by the vegetation. This is directly related to the food available to certain wildlife species and life stages, and is therefore an indicator of wildlife production. Also, some wildlife, including certain waterfowl, tend to be plant species specific with regard to placement of nests (Delacour, 1964) or in selection of plant foods. Thus, although life form plays a more important role in wildlife production and use of a wetland, plant species variety is also a contributing factor. As plant species variety increases

the potential of the wetland to provide specialized functions essential for some wildlife to complete their life cycle requirements also improves. Because of its secondary role in determining wildlife production and use, this element was assigned a weight of 2. The condition (high, medium, low) was chosen using best professional judgement, based on comparing the kinds of plant species inventoried in a unit area of a given wetland to those found in the same unit areas of other wetlands in the study area (Table E-1).

1.9 PROPORTION OF WILDLIFE FOOD PLANTS

This element is a direct indicator of wildlife production and use, and of the degree of expression of those wetland functions which are essential for wildlife to fulfill their feeding requirements. Some plant species provide food for only a short time, but this is often during critical periods in wildlife cycles such as during annual migrations or before the onset of winter. Other plant species produce structures that supply food over winter. Both kinds of food production along with other factors, such as quantity produced, were considered in the analysis of plant food availability. Since vegetative structure plays a greater role in wildlife production and use than do the edible parts of plants, this element was assigned a weight of 1. It was included, however, to distinguish wetlands in which plant food production was particularly high so that when it occurred the contribution of such a condition to the overall assessment could be added. The condition (high, medium, low) was chosen following the field inventory, and was based on the food value of each species listed on the wetland inventory report (Martin et al., 1961) and its relative abundance (Table E-1).

1.10 VEGETATIVE DENSITY

Vegetative density is an expression of biomass or standing crop, which can serve as an index of net primary production of plant communities depending upon age of the wetland. During early wetland stages, such as shallow marsh and shrub swamp, high density is much more directly related to high primary production than in a mature wetland stage, such as wooded swamp. In the latter type, a large quantity of biomass may be represented in the vegetative structure while net annual primary production is very low. Moreover, in the younger stages a higher proportion of the primary production is in the form of edible structures that can be utilized by wildlife for food. However, in all stages, high plant density provides more breeding, resting and escape cover so that higher wildlife densities per unit area can be accommodated. Vegetative density, therefore, can serve both as an index of primary production and an indicator of potential numbers and relative abundance of wildlife species (Smith, 1980). Based on its contribution to the overall wildlife support value of a wetland, this element was assigned a weight of 2 (Table E-1).

1.11 WETLAND JUXTAPOSITION

Wildlife production and use in a wetland is generally higher if it is located near other wetlands, particularly those of a different class or with different subclasses. This value improves if the wetlands are connected by streams which provide cover and travelways to permit wetland wildlife to move safely between wetlands. This element becomes less important in large, diversified wetlands in which life cycle requirements

can be met without travelling to other wetlands. Based on its contribution to wildlife production and use, wetland juxtaposition was assigned a weighting of 3. The condition in which other wetlands were nearby and connected by streams was highly favorable and was accorded a weight of 3; if wetlands were nearby but not connected, the condition was moderately favorable and was given a weight of 2. Isolated wetlands received no value for wetland juxtaposition (Table E-1).

1.12 HYDROLOGIC POSITION (GROUND-WATER CONNECTION)

The position of a wetland with respect to ground water determines its longevity, water level fluctuation and nutrient level. Productivity rates of wetland plants are closely related to nutrient availability and abundance. Local aquifer (perched) wetlands have shorter longevity, lower nutrient levels, less diverse vegetation and greater water level fluctuation when compared with those connected to the main aquifer (Bay 1967). In wetlands connected to the main aquifer, water level is relatively constant and the abundance and availability of nutrients is higher because of ground water movement through the wetland soils. As a result, plant productivity rates are higher and wildlife production and use is greater. In general, main aquifer wetlands potentially have a greater short- and long-term importance to wildlife than local aquifer wetlands. In comparison with the contributions of other elements in the model, hydrologic position was assigned a weight of 2. The level of discrimination between water table/ artesian wetlands and artesian wetlands was not important with respect to those wetland functions relevant to wildlife cycles, and both were assigned a weight of 3 (Table E-1).

1.13 WATER LEVEL FLUCTUATION

The magnitude of water level fluctuation in a wetland has a direct effect on wildlife production and use. Wide fluctuations adversely affect a large variety of wildlife species. High water may destroy nests and young, and low water may expose the nests to predators. Although the contribution of this element to the model was considerably less than that of other elements (an assigned weight of 1), water level fluctuation was a consideration that affected the ability of a wetland to fulfill wildlife requirements and was part of the overall evaluation. Since low water fluctuation was the preferred condition it was assigned a weight of 2. Wetlands with a high water level fluctuation receive no rating for this element (Table E-1).

1.14 PERCENT OF WETLAND BORDERING OPEN WATER

The value of a wetland with respect to wildlife support is greater if associated with a stream, river or lake than if isolated. Open water provides habitat for waterfowl during migration and during the breeding season, as well as for other wildlife, such as otter and raccoons. The greater the percentage of wetland edge bordering open water, the higher the numbers and kinds of wildlife that will utilize the wetland. Because of the importance of this element in determining wildlife production and use, it was accorded a weight of 4. The weights assigned the conditions varied with the percent of wetland bordering open water (Table E-1).

1.15 SURFACE WATER CONNECTION

The kind of open water connected to a wetland influences wildlife production and use as well as the transport of organic material to other aquatic systems. Although some small streams, particularly those bordering marshes, may provide some habitat for waterfowl broods and other wildlife, the spectrum of aquatic and terrestrial wildlife which are able to fulfill certain life cycle requirements is greater in wetlands bordered by rivers and lakes. Thus, rivers, lakes and particularly combinations of riparian and lake habitats greatly improve wildlife production in the wetlands they border. In general, rivers are more important than small streams with respect to the transport of organic material because of the higher predictability of surface water flow during summer months. Overall however, the kind of surface water connection was less important than the percentage of bordering wetland edge; therefore, this element was assigned a weight of 1. The weight assigned to the conditions varied with the kind of water body and with combinations receiving the heaviest weighting (Table E-1).

"

1.16 SIZE

In general, as wetland size increases so does its value for wildlife production and use. Greater size results in greater insulation from human disturbance on the periphery. Also, habitat variety tends to improve with increased size, so that a large wetland would be more likely to fulfill all of a species life cycle requirements than a small wetland. Large wetlands are valuable as waterfowl feeding and resting areas during migration. Moreover, the factors which determine longevity such as permanence of the water table and watershed size were correlated with large

wetland size. As a result of the important role of this element in determining the kinds and numbers of wildlife supported by the wetland, it was accorded a weight of 5. The weight assigned to the condition was directly related to size (Table E-1).

2.0 WATERSHED FUNCTION MODELS

Watershed functions, as defined in proposed Wisconsin NR 132 consist of five separate functions; hydrologic support, ground-water, storm and floodwater storage, shoreline protection, and water quality maintenance functions. The following text describes the models for these functions.

2.1 HYDROLOGIC SUPPORT FUNCTION MODEL

Water resides in wetlands for a limited time; that is, some water is always passing through a wetland. Water leaves wetlands by evaporation-transpiration, recharge to the ground-water system or as surface water outflow to downstream areas (Winter, 1981a). The ability of a vegetative wetland to discharge surface water to downstream surface waterbodies, streams, lakes and other vegetated wetlands, is important in maintaining the chemical and physical integrity of downstream aquatic ecosystems.

The Hydrologic Support Function Model (Table E-2) is designed to assess the "Hydrologic Support Function" of a wetland defined in the Wisconsin Administrative Code, NR 132, by inventorying those physical elements which in combination allow a wetland to function so that it controls the quantity and quality of water that it discharges to downstream waterbodies. These physical elements defined in NR 132 include location, topographic position, areal extent (size), degree of connection, hydrologic regime, water chemistry, velocity, water depth, fluctuation patterns, water renewal rate and temporal pattern.

It is difficult to separate wetland functions into specific definitions. The functions ascribed to wetlands are highly interrelated. For

Table E-2. Hydrologic Support Function Model.

Elements	Element Weight	Condition Weight	Conditions
Size	4	3	Large $\geq$ 4.6 acres
		2	Moderate 1.1-4.5 acres
		1	Small $\leq$ 1.0 acres
Topographic Configuration	1	3	Semi-closed basin
		2	Valley
		1	Hillside
		0	Closed basin
Dominant Hydrologic Type	5	1	Condition 1
		2	Condition 2
		3	Condition 3
		4	Condition 4
		5	Condition 5
		0	Condition 6
Water Level Fluctuation	2	2	Low
		1	High
Outlet	4	2	Perennial Outlet
		1	Ephemeral Outlet
		1	Groundwater Outflow
		0	Absent
Inlet	1	2	Perennial
		1	Ephemeral
		0	Absent
Percent Wetland ^a Bordering on Open Water	4	1	<33%
		2	34-66%
		3	67-100%
		0	Does not border
		Range 6-66 ^b	
Mean 36			

^a Applies only to those wetlands with an outlet.

^b Total value for one inlet and one outlet only.

example, the hydrologic support function is closely related to the prevention of pollution and stormwater storage functions. In other words, these two wetland functions, in part, control the quantity and quality of water passed down stream. Thus, when assessing the hydrologic support function of a wetland, one must assess, in part, the wetland's stormwater storage and prevention of pollution function. Reppert et al. (1979) define a method to determine the hydrologic support functions of wetlands, but emphasize flushing rates as opposed to frequency of flooding. No consideration is given for base water flow maintenance.

According to NR 132 (Wisconsin Administrative Code), there is a correlation between specific wetland physical elements such as "location" and "topographic position" and a physical condition such as hydrologic "degree of connection". The hydrologic support function model includes those physical elements which give rise to a particular wetland functioning "to maintain the hydrologic characteristics, and thereby the physical and chemical integrity of an entire aquatic ecosystem." These elements are listed in the model (Table E-2).

2.1.1 Size

The size of a wetland was considered to be a critical element in the hydrological support function and was given a weight of 4. The larger a wetland, the more potential it has to contribute to the "hydrologic regime" of downstream receiving hydrologic systems. If all other inventory elements were equal between two wetlands except size, the larger wetland should better support the hydrological regime (Table E-2).

2.1.2 Topographic Configuration

Particular topographic wetland configurations dictate the "temporal pattern" or the "frequency of inundation" potential of a wetland. They also, in turn, control "water velocity" and the "ability of the water to carry suspended particulate matter." "Water depth, fluctuation patterns" and water "renewal rates" are also controlled in part by the topographic configuration. The topographic configuration, which slows the flow of water (reduces water velocity), and controls temporal patterns was considered most beneficial to the hydrologic support function of a wetland. This situation was defined as a semi-closed basin and it was given a condition weight of 3. Valleys and hillsides, respectively, were considered to be less beneficial. The element weight given to topographic configuration was low (1) since it was considered not to be as important as other elements (Table E-2).

2.1.3 Dominant Hydrologic Type

Dominant hydrologic type is used to describe the residence time of water in a wetland, travel time for a drop of water moving through a wetland. The more time a drop of water spends in the wetland, the greater its chance to interact with the physical elements of the wetland. This is a measure of the "living filter" function of a wetland which controls water chemistry to include "ionic composition" and "oxygen saturation." Each hydrologic type predicts potential water "velocity", "fluctuation patterns", "flooding" and "renewal rates". These factors control the quantity, quality and "temporal pattern" of water leaving the wetland. The conditions representative of the highest residence times were assumed to be the most valuable. Those reflecting low residence times were assumed to have low values (Table E-2).

2.1.4 Water Level Fluctuation

Water level fluctuation is a measure of the rise and fall of water in a wetland, its "frequency of inundation and its regularity or predictability." Wetlands with low water level fluctuations were assumed to be indicative of a complex set of wetland elements that control and regulate (smooth out) surface water flows. Wetlands with high water level fluctuations were assumed to be indicative of more extreme "flashy" and uneven surface water flows. Wetlands which exhibit the most control of water movement generally have small water level fluctuations and better store and release water. This maintains downstream base water flows, which, in turn, supports aquatic ecosystems (Table E-2).

2.1.5 Outflow

The outflow element was assigned a weight of 4 since it was critical to insuring that a wetland contributes to and supports other aquatic ecosystems. The greater the outflow, the more the wetland supports "renewal rates", "water depth", water chemistry and fluctuation patterns. Another important factor is that the outlet establishes the "degree of connection with other wetlands and water bodies." Perennial wetlands were given the highest condition weight (2) while ephemeral and groundwater (soil interflow) outlets were each given a weight of 1 (Table E-2).

2.1.6 Inflow

The type of inflowing water, whether perennial or ephemeral, determines, in part, the amount of water available for hydrologic support.

This element was considered to be less important than the outlet and was given an element weight of 2. Perennial inlets were weighted higher (2) than ephemeral ones (1) (Table E-2).

2.1.7 Wetland Shoreline as a Percent of Total Lake Shoreline
or Wetland Edge

The amount of contact or edge that a vegetative wetland has with a surface water body (pond, lake or stream) was assumed to be a critical element for the wetland to support the "hydrologic regime" of an aquatic ecosystem and was assigned an element weight of 4 (Table E-2). This percentage was determined by measuring the total length of lake or pond edge and then measuring the length of edge between the individual wetland and the lake or pond. For example, the length of the stream section passing through the wetland was compared with the total circumference of the wetland/upland boundary. Measurements were made using the orthophoto map (Scale: 1 inch = 400 feet) and the appropriate box was checked on the wetland inventory report.

2.2 GROUND-WATER FUNCTION MODEL

The ground-water function of a wetland may better be termed the "ground-water support function", since this function is directed towards a wetland's ability to recharge underlying aquifers. Wetlands in a recharge condition pass accumulated surface water and direct precipitation from the wetland soil downward into an aquifer. Many wetlands seasonally alternate between recharge and discharge. Even perched (local aquifer) wetlands may be partly recharging a deep underlying main aquifer by slow seepage. Winter (1981b) described the geohydrologic scientific uncertainties in estimating the water balance of lakes and wetlands. The potential for some ground-water recharge, however small, appears to be common to most wetlands. Thus, in developing the ground-water function model, it was assumed that all wetlands have some recharge potential and only those elements that enhance this potential were included in the model (Table E-3).

2.2.1 Surficial Geology

Surficial geology controls recharge and was assigned an element weight of 3. Those wetlands that occurred in till areas had the least potential for recharge since till was the most impermeable surficial geologic deposit in the study area. Stratified sand and gravel was the most permeable and thus offered the most recharge potential. Fine sand and gravel and alluvium had intermediate permeabilities and intermediate recharge potential. Condition weights were accordingly assigned (Table E-3).

Table E-3. Ground-water Function Model.

Elements	Element Weight	Condition Weight	Conditions
Surficial Geology	3	1	Till
		4	Stratified sand and gravel
		3	Stratified fine sand and silt
		2	Alluvium
Organic Material	2	3	Absent
		2	High permeability
		1	Low permeability
Hydrologic Position	5	2	Perched wetland
		4	Water table wetland
		2	Water table/artesian wetland
		1	Artesian wetland
Transmissivity Aquifer	4	1	Low <10,000 gal/day/ft
		2	Mod. 10,000-40,000 gal/day/ft
		3	High >40,000 gal/day/ft
Inlet	1	1	Absent
		3	Perennial
		2	Ephemeral
Outlet	2	3	Absent
		2	Perennial
		1	Ephemeral
Size	3	3	Large $\leq$ 4.6 acres
		2	Medium 1.1-4.5 acres
		1	Small $\geq$ 1.0 acres
		Range 20-68 ^a	
		Mean 44	

^aTotal value for one inlet and one outlet only.
Some wetlands may have more than one inlet or outlet
but the range above is for wetlands with only one
inlet and one outlet.

2.2.2 Organic Material

Organic material has a low vertical permeability and retards movement of surface water from a wetland to the underlying groundwater system. Some organic materials have higher permeabilities than others and allow greater recharge. Wetlands with little organic material would have the greatest recharge potential since the organic material "liner" is reduced. The organic material inventory elements were weighted using these assumptions (Table E-3).

2.2.3 Hydrologic Position

The hydrologic position element was considered the best measure of a wetland's recharge potential and was given the highest element weight (5). A water table (main aquifer) wetland was considered to be the best hydrogeologic situation for recharge and was assigned a condition weight of 4. Perched (local aquifer) hydrogeologic situations had the potential for slow recharge and were given a weight of 2. Water table/artesian wetlands have some recharge potential but are more commonly discharge areas. They were given a weight of 2 while artesian wetlands are almost always in a discharge condition and were given a weight of 1 (Table E-3).

2.2.4 Transmissivity of Aquifer

The aquifer is the receptor of recharge and transmissivity is a measure of the value of an aquifer for water withdrawal, ground-water movement, and possible discharge to down-gradient aquatic ecosystems. It

is used to define the hydrologic characteristics of an associated aquifer. The larger the transmissivity of an aquifer the more valuable will be the recharge of overlying wetlands. Because of its importance to the aquifer this element was assigned a weight of 4 (Table E-3).

2.2.5 Inlet

The inlet characteristics define, in part, the amount of surface water flowing into a wetland which may recharge the underlying aquifer. Perennial inlet conditions were given a higher weight (3) than ephemeral (2) because of the continuous water flow into the wetland and the potential to recharge the aquifer. The inlet element was assigned a weight of 1 (Table E-3).

2.2.6 Outlet

The amount of water leaving a wetland could provide an estimate of the recharge function of a wetland. A wetland receiving inflowing surface water but having no outlet, forces water to leave the wetland by recharge or evapotranspiration. A wetland having a perennial outlet, is constantly losing potential recharge water and may also be indicative of a discharge wetland. Thus, the highest inventory condition weight (3) was assigned to wetlands with no outlet and the lowest (1) to wetlands having an ephemeral outlet (Table E-3).

2.2.7. Size

The size of a wetland can be used to measure its potential recharge value. When other conditions are held equal, the larger a wetland, the greater its recharge potential. Large wetlands were weighted 3, medium 2 and small 1 (Table E-3).

2.3 STORM AND FLOODWATER STORAGE FUNCTION MODEL

The value of wetlands for control of storm waters and prevention of downstream flooding has been recognized by numerous investigators (Coleman and Kline, 1977). Wetlands may contain many natural resources which intercept, retain, and detain inflowing storm waters so that the outflow hydrograph has less of a peak and a greater time of concentration than the inflow hydrograph. How wetlands function to control storm water is a complex topic (Novitzki, 1978; Larson, 1981; and Reppert, 1981). One concept is to treat a wetland simplistically as a designed flood control device and apply standard hydrologic engineering approaches to estimating the wetland's flood storage volume as has been practiced by the Department of Environmental Quality Engineering in Massachusetts. Another concept is to examine the wetland as a complex ecosystem and assess the various elements of that ecosystem as to their ability to store water and retard water flows during periods of flood or storm discharge (Coleman and Kline, 1977). To meet the criteria presented in NR 132 (Wisconsin Administrative Code) the latter concept was used and the following model (Table E-4) was developed.

2.3.1 Dominant Wetland Class

Wetland vegetation has the potential for reducing the energy of inflowing storm water and retaining water. Those wetland classes which have the highest potential for primary production were also assumed to have the highest stem density to reduce flood water energy and to remove water by evapotranspiration. The inventory conditions shallow fresh marsh, wooded swamp and shrub swamp were assumed to be high primary production

Table E-4. Storm and Flood Water Storage Function Model.

Elements	Element Weight	Condition Weight	Conditions
Dominant Wetland Class	2	1	Stream or brookside wetland
		1	Open fresh water
		2	Deep fresh marsh (aquatic bed)
		4	Shallow fresh marsh
		4	Yearly flooded floodplain
		3	Wet meadow
		5	Shrub swamp
		4	Wooded swamp
		3	Bog
Percent Open Water	2	3	0-33%
		2	34-66%
		1	67-95%
		0	96-100%
Vegetative Density	4	3	High
		2	Moderate
		1	Low
Topographic Configuration	2	4	Closed basin
		3	Semi-closed basin
		2	Valley
		1	Hillside
Topographic Position in Watershed	3	3	Upper
		2	Intermediate
		1	Lower
Surficial Material of Watershed	2	4	Till
		1	Stratified sand and gravel
		3	Stratified fine sand and silt
		2	Alluvium

Table E-4. (continued)

Elements	Element Weight	Condition Weight	Conditions
Surficial Geologic Materials of Wetland Banks	2	1	Till
		4	Stratified sand and gravel
		2	Stratified fine sand and silt
		3	Alluvium
Organic Material	1	2	High permeability
		1	Low permeability
		0	Absent
Dominant Hydrologic Type	5	1	Condition 1
		2	Condition 2
		3	Condition 3
		4	Condition 4
		5	Condition 5
		6	Condition 6
Hydrologic Connection	4	1	Not part of riparian system
		2	Part of riparian system
Water Level Fluctuation	3	2	High
		1	Low
Inlet	1	2	Perennial
		1	Ephemeral
		0	Absent
Outlet	1	1	Perennial
		2	Ephemeral
		0	Absent
Size	4	3	Large $\geq$ 4.6 acres
		2	Medium 1.1-4.5 acres
		1	Small $\leq$ 1.0 acres
		Range 29-123 ^a	
		Mean 76	

^aTotal value for one inlet and one outlet only.
Some wetlands may have more than one inlet or outlet but the range above is for wetlands with only one inlet and one outlet.

vegetative communities and were assigned high condition weights. This element was given a weight of 2. This element also was considered to be a measure of the substrates' texture (vegetative structure), the material over which flood water must flow (Table E-4).

2.3.2 Percent Open Water

The percent open water element addresses the considerations of "previous degree of saturation" and wetland vegetation. Wetlands with large amounts of open water (67-95 percent) are predominantly saturated and have high amounts of surface water discharge. Also, there is little stem density to slow down flood water. This inventory condition was assigned a weight of 1 in comparison to a wetland with little area (0-30 percent) of open water (3) (Table E-4).

2.3.3 Vegetative Density

Vegetative density is an important criterion since it retards inflowing storm water. Some wetlands of the same dominant class may have different densities and thus different abilities to control floods. It was also considered to be an estimate of substrate texture. Since stem density was considered to be one of the most important vegetative elements it was given a weight of 4. Condition weight reflects an increase in flood control value corresponding to an increase in stem density (Low = 1, High = 3) (Table E-4).

2.3.4 Topographic Configuration

The topographic configuration element is a measure of the "basin shape" (Bureau of Reclamation, 1977). Basins with shapes similar to flood control dams, such as closed basins and semi-closed basins were given high condition weights, 4 and 3, respectively. These topographic shapes have the highest potential for retardation near the outlet so that the basin can fill with water. Valleys and hillsides have little if any potential for holding water, but they have the potential for channel storage (valley) or water spreading (hillsides) (Table E-4).

2.3.5 Topographic Position in Watershed

The location of a wetland in a stream's watershed was considered to influence the ability or importance of the wetland in controlling flooding. Wetlands near the top of the watershed were considered to be important since they are the first to receive runoff (they have the shortest times of concentration). As a result they absorb the initial hydrologic shock generated by a runoff event. Without wetlands high in the watershed, lower sections of the stream would have higher flood peaks and a shorter time of concentration. As a result, the element weight assigned was moderate (3) and condition weights were correlated with watershed locations (upper 3, lower 1) (Table E-4).

2.3.6 Surficial Geological Materials

Impervious surficial geologic materials of the watershed permit greater surface water discharge which results in higher peak discharges.

Those wetlands occurring in high surface water runoff potential watersheds are more important in controlling floods than those in low surface water drainage potential watersheds. Till has a high surface water discharge potential, while permeable sand and gravel has a low potential and the condition weights reflect this relationship (Till - 4, stratified sand and gravel - 1) (Table E-4).

2.3.7 Surficial Geologic Materials of Wetland Embankments

As water rises in a wetland because of rapidly inflowing surface water, the water level in the wetland may become higher than the groundwater table in the surrounding embankments. If this condition continued for sufficient time, water would infiltrate from the wetland through the embankments and cause a rise in the water table. The more permeable the wetland embankments, the greater the potential for them to store flood waters (bank storage). Impermeable till has little storage potential whereas permeable sand and gravel has a high storage potential and the condition weights (1 to 4) reflect this relationship (Table E-4).

2.3.8 Organic Materials

Some flood water storage may occur in wetland organic soils that are not saturated. High permeability wetland soils have larger porosities and a greater potential for drying than do low permeability soils and were assigned a higher condition weight (2 versus 1). This element was not weighted high (1) because organic soils are anaerobic due to water saturation and are seldom "dry" or unsaturated (Table E-4).

2.3.9 Dominant Hydrologic Type

Dominant hydrologic type was considered to be the most important element and was given the highest weight (5). This element is a measure of the potential length of time (retention time) that a drop of water spends in a wetland. Hydrologic Condition 1 is a high gradient rushing stream passing water through the wetlands as rapidly as possible and has the least impact on reducing peak surface water discharges and the lowest floodwater storage potential since it is not a topographically flat area. Hydrologic Condition 6, a closed depression with no outlet, stores water which enters and has the highest flood control potential; therefore, it was given a condition weight of 6 (Table E-4).

2.3.10 Hydrologic Connection

This element received a high weighting (4) since it was believed that a wetland must be part of a riparian system in order to protect downstream areas from flooding. Isolated wetlands also serve a flood control function by retention of water and not passing it downstream; however, they were not believed to play as important a role in flood control as wetlands connected to a riparian system. Isolated wetlands have a similar flood control value to isolated upland closed basins. However, it is only when a vegetated wetland occurs as part of a riparian system that the role of the vegetation and soils play an important role in reducing flood flows and providing flood storage.

2.3.11 Water Level Fluctuation

A high water level fluctuation observed in a wetland indicates that the wetland is functioning to store floodwaters. This condition was assigned an element weight of 2 and condition weights of 2 and 1 (Table E-4).

2.3.12 Inlet

The amount and frequency of water flowing into a wetland are partly controlled by its inlet. The greater the volume of inflowing water the more important becomes the function of a wetland in controlling that water. A wetland could have all the components necessary to control storm water, but if it is seldom required to do so, it has less value than a wetland which frequently receives large amounts of water. Thus, a perennial inlet was assigned a weight of 2 and an ephemeral inlet 1 (Table E-4).

2.3.13 Outlet

The outlet of a wetland partially controls the amount of floodwater that can be stored in the wetland. An ephemeral outlet was assumed to have higher water storage capacity than a perennial outlet. In addition, a perennial outlet may indicate continuous saturation of wetland soils, while ephemeral outlets could indicate that the wetland soils may become dry during parts of the year. Thus, an ephemeral outlet was assigned a weight of 2 and a perennial outlet a weight of 1 (Table E-4).

2.3.14 Size

If all other elements were equal between two wetlands, it was assumed that the larger wetland would have a greater potential to control flooding than a smaller one. As a result, large wetlands (>1.8 ha [4.6 acres]) were assigned a weight of 3, medium 2, and small 1 (Table E-4).

2.4 SHORELINE PROTECTION FUNCTION MODEL

When wetlands are adjacent to a lake or a stream channel, they buffer the wave and current energy of these water bodies and protect upland ecosystems and valuable residential, commercial and industrial acreage. Such wetlands have preemptive value as shown in Table E-5 along with the other elements required for this model.

2.4.1 Vegetative Density

Vegetative density affords protection of shorelines by providing plant stems which reduce water flow rates and thus decrease erosive energy. Plant stems also prevent debris and ice from battering the shoreline. The higher the vegetation stem density, the greater the shoreline protection (Table E-5).

2.4.2 Dominant Wetland Class

The shoreline buffering capacity of a wetland is in part a reflection of the strength of the plant stems to resist water flow, floating debris and ice. Also, the type of vegetation present determines the strength of the root mat for erosion control. Wetland classes with poorly rooted floating communities and non-woody stems were assumed to offer little shoreline buffering capacity, such as a deep marsh which was assigned a condition weight of 1. On the other hand, a shrub swamp or wooded swamp containing strong plant stems and thick root mats securely attached to the soil were considered to have a high shoreline buffering capacity and were assigned a weight of 4. Other classes were intermediate in value (Table E-5).

Table E-5. Shoreline Protection Function Model.

Elements	Element Weight	Condition Weight	Conditions
Wetland Borders ^a Lake or Stream	NA ^b	NA	Yes
		NA	No
Vegetative Density	2	3	High
		2	Moderate
		1	Low
Dominant Wetland Class	3	0	Open fresh water
		0	Stream and brookside
		1	Deep fresh marsh (aquatic bed)
		2	Shallow fresh marsh
		4	Yearly floodplain
		1	Wet meadow
		4	Shrub swamp
		4	Wood swamp
		3	Bog
Surficial Material Underlying Wetland	1	2	Till
		1	Stratified sand and gravel
		4	Stratified fine sand and silt
		3	Alluvium
Fetch (Lakes only)	4	2	Over 2000 ft.
		1	Under 2000 ft.
Depth of Lake	1	2	Deep 6 ft.
		1	Shallow 6 ft.
		Range 3-32	
		Mean 17	

^a preemptive^b = not applicable

2.4.3 Surficial Material Underlying a Wetland

Some wetlands overlies surficial geologic materials which are very difficult to erode. A wetland located upon easily erodable materials such as fine sand and silt have a greater protective function than wetlands located on more difficult materials to erode such as stratified sand and gravel. Condition weights were assigned accordingly (Table E-5).

2.4.4 Fetch

Fetch is a measure of the length of open lake water across which wind may blow to generate waves. In general, a long fetch will create a high wave. A fetch of >609.6 m (2000 feet) was considered large, <609.6 m was considered small. Large fetch was assigned a condition weight of 2 while small fetch was assigned a weight of 1. Fetch was considered the most important element and was weighted 4 (Table E-5).

2.4.5 Depth of Lake

Large waves are created in deep lakes with a long fetch. A shallow lake with a long fetch will not generate waves as high as will a deep lake with an equally long fetch. Wave energy is primarily a result of wave height. The depth of a lake is generally given an element weight equal to that of fetch. However, it was not since all the study area lakes are shallow and capable of generating only small waves. Fetch in this case is more important than depth in determining wave height (Table E-5).

2.5 WATER QUALITY MAINTENANCE FUNCTION MODEL

According to Wisconsin Administrative Code, NR 132, "wetlands may degrade, inactivate, or store materials such as heavy metals, sediments, nutrients, and organic compounds that would otherwise drain into waterways." This function is best defined as the ability of a wetland to abate inflowing pollutants and to discharge cleaner water. In the Massachusetts Wetlands Protection Act (Massachusetts General Laws 131-40) this function is defined as the prevention of pollution value of a wetland. It has also been referred to as the wetland's "living-filter" function.

Wetlands may act as "living-filters" removing floatable and sinkable debris, suspended solids, dissolved solids, nutrients and chemical compounds, both natural and manmade by a variety of methods including physical filtering, sedimentation, nutrient uptake, adsorption, and absorption (Burton, 1981; Davis et al., 1981; Kadlec, 1981; and Oberts, 1981).

The following model (Table E-6) has been developed to assess the pollution abatement function by using the nine criteria set forth in NR 132:

- 1) density and distribution of plants;
- 2) area, depth and basin shape;
- 3) hydrologic regime;
- 4) physical, chemical and biological properties of the water and soil;
- 5) relationship of wetland size to watershed size;
- 6) the number and size of other wetlands remaining in the watershed;
- 7) topography of the watershed;

Table E-6. Water Quality Maintenance Function Model.

Elements	Element Weight	Condition Weight	Conditions
Dominant Wetland Class	4	1	Stream or brookside wetland
		0	Open fresh water
		3	Deep fresh marsh (aquatic bed)
		4	Shallow fresh marsh
		4	Yearly floodplain
		3	Wet meadow
		4	Shrub swamp
		2	Wooded swamp
		2	Bog
Percent Open Water	1	3	0-33%
		2	34-66%
		1	67-95%
		0	96-100%
Vegetative Density	3	3	High
		2	Moderate
		1	Low
Topographic Configuration	3	4	Closed basin
		3	Semi-closed basin
		2	Valley
		1	Hillside
Topographic Position in Watershed	2	1	Upper
		2	Intermediate
		3	Lower
Organic Material	1	1	High permeability
		2	Low permeability
		0	Absent

Table E-6. (continued)

Elements	Element Weight	Condition Weight	Conditions
Dominant Hydrologic Type	4	1	Condition 1
		2	Condition 2
		3	Condition 3
		4	Condition 4
		5	Condition 5
		6	Condition 6
Hydrologic Connection	2	1	Not part of riparian system
		2	Part of riparian system
Inlet	2	2	Perennial
		1	Ephemeral
		0	Absent
Outlet	3	2	Perennial
		1	Ephemeral
		0	Absent
Size	4	3	Large $\geq$ 4.6 acres
		2	Moderate 1.1-4.5 acres
		1	Small $\leq$ 1.0 acres
		Range 18-98 ^a	
		Mean	58

^aTotal value for one inlet and one outlet only.
Some wetlands may have more than one inlet or outlet
but the range above is only for wetlands with one
inlet and one outlet.

- 8) position of the wetland relative to springs, lakes rivers and other waters; and
- 9) land use practices and trends within the watershed, or the likelihood of nutrient, sediment or toxin loads increasing.

2.5.1 Dominant Wetland Class

The dominant wetland class defines the type of vegetative community that may act as a "living-filter". This element was considered to be important and was weighted 4. Some types of wetlands are assumed to have better physical filtering and nutrient uptake than others. Shallow fresh marsh, shrub swamp and yearly floodplain were considered to be the best "living-filters" and were assigned a weight of 4. The stream or brook-side wetland offered the least amount of potential for interaction of water with vegetation and was weighted the lowest (1). Other classes were weighted intermediate (Table E-6).

2.5.2 Percent Open Water

The lesser the amount of open water, the more the contact between water and the vegetative community. Those wetlands having little open water will function best since their water is in contact with the largest percentage of wetland plants. Those wetlands having 0-30 percent open water were considered the best and were given a weight of 3. Those having large amounts of open water, 67-95 percent, were weighted 1 (Table E-6).

2.5.3 Vegetative Density

Densely vegetated wetlands provide a high rate of physical filtering and nutrient uptake and were given a weight of 3. Wetlands with low vegetative density have the least potential for physical filtering and nutrient uptake and were weighted 1. This element was considered important in assessing the pollution abatement function and was assigned a weight of 3 (Table E-6).

2.5.4 Topographic Configuration

Topographic configuration is a description of the "basin shape" and the "topography of the watershed." The topographic configuration relates to the potential for the wetland to act as a trap for inflowing pollutants. The best pollutant trap is a closed basin which does not release any water to a downstream ecosystem, and was weighted the highest (4). A hillside offers the least ability to trap pollutants and was weighted the lowest (1) (Table E-6).

2.5.5 Topographic Position in Watershed

This element refers to the "relationship of wetland size to watershed size" and the "number and size of other wetlands remaining in the watershed." It was assumed that wetlands lower in the watershed will have larger watersheds than wetlands higher in the watershed. Thus, such wetlands will receive a larger volume of water for renovation. Also, wetlands low in the watershed will have fewer wetlands below them to further renovate polluted water. For these reasons, wetlands lower in the

watershed were assigned a higher weight (3) and those higher in the watershed a low weight (1) (Table E-6).

2.5.6 Organic Material

Organic material has the potential to remove pollutants by adsorption and absorption. Organic soils also act as habitat for bacteria which are important in nutrient cycling. The lower the permeability of an organic material, the larger the number of molecular attachment sites available for absorption and adsorption. Also, water will pass more slowly through organic soil, offering a longer period of time for trapping and retaining pollutants before they pass downstream. Low permeability materials were assigned a condition weight of 2 and high permeability materials a weight of 1 (Table E-6).

2.5.7 Dominant Hydrologic Type

Dominant hydrologic type refers to the residence time of water in a wetland or the amount of time required for a drop of water to move through a wetland. The longer a drop of water spends in the wetland, the greater its chances to interact with the "living-filter" function of the wetland. Those conditions that have the highest residence times were considered to have the greatest function. Those with lowest residence times were considered to have the least function. Appendix C, Section 4.3 defines the various dominant hydrologic types in detail. Hydrologic Condition 6 was considered to be the best pollutant trap since it allows nothing to pass downstream. Hydrologic Conditions 4 and 5 have slightly different

residence times, but are very similar and were assigned equal weights (4). Condition 1, a rushing stream, does little to remove pollutants and was given a weight of 1 (Table E-6).

2.5.8 Hydrologic Connection

The hydrologic connection defines the "position of the wetland within the watershed" relative to springs, lakes, rivers and other waters. Basically a wetland is either located above other aquatic ecosystems and protects them by pollution abatement function or it does not. If it is not part of a riparian system, it can not directly protect downstream ecosystems and was weighted the lowest (1). If it is part of a riparian system, it protects downstream ecosystems and was assigned a weight of 2 (Table E-6).

2.5.9 Inlet

Since perennial inlets have water flow continuously, they have the potential to continuously add polluted water to the wetland. Wetlands having perennial inlets could have the potential to renovate inflowing water continuously and were considered more valuable than wetlands having ephemeral inlets. Perennial inlets were assigned a weight of 2 and ephemeral inlets were weighted 1 (Table E-6).

2.5.10 Outlet

The outlet character of a wetland is an important element in the hydrologic regime. An important function of a wetlands' hydrologic regime

is to maintain downstream ecosystems by maintaining base water flow, which decreases pollution by dilution, maintains water chemistry and temperature, and provides water volumes for aquatic habitats. Perennial outlets have more of a potential to provide clean downstream water than do ephemeral outlets and were weighted higher (2); ephemeral outlets were weighted lower (1) (Table E-6).

2.5.11 Size

When other elements are equal, the larger the wetland the greater will be its prevention of pollution function. This element was weighted high (4) since the potential quantity of pollutants entering a wetland either naturally or man-induced, is difficult to predict. Larger wetlands should be able to renovate a larger quantity of polluted water. Large wetlands (>1.8 ha [4.6 acres]) were assigned a weight of 3, moderate size wetlands 2 and small wetlands 1 (Table E-6).

In the study area, all wetlands were considered to have an equal "likelihood of nutrient, sediment or toxin loads increasing" so the pollution abatement function model would not be biased towards potential Crandon Project activities.

3.0 CULTURAL AND ECONOMIC FUNCTION MODEL

In attempting to model wetland cultural values, it became apparent that the cultural heritage of people in the vicinity of the proposed Crandon Project was not readily definable in terms of model elements and that such a model would not be an adequate evaluation of all possible relevant considerations. For this reason, it was decided that major cultural considerations would be identified by contacting appropriate information sources and making a qualitative assessment of wetland cultural values. The wetland functions that give rise to economic value, on the other hand, were much more readily identified in terms of model elements. The elements which were considered to be most important in determining economic function are presented in Table E-7.

3.1 DOMINANT WETLAND CLASS

Dominant wetland class has a direct bearing on whether commercial products are present such as wild rice, furbearers or game fish that have the potential to contribute to the economic base of the region. Because of its important role in the model, this element was assigned a weight of 4. The weighting was high for classes having high potential for producing cash crops such as wooded swamps, which very often contain some harvestable timber, or marshes which provide habitat for commercial crops and game species. Conversely, the weighting was low for classes that seldom produce economically viable crops, such as shrub swamps (Table E-7).

Table E-7. Cultural and Economic Function Model.

Elements	Element Weight	Condition Weight	Conditions
Dominant Wetland Class	4	0	Stream or brookside
		0	Open fresh water
		4	Deep fresh marsh
		4	Shallow fresh marsh
		0	Yearly flooded floodplain
		2	Wet meadow
		3	Shrub swamp
		5	Wooded swamp (deciduous)
		6	Wooded swamp (coniferous)
		3	Bog
Access	3	3	Within 100' of road
		2	Access by passable waterway
		1	Isolated
Size	8	3	Large $\geq$ 4.6 acres
		2	Medium 1.1-4.5 acres
		1	Small $\leq$ 1.0 acres
		Range 11-87	
		Mean	54

3.2 ACCESS

Access to wetlands having a potential cash crop is a factor in the wetlands' economic value, but its importance as an element in the model was less than that of the other 2 elements, which determine the presence and extent of the resource. Moreover, if the cash crop has a major value, access will be developed when a decision has been made to harvest. Based on the above, this element was assigned a weight of 3; the weight assigned the condition increases with ease of access (Table E-7).

3.3 SIZE

Size of a wetland containing a potential cash crop is as important a factor in determining economic viability of the resource as actual presence of the crop. Size is directly related to total yield of the harvest, which has a direct bearing on both the decision to harvest and cash return. It was determined that this element should have the same maximum possible score as "Dominant Wetland Class" and it was assigned a weight of 8; the large size category was weighted 3 (Table E-7).

4.0 RECREATIONAL FUNCTION MODEL

The elements in this model are very similar to the criteria used by Bedford et al. (1974) to assess the recreational value of wetlands in Dane County, Wisconsin (Table E-8).

4.1 DOMINANT WETLAND CLASS

Dominant wetland class directly affects the potential for hunting, trapping, fishing and nature study. Wetland classes differ with respect to wildlife species diversity, and net primary production; shallow marsh provides habitat for songbirds and certain mammals, coniferous swamps provide winter yards for deer, and aquatic beds provide habitat for warm water fish species. Based on its role in determining recreational value this element was assigned a weight of 3 and the weights assigned to each class varied with its importance as wildlife habitat (Table E-8).

4.2 PERCENT OPEN WATER

Percent open water is an important element, since it affects recreational potential in several ways. Open water provides opportunities for boating and fishing, as well as providing an added habitat element for both game and non-game wildlife. Based on its role in this model, this element was assigned a weight of 3. The weight assigned to the condition increased with percent open water, the optimum condition being between two-thirds and complete open water (Table E-8).

Table E-8. Recreational Function Model.

Elements	Element Weight	Condition Weight	Conditions
Dominant Wetland Class	3	0	Stream or brookside
		0	Open fresh water
		6	Deep fresh marsh
		5	Shallow fresh marsh
		0	Yearly flooded floodplain
		0	Wet meadow
		2	Shrub swamp
		2	Wooded swamp (deciduous)
		3	Wooded swamp (coniferous)
		2	Bog
Percent Open Water	3	1	0-33%
		2	34-66%
		3	67-95%
		0	96-100%
Surface Water Association	4	1	Connected to a small stream
		2	Connected to a river
		3	Connected to a lake
		4	Connected to a combination
		0	Not connected
Access to Public	2	3	Within 100' of road
		2	Access by passable waterway
		1	Isolated
Size	4	3	Large $\geq$ 4.6 acres
		2	Medium 1.1-4.5 acres
		1	Small $\leq$ 1.0 acres
Legal Access	2	2	Yes
		1	No

Table E-8. (continued)

Elements	Element Weight	Condition Weight	Conditions
Output From Biological Function Model	3	3	High
		2	Moderate
		1	Low
		Range 10-71	
		Mean	40

4.3 SURFACE WATER CONNECTION

Connection of a wetland to a surface water body is the most important factor affecting recreational potential, since without a surface water connection the recreational benefits associated with open water discussed above are absent from the wetland. Surface water connection directly influences wildlife and finfish production, an important factor affecting recreational potential. Because of its importance in determining recreational potential of a wetland this element was assigned a weight of 4. The weight accorded to the condition is related to the type of connection and the recreational benefits associated with each, a combination of lake and riparian system being the most ideal (Table E-8).

4.4 PUBLIC ACCESS

Although access to a wetland is a factor in its recreational potential, this element was considered to be less important than others in the model. In fact, in a wetland affording good hunting and fishing opportunities isolation may be an enhancement to those sportsmen willing to make their own access. Based on the above, this element was assigned a weight of 2. The weight assigned to the condition increased with ease of access (Table E-8).

4.5 SIZE

Size is a very important element since it directly influences recreational carrying capacity of a wetland. Larger wetlands support a greater variety and density of wildlife, and afford more opportunities for

recreational activities associated with wetlands such as canoeing, nature study and hunting. Because of its important role in this model, size was accorded a weight of 5, the weight assigned to the condition varying directly with size (Table E-8).

4.6 LEGAL ACCESS

Ownership status determines whether a wetland is legally accessible; the broad categories of ownership are public, private and Native American. As with Public Access, this element was much less important than those functional elements which actually determine recreational potential because ownership and legal access status can both change. Accordingly, "Legal Access" was assigned a weight of 2 (Table E-8).

4.7 OUTPUT FROM BIOLOGICAL FUNCTION MODEL

Since the potential of a wetland for biological production and variety determines whether it might provide habitat for or be productive of species of recreational, cultural or economic interest, this was an important consideration in determining recreational potential. The contribution of this element to the recreational model was included by assigning one of three conditions using the output from the biological function model. As a result of the importance of this output to the recreational model, it was assigned a weight of 3 (Table E-8).

5.0 AESTHETICS FUNCTION MODEL

5.1 DOMINANT WETLAND CLASS

Dominant wetland class was important in determining the aesthetic value of a wetland. Certain wetland classes have higher visual appeal than others. For example, floating mats of vegetation such as occur in a bog or an aquatic bed are highly attractive; shrub swamps and most deciduous swamps, on the other hand, provide very shallow vistas and little visual relief, therefore, their contributions to the aesthetics of a wetland were considered to be minimal. This element was assigned a weight of 4 and the weights assigned to the wetland classes varied with their visual appeal (Table E-9).

5.2 NUMBER OF WETLAND SUBCLASSES (RICHNESS)

Subclass richness is a measure of the variety of plant form and arrangement. Where this factor was rated high the wetland was also rated high in visual richness and aesthetic appeal. This element was assigned a weight of 3, and the weights assigned to the conditions varied with the number of different wetland subclasses (Table E-9).

5.3 PERCENT OPEN WATER

Open water is an important factor contributing to the aesthetic appeal of a wetland, and this element was assigned a weighting of 4. The aesthetic appeal improves as percent open water increases with an optimum occurring for most people at around 95 percent. Up to this point, sufficient

Table E-9. Aesthetic Function Model.

Elements	Element Weight	Condition Weight	Conditions
Dominant Wetland Class	4	0	Stream or brookside wetland
		0	Open fresh water
		5	Deep fresh marsh
		4	Shallow fresh marsh
		0	Yearly flooded floodplain
		0	Wet meadow
		2	Shrub swamp
		3	Wooded swamp (deciduous)
		3	Wooded swamp (coniferous)
		5	Bog
Number of Subclasses (Richness)	3	4	6-9
		3	4-5
		2	2-3
		1	1
Percent Open Water	4	1	0-33%
		3	34-66%
		4	67-95%
		0	96-100%
Access to Public	3	3	Within 100' of road
		2	Access by passable waterway
		1	Isolated
Local Scarcity	3	1	<200' to nearest similar type
		2	201-1000' to nearest similar type
		3	>1000' to nearest similar type
		Range 9-66	
		Mean 37	

vegetation is present to provide visual relief but as percent vegetation diminishes to zero, visual richness declines (Table E-9).

5.4 ACCESS

Access to a view of a wetland is certainly a factor contributing to its aesthetic value. If access was limited, appreciation of the wetland's aesthetic attributes was considered to be minimal. However, access may be created to provide visual access to a particularly appealing view, therefore, this factor was not as important as the functional components "Dominant Wetland Class" and "Percent Open Water," in determining the aesthetic value of a wetland. The weight assigned to this element was 3, and the weights assigned to the conditions varied with ease of access (Table E-9).

5.5 LOCAL SCARCITY

Visual relief is a factor in the aesthetic value of a wetland. Where a particular wetland type was commonly distributed over the landscape, visual relief was considered to be low; but where a type was quite rare, relief was given a heavy weighting. This element was assigned a weight of 3 and weights assigned to the conditions varied depending on the commonness of the wetland type as a landscape element (Table E-9).

6.0 EDUCATIONAL FUNCTION MODEL

There exists such a variety of elements to the processes of education that no system can be developed that foresees all future educational opportunities and directions. This model was designed to include present educational uses and trends at various age and professional levels of education.

6.1 NUMBER OF WETLAND SUBCLASSES (RICHNESS)

This element is a measure of the variety of vegetative life forms available for study in a wetland. As the number of subclasses increases the opportunity becomes greater to observe natural history phenomena compared to a similar sized wetland of lower plant form variability and therefore, having less edge, lower interspersions and fewer wildlife. Based on the above, this element was assigned a weight of 3; the weight assigned to the conditions varies with the number of subclasses as presented in Table E-10.

6.2 PUBLIC ACCESS

Wetlands affording public access permit larger numbers of people to study wetland processes and observe plant and animal life cycle interactions than do isolated wetlands. Because access was considered important in terms of the educational value of a wetland, this element was assigned a weight of 4, and the weights assigned to the conditions varied with ease of access (Table E-10).

Table E-10. Educational Function Model.

Elements	Element Weight	Condition Weight	Conditions
Subclass Richness (Lateral Diversity)	3	4	6-9
		3	4-5
		2	2-3
		1	1
Access to Public	4	3	Within 100 ft. of road
		2	Access by passable waterway
		1	Isolated
		Range	7-24
		Mean	15

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Appendix 3.10-3

1994 Wetland Verification Delineation



Crandon Mining Company

March 22, 1995

7 N. BROWN ST., 3RD FLOOR
RHINELANDER, WI 54501-3161

David Ballman
Ecologist, U.S. Army Corps of Engineer
St. Paul District
190 Fifth Street East
St. Paul, MN 55101

RE: Crandon Project - Wetland Verification Delineation

Dear Mr. Ballman:

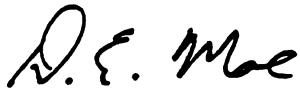
The Crandon Project wetland delineation verification has been completed as per the procedures outlined in the July 21, 1994 letter previously sent to you. Subsequent to the September 8, 1994, field meeting at the Crandon project site, at which time flagged wetland boundaries were validated by you and the Wisconsin Department of Natural Resources, the planned wetlands horizontal-control survey was completed.

A comparison between the wetland delineation completed in the early 1980s and the August 1994 verification is provided in the attached technical memorandum. The conclusion of the comparison is that the wetland delineation work performed in the 1980's by Normandeau and Associates, Inc. and Interdisciplinary Environmental Planning, Inc. is an accurate representation of the wetlands in the entire study area.

This completes our verification study of the wetlands in the vicinity of the Crandon Project site. If you have any questions regarding our work please feel free to call me at (715) 365-1450 or Ron Steg of Foth & Van Dyke at (414) 497-2500.

Sincerely,

Don Moe



Technical/Permitting Manager

DM:mkj:jcp
Attachments

cc: Bill Tans, WDNR
Archie Wilson, WDNR
Larry Lynch, WDNR
Robert Jaeger, Bureau of Indian Affairs
Al Milham, Forest County Potawatomi
Arlyn Ackley, Sokaogon Chippewa Community
John Teller, Menominee Indian Tribe of Wisconsin
M. Catherine Condon, Greene, Meyer & McElroy
David Kee, USEPA-Air Division (A18J)
Jerry Sevic, Foth & Van Dyke
Garrett Hollands, Fugro-McClelland
Tim Weyenberg, Foth & Van Dyke



Foth & Van Dyke Memorandum

March 21, 1995

TO: Jerry Sevick, Foth & Van Dyke

CC: Don Moe, Crandon Mining Company
Tim Weyenberg, Foth & Van Dyke
Garrett Hollands, Fugro-McClelland
Master File

FR: Brad Helmandollar, Foth & Van Dyke *BH*
Ron Steg, Foth & Van Dyke *RS*

RE: Crandon Mining Company - Wetland Delineation Verification

In response to discussions with the U.S. Army Corps of Engineers (USCOE) and the Wisconsin Department of Natural Resources (WDNR), Foth & Van Dyke developed a plan to verify the boundaries of wetlands in the Crandon Mining Company (CMC) study area. The plan was outlined in a letter to David Ballman, USCOE, issued on July 21, 1994 (Attachment 1).

The approach for verifying the boundaries of wetlands existing in the CMC study area, as mapped by previous investigators (Normandeau Associates, Inc. and Interdisciplinary Environmental Planning, Inc., 1982, CMC-NOI-164), consisted of field delineation of approximately 25% of the wetlands existing in the mine/mill site and TMA configurations current at that time. This delineation was to be followed by completion of a horizontal control survey of the delineated wetlands and creation of a wetland boundary map at the same scale as the previously prepared wetland maps. Verification was then to be accomplished through direct comparison between the two maps. Details regarding the implementation of the approach and the results of the work are presented in the following paragraphs.

On August 24 and 25, 1994, Ron Steg and Brad Helmandollar of Foth & Van Dyke conducted delineation work on six wetlands on the Crandon Project site, designated as Wetlands P2, 5, M3, F64, F65 and F66. Wetlands 5, M3, F64 and F65 were delineated in their entirety. Only that portion of Wetland P2 existing within the mine/mill site was delineated. Wetland F66 was not considered in the July 21, 1994 work plan, however, based on field conditions observed at the time of the site visit, the southern portion of this wetland was delineated. Wetlands P2 and 5 are located within the proposed mine/mill site. The remaining wetlands, M3, F64, F65 and F66, are located within the proposed TMA. The boundaries of these wetlands were delineated with black and red striped survey tape. Field data forms are provided in Attachment 2.

On September 8, 1994, representatives of CMC and Foth & Van Dyke met with representatives of the USCOE and the WDNR to conduct a field review of the delineated wetland boundaries. The group was unanimously in agreement with the Foth & Van Dyke wetland boundary determination.

On September 28, 1994, Foth & Van Dyke surveyors were taken to and shown the boundaries for all delineated wetlands. In the days that followed a horizontal control survey was completed. The survey information was then downloaded into Foth & Van Dyke's CADD system so the coordinates could be plotted on the existing wetland maps. As Wetlands F66 and P2 were not delineated in their entirety, the surveyed wetland boundary was tied into the previous wetland boundary based on interpretation of May 1993 aerial photography, followed by field verification on August 27, 1994. Figures 1A and 1B provide a comparison of the August 1994 and previously mapped wetland boundaries.

Table 1 presents a comparison between the August 1994 wetland verification work to previously mapped wetlands. The configuration of the boundary of Wetland F65 is somewhat different than previously mapped. The August 1994 mapping resulted in a westerly shift in the connection between wetlands F65 and F66, however the overall size of these two wetlands remains very close to the previously mapped acreage. Wetland 5, as mapped in August 1994, is considerably smaller than previously mapped and is shifted approximately 50 feet to the south. The configuration of the remaining wetlands mapped in 1994 is much the same as the previous mapping. The resultant acreage from the 1994 delineation is approximately 13 percent less than the previous mapping. If this approximation is extrapolated to the entire study area, the previous wetland mapping represents a slight over estimate of the actual wetland acreage in the study area.

Based on the 1994 verification work, botanical surveys of the entire study area conducted by the Foth & Van Dyke botany team, and a review of fall 1993 and spring 1994 aerial photography of the study area, it is concluded that the wetland delineation work performed by Normandeau and Associates, Inc. and Interdisciplinary Environmental Planning, Inc. is an accurate representation of the wetlands in the entire study area and may have actually overestimated the acreage by up to 13 percent.

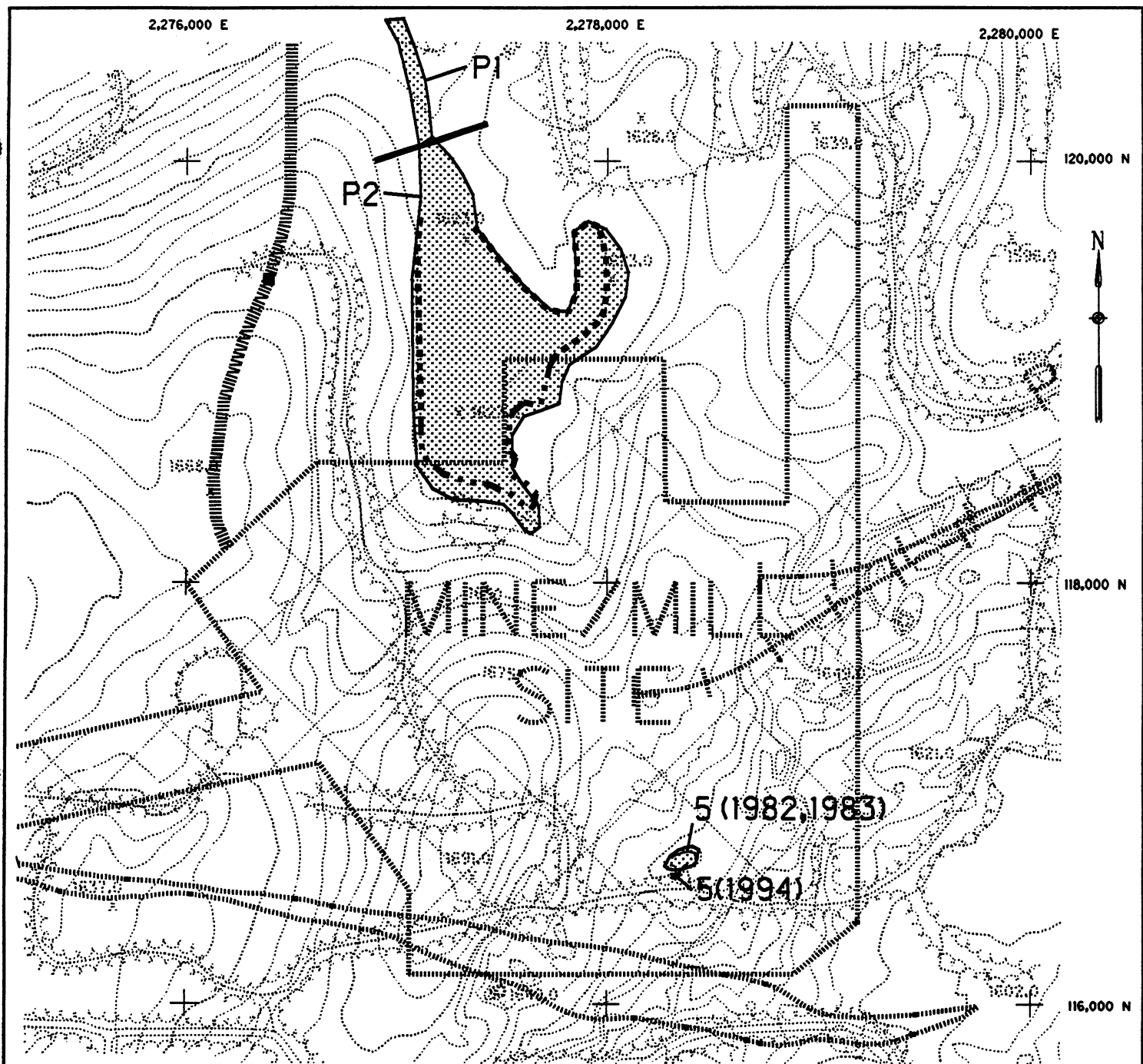
Please note that since the field verification work was completed, the configuration of both the mine/mill site and TMA have changed somewhat as work on the project's environmental impact report and permit applications has progressed. For consistency and to avoid confusion, the location and configuration of both the mine/mill site and TMA shown on the attached figures are those that were used to develop the wetland delineation work plan. The fact that the mine/mill site and TMA locations and configurations have changed slightly since the work plan was developed does not affect the results and conclusions of the work addressed in this memorandum.

Table 1

**Comparison of Wetland Acreage from August 1994 Verification Work
to Previous Mapping Work
Crandon Project**

Wetland	Acreage August 1994 Mapping	Acreage Previous Mapping
5	0.01	0.28
M3	4.50	5.52
F64	4.50	5.21
F65	2.40	2.36
F66	16.10	17.07
P2	18.00	21.91
Total	45.51	52.35

Prepared by: BDH
Checked by: RFS



LEGEND

P2

WETLAND IDENTIFICATION

WETLAND DIVIDER

WETLAND BOUNDARY DETERMINED BY FOTH & VAN DYKE IN 1994 BASED ON REVIEW OF AERIAL PHOTOGRAPHY AND FIELD RECONNAISSANCE

WETLAND BOUNDARY BASED ON FIELD DELINEATION AND HORIZONTAL CONTROL SURVEY IN 1994 BY FOTH & VAN DYKE

WETLANDS MAPPING BASED ON NORMANDEAU ASSOCIATES, INC. AND INTERDISCIPLINARY ENVIRONMENTAL PLANNING, INC., 1982 AND INTERDISCIPLINARY ENVIRONMENTAL PLANNING, INC., 1983

NOTES

1. APPROXIMATE SITE AREA: PART OF SECTION 25, T35N, R12E, TOWN OF NASHVILLE AND PART OF SECTIONS 29, 30 AND 32, T35N, R12E, TOWN OF LINCOLN, FOREST COUNTY, WISCONSIN.
2. TOPOGRAPHIC BASE MAP DIGITIZED FROM 1" = 1000' SCALE, 5' CONTOUR INTERVAL MAP PREPARED BY AERO-METRIC ENGINEERING, INC., SHEBOYGAN, WISCONSIN, DATE OF PHOTOGRAPHY APRIL 28, 1976.
3. HORIZONTAL DATUM BASED ON WISCONSIN STATE PLANE COORDINATE SYSTEM - NORTH ZONE.
4. VERTICAL DATUM BASED ON MEAN SEA LEVEL DATUM, CONTOUR INTERVAL IS FIVE FEET.
5. COUNTY AND TOWNSHIP LINES DIGITIZED FROM 7.5' SERIES USGS MAPS.

Foth & Van Dyke

REVISED	DATE	BY	DESCRIPTION
CHECKED BY: JKS1			DATE: JAN, '95
APPROVED BY: RFS			DATE: JAN, '95
APPROVED BY: GWS			DATE: JAN, '95



Crandon Mining Company

FIGURE 1A

WETLAND VERIFICATION DELINEATION RESULTS

Scale: 1" = 700'	Date: JANUARY 1995
Prepared By: Foth & Van Dyke	By: JRB

2,282,000 E

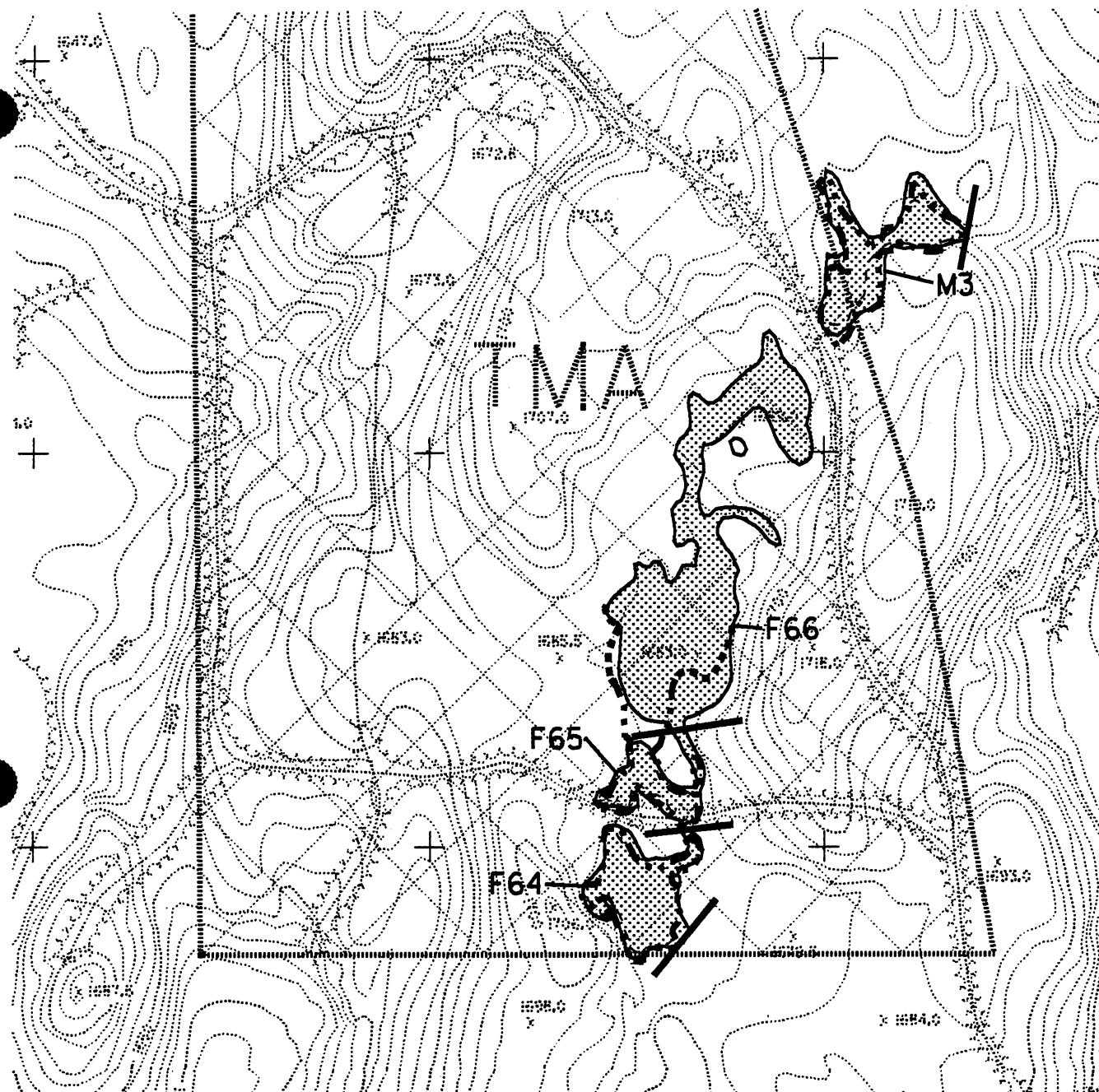
2,284,000 E

2,286,000 E

86,000 N

84,000 N

82,000 N

**LEGEND**

F66

WETLAND IDENTIFICATION

WETLAND DIVIDER

WETLAND BOUNDARY DETERMINED BY
FOTH & VAN DYKE IN 1994 BASED ON
REVIEW OF AERIAL PHOTOGRAPHY AND
FIELD RECONNAISSANCE

WETLAND BOUNDARY BASED ON
FIELD DELINEATION AND HORIZONTAL
CONTROL SURVEY IN 1994 BY FOTH &
VAN DYKE

WETLANDS MAPPING BASED ON NORMANDEAU ASSOCIATES,
INC. AND INTERDISCIPLINARY ENVIRONMENTAL PLANNING, INC.,
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1. APPROXIMATE SITE AREA PART OF SECTION 25, T35N, R12E, TOWN OF NASHVILLE AND PART OF SECTIONS 29, 30 AND 32, T35N, R12E, TOWN OF LINCOLN, FOREST COUNTY, WISCONSIN.
2. TOPOGRAPHIC BASE MAP DIGITIZED FROM 1" = 1000' SCALE, 9' CONTOUR INTERVAL MAP PREPARED BY AERO-METRIC ENGINEERING, INC., SHEBOYGAN, WISCONSIN, DATE OF PHOTOGRAPHY APRIL 28, 1976.
3. HORIZONTAL DATUM BASED ON WISCONSIN STATE PLANE COORDINATE SYSTEM - NORTH ZONE.
4. VERTICAL DATUM BASED ON MEAN SEA LEVEL. DATUM CONTOUR INTERVAL IS FIVE FEET.
5. COUNTY AND TOWNSHIP LINES DIGITIZED FROM 7.5' SERIES USGS MAPS.

Foth & Van Dyke

REVISED	DATE	BY	DESCRIPTION
CHECKED BY:		JKS1	DATE: JAN.'95
APPROVED BY:		RFS	DATE: JAN.'95
APPROVED BY:		GWS	DATE: JAN.'95

**Crandon Mining Company****FIGURE 1B****WETLAND VERIFICATION DELINEATION RESULTS**

Scale: 1" = 800' Date: JANUARY 1995

Prepared By: Foth & Van Dyke

By: JRB

Attachment 1



Crandon Mining Company

7 N. BROWN ST., 3RD FLOOR
RHINELANDER, WI 54501-3161

July 21, 1994

David Ballman
Ecologist, U.S. Army Corps of Engineers
St. Paul District
190 Fifth Street East
St. Paul, MN 55101

Dear Mr. Ballman:

RE: Wetland Verification Delineation - Crandon Project

This letter is provided in response to your site review and subsequent telephone conversation recommending that Crandon Mining Company (CMC) conduct a "verification" study to confirm the accuracy of wetland delineation conducted in the 1980s.

Wetlands existing in the environmental study area were mapped previously by Normandeau Associates, Inc., Interdisciplinary Environmental Planning, Inc., and Fugro-McClelland. Mapping procedures were consistent with standard wetland mapping practices existing at the time the work was conducted. Based on conversations with the St. Paul District of the U.S. Army Corps of Engineers, CMC proposes verification delineation and mapping of approximately one-quarter of the wetland acreage existing within the boundaries of the direct impact area of the project. Portions of eight and 12 wetlands exist within the mine/mill site and tailings management area, respectively (Table 1). As noted on the table, CMC proposes to delineate and map wetlands 5 and P2 in the mine/mill site, and wetlands F65, F64 and M3 in the TMA.

Wetlands will be delineated using the routine wetland determination method described in the 1987 Corps of Engineers Wetland Delineation Manual. Wetland boundaries will be flagged with labeled and numbered survey tape. Following the delineation, a horizontal control survey will provide the data necessary to map the wetlands onto Foth & Van Dyke's base map of the area.

After the wetlands are flagged, we will notify you so a field assessment can be conducted by your staff. The verification of the delineation of these wetland areas is also being conducted to provide the WDNR with information they need for their verification that wetland boundaries/acreage have not appreciably changed since the previous studies were completed.

This work will be scheduled in August, 1994. The results of the work will be summarized in a letter report, including a wetland map, to be submitted within three weeks of the completion of the field activities.

David Ballman
U.S. Army Corps of Engineers
July 21, 1994
Page 2

We look forward to your comments on this verification activity.

Sincerely,

D. E. Moe

Don Moe
Technical/Permitting Manager

DEM:jcp

Attachment

cc: Bill Tans, WDNR
Archie Wilson, WDNR
Larry Lynch, WDNR
Robert Jaeger, Bureau of Indian Affairs
Al Milham, Forest County Potawatomi
Arlyn Ackley, Sokaogon Chippewa Community
Glen Miller, Menominee Tribe
David Kee, USEPA-Air Division (A18J)
Jerry Sevic, Foth & Van Dyke

Table 1
Wetlands in the Mine/Mill Site and Tailings Management Area
Crandon Mining Company

Wetland ID	Total Wetland Acres ¹	Wetland Acres w/in Site ²
Mine/Mill Site		
R8	1.8	0.3
#4	0.2	0.2
#5	0.3	0.3
#6	0.2	0.2
#9	0.2	0.2
#11	0.6	0.6
#12	0.1	0.1
P2	20.8	1.4
Total Mine/Mill	24.2	3.3
TMA		
F27	4.2	3.7
F31	6.0	2.3
F32	0.6	0.5
F63	9.6	2.6
F64	4.5	4.2
F65	2.5	2.5
F66	16.2	16.2
F31	6.0	2.3
M3	4.2	1.7
#18	1.2	1.2
#19	0.1	0.1
#20	1.0	1.0
Total TMA	56.1	38.3

Note: CMC proposes to delineate and map wetlands 5 and P2 in the mine/mill site, and wetlands F65, F64, and M3 in the TMA.

¹ Acreage taken from Table 1 - Letter dated March 25, 1994 to Mr. Michael F. O'Keefe

² Preliminary acreage estimate based on planimetry.

Attachment 2

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Mine Site	Date: 8/25/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg/Brad Helmandollar	State: WI

Do Normal Circumstances exist on the site?	Yes	No	Wetland ID: M3
Is the site significantly disturbed (Atypical Situation)?	Yes	No	Transect ID:
Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes	No	Plot ID: 1A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Acer saccharum</i> *	trees	FACU	9. <i>Viola spp.</i>	herb	
2. <i>Tsuga canadensis</i>	tree	FACU	10. <i>Aster macrophyllus</i>	herb	N/A
3. <i>Abies balsamen</i>	tree	FACW	11.		
4. <i>Betula papyrifera</i>	tree	FACU+	12.		
5. <i>Balleghaniensis</i>	tree	FAC	13.		
6. <i>Acer saccharum</i>	shrub	FACU	14.		
7. <i>Lycopodium obscurum</i> *	herbs	FACU	15.		
8. <i>Lycopodium annotonum</i>	herbs	FAC	16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). < 50% * = dominant species

Remarks:

HYDROLOGY

Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: ☐ Water Stained/Silt Covered Leaves ☐ Drift Lines ☐ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☐ Exposed Roots ☐ Periodically Flooded Channels/Depressions
Field Observations: Depth of Surface Water <u>NA</u> (in.) Depth of Free Water in Pit <u>NA</u> (in.) Depth of Saturated Soil <u>NA</u> (in.)	
Remarks: No hydrology indicators	

Map Unit Name * (Series and Phase):	Drainage Class: * Field Observations Confirm Mapped Type? Yes No															
Profile Description: <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Depth (inches)</th> <th style="text-align: center;">Matrix Color (Munsell Notation)</th> <th style="text-align: center;">Mottle Colors (Munsell Notation)</th> <th style="text-align: center;">Mottle Abundance</th> <th style="text-align: center;">Soil Texture/ Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0-8"</td> <td style="text-align: center;">10 YR 3/6</td> <td></td> <td></td> <td style="text-align: center;">sandy loam</td> </tr> <tr> <td style="text-align: center;">8-24"</td> <td style="text-align: center;">10 YR 4/4</td> <td></td> <td></td> <td style="text-align: center;">sandy loam</td> </tr> </tbody> </table>		Depth (inches)	Matrix Color (Munsell Notation)	Mottle Colors (Munsell Notation)	Mottle Abundance	Soil Texture/ Type	0-8"	10 YR 3/6			sandy loam	8-24"	10 YR 4/4			sandy loam
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0-8"	10 YR 3/6			sandy loam												
8-24"	10 YR 4/4			sandy loam												
Hydric Soil Indicators: <table style="width: 100%; border-collapse: collapse;"> <tr> <td>☐ Histosol</td> <td>☐ Concretions</td> </tr> <tr> <td>☐ Histic Epipedon</td> <td>☐ High Organic Content in Surface Layer in Sandy Soil</td> </tr> <tr> <td>☐ Sulfidic Odor</td> <td>☐ Organic Streaking in Sandy Soil</td> </tr> <tr> <td>☐ Aquic Moisture Regime</td> <td>☐ Listed on Local Hydric Soils List</td> </tr> <tr> <td>☐ Reducing Conditions</td> <td>☐ Listed on National Hydric Soils List</td> </tr> <tr> <td>☐ Gleyed or Low Chroma</td> <td>☐ Other (Explain in Remarks)</td> </tr> </table>		☐ Histosol	☐ Concretions	☐ Histic Epipedon	☐ High Organic Content in Surface Layer in Sandy Soil	☐ Sulfidic Odor	☐ Organic Streaking in Sandy Soil	☐ Aquic Moisture Regime	☐ Listed on Local Hydric Soils List	☐ Reducing Conditions	☐ Listed on National Hydric Soils List	☐ Gleyed or Low Chroma	☐ Other (Explain in Remarks)			
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☐ Reducing Conditions	☐ Listed on National Hydric Soils List															
☐ Gleyed or Low Chroma	☐ Other (Explain in Remarks)															
Remarks: No hydric indicators																

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes <u>No</u> Wetland Hydrology Present? Yes <u>No</u> Hydric Soils Present? Yes <u>No</u>	Is this Sampling Point Within a Wetland? Yes <u>No</u>
Remarks:	

* Forest County Soil Survey Not Complete

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Mine Site	Date: 8/25/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg/Brad Helmandollar	State: WI

Do Normal Circumstances exist on the site? <u>Yes</u> No	Wetland ID: M3
Is the site significantly disturbed (Atypical Situation)? Yes <u>No</u>	Transect ID:
Is the area a potential Problem Area? (If needed, explain on reverse.) Yes <u>No</u>	Plot ID: 1B

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Acer rubrum</i> *	tree	FAC	9. <i>Dryopteris</i> spp.	herb	
2. <i>Betula alleghaniensis</i>	tree	FAC	10. <i>Cornus canadensis</i>	herb	FAC
3. <i>Populus tremuloides</i> *	tree	FAC	11. <i>Osmonda cinnamomea</i>	herb	FACW
4. <i>Acer rubrum</i>	shrub	FAC	12.		
5. <i>Betula alleghaniensis</i>	shrub	FAC	13.		
6. <i>Abies balsamea</i>	shrub	FACW	14.		
7. <i>Picea mariana</i>	shrub	FACW	15.		
8. <i>Sphagnum magellanicum</i>	herb	OBL	16.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). 100% * = dominant species					
Remarks:					

HYDROLOGY

Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: ☒ Water Stained/Silt Covered Leaves ☐ Drift Lines ☐ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☐ Exposed Roots ☒ Periodically Flooded Channels/Depressions
Field Observations: Depth of Surface Water <u>NA</u> (in.) Depth of Free Water in Pit <u>NA</u> (in.) Depth of Saturated Soil <u>NA</u> (in.)	
Remarks:	

Map Unit Name * (Series and Phase):	Drainage Class: * Field Observations Confirm Mapped Type? Yes No																				
Profile Description: <table style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="text-align: center;">Depth (inches)</th> <th style="text-align: center;">Matrix Color (Munsell Notation)</th> <th style="text-align: center;">Mottle Colors (Munsell Notation)</th> <th style="text-align: center;">Mottle Abundance</th> <th style="text-align: center;">Soil Texture/ Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0-10"</td> <td style="text-align: center;">10 YR 2/1</td> <td></td> <td></td> <td style="text-align: center;">organic</td> </tr> <tr> <td style="text-align: center;">10-20"</td> <td style="text-align: center;">10 YR 2/1</td> <td></td> <td></td> <td style="text-align: center;">organic</td> </tr> <tr> <td style="text-align: center;">20-24"</td> <td style="text-align: center;">2.5 YR 5/2</td> <td style="text-align: center;">7.5 YR 4/6</td> <td></td> <td style="text-align: center;">silt loam</td> </tr> </tbody> </table>		Depth (inches)	Matrix Color (Munsell Notation)	Mottle Colors (Munsell Notation)	Mottle Abundance	Soil Texture/ Type	0-10"	10 YR 2/1			organic	10-20"	10 YR 2/1			organic	20-24"	2.5 YR 5/2	7.5 YR 4/6		silt loam
Depth (inches)	Matrix Color (Munsell Notation)	Mottle Colors (Munsell Notation)	Mottle Abundance	Soil Texture/ Type																	
0-10"	10 YR 2/1			organic																	
10-20"	10 YR 2/1			organic																	
20-24"	2.5 YR 5/2	7.5 YR 4/6		silt loam																	
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☐ Gleyed or Low Chroma	☐ Other (Explain in Remarks)																				
Remarks:																					

WETLAND DETERMINATION

Hydrophytic Vegetation Present? <u>Yes</u> No Wetland Hydrology Present? <u>Yes</u> No Hydric Soils Present? <u>Yes</u> No	Is this Sampling Point Within a Wetland? <u>Yes</u> No
Remarks:	

* Forest County Soil Survey Not Complete

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Mine Site	Date: 8/24/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg/Brad Helmandollar	State: WI

Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Wetland ID: M3
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No	Transect ID:
Is the area a potential Problem Area? (If needed, explain on reverse.) ☐ Yes ☒ No	Plot ID: 2A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Acer rubrum</i> *	tree	FAC	9. <i>Aralia nudicaulis</i>	herb	FACU
2. <i>Populus tremuloides</i> *	tree	FAC	10. <i>Coptis trifolia</i>	herb	FACW
3. <i>Betula alleghaniensis</i>	tree	FAC	11. <i>Lycopodium locidolom</i>	herb	FAC+
4. <i>Prunus serotina</i>	tree	FACU	12. <i>Cornus canadensis</i>	herb	FAC
5. <i>Abies balsamea</i>	shrub	FACW	13. <i>Dryopteris spp.</i>	herb	
6. <i>Acer saccharum</i>	shrub	FACU	14.		
7. <i>Acer rubrum</i>	shrub	FAC	15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). < 50% * = dominant species

Remarks:

HYDROLOGY

Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: ☐ Water Stained/Silt Covered Leaves ☐ Drift Lines ☐ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☐ Exposed Roots ☐ Periodically Flooded Channels/Depressions
Field Observations: Depth of Surface Water <u>NA</u> (in.) Depth of Free Water in Pit <u>NA</u> (in.) Depth of Saturated Soil <u>NA</u> (in.)	
Remarks: Sloping topography toward wetland No indicators or wetland hydrology	

Map Unit Name * (Series and Phase):	Drainage Class: * Field Observations Confirm Mapped Type? Yes No										
Profile Description: <table style="width: 100%; border: none;"> <thead> <tr> <th style="text-align: center;">Depth (inches)</th> <th style="text-align: center;">Matrix Color (Munsell Notation)</th> <th style="text-align: center;">Mottle Colors (Munsell Notation)</th> <th style="text-align: center;">Mottle Abundance</th> <th style="text-align: center;">Soil Texture/ Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0-20"</td> <td></td> <td style="text-align: center;">10 YR 3/6</td> <td></td> <td style="text-align: center;">sandy loam</td> </tr> </tbody> </table>		Depth (inches)	Matrix Color (Munsell Notation)	Mottle Colors (Munsell Notation)	Mottle Abundance	Soil Texture/ Type	0-20"		10 YR 3/6		sandy loam
Depth (inches)	Matrix Color (Munsell Notation)	Mottle Colors (Munsell Notation)	Mottle Abundance	Soil Texture/ Type							
0-20"		10 YR 3/6		sandy loam							
Hydric Soil Indicators: ☐ Histosol ☐ Concretions ☐ Histic Epipedon ☐ High Organic Content in Surface Layer in Sandy Soil ☐ Sulfidic Odor ☐ Organic Streaking in Sandy Soil ☐ Aquic Moisture Regime ☐ Listed on Local Hydric Soils List ☐ Reducing Conditions ☐ Listed on National Hydric Soils List ☐ Gleyed or Low Chroma ☐ Other (Explain in Remarks)											
Remarks: No hydric indicators											

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes <u>No</u> Wetland Hydrology Present? Yes <u>No</u> Hydric Soils Present? Yes <u>No</u>	Is this Sampling Point Within a Wetland? Yes <u>No</u>
Remarks: Plot located adjacent to Flag 15	

* Forest County Soil Survey Not Complete

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Mine Site	Date: 8/24/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg/Brad Helmandollar	State: WI
Do Normal Circumstances exist on the site? <u>Yes</u> No	Wetland ID: M3
Is the site significantly disturbed (Atypical Situation)? Yes <u>No</u>	Transect ID:
Is the area a potential Problem Area? (If needed, explain on reverse.) Yes <u>No</u>	Plot ID: 2B

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Acer rubrum</i> *	tree	FAC	9.		
2. <i>Populus tremuloides</i> *	tree	FAC	10.		
3. <i>Acer rubrum</i>	shrub	FAC	11.		
4. <i>Dryopteris</i> spp.	herb		12.		
5. <i>Lycopodium obscurum</i>	herb	FACU	13.		
6. <i>Coptis trifolia</i>	herb	FACW	14.		
7. <i>Lycopodium annotinum</i>	herb	FAC	15.		
8. <i>Acer saccharum</i>	herb	FACU	16.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). 75% * = dominant species					
Remarks:					

HYDROLOGY

Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: ☒ Water Stained/Silt Covered Leaves ☐ Drift Lines ☐ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☐ Exposed Roots ☒ Periodically Flooded Channels/Depressions
Field Observations: Depth of Surface Water <u>NA</u> (in.) Depth of Free Water in Pit <u>NA</u> (in.) Depth of Saturated Soil <u>NA</u> (in.)	
Remarks:	

Map Unit Name * (Series and Phase):	Drainage Class: * Field Observations Confirm Mapped Type? Yes No												
Profile Description: <table style="width: 100%; margin-top: 10px;"> <thead> <tr> <th style="text-align: center;">Depth (inches)</th> <th style="text-align: center;">Matrix Color (Munsell Notation)</th> <th style="text-align: center;">Mottle Colors (Munsell Notation)</th> <th style="text-align: center;">Mottle Abundance</th> <th style="text-align: center;">Soil Texture/ Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0-24"</td> <td style="text-align: center;">10 YR 7/2</td> <td style="text-align: center;">10 YR 5/8</td> <td style="text-align: center;">minor</td> <td style="text-align: center;">clay loam</td> </tr> </tbody> </table>		Depth (inches)	Matrix Color (Munsell Notation)	Mottle Colors (Munsell Notation)	Mottle Abundance	Soil Texture/ Type	0-24"	10 YR 7/2	10 YR 5/8	minor	clay loam		
Depth (inches)	Matrix Color (Munsell Notation)	Mottle Colors (Munsell Notation)	Mottle Abundance	Soil Texture/ Type									
0-24"	10 YR 7/2	10 YR 5/8	minor	clay loam									
Hydric Soil Indicators: <table style="width: 100%; margin-top: 10px;"> <tr> <td>☐ Histosol</td> <td>☐ Concretions</td> </tr> <tr> <td>☐ Histic Epipedon</td> <td>☐ High Organic Content in Surface Layer in Sandy Soil</td> </tr> <tr> <td>☐ Sulfidic Odor</td> <td>☐ Organic Streaking in Sandy Soil</td> </tr> <tr> <td>☐ Aquic Moisture Regime</td> <td>☐ Listed on Local Hydric Soils List</td> </tr> <tr> <td>☐ Reducing Conditions</td> <td>☐ Listed on National Hydric Soils List</td> </tr> <tr> <td>☒ Gleyed or <u>Low Chroma</u></td> <td>☐ Other (Explain in Remarks)</td> </tr> </table>		☐ Histosol	☐ Concretions	☐ Histic Epipedon	☐ High Organic Content in Surface Layer in Sandy Soil	☐ Sulfidic Odor	☐ Organic Streaking in Sandy Soil	☐ Aquic Moisture Regime	☐ Listed on Local Hydric Soils List	☐ Reducing Conditions	☐ Listed on National Hydric Soils List	☒ Gleyed or <u>Low Chroma</u>	☐ Other (Explain in Remarks)
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☒ Gleyed or <u>Low Chroma</u>	☐ Other (Explain in Remarks)												
Remarks:													

WETLAND DETERMINATION

Hydrophytic Vegetation Present? <u>Yes</u> No Wetland Hydrology Present? <u>Yes</u> No Hydric Soils Present? <u>Yes</u> No	Is this Sampling Point Within a Wetland? <u>Yes</u> No
Remarks:	

* Forest County Soil Survey Not Complete

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Mine Site	Date: 8/25/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg/Brad Helmandollar	State: WI
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Wetland ID: M3
Is the site significantly disturbed (Atypical Situation)? Yes ☒ No	Transect ID:
Is the area a potential Problem Area? (If needed, explain on reverse.) Yes ☒ No	Plot ID: 2C

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Acer rubrum</i> *	tree	FAC	9. <i>Sphagnum spp.</i>	herb	OBL
2. <i>Betula alleghaniensis</i>	tree	FAC	10.		
3. <i>Tsuga canadensis</i>	tree	FACU+	11.		
4. <i>Populus tremuloides</i>	tree	FAC	12.		
5. <i>Acer rubrum</i>	shrub	FAC	13.		
6. <i>Betula alleghaniensis</i>	shrub	FAC	14.		
7. <i>Dryopteris Spp</i>	herb		15.		
8. <i>Trientalis borealis</i>	herb	FAC+	16.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). 90%			* = dominant species		
Remarks:					

HYDROLOGY

_____ Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: ☒ Water Stained/Silt Covered Leaves ☐ Drift Lines ☐ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☒ Exposed Roots ☒ Periodically Flooded Channels/Depressions
Field Observations: Depth of Surface Water <u>NA</u> (in.) Depth of Free Water in Pit <u>NA</u> (in.) Depth of Saturated Soil <u>NA</u> (in.)	
Remarks:	

Map Unit Name * (Series and Phase):	Drainage Class: * Field Observations Confirm Mapped Type? Yes No										
Profile Description: <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Depth (inches)</th> <th style="text-align: center;">Matrix Color (Munsell Notation)</th> <th style="text-align: center;">Mottle Colors (Munsell Notation)</th> <th style="text-align: center;">Mottle Abundance</th> <th style="text-align: center;">Soil Texture/ Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0-24"</td> <td style="text-align: center;">7.5 YR 6/2</td> <td style="text-align: center;">7.5 YR 5/8</td> <td style="text-align: center;">moderate</td> <td style="text-align: center;">sandy loam</td> </tr> </tbody> </table>		Depth (inches)	Matrix Color (Munsell Notation)	Mottle Colors (Munsell Notation)	Mottle Abundance	Soil Texture/ Type	0-24"	7.5 YR 6/2	7.5 YR 5/8	moderate	sandy loam
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0-24"	7.5 YR 6/2	7.5 YR 5/8	moderate	sandy loam							
Hydric Soil Indicators: ☐ Histosol ☐ Concretions ☐ Histic Epipedon ☐ High Organic Content in Surface Layer in Sandy Soil ☐ Sulfidic Odor ☐ Organic Streaking in Sandy Soil ☐ Aquic Moisture Regime ☐ Listed on Local Hydric Soils List ☐ Reducing Conditions ☐ Listed on National Hydric Soils List ☒ Gleyed or <u>Low Chroma</u> ☐ Other (Explain in Remarks)											
Remarks: Basis-mottles and low chroma											

WETLAND DETERMINATION

Hydrophytic Vegetation Present? <u>Yes</u> No Wetland Hydrology Present? <u>Yes</u> No Hydric Soils Present? <u>Yes</u> No	Is this Sampling Point Within a Wetland? <u>Yes</u> No
Remarks: Basis - edge of sphagnum, clear topography Plot located adjacent to Flag 15	

* Forest County Soil Survey Not Complete

Data Form

Routine Wetland Determination

(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Mine Site	Date: 8/25/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg/Brad Helmandollar	State: WI
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Wetland ID: M3
Is the site significantly disturbed (Atypical Situation)? Yes ☒ No	Transect ID:
Is the area a potential Problem Area? (If needed, explain on reverse.) Yes ☒ No	Plot ID: 2D

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Tsuga canadensis</i> *	tree	FACU+	9. <i>Trientalis borealis</i>	herbs	FAC+
2. <i>Betula alleghaniensis</i>	tree	FAC	10. <i>Streptopus roseus</i>	herb	FAC
3. <i>Populus tremuloides</i>	tree	FAC	11. <i>Clintonia borealis</i>	herbs	FAC+
4. <i>Acer rubrum</i>	tree	FAC	12. <i>Aralia nudicaulis</i>	herbs	FACU
5. <i>Acer saccharum</i>	tree	FACU	13.		
6. <i>Acer rubrum</i> *	shrub	FAC	14.		
7. <i>Acer saccharum</i>	shrub	FACU	15.		
8. <i>Dryopteris</i> spp	herb		16.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). < 50%			* = dominant species		
Remarks: Hemlock is the dominant plant species					

HYDROLOGY

Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: ☐ Water Stained/Silt Covered Leaves ☐ Drift Lines ☐ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☐ Exposed Roots ☐ Periodically Flooded Channels/Depressions
Field Observations: Depth of Surface Water <u>NA</u> (in.) Depth of Free Water in Pit <u>NA</u> (in.) Depth of Saturated Soil <u>NA</u> (in.)	
Remarks: No indication of hydrology	

Map Unit Name * (Series and Phase):	Drainage Class: * Field Observations Confirm Mapped Type? Yes No												
Profile Description: <table style="width: 100%; border: none;"> <tr> <td style="text-align: center; width: 20%;">Depth (inches)</td> <td style="text-align: center; width: 20%;">Matrix Color (Munsel Notation)</td> <td style="text-align: center; width: 20%;">Mottle Colors (Munsel Notation)</td> <td style="text-align: center; width: 20%;">Mottle Abundance</td> <td style="text-align: center; width: 20%;">Soil Texture/ Type</td> </tr> <tr> <td style="text-align: center;">0-24"</td> <td style="text-align: center;">10 YR 6/4</td> <td></td> <td></td> <td style="text-align: center;">silty-loam</td> </tr> </table>		Depth (inches)	Matrix Color (Munsel Notation)	Mottle Colors (Munsel Notation)	Mottle Abundance	Soil Texture/ Type	0-24"	10 YR 6/4			silty-loam		
Depth (inches)	Matrix Color (Munsel Notation)	Mottle Colors (Munsel Notation)	Mottle Abundance	Soil Texture/ Type									
0-24"	10 YR 6/4			silty-loam									
Hydric Soil Indicators: <table style="width: 100%; border: none;"> <tr> <td>☐ Histosol</td> <td>☐ Concretions</td> </tr> <tr> <td>☐ Histic Epipedon</td> <td>☐ High Organic Content in Surface Layer in Sandy Soil</td> </tr> <tr> <td>☐ Sulfidic Odor</td> <td>☐ Organic Streaking in Sandy Soil</td> </tr> <tr> <td>☐ Aquic Moisture Regime</td> <td>☐ Listed on Local Hydric Soils List</td> </tr> <tr> <td>☐ Reducing Conditions</td> <td>☐ Listed on National Hydric Soils List</td> </tr> <tr> <td>☐ Gleyed or Low Chroma</td> <td>☐ Other (Explain in Remarks)</td> </tr> </table>		☐ Histosol	☐ Concretions	☐ Histic Epipedon	☐ High Organic Content in Surface Layer in Sandy Soil	☐ Sulfidic Odor	☐ Organic Streaking in Sandy Soil	☐ Aquic Moisture Regime	☐ Listed on Local Hydric Soils List	☐ Reducing Conditions	☐ Listed on National Hydric Soils List	☐ Gleyed or Low Chroma	☐ Other (Explain in Remarks)
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☐ Gleyed or Low Chroma	☐ Other (Explain in Remarks)												
Remarks: No indication of hydric soils													

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes <u>No</u> Wetland Hydrology Present? Yes <u>No</u> Hydric Soils Present? Yes <u>No</u>	Is this Sampling Point Within a Wetland? Yes <u>No</u>
Remarks: Plot located adjacent to Flag 57	

* Forest County Soil Survey Not Complete

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Mine Site	Date: 8/25/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg/Brad Helmandollar	State: WI
Do Normal Circumstances exist on the site? Yes No	Wetland ID: M3
Is the site significantly disturbed (Atypical Situation)? Yes No	Transect ID:
Is the area a potential Problem Area? Yes No (If needed, explain on reverse.)	Plot ID: 3A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Acer saccharum</i>	tree	FACU	9. <i>Dryopteris Spp.</i>	herb	
2. <i>Tsuga canadensis</i>	tree	FACU+	10. <i>Acer saccharinum</i>	sapling	FACU
3. <i>Betula alleghaniensis</i>	tree	FAC	11.		
4. <i>Abies balsamea</i>	tree	FACW	12.		
5. <i>Acer saccharum</i>	shrub	FACU	13.		
6. <i>Ulmus americana</i>	shrub	FALW-	14.		
7. <i>Lycopodium obscurum</i>	shrub	FALU	15.		
8. <i>Aralia nudicaulis</i>	shrub	FACU	16.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). * = dominant species					
Remarks:					

HYDROLOGY

_____ Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: ☐ Water Stained/Silt Covered Leaves ☐ Drift Lines ☐ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☐ Exposed Roots ☐ Periodically Flooded Channels/Depressions
Field Observations: Depth of Surface Water <u>NA</u> (in.) Depth of Free Water in Pit <u>NA</u> (in.) Depth of Saturated Soil <u>NA</u> (in.)	
Remarks:	

Map Unit Name * (Series and Phase):	Drainage Class: * Field Observations Confirm Mapped Type? Yes No																				
Profile Description: <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Depth (inches)</th> <th style="text-align: center;">Matrix Color (Munsell Notation)</th> <th style="text-align: center;">Mottle Colors (Munsell Notation)</th> <th style="text-align: center;">Mottle Abundance</th> <th style="text-align: center;">Soil Texture/ Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0-4"</td> <td></td> <td></td> <td></td> <td style="text-align: center;">Organic</td> </tr> <tr> <td style="text-align: center;">4-12"</td> <td style="text-align: center;">7.5 YR 6/8</td> <td></td> <td></td> <td style="text-align: center;">Sandy Loam</td> </tr> <tr> <td style="text-align: center;">12-24"</td> <td style="text-align: center;">10 YR 6/4</td> <td></td> <td></td> <td style="text-align: center;">Sandy Loam</td> </tr> </tbody> </table>		Depth (inches)	Matrix Color (Munsell Notation)	Mottle Colors (Munsell Notation)	Mottle Abundance	Soil Texture/ Type	0-4"				Organic	4-12"	7.5 YR 6/8			Sandy Loam	12-24"	10 YR 6/4			Sandy Loam
Depth (inches)	Matrix Color (Munsell Notation)	Mottle Colors (Munsell Notation)	Mottle Abundance	Soil Texture/ Type																	
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4-12"	7.5 YR 6/8			Sandy Loam																	
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Hydric Soil Indicators: <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top;"> ☐ Histosol ☐ Histic Epipedon ☐ Sulfidic Odor ☐ Aquic Moisture Regime ☐ Reducing Conditions ☐ Gleyed or Low Chroma </td> <td style="width: 50%; vertical-align: top;"> ☐ Concretions ☐ High Organic Content in Surface Layer in Sandy Soil ☐ Organic Streaking in Sandy Soil ☐ Listed on Local Hydric Soils List ☐ Listed on National Hydric Soils List ☐ Other (Explain in Remarks) </td> </tr> </table>		☐ Histosol ☐ Histic Epipedon ☐ Sulfidic Odor ☐ Aquic Moisture Regime ☐ Reducing Conditions ☐ Gleyed or Low Chroma	☐ Concretions ☐ High Organic Content in Surface Layer in Sandy Soil ☐ Organic Streaking in Sandy Soil ☐ Listed on Local Hydric Soils List ☐ Listed on National Hydric Soils List ☐ Other (Explain in Remarks)																		
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Remarks: No hydric indicators																					

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes <u>No</u> Wetland Hydrology Present? Yes <u>No</u> Hydric Soils Present? Yes <u>No</u>	Is this Sampling Point Within a Wetland? Yes <u>No</u>
Remarks:	

* Forest County Soil Survey Not Complete

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Mine Site	Date: 8/25/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg/Brad Helmandollar	State: WI
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Wetland ID: M3
Is the site significantly disturbed (Atypical Situation)? Yes ☐ No ☒	Transect ID:
Is the area a potential Problem Area? (If needed, explain on reverse.) Yes ☐ No ☒	Plot ID: 3B

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Fraxinus nigra</i> *	tree	FACW+	9. <i>Dryopteris Spp.</i>		
2. <i>Betula alleghaniensis</i>	tree	FAC	10. <i>Impatiens capensis</i>	herb	FACW
3. <i>Populus tremuloides</i>	tree	FAC	11. <i>Scutellaria Spp.</i>		
4. <i>Ulmus americana</i>	tree	FACW-	12.		
5. <i>Fraxinus nigra</i>	shrub	FACW+	13.		
6. <i>Nemopanthis mucronata</i>	shrub	OBL	14.		
7. <i>Betula alleghaniensis</i>	shrub	FAC	15.		
8. <i>Calamagrostis canadensis</i>	herb	OBL	16.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). 100%			* = dominant species		
Remarks:					

HYDROLOGY

_____ Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: ☐ Water Stained/Silt Covered Leaves ☐ Drift Lines ☐ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☐ Exposed Roots ☐ Periodically Flooded Channels/Depressions
Field Observations: Depth of Surface Water <u>NA</u> (in.) Depth of Free Water in Pit <u>NA</u> (in.) Depth of Saturated Soil <u>NA</u> (in.)	
Remarks: Sloping topography	

Map Unit Name * (Series and Phase):	Drainage Class: * Field Observations Confirm Mapped Type? Yes No															
Profile Description: <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Depth (inches)</th> <th style="text-align: center;">Matrix Color (Munsell Notation)</th> <th style="text-align: center;">Mottle Colors (Munsell Notation)</th> <th style="text-align: center;">Mottle Abundance</th> <th style="text-align: center;">Soil Texture/ Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0-4"</td> <td></td> <td></td> <td></td> <td style="text-align: center;">O.M.</td> </tr> <tr> <td style="text-align: center;">4-24"</td> <td style="text-align: center;">10 YR 5/1</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Depth (inches)	Matrix Color (Munsell Notation)	Mottle Colors (Munsell Notation)	Mottle Abundance	Soil Texture/ Type	0-4"				O.M.	4-24"	10 YR 5/1			
Depth (inches)	Matrix Color (Munsell Notation)	Mottle Colors (Munsell Notation)	Mottle Abundance	Soil Texture/ Type												
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4-24"	10 YR 5/1															
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Remarks:																

WETLAND DETERMINATION

Hydrophytic Vegetation Present? <u>Yes</u> No Wetland Hydrology Present? <u>Yes</u> No Hydric Soils Present? <u>Yes</u> No	Is this Sampling Point Within a Wetland? <u>Yes</u> No
Remarks:	

* Forest County Soil Survey Not Complete

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Mine Site	Date: 8/25/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg/Brad Helmandollar	State: WI

Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Wetland ID: F64
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No	Transect ID:
Is the area a potential Problem Area? (If needed, explain on reverse.) ☐ Yes ☒ No	Plot ID: 1A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Betula alleghaniensis</i>	tree	FAC	9.		
2. <i>Acer saccharum</i> *	tree	FACU	10.		
3. <i>Abies balsamea</i>	tree	FACW	11.		
4. <i>Abies balsamea</i> *	shrub	FAC	12.		
5. <i>Acer saccharinum</i>	shrub	FACU	13.		
6. <i>Aralia nudicaulis</i>	herb	FACU	14.		
7. <i>Lycopodium obscurum</i>	herb	FACU	15.		
8. <i>Lycopodium claratum</i>	herb	FAC	16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). < 50% * = dominant species

Remarks:

HYDROLOGY

_____ Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: ☐ Water Stained/Silt Covered Leaves ☐ Drift Lines ☐ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☐ Exposed Roots ☐ Periodically Flooded Channels
Field Observations: Depth of Surface Water <u>NA</u> (in.) Depth of Free Water in Pit <u>NA</u> (in.) Depth of Saturated Soil <u>NA</u> (in.)	
Remarks:	

Map Unit Name * (Series and Phase):	Drainage Class: * Field Observations Confirm Mapped Type? Yes No												
Profile Description: <table style="width: 100%; border: none;"> <thead> <tr> <th style="text-align: center;">Depth (inches)</th> <th style="text-align: center;">Matrix Color (Munsell Notation)</th> <th style="text-align: center;">Mottle Colors (Munsell Notation)</th> <th style="text-align: center;">Mottle Abundance</th> <th style="text-align: center;">Soil Texture/ Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0-24"</td> <td></td> <td style="text-align: center;">7.5 YR 5/8</td> <td></td> <td style="text-align: center;">sandy loam</td> </tr> </tbody> </table>		Depth (inches)	Matrix Color (Munsell Notation)	Mottle Colors (Munsell Notation)	Mottle Abundance	Soil Texture/ Type	0-24"		7.5 YR 5/8		sandy loam		
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Remarks: No hydric indicators													

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes ☒ No Wetland Hydrology Present? Yes ☒ No Hydric Soils Present? Yes ☒ No	Is this Sampling Point Within a Wetland? Yes ☒ No
Remarks:	

* Forest County Soil Survey Not Complete

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Mine Site	Date: 8/25/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg/Brad Helmandollar	State: WI
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Wetland ID: F64
Is the site significantly disturbed (Atypical Situation)? Yes ☒ No	Transect ID:
Is the area a potential Problem Area? (If needed, explain on reverse.) Yes ☒ No	Plot ID: 1B

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Acer rubrum</i> *	tree	FAC	9.		
2. <i>Betula alleghaniensis</i>	tree	FAC	10.		
3. <i>Carex intumescens</i> *	herb	FACW+	11.		
4. <i>Bidens connata</i>	herb	OBL	12.		
5. <i>Scotilaria lateriflora</i>	herb	OBL	13.		
6. <i>Sphagnum magellanicum</i>			14.		
7.			15.		
8.			16.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). 100% * = dominant species					
Remarks: Trees and saplings only around periphery					

HYDROLOGY

____ Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: ☒ Water Stained/Silt Covered Leaves ☐ Drift Lines ☒ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☐ Exposed Roots ☐ Periodically Flooded Channels/Depressions
Field Observations: Depth of Surface Water <u>1</u> (in.) Depth of Free Water in Pit <u>0</u> (in.) Depth of Saturated Soil <u>0</u> (in.)	
Remarks: Plot located in a periodically flooded depression	

Map Unit Name * (Series and Phase):	Drainage Class: * Field Observations Confirm Mapped Type? Yes No															
Profile Description: <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Depth (inches)</th> <th style="text-align: center;">Matrix Color (Munsell Notation)</th> <th style="text-align: center;">Mottle Colors (Munsell Notation)</th> <th style="text-align: center;">Mottle Abundance</th> <th style="text-align: center;">Soil Texture/ Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0-10"</td> <td style="text-align: center;">5 Y 5/1</td> <td></td> <td></td> <td style="text-align: center;">wet sand</td> </tr> <tr> <td style="text-align: center;">0-20"</td> <td style="text-align: center;">10 YR 4/4</td> <td></td> <td></td> <td style="text-align: center;">silty clay</td> </tr> </tbody> </table>		Depth (inches)	Matrix Color (Munsell Notation)	Mottle Colors (Munsell Notation)	Mottle Abundance	Soil Texture/ Type	0-10"	5 Y 5/1			wet sand	0-20"	10 YR 4/4			silty clay
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Remarks: 																

WETLAND DETERMINATION

Hydrophytic Vegetation Present? <u>Yes</u> No Wetland Hydrology Present? <u>Yes</u> No Hydric Soils Present? <u>Yes</u> No	Is this Sampling Point Within a Wetland? <u>Yes</u> No
Remarks: 	

* Forest County Soil Survey Not Complete

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Mine Site	Date: 8/25/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg/Brad Helmandollar	State: WI

Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Wetland ID: F64
Is the site significantly disturbed (Atypical Situation)? Yes ☒ No	Transect ID:
Is the area a potential Problem Area? (If needed, explain on reverse.) Yes ☒ No	Plot ID: 1C

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Larix laricina</i> *	tree	FACW	9.		
2. <i>Picea mariana</i> *	tree	FACW	10.		
3. <i>Chamaedaphne calyculata</i>	shrub	OBL	11.		
4. <i>Pilea moriana</i>	shrub	FACW	12.		
5. <i>Larix laricina</i>	shrub	FACW	13.		
6. <i>Sphagnum spp.</i>	herb	OBL	14.		
7. <i>Carex spp.</i>	herb		15.		
8. <i>Iris versicolor</i>	herb	OBL	16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). 100% * = dominant species

Remarks:

HYDROLOGY

Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: ☐ Water Stained/Silt Covered Leaves ☐ Drift Lines ☐ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☐ Exposed Roots ☐ Periodically Flooded Channels/Depressions
Field Observations: Depth of Surface Water <u>NA</u> (in.) Depth of Free Water in Pit <u>0</u> (in.) Depth of Saturated Soil <u>0</u> (in.)	
Remarks: Landscape position clearly indicates hydrology	

Map Unit Name * (Series and Phase):	Drainage Class: * Field Observations Confirm Mapped Type? Yes No												
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Remarks: 													

WETLAND DETERMINATION

Hydrophytic Vegetation Present? <u>Yes</u> No Wetland Hydrology Present? <u>Yes</u> No Hydric Soils Present? <u>Yes</u> No	Is this Sampling Point Within a Wetland? <u>Yes</u> No
Remarks: 	

* Forest County Soil Survey Not Complete

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Mine Site	Date: 8/25/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg/Brad Helmandollar	State: WI
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Wetland ID: F65
Is the site significantly disturbed (Atypical Situation)? Yes ☐ No ☒	Transect ID:
Is the area a potential Problem Area? Yes ☐ No ☒ (If needed, explain on reverse.)	Plot ID: 1A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Acer saccharum</i> *	tree	FACU	9.		
2. <i>Populus tremuloides</i>	tree	FAC	10.		
3. <i>Fraxinus nigra</i>	tree	FACW+	11.		
4. <i>Abies balsamea</i>	shrub	FACW	12.		
5. <i>Acer saccharum</i> *	shrub	FACU	13.		
6. <i>Lycopodium obscurum</i>	herb	FACU	14.		
7. <i>Athyrium Felix-femina</i>	herb	FAC	15.		
8. <i>Aralia nudicaulis</i>	herb	FACU	16.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). * = dominant species < 50%					
Remarks: Dominants are upland plants					

HYDROLOGY

Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: ☐ Water Stained/Silt Covered Leaves ☐ Drift Lines ☐ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☐ Exposed Roots ☐ Periodically Flooded Channels/Depressions
Field Observations: Depth of Surface Water <u>NA</u> (in.) Depth of Free Water in Pit <u>NA</u> (in.) Depth of Saturated Soil <u>NA</u> (in.)	
Remarks: Sloping topography	

Map Unit Name * (Series and Phase):	Drainage Class: * Field Observations Confirm Mapped Type? Yes No												
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Remarks: No indicators of hydric soils													

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes <u>No</u> Wetland Hydrology Present? Yes <u>No</u> Hydric Soils Present? Yes <u>No</u>	Is this Sampling Point Within a Wetland? Yes <u>No</u>
Remarks:	

* Forest County Soil Survey Not Complete

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Mine Site	Date: 8/25/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg/Brad Helmandollar	State: WI
Do Normal Circumstances exist on the site? <u>Yes</u> No	Wetland ID: F65
Is the site significantly disturbed (Atypical Situation)? Yes <u>No</u>	Transect ID:
Is the area a potential Problem Area? Yes <u>No</u> (If needed, explain on reverse.)	Plot ID: 1B

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Fraxinus nigra</i> *	tree	FACW+	9. <i>Dryopteris spinulosa</i>	herb	FACW
2. <i>Acer rubrum</i> *	tree	FAC	10.		
3. <i>Betula alleghaniensis</i>	tree	FAC	11.		
4. <i>Abies balsamea</i>	tree	FACW	12.		
5. <i>Abies balsamea</i>	shrub	FACW	13.		
6. <i>Nemopanthus mucronatus</i>	shrub	OBL	14.		
7. <i>Scutellaria laterifolia</i>	herb	OBL	15.		
8. <i>Sphagnum</i> spp.	herb	OBL	16.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). 100% * = dominant species					
Remarks:					

HYDROLOGY

_____ Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other <u>X</u> No Recorded Data Available	Wetland Hydrology Indicators: ☒ Water Stained/Silt Covered Leaves ☐ Drift Lines ☐ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☐ Exposed Roots ☒ Periodically Flooded Channels/Depressions
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Remarks:	

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Remarks:																

WETLAND DETERMINATION

Hydrophytic Vegetation Present? <u>Yes</u> No Wetland Hydrology Present? <u>Yes</u> No Hydric Soils Present? <u>Yes</u> No	Is this Sampling Point Within a Wetland? <u>Yes</u> No
Remarks:	

* Forest County Survey Not Complete

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Mine Site	Date: 8/25/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg/Brad Helmandollar	State: WI
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Wetland ID: F65
Is the site significantly disturbed (Atypical Situation)? Yes ☐ No ☒	Transect ID:
Is the area a potential Problem Area? Yes ☐ No ☒ (If needed, explain on reverse.)	Plot ID: 1C

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Acer rubrum</i> *	tree	FAC	9.		
2. <i>Populus tremuloides</i>	tree	FAC	10.		
3. <i>Salix spp.</i> *	shrub		11.		
4. <i>Acer rubrum</i>	shrub	FAC	12.		
5. <i>Spirea alba</i>	herb	FACW+	13.		
6. <i>Sphagnum spp.</i>	herb	OBL	14.		
7. <i>Scirpus cyperinus</i>	herb	OBL	15.		
8. <i>Calamagrostis canadensis</i>	herb	OBL	16.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). 100%			* = dominant species		
Remarks:					

HYDROLOGY

Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: ☒ Water Stained/Silt Covered Leaves ☐ Drift Lines ☐ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☐ Exposed Roots ☒ Periodically Flooded Channels/Depressions
Field Observations: Depth of Surface Water <u>NA</u> (in.) Depth of Free Water in Pit <u>NA</u> (in.) Depth of Saturated Soil <u>NA</u> (in.)	
Remarks:	

Map Unit Name * (Series and Phase):	Drainage Class: * Field Observations Confirm Mapped Type? Yes No															
Profile Description: <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Depth (inches)</th> <th style="text-align: center;">Matrix Color (Munsell Notation)</th> <th style="text-align: center;">Mottle Colors (Munsell Notation)</th> <th style="text-align: center;">Mottle Abundance</th> <th style="text-align: center;">Soil Texture/ Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0-6"</td> <td style="text-align: center;">2.5 YR 3/2</td> <td></td> <td></td> <td style="text-align: center;">silty loam</td> </tr> <tr> <td style="text-align: center;">6-24"</td> <td style="text-align: center;">10 YR 4/6</td> <td style="text-align: center;">5 Y 5/1</td> <td style="text-align: center;">moderate</td> <td style="text-align: center;">silty loam</td> </tr> </tbody> </table>		Depth (inches)	Matrix Color (Munsell Notation)	Mottle Colors (Munsell Notation)	Mottle Abundance	Soil Texture/ Type	0-6"	2.5 YR 3/2			silty loam	6-24"	10 YR 4/6	5 Y 5/1	moderate	silty loam
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Remarks:																

WETLAND DETERMINATION

Hydrophytic Vegetation Present? <u>Yes</u> No Wetland Hydrology Present? <u>Yes</u> No Hydric Soils Present? <u>Yes</u> No	Is this Sampling Point Within a Wetland? <u>Yes</u> No
Remarks: Plot located adjacent to Flag 50	

* Forest County Soil Survey Not Complete

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Mine Site	Date: 8/25/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg/Brad Helmandollar	State: WI
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Wetland ID: F65
Is the site significantly disturbed (Atypical Situation)? Yes ☐ No ☒	Transect ID:
Is the area a potential Problem Area? Yes ☐ No ☒ (If needed, explain on reverse.)	Plot ID: 2A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Acer saccharum</i> *	tree	FACU	9. <i>Lycopodium obscurum</i>	herb	FACU
2. <i>Populus tremuloides</i>	tree	FAC	10. <i>Trientalis borealis</i>	herb	FAC+
3. <i>Acer rubrum</i>	tree	FAC	11.		
4. <i>Fraxinus americana</i>	shrub	FACU	12.		
5. <i>Abies balsamea</i>	shrub	FACW	13.		
6. <i>Acer saccharum</i> *	shrub	FACU	14.		
7. <i>Fraxinus nigra</i>	shrub	FACW+	15.		
8. <i>Aralia nudicaulis</i>	herb	FACU	16.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). 50% * = dominant species					
Remarks: The dominant plants are upland plants					

HYDROLOGY

Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: ☐ Water Stained/Silt Covered Leaves ☐ Drift Lines ☐ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☐ Exposed Roots ☐ Periodically Flooded Channels/Depressions
Field Observations: Depth of Surface Water <u>NA</u> (in.) Depth of Free Water in Pit <u>NA</u> (in.) Depth of Saturated Soil <u>NA</u> (in.)	
Remarks: Topography sloping towards wetland	

Map Unit Name * (Series and Phase):	Drainage Class: * Field Observations Confirm Mapped Type? Yes No												
Profile Description:													
Depth (inches) 0-10" 10-18"	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Matrix Color (Munsel Notation)</th> <th style="text-align: center;">Mottle Colors (Munsel Notation)</th> <th style="text-align: center;">Mottle Abundance</th> <th style="text-align: center;">Soil Texture/ Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">10 YR 4/2</td> <td></td> <td></td> <td style="text-align: center;">sandy loam</td> </tr> <tr> <td style="text-align: center;">10 YR 3/4</td> <td></td> <td></td> <td style="text-align: center;">sandy loam</td> </tr> </tbody> </table>	Matrix Color (Munsel Notation)	Mottle Colors (Munsel Notation)	Mottle Abundance	Soil Texture/ Type	10 YR 4/2			sandy loam	10 YR 3/4			sandy loam
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Remarks: No hydric soil indicators													

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes ☒ No Wetland Hydrology Present? Yes ☒ No Hydric Soils Present? Yes ☒ No	Is this Sampling Point Within a Wetland? Yes ☒ No
Remarks:	

* Forest County Soil Survey Not Complete

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Mine Site	Date: 8/25/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg/Brad Helmandollar	State: WI
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Wetland ID: F65
Is the site significantly disturbed (Atypical Situation)? Yes ☐ No ☒	Transect ID:
Is the area a potential Problem Area? Yes ☐ No ☒ (If needed, explain on reverse.)	Plot ID: 2B

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Acer rubrum</i> *	tree	FAC	9. <i>Scutellaria lateraflora</i>	herb	OBL
2. <i>Betula alleghaniensis</i>	tree	FAC	10.		
3. <i>Populus tremuloides</i>	tree	FAL	11.		
4. <i>Abies balsamea</i>	tree	FACW	12.		
5. <i>Acer rubrum</i> *	shrub	FAC	13.		
6. <i>Betula alleghaniensis</i>	shrub	FAC	14.		
7. <i>Abies balsamea</i>	shrub	FACW	15.		
8. <i>Spagnum spp.</i>	herb	OBL	16.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). 100%			* = dominant species		
Remarks:					

HYDROLOGY

Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: ☒ Water Stained/Silt Covered Leaves ☐ Drift Lines ☐ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☒ Exposed Roots ☒ Periodically Flooded Channels/depressions
Field Observations: Depth of Surface Water <u>NA</u> (in.) Depth of Free Water in Pit <u>NA</u> (in.) Depth of Saturated Soil <u>NA</u> (in.)	
Remarks:	

Map Unit Name * (Series and Phase):	Drainage Class: * Field Observations Confirm Mapped Type? Yes No			
Profile Description:				
Depth (inches)	Matrix Color (Munsel Notation)	Mottle Colors (Munsel Notation)	Mottle Abundance	Soil Texture/ Type
0-10"	2.5 yr 4/2			
10-24"	2.5 yr 5/2	10 yr 4/6	moderate	sandy loam
Hydric Soil Indicators:				
☐ Histosol	☐ Concretions			
☐ Histic Epipedon	☐ High Organic Content in Surface Layer in Sandy Soil			
☐ Sulfidic Odor	☐ Organic Streaking in Sandy Soil			
☐ Aquic Moisture Regime	☐ Listed on Local Hydric Soils List			
☐ Reducing Conditions	☐ Listed on National Hydric Soils List			
☒ Gleyed or <u>Low Chroma</u>	☐ Other (Explain in Remarks)			
Remarks:				

WETLAND DETERMINATION

Hydrophytic Vegetation Present? <u>Yes</u> No Wetland Hydrology Present? <u>Yes</u> No Hydric Soils Present? <u>Yes</u> No	Is this Sampling Point Within a Wetland? <u>Yes</u> No
Remarks:	

* Forest County Soil Survey Not Complete

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Mine Site	Date: 8/25/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg/Brad Helmandollar	State: WI
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Wetland ID: F65
Is the site significantly disturbed (Atypical Situation)? Yes ☐ No ☒	Transect ID:
Is the area a potential Problem Area? Yes ☐ No ☒ (If needed, explain on reverse.)	Plot ID: 3A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Quercus rubra</i>	tree	FACU	9.		
2. <i>Acer saccharum</i> *	tree	FACU	10.		
3. <i>Populus tremuloides</i>	tree	FAC	11.		
4. <i>Abies balsamea</i>	tree	FACU	12.		
5. <i>Acer saccharum</i> *	shrub	FACU	13.		
6. <i>Betula alleghaniensis</i>	shrub	FAC	14.		
7. <i>Lycopodium obscurum</i>	herb	FACU	15.		
8. <i>Triantulus borealis</i>	herb	FAC+	16.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). 30%			* = dominant species		
Remarks:					

HYDROLOGY

Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: ☐ Water Stained/Silt Covered Leaves ☐ Drift Lines ☐ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☐ Exposed Roots ☐ Periodically Flooded Channels
Field Observations: Depth of Surface Water <u>NA</u> (in.) Depth of Free Water in Pit <u>NA</u> (in.) Depth of Saturated Soil <u>NA</u> (in.)	
Remarks: No indicators of wetland hydrology	

Map Unit Name * (Series and Phase):	Drainage Class: * Field Observations Confirm Mapped Type? Yes No															
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Remarks: No indicators of hydric soils																

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes <u>No</u> Wetland Hydrology Present? Yes <u>No</u> Hydric Soils Present? Yes <u>No</u>	Is this Sampling Point Within a Wetland? Yes <u>No</u>
Remarks: No indication of water Plot located west of Flag 32	

* Forest County Soil Survey Not Complete

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Mine Site	Date: 8/25/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg/Brad Helmandollar	State: WI
Do Normal Circumstances exist on the site? <u>Yes</u> No	Wetland ID: F65
Is the site significantly disturbed (Atypical Situation)? Yes <u>No</u>	Transect ID:
Is the area a potential Problem Area? Yes <u>No</u> (If needed, explain on reverse.)	Plot ID: 3B

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Betula alleghaniensis</i> *	tree	FAC	9. <i>Scutellaria lateriflora</i>	herb	OBL
2. <i>Acer rubrum</i> *	tree	FAC	10. <i>Coptis trifolia</i>	tree	FACW
3. <i>Tsuga canadensis</i>	tree	FACU+	11. <i>Viola spp</i>		
4. <i>Fraxinus nigra</i>	tree	FACW+	12.		
5. <i>Betula alleghaniensis</i> *	shrub	FAC	13.		
6. <i>Acer rubrum</i> *	shrub	FAC	14.		
7. <i>Fraxinus nigra</i>	shrub	FACW+	15.		
8. <i>Spagnum spp.</i>	herb	OBL	16.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). 90% * = dominant species					
Remarks:					

HYDROLOGY

Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: ☒ Water Stained/Silt Covered Leaves ☐ Drift Lines ☐ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☐ Exposed Roots ☒ Periodically Flooded Channels/Depressions
Field Observations: Depth of Surface Water <u>NA</u> (in.) Depth of Free Water in Pit <u>NA</u> (in.) Depth of Saturated Soil <u>NA</u> (in.)	
Remarks:	

Map Unit Name * (Series and Phase):	Drainage Class: * Field Observations Confirm Mapped Type? Yes No																				
Profile Description:																					
Depth (inches) 0-2" 2-6" 6-20" 20-24"	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Matrix Color (Munsell Notation)</th> <th style="text-align: center;">Mottle Colors (Munsell Notation)</th> <th style="text-align: center;">Mottle Abundance</th> <th style="text-align: center;">Soil Texture/ Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">leaf litter</td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">2.5 yr 4/2</td> <td></td> <td></td> <td style="text-align: center;">sandy loam</td> </tr> <tr> <td style="text-align: center;">2.5 yr 4/2</td> <td style="text-align: center;">10 yr 4/6</td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">10 yr 4/4</td> <td style="text-align: center;">10 yr 4/6</td> <td></td> <td style="text-align: center;">sandy loam</td> </tr> </tbody> </table>	Matrix Color (Munsell Notation)	Mottle Colors (Munsell Notation)	Mottle Abundance	Soil Texture/ Type	leaf litter				2.5 yr 4/2			sandy loam	2.5 yr 4/2	10 yr 4/6			10 yr 4/4	10 yr 4/6		sandy loam
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Remarks:																					

WETLAND DETERMINATION

Hydrophytic Vegetation Present? <u>Yes</u> No Wetland Hydrology Present? <u>Yes</u> No Hydric Soils Present? <u>Yes</u> No	Is this Sampling Point Within a Wetland? <u>Yes</u> No
Remarks: Plot located adjacent to Flags 32 and 33	

* Forest County Soil Survey Not Yet Complete

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Mine Site	Date: 8/25/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg/Brad Helmandollar	State: WI
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Wetland ID: F65
Is the site significantly disturbed (Atypical Situation)? Yes ☐ No ☒	Transect ID:
Is the area a potential Problem Area? Yes ☐ No ☒ (If needed, explain on reverse.)	Plot ID: 4A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Acer rubrum</i> *	tree	FAC	9. <i>Aralia nudicaulis</i>	herb	FACU
2. <i>Tsuga canadensis</i>	tree	FACU+	10. <i>Viola spp.</i>	herb	
3. <i>Abies balsamea</i>	tree	FACW	11. <i>Trientalis borealis</i>	herb	FAC+
4. <i>Populus tremuloides</i>	tree	FAC	12.		
5. <i>Abies balsamea</i> *	shrub	FACW	13.		
6. <i>Acer rubrum</i>	shrub	FAC	14.		
7. <i>Lycopodium annotinum</i>	herb	FAC	15.		
8. <i>Lycopodium obscurum</i>	herb	FACU	16.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). 50%			* = dominant species		
Remarks:					

HYDROLOGY

Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: ☐ Water Stained/Silt Covered Leaves ☐ Drift Lines ☐ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☐ Exposed Roots ☐ Periodically Flooded Channels/Depressions
Field Observations: Depth of Surface Water <u>NA</u> (in.) Depth of Free Water in Pit <u>NA</u> (in.) Depth of Saturated Soil <u>NA</u> (in.)	
Remarks: No indication of hydrology	

Map Unit Name * (Series and Phase):	Drainage Class: * Field Observations Confirm Mapped Type? Yes No												
Profile Description:													
Depth (inches) 0-8" 8-24"	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Matrix Color (Munsel Notation)</th> <th style="text-align: center;">Mottle Colors (Munsel Notation)</th> <th style="text-align: center;">Mottle Abundance</th> <th style="text-align: center;">Soil Texture/ Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">7.5 yr 4/4</td> <td></td> <td></td> <td style="text-align: center;">sandy loam</td> </tr> <tr> <td style="text-align: center;">10 yr 4/4</td> <td></td> <td></td> <td style="text-align: center;">sandy loam</td> </tr> </tbody> </table>	Matrix Color (Munsel Notation)	Mottle Colors (Munsel Notation)	Mottle Abundance	Soil Texture/ Type	7.5 yr 4/4			sandy loam	10 yr 4/4			sandy loam
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Hydric Soil Indicators:													
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Remarks: No indications of hydric soils													

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes <u>No</u> Wetland Hydrology Present? Yes <u>No</u> Hydric Soils Present? Yes <u>No</u>	Is this Sampling Point Within a Wetland? Yes <u>No</u>
Remarks: Vegetation marginally hydrophytic-no indication of hydrology or hydric soils Plot located east of Flag 36	

* Forest County Soil Survey Not Complete

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Mine Site	Date: 8/25/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg/Brad Helmandollar	State: WI
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Wetland ID: F65
Is the site significantly disturbed (Atypical Situation)? Yes ☐ No ☒	Transect ID:
Is the area a potential Problem Area? Yes ☐ No ☒ (If needed, explain on reverse.)	Plot ID: 4B

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Tsuga canadensis</i>	tree	FACU+	9. <i>Coptis trifolia</i>	herb	FACW
2. <i>Betula alleghaniensis</i> *	tree	FAC	10. <i>Carex spp.</i>	herb	
3. <i>Acer rubrum</i> *	tree	FAC	11. <i>Lycopus americanus</i>	herb	OBL
4. <i>Betula alleghaniensis</i> *	shrub	FAC	12.		
5. <i>Picea mariana</i>	shrub	FACW	13.		
6. <i>Acer rubrum</i>	shrub	FAC	14.		
7. <i>Ilex verticillata</i>	shrub	FACW	15.		
8. <i>Sphagnum spp.</i>	herb	OBL	16.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). 90% * = dominant species					
Remarks:					

HYDROLOGY

Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: ☐ Water Stained/Silt Covered Leaves ☐ Drift Lines ☐ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☐ Exposed Roots ☐ Periodically Flooded Channels/Depressions
Field Observations: Depth of Surface Water <u>N/A</u> (in.) Depth of Free Water in Pit <u>N/A</u> (in.) Depth of Saturated Soil <u>4</u> (in.)	
Remarks: Clear presence of hydrology	

Map Unit Name * (Series and Phase):	Drainage Class: * Field Observations Confirm Mapped Type? Yes No																				
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Remarks:																					

WETLAND DETERMINATION

Hydrophytic Vegetation Present? <u>Yes</u> No Wetland Hydrology Present? <u>Yes</u> No Hydric Soils Present? <u>Yes</u> No	Is this Sampling Point Within a Wetland? <u>Yes</u> No
Remarks: Plot located west of Flag 36	

* Forest County Soil Survey Not Complete

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Mine Site	Date: 8/25/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg/Brad Helmandollar	State: WI

Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Wetland ID: P2
Is the site significantly disturbed (Atypical Situation)? Yes ☒ No	Transect ID:
Is the area a potential Problem Area? (If needed, explain on reverse.) Yes ☒ No	Plot ID: 1A (at Flag No. 1)

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Abies balsamea</i> *	tree	FACW	9. <i>Aralia nudicaulis</i> *	herb	FACU
2. <i>Populus tremuloides</i> *	tree	FAC	10. <i>Cornus canadensis</i>	herb	FAC
3. <i>Acer rubrum</i> *	tree	FAC	11. <i>Lycopodium anatinum</i>	herb	FAC
4. <i>Acer saccharum</i> *	shrub	FACU	12.		
5. <i>Acer rubrum</i>	shrub	FAC	13.		
6. <i>Betula papyrifera</i>	shrub	FACU+	14.		
7. <i>Aster macrophyllus</i>	herb		15.		
8. <i>Athyrium Felix-femina</i>	herb	FAC	16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). < 50% * = dominant species

Remarks:

HYDROLOGY

Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: ☐ Water Stained/Silt Covered Leaves ☐ Drift Lines ☐ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☐ Exposed Roots ☐ Periodically Flooded Channels/Depressions
Field Observations: Depth of Surface Water <u>NA</u> (in.) Depth of Free Water in Pit <u>NA</u> (in.) Depth of Saturated Soil <u>NA</u> (in.)	
Remarks: No indication of wetland hydrology	

Map Unit Name * (Series and Phase):	Drainage Class: * Field Observations Confirm Mapped Type? Yes No																																			
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Remarks: Too rocky to get a soil sample.																																				

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes <u>No</u> Wetland Hydrology Present? Yes <u>No</u> Hydric Soils Present? Yes <u>No</u>	Is this Sampling Point Within a Wetland? Yes <u>No</u>
Remarks: Plot located at Flag 1	

* Forest County Soil Survey Not Complete

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Mine Site	Date: 8/25/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg/Brad Helmandollar	State: WI

Do Normal Circumstances exist on the site? Yes No	Wetland ID: P2
Is the site significantly disturbed (Atypical Situation)? Yes No	Transect ID:
Is the area a potential Problem Area? (If needed, explain on reverse.) Yes No	Plot ID: 1B

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Thuja occidentalis</i> *	tree	FACW	9. <i>Osmunda claytoniana</i>	herb	OBL
2. <i>Populus tremuloides</i>	tree	FAC	10. <i>Abies balsamea</i>	tree	FACW
3. <i>Picea mariana</i> *	tree	FACW	11.		
4. <i>Acer rubrum</i>	shrub	FAC	12.		
5. <i>Alnus rugosa</i>	shrub	OBL	13.		
6. <i>Ilex verticillata</i>	shrub	FACW	14.		
7. <i>Cornus canadensis</i>	herb	FAC	15.		
8. <i>Sphagnum spp.</i>	herb	OBL	16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). 100% * = dominant species

Remarks:

HYDROLOGY

Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: ☐ Water Stained/Silt Covered Leaves ☐ Drift Lines ☐ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☐ Exposed Roots ☒ Periodically Flooded Channels/Depressions
Field Observations: Depth of Surface Water <u>NA</u> (in.) Depth of Free Water in Pit <u>NA</u> (in.) Depth of Saturated Soil <u>NA</u> (in.)	
Remarks: Hydrology clearly evidenced by topographic position	

Map Unit Name * (Series and Phase):	Drainage Class: * Field Observations Confirm Mapped Type? Yes No												
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Remarks:													

WETLAND DETERMINATION

Hydrophytic Vegetation Present? <u>Yes</u> No Wetland Hydrology Present? <u>Yes</u> No Hydric Soils Present? <u>Yes</u> No	Is this Sampling Point Within a Wetland? <u>Yes</u> No
Remarks:	

* Forest County Soil Survey Not Complete

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Mine Site	Date: 8/25/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg/Brad Helmandollar	State: WI

Do Normal Circumstances exist on the site? <u>Yes</u> No	Wetland ID: P2
Is the site significantly disturbed (Atypical Situation)? Yes <u>No</u>	Transect ID:
Is the area a potential Problem Area? (If needed, explain on reverse.) Yes <u>No</u>	Plot ID: 2A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Populus tremuloides</i> *	tree	FAC	9. <i>Osmunda claytoniana</i>	herb	FAC+
2. <i>Betula papyrifera</i> *	tree	FACU	10.		
3. <i>Abies balsamen</i>	tree	FACW	11.		
4. <i>Acer rubrum</i>	shrub	FAC	12.		
5. <i>Acer saccharinum</i>	shrub	FACU	13.		
6. <i>Rubus occidentalis</i>	herb		14.		
7. <i>Lycopodium obscurum</i>	herb	FACU	15.		
8. <i>Coptis trifolia</i>	herb	FACW	16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). < 50% * = dominant species

Remarks:

HYDROLOGY

_____ Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other <u> X </u> No Recorded Data Available	Wetland Hydrology Indicators: ☐ Water Stained/Silt Covered Leaves ☐ Drift Lines ☐ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☐ Exposed Roots ☐ Periodically Flooded Channels/Depressions
Field Observations: Depth of Surface Water <u> NA </u> (in.) Depth of Free Water in Pit <u> NA </u> (in.) Depth of Saturated Soil <u> NA </u> (in.)	
Remarks: No indicators of wetland hydrology	

Map Unit Name * (Series and Phase):	Drainage Class: * Field Observations Confirm Mapped Type? Yes No												
Profile Description: <table style="width: 100%; border: none;"> <thead> <tr> <th style="text-align: center;">Depth (inches)</th> <th style="text-align: center;">Matrix Color (Munsell Notation)</th> <th style="text-align: center;">Mottle Colors (Munsell Notation)</th> <th style="text-align: center;">Mottle Abundance</th> <th style="text-align: center;">Soil Texture/ Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0-24"</td> <td style="text-align: center;">10 YR 6/8</td> <td></td> <td></td> <td style="text-align: center;">silt loam</td> </tr> </tbody> </table>		Depth (inches)	Matrix Color (Munsell Notation)	Mottle Colors (Munsell Notation)	Mottle Abundance	Soil Texture/ Type	0-24"	10 YR 6/8			silt loam		
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Remarks: No hydric indicators													

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes <u>No</u> Wetland Hydrology Present? Yes <u>No</u> Hydric Soils Present? Yes <u>No</u>	Is this Sampling Point Within a Wetland? Yes <u>No</u>
Remarks:	

* Forest County Soil Survey Not Complete

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Mine Site	Date: 8/25/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg/Brad Helmandollar	State: WI

Do Normal Circumstances exist on the site?	Yes	No	Wetland ID: P2
Is the site significantly disturbed (Atypical Situation)?	Yes	No	Transect ID:
Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes	No	Plot ID: 2B

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Picea mariana</i>	tree	FACW	9. <i>Calamagrostis canadensis</i>	herb	OBL
2. <i>Populus tremuloides</i> *	tree	FAC	10. <i>Lycopus americanus</i>	herb	OBL
3. <i>Thuja occidentalis</i>	tree	FACW	11.		
4. <i>Acer rubrum</i>	shrub	FAC	12.		
5. <i>Ilex verticillata</i>	shrub	FACW+	13.		
6. <i>Alnus rugosa</i>	shrub	OBL	14.		
7. <i>Vaccinium myrtilloides</i>	shrub	FACW-	15.		
8. <i>Sphagnum spp.</i>	herb		16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). 100% * = dominant species

Remarks:

HYDROLOGY

Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: ☐ Water Stained/Silt Covered Leaves ☐ Drift Lines ☐ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☐ Exposed Roots ☒ Periodically Flooded Channels/Depressions
Field Observations: Depth of Surface Water <u>NA</u> (in.) Depth of Free Water in Pit <u>NA</u> (in.) Depth of Saturated Soil <u>NA</u> (in.)	
Remarks: Hydrology clearly evidenced by topography	

Map Unit Name * (Series and Phase):	Drainage Class: * Field Observations Confirm Mapped Type? Yes No															
Profile Description: <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Depth (inches)</th> <th style="text-align: center;">Matrix Color (Munsell Notation)</th> <th style="text-align: center;">Mottle Colors (Munsell Notation)</th> <th style="text-align: center;">Mottle Abundance</th> <th style="text-align: center;">Soil Texture/ Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0-4"</td> <td style="text-align: center;">black</td> <td></td> <td></td> <td style="text-align: center;">organic</td> </tr> <tr> <td style="text-align: center;">4-14"</td> <td style="text-align: center;">10 YR 7/2</td> <td style="text-align: center;">10 YR 6/8</td> <td style="text-align: center;">minor</td> <td style="text-align: center;">silt loam</td> </tr> </tbody> </table>		Depth (inches)	Matrix Color (Munsell Notation)	Mottle Colors (Munsell Notation)	Mottle Abundance	Soil Texture/ Type	0-4"	black			organic	4-14"	10 YR 7/2	10 YR 6/8	minor	silt loam
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Remarks:																

WETLAND DETERMINATION

Hydrophytic Vegetation Present? <u>Yes</u> No Wetland Hydrology Present? <u>Yes</u> No Hydric Soils Present? <u>Yes</u> No	Is this Sampling Point Within a Wetland? <u>Yes</u> No
Remarks: Plot located adjacent to Flag 14	

* Forest County Soil Survey Not Complete

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Mine Site	Date: 8/25/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg/Brad Helmandollar	State: WI
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Wetland ID: P2
Is the site significantly disturbed (Atypical Situation)? Yes ☐ No ☒	Transect ID:
Is the area a potential Problem Area? Yes ☐ No ☒ (If needed, explain on reverse.)	Plot ID: 3A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Abies balsamea</i>	tree	FACW	9. <i>Rubus idaeus</i>	herb	FACU+
2. <i>Populus tremloides</i> *	tree	FAC	10. <i>Clintonia borealis</i>	herb	FAC+
3. <i>Betula papyrifera</i>	tree	FACU	11. <i>Acer rubrum</i>	tree	FAC
4. <i>Corylus americana</i>	shrub	FACU	12.		
5. <i>Acer rubrum</i>	shrub	FAC	13.		
6. <i>Lycopodium obscurum</i>	herb	FACU	14.		
7. <i>Cornus canadensis</i>	herb	FAC	15.		
8. <i>Athyrium Filix-femina</i>	herb	FAC	16.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). 60% * = dominant species					
Remarks:					

HYDROLOGY

Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: ☐ Water Stained/Silt Covered Leaves ☐ Drift Lines ☐ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☐ Exposed Roots ☐ Periodically Flooded Channels
Field Observations: Depth of Surface Water <u>NA</u> (in.) Depth of Free Water in Pit <u>NA</u> (in.) Depth of Saturated Soil <u>NA</u> (in.)	
Remarks: Topography sloping towards wetland No hydrology indicators present	

Map Unit Name * (Series and Phase):	Drainage Class: * Field Observations Confirm Mapped Type? Yes No												
Profile Description: <table style="width: 100%; border: none;"> <thead> <tr> <th style="text-align: center;">Depth (inches)</th> <th style="text-align: center;">Matrix Color (Munsel Notation)</th> <th style="text-align: center;">Mottle Colors (Munsel Notation)</th> <th style="text-align: center;">Mottle Abundance</th> <th style="text-align: center;">Soil Texture/ Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0-24</td> <td style="text-align: center;">10 YR 6/4</td> <td style="text-align: center;">10 YR 5/8</td> <td style="text-align: center;">minor</td> <td style="text-align: center;">silty loam/ stoney</td> </tr> </tbody> </table>		Depth (inches)	Matrix Color (Munsel Notation)	Mottle Colors (Munsel Notation)	Mottle Abundance	Soil Texture/ Type	0-24	10 YR 6/4	10 YR 5/8	minor	silty loam/ stoney		
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Remarks: Very stoney soil-no hydric indicators													

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes <u>No</u> Wetland Hydrology Present? Yes <u>No</u> Hydric Soils Present? Yes <u>No</u>	Is this Sampling Point Within a Wetland? Yes <u>No</u>
Remarks:	

* Forest County Soil Survey Not Complete

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site: Crandon Mine Site	Date: 8/25/94
Applicant/Owner: Crandon Mining Company	County: Forest
Investigator: Ron Steg/Brad Helmandollar	State: WI
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Wetland ID: P2
Is the site significantly disturbed (Atypical Situation)? Yes ☐ No ☒	Transect ID:
Is the area a potential Problem Area? Yes ☐ No ☒ (If needed, explain on reverse.)	Plot ID: 3B

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Populus tremuloides</i>	tree	FACW	9. <i>Cornus canadensis</i>	herb	FAC
2. <i>Thuja occidentalis</i> *	tree	FACW	10. <i>Sphagnum spp.</i> *	herb	OBL
3. <i>Picea mariana</i>	tree	FACW	11.		
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5. <i>Acer rubrum</i>	shrub	FAC	13.		
6. <i>Alnus rugosa</i>	shrub	OBL	14.		
7. <i>Ilex verticillata</i>	shrub	FACW+	15.		
8. <i>Vaccinium myrtilloides</i>	shrub	FACW -	16.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC). 100% * = dominant species					
Remarks:					

HYDROLOGY

Recorded Data (Describe in Remarks): ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: ☒ Water Stained/Silt Covered Leaves ☐ Drift Lines ☐ High Water Marks ☐ Sand/Silt Deposits ☐ Swollen Tree Bases ☐ Exposed Roots ☒ Periodically Flooded Channels/Depressions
Field Observations: Depth of Surface Water <u>NA</u> (in.) Depth of Free Water in Pit <u>NA</u> (in.) Depth of Saturated Soil <u>NA</u> (in.)	
Remarks:	

Map Unit Name * (Series and Phase):	Drainage Class: * Field Observations Confirm Mapped Type? Yes No												
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Remarks: 													

WETLAND DETERMINATION

Hydrophytic Vegetation Present? <u>Yes</u> No Wetland Hydrology Present? <u>Yes</u> No Hydric Soils Present? <u>Yes</u> No	Is this Sampling Point Within a Wetland? <u>Yes</u> No
Remarks: Plot is located adjacent to Flag 35 Hydric soils assumed based on vegetation, hydrology and landscape position	

* Forest County Soil Survey Not Complete

Appendix 3.10-4

Normalized Results of 10 Functional Models for Wetlands for the Study Area

Appendix 3.10-4 Table 1

Normalized Results of 10 Functional Models for 127 Wetlands in the Study Area

FUNCTIONAL MODELS											
Wetland No.	Biological Function	Hydrologic Support Function	Groundwater Function	Storm and Floodwater Storage Function	Shoreline Protection Function	Water Quality Maintenance Function	Cultural and Economic Function	Recreational Function	Aesthetics Function	Education Function	Total
A1	14.00	0.24	1.28	4.72	0.00	4.48	1.75	1.80	2.30	0.90	31.47
A2	10.80	3.60	2.24	4.24	0.00	3.04	3.50	1.40	1.95	0.00	30.77
A3	6.40	0.64	2.24	4.96	0.00	3.92	3.05	1.15	1.95	0.00	24.31
B1	8.40	2.80	3.12	2.40	0.00	2.56	0.00	1.05	1.60	0.00	21.93
B2*	20.80	5.12	3.52	5.52	0.00	5.52	4.35	2.45	1.65	0.90	49.83
B3*	13.20	2.72	3.12	3.44	2.32	2.64	3.05	1.90	2.00	0.00	34.49
B4*	19.60	4.56	1.84	5.68	0.00	4.48	4.35	2.45	1.95	0.90	45.81
B5*	14.40	0.24	2.80	4.96	0.00	4.56	2.60	1.50	1.40	0.00	32.46
B8*	8.80	0.24	2.56	4.08	0.00	4.00	2.15	1.25	2.10	0.00	25.18
D1*	22.00	5.12	3.20	5.60	3.68	5.28	5.00	2.77	2.45	3.25	58.35
D2	6.00	1.76	2.64	2.32	0.00	1.36	0.00	1.30	1.95	0.00	17.33
D3*	11.20	4.08	1.44	5.36	0.00	4.08	3.05	1.65	1.65	0.00	32.51
D4*	19.60	4.40	1.52	5.76	0.00	4.56	4.35	2.45	1.95	0.90	45.49
D4A*	0.00	0.64	1.68	5.36	0.00	4.32	3.05	1.30	1.65	0.00	28.00
D5*	8.00	0.24	2.80	4.96	0.00	3.92	1.30	1.00	2.65	0.00	24.87
D8*	8.80	0.24	1.52	4.64	0.00	3.52	2.15	1.25	2.10	0.00	24.22
D18	6.00	0.24	1.52	4.80	0.00	3.68	2.15	0.80	1.40	0.00	20.59
F1	16.80	3.76	4.80	2.64	0.00	3.28	1.75	2.20	1.95	0.90	38.08
F2	31.60	5.30	4.80	4.24	1.04	5.28	3.50	4.00	2.55	0.90	63.23
F4	21.20	4.96	2.96	5.36	3.68	4.80	3.50	2.60	1.65	0.90	51.61
F5	16.00	0.64	3.20	5.44	0.00	4.24	4.15	1.95	1.95	2.35	39.92
F6	8.40	4.08	2.08	3.92	0.00	3.76	0.00	0.80	0.90	0.00	23.94
F7	22.00	1.86	2.80	5.76	0.00	5.76	3.50	2.45	2.55	0.90	47.58
F8	9.60	0.24	2.56	4.48	0.00	3.92	2.15	1.00	1.95	0.90	26.80
F9	21.60	4.96	3.68	4.96	6.32	4.64	4.65	3.40	2.20	2.05	58.46
F10*	22.40	5.52	3.52	6.08	7.04	5.12	4.35	3.30	1.65	0.90	59.88
F11*	15.20	4.56	3.12	5.76	0.00	4.88	5.00	2.60	1.95	2.35	45.42
F12	24.00	1.52	3.68	6.16	3.36	5.60	3.50	3.40	2.00	0.90	54.12
F13*	12.80	0.64	3.20	5.76	0.00	4.56	3.50	1.40	1.95	0.00	33.81

Appendix 3.10-4 Table 1

Normalized Results of 10 Functional Models for 127 Wetlands in the Study Area

FUNCTIONAL MODELS											
Wetland No.	Biological Function	Hydrologic Function	Groundwater Function	Storm and Floodwater Storage Function	Shoreline Protection Function	Water Quality Maintenance Function	Cultural Economic Function	Recreational Function	Aesthetics Function	Education Function	Total
F15	20.80	1.44	3.68	5.60	0.00	4.32	4.55	2.20	2.45	3.25	48.29
F16	15.50	1.12	3.68	6.16	0.00	4.64	3.70	2.20	3.40	3.25	43.65
F17	9.20	0.64	1.68	5.36	0.00	4.32	3.05	1.30	1.65	0.00	27.20
F18	20.80	5.12	3.68	5.68	0.00	5.28	4.35	2.30	1.95	0.90	50.06
F19	23.60	5.60	3.68	5.52	4.64	6.08	3.80	4.45	3.60	2.05	63.02
F21	12.00	5.12	2.80	5.36	4.64	5.76	3.25	3.80	3.05	3.25	59.03
F22	8.80	4.08	2.64	4.80	0.00	4.00	3.70	1.80	2.45	2.35	34.62
F23*	23.20	6.04	3.36	6.32	4.64	6.32	3.50	3.80	2.55	0.90	60.63
F24	8.40	2.24	2.08	3.28	0.00	2.56	0.65	1.25	1.85	2.35	24.66
F25*	12.80	4.24	1.52	5.52	0.00	4.72	3.70	1.80	2.70	3.25	40.25
F26	7.20	2.14	1.44	2.40	0.00	1.68	0.00	0.65	0.60	0.00	16.11
F27*	8.80	4.08	1.44	5.04	0.00	3.84	3.70	1.80	2.70	3.25	34.65
F28*	25.00	5.92	3.20	6.08	4.32	4.96	3.05	2.45	3.30	0.90	59.18
F29*	20.40	4.08	1.28	5.44	0.00	5.28	2.15	1.70	1.60	0.90	42.83
F30	7.60	1.76	1.44	2.24	0.00	1.60	0.00	0.90	1.60	0.00	17.14
F31*	16.80	4.46	1.52	5.60	0.00	4.56	4.35	2.30	2.20	0.90	42.79
F32*	7.60	0.24	1.28	5.04	0.00	4.00	2.15	0.80	1.65	0.00	22.76
F33	7.20	3.60	1.68	4.32	0.00	3.20	3.05	1.30	1.65	0.00	26.00
F34	7.60	0.32	1.28	4.24	0.00	2.96	2.15	0.80	1.65	0.00	19.00
F35	16.40	0.64	2.00	5.76	0.00	4.56	4.15	1.95	2.20	2.35	40.01
F36	10.40	0.72	1.68	4.56	0.00	3.28	3.70	1.50	2.20	2.35	30.39
F37	28.70	6.40	3.76	5.60	4.00	6.08	3.80	4.20	2.55	2.05	67.14
F38	7.60	2.48	2.08	2.48	0.00	2.16	0.00	0.90	1.60	0.00	19.30
F39	18.80	4.64	2.96	5.92	0.00	5.84	3.05	2.05	1.05	0.00	44.31
F40	25.30	4.64	3.20	5.28	0.00	5.68	4.15	2.90	2.55	3.25	56.95
F42	11.20	0.24	2.96	5.04	0.00	4.64	1.30	1.05	2.00	0.00	28.03
F43	10.80	0.64	3.20	5.60	0.00	4.56	2.15	1.15	2.35	0.00	30.45
F45	12.40	0.24	2.80	4.96	0.00	3.92	1.30	0.80	2.65	0.90	29.97
F46	12.00	0.64	3.20	5.44	0.00	4.24	4.15	1.90	1.95	2.35	35.87

Appendix 3.10-4 Table 1

Normalized Results of 10 Functional Models for 127 Wetlands in the Study Area

FUNCTIONAL MODELS											
Wetland No.	Biological Function	Hydrologic Support Function	Groundwater Function	Storm and Floodwater Storage Function	Shoreline Protection Function	Water Quality Maintenance Function	Cultural and Economic Function	Recreational Function	Aesthetics Function	Education Function	Total
F48	10.40	0.24	2.80	5.44	0.00	4.16	2.60	1.25	1.40	0.00	28.29
F50	7.20	0.24	2.80	5.12	0.00	3.92	2.15	0.80	1.65	0.00	23.88
F51	8.00	0.24	2.80	4.48	0.00	3.44	2.15	1.30	2.45	0.00	24.86
F52	16.40	0.72	3.36	6.08	0.00	4.88	2.15	1.70	2.65	0.90	38.84
F53	17.20	4.56	3.12	6.08	0.00	4.72	4.35	2.30	1.40	0.00	43.73
F54	13.20	0.64	3.20	5.60	0.00	4.56	2.15	1.15	2.10	0.00	32.60
F55	7.60	0.24	2.56	4.40	0.00	3.52	2.15	1.30	2.70	0.00	24.47
F57*	21.60	5.84	2.96	5.36	3.68	5.04	3.90	3.05	2.20	0.90	54.53
F58	15.5	0.24	2.56	4.32	0.00	4.56	2.40	2.40	3.50	3.25	38.73
F60*	20.00	4.64	2.00	5.84	0.00	5.04	5.00	2.60	2.70	3.25	51.07
F61*	8.80	3.36	1.28	4.48	0.00	3.68	3.70	1.80	1.95	2.35	31.40
F62*	14.40	4.56	1.68	5.28	0.00	4.64	4.55	2.40	2.45	3.25	43.21
F63*	18.80	5.12	2.00	5.84	0.00	5.04	4.35	3.20	1.95	0.90	46.30
F64*	15.20	5.12	2.00	5.68	0.00	5.04	3.05	2.05	2.65	0.00	40.79
F65*	20.80	4.64	1.52	5.36	0.00	5.28	2.15	1.70	1.60	0.90	43.95
F66*	20.00	4.56	1.84	5.68	0.00	4.48	4.35	2.30	1.95	0.90	46.06
F69*	9.20	4.08	1.44	5.36	0.00	4.08	3.70	1.80	2.20	2.35	34.21
F70*	13.60	0.96	1.68	5.20	0.00	4.08	3.05	1.40	1.65	0.90	32.52
F72*	8.80	0.72	1.68	4.88	0.00	3.52	3.05	1.15	1.65	0.00	25.45
F81*	8.80	1.52	1.28	3.92	0.00	2.88	0.65	1.15	2.45	2.35	25.00
F86	7.60	0.24	2.56	5.52	0.00	4.00	2.85	1.15	2.20	2.35	28.47
F87	7.60	0.24	2.56	5.52	0.00	4.00	2.85	1.15	2.20	2.35	28.47
F90	7.20	1.52	3.12	3.60	0.00	2.88	0.65	1.15	2.45	2.35	24.92
F114*	17.60	0.24	5.04	4.56	0.00	4.32	2.40	2.40	3.25	3.25	43.06
F116	8.80	0.24	3.92	5.44	0.00	4.16	2.60	1.05	1.65	0.00	27.86
F119	13.60	0.64	3.20	5.44	0.00	4.24	4.15	1.95	2.20	3.25	38.67
F121	7.60	0.24	2.80	5.12	0.00	3.92	2.15	0.80	1.40	0.00	24.03
F122	6.80	0.24	2.80	5.12	0.00	3.92	2.85	1.15	1.95	2.35	27.18
F122A	14.40	0.24	2.80	4.80	0.00	4.24	1.95	1.65	3.05	3.25	36.38

Appendix 3.10-4 Table 1

Normalized Results of 10 Functional Models for 127 Wetlands in the Study Area

FUNCTIONAL MODELS											
Wetland No.	Biological Function	Hydrologic Support Function	Groundwater Function	Storm and Floodwater Storage Function	Shoreline Protection Function	Water Quality Maintenance Function	Cultural and Economic Function	Recreational Function	Aesthetics Function	Education Function	Total
F125	10.80	0.24	2.80	4.64	0.00	4.16	1.95	1.65	3.40	3.25	32.89
F126	11.60	0.64	3.20	5.92	0.00	4.96	2.60	1.60	2.00	0.00	32.52
F127	12.80	0.00	1.28	4.80	0.00	3.68	2.15	1.05	2.10	0.00	27.86
G1	6.80	0.24	2.80	5.12	0.00	3.92	2.15	1.00	1.65	0.00	23.68
H1	17.60	1.12	2.40	6.16	0.00	4.88	4.35	1.95	1.95	0.90	41.31
I1	14.40	0.24	2.56	4.88	0.00	3.92	2.85	1.65	2.90	3.25	36.65
J1	4.80	0.24	2.56	4.88	0.00	3.52	2.15	1.30	3.00	0.00	22.45
K1	10.80	1.76	1.44	2.48	0.00	2.16	0.65	1.00	1.65	3.25	25.19
K2	17.20	4.64	2.00	5.84	0.00	5.04	5.00	2.60	2.45	3.25	48.02
K3	14.80	4.56	1.52	5.92	0.00	4.80	5.00	2.60	2.20	2.35	43.75
K4	11.60	0.24	1.52	4.80	0.00	4.24	1.95	1.40	3.05	3.25	32.05
K5	9.60	0.24	1.52	5.28	0.00	4.16	1.95	1.15	3.15	2.35	29.40
M1	11.60	4.24	1.12	4.96	0.00	5.60	1.95	1.80	2.10	2.35	35.72
M2	8.80	1.76	1.44	2.56	0.00	1.84	0.00	0.90	1.30	0.00	18.60
M3*	13.60	4.08	1.12	5.60	0.00	4.48	3.05	1.70	1.95	0.90	36.48
M4	8.80	0.24	1.28	4.56	0.00	3.68	2.15	1.05	2.35	0.00	24.11
M5	16.00	4.08	1.44	5.36	0.00	4.08	4.15	2.30	2.45	3.25	43.11
M6	11.20	3.68	0.96	4.24	0.00	3.84	2.15	1.15	1.65	0.00	28.87
N1	15.60	0.24	2.56	5.04	0.00	4.96	1.95	1.65	3.05	3.25	38.30
O1*	18.80	5.12	3.20	5.44	0.00	5.60	4.35	2.45	2.20	0.90	48.06
O3	11.20	4.08	2.40	5.76	0.00	4.16	3.70	1.95	2.45	2.35	38.05
P1	13.60	3.28	2.24	3.68	3.36	3.68	3.05	1.70	1.95	0.00	36.54
P2*	17.20	4.56	1.84	6.08	0.00	4.72	4.35	2.30	1.95	0.00	43.00
R1*	13.60	4.56	2.96	5.52	0.00	4.48	3.90	2.05	1.65	0.90	39.62
R1A*	16.00	4.96	2.96	5.28	3.04	4.64	3.90	2.05	1.40	0.00	44.23
R3	26.80	5.92	2.96	5.44	1.04	5.60	3.80	4.20	2.80	2.05	60.61
R5	24.40	5.42	3.20	5.84	3.04	4.56	5.00	2.60	3.00	4.10	61.16
R7	10.40	4.08	2.40	5.76	0.00	4.16	3.70	1.80	2.45	2.35	37.10
R7A	17.20	0.64	3.20	6.48	0.00	5.28	2.85	1.70	1.85	2.35	41.55

Appendix 3.10-4 Table 1

Normalized Results of 10 Functional Models for 127 Wetlands in the Study Area

FUNCTIONAL MODELS											
Wetland No.	Biological Function	Hydrologic Support Function	Groundwater Function	Storm and Floodwater Storage Function	Shoreline Protection Function	Water Quality Maintenance Function	Cultural and Economic Function	Recreational Function	Aesthetics Function	Education Function	Total
R8*	14.00	0.64	2.00	5.92	0.00	5.28	2.85	1.70	1.85	2.35	36.59
T1*	13.20	0.64	4.64	5.28	0.00	4.24	2.85	1.50	3.15	2.35	37.85
T2*	20.00	0.64	4.64	5.60	0.00	4.56	2.85	1.70	2.90	3.25	46.14
T3*	16.00	0.24	4.24	5.28	0.00	4.64	1.95	1.40	1.60	2.35	37.70
T4*	27.60	6.40	5.88	5.44	3.04	5.90	4.65	3.70	2.45	2.05	67.11
T5	15.20	0.64	2.96	5.36	0.00	4.32	3.50	1.65	1.95	0.00	35.58
W1*	22.40	5.32	6.16	5.68	3.68	5.44	4.35	2.60	1.95	0.90	58.48
W2*	22.80	5.52	5.04	5.44	3.68	5.44	4.35	2.30	1.95	0.90	57.42
X2	12.00	0.24	1.28	4.88	0.00	3.92	2.15	1.05	2.10	0.00	27.62
X3	20.00	4.56	1.84	5.68	0.00	4.48	4.35	2.30	2.20	0.90	46.31
X4	10.80	0.24	1.28	5.36	0.00	4.96	1.75	1.55	2.30	0.00	28.24

*wetlands of special interest

3.10-4-5

Appendix 3.10-4 Table 2

Normalized Results of 10 Functional Models for 23 Wetlands

FUNCTIONAL MODELS												
Wetland No.	Wetland Type	Biological Function	Hydrologic Support Function	Groundwater Function	Storm and Floodwater Storage Function	Shoreline Protection Function	Water Quality Maintenance Function	Cultural and Economic Function	Recreational Function	Aesthetics Function	Education Function	Total
Z1	SM	53	14	70	77	0	70	70	54	46	18	472
Z2	SM	47	14	70	77	0	70	70	49	46	0	443
Z3	SM	23	8	65	70	0	61	35	13	18	0	293
Z4	SM	33	8	65	70	0	61	35	18	18	0	308
Z5	SM	49	68	63	76	0	68	83	62	51	47	567
Z6	CS	51	68	61	71	0	56	100	57	44	65	573
Z7	DS	39	49	63	44	0	37	17	25	18	0	292
Z8	DS	37	55	56	50	0	43	17	25	18	0	301
Z9	CS	57	65	68	67	46	58	87	51	33	18	550
Z10	DS	56	57	63	76	0	59	91	52	49	82	585
Z11	CS	46	55	63	69	0	52	100	52	39	47	523
Z12	SS	48	19	70	79	0	70	74	41	32	47	480
Z13	SS	41	8	65	74	0	66	57	34	32	47	424
Z14	CS	62	81	70	62	38	58	100	57	49	65	642
Z15	CS	47	14	70	72	0	58	100	46	39	47	493
Z16	CS	59	14	70	77	0	61	100	51	49	65	546
Z17	SM	71	62	59	65	13	59	96	69	86	18	575
Z18	DS	47	81	68	68	38	63	91	48	44	65	613
Z19	CS	46	73	65	69	0	64	70	39	39	18	483
Z20	SM	60	16	56	71	0	77	126	70	77	65	640
Z21	CS	34	8	51	68	0	53	83	39	49	65	469
Z22	SM	64	24	54	77	0	70	126	70	82	82	670
Z23	CS	50	81	68	71	38	61	87	66	39	0	561

SM-shallow marsh, SS-shrub swamp, DS-deciduous swamp, CS-conifer swamp

Appendix 3.10-4 Table 3

Normalized Results of 10 Functional Wetland Assessment Models for 20 Wetlands in the Plant Site

FUNCTIONAL MODELS											
Wetland No.	Biological Function	Hydrologic Support Function	Groundwater Function	Storm and Floodwater Storage Function	Shoreline Protection Function	Water Quality Maintenance Function	Cultural and Economic Function	Recreational Function	Aesthetics Function	Education Function	Total
1	10.9	0.3	2.2	5.4	0.0	5.1	0.8	0.8	1.6	0.9	28
2	9.6	4.3	1.5	5.1	0.0	4.1	1.3	1.5	1.9	2.4	32
3	Part of R7A	-	-	-	-	-	-	-	-	-	-
4	Part of R8	-	-	-	-	-	-	-	-	-	-
5	7.4	4.5	1.5	4.9	0.0	4.2	1.3	0.8	1.9	0.9	28
6	7.1	4.5	1.5	4.4	0.0	3.6	1.3	0.8	1.4	0.0	25
7	10.2	0.0	1.5	5.3	0.0	4.5	1.6	1.1	1.4	0.0	26
8	12.1	0.3	2.2	4.9	0.0	4.0	1.6	1.1	1.7	0.9	29
9	16.4	4.5	0.8	5.2	0.0	5.1	1.4	2.5	3.1	3.2	42
10	16.4	5.2	1.8	6.0	0.0	5.1	2.5	2.3	1.9	2.4	44
11	7.8	0.8	2.7	5.5	0.0	4.7	1.8	1.1	1.7	0.0	26
12	5.9	0.3	2.2	4.9	0.0	4.0	1.3	0.8	1.7	0.0	21
13	4.7	0.3	2.2	4.9	0.0	4.0	1.7	1.1	1.9	2.4	23
14	5.6	0.8	2.2	4.9	0.0	3.8	1.7	1.5	1.9	2.4	25
15	4.7	0.3	2.2	4.9	0.0	4.0	1.7	1.1	1.9	2.4	23
16	5.9	0.3	2.2	4.9	0.0	4.0	1.3	1.1	1.9	2.4	24
17	9.6	0.3	2.2	5.2	0.0	4.3	1.3	0.8	2.2	0.9	27
18	13.3	0.9	2.3	5.5	0.0	4.3	2.1	1.4	1.4	0.0	31
19	10.5	0.3	2.2	5.0	0.0	4.8	1.2	1.1	1.8	2.4	29
20	9.0	1.1	2.7	5.2	0.0	4.1	2.2	1.5	2.2	2.4	30
21	4.3	0.3	2.2	4.9	0.0	4.0	1.7	1.1	2.5	2.4	23
22	4.7	0.3	2.2	4.7	0.0	4.4	0.9	0.7	0.8	2.4	21

3.10-4-7

Prepared by: LDB
Checked by: GGH

Appendix 3.11-1

24-Hour Sound Level Measurement Data

15-Minute Interval Report, 1/4

Location 2A: SH 55 near Mole Lake, 14-15 March 1995

Intv	Hour	Leq dBA	Lmin dBA	Lmax dBA	L1 dBA	L5 dBA	L10 dBA	L50 dBA	L90 dBA	L99 dBA
2	6	50.4	28.2	62.5	60.4	56.4	54.7	46.1	32.0	28.7
3	6	49.7	30.8	67.4	60.7	55.5	52.7	41.3	34.5	31.6
4	7	49.0	29.8	67.0	58.7	54.7	52.4	42.0	33.3	30.9
5	7	50.4	31.8	66.2	62.9	55.9	53.6	43.6	36.4	32.4
6	7	51.8	33.7	70.6	64.7	57.5	52.6	43.6	36.6	34.2
7	7	47.3	30.9	61.0	58.6	53.5	51.3	40.1	34.0	31.3
8	8	47.3	28.7	64.0	58.6	53.7	50.9	37.2	31.2	29.1
9	8	45.2	28.5	58.3	55.9	52.5	50.0	36.4	30.6	29.1
10	8	48.3	28.8	64.3	58.3	54.6	52.4	40.3	32.1	30.1
11	8	46.1	28.7	65.7	58.7	51.1	46.3	34.8	30.4	29.0
12	9	46.3	28.5	62.0	58.6	53.4	49.5	36.4	30.9	28.5
13	9	48.5	28.8	64.3	62.5	54.6	49.8	37.5	31.2	29.4
14	9	44.5	29.0	57.9	54.1	51.0	49.0	38.6	31.9	29.5
15	9	48.1	28.7	68.1	59.6	52.1	50.3	36.4	30.6	29.1
16	10	44.3	28.5	56.6	55.0	51.5	48.7	36.8	30.4	28.5
17	10	49.7	29.1	70.2	60.0	55.3	51.3	36.9	31.5	29.6
18	10	47.8	28.9	63.1	60.8	53.9	50.7	39.0	30.8	29.2
19	10	48.1	29.3	66.0	60.7	53.7	50.8	38.3	31.9	30.0
20	11	49.1	30.1	63.5	60.3	55.2	52.1	42.7	33.6	30.4
21	11	47.8	30.5	64.0	59.9	53.8	50.9	41.7	33.8	30.6
22	11	46.3	28.6	61.6	58.5	52.7	50.0	37.0	29.8	28.6
23	11	49.2	29.6	67.1	61.2	54.5	51.4	40.4	32.7	30.5
24	12	47.5	31.0	63.4	59.4	53.9	50.6	40.0	34.2	31.8
25	12	45.4	30.2	66.0	56.5	49.1	46.9	37.6	32.4	30.5
26	12	47.0	29.8	59.3	57.0	53.7	51.1	41.5	35.3	30.4
27	12	48.2	33.4	61.7	59.2	54.8	51.1	43.3	35.8	33.9
28	13	46.7	30.0	64.6	59.4	52.2	49.3	37.7	32.2	30.3

3.11-1-1

15-Minute Interval Report, 2/4

Location 2A: SH 55 near Mole Lake, 14-15 March 1995

Intv	Hour	Leq dBA	Lmin dBA	Lmax dBA	L1 dBA	L5 dBA	L10 dBA	L50 dBA	L90 dBA	L99 dBA
29	13	48.5	28.8	65.6	63.5	53.4	49.6	37.7	31.3	29.2
30	13	48.1	29.9	61.7	58.5	54.5	52.4	41.8	33.4	30.3
31	13	42.1	29.5	57.0	50.9	48.8	46.6	36.7	32.1	30.1
32	14	48.8	29.2	60.3	58.7	55.2	53.0	44.1	34.8	30.4
33	14	51.1	28.8	70.4	63.9	55.6	53.3	41.9	31.1	28.9
34	14	49.3	30.7	65.2	60.3	55.4	53.3	43.3	35.6	31.4
35	14	49.6	33.9	62.3	58.5	55.9	54.0	44.9	37.9	34.8
36	15	50.0	34.2	60.2	58.2	55.4	54.3	47.1	39.2	35.1
37	15	48.2	34.1	58.5	57.4	54.0	52.4	44.2	38.3	35.2
38	15	52.8	38.1	67.1	61.5	58.2	56.5	49.6	42.1	39.2
39	15	51.1	34.0	61.5	59.9	57.8	56.1	45.3	38.1	35.3
40	16	54.1	37.1	66.6	64.2	60.0	57.6	49.8	43.0	39.0
41	16	52.3	32.5	64.2	61.1	59.0	57.0	46.9	35.8	33.1
42	16	53.3	37.5	62.3	61.2	58.8	57.4	50.7	41.4	38.4
43	16	54.4	32.2	70.2	65.7	59.9	57.0	49.2	38.4	33.2
44	17	52.1	32.4	60.8	59.7	57.9	56.6	48.8	38.7	33.9
45	17	54.0	29.7	67.9	66.0	58.9	57.0	49.9	38.7	30.7
46	17	52.7	36.0	66.6	63.2	58.2	56.2	48.6	40.3	37.2
47	17	50.2	29.9	62.3	60.0	56.4	54.5	46.0	36.1	30.8
48	18	48.8	32.9	59.5	58.5	55.1	52.7	44.5	37.3	34.3
49	18	50.9	33.9	62.1	58.9	57.0	55.6	47.1	37.6	34.4
50	18	51.3	29.0	69.4	59.8	57.4	55.4	44.9	33.6	29.8
51	18	49.8	28.3	69.4	58.5	54.9	53.6	43.8	31.4	28.8
52	19	48.9	28.0	64.8	59.4	55.3	53.4	41.3	31.4	28.3
53	19	45.4	27.3	59.1	56.3	53.0	50.3	36.1	30.6	27.7
54	19	47.4	27.5	60.2	57.9	54.3	52.2	39.0	31.1	28.1
55	19	45.1	27.2	58.6	56.1	53.0	50.3	35.0	29.4	27.7

3.11-1-2

15-Minute Interval Report, 3/4

Location 2A: SH 55 near Mole Lake, 14-15 March 1995

Intv	Hour	Leq dBA	Lmin dBA	Lmax dBA	L1 dBA	L5 dBA	L10 dBA	L50 dBA	L90 dBA	L99 dBA
56	20	50.1	27.7	65.1	60.1	56.3	54.1	42.6	32.2	27.9
57	20	46.0	29.0	56.7	55.7	52.9	51.1	38.6	32.9	29.7
58	20	47.1	28.5	60.1	56.8	54.3	52.3	38.2	31.2	28.8
59	20	45.7	27.8	59.8	58.0	53.1	49.2	34.8	28.6	27.8
60	21	47.5	28.0	62.5	58.8	54.3	51.8	39.6	30.7	28.5
61	21	51.0	27.6	68.6	63.7	56.1	54.1	41.9	29.9	27.6
62	21	45.5	26.8	58.1	56.4	53.4	50.6	34.5	27.3	26.8
63	21	46.3	27.0	60.5	56.7	53.7	51.4	36.8	27.6	27.0
64	22	48.3	30.3	60.3	59.2	55.8	53.4	37.7	31.4	30.4
65	22	52.4	29.8	63.1	61.5	58.6	56.9	47.1	35.0	30.2
66	22	45.0	30.6	58.9	57.3	52.0	47.7	37.0	32.7	31.1
67	22	47.2	27.8	58.7	57.9	54.9	52.0	37.4	28.4	27.8
68	23	47.4	27.0	61.5	59.3	54.1	52.0	37.6	29.5	27.3
69	23	49.6	26.6	63.8	60.8	56.9	54.0	36.7	26.8	26.6
70	23	46.8	26.6	60.4	58.8	54.9	50.8	36.2	27.2	26.6
71	23	48.6	27.1	62.3	61.2	55.8	52.2	39.3	27.6	27.1
72	0	47.6	27.2	61.8	60.6	55.3	50.9	34.3	27.7	27.2
73	0	48.2	27.0	63.0	60.3	55.3	52.4	38.7	28.1	27.1
74	0	42.9	26.9	58.5	54.6	50.9	45.9	32.9	27.4	27.0
75	0	37.4	27.0	54.9	50.9	43.5	35.8	27.9	27.2	27.0
76	1	45.1	26.5	59.1	57.6	52.7	49.0	35.5	27.5	26.5
77	1	45.3	27.0	60.8	57.8	53.3	47.7	33.3	27.5	27.0
78	1	41.5	26.5	60.0	54.8	47.3	42.2	27.8	26.5	26.5
79	1	39.1	27.2	57.0	53.8	42.7	38.2	29.8	27.9	27.2
80	2	40.5	26.9	58.8	53.4	47.1	41.6	27.7	27.1	27.0
81	2	37.9	26.9	53.4	50.4	44.8	40.7	28.3	27.2	27.0
82	2	36.0	27.8	54.9	49.6	40.8	33.3	28.8	28.1	27.8

3.11-1-3

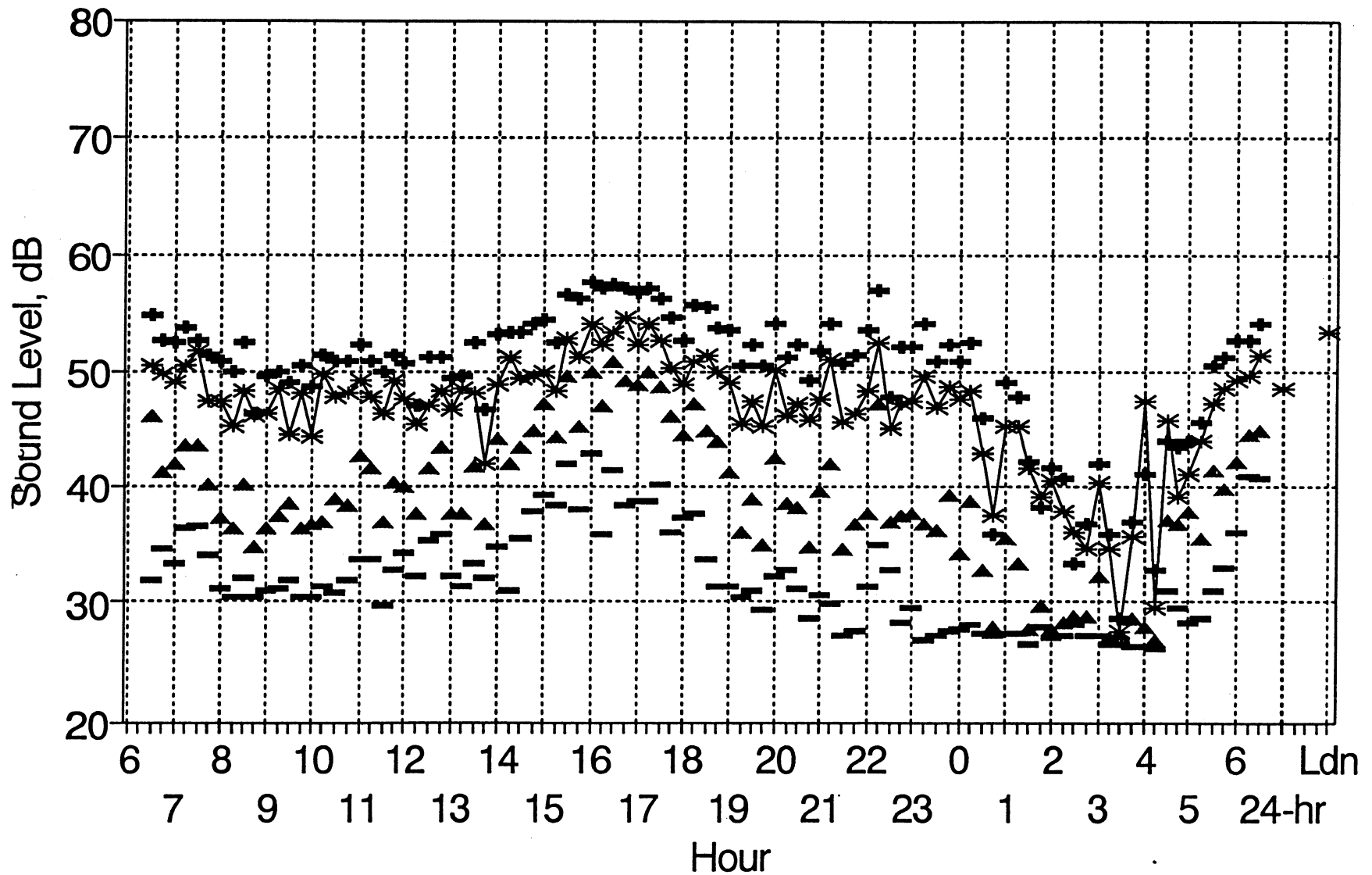
15-Minute Interval Report, 4/4

Location 2A: SH 55 near Mole Lake, 14-15 March 1995

Intv	Hour	Leq dBA	Lmin dBA	Lmax dBA	L1 dBA	L5 dBA	L10 dBA	L50 dBA	L90 dBA	L99 dBA
83	2	34.7	27.2	50.0	47.4	40.8	36.7	28.8	27.3	27.2
84	3	40.4	26.9	56.3	54.5	45.8	42.1	32.4	27.3	27.0
85	3	34.6	26.5	52.3	46.7	39.9	35.8	27.0	26.5	26.5
86	3	27.6	26.5	31.5	30.2	29.3	28.7	27.5	26.5	26.5
87	3	35.7	26.4	51.9	48.9	39.3	36.9	28.7	26.4	26.4
88	4	47.3	26.4	67.6	60.7	49.4	41.0	28.0	26.4	26.4
89	4	29.5	26.2	43.2	37.1	34.7	32.9	26.9	26.2	26.2
90	4	45.7	27.0	64.3	60.7	48.7	43.9	37.1	30.9	27.8
91	4	39.1	26.6	47.7	45.8	44.5	43.3	36.8	29.5	27.1
92	5	41.2	26.6	55.3	52.4	45.7	43.9	37.9	28.3	26.6
93	5	43.9	26.8	61.6	57.1	47.3	45.5	35.6	28.7	26.8
94	5	47.1	27.5	62.2	57.8	53.5	50.3	41.4	31.1	27.9
95	5	48.4	29.8	65.2	61.5	54.8	51.1	39.7	33.0	30.3
96	6	49.2	33.2	64.0	61.0	55.8	52.6	42.2	36.0	33.9
97	6	49.5	38.5	63.7	59.9	56.5	52.7	44.5	40.9	39.2
98	6	51.2	38.5	67.1	63.9	56.8	54.1	44.8	40.7	38.9
24-hr Ldn		48.5 53.3	26.2	70.6						
Daytime Maximum		54.4			66.0	60.0	57.6	50.7	43.0	39.2
Daytime Average		49.5			59.4	54.8	52.3	41.4	33.7	30.9
Daytime Minimum		42.1			50.9	48.8	46.3	34.5	27.3	26.8
Nighttime Maximum		52.4			63.9	58.6	56.9	47.1	40.9	39.2
Nighttime Average		46.2			55.3	49.5	45.8	35.2	29.5	28.4
Nighttime Minimum		27.6			30.2	29.3	28.7	26.9	26.2	26.2

3.11-1-4

Location 2A: SH 55 near Mole Lake, 14-15 March 1995



—*— Leq + L10 ▲ L50 - L90

3.11-1-5

15-Minute Interval Report, 1/4

Location 3: 10085 Airport Drive, March 14-15, 1995

Intv	Hour	Leq dBA	Lmin dBA	Lmax dBA	L1 dBA	L5 dBA	L10 dBA	L50 dBA	L90 dBA	L99 dBA
1	7	61.2	24.7	76.5	72.8	68.8	66.6	44.3	28.4	25.1
2	8	54.8	25.3	73.0	69.3	61.4	55.8	34.8	27.8	25.4
3	8	44.8	24.6	64.9	57.6	48.2	44.1	39.4	26.8	25.2
4	8	50.0	25.0	67.1	64.8	54.2	48.8	43.2	29.8	25.9
5	8	50.1	41.1	63.7	57.0	53.2	51.6	48.9	48.0	46.6
6	9	52.4	46.1	68.2	63.2	57.6	54.6	49.0	47.4	46.4
7	9	48.6	24.8	66.9	61.9	53.1	49.4	42.0	27.8	25.3
8	9	39.1	25.1	55.3	50.9	45.4	42.0	32.6	27.6	25.9
9	9	54.8	25.0	71.7	69.0	61.5	52.0	37.8	31.2	26.2
10	10	34.3	24.1	45.3	42.3	40.0	38.6	30.5	25.7	24.3
11	10	38.2	24.3	58.0	51.2	41.7	37.4	30.7	27.0	25.2
12	10	41.7	24.8	60.9	53.9	46.7	42.3	33.5	27.9	25.3
13	10	37.5	26.7	53.0	46.6	42.7	40.3	34.2	29.9	27.3
14	11	34.6	27.0	48.7	43.9	39.5	37.4	31.7	28.6	27.2
15	11	42.0	27.2	61.8	55.5	46.7	41.2	33.7	30.4	27.8
16	11	52.3	25.9	69.1	66.6	56.2	53.5	46.5	30.3	26.6
17	11	52.3	47.5	62.7	59.2	56.3	54.9	51.0	49.1	48.1
18	12	50.9	41.0	63.7	58.3	55.1	53.4	49.9	42.5	41.1
19	12	46.8	24.7	66.1	61.3	49.0	46.5	30.8	26.7	25.2
20	12	38.7	26.3	55.3	51.6	43.1	39.5	33.9	30.4	27.3
21	12	37.8	27.4	54.6	50.9	41.1	37.4	32.6	29.5	27.6
22	13	42.8	28.7	58.8	54.4	48.9	45.8	35.7	31.2	29.3
23	13	40.4	29.6	57.1	51.6	44.8	42.5	36.1	32.0	30.2
24	13	45.6	28.4	64.9	58.6	50.8	48.7	34.9	31.3	29.4
25	13	47.2	25.3	66.1	59.9	53.3	47.8	36.2	29.7	26.2
26	14	44.6	26.9	62.5	59.4	49.6	44.4	35.6	30.3	27.7
27	14	51.2	27.3	62.7	59.3	55.8	54.8	47.8	32.2	28.3
28	14	56.0	42.2	68.4	66.3	58.6	57.5	54.8	51.8	43.1

3.11-1-6

15-Minute Interval Report, 2/4

Location 3: 10085 Airport Drive, March 14-15, 1995

Intv	Hour	Leq dBA	Lmin dBA	Lmax dBA	L1 dBA	L5 dBA	L10 dBA	L50 dBA	L90 dBA	L99 dBA
29	14	53.7	33.1	66.4	63.4	57.5	55.8	52.9	38.0	34.2
30	15	53.5	41.8	61.5	58.9	57.4	56.4	52.5	49.4	42.4
31	15	54.1	39.6	70.9	64.6	59.3	56.8	50.2	43.0	40.3
32	15	58.4	49.7	78.8	66.6	60.2	58.9	56.5	54.1	50.7
33	15	70.8	38.6	98.6	78.2	61.0	57.9	55.2	50.7	39.6
34	16	52.1	34.7	67.6	64.6	58.4	54.5	45.1	38.2	35.4
35	16	68.0	28.0	94.5	81.6	56.4	48.1	37.3	32.2	29.3
36	16	54.6	26.8	74.0	67.9	60.0	54.3	40.8	33.1	28.1
37	16	49.2	28.5	66.2	60.9	56.6	54.2	38.0	32.2	29.3
38	17	65.4	37.2	82.2	71.4	68.1	67.2	64.7	55.7	44.0
39	17	64.6	62.2	82.3	69.7	66.7	65.7	63.8	62.8	62.2
40	17	64.0	61.9	76.5	68.5	66.0	65.0	63.6	62.4	62.0
41	17	59.7	29.5	73.6	69.6	65.4	63.9	47.0	35.6	30.3
42	18	42.7	33.2	58.4	54.2	44.9	42.6	40.5	39.2	34.3
43	18	41.8	31.7	58.6	54.7	45.2	41.7	38.2	34.8	32.5
44	18	44.2	27.8	57.3	54.9	49.6	47.7	41.5	31.0	28.9
45	18	39.5	23.0	55.9	52.7	46.9	39.5	31.2	23.9	23.1
46	19	40.7	23.2	57.0	53.1	48.8	43.3	30.4	26.5	23.4
47	19	36.1	24.2	54.4	49.0	41.9	37.4	28.0	25.4	24.2
48	19	37.1	23.2	52.8	49.9	43.5	38.5	28.9	24.2	23.2
49	19	36.1	22.7	54.1	49.0	41.7	35.3	26.8	23.3	22.7
50	20	40.0	24.0	55.5	52.7	47.5	41.9	31.0	25.3	24.1
51	20	37.5	23.1	59.1	50.6	39.1	35.8	31.1	24.2	23.1
52	20	34.5	26.3	42.3	40.2	38.4	37.5	33.5	28.3	26.4
53	20	41.8	27.7	62.4	56.5	40.3	38.9	34.2	29.7	28.2
54	21	36.7	24.3	54.7	48.7	38.7	37.4	32.4	26.2	24.3
55	21	46.3	25.9	73.0	57.3	49.5	45.1	32.3	28.1	26.4
56	21	35.8	24.6	54.3	48.3	38.7	35.8	29.6	25.6	24.6

3.11-1-7

15-Minute Interval Report, 3/4

Location 3: 10085 Airport Drive, March 14-15, 1995

	Intv	Hour	Leq dBA	Lmin dBA	Lmax dBA	L1 dBA	L5 dBA	L10 dBA	L50 dBA	L90 dBA	L99 dBA
	57	21	39.3	23.7	59.2	53.2	38.7	36.2	29.9	26.1	23.8
	58	22	32.8	24.1	39.8	38.6	37.1	36.1	31.8	25.0	24.1
	59	22	45.4	31.7	64.3	58.3	50.5	47.1	38.4	35.1	32.2
	60	22	40.1	36.7	45.0	44.2	42.9	42.3	39.6	37.7	37.0
	61	22	36.4	30.3	43.7	41.1	40.1	39.5	35.4	31.6	30.4
	62	23	40.7	25.3	57.8	52.8	46.9	42.7	32.4	27.4	25.6
	63	23	37.7	23.5	57.6	49.9	39.1	37.5	29.5	24.4	23.5
	64	23	40.2	22.8	59.7	51.9	46.2	40.8	27.2	23.3	22.8
	65	23	36.0	22.7	53.2	46.8	41.3	38.8	30.0	24.0	23.0
	66	0	31.6	23.1	49.3	41.4	36.7	33.9	27.9	23.8	23.1
	67	0	38.8	23.7	60.1	51.6	38.6	35.2	28.5	25.1	24.1
	68	0	29.3	23.1	48.5	37.2	33.8	32.5	25.7	23.6	23.1
	69	0	26.4	22.8	40.0	36.6	30.7	27.4	24.3	23.2	23.0
	70	1	38.7	24.6	49.4	47.2	45.1	43.1	35.4	27.5	25.1
	71	1	33.8	22.7	44.5	43.2	40.8	39.3	25.7	23.2	22.7
	72	1	39.5	22.9	60.9	54.4	37.3	33.7	24.8	23.3	23.0
	73	1	30.9	23.0	44.7	41.9	38.8	34.2	25.0	23.4	23.0
	74	2	24.9	22.7	43.5	31.2	26.4	25.6	23.8	23.1	22.7
	75	2	28.4	22.9	42.8	38.6	34.9	30.8	24.6	23.3	23.0
	76	2	25.6	23.2	39.7	30.7	28.8	27.4	24.7	23.4	23.2
	77	2	51.7	25.6	62.7	60.3	55.4	53.4	51.4	37.1	26.1
	78	3	58.2	23.5	73.9	71.5	66.3	54.9	39.6	24.9	24.0
	79	3	27.9	23.2	44.0	38.0	32.1	30.0	25.6	24.1	23.2
	80	3	29.2	23.8	42.5	37.6	35.0	32.9	26.0	24.4	24.0
	81	3	28.5	23.8	50.9	34.7	29.4	28.3	26.1	24.8	24.1
	82	4	36.2	24.4	50.7	47.6	45.0	40.4	27.0	25.3	24.4
	83	4	43.4	24.4	58.7	53.8	50.3	47.3	27.5	25.2	24.4
	84	4	51.8	24.4	69.1	66.5	55.8	46.8	44.2	25.7	24.7

3.11-1-8

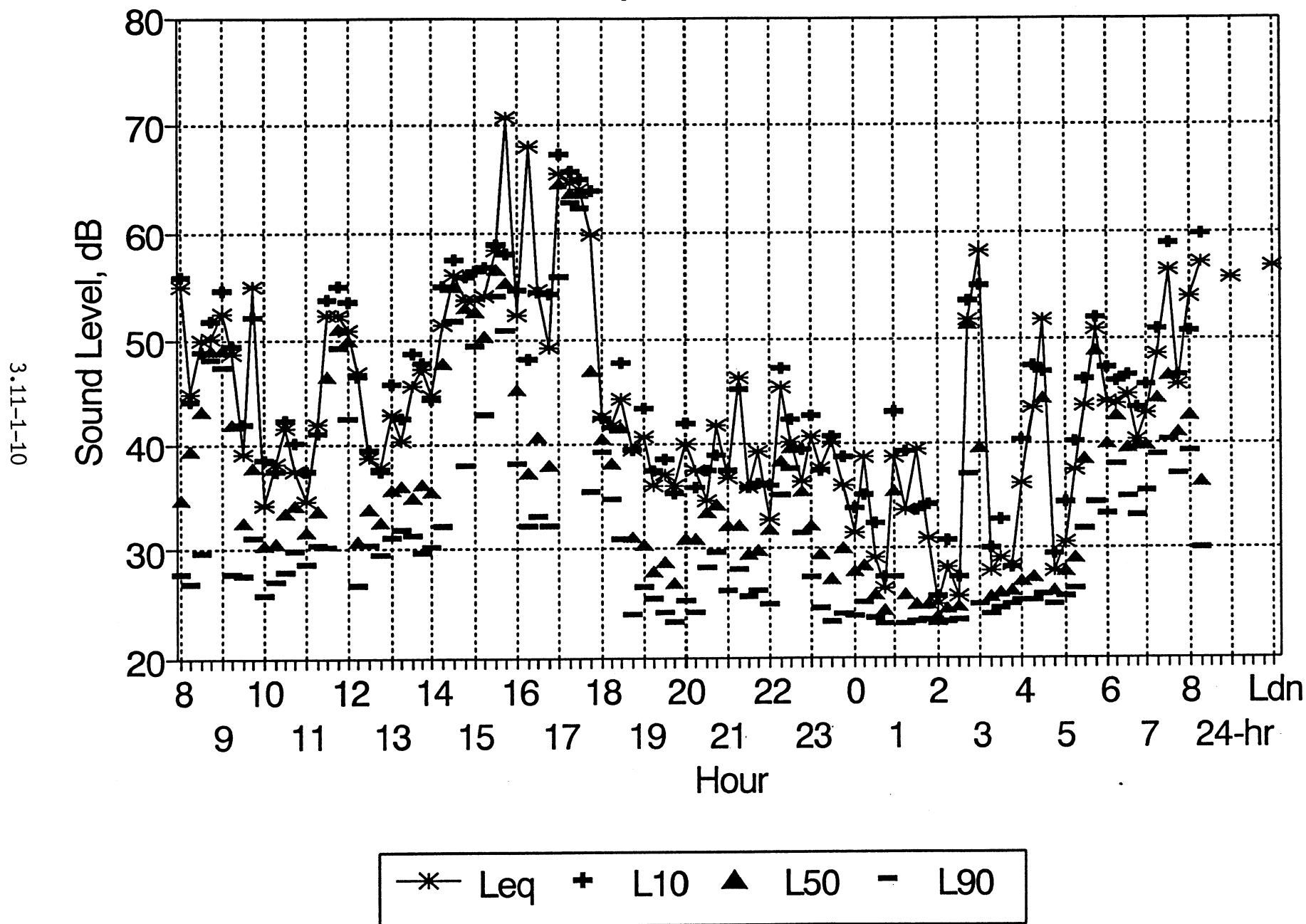
15-Minute Interval Report, 4/4

Location 3: 10085 Airport Drive, March 14-15, 1995

Intv	Hour	Leq dBA	Lmin dBA	Lmax dBA	L1 dBA	L5 dBA	L10 dBA	L50 dBA	L90 dBA	L99 dBA
85	4	27.9	24.2	46.5	35.6	31.4	29.6	26.1	25.0	24.2
86	5	30.7	24.4	43.3	37.9	36.0	34.4	28.0	25.6	24.5
87	5	37.4	25.2	54.4	49.7	44.0	40.2	29.2	26.4	25.3
88	5	43.6	27.9	60.0	55.6	49.2	46.1	38.5	31.9	28.6
89	5	50.8	29.9	65.5	62.8	54.6	51.9	48.8	34.4	31.7
90	6	43.9	30.9	57.6	53.6	49.0	47.1	40.0	33.2	31.2
91	6	43.7	33.0	54.2	51.3	47.6	45.9	42.7	38.1	34.3
92	6	44.6	32.1	61.7	56.8	49.3	46.5	39.6	34.9	32.8
93	6	40.4	27.9	48.4	46.9	44.6	43.4	39.7	33.1	28.6
94	7	42.9	30.2	57.4	51.4	48.0	45.6	39.9	35.4	33.5
95	7	48.4	32.6	61.9	60.2	53.4	50.8	44.2	39.0	33.6
96	7	56.3	36.1	73.0	69.0	64.1	58.8	46.5	40.4	36.9
97	7	45.5	32.0	66.4	56.5	49.4	46.4	41.0	37.1	33.0
98	8	53.8	36.1	71.7	67.5	59.9	50.6	42.7	39.2	36.7
99	8	57.0	27.2	73.2	69.3	66.5	59.8	36.3	30.2	27.7
24-hr		55.6	22.7	98.6						
Ldn		56.9	(52.4)							
Daytime Maximu		70.8			81.6	68.1	67.2	64.7	62.8	62.2
Daytime Average		57.4	(45.7)		58.5	51.3	47.9	40.1	34.4	31.6
Daytime Minimu		34.3			40.2	38.4	35.3	26.8	23.3	22.7
Nighttime Maxim		58.2			71.5	66.3	54.9	51.4	38.1	37.0
Nighttime Averag		45.7			47.2	42.0	39.1	32.1	27.4	25.9
Nighttime Minimu		24.9			30.7	26.4	25.6	23.8	23.1	22.7

Truck maintenance, eg. impact wrenches and steam cleaning, were observed near the monitor locations.
 () Average Leq and Ldn were computed by eliminating daytime data when noisy maintainace activities were observed between 1515 and 1800.

Location 3: 10085 Airport Drive, March 14-15, 1995



15-Minute Interval Report, 1/4

Location 8: N. Rolling Stone Lake Road, 14-15 March 1995

Intv	Hour	Minute	Leq dBA	Lmin dBA	Lmax dBA	L1 dBA	L5 dBA	L10 dBA	L50 dBA	L90 dBA	L99 dBA
2	7	15	36.3	26.6	55.9	49.3	41.3	35.0	27.4	26.6	26.6
3	7	30	27.4	26.7	31.3	28.9	28.2	27.9	27.5	27.0	26.7
4	7	45	32.6	26.8	53.0	45.2	34.5	32.4	28.0	27.2	26.8
5	8	0	36.0	26.7	53.0	47.1	41.7	38.8	30.6	27.5	27.0
6	8	15	30.9	27.0	50.1	39.5	33.5	31.9	28.4	27.3	27.0
7	8	30	42.1	27.1	57.1	53.8	51.5	44.7	29.3	27.4	27.1
8	8	45	30.9	27.2	45.5	40.8	35.1	33.0	28.4	27.3	27.2
9	9	0	31.2	27.4	46.0	40.2	34.7	32.8	29.3	28.0	27.4
10	9	15	29.3	27.6	37.8	34.2	32.2	30.9	28.7	27.6	27.6
11	9	30	31.2	27.8	46.6	36.5	34.2	33.0	30.1	28.3	27.8
12	9	45	32.0	27.7	41.0	38.7	36.4	35.1	30.1	28.3	27.7
13	10	0	34.9	27.8	45.0	41.5	39.0	37.8	33.7	29.3	28.1
14	10	15	34.0	27.6	50.0	45.4	39.7	36.3	29.0	27.6	27.6
15	10	30	29.3	27.7	39.7	36.2	32.6	30.7	28.3	27.7	27.7
16	10	45	29.2	27.6	39.3	34.7	32.1	30.8	28.4	27.6	27.6
17	11	0	32.9	27.6	47.6	41.5	37.9	36.0	30.3	28.1	27.6
18	11	15	29.0	27.7	38.4	34.7	31.9	30.5	28.3	27.7	27.7
19	11	30	31.9	27.6	49.5	40.9	36.7	34.7	28.9	27.9	27.6
20	11	45	30.0	28.0	48.7	37.9	31.7	29.9	28.6	28.1	28.0
21	12	0	29.1	28.1	42.4	33.6	30.3	29.7	28.6	28.1	28.1
22	12	15	30.5	28.1	43.7	38.2	34.9	31.8	28.9	28.2	28.1
23	12	30	37.5	28.1	55.4	51.5	43.3	33.2	28.8	28.2	28.1
24	12	45	40.7	28.1	66.9	48.9	41.0	39.0	29.7	28.3	28.1
25	13	0	29.8	27.9	41.9	37.5	32.5	30.9	28.7	28.1	27.9
26	13	15	31.4	28.0	46.7	42.8	36.2	32.0	28.6	28.1	28.0
27	13	30	29.3	27.7	41.9	35.0	31.6	29.9	28.6	28.1	27.7
28	13	45	34.4	27.6	51.3	47.1	40.7	34.0	28.1	27.6	27.6

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15-Minute Interval Report, 2/4

Location 8: N. Rolling Stone Lake Road, 14-15 March 1995

Intv	Hour	Minute	Leq dBA	Lmin dBA	Lmax dBA	L1 dBA	L5 dBA	L10 dBA	L50 dBA	L90 dBA	L99 dBA
29	14	0	28.9	27.8	35.6	32.7	30.7	29.9	28.6	27.8	27.8
30	14	15	31.3	27.9	47.8	41.6	34.3	31.8	28.8	28.1	27.9
31	14	30	28.2	27.5	35.4	32.3	29.1	28.8	27.7	27.5	27.5
32	14	45	28.2	27.3	35.3	31.5	29.4	28.9	27.8	27.3	27.3
33	15	0	29.9	27.4	46.2	39.6	33.6	29.4	27.8	27.4	27.4
34	15	15	35.7	27.7	53.3	46.7	43.1	37.7	29.3	28.0	27.7
35	15	30	33.6	27.7	46.6	40.5	38.1	36.7	31.5	28.3	27.7
36	15	45	38.4	27.9	53.9	48.5	44.2	42.1	33.5	28.7	28.1
37	16	0	43.6	28.2	66.5	53.1	49.3	47.1	34.5	29.2	28.2
38	16	15	45.9	27.5	63.7	59.2	52.6	48.8	32.3	27.9	27.5
39	16	30	31.4	27.4	48.6	40.2	34.6	32.3	29.0	27.4	27.4
40	16	45	28.9	27.1	37.3	34.8	31.8	30.7	28.0	27.2	27.1
41	17	0	30.1	27.4	45.6	40.1	32.5	30.7	28.5	27.4	27.4
42	17	15	32.6	27.0	49.6	44.6	39.1	31.3	28.4	27.3	27.0
43	17	30	28.3	27.1	32.1	30.9	29.7	29.2	28.0	27.2	27.1
44	17	45	27.5	26.7	33.1	30.5	28.8	28.0	27.4	26.7	26.7
45	18	0	27.0	26.6	27.8	27.8	27.8	27.7	26.7	26.6	26.6
46	18	15	27.5	26.6	34.1	31.6	29.6	28.8	26.9	26.6	26.6
47	18	30	31.1	26.6	48.3	43.5	34.1	29.4	27.3	26.6	26.6
48	18	45	29.6	26.6	45.6	39.6	32.6	28.9	27.5	26.6	26.6
49	19	0	29.8	26.5	47.4	40.9	31.8	27.9	26.6	26.5	26.5
50	19	15	26.7	26.5	28.5	27.8	27.0	26.9	26.5	26.5	26.5
51	19	30	26.8	26.5	30.1	28.0	27.5	27.0	26.5	26.5	26.5
52	19	45	26.6	26.4	27.3	27.0	26.9	26.9	26.5	26.4	26.4
53	20	0	26.6	26.4	27.5	27.1	27.0	26.9	26.5	26.4	26.4
54	20	15	26.8	26.4	30.2	28.4	27.8	27.5	26.6	26.4	26.4
55	20	30	27.3	26.5	33.7	32.2	28.6	27.9	26.9	26.5	26.5

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15-Minute Interval Report, 3/4

Location 8: N. Rolling Stone Lake Road, 14-15 March 1995

Intv	Hour	Minute	Leq dBA	Lmin dBA	Lmax dBA	L1 dBA	L5 dBA	L10 dBA	L50 dBA	L90 dBA	L99 dBA
56	20	45	31.8	27.3	39.4	35.7	34.6	33.9	31.7	27.6	27.3
57	21	0	28.8	26.5	33.0	31.9	31.2	30.7	28.6	26.5	26.5
58	21	15	28.0	26.6	32.1	30.5	29.7	29.4	27.9	26.6	26.6
59	21	30	27.4	26.6	29.6	28.9	28.5	28.0	27.3	26.6	26.6
60	21	45	30.0	26.7	34.7	33.9	33.4	32.8	29.5	27.3	26.7
61	22	0	28.5	27.0	37.0	31.6	30.6	30.1	27.9	27.2	27.0
62	22	15	30.2	28.1	36.6	32.7	31.8	31.5	30.1	28.6	28.1
63	22	30	35.4	30.4	47.4	43.5	38.5	36.6	34.4	31.8	30.4
64	22	45	35.7	32.2	44.0	39.0	37.9	37.1	35.5	33.4	32.2
65	23	0	30.0	27.4	41.3	34.9	33.9	32.6	28.9	28.0	27.4
66	23	15	27.5	26.8	36.1	30.5	28.0	27.9	27.5	27.0	26.8
67	23	30	28.3	26.7	42.3	34.6	31.1	29.6	27.5	26.7	26.7
68	23	45	27.0	26.6	35.7	29.3	27.8	27.5	26.6	26.6	26.6
69	0	0	26.8	26.5	37.3	28.0	27.4	27.0	26.5	26.5	26.5
70	0	15	27.4	26.4	41.1	32.9	27.8	27.4	26.6	26.4	26.4
71	0	30	30.8	26.4	53.7	40.6	27.9	27.5	26.6	26.4	26.4
72	0	45	26.7	26.4	35.1	29.4	27.0	26.9	26.5	26.4	26.4
73	1	0	26.9	26.4	36.5	30.2	27.8	27.4	26.6	26.4	26.4
74	1	15	28.0	26.4	37.1	33.4	31.8	30.5	26.8	26.4	26.4
75	1	30	26.8	26.3	36.8	30.3	27.3	27.0	26.5	26.3	26.3
76	1	45	28.5	26.3	39.2	36.9	33.9	29.7	26.6	26.3	26.3
77	2	0	26.9	26.4	40.7	30.4	27.7	27.0	26.5	26.4	26.4
78	2	15	26.7	26.5	31.1	28.0	27.4	27.0	26.5	26.5	26.5
79	2	30	26.8	26.5	34.0	29.3	27.6	27.0	26.5	26.5	26.5
80	2	45	27.6	26.5	36.5	31.7	29.9	29.2	26.8	26.5	26.5
81	3	0	27.0	26.5	35.6	30.1	27.8	27.4	26.6	26.5	26.5
82	3	15	27.0	26.5	36.0	30.2	27.7	27.1	26.6	26.5	26.5

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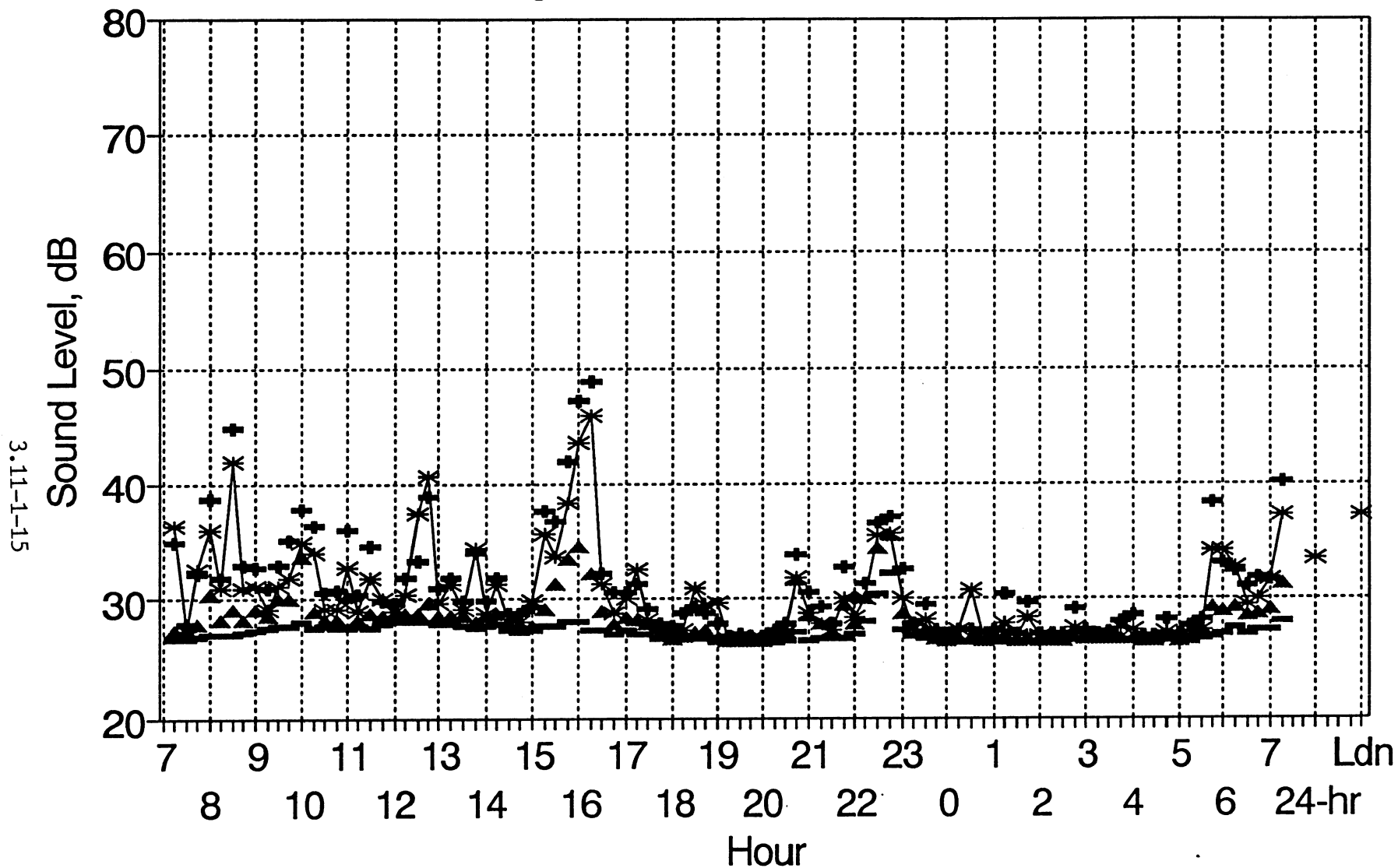
15-Minute Interval Report, 4/4

Location 8: N. Rolling Stone Lake Road, 14-15 March 1995

Intv	Hour	Minute	Leq dBA	Lmin dBA	Lmax dBA	L1 dBA	L5 dBA	L10 dBA	L50 dBA	L90 dBA	L99 dBA
83	3	30	26.9	26.5	36.5	28.9	27.7	27.2	26.6	26.5	26.5
84	3	45	27.6	26.5	37.5	33.7	30.4	28.1	26.7	26.5	26.5
85	4	0	27.4	26.5	36.3	32.8	30.2	28.6	26.6	26.5	26.5
86	4	15	26.7	26.5	29.0	27.9	27.1	26.9	26.5	26.5	26.5
87	4	30	26.7	26.5	27.7	27.7	27.0	26.9	26.5	26.5	26.5
88	4	45	27.2	26.5	30.8	29.7	28.8	28.4	26.8	26.5	26.5
89	5	0	26.8	26.5	29.4	27.9	27.4	27.0	26.5	26.5	26.5
90	5	15	27.0	26.5	34.2	29.6	28.2	27.8	26.7	26.5	26.5
91	5	30	27.5	26.7	32.4	30.3	28.9	28.4	27.5	26.7	26.7
92	5	45	34.3	26.8	50.8	43.6	40.3	38.3	29.4	27.2	26.8
93	6	0	34.2	27.0	54.4	46.6	37.0	33.1	29.1	27.6	27.0
94	6	15	32.9	27.6	46.8	43.9	40.1	32.5	29.4	28.1	27.6
95	6	30	29.5	27.0	41.1	34.8	32.3	31.2	28.7	27.3	27.0
96	6	45	30.0	27.5	42.1	37.2	33.3	31.9	28.8	27.6	27.5
97	7	0	31.7	27.5	51.5	38.1	32.9	31.7	29.3	28.1	27.5
98	7	15	37.3	27.8	51.5	49.2	43.8	40.1	31.3	29.1	28.1
Overall	24-hr		33.5	26.3	66.9						
	Ldn		37.2								
Daytime	Maximum		45.9			59.2	52.6	48.8	34.5	29.3	28.2
Daytime	Average		34.5			38.5	34.6	32.4	28.8	27.5	27.3
Daytime	Minimum		26.6			27.0	26.9	26.9	26.5	26.4	26.4
Nighttime	Maximum		35.7			46.6	40.3	38.3	35.5	33.4	32.2
Nighttime	Average		29.7			33.1	30.5	29.4	27.7	27.1	26.9
Nighttime	Minimum		26.7			27.7	27.0	26.9	26.5	26.3	26.3

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Location 8: N. Rolling Stone Lake Road, 14-15 March 1995



15-Minute Interval Report, 1/4

Location 9 - Ground Hemlock Lake, 14-15 March 1995

Intv	Hour	Duration	Leq dBA	Lmin dBA	Lmax dBA	L1 dBA	L5 dBA	L10 dBA	L50 dBA	L90 dBA	L99 dBA
2	8	45	42.8	21.1	62.4	57.4	45.9	41.5	28.2	23.1	21.4
3	9	0	26.4	21.0	40.1	33.4	29.8	28.3	25.5	21.9	21.1
4	9	15	39.5	21.4	57.0	53.2	44.7	40.8	26.2	22.1	21.4
5	9	30	46.6	21.1	66.5	58.0	55.1	50.1	29.8	24.0	21.7
6	9	45	42.5	21.0	63.2	56.5	45.2	38.7	27.1	22.0	21.1
7	10	0	22.9	20.9	33.2	28.8	25.5	24.4	22.1	21.1	20.9
8	10	15	27.3	21.0	43.7	37.1	33.1	31.1	23.2	21.3	21.0
9	10	30	35.5	21.5	52.0	45.6	41.3	39.1	30.8	23.8	22.3
10	10	45	38.2	21.0	58.6	54.0	32.2	28.1	24.4	22.9	21.5
11	11	0	43.1	21.5	59.8	56.9	49.8	45.3	30.8	23.9	22.2
12	11	15	30.2	21.7	49.8	42.6	34.8	32.1	24.8	22.8	22.0
13	11	30	29.2	21.8	41.3	37.6	33.9	32.6	27.4	24.1	22.5
14	11	45	33.2	21.5	48.2	45.1	39.7	36.5	27.8	24.1	21.8
15	12	0	30.4	21.2	43.4	37.0	34.9	33.7	29.1	23.9	21.6
16	12	15	32.6	23.3	49.8	43.2	37.3	36.0	29.2	26.4	25.0
17	12	30	36.4	21.4	53.9	48.3	43.9	41.1	27.2	23.6	22.0
18	12	45	28.2	22.2	43.1	36.5	32.6	31.1	26.2	23.6	22.7
19	13	0	28.1	21.4	47.1	37.9	32.3	29.8	25.2	23.0	22.0
20	13	15	31.5	21.0	49.3	44.2	37.9	32.9	23.7	21.4	21.0
21	13	30	33.2	21.0	50.8	45.2	40.5	36.0	24.6	22.0	21.1
22	13	45	30.1	21.0	45.9	41.6	37.3	33.5	23.7	21.7	21.1
23	14	0	27.7	21.1	37.2	35.7	32.8	31.2	25.1	21.8	21.1
24	14	15	29.3	21.1	47.6	40.6	34.0	32.1	24.0	21.7	21.1
25	14	30	31.8	21.1	47.8	43.1	38.5	35.5	25.7	22.3	21.2
26	14	45	29.6	20.6	46.4	38.8	33.8	32.2	27.1	21.9	20.7
27	15	0	33.2	21.3	45.3	42.4	39.8	37.6	28.1	23.1	21.5
28	15	15	34.0	22.2	51.8	43.5	37.7	36.4	31.4	25.7	23.1

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15-Minute Interval Report, 2/4

Location 9 - Ground Hemlock Lake, 14-15 March 1995

Intv	Hour	Duration	Leq dBA	Lmin dBA	Lmax dBA	L1 dBA	L5 dBA	L10 dBA	L50 dBA	L90 dBA	L99 dBA
29	15	30	31.6	22.2	42.6	39.9	37.5	35.4	29.0	24.7	22.6
30	15	45	37.7	22.0	56.3	51.0	41.6	39.2	31.3	25.2	23.1
31	16	0	37.7	24.7	48.1	45.0	42.4	41.2	35.9	31.3	28.2
32	16	15	37.8	26.2	48.8	45.2	43.3	41.7	35.6	30.7	27.5
33	16	30	34.5	21.5	46.8	41.8	39.5	38.1	32.8	23.6	21.5
34	16	45	29.1	21.9	43.6	37.1	33.9	32.9	25.7	22.6	22.0
35	17	0	32.5	21.2	47.1	43.7	39.5	36.9	25.6	22.2	21.2
36	17	15	36.1	21.5	47.2	45.9	43.9	41.8	27.8	22.5	21.5
37	17	30	38.3	22.1	47.1	46.0	45.0	43.7	34.7	26.4	22.4
38	17	45	22.5	20.6	40.1	28.1	23.3	22.7	21.6	21.1	20.6
39	18	0	21.5	20.5	31.4	25.1	22.7	22.1	21.5	21.1	20.5
40	18	15	24.2	20.9	35.6	32.2	29.5	27.8	22.0	21.2	21.0
41	18	30	25.2	20.6	33.6	31.3	28.6	27.8	25.1	21.2	21.0
42	18	45	21.9	20.5	29.8	25.7	24.0	23.4	21.7	21.1	20.5
43	19	0	22.2	20.4	31.5	28.6	25.8	23.9	21.7	21.0	20.4
44	19	15	22.7	20.6	35.0	32.1	24.6	22.9	21.6	21.1	20.7
45	19	30	24.1	20.4	33.9	31.0	28.7	26.8	22.0	20.6	20.4
46	19	45	27.1	20.4	44.0	39.1	31.8	30.3	21.5	20.4	20.4
47	20	0	21.6	20.4	35.2	25.4	23.1	22.1	21.2	20.4	20.4
48	20	15	22.9	20.9	31.0	27.0	25.5	24.7	22.1	21.1	20.9
49	20	30	32.3	21.1	39.5	38.7	37.6	36.8	28.7	22.8	21.2
50	20	45	45.3	21.9	52.9	52.5	51.0	49.8	41.3	23.6	21.9
51	21	0	45.3	34.3	50.1	49.6	48.5	47.8	44.5	39.9	34.5
52	21	15	29.8	21.6	39.2	38.5	35.5	32.6	26.4	22.6	21.6
53	21	30	35.1	26.5	40.9	40.0	39.1	38.4	33.7	30.2	26.9
54	21	45	41.2	27.3	49.0	45.5	44.7	44.3	40.3	29.9	28.1
55	22	0	43.2	36.3	51.5	47.4	46.0	45.5	43.1	39.2	37.1

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15-Minute Interval Report, 3/4

Location 9 - Ground Hemlock Lake, 14-15 March 1995

Intv	Hour	Duration	Leq dBA	Lmin dBA	Lmax dBA	L1 dBA	L5 dBA	L10 dBA	L50 dBA	L90 dBA	L99 dBA
56	22	15	44.7	38.9	51.8	48.9	47.8	47.0	44.1	41.4	39.8
57	22	30	45.8	39.9	53.7	49.8	48.5	47.8	45.4	42.3	40.9
58	22	45	50.9	47.1	59.9	53.5	52.7	52.3	50.9	48.5	47.3
59	23	0	49.3	43.2	55.6	53.1	51.9	51.4	49.0	45.9	44.3
60	23	15	43.3	35.9	52.9	48.5	46.7	45.8	42.4	39.1	37.2
61	23	30	40.2	33.4	52.9	47.3	44.0	42.6	38.9	36.4	35.0
62	23	45	37.3	29.2	50.9	44.5	41.4	39.9	35.8	32.8	31.0
63	0	0	35.7	27.9	52.4	43.8	39.7	37.9	33.8	31.1	29.3
64	0	15	35.7	27.2	55.0	44.6	39.8	37.7	32.9	30.1	28.2
65	0	30	33.8	25.1	50.0	42.2	38.3	36.4	31.8	28.7	26.9
66	0	45	33.5	25.0	48.0	41.4	37.9	36.2	31.6	28.4	26.4
67	1	0	35.4	25.2	50.8	44.8	40.1	37.9	33.0	29.8	27.2
68	1	15	50.6	28.4	65.7	63.9	54.7	52.5	39.4	32.3	29.9
69	1	30	37.0	25.7	52.3	44.2	40.3	38.4	32.8	29.4	27.4
70	1	45	35.1	25.9	49.9	44.5	39.7	37.6	32.7	29.5	27.6
71	2	0	35.7	26.4	51.0	44.6	40.4	38.5	33.4	30.1	27.9
72	2	15	35.4	26.4	47.8	43.8	40.2	38.3	33.3	29.9	27.8
73	2	30	35.9	26.7	47.4	43.7	40.7	39.0	33.9	30.3	28.0
74	2	45	36.0	27.9	49.1	43.7	40.2	38.6	34.2	31.1	29.2
75	3	0	36.1	27.8	48.3	43.8	40.8	39.2	34.2	30.7	28.8
76	3	15	37.4	27.3	51.9	45.9	42.3	40.6	34.8	31.2	28.9
77	3	30	38.6	27.9	54.8	47.6	43.5	41.7	35.9	31.8	29.5
78	3	45	38.6	28.1	55.2	47.3	43.2	41.4	36.3	32.4	29.9
79	4	0	38.8	27.8	53.4	47.0	43.7	41.9	36.5	32.3	29.8
80	4	15	39.1	29.0	53.0	47.6	44.0	42.3	36.8	32.9	30.5
81	4	30	39.8	29.1	53.4	48.3	44.6	42.8	37.4	33.7	31.4
82	4	45	40.5	27.7	57.1	49.9	45.5	43.5	37.4	33.1	30.3

3.11-1-18

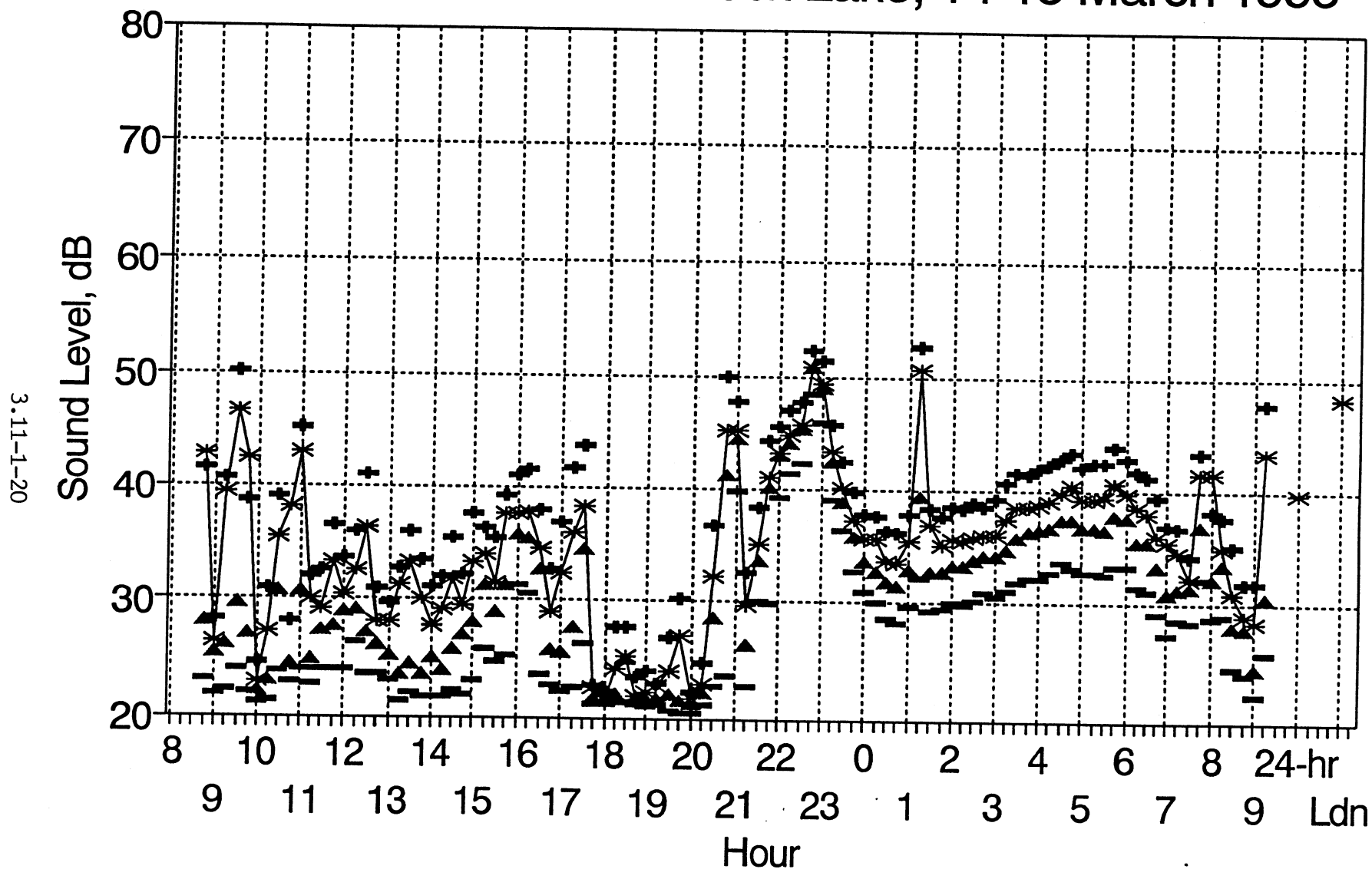
15-Minute Interval Report, 4/4

Location 9 - Ground Hemlock Lake, 14-15 March 1995

Intv	Hour	Duration	Leq dBA	Lmin dBA	Lmax dBA	L1 dBA	L5 dBA	L10 dBA	L50 dBA	L90 dBA	L99 dBA
83	5	0	39.3	28.0	55.4	48.0	43.9	42.2	36.8	32.7	30.4
84	5	15	39.2	28.8	52.2	47.2	44.3	42.5	36.8	32.9	30.5
85	5	30	39.5	28.8	56.7	48.2	44.6	42.6	36.6	32.6	30.2
86	5	45	40.6	28.2	52.7	49.2	45.9	44.0	37.8	33.4	31.2
87	6	0	39.8	27.0	53.1	47.7	44.9	43.0	37.6	33.3	30.4
88	6	15	38.5	26.3	52.7	47.5	43.8	41.8	35.6	31.6	28.9
89	6	30	38.1	26.7	51.8	47.2	43.2	41.3	35.4	31.2	28.5
90	6	45	36.1	24.4	50.2	45.0	41.7	39.4	33.4	29.2	25.3
91	7	0	35.4	25.1	50.2	47.1	41.3	37.0	30.9	27.5	26.1
92	7	15	34.6	26.9	54.7	44.0	39.2	36.7	31.4	28.7	27.3
93	7	30	32.4	26.1	45.3	39.0	35.5	34.3	31.6	28.5	26.7
94	7	45	41.7	26.7	57.7	54.7	45.5	43.3	36.9	32.2	29.0
95	8	0	41.6	25.8	63.0	54.2	43.2	38.2	32.2	28.8	26.9
96	8	15	35.0	25.3	45.4	42.9	39.2	37.7	33.5	29.1	26.7
97	8	30	31.1	22.7	44.4	38.7	36.4	35.2	28.1	24.6	23.2
98	8	45	29.1	22.1	41.7	35.3	33.3	31.9	27.9	23.9	22.3
99	9	0	28.5	21.2	42.1	37.8	34.0	32.0	24.4	22.1	21.2
100	9	15	43.4	23.3	58.2	54.8	50.7	47.8	30.7	25.7	23.9
Overall 24-hr			39.8	20.4	67.9						
Ldn			48.3								
Daytime Maximum			46.6			58.0	55.1	50.1	44.5	39.9	34.5
Daytime Average			36.9			41.6	37.0	34.9	28.0	24.1	22.7
Daytime Minimum			21.5			25.1	22.7	22.1	21.2	20.4	20.4
Nighttime Maximum			50.9			63.9	54.7	52.5	50.9	48.5	47.3
Nighttime Average			42.3			47.1	43.6	42.0	37.0	33.4	31.2
Nighttime Minimum			33.5			41.4	37.9	36.2	31.6	28.4	25.3

3.11-1-19

Location 9 - Ground Hemlock Lake, 14-15 March 1995



Appendix 3.11-2

Ambient Ground Vibration Data

EVENT #164 12:39:22 27 SEP 94
 EVENT WINDOW = 2 SECONDS
 SN:86-4428 A=0464 B=0648 SL=0000
 OPERATOR = NANDU
 CRANDON BASE LINE READINGS 9/94

CHANNEL	PEAK
A LONG.	NOT OVER THLD
A VERT.	NOT OVER THLD
A TRAN.	NOT OVER THLD
A VECTOR	NOT OVER THLD
THLD	0.0300 IPS RANGE 0.3
B LONG.	NOT OVER THLD
B VERT.	NOT OVER THLD
B TRAN.	+0.0035 IPS
B VECTOR	0.0047 IPS
THLD	0.0030 IPS RANGE 0.3

EVENT #164
 A VECTOR
 INCOMPLETE DATA SAMPLE

EVENT #164
 B VECTOR

FREQ.	NORM.	PEAK	NORM.
BAND	BAND	FREQ.	PEAK
(HZ)			
5-7	0.011	7	63E-4
8-10	0.016	8	87E-4
11-14	0.019	12	0.011
15-18	0.093	15	0.055
19-27	0.13	20	0.045
28-39	0.54	32	0.19
40-53	0.036	42	0.015
54-75	0.031	73	0.012
76-107	0.095	95	0.016
108-151	0.022	108	54E-4
152-213	21E-4	153	21E-4

EVENT #167 14:57:57 27 SEP 94
 EVENT WINDOW = 2 SECONDS
 SN:86-4428 A=0464 B=0648 SL=0000
 OPERATOR = NANDU
 CRANDON BASE LINE READINGS 9/94

CHANNEL	PEAK
A LONG.	NOT OVER THLD
A VERT.	NOT OVER THLD
A TRAN.	NOT OVER THLD
A VECTOR	NOT OVER THLD
THLD	0.0300 IPS RANGE 0.3
B LONG.	-0.0106 IPS
B VERT.	+0.0076 IPS
B TRAN.	NOT OVER THLD
B VECTOR	0.0129 IPS
THLD	0.0030 IPS RANGE 0.3

EVENT #167
 A VECTOR
 INCOMPLETE DATA SAMPLE

EVENT #167
 B VECTOR

FREQ.	NORM.	PEAK	NORM.
BAND	BAND	FREQ.	PEAK
(HZ)			
5-7	0.012	5	84E-4
8-10	0.034	8	0.020
11-14	0.035	13	0.023
15-18	0.079	17	0.035
19-27	0.14	22	0.040
28-39	0.21	38	0.051
40-53	0.40	47	0.065
54-75	0.073	55	0.027
76-107	95E-4	76	29E-4
108-151	0	151	0
152-213	0	213	0

EVENT #168 15:11:00 27 SEP 94
 EVENT WINDOW = 2 SECONDS
 SN:S6=4420 A=0464 B=0640 SL=0000
 OPERATOR = NANDU
 CRANDON, BASE LINE READINGS 9/94

CHANNEL	PEAK
A LONG.	NOT OVER THLD
A VERT.	NOT OVER THLD
A TRAN.	NOT OVER THLD
A VECTOR	NOT OVER THLD
THLD	0.0300 IPS RANGE 0.3
B LONG.	-0.0041 IPS
B VERT.	NOT OVER THLD
B TRAN.	NOT OVER THLD
B VECTOR	0.0047 IPS
THLD	0.0030 IPS RANGE 0.3

EVENT #168
 A VECTOR
 INCOMPLETE DATA SAMPLE

EVENT #168
 B VECTOR

FREQ.	NORM.	PEAK	NORM.
BAND	BAND	FREQ.	PEAK
(HZ)			
5-7	0.016	7	0.014
8-10	0.014	10	0.014
11-14	0.032	13	0.017
15-18	0.026	18	0.016
19-27	0.046	23	0.021
28-39	0.15	35	0.077
40-53	0.46	40	0.11
54-75	0.19	56	0.061
76-107	51E-4	78	51E-4
108-151	0.061	143	0.021
152-213	0	213	0

EVENT #169 16:24:13 27 SEP 94
 EVENT WINDOW = 2 SECONDS
 SN:S6=4420 A=0464 B=0640 SL=0000
 OPERATOR = NANDU
 CRANDON, BASE LINE READINGS 9/94

CHANNEL	PEAK
A LONG.	NOT OVER THLD
A VERT.	NOT OVER THLD
A TRAN.	NOT OVER THLD
A VECTOR	NOT OVER THLD
THLD	0.0300 IPS RANGE 0.3
B LONG.	+0.0059 IPS
B VERT.	-0.0035 IPS
B TRAN.	NOT OVER THLD
B VECTOR	0.0065 IPS
THLD	0.0030 IPS RANGE 0.3

EVENT #169
 A VECTOR
 INCOMPLETE DATA SAMPLE

EVENT #169
 B VECTOR

FREQ.	NORM.	PEAK	NORM.
BAND	BAND	FREQ.	PEAK
(HZ)			
5-7	0	7	0
8-10	28E-4	10	28E-4
11-14	61E-4	13	31E-4
15-18	0.016	18	73E-4
19-27	0.020	20	80E-4
28-39	51E-4	38	51E-4
40-53	0.66	51	0.15
54-75	0.25	55	0.085
76-107	0	106	0
108-151	97E-4	145	50E-4
152-213	0.034	155	0.011

EVENT #172 12:16:47 28 SEP 94
 EVENT WINDOW = 2 SECONDS
 SN:56=4420 A=0464 B=0640 SL=0000
 OPERATOR = NANDU
 CRANDON BASE LINE READINGS 9/94

CHANNEL	PEAK
A LONG.	NOT OVER THLD
A VERT.	NOT OVER THLD
A TRAN.	NOT OVER THLD
A VECTOR	NOT OVER THLD
THLD	0.0300 IPS RANGE 0.3
B LONG.	-0.0035 IPS
B VERT.	NOT OVER THLD
B TRAN.	NOT OVER THLD
B VECTOR	0.0035 IPS
THLD	0.0030 IPS RANGE 0.3

EVENT #172
 A VECTOR
 INCOMPLETE DATA SAMPLE

FREQ. BAND (HZ)	NORM. BAND	PEAK FREQ.	NORM. PEAK
5-7	0	7	0
8-10	0	10	0
11-14	0	13	0
15-18	0	18	0
19-27	0	27	0
28-39	0.34	37	0.068
40-53	0.16	40	0.062
54-75	0	75	0
76-107	0.50	83	0.069
108-151	0	151	0
152-213	0	213	0

EVENT #173 12:33:06 28 SEP 94
 EVENT WINDOW = 2 SECONDS
 SN:56=4420 A=0464 B=0640 SL=0000
 OPERATOR = NANDU
 CRANDON BASE LINE READINGS 9/94

CHANNEL	PEAK
A LONG.	NOT OVER THLD
A VERT.	NOT OVER THLD
A TRAN.	NOT OVER THLD
A VECTOR	NOT OVER THLD
THLD	0.0300 IPS RANGE 0.3
B LONG.	+0.0035 IPS
B VERT.	NOT OVER THLD
B TRAN.	+0.0047 IPS
B VECTOR	0.0047 IPS
THLD	0.0030 IPS RANGE 0.3

EVENT #173
 A VECTOR
 INCOMPLETE DATA SAMPLE

EVENT #173
 B VECTOR
 INCOMPLETE DATA SAMPLE

EVENT #174 12:33:35 28 SEP 94
 EVENT WINDOW = 2 SECONDS
 SN:56=4420 A=0464 B=0640 SL=0000
 OPERATOR = NANDU
 CRANDON, BASE LINE READINGS 9/94

CHANNEL	PEAK
A LONG.	NOT OVER THLD
A VERT.	NOT OVER THLD
A TRAN.	NOT OVER THLD
A VECTOR	NOT OVER THLD
THLD	0.0300 IPS RANGE 0.3
B LONG.	NOT OVER THLD
B VERT.	NOT OVER THLD
B TRAN.	+0.0035 IPS
B VECTOR	0.0035 IPS
THLD	0.0030 IPS RANGE 0.3

EVENT #174
 A VECTOR
 INCOMPLETE DATA SAMPLE

EVENT #174
 B VECTOR

FREQ.	NORM.	PEAK	NORM.
BAND	BAND	FREQ.	PEAK
(HZ)			
5-7	0	7	0
8-10	0	10	0
11-14	0	13	0
15-18	0	18	0
19-27	1.00	25	0.41
28-39	0	38	0
40-53	0	53	0
54-75	0	75	0
76-107	0	106	0
108-151	0	151	0
152-213	0	213	0

EVENT #175 12:34:35 28 SEP 94
 EVENT WINDOW = 2 SECONDS
 SN:56=4420 A=0464 B=0640 SL=0000
 OPERATOR = NANDU
 CRANDON, BASE LINE READINGS 9/94

CHANNEL	PEAK
A LONG.	NOT OVER THLD
A VERT.	NOT OVER THLD
A TRAN.	NOT OVER THLD
A VECTOR	NOT OVER THLD
THLD	0.0300 IPS RANGE 0.3
B LONG.	NOT OVER THLD
B VERT.	NOT OVER THLD
B TRAN.	+0.0041 IPS
B VECTOR	0.0041 IPS
THLD	0.0030 IPS RANGE 0.3

EVENT #175
 A VECTOR
 INCOMPLETE DATA SAMPLE

EVENT #175
 B VECTOR

FREQ.	NORM.	PEAK	NORM.
BAND	BAND	FREQ.	PEAK
(HZ)			
5-7	0.63	5	0.35
8-10	0.25	8	0.25
11-14	0	13	0
15-18	0.12	17	0.12
19-27	0	27	0
28-39	0	38	0
40-53	0	53	0
54-75	0	75	0
76-107	0	106	0
108-151	0	151	0
152-213	0	213	0

Appendix 3.13-1

**Schreiber/Anderson Associates 1985 Report Titled
"Visual Impact Assessment - Surface Facilities"**

EXXON MINERALS COMPANY

Revised
**VISUAL IMPACT
ASSESSMENT**

CRANDON PROJECT
SURFACE FACILITIES

Revised October 1985

LANDSCAPE ARCHITECTURE • URBAN DESIGN

SCHREIBER / ANDERSON ASSOCIATES

923 WILLIAMSON STREET
MADISON, WISCONSIN 53703
PHONE 608-255-0800

FILE MAIN ENI 7
Sub AE. IA
Sub _____
Keywords _____

3.13-1-1

PREFACE

The following report is a revision of the 1982 Visual Impact Assessment, Crandon Project, Mine/Mill Surface Facility, prepared by The Sanborn Group, Inc., Madison, Wisconsin. This revision is pursuant to changes in the height and design of the headframe structure, and changes in the layout and design of the mine waste disposal facility. There have been no changes in the design or function of the railroad siding which was discussed in the original report.

The findings presented in this report are based upon a review of site photography taken by The Sanborn Group, Inc. in 1982, plus U.S. Geological Survey mapping of the project area, and facility design plans. In utilizing the photographs and U.S. Geologic Survey maps as a basis for Revising the report, it was assumed that the existing conditions observed in 1982 have not significantly changed.

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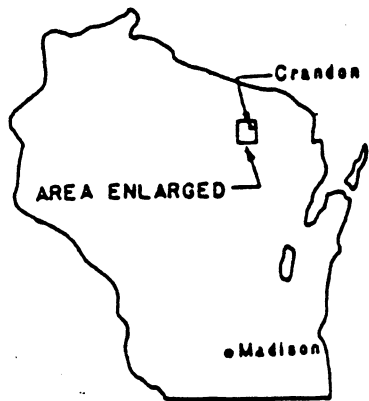
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1.0 INTRODUCTION

1.1 PROJECT LOCATION

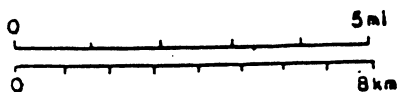
Exxon Minerals Company (Exxon) is proposing to develop a mine/mill complex to mine and process zinc, copper, and lead bearing ores from a deposit located in Forest County, Wisconsin (Figure 1.1-1). The proposed development, known as the Crandon Project, involves a mine/mill site situated around the ore deposit. Approximately 47 ha (115 acres) will be cleared for the mine/mill surface facilities and 18 ha (45 acres) will be occupied by structures, roads, parking, and storage areas. Associated project facilities include a mine waste disposal facility approximately 146 ha (360 acres) in area, a railroad spur and siding and an access road north of the mine/mill site. The site is located 8 km (5 miles) due south of Crandon, Wisconsin and 3 km (2 miles) east of Highway 55. Swamp Creek is located approximately 1.6 km (1 mile) north of the site, and Little Sand Lake approximately 0.4 km (0.25 mile) south. Sand Lake Road defines the southern boundary of the mine/mill site.



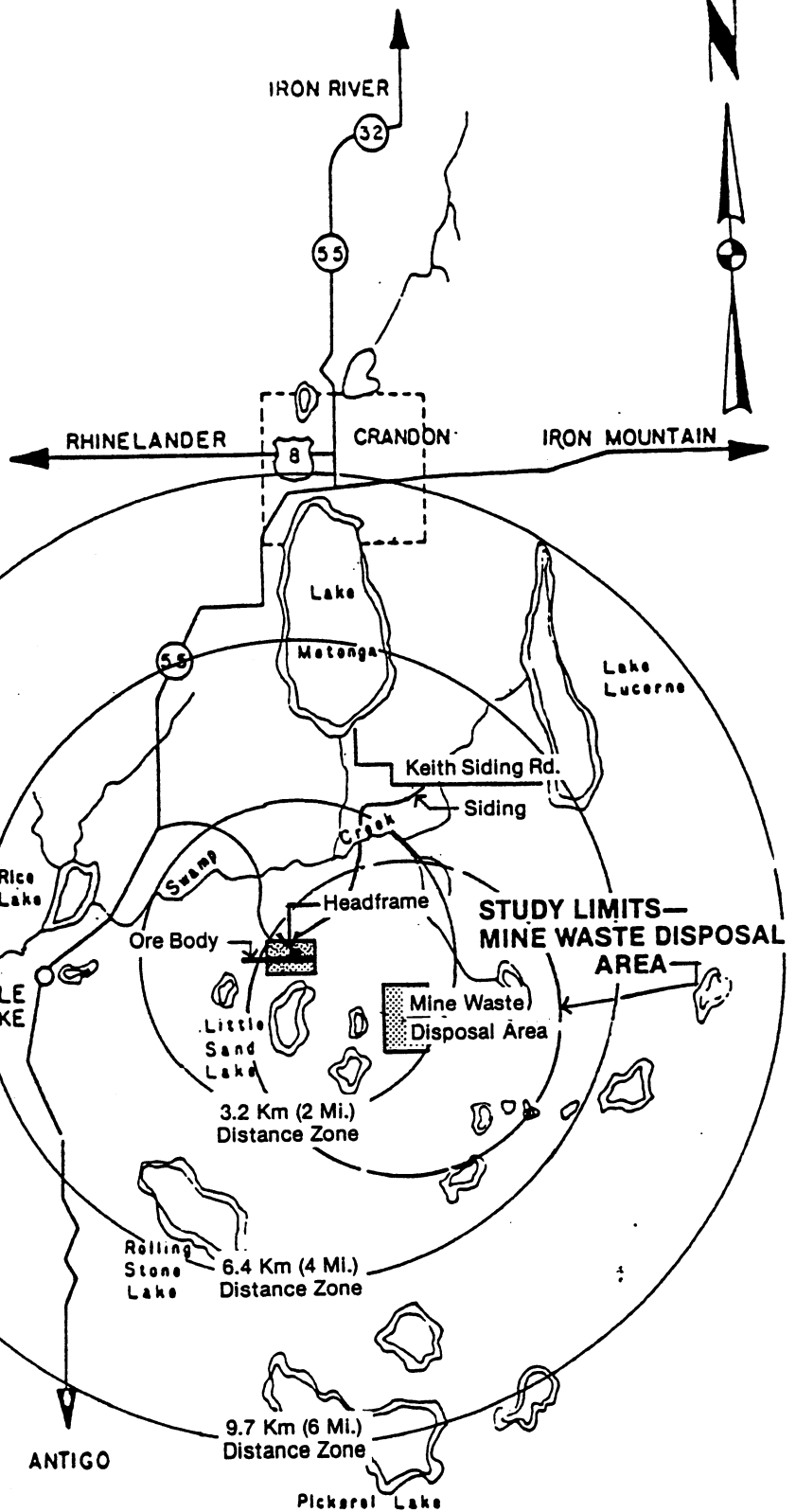
WISCONSIN

STUDY LIMITS—
HEADFRAME

SCALE



SURFACE FACILITY LOCATIONS
AND GEOGRAPHIC AREA OF THE VISUAL
STUDY



EXXON MINERALS COMPANY
CRANDON PROJECT

PROJECT LOCATION MAP

Figure 1.0-1

1.2 SCOPE

This report presents the results of inventories on a regional and site-specific basis of the potential visual impacts of specific surface facilities associated with the Crandon Project. Results of this work will be used to partially fulfill the requirements of Chapter 4, Environmental Consequences of the Crandon Project EIR.

The scope of work included:

- 1) Review of available photography from pre-selected viewpoints to determine the presence or absence of specific mine surface facilities and a written documentation of the findings.
- 2) Simulation of the project features on photographs taken from viewpoints where they will be visible; and
- 3) Discussion of potential mitigative measures for lessening possible visual impacts.

The surface facilities that were evaluated as part of this study are required to support the underground mine operation, and included:

- 1) Headframe - a reinforced concrete tower which is the main point of transport for personnel and supplies to the underground mine, and the conveyance of ore to the surface. The tower has a vertical dimension of 47 m (155 feet), and horizontal dimensions of approximately 10 x 11.5 m (32 x 38 feet);
- 2) Tailings ponds - areas designed for surface disposal of crushed or ground rock waste material tailings generated directly from the mining and processing of ore. The ponds will cover approximately 138 ha (340 acres) and have a maximum pond crest elevation of 528 m (1,732 feet); and
- 3) Railroad siding - a portion of the system required for transport of ore concentrates off-site. The facility will cover a 2.4-ha (5.9-acre) area and consist of three tracks, 1,100 m (3,608 feet) in length and a 22 m (72 feet) wide.

1.3 PROJECT REGION DESCRIPTION

1.3.1 Natural Features

The regional landscape of northeastern Wisconsin which encompasses the mine/mill site is characterized by topographic variety and vegetative diversity. The mine/mill site area and surrounding region are primarily forested upland with lesser amounts of forested wetland, and an abundance of lakes and streams. Vegetation in the upland zone occupying the majority of the mine/mill site is visually monotypical, consisting of northern hardwoods represented by maple, aspen and birch species. Upland drainage corridors support conifer stands of cedar and spruce, and penetrate site perimeters on the north, west, and southeast. These coniferous stands provide visual relief to the predominant upland deciduous vegetation. Additional visual interest is created by the presence of tamarack and alder in wetland vegetative communities. Less than 1 percent of the lands in a 161 km² (100 square mile) environmental study area surrounding the ore body consists of non-forested vegetation types, such as clear cuts, agricultural, and developed lands (Exxon Minerals Company, 1982).

Topography in the project region is characterized by a general southwest trend of ridges and intervening valleys. Pockets of closed drainage create wetland conditions in low-lying areas. Elevational changes range from 470 to 591 m (1,540 to 1,939 feet). Slope conditions vary from 0 to 35 percent.

1.3.2 Cultural Features

Forestry is the principal industry and the economic base of the

region. Abundant forest and water resources and large public land holdings support year round recreation and tourism.

The region supports low population densities. A substantial proportion of area residences are used for seasonal recreational purposes. The majority of residences in the region are located along lake shores (Exxon Minerals Company, 1982). Other residences are sparsely located along roads in the site area. The City of Crandon, located north of the project area, is the nearest retail, commercial and population center in proximity to the mine/mill site. Other residential concentrations occur in the Village of Mole Lake, and on the Mole Lake Indian Reservation located west of the proposed site.

The region supports a well developed system of federal, state and county highways. Seasonal traffic levels fluctuate widely because of tourist movement. Average daily traffic levels in the summer tourist months of June, July, and August range from 50 to 100 percent greater than in other months of the year (Exxon Minerals Company, 1982).

2.0 PROJECT METHODOLOGY

A three-phased evaluation process was used to identify potential visual impacts resulting from the Crandon Project. Viewpoint selection, field documentation, and simulation phases are discussed below.

2.1 VIEWPOINT SELECTION

2.1.1 Criteria

The following criteria served as the basis for viewpoint selection:

- 1) The identification of locations representative of visually sensitive or intensive land use in the locality of the mine/mill site. Locations included existing and potential residential and other land use concentrations, and locations on roadways in the mine/mill site area which were representative of views from larger segments of highway;
- 2) The location of topographic elevations which are comparable to those at the headframe and tailings pond sites. The railroad siding was not considered in this manner because of the localized viewing area that could potentially be affected; and
- 3) The location of sizeable foreground openings in the forest cover which offer potential views of the facilities.

2.1.2 Method

Key viewpoints locations were identified in 1982 by the Wisconsin Department of Natural Resources (DNR) and Exxon. Additional viewpoints were also identified by The Sanborn Group, Inc., at that time

through application of the viewpoint selection criteria, analysis of map information provided by Exxon and from U.S. Geological Survey mapping of the region.

The Sanborn Group's search for additional viewpoints was performed in the following manner:

- 1) Schematic plans of the mine/mill facilities were superimposed on 1:24,000 scale USGS topographic maps to establish the location of the facilities; and
- 2) Viewpoint selection criteria, presented in subsection 2.1.1, were applied in review of the USGS mapping to identify additional viewpoints from which the project features may be visible. Viewpoint and project feature elevations and site lines were compared to determine if intervening landforms or vegetational screening would obstruct views of the facilities from the viewpoints. Aerial planimetric maps were also studied to identify potential vegetative screening.

This method of viewpoint selection is well documented in the literature, and has been employed similarly in the visual assessment of other facilities (Steinitz, 1977; Elsner and Smardon, 1979; The Saratoga Associates, 1980).

Computer assisted application of this method in the analysis of viewpoints, viewsheds, and the potential visual impacts of power plants, utilities, and highway corridors has also been utilized (Landscapes Limited, 1973; Robinette, 1973; Johnson, 1974; Institute for Environmental Studies, University of Wisconsin-Madison, 1976).

2.1.3 Viewpoint Locations

Land and far shoreline viewpoints and approximate viewing distances to the headframe, mine waste disposal area, and railroad siding are identified in Tables 2.0-1 through 2.0-3. Viewpoints associated with waterbodies were

TABLE 2.0-1

HEADFRAME VIEWPOINT LOCATIONS

VIEWPOINT NO.	VIEWPOINT	VIEWING DISTANCE TO HEADFRAME
		km(miles)
1	Main Public Landing on Deep Hole Lake	3.1(1.9)
2	Main Public Landing on Duck Lake	1.8(1.1)
3	Southwest Shore of Little Sand Lake	2.25(1.4)
4	Southwest Shore of Oak Lake	2.25(1.4)
5	Sokaogon Chippewa Community Park	4.7(2.9)
6	Mole Lake Community Park	4.7(2.9)
7	South Shore of Rolling Stone Lake	6.4(4)
8*	Highway 55 - South of Mole Lake	5.5(3.4)
9*	Intersection of Sand Lake and Black Joe Roads	3.9(2.4)
10	Highway 55 - North of Swamp Creek; North Entrance of Chief Ackley Memorial Housing Project	3.7(2.3)
11*	Highway 55 - North of Swamp Creek	4.2(2.6)
12	Veterans Memorial Park - Public Campground	4.7(2.9)
13	Village of Crandon - Main Public Landing/ Swimming Beach on Lake Metonga	8.5(5.3)
14*	Village of Crandon - East Shore of Lake Metonga	7.2(4.5)
15	Main Public Landing on Lake Lucerne	7.2(4.5)
16	Private Dock on East Shore of Ground Hemlock Lake	4.5(2.8)
17	Intersection of County Highways Q and W	6.6(4.1)
18	Intersection of County Highway Q and St. John's Lane	5.5(3.4)

TABLE 2.0-1 (Continued)

VIEWPOINT NO.	VIEWPOINT	VIEWING DISTANCE TO HEADFRAME
		km(miles)
19*	Sand Lake Road East of Exxon Field Office	0.8(0.5)
20*	Lakeview Road	9.2(5.7)
21*	Keith Siding Road	3.4(2.1)
22*	Keith Siding Road	3.7(2.3)
23	North Edge of Lake Lucerne from Potowatomi Trail	9.7(6.0)
24	Scenic Wayside on Highway 8	11.3(7)
25*	Highway 8 at Western Corporate Boundary of Crandon	10(6.2)
26	Sugarbush Hill Lookout Tower	11.6(7.2)
27*	Airport Road	3.7(2.3)

* Viewpoints located by the application of selection criteria and methods described in subsection 2.1.2, and field verification.

TABLE 2.0-2

MINE WASTE DISPOSAL FACILITY VIEWPOINT LOCATIONS

VIEWPOINT NO.	VIEWPOINT	VIEWING DISTANCE TO HEADFRAME
		km (miles)
28	Deep Hole Lake Road East of Balloon No. 1	0.31 (0.19)
29	Deep Hole Lake Road West of Balloon No. 1	0.45 (0.28)
30	Southwest Shore of Duck Lake	0.92 (0.57)
31	Southwest Shore of Deep Hole Lake	1.53 (0.95)
32	West Shore of Little Sand Lake	2.4 (1.5)
33	County Highway Q	2.1 (1.3)
34	Sand Lake Road	0.45 (0.28)

TABLE 2.0-3

RAILROAD SIDING VIEWPOINT LOCATIONS

VIEWPOINT NO.	VIEWPOINT DESCRIPTION	VIEWING DISTANCE TO RAILROAD SIDING
		km (miles)
21	Keith Siding Road	0.34 (0.21)
22	Keith Siding Road	0.76 (0.47)
35	County Highway W	---

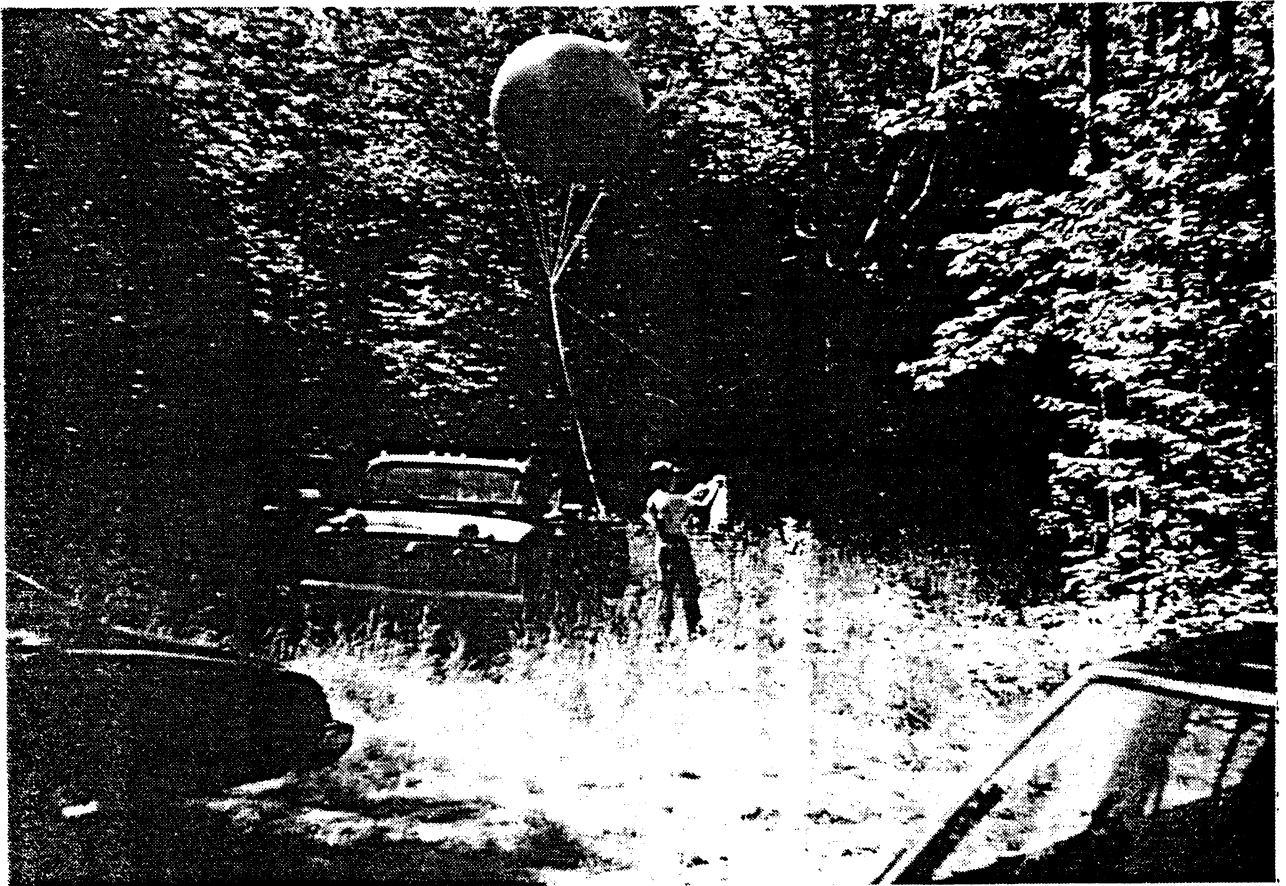
located at main public landings and lakeshores farthest from the proposed project facilities, rather than on the actual waterbodies. Numbers preceding the viewpoint locations correspond to those assigned to viewpoint locations illustrated on Figure 2.0-1. This figure identifies the viewpoints established by the DNR, Exxon and The Sanborn Group, Inc. Following viewpoint selection, the project area was inspected to evaluate the existing landscape and record its appearance.

2.2 VIEW DOCUMENTATION

Documentation of the visibility of the proposed headframe, tailings pond embankments and railroad siding was determined from viewing black and white photographs of the project site features taken from the selected viewpoints described in Tables 2.0-1 through 2.0-3. The photographs were taken on August 16-20, 1982 by the Sanborn Group, Inc. for purposes of preparing a visual assessment of the headframe, tailings pond and railroad siding as originally designed. At that time, in order to establish the presence or absence of the mine facilities in those photographs, helium-filled balloons were used to locate the headframe and tailings pond embankments. The balloons, 2.5 m (8.25 feet) and 1.7 m (5.5 feet) in diameter, respectively, were tethered at the headframe location and where the tailings pond embankments were to cross Deep Hole Lake Road (Figure 2.0-2).

The proposed railroad siding was located by using .6 x 1.2 m (2 x 4 feet) white styrofoam markers staked to a 2.4 m (8 feet) height and spaced at 30.5 m (100 feet) intervals. The marker locations were established by field survey. The portion of the siding that would be located in dense forested area was not evaluated because the vegetation in the area would screen views to the siding.

A description of the photographic procedure used to acquire the view photography, and copies of the original field notes made at each observation point are contained in Appendices A and B, respectively.



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**HEADFRAME VERTICAL
REFERENCE BALLOON**

Figure 2.0-2

2.2.1 Visibility Determination Methodology

Headframe - Photographs in which the headframe helium balloon was visible were selected to evaluate the visibility of the revised headframe. In the original photos the helium balloon was tethered at the headframe location 78 m (258 feet) above the finished surface grade of 508 m (1,665 feet).

The elevation of the balloon in the photos is therefore 586 m (1,923 feet). The revised headframe structure will extend 47 m (155 feet) above the same finished grade at the same location for a top elevation of 554 m (1,820 feet). The elevation of the photo foreground was determined from a U.S. Geologic Survey map for the area, a vertical scale was determined by interpolation between the known points and the height of the new headframe established.

To check this procedure, sections of the viewing line at a horizontal scale equal to the vertical scale of the headframe were constructed. The foreground vegetation seen in the viewpoint photos was located on the section line and its impact on the view noted. The vegetation used in the sections was assumed to be 15 m (50 feet) in height. Figure 2.0-3 illustrates the methodology used.

Tailings Ponds - Available photographs included views of the original tailings pond embankment as it intersects with Deep Hole Lake Road. Helium balloons were not tethered at the elevation of the pond crests at the interior of the mine waste disposal facility because the balloons would have been lower than the existing vegetation. To determine visibility, the revised tailings pond's configuration and crest elevation were compared

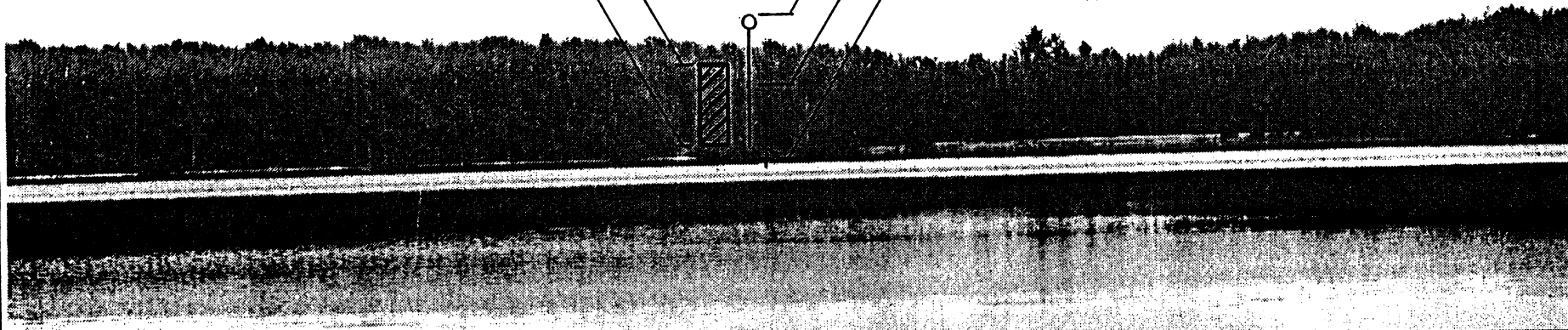
Top of Headframe (HF) 554 m (1820 ft)

Grade at HF 508 m (1665 ft)

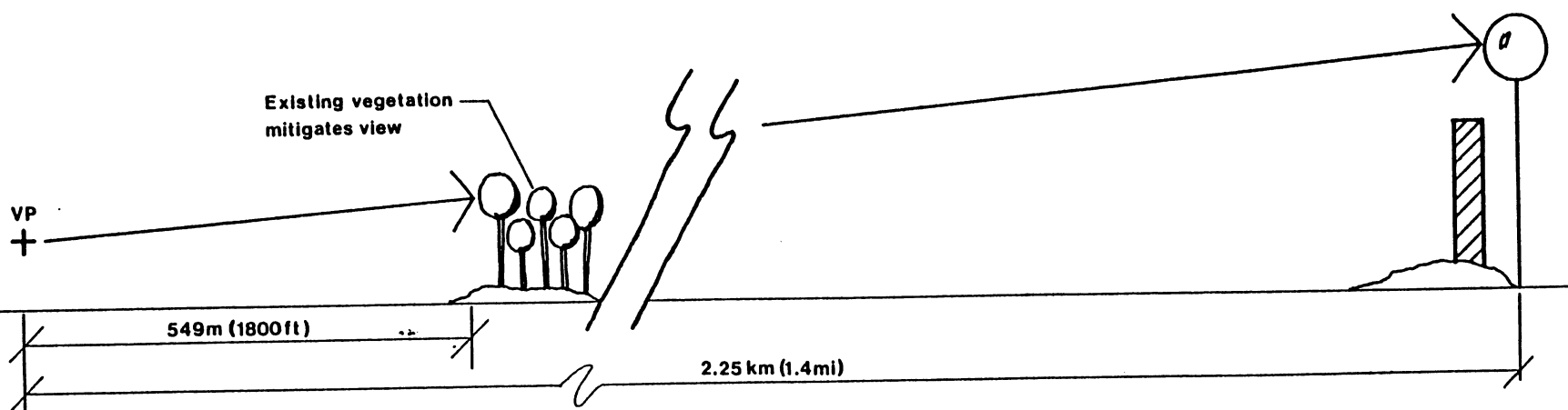
Top of Ballon 586 m (1923 ft)

Mid-point 542 m (1775.5 ft)

Pond (from USGS Mapping) 498 m (1632 ft)



□ PHOTO INTERPOLATION



□ SECTION

VISIBILITY DETERMINATION
METHODOLOGY

Figure 2.0-3

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CRANDON PROJECT

3.13-1-23

with the original design. The new tailings ponds will be sited in the same location as the original ponds; however, the ponds have been reduced in size and will not extend as far south. Project topography maps and vegetation maps were also examined to determine potential visibility.

Railroad Siding - Photos taken from the railroad siding viewing points were reviewed for evidence of the white styrofoam markers delineating the siding alignment. By comparing the known size of the styrofoam markers with the scale of the markers seen in the photographs, the relative scale of the railcars using the siding was determined.

2.2.2 Simulation

The scaled equation technique (U.S. Department of the Interior, Bureau of Land Management, 1980) was used to develop simulations of the project facilities prior to construction, enabling an evaluation of potential visual impacts. The technique recognizes that an object of known size at a known distance in a photograph can be used to establish the size of other objects at that same distance.

Visible portions of the facilities were simulated at their proper position and scale on 203 x 254 mm (8 x 10 inch) black and white photographs by scaling from the known dimensions and elevations of the tethered balloons and white styrofoam markers.

A life-like representation of the potential visual effect was created by superimposing a graphic image of the structure on the balloon or styrofoam image shown in the existing landscape scene.

3.0 OBSERVATIONS

3.1 INTRODUCTION

This section addresses the presence or absence of potential visual effects created by the headframe, mine waste disposal facility, and railroad siding, including a discussion or presentation of the following:

- 1) A written discussion of the visual presence or absence of the three project features at specific viewpoints which are representative of visually sensitive land uses in the project area;
- 2) Photographic simulations that represent the scale of the project features when viewed from selected viewpoints; and
- 3) Factors affecting the visibility of the proposed facilities, including topographic and vegetational screening, and viewer orientation. Representative photographs and plan views will illustrate these factors.

Foliage was present when the viewpoint photography was taken in August 1982. As a result, the effects of seasonal change on the ability of vegetation in the project area to screen views can only be hypothesized.

The photographic simulations may represent an exaggerated condition of potential visual effect. The scenes are composed in such a manner that the proposed facilities are centered in the photograph of the landscape setting. Hence, the impact may be more pronounced than if one were to perceive it in the actual setting. The photographic simulations are intended to be typical of the visual effect viewed from the general geographic area surrounding the viewpoint, and do not represent an isolated instance of impact common only to a specific viewpoint.

3.2 VIEWPOINT OBSERVATION RESULTS

3.2.1 Headframe

Visual presence or absence of the headframe from the viewpoints is denoted in Table 3.0-1. The viewpoint numbers in the table correspond to those identified on Figure 2.0-1. A description of the observations made at each of the viewpoints is presented in Appendix B.

The results of data compiled from the photographic views suggest that three principal geographic areas, represented by clustered viewpoints, will be potentially affected by the headframe. The areas include:

- 1) A segment of Highway 55, about 1.0 km (0.6 mile) in length, bearing approximately 1.8 km (1.1 miles) south of Sherman Corners;
- 2) The City of Crandon represented by the north and east shores of Lake Metonga.
- 3) The southwest shore of Little Sand Lake.

In addition, the headframe will be visible from the Sugarbush Hill Lookout Tower, and a portion of Sand Lake Road, approximately 91 m (300 feet) in length, located 0.8 km (0.5 mile) southeast of the headframe. A separate discussion of each geographic area is presented below.

Highway 55 Corridor - Intermittent views of the headframe will be available along a 1.0-km (0.62-mile) segment of the highway. Potential views were recorded at Viewpoint No. 11 (Figure 3.0-1). The photographic simulation of the view from this viewpoint is not entirely representative of the perception of the headframe when traveling the roadway. The simulation, although accurate, offers a static view not typical of the movement

TABLE 3.0-1

HEADFRAME VISIBILITY

VIEWPOINT NO.	VIEWPOINT DESCRIPTION	VISUAL PRESENCE/ABSENCE OF HEADFRAME
1	Main Public Landing on Deep Hole Lake	Absence
2	Main Public Landing on Duck Lake	Absence
3	Southwest Shore of Little Sand Lake	Presence
4	Southwest Shore of Oak Lake	Absence
5	Sokaogon Chippewa Community Park	Absence
6	Mole Lake Community Park	Absence
7	South Shore of Rolling Stone Lake	Absence
8 *	Highway 55 - South of Mole Lake	Absence
9 *	Intersection of Sand Lake and Black Joe Roads	Absence
10	Highway 55 - North of Swamp Creek; North Entrance of Chief Ackley Memorial Housing Project	Absence
11 *	Highway 55 - North of Swamp Creek	Presence**
12	Veterans Memorial Park- Public Campground	Absence
13	Village of Crandon-Main Public Landing/Swimming Beach on Lake Metonga	Presence
14 *	Village of Crandon - East Shore of Lake Metonga	Presence
15	Main Public Landing on Lake Lucerne	Absence
16	Private Dock on East Shore of Ground Hemlock Lake	Absence
17	Intersection of County Highways Q and W	Absence

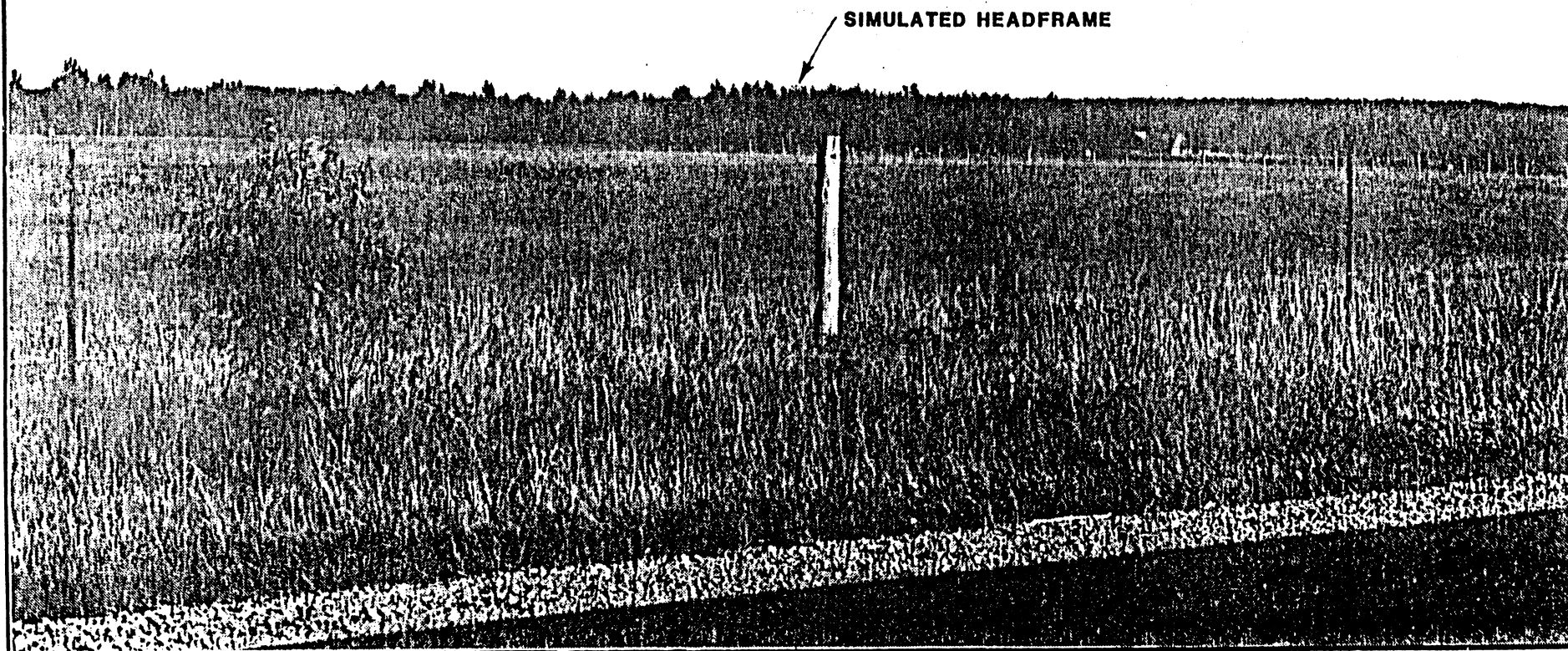
Table 3.0-1 (Continued)

18	Intersection of County Highway Q and St. John's Lane	Absence
19 *	Sand Lake Road East of Exxon Field Office	Presence
20 *	Lakeview Road	Absence
21 *	Keith Siding Road	Absence
22 *	Keith Siding Road	Absence
23	North Edge of Lake Lucerne from Potowatomi Trail	Absence
24	Scenic Wayside on Highway 8	Absence
25 *	Highway 8 at Western Corporate Boundary of Crandon	Absence
26	Sugarbush Hill Tower	Presence
27 *	Airport Road	Presence

Viewpoints identified by an asterisk (*) were located by application of selection criteria and methods described in subsection 2.1.2, and field verification. Remaining viewpoint locations were determined by Exxon and the DNR.

The double asterisk (**) following "Presence" indicates a potential winter viewing condition only.

3.13-1-29



SIMULATED HEADFRAME

Headframe Simulation Located
at the Center of the Scene

HEADFRAME SIMULATION
U.S. HIGHWAY 55 CORRIDOR

EXXON MINERALS COMPANY

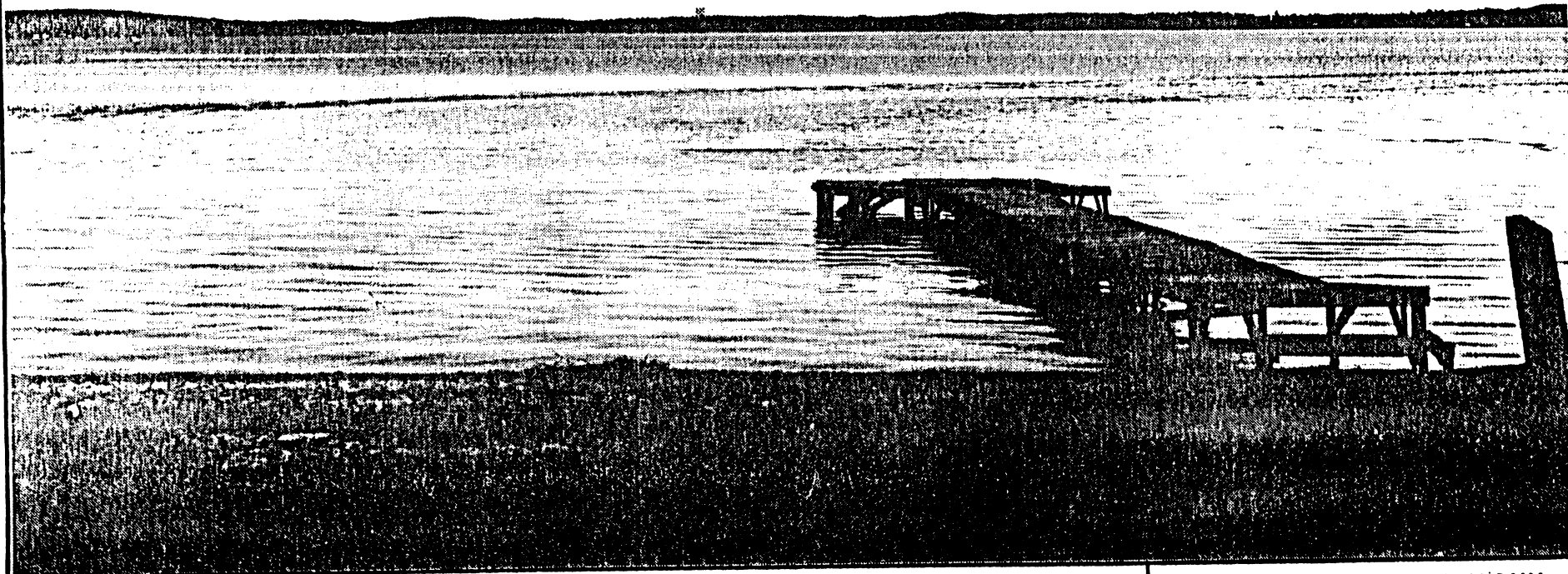
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and progression of views sensed from the highway (Wartofsky, 1980). The angle of view to the headframe from Highway 55 is outside the 65 degree cone of concentrated vision established for a driver traveling at a 45 m.p.h. highway speed (U.S. Department of Agriculture, Forest Service, 1973). Therefore, although visible, the headframe may not be readily perceived from an automobile traveling on Highway 55. The effects of viewing duration will play a role in the potential visual impact sensed by the viewer from points along the highway. Viewing time can be directly related to the degree of visual impact witnessed from a given viewpoint (U.S. Department of Interior, Bureau of Land Management, 1980). Although the headframe will be visible from Highway 55, the degree of visibility may be less than that which is imposed on a stationary land use such as a residential concentration.

City of Crandon - The headframe will be visible from several areas within the corporate boundaries of Crandon. Viewpoints No. 13 and 14 represent the visual presence of the headframe from the north and east shores of Lake Metonga at the main public boat landing and swimming beach, and residential areas, respectively. The main public boat landing on the north shore of Lake Metonga, Viewpoint No. 13 (Figure 3.0-2), represents the scale of the headframe at a viewing distance of approximately 8.9 km (5.5 miles).

Adjacent Lakes - The headframe will be visible from the southwest shore of Little Sand Lake but not from Oak or Duck lakes. The lakes represent recreation areas within a 2.4-km (1.5-mile) radius of the proposed structure. The headframe will be visible from the south shoreline of Little Sand Lake, which is currently undeveloped and supports wetland vegetation. A residential concentration is established on the northwest edge of the

3.13-1-31



Headframe Simulation Located
at the Center of the Scene

HEADFRAME SIMULATION VILLAGE OF CRANDON

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CRANDON PROJECT

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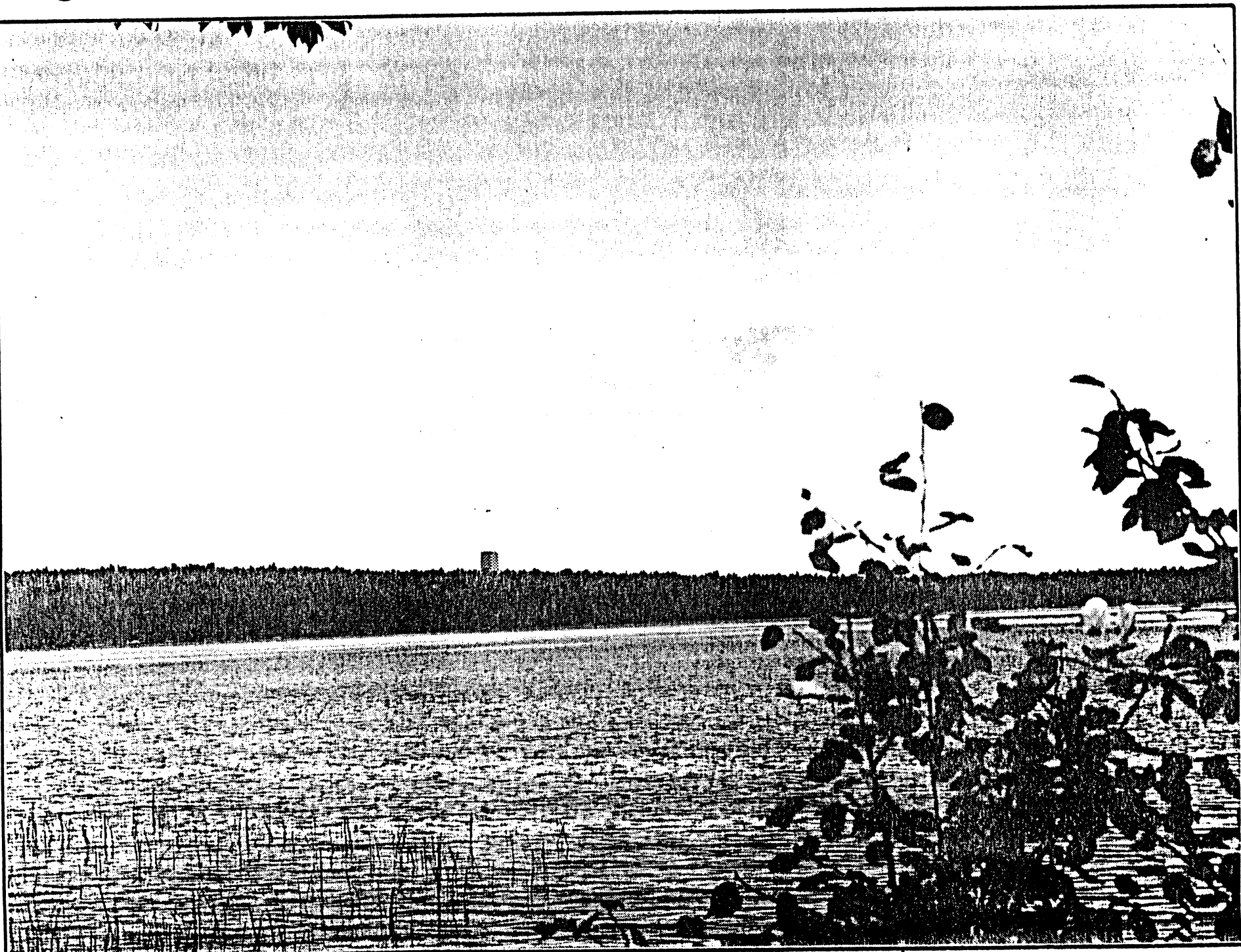
lake, but the headframe will not be visible from this area because of vegetational screening. Viewpoint No. 3 (Figure 3.0-3) documents the view of the headframe from Little Sand Lake.

Sugarbush Hill Lookout Tower - The Sugarbush Hill Lookout Tower was the most distant viewpoint, 11.6 km (7.2 miles), from which the headframe was visible. The elevation at the base of the tower, 591 m (1,939 feet), is higher than that at the headframe location, 508 m (1,665 feet). Upon ascending the tower, a viewer gains a panoramic view of the project area landscape. This added height differential may allow views of not only the headframe in clear weather, but also the clearings made for the mine/mill facilities and the mine waste disposal facility. A simulation of the headframe from Sugarbush Hill Lookout Tower is provided on Figure 3.0-4.

Sand Lake Road - The portion of Sand Lake Road represented by Viewpoint No. 19, located 0.8 km (0.5 mile) southeast of the headframe, was the closest location from which the headframe was visible (Figure 3.0-5). Orientation of the road in the direction of the headframe allows views of the facility from the road corridor. Vegetation close to the road edge will obstruct visibility to the headframe from other portions of Sand Lake Road which are not oriented in the direction of the structure.

3.2.2 Mine Waste Disposal Facility

The visual presence or absence of the mine waste disposal facility from selected viewpoints is noted in Table 3.0-2. The viewpoints correspond to the locations illustrated on Figure 2.0-1.

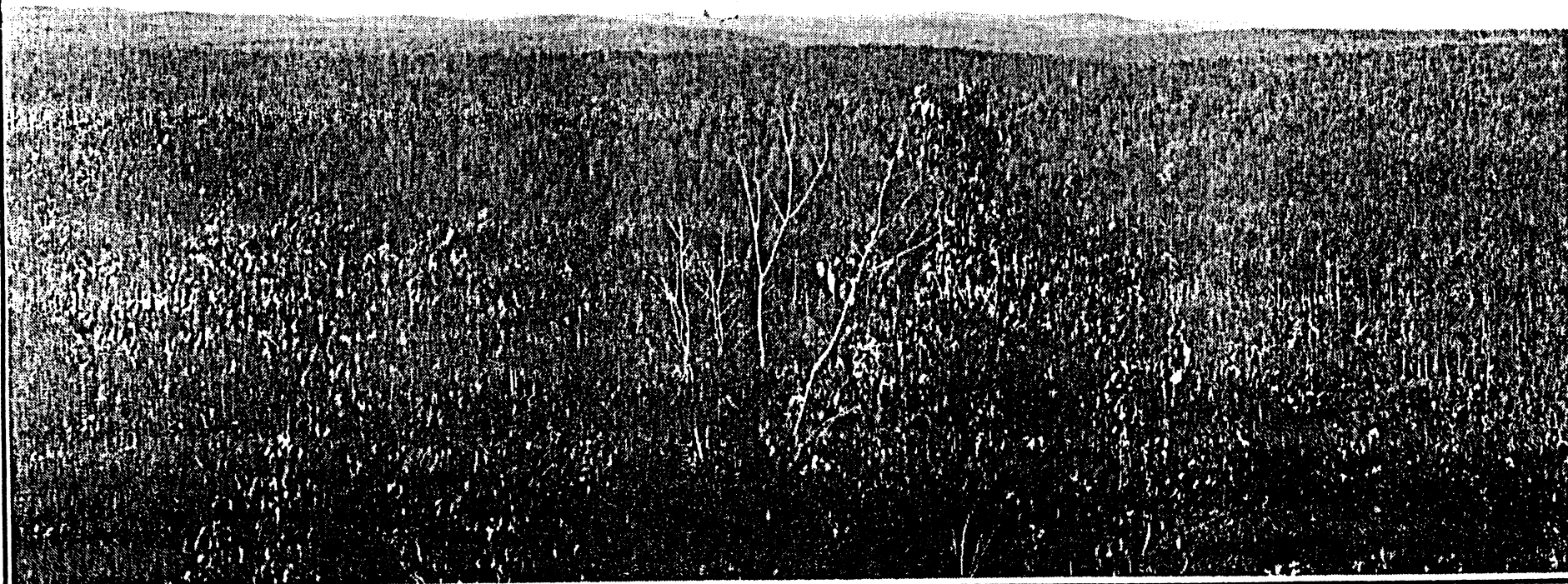


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Headframe Simulation Located
at the Center of the Scene

HEADFRAME SIMULATION

FXXON MINFRAI S COMPANY



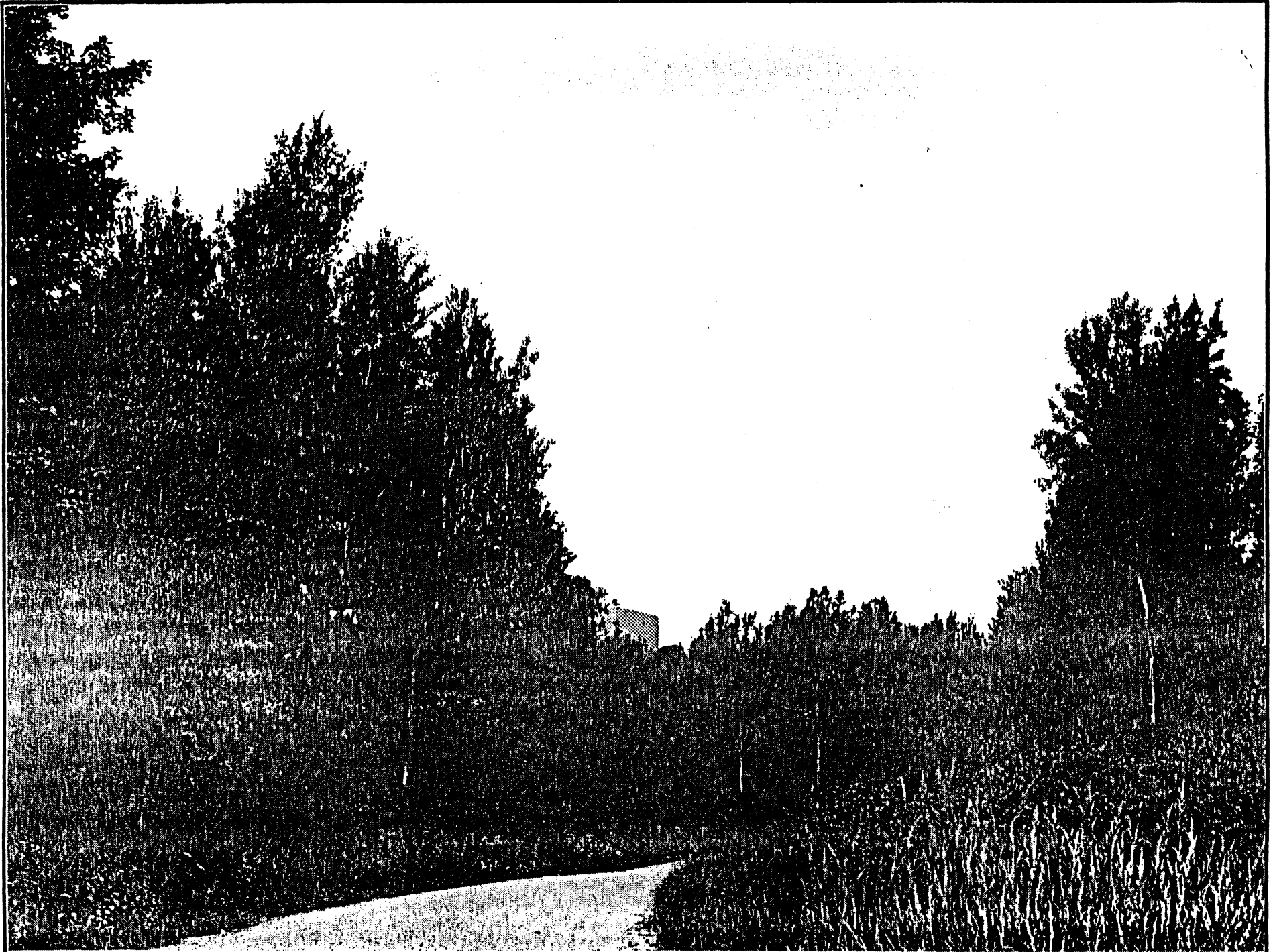
Headframe Simulation Located
at the Center of the Scene

HEADFRAME SIMULATION SUGARBUSH HILL TOWER

Figure 2.0-4

EXXON MINERALS COMPANY

SUGARBUSH HILL PROJECT



Headframe Simulation Located
at the Center of the Scene
0.8 km (0.5 mi) viewing distance

HEADFRAME SIMULATION SAND LAKE ROAD

Figure 3.0-5

EXXON MINERALS COMPANY
CRANDON PROJECT

TABLE 3.0-2

MINE WASTE DISPOSAL FACILITY VISIBILITY

VIEWPOINT NO.	VIEWPOINT DESCRIPTION	VISUAL PRESENCE OR ABSENCE OF MINE WASTE DISPOSAL FACILITY
28	Deep Hole Lake Road East of Balloon No. 1	Absence
29	Deep Hole Lake Road West of Balloon No. 1	Absence
30	Southwest Shore of Duck Lake	Absence
31	Southwest Shore of Deep Hole Lake	Absence
32	West Shore of Little Sand Lake	Absence
33	County Highway Q	Absence
34	Sand Lake Road	Absence

The mine waste disposal facility does not appear to be visible from any of the selected viewpoints. The configuration of the revised mine waste disposal facility is shown on Figure 3.0-6. The new facility will cover less area and have a lower pond crest elevation than the original design. At its closest points, the southwest corner of the facility will be 220 m (722 feet) from Sand Lake Road and the southeast corner of the facility will be 204 m (669 feet) from Deep Hole Lake Road (Viewpoints No. 28 and 29). Duck Lake, Viewpoint No. 30, along the western edge of the facility, is 305 m (1,000 feet) away. In all three instances, the existing forest cover, 15 to 21 m (50 to 70 feet) in height, in combination with viewpoint elevations lower than the facility embankments, will screen views to the mine waste disposal facility.

Similarly, the mine waste disposal facility should not be visible from Viewpoints No. 31 through 34 because of the height and screening characteristics of the existing vegetation, the proximity of the vegetation to the viewpoint and the fact the pond crest will typically be lower than the intervening vegetation.

3.2.3 Railroad Siding

The visibility of the railroad siding from selected viewpoints is identified in Table 3.0-3. Viewpoint numbers correspond to those illustrated on Figure 2.0-1.

The railroad siding will be visible from a segment of Keith Siding Road located approximately 3.2 km (2 miles) west of the intersection with County Highway W and extending westerly for approximately 0.8 km

TABLE 3.0-3

RAILROAD SIDING VISIBILITY

VIEWPOINT NO.	VIEWPOINT DESCRIPTION	VISUAL PRESENCE OR ABSENCE OF RAILROAD SIDING
21	Keith Siding Road	Presence
22	Keith Siding Road	Presence
35	County Highway W	Absence*

* No photography was taken at this viewpoint. Study of 1:24,000 USGS mapping, and field investigation identified that intervening landforms and vegetation conceal the siding.

(0.5) mile). Keith Siding Road is a combination secondary and light-duty highway which, along with County Highway W, is a primary traffic artery connecting the Crandon and Lake Metonga vicinities with the Lake Lucerne area.

Figure 3.0-7 illustrates the viewing area and identifies the factors affecting the visibility of the siding.

A simulation of the railroad siding from the Keith Siding road viewing area (Viewpoint No. 21) is illustrated on Figure 3.0-8. In this example, Keith Siding Road exhibits a north/south orientation which will allow views of the siding when approaching from the north.

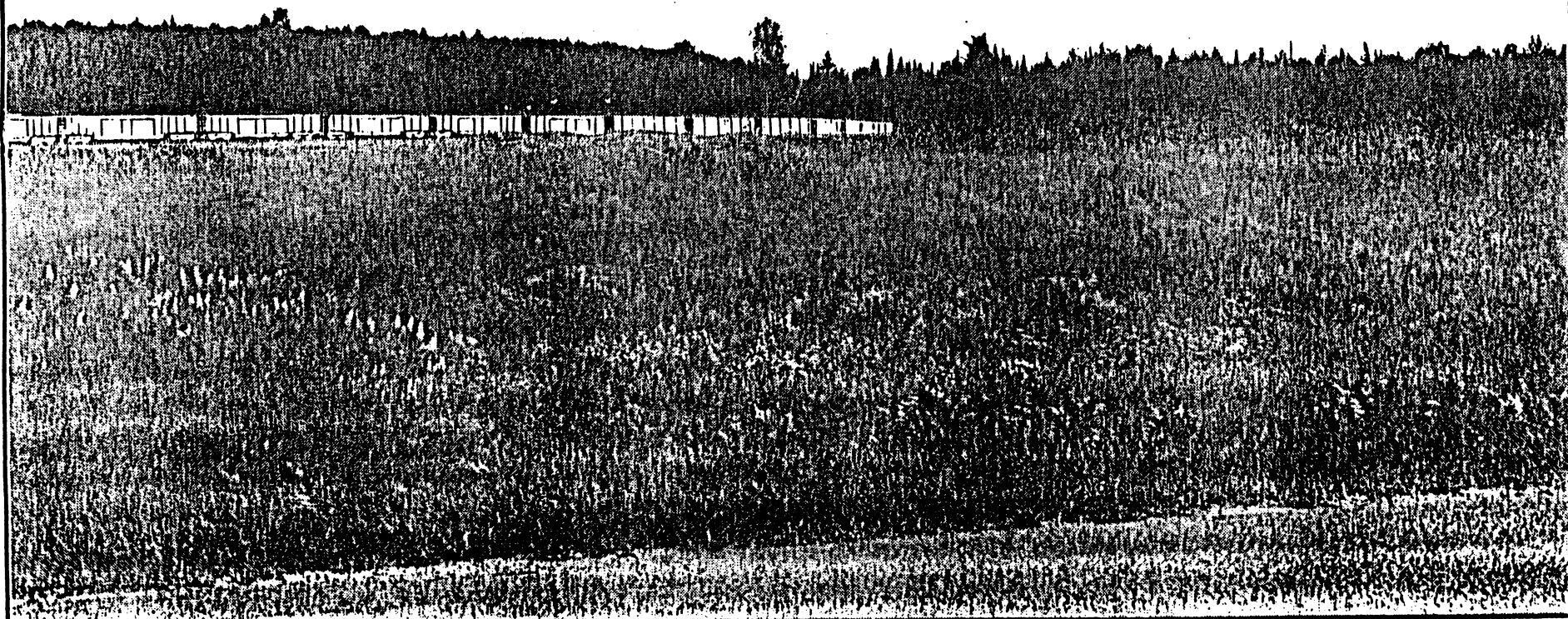
The siding will not be visible from County Highway W, or any of the unimproved roads within a 3.2 km (2 mile) radius of the siding. Vegetative screening is the principal reason for the lack of visibility.

3.2.4 Summary of Visibility of Project Facilities

Viewpoints where the mine surface facilities are visible have the following terrain characteristics.

- 1) The presence of man-made openings in the forest cover resulting from agricultural or road development;
- 2) The presence of natural openings in the forest cover, i.e., waterbodies, wetlands. The mine surface facilities will only be visible from shorelines farthest from the headframe, when viewed over open expanses of water; and
- 3) The absence of intervening landforms and tall, dense foreground vegetation, which, if present, would obstruct views of the mine surface facilities.

3.13-1-40



Rail Siding Simulation
Located at the Center of the Scene

RAILROAD SIDING SIMULATION
KEITH SIDING ROAD

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4.0 VISUAL MITIGATION

Recommended visual mitigation measures are discussed herein for the establishment and operation of the Crandon Project. Development of these measures is pursuant to the Wisconsin Administration Code, Section NR 132.17, Minimum Design and Operation Requirements for Metallic Mineral Mining.

Potential visual mitigation measures will be identified which can be employed to fulfill the requirements of NR 132.17. To facilitate this discussion, a description of the visual elements of color, form, line, texture, and scale, identified in Smardon (1979), will be used to establish the visual character of the headframe, mine waste disposal facility, and railroad siding in the context of the existing environment.

4.1 VISUAL CHARACTER OF HEADFRAME

The visual characteristics of the headframe are identified for each of the principal geographic areas from which it is visible including: the Highway 55 Corridor, the City of Crandon, Little Sand Lake, the Sugar-bush Hill Lookout Tower, and Sand Lake Road. Reference to foreground, middleground and background distance zones in the discussion of the headframe and landscape setting corresponds to those identified in the Visual Resource Management System in National Forest Landscape Management (U.S. Department of Agriculture, Forest Service, 1973 and 1974).

Visibility and clarity of detail are often a function of viewing distance (Smardon, 1979). Distance affects the perception of color, scale,

and spatial character-- the elements which Smardon considers to be the most important in setting landscape character and dictating the compatibility of landscape modifications. Distance affects the perception of scale; the apparent size of an object decreases with distance from the observer. Spatial dominance is also affected; the proximity to an object will affect the perception of its spatial importance. Longer viewing distances tend to reduce the impression of spatial enclosure and dominance. These principles, as they pertain to the headframe, will be addressed for each of the geographic view areas.

4.1.1 Highway 55 Corridor (Viewpoint No. 11)

The headframe form shown on Figure 3.0-1 will be less conspicuous from the Highway 55 corridor than from viewpoints on adjacent lakes. During the summer months the headframe will be slightly visible at the top of the background tree line. The effects of vegetation in reducing the visual contrast and dominance of the headframe are again evident in this view area. The density of vegetation and its irregular top line combine to absorb the headframe into the landscape horizon.

The distance between the viewpoint in Figure 3.0-1 and the headframe, 4.2 km (2.6 miles), will also reduce the structure's visibility by reducing its dominance. This effect can be further enhanced through color selection which will blend the headframe with the background sky.

4.1.2 City of Crandon (Viewpoints No. 13, 14 and 25)

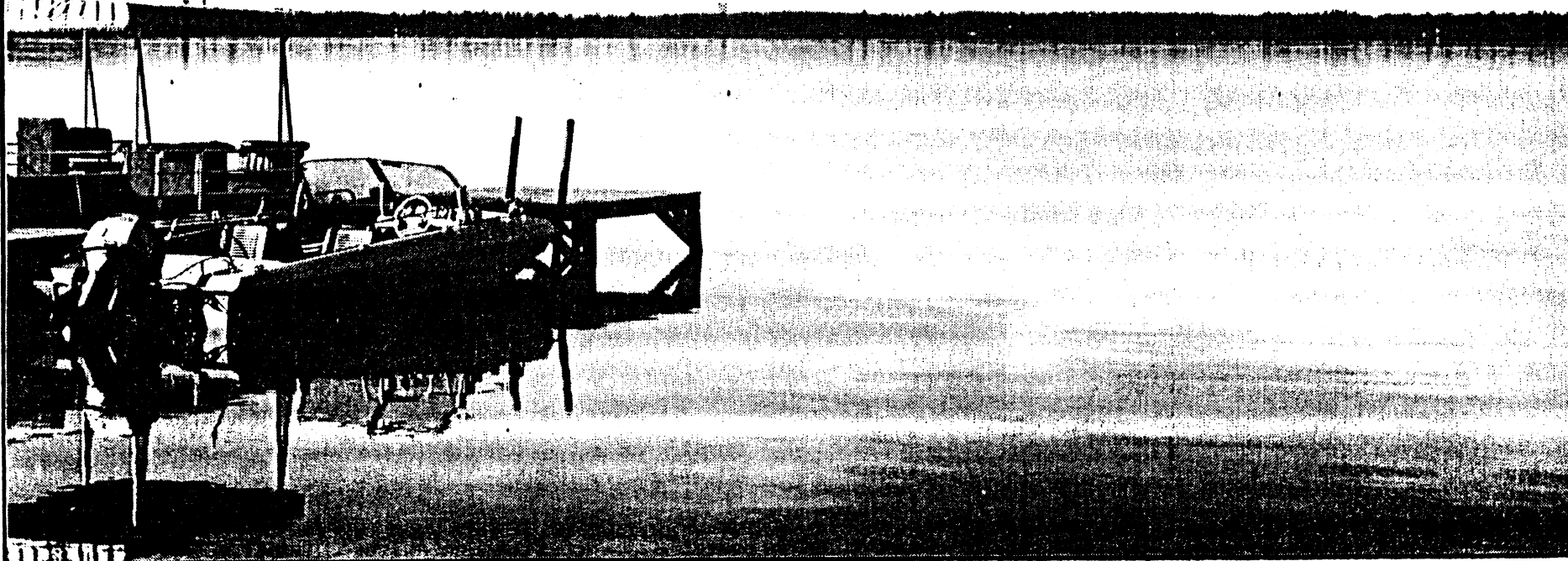
The visual contrast between the vertically oriented headframe and the horizontal landscape pattern created by the water and forested

landforms in Viewpoints No. 13 and 14 is illustrated on Figures 3.0-2 and 4.0-1. The visual contrast, resulting from form differences, is strengthened because of the viewing distance to the headframe and the background landscape which results in the simplification of detail and texture. The basic elements in the scenes are patterns of light and dark color and horizontal and vertical forms. Thus, even though the background location of the headframe in the scenes tends to reduce the scale dominance of the structure, the form contrast is accentuated because it is viewed against a sky backdrop and a strong horizontal tree line. The skyline form, which is less undulating at the background viewing distance, increases the opportunity for visual contrast of the headframe form with the perceived landscape pattern.

The importance of foreground and middleground vegetation to the reduction of form contrast created by the headframe is illustrated on Figure 4.0-2, Viewpoint No. 25. In this example, the positioning of the existing vegetation allows the perception of individual tree detail and texture which creates a more irregular skyline than that perceived at background distances. The irregular skyline form reduces the form contrast of the headframe by absorbing the structure in the scene and making it less conspicuous.

4.1.3 Little Sand Lake (Viewpoint No. 3)

The principles of visual contrast and visual dominance, identified in Smardon (1979), are exhibited by the headframe view from Little Sand Lake. Form and line differences between the headframe and the existing landscape will create visual contrast. The headframe form, vertical



Headframe Simulation Located
at the Center of the Scene
7.2 km (4.5 mi) viewing distance

HEADFRAME SIMULATION VILLAGE OF CRANDON

Figure 4.0-1

EXXON MINERALS COMPANY
CRANDON PROJECT



Headframe Simulation Located
at the Center of the Scene
10 km (6.2 mi.) viewing distance

HEADFRAME SIMULATION VILLAGE OF CRANDON

Figure 4.0-2

EXXON MINERALS COMPANY
CRANDON PROJECT

orientation, smooth and regular line, is distinct from the horizontal landscape patterns of the forest cover. Visual dominance of the headframe is created in this example by the form and scale contrast of the structure with other landscape elements. The relative scale of the headframe will be large when compared with other elements in the setting. The spatial enclosure created by the forest edge will also restrict the field of vision from the lake edge, increasing the visual prominence of the headframe.

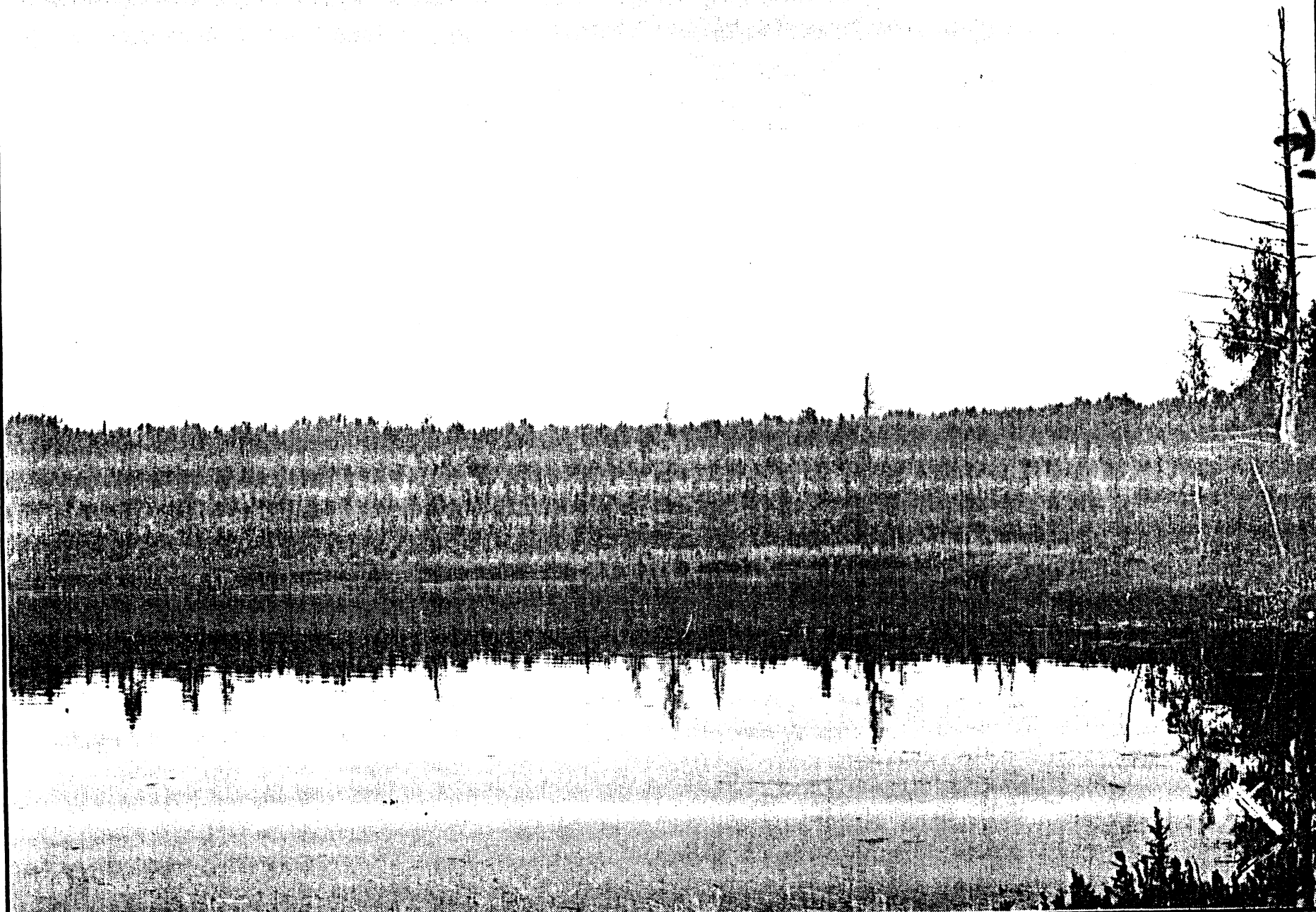
The proximity of the far shore vegetation to the lake shoreline viewpoints is an important factor in mitigating the visual dominance of the headframe. Visibility of the headframe is reduced as the distance between the far shore vegetation and viewpoint decreases. This effect is graphically illustrated when comparing Figures 3.0-3 and 4.0-3 where simulations of the headframe from viewpoints on Little Sand and Duck lakes show the mitigating effect of far shore vegetation, located at distances of 1,219 and 152 m (4,000 and 500 feet) from their respective viewpoints.

4.1.4 Sugarbush Hill Lookout Tower (Viewpoint No. 26)

Views of the headframe from the lookout tower, Figure 3.0-4, indicate that the landscape character of the region exhibits little variety, as defined in National Forest Landscape Management Volumes 1 and 2 (U.S. Department of Agriculture, Forest Service, 1973 and 1974), because of the monotypical forest cover. This enables openings in the vegetation that are strong in form to dominate the natural landscape.

The cleared openings in the existing forest cover for the mine/mill site, 47 ha (115 acres), and the mine waste disposal facility, 146 ha (360 acres), will be potentially visible from the Sugarbush Hill Lookout

3.13-1-47



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Headframe Simulation Located
at the Center of the Scene
1.8 km (1.1 mi.) viewing distance

HEADFRAME SIMULATION
DUCK LAKE
VIEWPOINT NO. 2

Figure 4.0-3

EXXON MINERALS COMPANY
CRANDON PROJECT

Tower because of the edge contrast they will create.

Sugarbush Hill Lookout Tower is located approximately 11.6 km (7.2 miles) from the mine/mill site. At that distance it is unlikely specific details of the mine/mill structures and headframe will be perceived. However, large structures and light reflections off structures may be visible in the clearings. Factors affecting the visibility of the site clearings and structures include atmospheric conditions and the effectiveness of the site's landscape reclamation proposals in restoring native vegetation forms on the mine/mill site interior and on the tailing ponds.

4.1.5 Sand Lake Road (Viewpoint No. 19)

Form and texture contrast between the headframe and existing environment, the limited field of vision created by roadside vegetation and the orientation of the road on the headframe will result in a focal landscape composition (Figure 3.0-5). For about 0.8 km (0.5 mile), the road is oriented directly toward the headframe which will be just visible over the middleground tree line. The scale of the headframe and the scale and irregular outline of the middleground vegetation will help in reducing the contrast of the headframe with the landscape.

4.2 VISUAL MITIGATION MEASURES - HEADFRAME (VIEWPOINTS NO. 1 THROUGH 27)

The headframe will exhibit varying degrees of visual contrast and visual dominance which are a result of form, line, and scale disparities between the structure and other distinct objects or areas in the landscape. These concepts, identified in Smardon (1979), may result in visual impacts. Appropriate color selection, sensitive headframe design, and the placement of vegetation to screen views of the headframe are procedures which can be employed to mitigate visual impacts resulting from the headframe.

4.2.1 Color Selection

Color selection is important in mitigating the visual contrast and dominance created by the headframe. Color is an important element in creating visual contrast (Smardon, 1979). Visual contrast created by color is affected by distance. Atmospheric perspective created by the scattering of light by haze or dust particles will soften color contrasts at middle-ground distances and reduce color distinction at background distances by replacing colors with values of blue and gray (U.S. Department of Agriculture, Forest Service, 1973 and 1975). Colors tend to become paler, lower in chroma (color brilliance), and bluer as viewing distances increase. Lighting conditions also affect color perception. Illuminated surfaces lose color intensity and are more reflective under mid-day sun, and become darker and more reddish during early and late daylight. Cloudy conditions reduce color value, the degree of lightness or darkness, and color brilliance.

Color selection for the headframe should be based on local conditions and the relative distance from the viewpoints where the headframe

is most visible. The headframe color will not appear distinct, and will be lower in color brilliance and value from the middleground and background viewing distances. In addition to atmospheric effects, the surface material texture of the headframe will effect the perception of color over distances. The headframe, constructed of concrete, will exhibit a fine-grained, smooth surface texture which will reflect sunlight. The reflectivity of the surface will result in a lightening of the surface color, even if a matte-finish is used. The headframe should be colored somewhat darker than the sky background to compensate for this reflection. A roughened surface texture, which would tend to absorb rather than reflect light, may also be helpful in reducing the reflectivity of the headframe. Final color and texture selections should be based on a study of site conditions.

It is impossible to conceal the headframe through the use of color. Color cannot be relied upon to diminish the visual impact of the headframe because the variation in daily and seasonal sky conditions will restrict the blend of headframe with sky backdrop. Color should be selected on the basis of making the headframe more compatible with the sky backdrop and surrounding environment. Robinette (1973) has drawn similar conclusions from color selection studies for power transmission towers and other large scale structures.

4.2.2 Headframe Design

The compatibility of form between the headframe and the surrounding landscape is an important issue in mitigating potential visual impacts created by the headframe. Several studies addressing the visual acceptability of power transmission structures in the environment have implications for headframe design. A study by Johnson, Johnson and Roy (1970) for Consumer's Power Company as cited by Robinette (1973) indicated that the most visually acceptable structural designs in the environment are those of the simplest form. Robinette (1973) reported that the most appropriate design purpose for power transmission structures would be to achieve designs that are so simple as to be inoffensive and unnoticeable. He concluded that attempts at increasing the attractiveness of towers have sometimes led to exotic designs that only attract more attention than those of less complex silhouette. In conclusion, simplification of design form will make the headframe as visually inconspicuous as is practical from areas where it will be visible.

4.2.3 Vegetative Screening

Observations made of the headframe and landscape setting from Highway 55 west of Crandon and from Sand Lake Road made earlier in Section 3.0, recognize the ability of vegetative screening to reduce the visual contrast and visual dominance of the headframe. The location of existing vegetation was also identified as a reason for the headframe not being visible at 21 of the 27 viewpoints.

If the existing vegetation remains, it will satisfactorily screen the headframe, thus making further mitigation unnecessary in most views.

If mitigation measures are required, landscaping can be placed to screen views of the headframe. As illustrated on Figure 4.0-3, the closer landscaping is kept in the view foreground, the more complete the visual mitigation will be.

The wintertime views of the headframe should not be significantly different than the summer scenes. Even without leaves the presence of evergreens in the landscape and the vegetation texture and depth will continue to partially or totally mitigate views.

4.3 VISUAL CHARACTER - MINE WASTE DISPOSAL FACILITY (VIEWPOINTS NO. 28 THROUGH 34)

As determined in subsection 3.2.2, the mine waste disposal facility will not be visible from the selected viewpoints with the possible exception of Sugarbush Hill Lookout Tower, Viewpoint No. 26, discussed in subsection 3.2.1. The tall, dense vegetation in the foreground and middle-ground of Viewpoints No. 28 through 34 is the primary factor affecting visibility. During the winter months the effectiveness of the vegetation in mitigating views should not be greatly different than in summer. The presence of evergreens in the landscape, tree and shrub density and the branching character and depth of the vegetation should mitigate views to this facility.

4.4 VISUAL MITIGATION - MINE WASTE DISPOSAL FACILITY

Further visual mitigation is not anticipated in the mine waste disposal facility area.

4.5 VISUAL CHARACTER - RAILROAD SIDING VIEWPOINTS NO. 21 AND 22)

The dominant visual elements perceived from viewpoints on Keith Siding Road are illustrated on Figure 3.0-8. Strong horizontal lines created by the intersection of the opening with the forest cover, and the intersection of the sky and vegetation are the main visual features at Viewpoints No. 21 and 22.

The railroad siding will accommodate ore-carrying gondola cars approximately 3 m (10 feet) in height and 15.8 m (52 feet) in length. The nature of the line created by the gondola cars, as perceived from a distance, may be compatible with the dominant horizontal lines in the scene. Although color differences between the ore cars and scenery will exist, this line compatibility, coupled with a viewing backdrop of mixed coniferous and deciduous vegetation, will lessen the visual contrast created by the siding.

4.6 VISUAL MITIGATION - RAILROAD SIDING

Several factors affect the visibility of the siding and its subsequent visual mitigation, including:

- 1) When viewed from a moving automobile, the perceived visual contrast created by the siding may be minimal because it will only be visible for a short viewing time and distance;
- 2) The 0.3 km (0.2 mile) setback from Keith Siding Road will reduce the relative scale of the gondola cars and their visual importance; and
- 3) An existing rail line is located approximately 0.4 km (0.2 mile) east of the railroad siding; thus, viewers are accustomed to the presence of rail activity in the area of the railroad siding.

The siding will not create major visual contrasts in form and line with other features in the landscape setting, and therefore may not create a visual impact. If visual mitigation is required, a row of plantings parallel to the outside track could be used to screen the siding from the Keith Siding Road viewing area. Earth berming could create a similar effect.

5.0 REFERENCES

5.1 REFERENCES CITED

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APPENDIX A

PHOTOGRAPHIC DOCUMENTATION

The equipment and procedures used by The Sanborn Group, Inc. to record potential visual impacts are described below:

Equipment - From each viewpoint three 35 mm cameras were used to photograph the scene in the direction of the proposed project facilities. Two cameras were equipped with black and white high contrast/high resolution print film. Color slide film was used in the third camera. All were fine-grained films selected to provide a sharply defined image of the balloon(s) or markers. The cameras were fitted with 45 and 50 mm lenses. The photographs were representative of the 60 degree central field of human vision, and correspond to how one would see the landscape scene from the viewpoints. Camera shots were bracketed, (i.e., repeated at higher and lower exposure settings), to achieve the best photographic quality. The cameras were mounted on tripods and operated with a cable release to avoid camera-motion blur.

Binoculars (10 power, 55 mm lens) were used to locate the headframe and tailings pond balloons from the more distant viewpoints where siting was difficult with unaided vision. A compass was used in orienting the cameras to the correct bearing of the balloons from viewpoints where they were not visible.

Procedure - Photographs were taken during mid-morning to late afternoon hours of August 16-20, 1982. Lighting conditions were held constant by sequencing the photographs to allow for back and side-lighting of the scenes by the sun. Photography from viewpoints located south and east

of the mine/mill site was conducted in the morning hours; correspondingly scenes photographed from viewpoints north and west of the site were taken in the afternoon hours.

Photography was taken from all viewpoints, regardless of balloon visibility, to provide a complete record of the presence or absence of potential visual impacts.

A standard data form was completed at each viewpoint location to document observations. The following information was recorded on the form: the specific facility under study, photographic data, viewpoint location, the elevation, bearing and distance to the reference point, generalized weather conditions, a description of the vegetation observed from the viewpoint, comments regarding visibility of the balloon, and implications for future visual impact. Appendix 3 includes field observation data forms completed during field work.

A 1:24000 scale USGS topographic map of the site area, with project facilities and viewpoint locations noted, was used during field work to check the locations of waterbodies, landforms, vegetative openings, and roadways. Viewpoint locations are presented on Figure 2.0-1.

APPENDIX B

FIELD OBSERVATION STANDARD
DATA FORMS

Visual Impact Assessment
August 16-20, 1982

THE SANBORN GROUP, INC.

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8-17
Time: 9:00 AM

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	<u>K</u>	<u>CAE</u>	<u>C-19</u>
Lens:	<u>55</u>	<u>50</u>	<u>45</u>
Filter(s):	<u>sky</u>	<u>sky</u>	<u>—</u>
Shutter Speed:	<u>250</u>	<u>125</u>	<u>250</u>
F-Stop:	1 <u>2.8</u> 2 <u>—</u> 3 <u>—</u>	1 <u>1.8</u> 2 <u>—</u> 3 <u>—</u>	1 <u>Auto</u> 2 <u>—</u> 3 <u>—</u>
ASA:	<u>200</u>	<u>32</u>	<u>25</u>
Film:	<u>Tech pan</u>	<u>Panx</u>	<u>K-25</u>

SUBJECT DESCRIPTION

	Headframe	Tailings Ponds	Railroad Siding
Viewpoint No.	<u>1-(1#2)</u>	<u>1-1#2</u>	<u>1-24</u>
Photograph No.	<u>1-1#2</u>	<u>1-1#2</u>	<u>1-24</u>

WEATHER CONDITIONS:

Clear sky; Bright blue sky

VIEWPOINT LOCATION:

Headframe locationAPPROXIMATE VIEWPOINT
ELEVATION:APPROXIMATE DISTANCE
AND DIRECTION TO
SUBJECT:

VEGETATION -

Description:

Height: — Less than 6 feet — 6-25 Feet — More than 25 feetBALLOON VISIBILITY: — Visible with unaided vision.— Visible with aided vision.

COMMENTS:

Balloon filling procedure

THE SANBORN GROUP, INC.

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8.17.82Time: 10:53 A.M.

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	<u>Konica</u>	<u>Canon AE-1</u>	<u>Canon QL19</u>
Lens:	<u>50 mm</u>	<u>50 mm</u>	<u>45 mm</u>
Filter(s):	<u>UV</u>	<u>UV</u>	
Shutter Speed:	<u>250</u>	<u>125</u>	<u>250</u>
F-Stop:	1 <u>11</u> 2 <u>8 1/2</u> 3 <u>11.5</u>	1 <u>8 1/2</u> 2 <u>11</u> 3 <u>8</u>	1 <u>EE</u> 2 <u>25</u> 3 <u>25</u>
ASA:	<u>200</u>	<u>32</u>	<u>25</u>
Film:	<u>tech. pan</u>	<u>Pan</u>	<u>Kodachrome 25</u>

SUBJECT DESCRIPTION

☒ Headframe ☐ Tailings Ponds ☐ Railroad Siding

Viewpoint No. 1 Description public access @ Deep Hole Lake

Photograph No. 1-6/7/8/9 1-3/4/5/6 1-25

WEATHER CONDITIONS:

Clear sky; bright sun

VIEWPOINT LOCATION:

Deep Hole Lake - public landingAPPROXIMATE VIEWPOINT
ELEVATION:1603APPROXIMATE DISTANCE
AND DIRECTION TO
SUBJECT:1.9 miles to the north

VEGETATION -

Description:

Trees in background; water in foreground & middle groundHeight: ☐ Less than 6 feet ☐ 6-25 Feet ☒ More than 25 feet

BALLOON VISIBILITY:

☐ Visible with unaided vision. No visibility
☐ Visible with aided vision.

COMMENTS:

Foreground primarily water from public access;
Veg @ more than 25' in background; balloon not visible
from this locationCraig G. Schiestl

THE SANBORN GROUP, INC.

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSIS

Date: 8.17.82
Time: 12:07 A.M.

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	<u>KONICA</u>	<u>CANON AE-1</u>	<u>CANON RL 19</u>
Lens:	<u>50MM</u>	<u>50 MM</u>	<u>45 MM</u>
Filter(s):	<u>UV SKYLIGHT</u>	<u>UV SKYLIGHT</u>	<u>HOHE</u>
Shutter Speed:	<u>250</u>	<u>125</u>	<u>250</u>
F-Stop:	<u>1 1/8.5 2 11 3 8</u>	<u>1 8.5 2 11 3 8</u>	<u>1 EE 2 3</u>
ASA:	<u>200</u>	<u>32</u>	<u>25</u>
Film:	<u>TECH PAN</u>	<u>PANATOMIC X</u>	<u>KODACHROME 25</u>

SUBJECT DESCRIPTION

☒ Headframe ☐ Tailings Ponds ☐ Railroad Siding

Viewpoint No. 3 Description 12/13/14/15

Photograph No. 1-14/15/16/17 1-18/19/20/21 1-27

WEATHER CONDITIONS: CLEAR ; BRIGHT SKY ; MIN. WIND - APPROX. 5-10 MPH.

VIEWPOINT LOCATION: SW SHORE LITTLE SAND LAKE ; @ FOREST & LANGLADE CTY. LINE

APPROXIMATE VIEWPOINT ELEVATION: APPROX. 1600

APPROXIMATE DISTANCE AND DIRECTION TO SUBJECT: 1 1/2 MILES TO HEADFRAME BALLOON TO NORTH

VEGETATION - Description: FOREGROUND & MIDDLEGROUND WATER ; BACKGROUND OVERSTORY VEG. OVER 25' IN HEIGHT

Height: ☐ Less than 6 feet ☐ 6-25 Feet ☒ More than 25 feet

BALLOON VISIBILITY: ☒ Visible with unaided vision.
☐ Visible with aided vision.

COMMENTS: BALLOON VERY VISIBLE W/UNAIDED VISION ; MINIMAL DEFLECTION OF BALLOON DUE TO WIND

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8.17.82
Time: 2:20 P.M.

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	<u>KONICA</u>	<u>CANON AE-1</u>	<u>CANON RL19</u>
Lens:	<u>50MM</u>	<u>50MM</u>	<u>45MM</u>
Filter(s):	<u>UV SKYLIGHT</u>	<u>UV SKYLIGHT</u>	<u>UV SKYLIGHT</u>
Shutter Speed:	<u>250</u>	<u>125</u>	<u>125</u>
F-Stop:	<u>1 8.5 2 8 3 8.11</u>	<u>1 2.8 2 11 3 8.5</u>	<u>1 EE 2 3</u>
ASA:	<u>200</u>	<u>115 32</u>	<u>25</u>
Film:	<u>TECH PAN</u>	<u>PANATOMIC X</u>	<u>KODACHROME 25</u>

SUBJECT DESCRIPTION

☒ Headframe ☐ Tailings Ponds ☐ Railroad Siding

Viewpoint No. 4 Description _____

Photograph No. 1-18/19/20/21 1-16/17/18/19/20 1-28

WEATHER CONDITIONS: CLEAR; BRIGHT SUN; MINIMAL HAZE;
WIND 5-10 MPH

VIEWPOINT LOCATION: SW SHORE OF OAK LAKE LOOKING NE @
HEADFRAME BALLOON

APPROXIMATE VIEWPOINT ELEVATION: 1632'

APPROXIMATE DISTANCE AND DIRECTION TO SUBJECT: 1.4 MILES TO NE

VEGETATION -
Description: FOREGROUND & MIDDLE GROUND WATER; BACKGROUND
OVERSTORY VEG. @ MORE THAN 25'

Height: ☐ Less than 6 feet ☐ 6-25 Feet ☒ More than 25 feet

BALLOON VISIBILITY: ☒ Visible with unaided vision.
☐ Visible with aided vision.

COMMENTS: EASILY PERCEIVED; WELL ABOVE TREE

LINE

Observer Signature: Craig G. Schuster
3.13-1-65

THE SANBORN GROUP, INC.

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8-17-82
Time: 2:50 P.M.

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	<u>KONICA</u>	<u>CANON AE-1</u>	<u>CANON QL19</u>
Lens:	<u>50 MM</u>	<u>50 MM</u>	<u>45 MM</u>
Filter(s):	<u>UV SKYLIGHT</u>	<u>UV SKYLIGHT</u>	<u>—</u>
Shutter Speed:	<u>250</u>	<u>125</u>	<u>250</u>
F-Stop:	<u>1 8.5 2 8 3 11</u>	<u>1 8 2 5.6 3 8.5</u>	<u>1 5.6 2 3</u>
ASA:	<u>200</u>	<u>32</u>	<u>25</u>
Film:	<u>TECH PAN</u>	<u>PANATOMIC X</u>	<u>KODACHROME 25</u>

SUBJECT DESCRIPTION

☒ Headframe ☐ Tailings Ponds ☐ Railroad Siding

Viewpoint No. 5 Description _____

Photograph No. 1-22/23/24/25 | 1-21/22/23/24 | 1-29

WEATHER CONDITIONS: BRIGHT SUN; MINIMAL HAZE; MINIMAL WIND
CLOUDLESS

VIEWPOINT LOCATION: MOLE LAKE COMMUNITY PARK; WAYSIDE LOCATION
ADJACENT TO HWY 55 (SOKAOGON PARK)

APPROXIMATE VIEWPOINT ..
ELEVATION: 1550'

APPROXIMATE DISTANCE
AND DIRECTION TO
SUBJECT: DUE EAST @ 2.9 MI.

VEGETATION -
Description: FOREGROUND MAINTAINED TREE; MIDDLEGROUND
YOUNG PINE STAND @ 6-25'; BACKGROUND OVERSTORY 25'

Height: ☐ Less than 6 feet ☒ 6-25 Feet ☒ More than 25 feet

BALLOON VISIBILITY: ☐ Visible with unaided vision.
☐ Visible with aided vision.

COMMENTS: BALLOON NOT VISIBLE W/UNAIDED OR AIDED
VISION DUE TO MIDDLEGROUND & BACKGROUND VEG.

THE SANBORN GROUP, INC.

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8.17.82Time: 3:00 P.M.

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	<u>KONICA</u>	<u>CANON AE-1</u>	<u>CANON QL19</u>
Lens:	<u>50MM</u>	<u>50MM</u>	<u>45MM</u>
Filter(s):	<u>UV SKYLIGHT</u>	<u>UV SKYLIGHT</u>	<u>—</u>
Shutter Speed:	<u>250</u>	<u>125</u>	<u>EE 250</u>
F-Stop:	<u>1 8.5 2 8 3 11</u>	<u>1 8.5 2 5.6 3 11.5</u>	<u>1 EE 2 — 3 —</u>
ASA:	<u>200</u>	<u>32</u>	<u>25</u>
Film:	<u>TECH PAN</u>	<u>PANATOMIC X</u>	<u>KODACHROME 25</u>

SUBJECT DESCRIPTION

☒ Headframe ☐ Tailings Ponds ☐ Railroad Siding

Viewpoint No. 6 Description _____

Photograph No. 1-26/27/28/29 1-25/26/27/28 1-30

WEATHER CONDITIONS: BRIGHT SUN; CLEAR SKY; MINIMAL HAZE; WIND
DIRECTION/SPEED 5-10 MPH

VIEWPOINT LOCATION: MOLE LAKE COMMUNITY PARK; PICNIC AREA

APPROXIMATE VIEWPOINT
ELEVATION: 1552

APPROXIMATE DISTANCE
AND DIRECTION TO
SUBJECT: DUE EAST 2.9 MILES

VEGETATION -

Description: FOREGROUND LOWLAND VEG. LESS THAN 6'; MIDDLEGROUN
WATER; BACKGROUND OVERSTORY VEG. > 25'

Height: ☒ Less than 6 feet ☒ 6-25 Feet ☒ More than 25 feet

BALLOON VISIBILITY: ☐ Visible with unaided vision.
☐ Visible with aided vision.

COMMENTS:

BALLOON NOT VISIBLE W/BINOCULARS

THE SANBORN GROUP, INC.

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8.17.82
Time: 3:37 P.M.

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	<u>KONICA</u>	<u>CANON AE-1</u>	<u>CANON QL 19</u>
Lens:	<u>50 MM</u>	<u>50 MM</u>	<u>45 MM</u>
Filter(s):	<u>UV SKYLIGHT</u>	<u>UV SKYLIGHT</u>	<u>—</u>
Shutter Speed:	<u>250</u>	<u>125</u>	<u>250</u>
F-Stop:	<u>18.5 25.65 31.5</u>	<u>18.5 25.65 31.5</u>	<u>1EE 2 3</u>
ASA:	<u>200</u>	<u>32</u>	<u>25</u>
Film:	<u>TECH PAN</u>	<u>PANATOMIC X</u>	<u>KODACHROME 25</u>

SUBJECT DESCRIPTION

☒ Headframe ☐ Tailings Ponds ☐ Railroad Siding
Viewpoint No. 7 DescriptionPhotograph No. 1-30/31/32/33 1-30/31/32/33 1-31

WEATHER CONDITIONS:

CLEAR ; CLOUDLESS ; MINIMAL HAZE ; WIND VEL.
@ 5-10 MPH

VIEWPOINT LOCATION:

SW SIDE OF ROLLINGSTONE LAKE NEAR
WALLEYE LODGE & COTTAGESAPPROXIMATE VIEWPOINT
ELEVATION:1535APPROXIMATE DISTANCE
AND DIRECTION TO
SUBJECT:NE 4 MILES

VEGETATION -

Description:

FOREGROUND & MIDDLEGROUND WATER; BACKGROUND
RIDGES; NOBS COVERED W/OVERSTORY VEG @ +25'Height: ☐ Less than 6 feet ☐ 6-25 Feet ☐ More than 25 feetBALLOON VISIBILITY: ☐ Visible with unaided vision.☐ Visible with aided vision.

COMMENTS:

TOPOGRAPHY, RIDGES & NOBS CONCEAL HEADFRAME BALLOON ;
BALLOON NOT VISIBLE WITH AIDED VISION

THE SANBORN GROUP, INC.

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8-17-82Time: 4:33 P.M.

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	<u>KONICA</u>	<u>CANON AE-1</u>	<u>CANON QL-19</u>
Lens:	<u>50 MM</u>	<u>50 MM</u>	<u>45 MM</u>
Filter(s):	<u>UV SKYLIGHT</u>	<u>UV SKYLIGHT</u>	<u> </u>
Shutter Speed:	<u>250</u>	<u>1/250</u>	<u>250</u>
F-Stop:	<u>1 11 2 16 3 8</u>	<u>1 8.5 2 11.5 3 5.65</u>	<u>1 EE 2 3</u>
ASA:	<u>200</u>	<u>32</u>	<u>25</u>
Film:	<u>TECH PAN</u>	<u>PANATOMIC X</u>	<u>KODACHROME 25</u>

SUBJECT DESCRIPTION

☒ Headframe ☐ Tailings Ponds ☐ Railroad Siding

Viewpoint No. 8 Description

Photograph No. 2-1, 2, 3, 4 2-1, 2, 3, 4 1-32

WEATHER CONDITIONS: BRIGHT SUN; CLEAR SKY; MINIMUM HAZE;
WIND VELOCITY @ 5-10 MPH

VIEWPOINT LOCATION: HWY. 55 SOUTH OF MOLE LAKE

APPROXIMATE VIEWPOINT
ELEVATION:

~ 1560'

APPROXIMATE DISTANCE
AND DIRECTION TO
SUBJECT:

EAST 3.4 MILES

VEGETATION -

Description: FOREGROUND AGRICULTURAL FIELD; MIDDLE GROUND
MOLE LAKE; BACKGROUND OVERSTORY VEG. + 25'

Height: ☐ Less than 6 feet ☐ 6-25 Feet ☐ More than 25 feet

BALLOON VISIBILITY: ☐ Visible with unaided vision.
☐ Visible with aided vision.

COMMENTS: NOT VISIBLE W/ AIDED VISION; RISE IN
TOPD SHIELDS VIEW; NOT VISIBLE W/ NAKED EYE

THE SANBORN GROUP, INC.

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8.17.82
Time: 4:42 PM

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	<u>KONICA</u>	<u>CANON AE-1</u>	<u>CANON QL 19</u>
Lens:	<u>50 MM</u>	<u>50 MM</u>	<u>45 MM</u>
Filter(s):	<u>UV SKYLIGHT</u>	<u>UV SKYLIGHT</u>	<u>—</u>
Shutter Speed:	<u>250</u>	<u>125</u>	<u>250</u>
F-Stop:	<u>1 8.5 25.65 3 11.5</u>	<u>1 8.5 25.65 3 11.5</u>	<u>1 EE 2 3</u>
ASA:	<u>200</u>	<u>32</u>	<u>25</u>
Film:	<u>TECH PAN</u>	<u>PANATOMIC X</u>	<u>KODACHROME 25</u>

SUBJECT DESCRIPTION

☒ Headframe
 ☐ Tailings Ponds
 ☐ Railroad Siding
Viewpoint No. 1 Description INTERSECTION OF SAND LAKE RD & BLACK JOE RD.Photograph No. 2-5/6/7/8 2-8/6/7/8/9 1-33

#5 - MISFIRE

WEATHER CONDITIONS:

CLEAR SKY; BRIGHT SUN; MINIMAL HAZE;
WIND VEL. 5-10 MPH

VIEWPOINT LOCATION:

INTERSECTION OF SAND LAKE AND BLACK JOE ROADAPPROXIMATE VIEWPOINT
ELEVATION:1540'APPROXIMATE DISTANCE
AND DIRECTION TO
SUBJECT:DUE EAST ~ 2 1/2 MILES

VEGETATION -

Description:

FOREGROUND & MIDDLE GROUND - AG. FIELDS AND SAND
LAKE RD; BACKGROUND OVERSTORY VEG. +25'Height: ☒ Less than 6 feet ☐ 6-25 Feet ☒ More than 25 feet

BALLOON VISIBILITY:

☒ Visible with unaided vision.☐ Visible with aided vision.

COMMENTS:

BALLOON BARELY VISIBLE OVER TOP OF TREECANDYCraig Schmitt

THE SANBORN GROUP, INC.

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8.17.82
Time: 5:15 P.M.

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	<u>KONICA</u>	<u>CANON AE-1</u>	<u>CANON QL19</u>
Lens:	<u>50 MM</u>	<u>50 MM</u>	<u>45 MM</u>
Filter(s):	<u>UV SKYLIGHT</u>	<u>UV SKYLIGHT</u>	<u>—</u>
Shutter Speed:	<u>250</u>	<u>125</u>	<u>250</u>
F-Stop:	<u>1 8.5 2 5.6 3 11.5</u>	<u>1 8.5 2 5.6 3 11.5</u>	<u>1 EE 2 3</u>
ASA:	<u>200</u>	<u>32</u>	<u>25</u>
Film:	<u>TECH PAN</u>	<u>PALATOMIC X</u>	<u>KODACHROME 25</u>

SUBJECT DESCRIPTION

☒ Headframe ☐ Tailings Ponds ☐ Railroad Siding

Viewpoint No. 10 Description _____

Photograph No. 2-9/10/11/12 2-10/11/12/13 2-1

WEATHER CONDITIONS: CLEAR SKY; BRIGHT SUN; MINIMAL HAZE;
WIND VELOCITY ~ 5-10 MPH

VIEWPOINT LOCATION: NORTH ENTRANCE TO CHIEF ACKLEY MEMORIAL
HOUSING PROJECT

APPROXIMATE VIEWPOINT ELEVATION: 1550'

APPROXIMATE DISTANCE AND DIRECTION TO SUBJECT: 2.3 MILES
DUE EAST SOUTH 80°E

VEGETATION -

Description: FOREGROUND LOW VEG. MIDDLEGROUND/BACKGROUND
OVERSTORY VEG. +25'; TREE LINE IRREGULAR

Height: ☐ Less than 6 feet ☐ 6-25 Feet ☐ More than 25 feet

BALLOON VISIBILITY: ☒ Visible with unaided vision.
☐ Visible with aided vision.

COMMENTS: BALLOON PARTIALLY OBSCURED BY INTERMITTENT
OVERSTORY VEG - THIN PINES PARTIALLY OBSCURE BALLOON;
5-10 MPH WINDS DEFLECTS BALLOON QUITE NOTICEABLY
* BALLOON SEEN INTERMITTENTLY THROUGHOUT HOUSING AREA.

THE SANBORN GROUP, INC.

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8.17.82
Time: 5:25 PM.

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	<u>KONICA</u>	<u>CANON AE-1</u>	<u>CANON QL19</u>
Lens:	<u>50 MM</u>	<u>50MM</u>	<u>45 MM</u>
Filter(s):	<u>UV SKYLIGHT</u>	<u>UV SKYLIGHT</u>	<u>---</u>
Shutter Speed:	<u>250</u>	<u>125</u>	<u>250</u>
F-Stop:	<u>18.5 25.65 31.5</u>	<u>18.5 25.65 31.5</u>	<u>1 1.5 2 3</u>
ASA:	<u>200</u>	<u>32</u>	<u>25</u>
Film:	<u>TECH PAN</u>	<u>PANATOMIC X</u>	<u>KODACHROME</u>

SUBJECT DESCRIPTION

☒ Headframe ☐ Tailings Ponds ☐ Railroad Siding

Viewpoint No. 11 Description HWY. 55, NORTH OF SWAMP CREEK

Photograph No. 2-13/14/15/16 2-14/15/16/17 2-2

WEATHER CONDITIONS: CLEAR SKY; BRIGHT SUN; NO HAZE; MINIMAL WIND 5-10 MPH - INTERMITTENTLY CALM

VIEWPOINT LOCATION: HWY. 55, NORTH OF SWAMP CREEK

APPROXIMATE VIEWPOINT ELEVATION: 1613'

APPROXIMATE DISTANCE AND DIRECTION TO SUBJECT: 2.6 MILES

VEGETATION -
Description: AG. FIELD FOREGROUND / MIDDLE GROUND / BACKGROUND OVERSTORY VEG. + 25'

Height: ☐ Less than 6 feet ☐ 6-25 Feet ☐ More than 25 feet

BALLOON VISIBILITY: ☒ Visible with unaided vision.
☐ Visible with aided vision.

COMMENTS: BALLOON CLEARLY VISIBLE W/UNAIDED VISION;
CLEARLY TREE-LINE EASILY; BALLOON INTERMITTENTLY VISIBLE
ALONG HWY. 55 FROM MOELAKE RESERVATION HOUSING TO
~1/4 MILE NORTH OF BENCHMARK 1622 ON U.S.G.S. QUADRANGLE

THE SANBORN GROUP, INC.

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8.17.82
Time: 6:15 P.M.

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	<u>KONICA</u>	<u>CANON AE-1</u>	<u>CANON QL19</u>
Lens:	<u>50 MM</u>	<u>50 MM</u>	<u>45 MM</u>
Filter(s):	<u>UV SKYLIGHT</u>	<u>UV SKYLIGHT</u>	<u>—</u>
Shutter Speed:	<u>250</u>	<u>125</u>	<u>250</u>
F-Stop:	<u>1 8.5 25.6 3 11.5</u>	<u>1 8 25.6 3 11</u>	<u>1 EE 2 3</u>
ASA:	<u>200</u>	<u>32</u>	<u>25</u>
Film:	<u>TECH PAN</u>	<u>PANATOMICX</u>	<u>KODACHROME 25</u>

SUBJECT DESCRIPTION

☒ Headframe ☐ Tailings Ponds ☐ Railroad Siding
Viewpoint No. 12 DescriptionPhotograph No. 2-17/18/19/202-18/19/20/212-3WEATHER CONDITIONS: BRIGHT SUN ; CLOUDLESS SKY ; NO HAZE ;
CALM WINDSVIEWPOINT LOCATION: VETERANS MEMORIAL PARK - PHOTO TAKEN FROM
PUBLIC CAMPGROUNDAPPROXIMATE VIEWPOINT
ELEVATION: 1600 FT.APPROXIMATE DISTANCE
AND DIRECTION TO
SUBJECT: WSW 2.9 MILES

VEGETATION -

Description: FOREGROUND VEG. OPEN FIELD CLEARED FOR
CAMPING ; MIDDLEGROUND & BACKGROUND FOREST EDGE
@ 425' ; INTERMITTENT FOREGROUND SPRUCE
Height: ☐ Less than 6 feet ☐ 6-25 Feet ☐ More than 25 feetBALLOON VISIBILITY: ☐ Visible with unaided vision.
☐ Visible with aided vision.COMMENTS: NOT VISIBLE DUE TO HEIGHT OF FORE MIDDLE
BACKGROUND VEGETATION. ; SHOT IS REPRESENTATIVE OF
VISIBILITY THROUGHOUT PARK

THE SANBORN GROUP, INC.

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8.17.82Time: 6:45 P.M.

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	<u>KONICA</u>	<u>CANON AE-1</u>	<u>CANON QL19</u>
Lens:	<u>50MM</u>	<u>50MM</u>	<u>45MM</u>
Filter(s):	<u>UV SKYLIGHT</u>	<u>UV SKYLIGHT</u>	<u>—</u>
Shutter Speed:	<u>250</u>	<u>125</u>	<u>250</u>
F-Stop:	<u>1 8 2 5.6 3 11</u>	<u>1 8 2 5.6 3 11</u>	<u>1 5.6 2 3</u>
ASA:	<u>200</u>	<u>32</u>	<u>25</u>
Film:	<u>TECH PAN</u>	<u>PANATOMICX</u>	<u>KODACHROME</u>

SUBJECT DESCRIPTION

✓ Headframe — Tailings Ponds — Railroad Siding

Viewpoint No. 13 Description —

Photograph No. 2- 21/22/23/24 2- 22/23/24/25 2-4

WEATHER CONDITIONS: CALM WINDS ; CLEAR SKY ; NO HAZE
LAKE METONGA

VIEWPOINT LOCATION: PUBLIC SWIMMING BEACH @ NORTH SHORE OF
L. METONGA

APPROXIMATE VIEWPOINT ELEVATION: 1600'

APPROXIMATE DISTANCE AND DIRECTION TO SUBJECT: 5.3 MILES

VEGETATION -

Description: FOREGROUND & MIDDLEGROUND & BACKGROUND AN
OPEN EXpanse w/ VEGETATION ... NOTHING TO OBSCURE
PHOTOS... OVERSTORY VEG. ONLY @ HORIZON LINE

Height: — Less than 6 feet — 6-25 Feet — More than 25 feet

BALLOON VISIBILITY: ✓ Visible with unaided vision.
— Visible with aided vision.

COMMENTS: BALLOON, ALTHOUGH PERCEPTABLY SMALL, IS
CLEARLY VISIBLE; VERY HIGH OVER TREE LINE; BALLOON VERY
VISIBLE ALONG MAJORITY OF EASTERN SHORE OF LAKE METONGA

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8.18.82Time: 8:51 A.M.

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	<u>KONICA</u>	<u>CANON AE-1</u>	<u>CANON QL 19</u>
Lens:	<u>50 MM</u>	<u>50 MM</u>	<u>45 MM</u>
Filter(s):	<u>UV SKYLIGHT</u>	<u>UV SKYLIGHT</u>	<u>_____</u>
Shutter Speed:	<u>250</u>	<u>125</u>	<u>125</u>
F-Stop:	<u>1 8.5 2 5.65 3 11.5</u>	<u>1 8.5 2 5.65 3 11.5</u>	<u>1 EE 2 _____ 3 _____</u>
ASA:	<u>200</u>	<u>32</u>	<u>25</u>
Film:	<u>TECH PAN</u>	<u>PAHATOMIC X</u>	<u>KODACHROME</u>

SHOTS 32@11, 33@8, 34@16TAKEN W/200MM TELEPHOTO

SUBJECT DESCRIPTION

☒ Headframe	☐ Tailings Ponds	☐ Railroad Siding
Viewpoint No. <u>14</u> Description		
Photograph No. <u>2-25/26/27/28</u>	<u>2-26/27/28/29</u>	<u>2-5</u>
<u>POLARIZER FILTER - 29/30/31</u>		
<u>F-STOPS _____ 4.5/2.85/5.65</u>		

WEATHER CONDITIONS: SUNNY CONDITIONS; HIGH CIRRUS CLOUDS;MINIMAL HAZE; SLIGHT WINDS FROM SSW -
TO PICK UP TO 7-15 MPH LATER IN DAYVIEWPOINT LOCATION: EAST SIDE OF LAKE METONGA ON ROAD IN
VICINITY OF COTTAGES; APPROX. 1/2 MILE FROM
PUBLIC BEACHAPPROXIMATE VIEWPOINT
ELEVATION: 1000'APPROXIMATE DISTANCE
AND DIRECTION TO
SUBJECT: 4.5 MILES

VEGETATION -

Description:

FOREGROUND GRASSES; MIDDLEGROUND & BACKGROUND
WATER; BACKGROUND SHOWING TREE LINE @ HORIZON -
TREE LINE @ +25'Height: _____ Less than 6 feet _____ 6-25 Feet _____ More than 25 feetBALLOON VISIBILITY: ☒ Visible with unaided vision.☐ Visible with aided vision.

COMMENTS:

BALLOON CLEARLY VISIBLE WITH UNAIDED VISION;
ELEVATION OF BALLOON WELL ABOVE TREE LINE; HEADFRAME
WOULD BE CLEARLY VISIBLE ALONG MAJORITY OF EAST SHORE
OF METONGA; REFER TO U.S.G.S. OBSERVATION SHEET

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8-18-82
Time: 9:43 A.M.

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	<u>KONICA</u>	<u>CANON AE-1</u>	<u>CANON QL19</u>
Lens:	<u>50 MM</u>	<u>50 MM</u>	<u>45 MM</u>
Filter(s):	<u>UV SKYLIGHT</u>	<u>UV SKYLIGHT</u>	<u>—</u>
Shutter Speed:	<u>250</u>	<u>125</u>	<u>125</u>
F-Stop:	<u>1 8.5 2 5.65 3 11.5</u>	<u>1 8.5 2 5.65 3 11.5</u>	<u>1 F AUTO 2 3</u>
ASA:	<u>200</u>	<u>32</u>	<u>25</u>
Film:	<u>TECH PAN</u>	<u>PANATOMIC X</u>	<u>KODACHROME</u>

SUBJECT DESCRIPTION

✓ Headframe — Tailings Ponds — Railroad Siding
 Viewpoint No. 15 Description SITE OPEN IN FOREGROUND; SHOT TAKEN NEAR BOAT LAND
 Photograph No. 3-1/2/3/4 2-30/31/32/33 2-6

WEATHER CONDITIONS:

SUNNY CONDITIONS; HIGH CIRRUS CLOUDS;
MINIMAL HAZE; SLIGHT WINDS FROM SSW

VIEWPOINT LOCATION:

PARK AREA NEAR GRAVEL PIT ON EAST SHORE
OF LAKE LUCERNE - MAIN PUBLIC LANDING

APPROXIMATE VIEWPOINT
ELEVATION:

1644'

APPROXIMATE DISTANCE
AND DIRECTION TO
SUBJECT:

HEADFRAME RISES TO SW TO APPROX. 1900+';
DISTANCE FROM HEADFRAME APPROX. 4 1/2 MILES

VEGETATION -

Description:

FOREGROUND SHORELINE; MIDDLEGROUND & BACKGROUND
WATER AND OVERSTORY VEG. @ +25'

Height: — Less than 6 feet — 6-25 Feet — More than 25 feet

BALLOON VISIBILITY:

— Visible with unaided vision.
— Visible with aided vision.

COMMENTS:

VIEWPOINT @ LOWSPOT ON EAST SHORE OF LUCERNE;
RISE IN TOPOGRAPHY COUPLED WITH TREE CANOPY CONCEALS HEAD
FRAME TO THE SOUTH WEST; NOT VISIBLE DUE TO RIDGE SYSTEM
LOCATED WEST OF HEMLOCK CREEK.

Craig Schmidt

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8.18.87
Time: 10:25 A.M.

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	<u>KONICA</u>	<u>CANON AE-1</u>	<u>CANON QL19</u>
Lens:	<u>50 MM</u>	<u>50 MM</u>	<u>45 MM</u>
Filter(s):	<u>UV SKYLIGHT</u>	<u>UV SKYLIGHT</u>	<u>—</u>
Shutter Speed:	<u>250</u>	<u>125</u>	<u>125</u>
F-Stop:	<u>1 8.5 2 5.6 3 11.5</u>	<u>1 8.5 2 11.5 3 —</u>	<u>1 AUTO 2 — 3 —</u>
ASA:	<u>200</u>	<u>32</u>	<u>25</u>
Film:	<u>TECH PAN</u>	<u>PANATOMIC X</u>	<u>KODACHROME</u>

SUBJECT DESCRIPTION

☒ Headframe ☐ Tailings Ponds ☐ Railroad Siding

Viewpoint No. 16 Description —

Photograph No. 3-5/16/17/8 9-1/2/3/1 2-7
2-34/35/36

WEATHER CONDITIONS: BRIGHT SUN; HIGH CIRROUS CLOUDS, MINIMAL HAZE
SLIGHT WINDS FROM SSWVIEWPOINT LOCATION: DOCK ON EAST SHORELINE OF GROUND HEMLOCK
LAKEAPPROXIMATE VIEWPOINT
ELEVATION: 1579'APPROXIMATE DISTANCE
AND DIRECTION TO
SUBJECT: 2.8 MILES

VEGETATION -

Description: FOREGROUND/MIDDLEGROUND OVER WATER;
BACKGROUND OVERSTORY @ +25'Height: ☐ Less than 6 feet ☐ 6-25 Feet ☐ More than 25 feetBALLOON VISIBILITY: ☐ Visible with unaided vision.
☐ Visible with aided vision.COMMENTS: BALLOON NOT VISIBLE DUE TO RISE IN ELEVATION -
LANDFORM TO WEST BLOCKS POTENTIAL VIEW OF BALLOON; VIEW FROM
DOCK @ EAST SIDE OF LAKE OVER WATER; OVERSTORY VEG. @ +25'
ON WEST SHORE AND BEYONDObserver Signature: Craig Schiest

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8.18.82
Time: 11:10 A.M.

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	_____	_____	_____
Lens:	_____	_____	_____
Filter(s):	<u>NO</u>	<u>PHOTOGRAPHY</u>	_____
Shutter Speed:	<u>DUE TO</u>	<u>VEGETATIVE SCREENING</u>	_____
F-Stop:	1 _____ 2 _____ 3 _____	1 _____ 2 _____ 3 _____	1 _____ 2 _____ 3 _____
ASA:	_____	_____	_____
Film:	_____	_____	_____

SUBJECT DESCRIPTION

✓ Headframe _____ Tailings Ponds _____ Railroad Siding _____
 Viewpoint No. 17 Description _____
 Photograph No. _____

WEATHER CONDITIONS:

BRIGHT SUN ; MINIMAL HAZE ; SLIGHT WINDS
FROM SSW

VIEWPOINT LOCATION:

INTERSECTION OF HWY Q AND M

APPROXIMATE VIEWPOINT
ELEVATION:

1640'

APPROXIMATE DISTANCE
AND DIRECTION TO
SUBJECT:

4.1 MILES DUE WEST

VEGETATION -

Description:

DENSE OVERSTORY VEG.; HEIGHTS TO 50'; VEGETATION
IMMEDIATELY ADJACENT TO ROADWAY

Height: _____ Less than 6 feet _____ 6-25 Feet ✓ More than 25 feet

BALLOON VISIBILITY:

_____ Visible with unaided vision.
 _____ Visible with aided vision.

COMMENTS:

BALLOON NOT VISIBLE DUE TO +25' OVERSTORY
VEGETATION IN FOREGROUND & MIDDLEGROUND ; NO PHOTO TAKEN

Craig Schuster

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8-18-82
Time: 11:30 A.M.

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	_____	_____	_____
Lens:	_____	_____	_____
Filter(s):	<u>NO PHOTOGRAPHY</u>		
Shutter Speed:	<u>DUE TO VEGETATIVE SCREENING</u>		
F-Stop:	1 _____ 2 _____ 3 _____	1 _____ 2 _____ 3 _____	1 _____ 2 _____ 3 _____
ASA:	_____	_____	_____
Film:	_____	_____	_____

SUBJECT DESCRIPTION

☒ Headframe ☐ Tailings Ponds ☐ Railroad Siding

Viewpoint No. 18 Description _____

Photograph No. —

WEATHER CONDITIONS:

BRIGHT SUN ; MINIMAL HAZE

VIEWPOINT LOCATION:

INTERSECTION OF HWY 8 AND ST. JOHN'S LANE
IN VICINITY OF ST. JOHN'S LAKEAPPROXIMATE VIEWPOINT
ELEVATION:1600'APPROXIMATE DISTANCE
AND DIRECTION TO
SUBJECT:3.4 MILES NW

VEGETATION -

Description:

DENSE OVERSTORY VEG. SCREENS VIEWS

Height:

☐ Less than 6 feet☐ 6-25 Feet☒ More than 25 feet

BALLOON VISIBILITY:

☐ Visible with unaided vision.☐ Visible with aided vision.

COMMENTS:

BALLOON NOT VISIBLE DUE TO PRESENCE OF
IMMEDIATE FOREGROUND VEGETATION TO THE SIDES OF THE
ROADWAY; NO PHOTOS TAKEN FOR THIS REASON.; BALLOON
LOCATED TO THE NW FROM THIS POINT.

3.13-1-79 Observer Signature:

Craig Gschwendt

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8.18.82
Time: 11:55 A.M.

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	<u>KONICA</u>	<u>CANON AE-1</u>	<u>CANON QL 19</u>
Lens:	<u>50 MM</u>	<u>50 MM</u>	<u>45 MM</u>
Filter(s):	<u>UV SKYLIGHT</u>	<u>UV SKYLIGHT</u>	<u>—</u>
Shutter Speed:	<u>250</u>	<u>125</u>	<u>125</u>
F-Stop:	<u>1 8.5 2 5.65 3 11.5</u>	<u>1 8.5 2 5.65 3 11.5</u>	<u>1 AUTO 2 3</u>
ASA:	<u>200</u>	<u>32</u>	<u>25</u>
Film:	<u>TECH PAN</u>	<u>PANATOMIC X</u>	<u>KODACHROME</u>

SUBJECT DESCRIPTION

☒ Headframe ☐ Tailings Ponds ☐ Railroad Siding

Viewpoint No. 19 Description —

Photograph No. 3-9/10/11/12 3-4/5/6 2-8
3-12/3/4

WEATHER CONDITIONS:

BRIGHT SUN; HAZE; WIND WSW @ 7-15 MPH
AFFECTING TOP OF BALLOON STABILITY @ TOP OF TETHER
LINES; LINE STABLE - BALLOON FREE TO MOVE @ TOP
SAND LAKE ROAD VIEWING NW TO HEADFRAME

VIEWPOINT LOCATION:

BALLOON; VIEWPOINT IS DUE W OF EXXON FIELD
OFFICE

APPROXIMATE VIEWPOINT
ELEVATION:

1600'

APPROXIMATE DISTANCE
AND DIRECTION TO
SUBJECT:

1/2 MILE TO NW

VEGETATION -

Description:

OVERSTORY TO +25' TO SIDES OF ROADWAY; ROADWAY
TURN TO WEST LEAVING OVERSTORY VEG. TO +25' IN
BACKGROUND

Height: ☐ Less than 6 feet ☐ 6-25 Feet ☒ More than 25 feet

BALLOON VISIBILITY:

☒ Visible with unaided vision.
☐ Visible with aided vision.

COMMENTS:

BALLOON CLEARLY VISIBLE DUE TO ROAD
ORIENTATION, I.E. BALLOON CENTERED IN ROAD AS ONE APPROACHES
FROM THESE; A CLEAR BACKGROUND TREE LINE BY SUBSTANTIAL
HEIGHT

Craig Schuster

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8.18.82.
Time: 12:35 P.M.

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:			
Lens:			
Filter(s):	<u>NO PHOTOGRAPHY TAKEN</u>		
Shutter Speed:			
F-Stop:	1 <u> </u> 2 <u> </u> 3 <u> </u>	1 <u> </u> 2 <u> </u> 3 <u> </u>	1 <u> </u> 2 <u> </u> 3 <u> </u>
ASA:			
Film:			

SUBJECT DESCRIPTION

☒ Headframe ☐ Tailings Ponds ☐ Railroad Siding
 Viewpoint No. 20 Description WEST HILL HIGHPOINT ON LAKEVIEW RD.
 Photograph No.

WEATHER CONDITIONS:

HAZY CONDITIONS; WIND SSW @ 7-15 MPH

VIEWPOINT LOCATION:

BALLOON NOT VISIBLE ON LIGHT-DUTY ROAD FROM
INTERSECTION W/ HIGHWAY 5 UNTIL VIEWPOINT #20
LAKEVIEW ROADAPPROXIMATE VIEWPOINT
ELEVATION:1780'APPROXIMATE DISTANCE
AND DIRECTION TO
SUBJECT:5.7 MILES SOUTH

VEGETATION -

Description:

LOW FOREGROUND/MIDDLE GROUND VEGETATION
AND TOPOGRAPHIC HIGHPOINT PROVIDES CLEAR
VIEW OF HEADFRAMEHeight: Less than 6 feet 6-25 Feet More than 25 feet

BALLOON VISIBILITY:

☒ Visible with unaided vision.☐ Visible with aided vision.

COMMENTS:

BALLOON CLEARLY VISIBLE IN DISTANCE
W/NAKED EYE FROM HOB OF HILL; BALLOON WELL ABOVE
TREELINE; VERY SCENIC VIEW OF LAKE METONGA & FORESTED
RIDGE TO THE SE. ; NO PHOTO TAKEN

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8:18-82
Time: 2:45 PM

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	<u>KONICA</u>	<u>CANON AE-1</u>	<u>CANON QL19</u>
Lens:	<u>50 MM</u>	<u>50MM</u>	<u>45MM</u>
Filter(s):	<u>SKYLIGHT</u>	<u>UV SKYLIGHT</u>	<u>—</u>
Shutter Speed:	<u>250</u>	<u>125</u>	<u>—</u>
F-Stop:	<u>1 11 2 8 3 16</u>	<u>1 11 2 8 3 16</u>	<u>1 Auto 2 3</u>
ASA:	<u>200</u>	<u>32</u>	<u>25</u>
Film:	<u>TECH Pan</u>	<u>Panatomic X</u>	<u>Kodachrome</u>

SUBJECT DESCRIPTION

<u>✓</u> Headframe	<u>—</u> Tailings Ponds	<u>✓</u> Railroad Siding
Viewpoint No. <u>21</u> Description		
Photograph No. <u>3-13/14/15/16</u>	<u>3-7/8/9/10</u>	<u>2-9</u>

WEATHER CONDITIONS:

Partly sunny, winds ±15

VIEWPOINT LOCATION:

Keith Siding Road, viewing SW from north lane of roadAPPROXIMATE VIEWPOINT
ELEVATION:1590APPROXIMATE DISTANCE
AND DIRECTION TO
SUBJECT:

VEGETATION -

Description:

foreground - field, middle ground c. siding - mixed evergreen
deciduous; background forested hill

Height:

Less than 6 feet6-25 FeetX More than 25 feet

BALLOON VISIBILITY:

X Visible with unaided vision.— Visible with aided vision.

COMMENTS:

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8.18.82
Time: 3:20 P.M.

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	<u>KONICA</u>	<u>CANON AE-1</u>	<u>CANON QL19</u>
Lens:	<u>50 MM</u>	<u>50 MM</u>	<u>45 MM</u>
Filter(s):	<u>UV SKYLIGHT</u>	<u>UV SKYLIGHT</u>	<u> </u>
Shutter Speed:	<u>250</u>	<u>125</u>	<u>125</u>
F-Stop:	<u>1 8 2 11 3 16</u>	<u>1 8.5 2.5.5 3 11.5</u>	<u>1 2 3</u>
ASA:	<u>200</u>	<u>32</u>	<u>25</u>
Film:	<u>TECH PAN</u>	<u>PAHATOMIC X</u>	<u>KODACHROME</u>

SUBJECT DESCRIPTION

 Headframe Tailings Ponds ✓ Railroad SidingViewpoint No. Description Photograph No. 3-17/18/19/203-11/12/13/142-10

WEATHER CONDITIONS:

PARTLY CLOUDY ; HAZY ; WINDS FROM SSW @ 7-15 MPH

VIEWPOINT LOCATION:

INTERSECTION OF KEITH SIDING ROAD & ENTRANCE
TO EVERETTE RUDLOFF POTATO FARMAPPROXIMATE VIEWPOINT
ELEVATION:1540'APPROXIMATE DISTANCE
AND DIRECTION TO
SUBJECT:2.3 MI SOUTH

VEGETATION -

Description:

AG. FIELD FOREGROUND & MIDDLEGROUNDS; BACKGROUND
FOREST VEG. PROVIDES BACKDROP FOR WHITE MARKERSHeight: Less than 6 feet 6-25 Feet More than 25 feet

BALLOON VISIBILITY:

 Visible with unaided vision. Visible with aided vision.

COMMENTS:

HEADFRAME BALLOON HIDDEN BY MIDDLE
GROUND DECIDUOUS OVERSTORY VEG.

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 6.18.82
Time: 4:00 P.M.

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	<u>KONICA</u>	<u>CANON AE-1</u>	<u>CANON QL19</u>
Lens:	<u>50 MM</u>	<u>50 MM</u>	<u>45 MM</u>
Filter(s):	<u>UV SKYLIGHT</u>	<u>UV SKYLIGHT</u>	<u>—</u>
Shutter Speed:	<u>250</u>	<u>125</u>	<u>125</u>
F-Stop:	<u>1 11 2 8 3 16</u>	<u>1 11 2 8 3 16</u>	<u>1 AUTO 2 3</u>
ASA:	<u>200</u>	<u>32</u>	<u>25</u>
Film:	<u>TECH PAN</u>	<u>PANATOMIC X</u>	<u>KODACHROME</u>

SUBJECT DESCRIPTION

✓ Headframe — Tailings Ponds — Railroad Siding

Viewpoint No. 23 Description —

Photograph No. 3 - 21/22/23/24 3 - 16/17/18/19 2-11

WEATHER CONDITIONS:

HAZY ; PARTLY CLOUDY ; WINDS VARIABLE
SSW @ 7-15

VIEWPOINT LOCATION:

NORTH EDGE OF LAKE LUCERNE ALONG
POTAWOTTAMI TERRACE LOOKING SW
TRAIL

APPROXIMATE VIEWPOINT
ELEVATION:

1644'

APPROXIMATE DISTANCE
AND DIRECTION TO
SUBJECT:

6.0 MILES SW

VEGETATION -

Description:

FOREGROUND MAINTAINED TURF & SHORELINE VEG.
MIDDLEGROUND WATER ; BACKGROUND FORESTED RIDGE

Height: — Less than 6 feet — 6-25 Feet ✓ More than 25 feet

BALLOON VISIBILITY:

— Visible with unaided vision.
— Visible with aided vision.

COMMENTS:

NOT VISIBLE DUE TO RIDGE RUNNING
N/S ALONG WEST EDGE OF LAKE LUCERNE

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8.18.82
Time: 4:55 P.M.

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	<u>KONICA</u>	<u>CANON AE-1</u>	<u>CANON RL17</u>
Lens:	<u>50 MM</u>	<u>50 MM</u>	<u>45 MM</u>
Filter(s):	<u>UV SKYLIGHT</u>	<u>UV SKYLIGHT</u>	<u>—</u>
Shutter Speed:	<u>250</u>	<u>125</u>	<u>125</u>
F-Stop:	<u>1 8 2 5.6 3 11</u>	<u>1 8 2 5.6 3 11</u>	<u>1 AUTO 2 3</u>
ASA:	<u>200</u>	<u>32</u>	<u>25</u>
Film:	<u>TECH PAN</u>	<u>PANATOMICX</u>	<u>KODACHROME</u>

SUBJECT DESCRIPTION

✓ Headframe — Tailings Ponds — Railroad Siding

Viewpoint No. 24 Description —
 Photograph No. 3-25/26/27/28 3-20/21/22/23 2-12

WEATHER CONDITIONS: HAZY; WINDS SSW @ 1-15 MPHVIEWPOINT LOCATION: SCENIC WAYSIDE ON HIGHWAY BAPPROXIMATE VIEWPOINT ELEVATION: 1750'APPROXIMATE DISTANCE AND DIRECTION TO SUBJECT: 7 MILES SWVEGETATION -
Description: FORESTED RIDGE IN BACKGROUND CONCEALS HEADFRAME BALLOONHeight: — Less than 6 feet — 6-25 Feet ✓ More than 25 feetBALLOON VISIBILITY: — Visible with unaided vision.
— Visible with aided vision.COMMENTS: BALLOON NOT VISIBLE DUE TO OBSTRUCTION OF FOREGROUND OVERSTORY VEG (DECIDUOUS & CONIFEROUS MIX AND RIDGE RUNNING N/S ALONG WEST EDGE OF LAKE LUCERNE

THE SANBORN GROUP, INC.

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8.18.02
Time: 5:40 P.M.

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	<u>KONICA</u>	<u>CANON AE-1</u>	<u>CANON QL19</u>
Lens:	<u>50 MM & TELEPHOTO</u>	<u>50 MM</u>	<u>45 MM</u>
Filter(s):	<u>UV SKYLIGHT AND</u>	<u>UV SKYLIGHT</u>	<u>—</u>
Shutter Speed:	<u>250 POLARIZER</u>	<u>125</u>	<u>125</u>
F-Stop:	<u>1 8 2 5.6 3 11</u>	<u>1 5.6 2 4 3 8</u>	<u>1 AUTO 2 3</u>
ASA:	<u>200</u>	<u>32</u>	<u>25</u>
Film:	<u>TECH PAN</u>	<u>PANATOMICX</u>	<u>KODACHROME</u>

SUBJECT DESCRIPTION

✓ Headframe — Tailings Ponds — Railroad Siding

Viewpoint No. 25 DescriptionPhotograph No. 3-29/30/31/32 3-24/25/26/27 2-13#33 W/ POLARIZER → 33@4/31@8/35@5.6/36@11
#34 → TELEPHOTO

WEATHER CONDITIONS:

HAZY; WINDS SSW @ 7-15; LIGHT PARTLY CLOUDY

VIEWPOINT LOCATION:

HWY 8 @ WEST EDGE OF CRANDON; SHOOTING
ON CREST OF HILL LOOKING SOUTH FROM WEST
EDGE OF CRANDONAPPROXIMATE VIEWPOINT
ELEVATION:1700'APPROXIMATE DISTANCE
AND DIRECTION TO
SUBJECT:6.2 MILES SOUTH

VEGETATION -

Description:

LOWLAND AREA IN MIDDLEGROUND AND CAMERA
POSITION LOCATED ON RISE PROVIDED VIEWS OVER
THE OVERSTORY MIXED EVERGREEN & DECID. IN BACKGROUNDHeight: — Less than 6 feet — 6-25 Feet — More than 25 feet

BALLOON VISIBILITY:

— Visible with unaided vision.— Visible with aided vision.

COMMENTS:

BALLOON VISIBLE W/ NAKED EYE; IMAGE VERY
SMALL & DIFFICULT TO PERCEIVE; WHEN HEADFRAME
CONSTRUCTED THE BUILDING WILL BE APPARENT

3.13-1-86

Observer Signature:

Craig Schmitt

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8-19-82
Time: 8:15 A.M.

PHOTOGRAPHIC DATA	CAMERA 1	- CAMERA 2	CAMERA 3
Model:	<u>KONICA</u>	<u>CANON AE-1</u>	<u>CANON QL 19</u>
Lens:	<u>50MM/200MM</u>	<u>50MM</u>	<u>45MM</u>
Filter(s):	<u>UV SKYLIGHT/4</u>	<u>UV SKYLIGHT</u>	<u> </u>
Shutter Speed:	<u>250 POLARIZER</u>	<u>125</u>	<u>125</u>
F-Stop:	<u>1 8 2.5 6 3 11</u>	<u>1 8 2.5 6 3 11mm</u>	<u>1 AUTO 2 3</u>
ASA:	<u>200</u>	<u>32</u>	<u>25</u>
Film:	<u>TECH PAN</u>	<u>PANATOMIC X</u>	<u>KODACHROME</u>

SUBJECT DESCRIPTION

☒ Headframe ☐ Tailings Ponds ☐ Railroad Siding
Viewpoint No. 26 Description

Photograph No. 4 - 2/3/4/5/11 3 - 28/29/30/31 2 - 16/17
W/ POLARIZER - 6 @ 2.5/7 @ 2 1/8 @ 4 3 - 34/35/36
9 w/ 200MM @ 8.5/10 @ 5.65/11 @ 11

 WEATHER CONDITIONS: WINDS @ ±15 MPH; CLEAR SKY; BRIGHT SUN
MINIMAL HAZE
VIEWPOINT LOCATION: LOOKOUT TOWER @ SUGARBUSH HILLAPPROXIMATE VIEWPOINT
ELEVATION: 1940'APPROXIMATE DISTANCE
AND DIRECTION TO
SUBJECT: 7.2 MILES SW

VEGETATION -

 Description: FROM VIEWPT. LOCATED ON PLATFORM OF TOWER
ABOVE TREE LINE THE BALLOON RISES ABOVE A SERIES
OF FORESTED RIDGES; EASILY CLEARS TREELINE
 Height: Less than 6 feet 6-25 Feet ☒ More than 25 feet

 BALLOON VISIBILITY: ☒ Visible with unaided vision.
 Visible with aided vision.

 COMMENTS: BALLOON BARELY VISIBLE W/ NAKED EYE;
HEADFRAME WOULD BE CLEARLY VISIBLE FROM THIS POINT; MINE/
MILL SITE CLEARING WOULD BE READILY APPARENT

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8-20-82
Time: _____

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	_____	_____	_____
Lens:	_____	_____	_____
Filter(s):	<u>ND</u>	<u>PHOTOGRAPHY</u>	<u>TAKEN</u>
Shutter Speed:	_____	_____	_____
F-Stop:	<u>1</u> <u>2</u> <u>3</u>	<u>1</u> <u>2</u> <u>3</u>	<u>1</u> <u>2</u> <u>3</u>
ASA:	_____	_____	_____
Film:	_____	_____	_____

SUBJECT DESCRIPTION

☒ Headframe ☐ Tailings Ponds ☐ Railroad Siding

Viewpoint No. 27 Description _____

Photograph No. _____

WEATHER CONDITIONS: CLEAR SKY; BRIGHT SUNVIEWPOINT LOCATION: AIRPORT ROADAPPROXIMATE VIEWPOINT ELEVATION: 71610'APPROXIMATE DISTANCE AND DIRECTION TO SUBJECT: 2.3 MILES SOUTH

VEGETATION -

Description: OPEN FIELD FOREGROUND / MIDDLEGROUN
OVERSTORY VEG. IN BACKGROUND.Height: ☐ Less than 6 feet ☐ 6-25 Feet ☐ More than 25 feetBALLOON VISIBILITY: ☒ Visible with unaided vision.
☐ Visible with aided vision.COMMENTS: _____

THE SANBORN GROUP, INC.

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8.20.82
Time: 10:30 A.M.

T1 =

T2 =

T3 = PHOTOS OF BALLOON B1

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	<u>KONICA</u>	<u>CANON AE-1</u>	<u>CANON QL19</u>
Lens:	<u>50 MM</u>	<u>50 MM</u>	<u>45 MM</u>
Filter(s):	<u>UV SKYLIGHT</u>	<u>UV SKYLIGHT</u>	<u>---</u>
Shutter Speed:	<u>250</u>	<u>125</u>	<u>125</u>
F-Stop:	<u>1.4 5 2.5 6 3 2.6</u>	<u>1 4 2.2 8 3 5.6</u>	<u>1 AUTO 2 3</u>
ASA:	<u>200</u>	<u>32</u>	<u>25</u>
Film:	<u>TECH PAN</u>	<u>PANATOMICX</u>	<u>KODACHROME</u>

SUBJECT DESCRIPTION

HA Headframe ✓ Tailings Ponds --- Railroad Siding

Viewpoint No. 27 DescriptionPhotograph No. 4-12/13/14/15
17/18/19/204 - 1/2/3/42-18 27/28WEATHER CONDITIONS: WINDS 15[±]; CLEAR SKY; BRIGHT SUNWINDS DEFLECT BALLOON QUITE A LOT

VIEWPOINT LOCATION:

DEEPHOLE LAKEROAD ON S EDGE OF TAILINGS POND 3; VIEW
LOOKING SWAPPROXIMATE VIEWPOINT
ELEVATION:1670'APPROXIMATE DISTANCE
AND DIRECTION TO
SUBJECT:.19 MILE WEST

VEGETATION -

Description:

OVERSTORY VEG. DIRECTLY ADJACENT TO ROADSIDE @
50+' OBSURES BALLOON FROM ANYWHERE OTHER
THAN IMMEDIATE ROADWAYHeight: --- Less than 6 feet --- 6-25 Feet --- More than 25 feet

BALLOON VISIBILITY:

✓ Visible with unaided vision.--- Visible with aided vision.

COMMENTS:

BALLOON VISIBLE ONLY FROM ROADWAY; BALLOON
ELEVATED TO 54.4' HEIGHT; EMBANKMENT WILL BE VERY APPARENTCraig Schuster

THE SANBORN GROUP, INC.

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 10-20-82
8:22 AM
Time: 10:45 A.M.

PHOTOS OF BALLOON B1

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	<u>KONICA</u>	<u>CANON AE-1</u>	<u>CANON QL19</u>
Lens:	<u>50 MM</u>	<u>50MM</u>	<u>45 MM</u>
Filter(s):	<u>UV SKYLIGHT</u>	<u>UV SKYLIGHT</u>	<u>—</u>
Shutter Speed:	<u>250</u>	<u>125</u>	<u>125</u>
F-Stop:	<u>1 5/6 2 4 3 8</u>	<u>1 4.5 2 2.8 5 3 5.6 5</u>	<u>1 AUTO 2 3</u>
ASA:	<u>200</u>	<u>32</u>	<u>25</u>
Film:	<u>TECH PAN</u>	<u>PANATOMIC X</u>	<u>KODACHROME</u>

SUBJECT DESCRIPTION

☐ Headframe
 ☒ Tailings Ponds
 ☐ Railroad Siding

Viewpoint No. 28 Description _____

Photograph No. 4-21/22/23/24 4-5/6/7/8 2-29

WEATHER CONDITIONS: MOSTLY SUNNY

VIEWPOINT LOCATION: ROAD TO SOE TAILINGS POND 3 LOOKING
NE SITING ON BALLOON ; BALLOON IS
VISIBLE THE LENGTH OF THIS ROAD LOOKING
NE FROM INTERSECTION OF DEEP HOLE & LITTLE
CAND RDS. 1660'
BALLOON W/ HOLE IS NOT VISIBLE FROM ANY
OTHER

APPROXIMATE VIEWPOINT ELEVATION: _____

APPROXIMATE DISTANCE AND DIRECTION TO SUBJECT: .28 MILE NE

VEGETATION -

Description: OVERSTORY VEG. @ ROADSIDE RISES TO +50' HEIGHT
CONCEALING VIEW FROM ANYWHERE BUT ROADWAY

Height: ☐ Less than 6 feet ☐ 6-25 Feet ☒ More than 25 feet

BALLOON VISIBILITY: ☒ Visible with unaided vision.
☐ Visible with aided vision.

COMMENTS: BALLOON VERY VISIBLE ; EMBANKMENT WOULD
BE PROMINENT FEATURE IF ROAD ORIENTATION PROVIDED DIRECT
VIEWS ; DENSITY OF VEG. @ ROADSIDES WOULD CONCEAL EMBANKMENT
@ IF ORIENTATION DID NOT SITE ON EMBANKMENT

Date: 8.20.82
Time: 11:40 A.M.

SUBJECT DESCRIPTION

Viewpoint No. <u>29</u>	Description	
Photograph No. <u>4-28/29/30/31</u>	<u>4-9/10/11/12</u>	<u>2-30</u>

Observer Signature: Craig Schiestl

THE SANBORN GROUP, INC.

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8-20-82
Time: 12:25 P.M.

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	<u>KONICA</u>	<u>CANON AE-1</u>	<u>CANON QL19</u>
Lens:	<u>50 MM</u>	<u>50 MM</u>	<u>45 MM</u>
Filter(s):	<u>UV SKYLIGHT</u>	<u>UV SKYLIGHT</u>	<u> </u>
Shutter Speed:	<u>250</u>	<u>125</u>	<u>125</u>
F-Stop:	<u>1 B 2.5.6 3 11</u>	<u>1 B 2.5.6 3 11</u>	<u>1 AUTO 2 3</u>
ASA:	<u>200</u>	<u>32</u>	<u>25</u>
Film:	<u>TECH PAN</u>	<u>PANATOMIC X</u>	<u>KODACHROME</u>

SUBJECT DESCRIPTION

☐ Headframe ☒ Tailings Ponds ☐ Railroad Siding
 Viewpoint No. 30 Description
 Photograph No. 4-32/33/34/35 | 4-13/14/15/16 | 2-31

WEATHER CONDITIONS: PARTLY SUNNY ; WINDS @ $\pm$ 15 MPHVIEWPOINT LOCATION: WEST OF DEEP HOLE LAKE NEAR WETLAND AREAAPPROXIMATE VIEWPOINT ELEVATION: 1603'APPROXIMATE DISTANCE AND DIRECTION TO SUBJECT: .95 MILE NE OF VIEWPOINT
 VEGETATION -
 Description: FOREGROUND VEG WETLAND PLANTINGS, MIDDLE GROUND WATER, BACKGROUND VEG. FORESTED HILLSIDE
Height: ☐ Less than 6 feet ☐ 6-25 Feet ☒ More than 25 feet
 BALLOON VISIBILITY: ☐ Visible with unaided vision.
☐ Visible with aided vision.

 COMMENTS:
BALLOON NOT VISIBLE - DID NOT CLEAR TREES LINE
SUFFICIENTLY TO ALLOW SITING; PKE 114 TOPD ALSO
SHIELDS VIEW

3.13-1-92

Observer Signature: Craig Schiestl

THE SANBORN GROUP, INC.

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8-20-82
Time: _____

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	_____	_____	_____
Lens:	_____	_____	_____
Filter(s):	<u>NO</u>	<u>PHOTOGRAPHY</u>	<u>TAKEN</u>
Shutter Speed:	_____	_____	_____
F-Stop:	1 _____ 2 _____ 3 _____	1 _____ 2 _____ 3 _____	1 _____ 2 _____ 3 _____
ASA:	_____	_____	_____
Film:	_____	_____	_____

SUBJECT DESCRIPTION

_____ Headframe ☒ Tailings Ponds _____ Railroad Siding

Viewpoint No. 32 Description _____

Photograph No. _____

WEATHER CONDITIONS:

PARTLY SUNNY; WINDS @ ±15 MPH

VIEWPOINT LOCATION:

WEST SHORE OF LITTLE SAND LAKEAPPROXIMATE VIEWPOINT ..
ELEVATION:1591'APPROXIMATE DISTANCE
AND DIRECTION TO
SUBJECT:1.5 MILES TO THE EAST

VEGETATION -

Description:

FOREGROUND WATER; MIDDLEGROUND AND
BACKGROUND - FORESTEDHeight: _____ Less than 6 feet _____ 6-25 Feet ☒ More than 25 feet

BALLOON VISIBILITY:

_____ Visible with unaided vision.
_____ Visible with aided vision.

COMMENTS:

BALLOON NOT VISIBLE DUE TO FOREST
COVER AND RISE IN TOPOGRAPHY WHICH SHIELD TAILINGS
POND BALLOON.

3.13-1-93

Observer Signature: Craig G. Schiery

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8-20-82
Time: _____Date: 8-20-82
Time: _____

CAMERA 1

CAMERA 2

CAMERA 3

CAMERA 3

NO PHOTOGRAPHY TAKEN

EN

2 3

1 2 3

1 2 3

2 3

adframe

✓ Tailings Ponds

Railroad Siding

Railroad Siding

Description

PARTLY SUNNY; WINDS @ ± 15 MPH

MPH

COUNTY HIGHWAY 8

FT.

DENSE OVERSTORY VEGETATION IMMEDIATELY
ADJACENT TO ROADWAY

Less than 6 feet 6-25 Feet ✓ More than 25 feet

in 25 feet

Visible with unaided vision.

Visible with aided vision.

ROADWAY WAS DRIVEN; DETERMINED THAT

ROADWAY VEGETATION SCREENED VIEWS OF TAILINGS

FOR ENTIRE LENGTH OF ROADWAY

NS OF

OVERSTORY

Observer Signature:

Craig Schieth

Schieth

THE SANBORN GROUP, INC.

STANDARD DATA FORM
EXXON AESTHETIC IMPACT ANALYSISDate: 8.20.82
Time: _____

PHOTOGRAPHIC DATA	CAMERA 1	CAMERA 2	CAMERA 3
Model:	_____	_____	_____
Lens:	_____	_____	_____
Filter(s):	<u>NO</u>	<u>PHOTOGRAPHY</u>	<u>TAKEN</u>
Shutter Speed:	_____	_____	_____
F-Stop:	1 _____ 2 _____ 3 _____	1 _____ 2 _____ 3 _____	1 _____ 2 _____ 3 _____
ASA:	_____	_____	_____
Film:	_____	_____	_____

SUBJECT DESCRIPTION

_____ Headframe _____ Tailings Ponds ☒ Railroad Siding

Viewpoint No. 35 Description _____

Photograph No. _____

WEATHER CONDITIONS:

PARTLY SUNNY ; WINDS @ 15 MPH

VIEWPOINT LOCATION:

COUNTY HIGHWAY WAPPROXIMATE VIEWPOINT..
ELEVATION:APPROXIMATE DISTANCE
AND DIRECTION TO
SUBJECT:

VEGETATION -

Description:

DENSE OVERSTORY VEGETATION ADJACENT
TO ROADWAYHeight: _____ Less than 6 feet _____ 6-25 Feet ☒ More than 25 feet

BALLOON VISIBILITY:

_____ Visible with unaided vision.

_____ Visible with aided vision.

COMMENTS:

SIDING NOT VISIBLE DUE TO VEGETATIVE
SCREENING AND TOPOGRAPHIC VARIATION.

Appendix 3.13-2

1995 Field Data Forms

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 4 1995
Time: 0925
Observer: Brad Helmandollar
Viewpoint Number: 1

PHOTOGRAPHIC DATA

Model of Camera Nikon F2
Film Kodak Gold 200
Lens (mm) 1 50 2 50 3 50 4 35 5 35 6 35
F-Stop 1 11 2 8 3 16 4 8 5 11 6 5.6
ASA 200

SUBJECT DESCRIPTION

Headframe X Tailings Pond _____ Railroad Siding _____
Approximate Subject Elevation 1665 Ft msl
Photograph No. 1-3 4-6
Film Roll No. 1

Weather Conditions

-10°F SLIGHT BREEZE, CLEAR, SUNNY

Viewpoint Location

T34N R15E SEC. 6 NE 1/4 SE 1/4
DEEP HOLE LAKE BOAT LAUNCH

Approximate Viewpoint

1610 ft. msl

Elevation (msl)

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject

330 deg

Approximate Distance From
Viewpoint to Subject

2.0 mi

Comments

FOREGROUND - FROZEN LAKE
BACKGROUND - MIXED HARDWOOD STAND
UP TO THE WATERS EDGE (725')

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 24 1995
Time: 1400
Observer: Brad Helmandollar
Viewpoint Number: 1A

PHOTOGRAPHIC DATA

Model of Camera Nikon F2
Film Kodak Gold 200
Lens (mm) 1 35 2 35 3 35 4 350 5 350 6 350
F-Stop 1 5.6 2 4 3 2.8 4 4 5 5.6 6 2.8
ASA 200

SUBJECT DESCRIPTION

Headframe X Tailings Pond _____ Railroad Siding _____
Approximate Subject Elevation 1923 ft 1665 ft msl
Photograph No. 1-3 4-6
Film Roll No. 11

Weather Conditions 25° CLEAR, SUNNY

Viewpoint Location T35NRIZE SEC 35 NW 1/4 NE 1/4
SPIRIT HILL

Approximate Viewpoint 1760 ft msl
Elevation (msl)

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject 77°

Approximate Distance From 1.5 mi
Viewpoint to Subject

Comments NORTHERN HARDWOOD STAND - BLOCKS ALMOST
ALL VIEW OF THE MIDDLE OR BACKGROUND

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 4 1995
Time: 1600
Observer: Brad Helmandollar
Viewpoint Number: 2

PHOTOGRAPHIC DATA

Model of Camera Nikon F2
Film Kodak Gold 200
Lens (mm) 1 35 2 35 3 35 4 50 5 50 6 50
F-Stop 1 4 2 5.6 3 2.8 4 4 5 5.6 6 2.8
ASA 200

SUBJECT DESCRIPTION

Headframe X Tailings Pond _____ Railroad Siding _____
Approximate Subject Elevation 1665 ft msl
Photograph No. 1-3 4-6
Film Roll No. 6

Weather Conditions -5 CLEAR SUNNY

Viewpoint Location T35N R13E SEC 32 NW 1/4 SW 1/4
NORTH DUCK LAKE

Approximate Viewpoint 1620 ft
Elevation (msl) _____

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject 308°

Approximate Distance From Viewpoint to Subject 1.2 mi

Comments FOREGROUND - DUCK LAKE (FROZEN)
MIDDLE - SPARSELY FORESTED REGION OPPOSITE SIDE
OF LAKE BACKGROUND - MIXED HARDWOOD
STAND

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 4, 1995
Time: 1015
Observer: Brad Helmandollar
Viewpoint Number: 3

PHOTOGRAPHIC DATA

Model of Camera	Nikon F2
Film	Kodak Gold 200
Lens (mm)	1 <u>35</u> 2 <u>35</u> 3 <u>35</u> 4 <u>50</u> 5 <u>50</u> 6 <u>50</u>
F-Stop	1 <u>16</u> 2 <u>11</u> 3 <u>4</u> 4 <u>16</u> 5 <u>8</u> 6 <u>4</u>
ASA	200

SUBJECT DESCRIPTION

Headframe X Tailings Pond _____ Railroad Siding _____
Approximate Subject Elevation 1665 Ft msl
Photograph No. 13-15 16-18
Film Roll No. 1

Weather Conditions

-10°F CLEAR, SUNNY

Viewpoint Location

T34N RIZESEL 1 NE 1/4 NE 1/4
LITTLE SAND LAKE

Approximate Viewpoint

1600 FT

Elevation (msl)

Observer Position: Superior (Normal) Inferior

Bearing From Viewpoint to Subject

3 deg.

Approximate Distance From
Viewpoint to Subject

1.25 mi

Comments

FOREGROUND - FROZEN LAKE
BACKGROUND - MIXED HARDWOOD CONIFER
STAND UP TO THE WATERS EDGE

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 4 1995
Time: 1450
Observer: Brad Helmandollar
Viewpoint Number: 4

PHOTOGRAPHIC DATA

Model of Camera Nikon F2
Film Kodak Gold 200
Lens (mm) 1 35 2 35 3 35 4 50 5 50 6 50
F-Stop 1 4 2 5.6 3 2.8 4 4 5 5.6 6 2.8
ASA 200

SUBJECT DESCRIPTION

Headframe X Tailings Pond _____ Railroad Siding _____
Approximate Subject Elevation 1665 ft
Photograph No. 13-15 16-18
Film Roll No. 5

Weather Conditions

-5 CLEAR, SUNNY

Viewpoint Location

T35N R12E SEC 36 SE 1/4 NW 1/4
DAL LAKE

Approximate Viewpoint

1640 ft

Elevation (msl)

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject 53°

Approximate Distance From
Viewpoint to Subject

1.0 mi

Comments

FOREGROUND - FROZEN LAKE
BACKGROUND - PRODOMINATELY NORTHERN HARDWOOD
STAND UP TO THE EDGE OF THE LAKE

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 25 1995
Time: 1150
Observer: Brad Helmandollar
Viewpoint Number: 7

PHOTOGRAPHIC DATA

Model of Camera Nikon F2
Film Kodak Gold 200
Lens (mm) 1 35 2 35 3 35 4 50 5 50 6 50
F-Stop 1 4 2 2.8 3 2 4 5.6 5 4 6 8
ASA 200

SUBJECT DESCRIPTION

Headframe X Tailings Pond _____ Railroad Siding _____
Approximate Subject Elevation 1665 ft msl
Photograph No: 13-15 16-18
Film Roll No. 9

Weather Conditions 25° CLEAR & SUNNY

Viewpoint Location T34 R12E SEC 14 SE 1/4 NE 1/4
SOUTH ~~SE~~ ROLLING STONE LAKE

Approximate Viewpoint 1540 ft
Elevation (msl) _____

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject 22°

Approximate Distance From 3.5 mi
Viewpoint to Subject

Comments FOREGROUND/MIDDLE - FROZEN LAKE
BACKGROUND - WOODED RINGELINE

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 4 1994
Time: 1110
Observer: Brad Helmandollar
Viewpoint Number: 8

PHOTOGRAPHIC DATA

Model of Camera Nikon F2
Film Kodak Gold 200
Lens (mm) 1 35 2 35 3 35 4 50 5 50 6 50
F-Stop 1 4 2 5.6 3 2.8 4 4 5 5.6 6 2.8
ASA 200

SUBJECT DESCRIPTION

Headframe X Tailings Pond _____ Railroad Siding _____
Approximate Subject Elevation 1665 ft msl
Photograph No. 13-15 16-18
Film Roll No. 2

Weather Conditions 10 CLEAR, SUNNY

Viewpoint Location T35N R12E SEC 33 NE 1/4 NE 1/4
HIGHWAY 55 SOUTH OF MOLE LAKE

Approximate Viewpoint 1550 ft
Elevation (msl) _____

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject 82°

Approximate Distance From Viewpoint to Subject 3.5 mi

Comments LOOKING ACROSS ~~THE~~ STH 55 - FOREGROUND
AGRICULTURAL FIELD
BACKGROUND - STAND OF MIXED HARDWOOD
CONIFERS

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 4 1995
Time: 1040
Observer: Brad Helmandollar
Viewpoint Number: 9

PHOTOGRAPHIC DATA

Model of Camera	Nikon F2
Film	Kodak Gold 200
Lens (mm)	1 <u>35</u> 2 <u>35</u> 3 <u>35</u> 4 <u>50</u> 5 <u>50</u> 6 <u>50</u>
F-Stop	1 <u>8</u> 2 <u>5.6</u> 3 <u>4</u> 4 <u>4</u> 5 <u>5.6</u> 6 <u>2.8</u>
ASA	200

SUBJECT DESCRIPTION

Headframe X Tailings Pond _____ Railroad Siding _____
Approximate Subject Elevation 1665 ft
Photograph No. 1-3 4-6
Film Roll No. 2

Weather Conditions -10° CLEAR, SUNNY

Viewpoint Location T35N R12E S22 SE 1/4 SE 1/4
SAND LAKE + BLACK JOE ROADS

Approximate Viewpoint 1560 ft.
Elevation (msl) _____

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject 90°

Approximate Distance From Viewpoint to Subject 2.0 mi

Comments LOOKING EAST
DOWN SAND LAKE ROAD.
AGRICULTURAL LAND IN THE FOREGROUND TO
THE NORTH FOLLOWED BY A HARDWOOD/CONIFER
STAND. TO THE SOUTH OF SAND LAKE ROAD THERE
IS A MATURE CONIFER STAND

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 4 1994
Time: 1130
Observer: Brad Helmandollar
Viewpoint Number: 10

PHOTOGRAPHIC DATA

Model of Camera	Nikon F2
Film	Kodak Gold 200
Lens (mm)	1 <u>35</u> 2 <u>35</u> 3 <u>35</u> 4 <u>50</u> 5 <u>50</u> 6 <u>50</u>
F-Stop	1 <u>8</u> 2 <u>5.6</u> 3 <u>11</u> 4 <u>8</u> 5 <u>11</u> 6 <u>4</u>
ASA	200

SUBJECT DESCRIPTION

Headframe X Tailings Pond X Railroad Siding _____
Approximate Subject Elevation 1665 ft msl
Photograph No. 1-3 4-6
Film Roll No. 3

Weather Conditions -10° SUNNY CLEAR

Viewpoint Location

T35 N R 12 E SEC 23 SW 1/4 SW 1/4
ROUTE 55 JUST NORTH OF MOLE LAKE RESERVATION

Approximate Viewpoint

1555 ft

Elevation (msl)

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject

115°

Approximate Distance From
Viewpoint to Subject

2.0 mi

Comments

TMA IS DIRECTLY IN LINE WITH THE
HEAD FRAME
FOREGROUND - AGRICULTURAL FIELD - MIDDLE -
CONIFER SWAMP - BACKGROUND - MIXED HARDWOOD
CONIFER STAND.

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 4 1994
Time: 1145
Observer: Brad Helmandollar
Viewpoint Number: 11

PHOTOGRAPHIC DATA

Model of Camera Nikon F2
Film Kodak Gold 200
Lens (mm) 1 50 2 50 3 50 4 35 5 35 6 35
F-Stop 1 8 2 5.6 3 11 4 8 5 11 6 4
ASA 200

SUBJECT DESCRIPTION

Headframe X Tailings Pond X Railroad Siding _____
Approximate Subject Elevation 1665 ft msl
Photograph No. 7-9 10-12
Film Roll No. 3

Weather Conditions -10 SUNNY CLEAR

Viewpoint Location T35N R12E SEC 26 SW 1/4 NW 1/4
ROUTE 55 AT SWAMP CREEK

Approximate Viewpoint 1555 ft
Elevation (msl) _____

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject 100°

Approximate Distance From 2.5 mi
Viewpoint to Subject

Comments TMA IS DIRECTLY BEHIND HEADFRAME
FOREGROUND/MIDDLE - DRIVEWAY + YARD
BACKGROUND - STANDS OF LARGE PINES

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 4 1995
Time: 1230
Observer: Brad Helmandollar
Viewpoint Number: 12

PHOTOGRAPHIC DATA

Model of Camera Nikon F2
Film Kodak Gold 200
Lens (mm) 1 35 2 35 3 35 4 50 5 50 6 50
F-Stop 1 4 2 5.6 3 2.8 4 11 5 8 6 5.6
ASA 200

SUBJECT DESCRIPTION

Headframe X Tailings Pond _____ Railroad Siding _____
Approximate Subject Elevation 1665 ft msl
Photograph No. 1-3 4-6
Film Roll No. 4

Weather Conditions

-5 CLEAR SUNNY

Viewpoint Location

T35N R13E SEC 17 NW 1/4 NW 1/4
VET. MEMORIAL PARK, SOUTH LAKE METONGA

Approximate Viewpoint

1600 ft

Elevation (msl)

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject

95°

Approximate Distance From
Viewpoint to Subject

2.5 mi

Comments

FOREGROUND/MIDDLE - PARKING LOT
BACKGROUND - CONIFER STAND (>25')

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 4 1995
Time: 1200
Observer: Brad Helmandollar
Viewpoint Number: 13

PHOTOGRAPHIC DATA

Model of Camera Nikon F2
Film Kodak Gold 200
Lens (mm) 1 35 2 35 3 35 4 50 5 50 6 50
F-Stop 1 4 2 5.6 3 2.8 4 8 5 11 6 5.6
ASA 200

SUBJECT DESCRIPTION

Headframe X Tailings Pond _____ Railroad Siding _____
Approximate Subject Elevation 1665 ft. msl
Photograph No. 13-15 16-18
Film Roll No. 3

Weather Conditions -5° CLEAR, SUNNY

Viewpoint Location TRAIL RISE SEC 32 SW 1/4 NW 1/4
LAKE METONGA BOAT LAUNCH

Approximate Viewpoint Elevation (msl) 1610 ft

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject 197°

Approximate Distance From Viewpoint to Subject 6.0 mi 5.5 mi

Comments FOREGROUND/MIDDLE - FROZEN LAKE
BACKGROUND - FAINT TREE LINE

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 25 1995
Time: 0810
Observer: Brad Helmandollar
Viewpoint Number: 14

PHOTOGRAPHIC DATA

Model of Camera	Nikon F2
Film	Kodak Gold 200
Lens (mm)	1 <u>50</u> 2 <u>50</u> 3 <u>50</u> 4 <u>35</u> 5 <u>35</u> 6 <u>35</u>
F-Stop	1 <u>4</u> 2 <u>2.8</u> 3 <u>5.6</u> 4 <u>4</u> 5 <u>2.8</u> 6 <u>5.6</u>
ASA	200

SUBJECT DESCRIPTION

Headframe X Tailings Pond _____ Railroad Siding _____
Approximate Subject Elevation 1665 ft msl
Photograph No. 19-21 22-24
Film Roll No. 13

Weather Conditions

10° HAZE, SUNNY

Viewpoint Location

T36N R13E SEC 32 SE 1/4 SW 1/4
EAST SHORE OF LAKE METONGA

Approximate Viewpoint

1600 ft.

Elevation (msl)

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject

195°

Approximate Distance From
Viewpoint to Subject

4.8 mi

Comments

FOREGROUND/MIDDLE - FROZEN LAKE
BACKGROUND - MATURE CONIFER/HARDWOOD STAND.

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 4 1995
Time: 1315
Observer: Brad Helmandollar
Viewpoint Number: 15

PHOTOGRAPHIC DATA

Model of Camera Nikon F2
Film Kodak Gold 200
Lens (mm) 1 35 2 35 3 35 4 50 5 50 6 50
F-Stop 1 4 2 2.8 3 5.6 4 5.6 5 8 6 2.8
ASA 200

SUBJECT DESCRIPTION

Headframe X Tailings Pond _____ Railroad Siding _____
Approximate Subject Elevation 1665 ft msl
Photograph No. 13-15 16-18
Film Roll No. 4

Weather Conditions -5° CLEAR SUNNY

Viewpoint Location T35N R13E SEC 14 NW 1/4 SW 1/4
EAST SIDE OF LAKE LUCERNE - MAIN PUBLIC BOAT
LANDING

Approximate Viewpoint
Elevation (msl) 1670 ft

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject 235°

Approximate Distance From
Viewpoint to Subject 4 mi.

Comments FOREGROUND - FROZEN LAKE
BACKGROUND - PROBABLY CONIFER FOREST

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 24 1995
Time: 1515
Observer: Brad Helmandollar
Viewpoint Number: 16

PHOTOGRAPHIC DATA

Model of Camera Nikon F2
Film Kodak Gold 200
Lens (mm) 1 35 2 35 3 35 4 50 5 50 6 50
F-Stop 1 5.6 2 4 3 8 4 8 5 5.6 6 4
ASA 200

SUBJECT DESCRIPTION

Headframe X Tailings Pond X Railroad Siding _____
Approximate Subject Elevation _____
Photograph No. 13-15 16-18
Film Roll No. 11

Weather Conditions

25° CLEAR COOL

Viewpoint Location

T35N R13E SEC 34 SW 1/4 NW 1/4
EAST SHORE OF GROUND HENLOCK LAKE

Approximate Viewpoint

1606 FT.

Elevation (msl)

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject

282°

Approximate Distance From
Viewpoint to Subject

2.8 km

Comments

TMA AND HEADFRAME ARE IN LINE AT THIS
ANGLE.
FOREGROUND/MIDDLE - FROZEN LAKE
BACKGROUND - CONIFER STANDS UP TO THE EDGE
OF THE LAKE (725')

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 5 1995
Time: 0840
Observer: Brad Helmandollar
Viewpoint Number: 17

PHOTOGRAPHIC DATA

Model of Camera

Nikon F2

Film

Kodak Gold 200

Lens (mm)

1 35 2 35 3 35 4 50 5 50 6 50

F-Stop

1 2 2 2.8 3 1.4 4 2 5 2.8 6 1.4

ASA

200

SUBJECT DESCRIPTION

Headframe X

Tailings Pond _____

Railroad Siding _____

Approximate Subject Elevation 1665 ft msl

Photograph No. 13-15 16-18

Film Roll No. 6

Weather Conditions

5° CLEAR SUNNY

Viewpoint Location

T35N RBE SEC 26 SE 1/4 SW 1/4

INTERSECTION OF R+W

Approximate Viewpoint

1640 ft

Elevation (msl)

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject

270°

Approximate Distance From
Viewpoint to Subject

4.0 mi

Comments

FOREGROUND - ROAD/POLE SIZE TIMBER

MIDDLE - WET MEADOW

BACKGROUND - LARGE CONIFER STAND

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 4 1995
Time: 1345
Observer: Brad Helmandollar
Viewpoint Number: 18

PHOTOGRAPHIC DATA

Model of Camera Nikon F2
Film Kodak Gold 200
Lens (mm) 1 35 2 35 3 35 4 50 5 50 6 50
F-Stop 1 2 2 2.8 3 1.4 4 2 5 2.8 6 1.4
ASA 200

SUBJECT DESCRIPTION

Headframe X Tailings Pond _____ Railroad Siding _____
Approximate Subject Elevation 1665 ft msl
Photograph No. 1-3 4-6
Film Roll No. 5

Weather Conditions

-5 CLEAR, SUNNY

Viewpoint Location

T34N R43E SEC 9 NW 1/4 SW 1/4
INTERSECTION OF CTH Q + ST. JOHN'S LANE

Approximate Viewpoint

1600 ft

Elevation (msl)

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject

348°

Approximate Distance From
Viewpoint to Subject

3.5 mi

Comments

FOREGROUND/MIDDLE - ROAD - NORTHERN
HARDWOOD STAND (>25')
BACKGROUND - OPENING IN CANOPY FROM
LAKE.

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 5 1995
Time: 1000
Observer: Brad Helmandollar
Viewpoint Number: 19

PHOTOGRAPHIC DATA

Model of Camera Nikon F2
Film Kodak Gold 200
Lens (mm) 1 35 2 35 3 35 4 50 5 50 6 50
F-Stop 1 2.8 2 2 3 1.4 4 1.4 5 2.8 6 2.6
ASA 200

SUBJECT DESCRIPTION

Headframe X Tailings Pond _____ Railroad Siding _____
Approximate Subject Elevation 1665 ft msl
Photograph No. 13-15 16-18
Film Roll No. 7

Weather Conditions -5 CLEAR, SUNNY

Viewpoint Location T35N R13E SEC 30 SW 1/4 SW 1/4
EAST OF FIELD OFFICE ON SAND LAKE ROAD

Approximate Viewpoint 1600 ft
Elevation (msl) _____

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject 0°

Approximate Distance From Viewpoint to Subject 0.2 mi

Comments FOREGROUND - ROADWAY
MIDDLE - HARDWOOD STAND
BACKGROUND - "STAGNANT AREA" - CLEARED FOREST

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 25 1995
Time: 0940
Observer: Brad Helmandollar
Viewpoint Number: 20

PHOTOGRAPHIC DATA

Model of Camera Nikon F2
Film Kodak Gold 200
Lens (mm) 1 35 2 35 3 35 4 50 5 50 6 50
F-Stop 1 8 2 11 3 5.6 4 8 5 4 6 5.6
ASA 200

SUBJECT DESCRIPTION

Headframe X Tailings Pond _____ Railroad Siding _____
Approximate Subject Elevation ~~1575~~ 1665 ft msl
Photograph No. 13-15 16-18
Film Roll No. 14

Weather Conditions 10° SUNNY, CLEAR

Viewpoint Location T36N R12E SEC 36 NE 1/4 NE 1/4
PEAK OF LAKEVIEW ROAD

Approximate Viewpoint 1750 ft
Elevation (msl) _____

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject 180°

Approximate Distance From Viewpoint to Subject 6.0 mi

Comments FOREGROUND - PASTURE. NO WOODY VEGETATION
MIDDLE - DEPRESSION IN TOPOGRAPHY - MATURE
HARDWOOD/CONIFER STAND.
BACKGROUND - LAKE METONGA / WOODED RIDGE LINE

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 24 1995
Time: 1615
Observer: Brad Helmandollar
Viewpoint Number: 21

PHOTOGRAPHIC DATA

Model of Camera

Nikon F2

Film

Kodak Gold 200

Lens (mm)

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____

F-Stop

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____

ASA

200

NO PHOTOS

SUBJECT DESCRIPTION

Headframe X

Tailings Pond _____

Railroad Siding X

Approximate Subject Elevation 1665 ft msl

Photograph No. _____

Film Roll No. _____

Weather Conditions

30° CLEAR SUNNY

Viewpoint Location

T35N R13E SEC 17 SE 1/4 SW 1/4

KIETH SIDING ROAD

Approximate Viewpoint

1590

Elevation (msl)

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject

225°

Approximate Distance From
Viewpoint to Subject

2.5 mi / 0.5 mi

Comments

FOREGROUND - OLD FIELD

MIDDLE - OLD FIELD / CONIFER STAND

BACKGROUND - WOODED RIDGELINE

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 24 1995
Time: 1610
Observer: Brad Helmandollar
Viewpoint Number: 22

PHOTOGRAPHIC DATA

Model of Camera	Nikon F2
Film	Kodak Gold 200
Lens (mm)	1 <u>35</u> 2 <u>35</u> 3 <u>35</u> 4 <u>50</u> 5 <u>50</u> 6 <u>50</u>
F-Stop	1 <u>2</u> 2 <u>2.8</u> 3 <u>1.4</u> 4 <u>2</u> 5 <u>2.8</u> 6 <u>1.4</u>
ASA	200

SUBJECT DESCRIPTION

Headframe X Tailings Pond _____ Railroad Siding X
Approximate Subject Elevation 1665 ft msl
Photograph No. 1-3 4-6
Film Roll No. ~~12~~ 12

Weather Conditions 30° CLEAR, COOL

Viewpoint Location

T35N R13E SEC 17 SE 1/4 SW 1/4
WETLAND ROAD AT RR EXCHANGE

Approximate Viewpoint

1590 Ft

Elevation (msl)

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject

217°

Approximate Distance From
Viewpoint to Subject

3.0 mi / 0.6 mi

Comments

PICTURE ALSO SHOWS THE RAILROAD SPUR WEST
OF THE EXCHANGE
FOREGROUND - OPEN AREA - NO WOOD VEG
MIDDLE - WOODED AREA - WETLAND
BACKGROUND - SPLIT ALG AREA WITH HARDWOODS BORDERING

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 24 1995
Time: 5:16:10
Observer: Brad Helmandollar
Viewpoint Number: 22

PHOTOGRAPHIC DATA

Model of Camera	Nikon F2
Film	Kodak Gold 200
Lens (mm)	1 <u>35</u> 2 <u>35</u> 3 <u>35</u> 4 <u>50</u> 5 <u>50</u> 6 <u>50</u>
F-Stop	1 <u>2.8</u> 2 <u>4</u> 3 <u>2</u> 4 <u>2</u> 5 <u>2.8</u> 6 <u>1.4</u>
ASA	200

SUBJECT DESCRIPTION

Headframe _____ Tailings Pond _____ Railroad Siding X
Approximate Subject Elevation 1594 ft.
Photograph No. 13-15 16-18
Film Roll No. 13 12

Weather Conditions 30° CLEAR, SUNNY

Viewpoint Location

T35N R13E SEC 17 SE 1/4 SW 1/4
LIETH SIDING RD. SITE OF ACTUAL RR
EXCHANGE

Approximate Viewpoint

1590 ft

Elevation (msl)

SITE OF RR EXCHANGE

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject

145°

Approximate Distance From
Viewpoint to Subject

0.6 mi

Comments

FOREGROUND AGRICULTURAL FIELD
BACKGROUND - THICK CONIFER STAND

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 25 1995
Time: 1620
Observer: Brad Helmandollar
Viewpoint Number: ZZA

PHOTOGRAPHIC DATA

Model of Camera	Nikon F2
Film	Kodak Gold 200
Lens (mm)	1 <u>50</u> 2 <u>50</u> 3 <u>50</u> 4 <u>35</u> 5 <u>35</u> 6 <u>35</u>
F-Stop	1 <u>2</u> 2 <u>2.8</u> 3 <u>1.4</u> 4 <u>2</u> 5 <u>2.8</u> 6 <u>1.4</u>
ASA	200

SUBJECT DESCRIPTION

Headframe X Tailings Pond _____ Railroad Siding _____
Approximate Subject Elevation 1665 ft msl
Photograph No. 19-21 22-24
Film Roll No. 12

Weather Conditions

30° CLEAR, B. SUNNY

Viewpoint Location

T35N R13E SEC 15 SW 1/4 SW 1/4
CREST OF KEITH SIDING ROAD

Approximate Viewpoint

1700 ft

Elevation (msl)

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject

240°

Approximate Distance From
Viewpoint to Subject

3.2 mi

Comments

FOREGROUND - ROAD / MIXED HARDWOODS
MIDDLE / BACKGROUND - DECLINING TOPOGRAPHY
MIXED HARDWOOD STAND

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 24 1995
Time: 0945
Observer: Brad Helmandollar
Viewpoint Number: 23

PHOTOGRAPHIC DATA

Model of Camera Nikon F2
Film Kodak Gold 200
Lens (mm) 1 35 2 35 3 35 4 50 5 50 6 50
F-Stop 1 5.6 2 4 3 8 4 5.6 5 4 6 8
ASA 200

SUBJECT DESCRIPTION

Headframe X Tailings Pond _____ Railroad Siding _____
Approximate Subject Elevation 1665 ft msl
Photograph No. 13-15 15-18
Film Roll No. 8

Weather Conditions 25°, SUNNY, CLEAR

Viewpoint Location T35N R13E SE 1/4 SE 1/4 SE 1/4
NORTH EDGE OF LAKE LUCERNE

Approximate Viewpoint 1660 ft
Elevation (msl) _____

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject 217°

Approximate Distance From Viewpoint to Subject 6.0 mi

Comments FOREGROUND - EDGE OF LAKE (SNOW COVERED)
MIDDLE - FROZEN LAKE
BACKGROUND - WOODED RIDGE RAISING FROM
EDGE OF LAKE.

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 24, 1995
Time: 0915
Observer: Brad Helmandollar
Viewpoint Number: 24

PHOTOGRAPHIC DATA

Model of Camera	Nikon F2
Film	Kodak Gold 200
Lens (mm)	1 <u>35</u> 2 <u>35</u> 3 <u>35</u> 4 <u>50</u> 5 <u>50</u> 6 <u>50</u>
F-Stop	1 <u>2.8</u> 2 <u>4</u> 3 <u>2</u> 4 <u>8</u> 5 <u>5.6</u> 6 <u>4</u>
ASA	200

SUBJECT DESCRIPTION

Headframe X Tailings Pond _____ Railroad Siding _____
Approximate Subject Elevation 1665 ft msl
Photograph No. 1-3 4-6
Film Roll No. 8

Weather Conditions 25° SUNNY CLEAR

Viewpoint Location T35N R13E SEC. 25 NE 1/4 SW 1/4
REST STOP ON STH 8

Approximate Viewpoint 1750 ft
Elevation (msl) _____

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject 220°

Approximate Distance From Viewpoint to Subject 7 mi

Comments FOREGROUND - WAYSIDE BUILDINGS/SHELTERS
MIDDLE - VALLEY WITH MIXED HARDWOODS
BACKGROUND - SERIES OF WOODED PEAKS

3.13-2-25

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 25 1995
Time: 0740
Observer: Brad Helmandollar
Viewpoint Number: 25

PHOTOGRAPHIC DATA

Model of Camera

Nikon F2

Film

Kodak Gold 200

Lens (mm)

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____

F-Stop

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____

ASA

200

NO PHOTOS

SUBJECT DESCRIPTION

Headframe X

Tailings Pond _____

Railroad Siding _____

Approximate Subject Elevation 1665

Photograph No. _____

Film Roll No. _____

Weather Conditions

70 HAZY

Viewpoint Location

T35N R13E SEC32 NW 1/4 NE 1/4
EASTERN BOUNDARY OF CRANDON

Approximate Viewpoint

Elevation (msl)

1670

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject

185°

Approximate Distance From
Viewpoint to Subject

6.5 mi

Comments

AT THE PEAK ST#8 DEPRESSION
IN TOPOGRAPHY IN FOREGROUND.
MIXED STAND IN BACKGROUND.

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 24 1995
Time: 1010
Observer: Brad Helmandollar
Viewpoint Number: 26

PHOTOGRAPHIC DATA

Model of Camera	Nikon F2
Film	Kodak Gold 200
Lens (mm)	1 <u>35</u> 2 <u>35</u> 3 <u>35</u> 4 <u>50</u> 5 <u>50</u> 6 <u>50</u>
F-Stop	1 <u>4</u> 2 <u>2.8</u> 3 <u>5.6</u> 4 <u>8</u> 5 <u>5.6</u> 6 <u>11</u>
ASA	200

SUBJECT DESCRIPTION

Headframe X Tailings Pond _____ Railroad Siding _____
Approximate Subject Elevation 1665 ft msl
Photograph No. 1-3 4-6
Film Roll No. 9

Weather Conditions

25° SUNNY CLEAR

Viewpoint Location

T35N R13E SEC 26 SE 1/4 NW 1/4
SUGARBUSH HILL LOOKOUT TOWER

Approximate Viewpoint

1939 ft

Elevation (msl)

PICTURES TAKEN FROM TOP OF FIRE TOWER

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject

225°

Approximate Distance From
Viewpoint to Subject

7.5 mi

Comments

FOREGROUND - SEMI WOODED RIDGES*
BACKGROUND - WOODED RIDGES
* AREA OF TORNADO DAMAGE

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 25 1995
Time: 1005
Observer: Brad Helmandollar
Viewpoint Number: 27

PHOTOGRAPHIC DATA

Model of Camera	Nikon F2
Film	Kodak Gold 200
Lens (mm)	1 <u>35</u> 2 <u>35</u> 3 <u>35</u> 4 <u>50</u> 5 <u>50</u> 6 <u>50</u>
F-Stop	1 <u>4</u> 2 <u>2.8</u> 3 <u>5.6</u> 4 <u>2.8</u> 5 <u>4</u> 6 <u>2</u>
ASA	200

SUBJECT DESCRIPTION

Headframe X Tailings Pond _____ Railroad Siding _____
Approximate Subject Elevation 1665 ft msl
Photograph No. 1-3 4-6
Film Roll No. 15

Weather Conditions 10° CLEAR, SUNNY, VERY BRIGHT

Viewpoint Location T35 N R12E SEC 13 SE 1/4 NE 1/4
AIRPORT ROAD

Approximate Viewpoint 1611 ft.
Elevation (msl) _____

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject 170°

Approximate Distance From Viewpoint to Subject 2.5 mi

Comments FOREGROUND/MIDDLE - AGRICULTURAL LAND, NO WOODY
VEGETATION
BACKGROUND - MATURE CONIFER STAND (>25')

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 25 1995
Time: 0900
Observer: Brad Helmandollar
Viewpoint Number: 28

PHOTOGRAPHIC DATA

Model of Camera	Nikon F2
Film	Kodak Gold 200
Lens (mm)	1 <u>35</u> 2 <u>35</u> 3 <u>35</u> 4 <u>50</u> 5 <u>50</u> 6 <u>50</u>
F-Stop	1 <u>8</u> 2 <u>5.6</u> 3 <u>4</u> 4 <u>11</u> 5 <u>5.6</u> 6 <u>8</u>
ASA	200

SUBJECT DESCRIPTION

Headframe X Tailings Pond X Railroad Siding _____
Approximate Subject Elevation 1675 ft msl
Photograph No. 7-9 10-12
Film Roll No. _____

Weather Conditions 25° CLEAR, SUNNY

Viewpoint Location T35N R13E SEC 33 SE 1/4 NW 1/4
DEEP HOLE LAKE ROAD

Approximate Viewpoint 1600 ft
Elevation (msl) _____

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject 280°

Approximate Distance From Viewpoint to Subject 0.2 mi

Comments FOREGROUND - THICK LOWLAND HARDWOODS + CONIFERS
BACKGROUND - ELEVATION IN TOPOGRAPHY ~~AND~~
COVERED WITH HARDWOODS

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 25 1995
Time: 0910
Observer: Brad Helmandollar
Viewpoint Number: 29

PHOTOGRAPHIC DATA

Model of Camera Nikon F2
Film Kodak Gold 200 NO PHOTOS
Lens (mm) 1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____
F-Stop 1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____
ASA 200

SUBJECT DESCRIPTION

Headframe _____ Tailings Pond X Railroad Siding _____
Approximate Subject Elevation 1675 ft msl
Photograph No. _____
Film Roll No. _____

Weather Conditions

25° CLEAR, SUNNY

Viewpoint Location

DEEP HOLE + SAND LAKE ROADS
T34N R13E NE 1/4 SW 1/4 SEC 5

Approximate Viewpoint

1628 ft

Elevation (msl)

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject

20°

Approximate Distance From
Viewpoint to Subject

1.0 mi

Comments

FOREGROUND - HARDWOOD STAND BLOCKS
ALL VIEWS (>25')

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 24 1995
Time: 1300
Observer: Brad Helmandollar
Viewpoint Number: 30

PHOTOGRAPHIC DATA

Model of Camera Nikon F2
Film Kodak Gold 200
Lens (mm) 1 50 2 50 3 50 4 35 5 35 6 35
F-Stop 1 4 2 2.8 3 5.6 4 4 5 2.8 6 5.6
ASA 200

SUBJECT DESCRIPTION

Headframe _____ Tailings Pond X Railroad Siding _____
Approximate Subject Elevation 1675 fmsl
Photograph No. 19-21 22-24
Film Roll No. 10

Weather Conditions 25° CLEAR SUNNY

Viewpoint Location T35N R13E SEC 32 NW 1/4 SW 1/4
WEST SHORE OF DUCK LAKE

Approximate Viewpoint 1600 ft
Elevation (msl) _____

Observer Position: Superior (Normal) Inferior

Bearing From Viewpoint to Subject 70°

Approximate Distance From Viewpoint to Subject 0.3 mi.

Comments FOREGROUND - FROZEN LAKE
MIDDLE - MIXED HARDWOOD/CONIFER STAND
BACKGROUND - RAISED TOPOGRAPHY/HARDWOODS

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 5 1995
Time: 0940
Observer: Brad Helmandollar
Viewpoint Number: 31

PHOTOGRAPHIC DATA

Model of Camera	Nikon F2
Film	Kodak Gold 200
Lens (mm)	1 <u>35</u> 2 <u>35</u> 3 <u>35</u> 4 <u>50</u> 5 <u>50</u> 6 <u>50</u>
F-Stop	1 <u>2</u> 2 <u>1.4</u> 3 <u>2.8</u> 4 <u>4</u> 5 <u>2.8</u> 6 <u>5.6</u>
ASA	200

SUBJECT DESCRIPTION

Headframe _____ Tailings Pond X Railroad Siding _____
Approximate Subject Elevation 1675 ftmsl
Photograph No. 7-9 10-12
Film Roll No. 7

Weather Conditions -5° CLEAR, SUNNY

Viewpoint Location T35N R13E SEC 31 SE 1/4 SE 1/4
WEST DEEP HOLE LAKE

Approximate Viewpoint 1620°
Elevation (msl) _____

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject 35°

Approximate Distance From
Viewpoint to Subject 1.0 mi.

Comments FOREGROUND - FROZEN LAKE
BACKGROUND - MIXED HARDWOOD STAND UP
TO THE EDGE OF THE LAKE - SOME
INCREASE IN TOPOGRAPHY.

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 24 1995
Time: 1240
Observer: Brad Helmandollar
Viewpoint Number: 32

PHOTOGRAPHIC DATA

Model of Camera Nikon F2
Film Kodak Gold 200
Lens (mm) 1 50 2 50 3 50 4 35 5 35 6 35
F-Stop 1 4 2 5.6 3 8 4 5.6 5 8 6 4
ASA 200

SUBJECT DESCRIPTION

Headframe _____ Tailings Pond X Railroad Siding _____
Approximate Subject Elevation 1675 ft + msl
Photograph No. 7-9 10-12
Film Roll No. 10

Weather Conditions

25° CLEAR, SUNNY

Viewpoint Location

T35N R12E SEC 36 NE 1/4 SE 1/4
WEST LITTLE SANA LAKE

Approximate Viewpoint

1595 ft

Elevation (msl)

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject

90°

Approximate Distance From
Viewpoint to Subject

1.2 mi

Comments

FOREGROUND/MIDDLE - FROZEN LAKE
BACKGROUND MIXED HARDWOOD/CONIFER STAND
UP TO THE EDGE OF THE LAKE

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 25 1995
Time: 1055
Observer: Brad Helmandollar
Viewpoint Number: 33

PHOTOGRAPHIC DATA

Model of Camera Nikon F2
Film Kodak Gold 200
Lens (mm) 1 35 2 35 3 35 4 35 5 35 6 35
F-Stop 1 2.8 2 1.4 3 2 4 1.4 5 2.8 6 2
ASA 200

SUBJECT DESCRIPTION

Headframe X Tailings Pond X Railroad Siding _____
Approximate Subject Elevation 1665 ft msl
Photograph No. 7-10
Film Roll No. 16

Weather Conditions 20° CLEAR, SUNNY

Viewpoint Location T35N R13E SEC 4 SE 1/4 SE 1/4
COUNTY Q - NORTH OF KIMBERLY LANE

Approximate Viewpoint 1610 ft
Elevation (msl) _____

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject 305°

Approximate Distance From Viewpoint to Subject 3.5 mi

Comments MIXED CONIFER HARDWOOD STAND (>25')

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 25 1995
Time: 1100
Observer: Brad Helmandollar
Viewpoint Number: 33A

PHOTOGRAPHIC DATA

Model of Camera	Nikon F2
Film	Kodak Gold 200
Lens (mm)	1 <u>35</u> 2 <u>35</u> 3 <u>35</u> 4 <u>52</u> 5 <u>52</u> 6 <u>52</u>
F-Stop	1 <u>2</u> 2 <u>2.8</u> 3 <u>1.4</u> 4 <u>1.4</u> 5 <u>2</u> 6 <u>2.8</u>
ASA	200

SUBJECT DESCRIPTION

Headframe X Tailings Pond X Railroad Siding _____
Approximate Subject Elevation 1665 ft msl
Photograph No. 11-24
Film Roll No. 16

Weather Conditions 10° CLEAR, SUNNY

Viewpoint Location T35N R13E SEC 26 SE 1/4 SW 1/4
COUNTY Q - SOUTH OF W

Approximate Viewpoint 1620 ft.
Elevation (msl) _____

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject 280°

Approximate Distance From Viewpoint to Subject 4.0 mi

Comments SAPLING STAND IN THE FOREGROUND BLOCKS
VIEW

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 5 1995
Time: 1000
Observer: Brad Helmandollar
Viewpoint Number: 34

PHOTOGRAPHIC DATA

Model of Camera Nikon F2
Film Kodak Gold 200
Lens (mm) 1 35 2 35 3 35 4 50 5 50 6 50
F-Stop 1 8 2 11 3 5.6 4 8 5 11 6 5.6
ASA 200

SUBJECT DESCRIPTION

Headframe _____ Tailings Pond X Railroad Siding _____
Approximate Subject Elevation 1675 ± 1 msl
Photograph No. 19-21 22-24
Film Roll No. 7

Weather Conditions -5° CLEAR COOL

Viewpoint Location T35N R13E SEC 30 SW 1/4 SW 1/4
EAST OF FIELD OFFICE ON SAND LAKE ROAD

Approximate Viewpoint 1600 ft.
Elevation (msl) _____

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject 104°

Approximate Distance From 1.2 mi
Viewpoint to Subject

Comments FOREGROUND - ROADWAY
BACKGROUND - MIXED HARDWOOD STAND (725')

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JUN 25 1995
Time: 1024
Observer: Brad Helmandollar
Viewpoint Number: 35

PHOTOGRAPHIC DATA

Model of Camera	Nikon F2
Film	Kodak Gold 200
Lens (mm)	1 <u>35</u> 2 <u>35</u> 3 <u>35</u> 4 <u>50</u> 5 <u>50</u> 6 <u>50</u>
F-Stop	1 <u>2</u> 2 <u>2.8</u> 3 <u>1.4</u> 4 <u>2.8</u> 5 <u>2</u> 6 <u>1.4</u>
ASA	200

SUBJECT DESCRIPTION

Headframe _____ Tailings Pond X Railroad Siding _____
Approximate Subject Elevation 1675 ft msl
Photograph No. 22-24
Film Roll No. 15

Weather Conditions 10° CLEAR, SUNNY

Viewpoint Location T35N R13E SEC 10 NW 1/4 SW 1/4
COUNTY W - SOUTH OF LAKE LUCERNE

Approximate Viewpoint 1680 ft
Elevation (msl) _____

Observer Position: Superior Normal Inferior

Bearing From-Viewpoint to Subject 245°

Approximate Distance From
Viewpoint to Subject 3.8 mi

Comments POLE SIZE TIMBER - HARDWOODS - IN THE
FOREGROUND BLOCK THE VIEW OF THE
BACKGROUND

STANDARD DATA FORM
CRANDON MINING COMPANY
AESTHETIC IMPACT ANALYSIS

Date: JAN 25
Time: 1040
Observer: Brad Helmandollar
Viewpoint Number: 35A

PHOTOGRAPHIC DATA

Model of Camera	Nikon F2
Film	Kodak Gold 200
Lens (mm)	1 <u>50</u> 2 <u>50</u> 3 <u>50</u> 4 <u>35</u> 5 <u>35</u> 6 <u>35</u>
F-Stop	1 <u>2</u> 2 <u>2.8</u> 3 <u>1.4</u> 4 <u>2.8</u> 5 <u>1.4</u> 6 <u>2</u>
ASA	200

SUBJECT DESCRIPTION

Headframe X Tailings Pond X Railroad Siding _____
Approximate Subject Elevation _____
Photograph No. 1-6
Film Roll No. 16

Weather Conditions

10° CLEAR, SUNNY

Viewpoint Location

T35N R13E SEC 26 NW 1/4 SW 1/4
COUNTY W NORTH OF Q (1/3 mi)

Approximate Viewpoint

1650 Ft

Elevation (msl)

Observer Position: Superior Normal Inferior

Bearing From Viewpoint to Subject

280°

Approximate Distance From
Viewpoint to Subject

4.0 mi

Comments

FOREGROUND SAPLING SIZE CONIFER
PLANTATION - MIDDLE - MATURE CONIFER STAND
BACKGROUND MOUNTED RIDGE