1995 Annual Report

January 1995

Flambeau Mining Company
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Kennecott
Minerals

January 31, 1996

Mr. Lawrence J. Lynch
Mine Reclamation Unit
Bureau of Solid and Hazardous Waste Management
101 S. Webster Street, GEF II
P.O. Box 7921
Madison, WI 53707

RE: Flambeau Mining Company - 1995 Annual Report

Dear Mr. Lynch:

Flambeau is submitting 12 copies of the 1995 Annual Report pursuant to Part 1-8 of the conditions of the Mine Permit. This submittal also addresses other requirements of the Mining Permit. On January 30 you had expressed a preference that Flambeau submit the 1995 Annual Report in its entirety following January 31, rather than an incomplete report by this date. In a letter to you dated January 30, I had explained the unavoidable delay in completion of the Report.

If you have any comments or questions regarding this submittal, please contact me at 715-532-6690 Ext. 717.

Sincerely,

Jana E. Murphy
Supervisor of Environmental Affairs

Distribution

No. of Copies	Sent to
12	Mr. Lawrence J. Lynch Mine Reclamation Unit Bureau of Solid and Hazardous Waste Management 101 South Webster Street, GEF II Madison, WI 53707
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1	Mr. Paul Kent DeWitt Ross & Stevens S.C. 2 E. Mifflin Street-Suite 600 Madison, WI 53703-2685
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FLAMBEAU MINING COMPANY
1995 ANNUAL REPORT

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APPENDICES

1.0 PURPOSE AND NEED

This report serves to document the work that was done at the Flambeau Mine site in 1995 and to satisfy the requirements of the Mining Permit (MP) and the Type I and Type II storage area Conditional Approval (CA) letter dated March 9, 1993.

Mining Permit, Part 1, Condition 8:

In accordance with sec. 144.89, Stats., Flambeau shall submit a report annually to the Department summarizing the activities which took place on the mining site during the year and shall include other additional information specified in this permit and associated plan approvals.

Mining Permit, Part 2, Condition 4:

The annual report required under sec. 144.89, Stats., shall include discussion of all modifications received during the previous year and shall include an inventory of all modifications received subsequent to permit issuance. The annual report shall also discuss deviations from the approved Mining Plan as a result of final engineering refinements of subsequent plan approvals if these deviations do not require modifications, under Part 2, Conditions 2 and 3.

Mining Permit, Part 2, Condition 6:

Flambeau shall keep a log of all incidents, such as spills, pond overflows and embankment failure or leakage, reported to its environmental compliance staff. This log shall, at all reasonable times, be available for inspection by any duly authorized Department employee. A summary of incidents subject to various Department reporting requirements shall be included in the annual report required under sec. 144.89, Stats.

Mining Permit, Part 2, Condition 7 (Excerpt):

The annual report required under sec. 144.89, Stats, shall include a summary of all exploration drilling activities conducted on the mining site during the previous year.

Mining Permit, Part 2, Condition 14 (Excerpt):

The evaluation of the Type II collection system shall be included in the annual report required under this permit.

Mining Permit, Part 3, Condition 10:

Flambeau shall conduct a program of in-field trials for reclamation methods and materials prior to final reclamation. A description of methods, materials, analyses and results shall be submitted to the Department on an annual basis.

Mining Permit, Part 4, Condition 9:

Monitoring data and results shall be submitted to the Department within 30 days after completion of the required analyses. The annual report required in this permit shall summarize the year's monitoring activities and any observed trends in the monitoring data.

Conditional Approval, Condition 13:

The annual report required under the Mining Permit should include documentation of the following:

a. *Inspection of the sideslopes of the surge pond and runoff pond for any sign of washout or deformation.*

b. *Inspection of the 36" diameter drain from the Type II stockpile, the entrance manhole, access manholes, outlet and the geomembrane-covered seam in the pipe junction prior to the outlet.*

c. *Inspection of the scuff strip below the outlet of the 36" pipe outlet in the surge pond.*

Groundwater Withdrawal Permit, Condition 4 (Excerpt):

At the end of each year of pit excavation and ore extraction, Flambeau shall submit to the Department of Natural Resources, Bureau of Water Supply a written tabulation of the monthly totals for: precipitation volume, surface water run-on, groundwater inflow and dewatering pumping.

The location of the information which fulfills the requirements of the above conditions are referenced in Table 1-1.

TABLE 1-1

Location Information Key

Condition No.	Location of Information
MP, Part 1-8	Section 2.1
MP, Part 2-4	Section 2.2 and Appendix A
MP, Part 2-6	Section 2.4
MP, Part 2-7	Section 2.5
MP, Part 2-14	Section 4.6
MP, Part 3-10	Section 3
MP, Part 4-9	Section 4 and Appendix C through H
CA, Condition 13a	Section 4.6 and Appendix B
CA, Condition 13b	Section 4.6
CA, Condition 13c	Section 4.6 and Appendix B
GWP, Condition 4	Section 4.6

2.0 Operating Activities

2.1 1995 Summary

During the first quarter of 1995 Flambeau Mining Company (Flambeau) continued ore production from the Phase I portion of the pit (west half) reaching the 990 elevation. Ore production from Phase II commenced at the beginning of April, starting at the 1060 elevation and by year's end the pit had reached the 1010 elevation. Flambeau mined a total of 443,500 tons of ore during 1995 and of this total 427,000 tons were classified as copper ore and 15,700 gossan ore.

Waste rock production continued from Phase II starting at the 1080 elevation and by year's end the pit had reached the 1010 elevation. Beginning in October, Flambeau mined 81,000 tons of additional waste rock material from Phase I caused by slope failure from section 40,300 to 41,300. Flambeau mined a total of 1,600,000 tons of waste rock during 1995 and of this total 480,000 tons were classified as Type I (< 1% sulfur) and the remaining 1,120,000 tons were classified as Type II (> 1% sulfur).

Shipments of ore sent to Canada for processing totaled 449,500 tons. Flambeau supplemented shipments during 1995 with 6,000 tons from the on-site ore stockpile generated during 1994. Mill ore shipped to Timmins, Ontario totaled 358,000 tons and the remaining 91,500 tons of ore were shipped to Rouyn-Noranda, Quebec as either direct smelter ore (DSO) or as gossan ore.

Flambeau implemented a geotechnical program to review and secure the integrity of the open pit high walls. The program's strategy was to control water inflow resulting in a reduction of pore pressure along the exposed high walls. When rock conditions dictated, some method of ground support was implemented.

Water control was established by managing surface and ground water inflows. Directing Type I stockpile runoff water into the settling ponds controlled the surface water from migrating into the pit. The settling ponds were PVC lined to reduce water infiltration into the pit. Groundwater pore pressure at the high wall face was reduced by installing horizontal drains into the high walls. Horizontal drains were ineffective at section 40,500 creating the need to install three vertical dewatering wells that are designed to reduce the inflow of ground water. Construction logs of the dewatering wells are included in Appendix I.

Certain rock types, found predominately in Phase II, such as the andalusite biotite altered to chlorite and sericite required additional methods of support. Stabilization of this rock unit was established by installing 24 foot swellex bolts on a 5 feet by 5 feet pattern and wire mesh. Flambeau will adjust the rock bolt design as the rock unit changes in its characteristics.

The north wall from section 40,500 to 41,400 required a design refinement and installation of ground support. A low strength meta dacite rock unit that occurs along the final north wall from the 1070 elevation to the 1010 elevation necessitated the design refinement. The design

refinement consisted of decreasing the bench face angle from the pit rim to the 1070 elevation from 33 degrees to 27 degrees. In the pushback select monitoring wells recently constructed for determining groundwater impacts on the pit walls were abandoned. The abandoned wells were not part of Flambeau's compliance monitoring program. Abandonment reports are included in Appendix I. Likewise, the bench face angle directly below the 1070 to the 1010 elevation was reduced from 69 degrees to 45 degrees. Localized slope failures within the push back required that 24 foot swellex rock bolts, mesh and strap be installed from the 1036 elevation to the 1010 elevation.

Flambeau installed a rock fall fence designed to secure work areas within the mine from raveling high walls. The fence is located in the northwest corner of Phase I at the 1010 elevation. Flambeau constructed the rock fall fence of I-beams, wire cable and mesh a height of approximately 10 feet. Geogrid mesh will then be secured on the fence and draped over the bench face as it becomes exposed at depth.

The wastewater treatment plant (WWTP) discharged an average 517,000 gallons per discharge day through outfall 001 to the Flambeau River. No difficulties were experienced in achieving the required effluent standards.

~240gpm

The wastewater treatment plant discharged 127.15 million gallons of effluent to the Flambeau River during 1995 as compared to 129.1 million gallons during 1994. The average monthly discharge of 10.6 million gallons per month during 1995 remained relatively constant as compared to an average monthly discharge of 10.8 million gallons during 1994. As evident in Figure 2-1, effluent discharge peaked during August due to extensive precipitation totaling 9.65 inches for the month. The difference in quantity of water pumped from the pit as compared to the quantity of water discharged can be attributed to the additional surface runoff from the crusher/ore stockpile area and Type II stockpile which must be treated within the WWTP.

Surge and runoff ponds were dredged of sediments during the month of October removing approximately 200 tons of material. Sedimentation of the ponds has occurred since the construction of the mine in 1993 and had reduced the storage capacity of the ponds by approximately 30%.

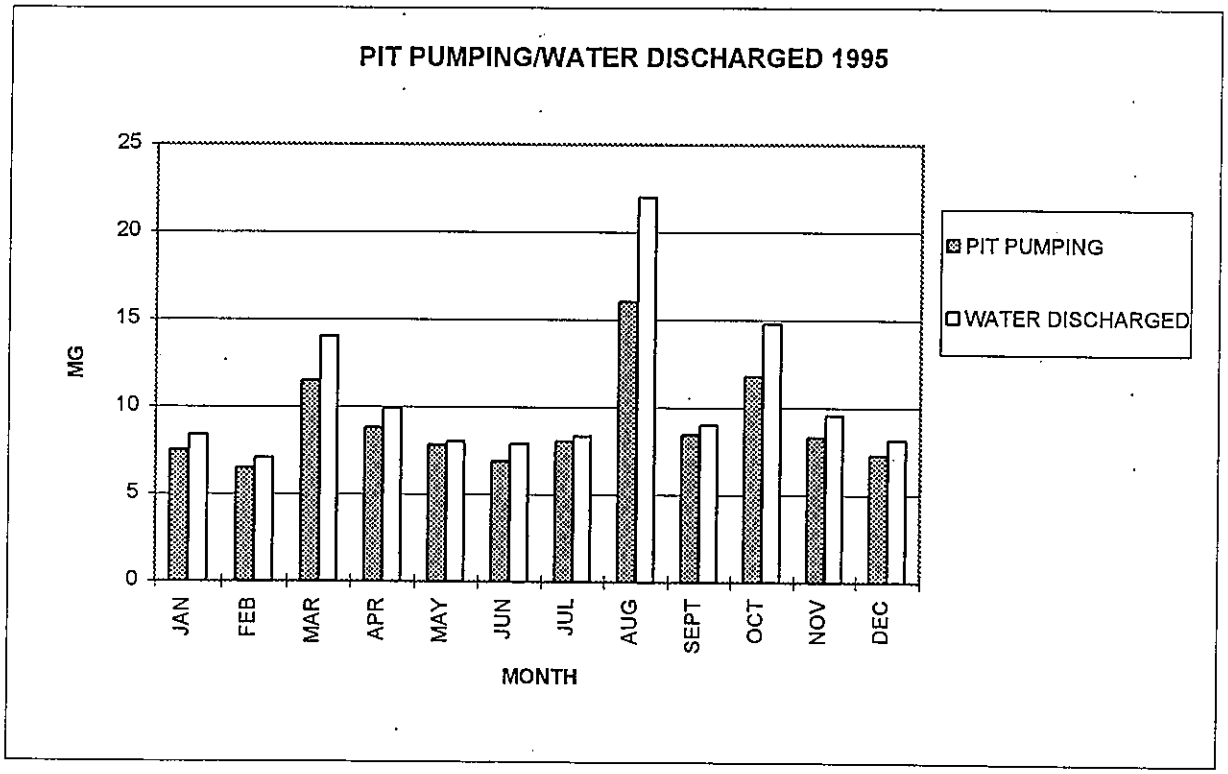
Flambeau's WPDES permit renewal application was submitted in a timely fashion on March 31, 1995. The WPDES permit was to be renewed by September 30, 1995; however, Flambeau continued to operate under the current permit due to the Department's delay in processing the renewal application. The Department published the draft WPDES permit for public notice during November. Few comments were received and, therefore, a public hearing was not warranted.

On January 27, 1995 Flambeau submitted its Title V air pollution control Operation Permit Application as a non Part-70 (minor) source. The actual required submittal date was February 1, 1998. In a letter dated June 29, 1995 the Department found the submittal administratively complete.

FIGURE 2-1

FLAMBEAU MINING COMPANY
PIT PUMPING/WATER DISCHARGED
1995

MONTH	PIT PUMPING (MG)	WATER DISCHARED (MG)
JAN	7.52	8.42
FEB	6.48	7.06
MAR	11.47	14.03
APR	8.79	9.89
MAY	7.84	8.00
JUN	6.87	7.89
JUL	8.03	8.35
AUG	16.00	22.01
SEPT	8.43	8.98
OCT	11.76	14.79
NOV	8.31	9.56
DEC	7.28	8.15



Reclamation activities throughout the year included routine inspection and maintenance of vegetation throughout the project area. Hydroseeding was performed on the Type I stockpile outer slopes and top surface with the intent to improve the stockpile's aesthetic appearance and reduce wind erosion. The open pit walls were hydroseeded above the Precambrian bedrock to reduce erosion. The prairie seed test plots and aquascape continue to be monitored annually to determine best methods to be utilized during final reclamation and to document naturally occurring fluctuations in performance. Within the Temporary Nursery, 225 tree seedlings were planted for use during final reclamation. A native grasses and wildflower display was constructed adjacent to the Visitor's Center and was well received by visitors.

Flambeau received national safety recognition both from MSHA's Sentinels of Safety Program and from *Industrial Safety and Hygiene News* (ISHN). Flambeau received the first place trophy in ISHN's "Safety that Soars" competition and was featured in the magazine's September issue. Optimization of safe working conditions included relocating the truck ready line to minimize the potential of truck exhaust fumes entering the laboratory air intake system. Both Ames and Flambeau employees worked without a lost time accident in 1995. An Ames employee pinched a finger which resulted in the only MSHA reportable accident. Both Ames and Flambeau completed general MSHA inspections without a single citation. As of December 31, 1995 Ames and Flambeau had combined to work 548 days without a lost time accident.

The following is a summary of significant milestones throughout the year:

°	Flambeau committed matching funds of $500,000 for community library in 1994. Site selection and detailed planning was conducted.	Jan. - Dec. 1995
°	Outstanding safety record	Jan.- Dec. 1995
°	Completion of 13 month Toxicity Reduction Period	January 1995
°	Visitor's Center re-modeled	Spring 1995
°	Rusk County initiates construction of two industrial buildings to attract industry	3rd Quarter 1995
°	Flambeau donated drill core to Wisconsin State Geological Survey.	3rd Quarter 1995
°	"Safety that Soars" award	September 1995
°	Lining settling ponds	October 1995
°	Flambeau presents citric acid study at Water Environment Federation Conference	October 1995
°	Rusk County Hockey Association acquired youth hockey equipment and uniforms with Flambeau contributions	December 1995

2.2 DEVIATIONS AND MODIFICATIONS

Condition 2-4 in the Mine Permit requires an inventory of deviations and modifications to the Permit received subsequent to permit issuance.

During 1995 there were no modifications to the Mining Permit. Minor deviations of constructed facilities were made and approved to accommodate specific site conditions. Deviations were reviewed and approved by WDNR prior to construction.

A list of deviations for 1995 is included in Appendix A.

2.3 CONSTRUCTION REPORTS

Documentation of the Type I stockpile's till blanket was submitted to the WDNR Mine Reclamation Unit on May 30, 1995. The submittal included cross sections and plan sheets which depict the top of the till blanket and illustrate that Flambeau has met the requirement of placement of a till blanket of approximately nine feet thick.

Documentation of the lining of the Type I settling ponds was submitted to the WDNR Mine Reclamation Unit on January 2, 1996. "Construction Documentation Report Type I Settling Ponds Liner Construction" (December 1995) is incorporated by reference.

Additionally, in its original letter authorizing mine start-up (March 9, 1993), WDNR requested that certain documentation be included in the Annual Report:

- Inspection of sideslopes of surge pond and runoff pond
- Inspection of Type II stockpile piping
- Inspection of scuff strip below the surge pond outlet

The required documentation is described in Section 4.6 of this report and included in Appendix B.

2.4 INCIDENT LOG

Mine Permit Condition 2-6 requires a log of all incidents such as spills, pond overflow, embankment failure or leakage. This log is maintained on-site and is available for inspection. During 1995 there were no reportable incidents. Spills are reported in accordance with Wis. Adm. Code ch. NR 158, CERCLA Reportable Quantities and SARA Section 302 Extremely Hazardous Substances Reportable Quantities.

2.5 DRILLHOLES

Mine Permit Condition 2-7 requires a summary of all exploration drilling activities conducted on the mine site during the previous year. One exploration program commenced in 1994 was completed during 1995. Hole 22-198 was predrilled using hammer drilling techniques to 970 feet in 1994 and deepened by core drilling to its ultimate depth of 2547 feet in 1995. This hole was permanently abandoned in December 1995.

During 1995 a program was initiated to reduce quantities of stored drillcore located at the H&H Building (on site) and the former Grow Cheese factory (off site). A portion of the Flambeau drillcore was segregated and placed within the Type II stockpile. The remainder of the Flambeau drillcore continues to be temporarily stored at H&H.

3.0 RECLAMATION ACTIVITIES

As required by the Mine Permit Section 3, reports on progress of reclamation activities are prepared throughout the year. An annual report is required by Condition 3-26(d). The 1995 Annual Reclamation Report dated November 14, 1995 was submitted to the WDNR and is incorporated by reference. Other reclamation updates submitted on January 27 and October 3, 1995 are incorporated by reference. Reclamation activities reported in the November 1995 report included construction of a native grasses and wildflower display near the Visitor's Center, assessment of prairie seed test plot and aquascape, installation of erosion control devices, planting of trees in buffer screen and temporary nursery, hydroseeding Type I stockpile outerslopes, site remedial seeding, and assessments of Wetland 1.

Wetland 1 is discussed in detail in Wetland Surface Flows, Section 4.2.6 of this report.

4.0 SITE MONITORING

4.1 GROUNDWATER QUALITY SAMPLING AND ANALYSIS

Quarterly groundwater monitoring was performed in accordance with descriptions provided in the Updated Monitoring Plan (July 1991), the Revised Mining Permit Quality Assurance/Quality Control Document (August 1991) and the Local Agreement. Results of the monitoring were submitted to the WDNR Mine Reclamation Unit March 21, June 29, September 29 and December 11, 1995. Those reports are incorporated by reference.

Monitoring data for each groundwater monitoring site is graphed and tabulated in Appendix C. A statistical trend test (Mann-Kendall test) was performed on the results for each compound within each well. Those results are also shown with the tabulated data. Only those water quality parameters which showed a statistically significant trend upward or downward are discussed in this section. More detailed information on trend analysis and other trends is contained in Appendix C. Sample results from the following wells appeared to show statistical trends:

MW1000P	Conductivity	(Downward Trend)
	Alkalinity	(Downward Trend)
	Copper	(Upward Trend)
	Hardness	(Downward Trend)
	Iron	(Downward Trend)
	Manganese	(Downward Trend)
	TDS	(Downward Trend)
MW1002	Alkalinity	(Downward Trend)
	Hardness	(Downward Trend)
MW1002G	Sulfate	(Upward Trend)
MW1005	Alkalinity	(Downward Trend)
	Iron	(Upward Trend)
	Manganese	(Upward Trend)
MW1005P	Iron	(Downward Trend)
MW1005S	Hardness	(Downward Trend)
MW1010P	Copper	(Upward Trend)
	Manganese	(Downward Trend)

Monitoring wells MW1000P and MW1010P indicate a downward trend for manganese and an upward trend for copper. MW1000P also indicates a downward trend for conductivity, alkalinity, hardness, iron and TDS. Monitoring wells MW1000P and MW1010P are located within the river pillar area between the open pit and the Flambeau River. Standing water levels recorded from these wells and the average river level indicate the groundwater flow has changed and currently flows from the river towards the open pit as was originally predicted. This change in flow direction would be expected to result in the slight trends being observed in these monitoring wells.

A downward trend was observed for alkalinity and hardness in MW1002. The downward trends are due mainly to a drop in concentrations in 1992 and 1993. The concentrations have remained relatively constant during the second half of 1994 and all of 1995.

An upward trend was observed for sulfate in MW1002G. The trend is inconsequential with an actual change in concentration of less than 5 mg/l. The concentration of sulfate in this well remains at a very low level.

A downward trend was observed for alkalinity in MW1005. The alkalinity in MW1005 has remained relatively constant since April 1993 except for a lower anomalous result from the October 1995 sample. MW1005 also shows an upward trend for iron and manganese concentrations. The Ladysmith area is known to have higher concentrations of iron in shallow wells than is typical for other areas. The manganese trend has resulted in only an overall change of 0.19 mg/l. MW1005 serves as a background well since it is upgradient from the mine site in regards to groundwater flow.

A downward trend was observed for iron in MW1005P. This downward trend is due mainly to changes in iron concentrations that occurred prior to 1994. The iron concentration in well MW1005P has remained relatively constant since October 1993. A downward trend was also observed for hardness in MW1005S. This downward trend is due mainly to changes in hardness concentrations that occurred prior to 1994. The hardness concentration in well MW1005S has remained relatively constant since July 1993. Both MW1005P and MW1005S serve as background wells since they are upgradient from the mine site in regards to groundwater flow.

Elevations of groundwater in wells and piezometers near the pit show decreasing trends from approximately 10 to 30 feet as anticipated in the Groundwater Model for the Kennecott Flambeau Project (July 1989). Groundwater elevations intermediate (1200 feet) and remote (2400 feet) from the pit are not as extreme as predicted by the model. Following pit construction, water levels have been temporarily drawn down around the pit, though when natural groundwater fluctuations prior to pit construction are taken into account, the new drawdown is minimal. Groundwater drawdown from pit dewatering can be seen in the following wells located within 500 feet from the pit: 1000R, 1000P, 1010P, PZ-S1, OW-7, OW-39, OW-42, 1004, 1004S, 1004P, 1001, 1001G, 1001P, 1003, 1003P, ST-9-23, ST-9-23A, PZ-S3, ST-9-26, PZ-1A and PZ-R1. Those wells located within close proximity of the pit are either dry or continue to show a slight downward trend in groundwater elevations as the pit is developed.

The downward trend in groundwater elevations in some of the wells located within close proximity of the pit was not as significant in 1995 as it had been during 1993 and the early part of 1994. The groundwater elevations appeared to somewhat stabilize during mid to late 1994 and continued this relatively steady state in 1995. Figure 4-1 presents the locations of monitoring wells. Graphs and further discussion on groundwater elevations are included in Appendix C.

4.2 SURFACE WATER

The surface water monitoring program includes sampling and analyses of the following elements: sediments, fish, macroinvertebrates, water quality, habitat characteristics and wetland surface flows. The Revised Mining Permit Quality Assurance/Quality Control Document (August 1991) specifies that an annual surface water monitoring report will be prepared and submitted to WDNR in March of each year. This portion of this report submitted in January, is the surface water monitoring report referenced in the Quality Assurance Document.

4.2.1 SEDIMENTS

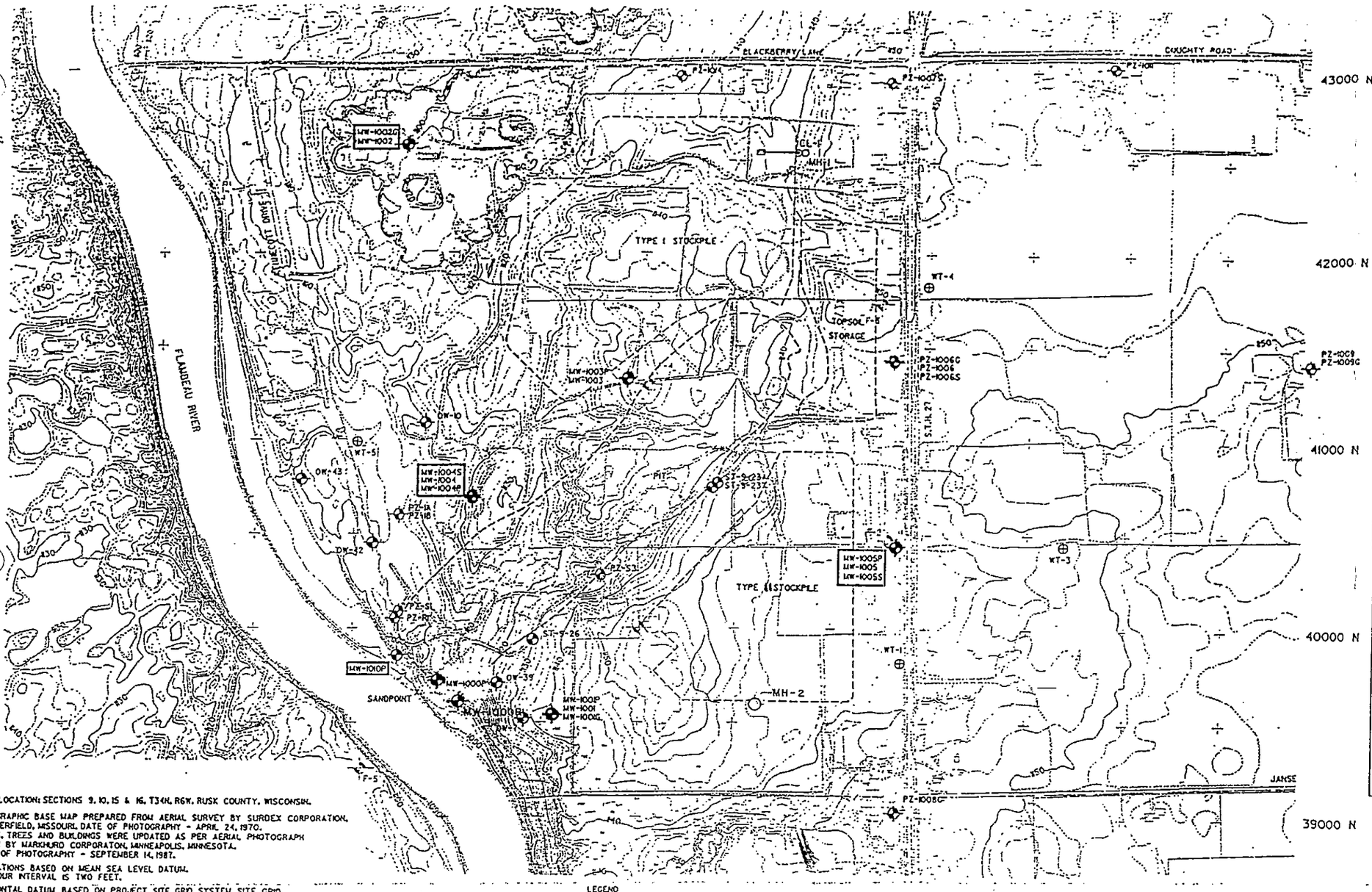
Sediment samples are collected once per year at two locations in the Flambeau River. Sediment traps were installed upstream (Site S-1) and downstream (Site S-3) of the Flambeau discharge locations on June 12, 1995 and retrieved on August 14, 1995. WDNR was advised of the installation and collection dates.

Figure 4-2 shows the sediment sampling locations. Results from the downstream sample site are noted on Table 4-1. Results from the Blackberry Lane sampling site upstream of the mine are noted in Table 4-2. More detailed information about the sediment sampling is contained in Appendix D.

In general, samples collected in 1995 were uniform in consistency composed primarily of poorly graded sand. Site S-1 had proportionately greater sediment accumulation with a higher percentage of sand than at Site S-3. In comparing 1995 analyses to previous years, only slight variability can be seen in individual parameters. Iron continues to appear to decrease in the upstream sample compared to previous years. Iron appears to remain relatively constant in the downstream sample at Site S-3. An important comparison is samples downstream of the mine to upstream of the mine. No significant increases of any constituent are seen in the upstream/downstream comparison, consistent with monitoring results in previous years. It can be concluded that negligible impact on Flambeau River sediments from mine activities has occurred.

4.2.2 FISH

Walleye are collected once per year during the annual low flow period. Samples are collected upstream and downstream of the mine. Samples of fish tissue are analyzed for metals, while length, sex and stomach contents of each fish are noted. In 1995, fish were collected on September 18 and 19 using a boat mounted with an electroshocker. Procedures described in the



GROUNDWATER AND COLLECTION LYSIMETER CONSTRUCTION AND OPERATION MONITORING PROGRAM

COLLECTION LYSIMETER/ WELL/PIEZOMETER NUMBER	ELEVATION OF SCREENED INTERVAL (FT. MSL)1	GEOLOGIC UNIT	PARAMETER*
MW-1000R	1095-1085	PRECAMBRIAN, TILL	1, 2
MW-1000P	1049-1044	PRECAMBRIAN	1, 2
MW-1001	1118-1108	TILL	1, 2
MW-1001G	1095-1090	TILL, SANDSTONE	1
MW-1001P	1051-1046	PRECAMBRIAN	1
MW-1002	1096-1086	SAND & GRAVEL	1, 2
MW-1002G	1055-1050	SAND & GRAVEL	1, 2
MW-1003	1113-1103	SANDSTONE	1
MW-1003P	1062-1057	PRECAMBRIAN	1
MW-1004	1132-1102	SAND & GRAVEL	1, 2
MW-1004S	1093-1088	SANDSTONE	1, 2
MW-1004P	1042-1037	PRECAMBRIAN	1, 2
MW-1005	1134-1124	TILL	1, 2
MW-1005S	1097-1092	SANDSTONE	1, 2
MW-1005P	1056-1051	PRECAMBRIAN	1, 2
PZ-1006	1143-1138	TILL	1
PZ-1006G	1119-1114	TILL	1
PZ-1006S	1101-1096	SANDSTONE	1
PZ-1007S	1110-1105	SANDSTONE	1
PZ-1008	1138-1128	TILL	1
PZ-1008G	1096-1091	SAND & GRAVEL	1
PZ-1009	1144-1134	TILL	1
PZ-1009G	1107-1102	TILL	1
MW-1010P	995- 990	PRECAMBRIAN	1, 2
PZ-1011	1114-1104	TILL	1
PZ-1012	1111-1101	TILL	1
PZ-R1	901- 881	PRECAMBRIAN	1
PZ-S1	1067-1062	PRECAMBRIAN	1
PZ-S3	1100-1095	SANDSTONE	1
SANDPOINT	1084-1082	SAND & GRAVEL	1
ST-9-23	1106-1101	SANDSTONE	1
ST-9-23A	1125-1120	SAND & GRAVEL	1
ST-9-26	1106-1101	TILL	1
PZ-1A	1099-1097	SAND & GRAVEL	1
PZ-1B	1103-1101	SAND & GRAVEL	1
OW-7	1088-1078	TILL	1
OW-10	1069-1059	TILL	1
OW-39	1107-1073	TILL	1
OW-42	1090-1058	SAND & GRAVEL	1
OW-43	1090-1022	SAND & GRAVEL	1
MH-2	N.A.	N.A.	3
CL-1	N.A.	N.A.	3

*1 GROUNDWATER ELEVATION (QUARTERLY).

*2 SPECIFIC CONDUCTIVITY (FIELD), PH (FIELD AND LAB), TDS, IRON, MANGANESE, SULFATE, COPPER, TOTAL ALKALINITY, TOTAL HARDNESS (ALL QUARTERLY).

*3 PH (FIELD AND LAB), SPECIFIC CONDUCTANCE (FIELD), TOTAL CHROMIUM, COPPER, IRON, MANGANESE, SULFATE, TOTAL DISSOLVED SOLIDS, TOTAL ALKALINITY, TOTAL HARDNESS, VOLUME OF LIQUID REMOVED (ALL QUARTERLY).
(NO TOTAL CHROMIUM FOR MH-2)

NOTES:

1. SITE LOCATION: SECTIONS 9, 10, 15 & 16, T34N, R6W, RUSK COUNTY, WISCONSIN.
2. TOPOGRAPHIC BASE MAP PREPARED FROM AERIAL SURVEY BY SURDEX CORPORATION, CHESTERFIELD, MISSOURI. DATE OF PHOTOGRAPHY - APRIL 24, 1970. ROADS, TREES AND BUILDINGS WERE UPDATED AS PER AERIAL PHOTOGRAPH TAKEN BY MARKHURD CORPORATON, MINNEAPOLIS, MINNESOTA. DATE OF PHOTOGRAPHY - SEPTEMBER 14, 1987.
3. ELEVATIONS BASED ON MEAN SEA LEVEL DATUM. CONTOUR INTERVAL IS TWO FEET.
4. HORIZONTAL DATUM BASED ON PROJECT SITE GRID SYSTEM. SITE GRID COORDINATES CORRELATION TO STATE PLANE COORDINATES DERIVED AS FOLLOWS:

SITE GRID COORDINATES CONTROL MONUMENT F-1	STATE PLANE COORDINATES
40000 N =	587,357.8087 N
40000 E =	1,711,516.1229 E

THE ANGULAR ROTATION FROM STATE PLANE BEARINGS TO SITE GRID BEARINGS IS 359°-13'-23" RIGHT WITH CONTROL POINT F-1 AS THE BASE POINT.

SEE FIGURE NO.'S 4-1 AND 4-2 FOR THE LOCATION OF WETLAND STAFF GAUGE WT-2 AND FOR SURFACE WATER MONITORING LOCATIONS.

LEGEND

- EXISTING CONTOUR
- EXISTING PAVED ROADWAY
- EXISTING TRAIL/GRAVEL SURFACE
- TREES AND/OR BRUSH
- FENCE
- CONTROL MONUMENT
- MONITORING WELL
- PIEZOMETER
- WELL ON THE WATER QUALITY MONITORING PROGRAM
- WT-5 WETLAND STAFF GAUGE
- MH-2 LEACHATE MANHOLE

N

0 300' 600'
SCALE

FOTH & VAN DYKE
GEOSCIENCES & ENVIRONMENTAL MANAGEMENT DIVISION
GREEN BAY, WISCONSIN

FLAMBEAU PROJECT
LADYSMITH, WISCONSIN

KENNECOTT MINERALS COMPANY
66 MINERAL SQUARE
SALT LAKE CITY, UTAH

FIGURE NO. 4-1
CONSTRUCTION AND OPERATION
GROUNDWATER AND COLLECTION
LYSIMETER MONITORING PROGRAM

DWG. NO.	DESCRIPTION

REFERENCES

DWG. NO.	DESCRIPTION

NO.	DATE	REVISIONS	BY	CHK'D	ENG'R	ENG'R REG. NO.
NO.	DATE	REVISIONS	BY	CHK'D	ENG'R	ENG'R REG. NO.

	BY	DATE
PROJ. ENG'R		
QUA. PROCESS ENG'R		
ENG'R QUA.		

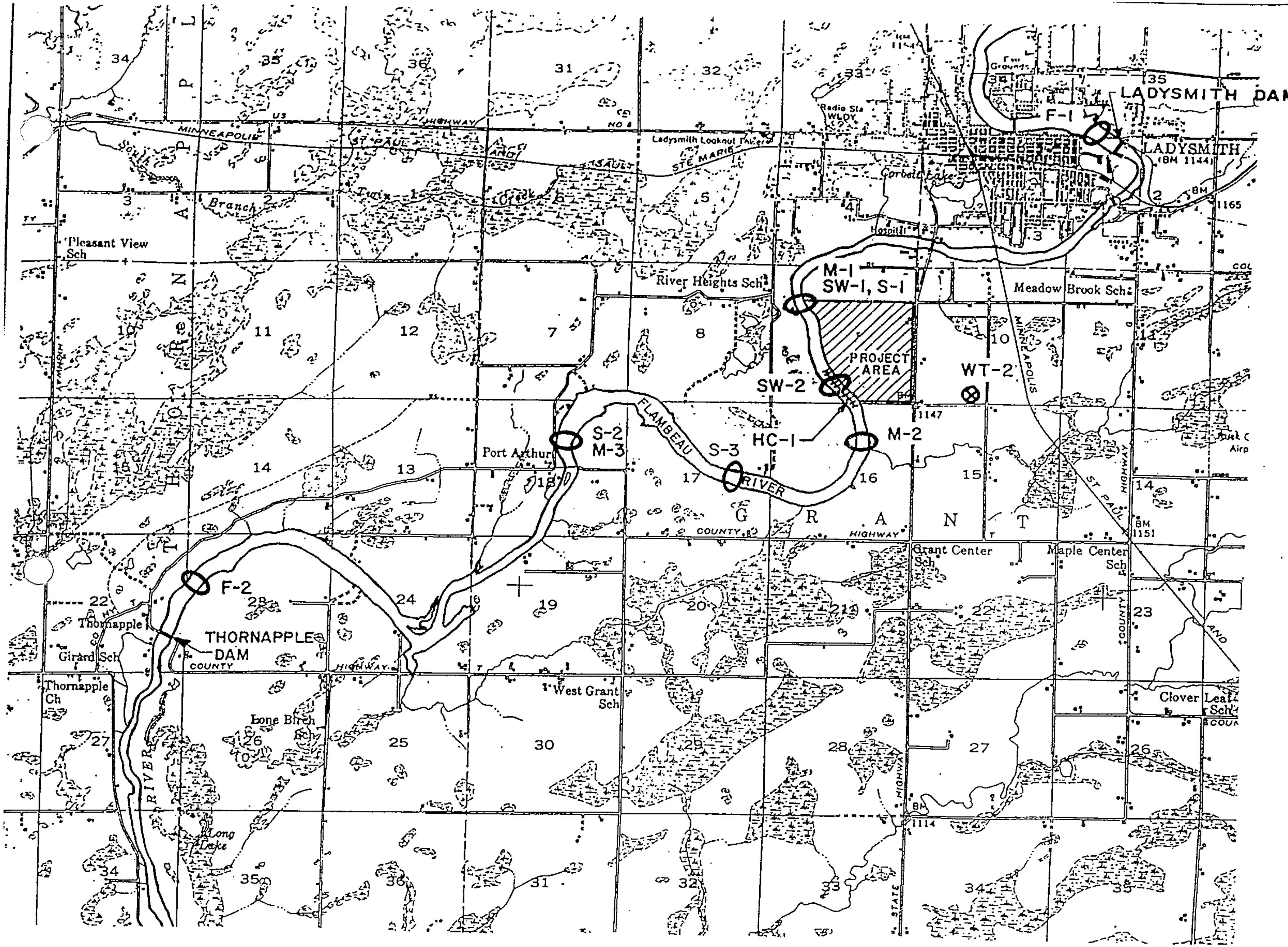
	BY	DATE
DESIGN		
DRAWN	DHS	12/89
CHK'D	GWS	12/89
QUA. ENG'R		

MICROFILM JOB

DRAWING NO. REV.

DIVISION DRAWING NO. —

SCALE: 1 SEE BAR SCALE



NOTE: SEE FIGURE NO. 4-1 FOR THE LOCATION OF WETLAND STAFF GAUGES WT-1, WT-3, WT-4 AND WT-5.

N

0 4000' 8000'

SCALE

LEGEND

SW-1	SAMPLING LOCATIONS FOR SURFACE WATER SAMPLES
S-1	SAMPLING LOCATION FOR SEDIMENTS
M-1	SAMPLING LOCATION FOR MACRO-INVERTEBRATES
F-1	SAMPLING LOCATION FOR FISH
HC-1	LOCATION FOR HABITAT CHARACTERISTICS OBSERVATIONS
WT-2	WETLAND STAFF GAUGE

MAP SOURCE: U.S.G.S. LADYSMITH, WI. 15 MINUTE QUADRANGLE

FOTH & VAN DYKE
GEOSCIENCES & ENVIRONMENTAL MANAGEMENT DIVISION
GREEN BAY, WISCONSIN

DRAWN DHS 12/89

FLAMBEAU PROJECT
LADYSMITH, WISCONSIN

KENNECOTT MINERALS COMPANY
1515 MINERAL SQUARE
SALT LAKE CITY, UTAH
84112

FIGURE NO. 4-2
CONSTRUCTION AND OPERATION
SURFACE WATER MONITORING
SITE LOCATIONS

TABLE 4-1

FLAMBEAU RIVER SEDIMENT SAMPLING RESULTS
DOWNSTREAM SAMPLING
(S-2 & S-3)

Metals (ppm)	1989 Baseline[1]	1991 (S-2)	1992 (S-2)	1993 (S-2)	1993 (S-3)	1994 (S-3)	1995 (S-3)
aluminum	NA	4000.0	12000.0	1500	4400	4000	3600
arsenic	1.1	1.5	4.1	<0.55	0.71	<1.6	1.5
cadmium	<0.5	0.6	<1.4	<0.055	0.11	0.13	0.085
chromium	4.8	13.0	24.0	23.8	9.6	10	6.6
copper	2.6	7.2	24.0	2.1	6.7	7.1	7.0
iron	2200	16000	25000	3100	8200	7700	7300
lead	<4.5	6.9	20	2.6	8.3	7.8	7.5
manganese	63	1600.0	570.0	610	830	860	780
mercury	<.01	0.1	<0.3	<0.057	<0.07	<0.03	<0.06
nickel	NA	7.3	12.0	1.7	6.5	6.2	5.0
selenium	NA	0.4	<0.9	<0.28	<0.26	<1.6	<0.27
silver	NA	<1.1	<2.6	0.086	0.58	<0.08	0.04
zinc	28	45.0	79.0	9.6	33	46	26
Other							
Total Solids (%)	69	76.8	35.0	32	56	NA	44.8
Total Volatile Solids (%)	NA	2.5	12.0	5.8	6.24	NA	6.9

NA = Not Analyzed

[1] Environmental Impact Report, March 3, 1989, p. 3.7-1.1

TABLE 4-2

FLAMBEAU RIVER SEDIMENT SAMPLING RESULTS
BLACKBERRY LANE
(S-1)

Metals (ppm)	1989 Baseline[1]	1991	1992	1993	1994	1995
aluminum	NA	3800.0	3300.0	4000.0	3900	2900
arsenic	0.9	2.2	2.2	1.4	<4.2	<0.41
cadmium	<0.5	<0.7	<0.6	<0.06	<0.42	<0.03
chromium	5.5	11.0	10.0	11	10	4.4
copper	2.8	7.3	6.0	7.0	5.8	6.4
iron	3000	18000.0	16000.0	15000	11000	4800
lead	<4.5	6.0	5.8	8.5	3.3	3.3
manganese	130	1900.0	1000.0	1300	1500	600
mercury	<.01	0.1	<0.1	<0.045	<0.04	<0.02
nickel	NA	5.8	6.1	8.4	7.4	6.1
selenium	NA	0.4	<0.4	<0.32	4.2	<0.44
silver	NA	<1.2	<1.1	0.057	<0.21	<0.05
zinc	16	47	33.0	38.0	34	18
Other						
Total Solids (%)	85	73	78.6	79.2	NA	76.7
Total Volatile Solids (%)	NA	1.8	1.6	0.8	NA	<2

NA = Not Analyzed

[1] Environmental Impact Report, March 3, 1989, p. 3.7-1.1

Updated Monitoring Plan (July 1991) and Revised Mining Permit Quality Assurance/Quality Control Document (August 1991) were followed.

General observations showed that species observed during the collection event were consistent with those collected in previous years. The stomach contents of the collected walleye varied from being empty to being full with fish and/or vegetation. There were no significant differences in metal content of fish tissue sampled downstream of the mine compared to upstream of the mine. Mercury concentrations in fish tissues continued to slightly decrease during 1995 at both the upstream and downstream locations. Appendix E contains more detailed information about the fish sampling. Fish sampling locations are shown in Figure 4-2.

4.2.3 MACROINVERTEBRATES

Crayfish are collected at three sampling locations once per year for metal analyses. The sampling and analyses are conducted in accordance with the Updated Monitoring Plan and the Revised Mining Permit Quality Assurance/Quality Control Document (August 1991). Samples were collected on August 14, 1995. Whole bodies were used for analysis and the results represent a composite for all crayfish collected per site. The analytical data continues to indicate that there is no relative difference in parameter concentrations when comparing upstream to downstream locations. The analytical results at all sites remain consistent with previous years' results. Aluminum results appear to be cycling at the three sample sites. Sediment and fish analyses do not show similar cycling of aluminum which indicates the cycling of aluminum results for crayfish may be associated with other variables such as analytical instrumentation.

Samples were collected on September 20, 1995 to identify macroinvertebrate fauna. The results of the 1995 macroinvertebrate sampling show similar results as compared to 1994. Sample diversity at the upstream sample site (M-1) was comparable to diversity at the sample site furthest downstream (M-3). Diversity at the first sample site downstream from the mine discharge channels, M-2, had greater diversity than either sites M-1 or M-3. The Flambeau River flooding during 1994 and low river conditions experienced during 1995 have resulted in continued lower numbers of organisms collected at all three sample locations. Macroinvertebrate sampling locations are shown on Figure 4-2.

Results for macroinvertebrate sampling are included in Appendix F.

4.2.4 SURFACE WATER QUALITY

Water samples are taken once per quarter from the Flambeau River at two monitoring locations. Samples are collected in accordance with procedures described in the Updated Monitoring Plan (July 1991) and the Revised Mine Permit Quality Assurance/Quality Control Document (August1991). The sample identified as SW-1 is upstream of the mine site; SW-2 is downstream of the mine. Figure 4-2 shows the locations of the surface water sampling. Results of quarterly

sampling have been submitted to WDNR on March 21, June 29, September 29 and December 11, 1995. Those submittals are incorporated by reference.

A summary of the 1995 surface water quality results are included on Table 4-3. The results from 1995 are consistent with data collected from the same locations in 1992-1994 and 1991 during baseline data collections. No significant difference in parameter concentrations is evident when comparing downstream water quality to upstream water quality, nor is there any statistically significant increasing or decreasing trend for any parameter. Trends of surface water quality results and statistical trend analysis are contained in Appendix C.

4.2.5 HABITAT CHARACTERISTICS

The annual habitat characterization along the eastern bank of the Flambeau River was conducted on September 21, 1995. The characterization followed procedures described in the Updated Monitoring Plan (July 1991) and the Revised Mining Quality Assurance/Quality Control Document (August 1991).

During the 1995 habitat characterization, substrate conditions of the Flambeau River were observed to have no appreciable differences that could be attributed to mining impacts as compared to 1992 observations which were previous to initiation of discharges from the mine's discharge channels. The low stage of the river allowed observation of exposed shoreline of up to 30 feet or more.

During 1994 a beaver hut had been observed upstream from Outfall 002. Remnants of the beaver hut remain with deposition of sediment observable immediately downstream. There was no sign of sedimentation on the riprap of either Outfall 001 or 002 which could be associated with discharges.

As in previous years, the east bank just north of Outfall 002 to about 100 feet below Outfall 001 remains naturally erodible. Logs previously observed submerged along the east bank continue to trap sediment that typically erodes from this bank.

A new beaver hut was observed on shore upstream from Meadowbrook Creek. Slight deposition of sediment was observed in the vicinity of the hut. Downstream from Meadowbrook Creek a bed of *Elodea sp.* had been observed in the past. No *Elodea sp.* was observed at this location during 1995 and was likely eliminated by the flood during September 1994. Additional detail including photographs is provided in Appendix G of this report.

4.2.6 WETLAND SURFACE FLOWS

Water levels in wetlands 1, 5C, 6C, 7 and 10A are measured monthly between March and December. Staff gauges designated WT 1 (Wetland 5C), WT 2 (Wetland 7), WT 3 (Wetland 6C), WT 4 (Wetland 10A) and WT 5 (Wetland 1) are measured. Figure 4-1 and Figure 4-2 show the staff gauge locations.

TABLE 4-3
1995 QUARTERLY SURFACE WATER
QUALITY DATA SUMMARY

	SW-1				SW-2			
	Jan-95	Apr-95	Jul-95	Oct-95	Jan-95	Apr-95	Jul-95	Oct-95
aluminum (ug/l)	59	93	60	96	260	120	43	120
arsenic (ug/l)	<1.4	<1.4	<1.8	<1.8	<1.4	<1.4	<1.8	<1.8
beryllium (ug/l)	<0.28	<0.28	<0.083	0.11	1.2	0.6	<0.083	0.12
cadmium (ug/l)	<0.52	0.22	<0.16	0.19	<0.52	<1.6	<0.16	0.27
chromium VI (ug/l)	<1.5	<1.5	<1.5	<6.0	<1.5	<1.5	<1.5	<6.0
chromium (ug/l)	<0.55	4.3	<0.61	1.4	<0.55	4.4	<0.61	2.0
copper (ug/l)	7.8	<3.8	<1.7	3.7	11	<3.8	<1.7	4.3
conductivity (field)	129	78	106	113	158	86	170	126
DO (mg/l)	11.9	9.3	8.5	10.1	8.6	10.8	10.2	8.5
hardness (mg/l)	48	36	43	40	55	36	46	46
lead (ug/l)	<0.78	4.5	<2.0	8.2	9.7	6.1	<2.0	8.3
mercury (ug/l)	<0.095	<0.095	<0.095	<0.095	<0.095	<0.095	<0.095	<0.095
nickel (ug/l)	<5.9	<5.9	<0.75	2.6	<5.9	<5.9	<0.75	0.80
pH (lab)	7.6	7.2	7.0	7.2	7.4	7.2	7.4	7.0
pH (field)	8.1	7.7	7.2	7.7	8.2	7.7	7.4	8.0
selenium (ug/l)	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5
silver (ug/l)	1.6	1.3	<1.1	<1.1	<0.85	1.8	<1.1	<1.1
sulfide (mg/l)	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
TDS (mg/l)	120	100	80	120	150	81	63	110
TSS (mg/l)	8.0	10.0	7.0	<1.0	6	<1.0	6	3
zinc (ug/l)	16	<12	<12	<12	21	<12	<12	13

Measurements were provided to WDNR Mine Reclamation Unit on March 21, June 29, September 29 and December 11, 1995; those reports are incorporated by reference. Tables 4-4 through 4-8 summarize the wetland elevations for the five wetlands. Wetlands 5C, 6C, 7 and 10A showed readings similar to previous years. During 1995, Wetland 1 experienced conditions similar to those during 1994. Previous to pit development, Wetland 1 was supported by spring flow along its eastern edge. During 1994 routine observations of Wetland 1 were initiated to assess potential impacts associated with decreased spring flow into Wetland 1. The 1994 assessments determined that addition of mitigation water to Wetland 1 was not warranted during that year.

On August 4, 1995, the condition of Wetland 1 was again evaluated. The investigation revealed that hydric soils in Wetland 1 continue to hold free water and to support the existing wetland plant community. Soils along the eastern edge of the wetland were not as moist as during 1994 observations. The lower soil moisture content observed on August 4 could have been attributed to lower than average precipitation during spring and early summer.

A plan to provide supplementary water to the surface of Wetland 1 was recommended. The supplementary water would be introduced at three points along the eastern perimeter and at one point on the northern end of the wetland. The objective of the mitigation plan is to saturate the soils of Wetland 1 by addition of water from May to October as necessary.

The intercept wells constructed during December 1995 along the open pit's north wall may provide supplementary water to Wetland 1. Groundwater from the wells will be characterized and the characterization submitted to the Department for approval previous to its potential use during 1996 as Wetland 1 mitigation water.

Results of Wetland 1 evaluation and mitigation plans are included in Appendix H.

4.3 METEOROLOGY

As required in the Air Pollution Control Permit No. 89-DLJ-033, Condition 10, meteorological data is continuously collected from a meteorological station. Operation of the station is in accordance with the Updated Monitoring Plan (July 1991) and the Revised Quality Assurance/Quality Control Document (August 1991). The meteorological station is inspected routinely by Flambeau personnel to ensure proper operation. Records of data at the meteorological station are maintained at the Flambeau Mine site and are available to WDNR as required by the Air Permit.

4.4 TOTAL SUSPENDED PARTICULATES (TSP)

Ambient air quality was monitored as required in the Mine Permit Condition 4-4. As described in the Updated Monitoring Plan (July 1991), Flambeau's Mine Permit, Part 3, Condition 4(b)

TABLE 4-4

MONTHLY WETLAND STAFF GAUGE READING SUMMARY

Staff Gauge Location/
Water Level (MSL)

WETLAND 5C

(WT-1)

	1991	1992	1993	1994	1995
MAR	--	1140.62	NRT	NRT	NRT
APR	--	1140.47	1140.60	1140.73	1140.34
MAY	1140.84	1140.21	1140.47	1140.22	1140.11
JUN	1140.78	NSW	1140.34	1140.06	NSW
JUL	1140.05	NSW	NSW	NSW	NSW
AUG	NSW	NSW	1140.48	NSW	1140.65
SEP	1140.21	1140.09	1140.51	1140.34	NSW
OCT	NSW	1140.68	1140.46	1140.28	1140.18
NOV	NRT	NRT	NRT	NRT	NRT
DEC	NRT	NRT	NRT	NRT	NRT

NRT = No reading taken due to frozen conditions
NSW = No standing water

TABLE 4-5

MONTHLY WETLAND STAFF GAUGE READING SUMMARY

Staff Gauge Location/
Water Level (MSL)

WETLAND 6C

(WT-3)

	1991	1992	1993	1994	1995
MAR	--	1146.90	NRT	NRT	NRT
APR	--	1146.72	NRT	1146.89	1146.67
MAY	1147.05	NSW	1146.78	NSW	1146.52
JUN	NSW	NSW	1146.66	NSW	NSW
JUL	NSW	NSW	NSW	NSW	NSW
AUG	NSW	NSW	NSW	NSW	NSW
SEP	NSW	NSW	NSW	NSW	NSW
OCT	NSW	NSW	NSW	NSW	1146.49
NOV	NRT	NRT	NRT	NRT	NRT
DEC	NRT	NRT	NRT	NRT	NRT

NRT = No reading taken due to frozen conditions
NSW = No standing water

TABLE 4-6

MONTHLY WETLAND STAFF GAUGE READING SUMMARY

Staff Gauge Location/
Water Level (MSL)

WETLAND 7

(WT-2)

	1991	1992	1993	1994	1995
MAR	--	1153.85	NRT	NRT	NRT
APR	--	1153.74	1153.82	1153.89	1153.59
MAY	1154.00	1153.62	1153.57	1153.49	1153.50
JUN	1153.58	1153.37	1153.64	1153.37	1152.99
JUL	1153.51	1153.16	1153.46	1153.13	NSW
AUG	1153.15	1153.15	1153.56	NSW	1153.03
SEP	1153.52	1153.06	1153.57	1153.48	1153.24
OCT	1153.44	1153.16	1153.51	1153.49	1153.58
NOV	NRT	NRT	NRT	NRT	NRT
DEC	NRT	NRT	NRT	NRT	NRT

NRT = No reading taken due to frozen conditions
NSW = No standing water

TABLE 4-7

MONTHLY WETLAND STAFF GAUGE READING SUMMARY

Staff Gauge Location/
Water Level (MSL)

WETLAND 10A

(WT-4)

	1991	1992	1993	1994	1995
MAR	--	1146.76	NRT	NRT	NRT
APR	--	1146.58	1146.74	1146.86	1146.64
MAY	1146.81	1146.46	1146.57	1146.48	1146.55
JUN	NSW	1146.16	1146.55	1146.39	1146.13
JUL	1146.11	1145.91	1146.41	1146.18	1145.83
AUG	NSW	1146.00	1146.55	1145.80	1146.52
SEP	1146.26	1146.12	1146.57	1146.45	1146.14
OCT	1146.10	1146.34	1146.53	1146.43	1146.53
NOV	NRT	NRT	NRT	NRT	NRT
DEC	NRT	NRT	NRT	NRT	NRT

NRT = No reading taken due to frozen conditions
NSW = No standing water

TABLE 4-8

MONTHLY WETLAND STAFF GAUGE READING SUMMARY

Staff Gauge Location/
Water Level (MSL)

WETLAND 1

(WT-5)

	1991	1992	1993	1994	1995
MAR	--	1102.32	NRT	NRT	NRT
APR	--	1102.29	1102.49	1102.18	1101.93
MAY	1102.35	1102.25	1102.03	NSW	NSW
JUN	1102.28	1102.26	NSW	NSW	NSW
JUL	1102.23	1101.90	NSW	NSW	NSW
AUG	NSW	1102.21	NSW	NSW	NSW
SEP	1102.33	1102.46	1101.92	NSW	NSW
OCT	1102.32	1102.37	NSW	NSW	1101.97
NOV	NRT	NRT	NRT	NRT	NRT
DEC	NRT	NRT	NRT	NRT	NRT

NRT = No reading taken due to frozen conditions
NSW = No standing water

allows for the TSP sampling schedule to be reduced to no less than once every six days if after one year of operation there has been no exceedance of a TSP standard. Upon completion of one year of mine operation without a TSP exceedance, Flambeau requested from the WDNR a reduction of the TSP sampling frequency from every second day to every sixth day. In a letter dated August 11, 1994 the WDNR granted approval for the reduced schedule. Flambeau initiated the every sixth day TSP schedule on August 18, 1994 and continued the reduced TSP sampling schedule throughout 1995.

Extreme meteorological conditions on December 5, 1995, including average wind speeds greater than 20 mph, resulted in an exceedance at one of the monitoring sites of the ambient air quality standard for particulate matter of 150 ug/m^3. Monitoring from the southeast air monitoring station (55-107-003) resulted in a TSP ambient air concentration of 191 ug/m^3. On January 16, 1996 Flambeau provided an exceedance investigation report in accordance with the Mining Permit, Part 4, Condition 4.e). Flambeau remained in compliance with permits and regulations since the second highest result at the Southeast site was 80 ug/m^3 which is well below the ambient air quality standard for particulate matter.

The highest result from the remaining three monitoring locations was below the required standard. The two atypical results from the Northeast site are attributed to freezing conditions which results in reduced use of water sprays for dust suppression. The annual geometric mean of TSP measurements for air monitoring stations ranged from 15 ug/m^3 to 25 ug/m^3 which are almost identical to the 1994 annual geometric means

TSP monitoring results were submitted to the WDNR Air Monitoring Section each month during 1995 as required in the Mine Permit Condition 4-9. The reports were submitted on the following dates: February 14, April 4, April 19, May 11, June 12, July 19, August 9, September 25, October 18, November 14 and December 12, 1995 and January 16, 1996. Copies of the reports are incorporated by reference.

Table 4-9 is a summary of the TSP monitoring results for 1995. Figures 4-3 to 4-6 present 1995 trends for TSP at the Flambeau air monitoring stations. Air monitoring station locations are shown on Figure 4-7.

In addition to monitoring total suspended particulates, ambient air quality is monitored with respect to arsenic, beryllium, cadmium, chromium, mercury and nickel. Composites of the TSP filters collected over three month periods have been submitted for analyses as specified in Condition 4-4 of the Mine Permit.

Reports of the quarterly composites which were submitted to the WDNR Air Monitoring Section during 1995 are incorporated by reference and are summarized in Table 4-10. Analyses resulted in very low or non-detectable concentrations of these metals.

TABLE 4-9

FLAMBEAU MINING COMPANY
TSP Data Summary (ug/m3)

Date	0001 North Site	0003 Southeast Site	0004 Northeast Site	0005 Northwest Site
1/3/95	6	43	7	8
1/9/95	46	44	133	41
1/15/95	10	10	10	8
1/21/95	6	35	8	7
1/27/95	38	41	49	45
2/2/95	32	41	58	14
2/8/95	25	69	137	13
2/14/95	26	50	27	38
2/20/95	12	46	61	11
2/26/95	35	29	14	10
3/4/95	36	39	42	29
3/10/95	33	37	35	34
3/16/95	27	21	24	19
3/22/95	17	12	10	6
3/28/95	22	15	17	9
4/3/95	14	33	16	11
4/9/95	12	14	10	10
4/15/95	17	21	14	16
4/21/95	9	7	NS	6
4/27/95	20	34	16	13
5/3/95	43	47	43	35
5/9/95	22	23	22	20
5/16/95	36	57	43	37
5/21/95	21	38	20	22
5/27/95	25	27	NS	26
6/2/95	NS	45	NS	51
6/8/95	17	19	27	16
6/14/95	64	57	56	63
6/20/95	79	80	77	73

NS: No Sample (Equipment Malfunction)

TABLE 4-9 (CONT.)

Date	0001 North Site	0003 Southeast Site	0004 Northeast Site	0005 Northwest Site
6/26/95	36	42	45	43
7/2/95	37	39	37	36
7/8/95	26	29	25	24
7/14/95	54	50	NS	45
7/20/95	28	30	28	32
7/26/95	25	23	22	19
8/1/95	15	21	NS	11
8/7/95	16	17	15	14
8/13/95	10	11	10	10
8/19/95	11	13	11	10
8/25/95	44	45	42	NS
8/31/95	28	35	28	NS
9/6/95	29	32	29	NS
9/12/95	35	32	46	25
9/18/95	17	24	23	14
9/24/95	11	9	11	10
9/30/95	35	35	34	32
10/6/95	2	2	2	1
10/12/95	66	63	70	51
10/18/95	27	33	29	22
10/24/95	3	4	3	1
10/30/95	5	10	6	1
11/5/95	14	14	14	12
11/11/95	6	15	5	5
11/17/95	17	16	22	16
11/23/95	7	13	7	4
11/29/95	23	21	22	27
12/5/95	35	191	45	39
12/11/95	6	15	5	5
12/17/95	33	35	36	31
12/23/95	5	6	4	5
12/29/95	26	27	30	24

NS: No Sample (Equipment Malfunction)

Figure 4-3

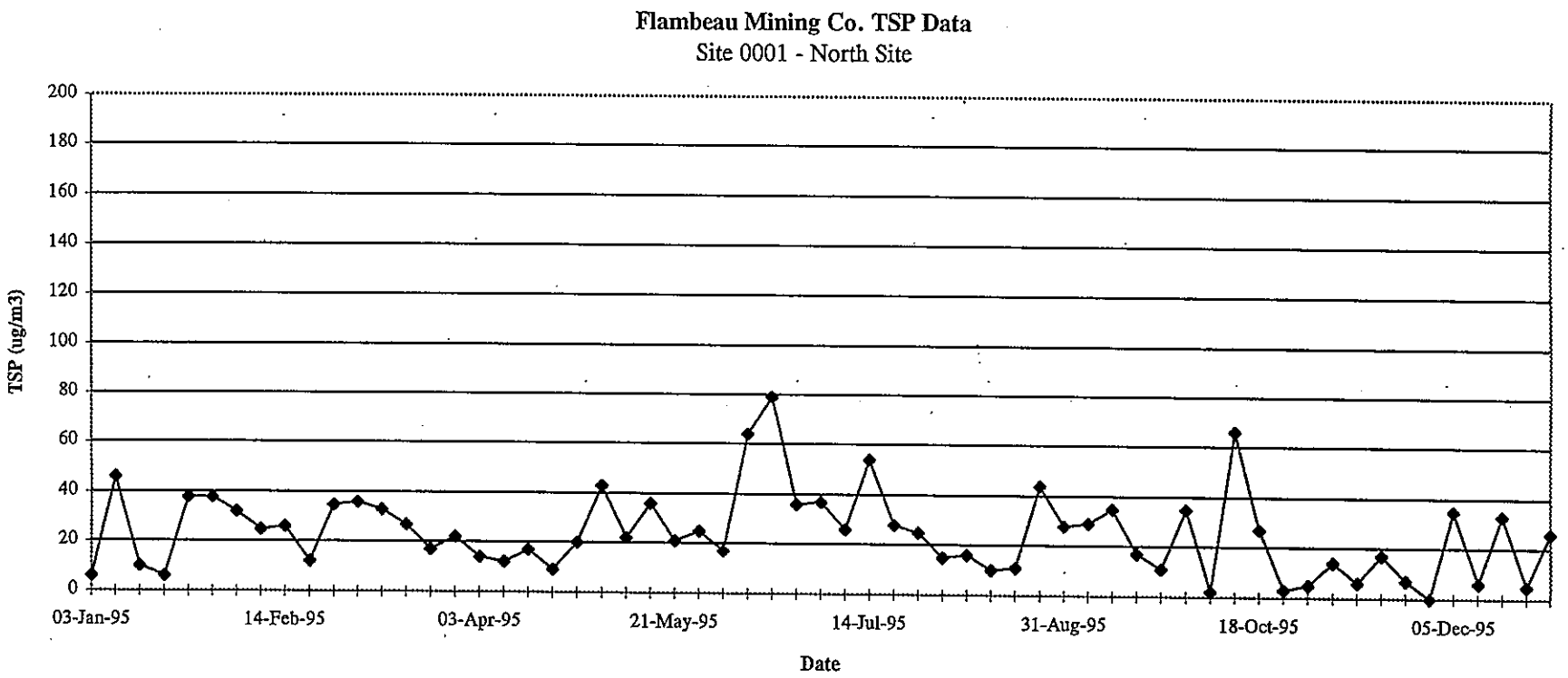

Flambeau Mining Co. TSP Data
Site 0001 - North Site
TSP (ug/m3)
200
180
160
140
120
100
80
60
40
20
0
03-Jan-95
14-Feb-95
03-Apr-95
21-May-95
14-Jul-95
31-Aug-95
18-Oct-95
05-Dec-95
Date

Figure 4-4

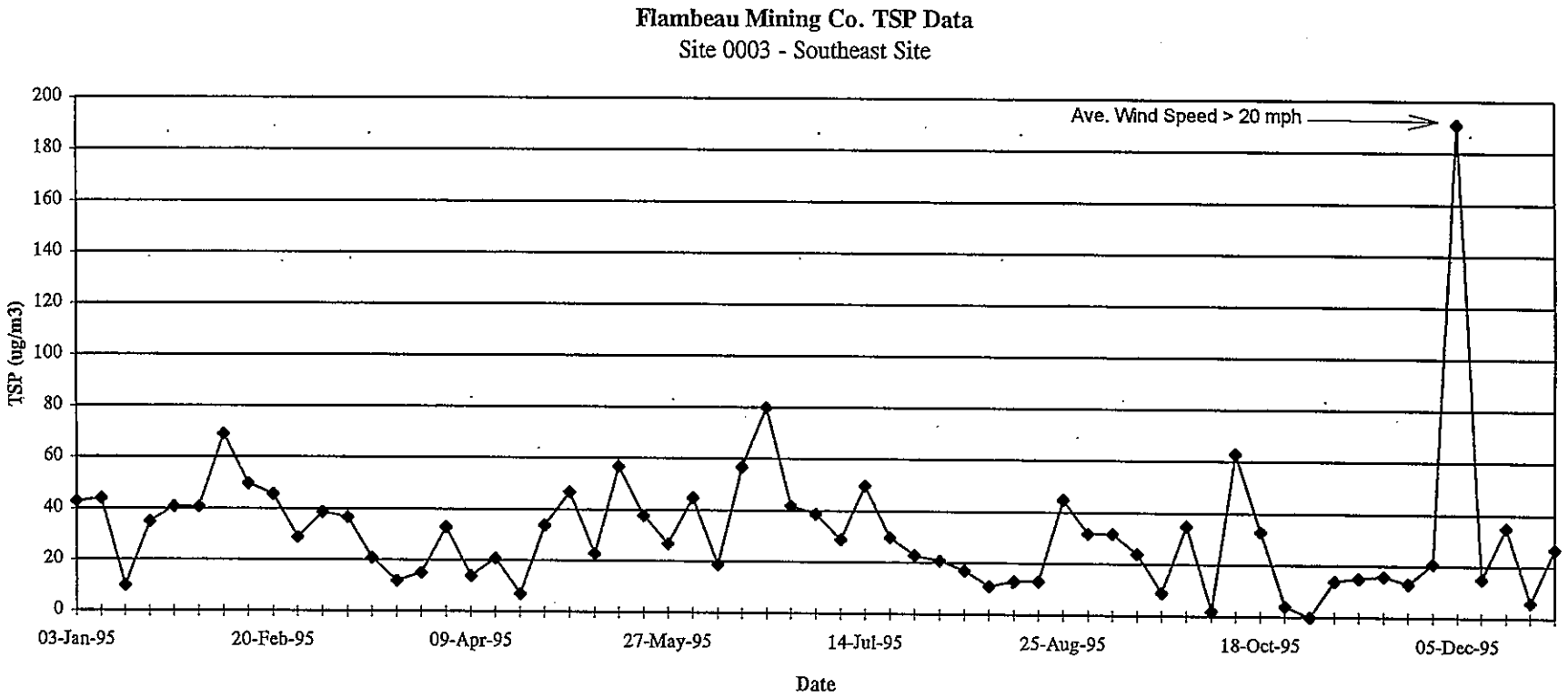

Flambeau Mining Co. TSP Data
Site 0003 - Southeast Site
Ave. Wind Speed > 20 mph
TSP (ug/m3)
200
180
160
140
120
100
80
60
40
20
0
03-Jan-95
20-Feb-95
09-Apr-95
27-May-95
14-Jul-95
25-Aug-95
18-Oct-95
05-Dec-95
Date

Figure 4-5

Flambeau Mining Co. TSP Data
Site 0004 - Northeast Site

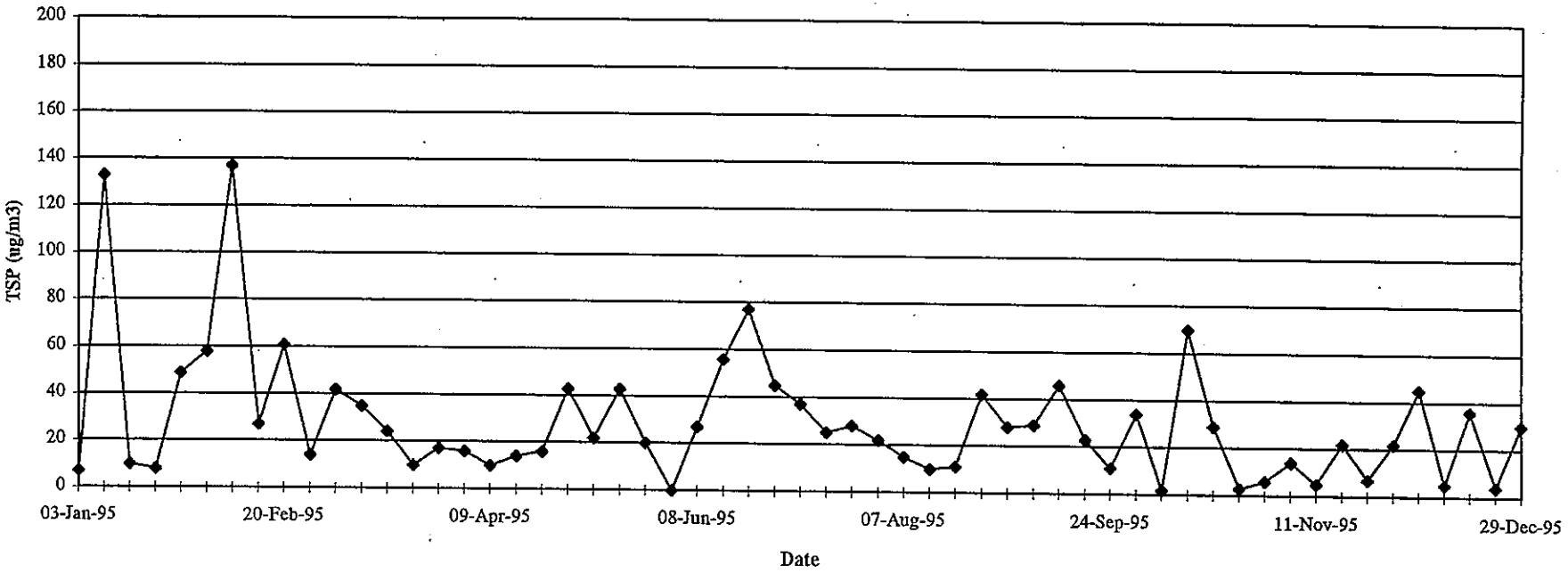
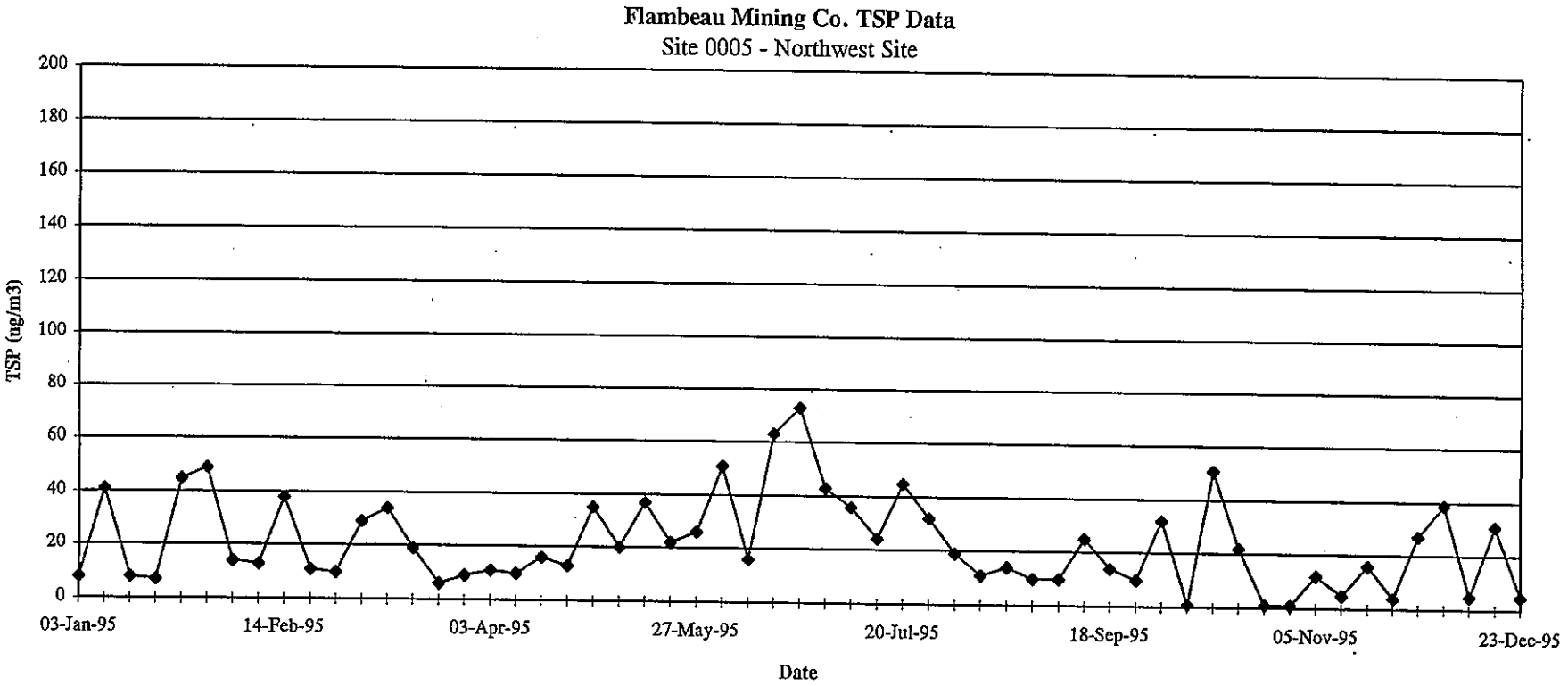
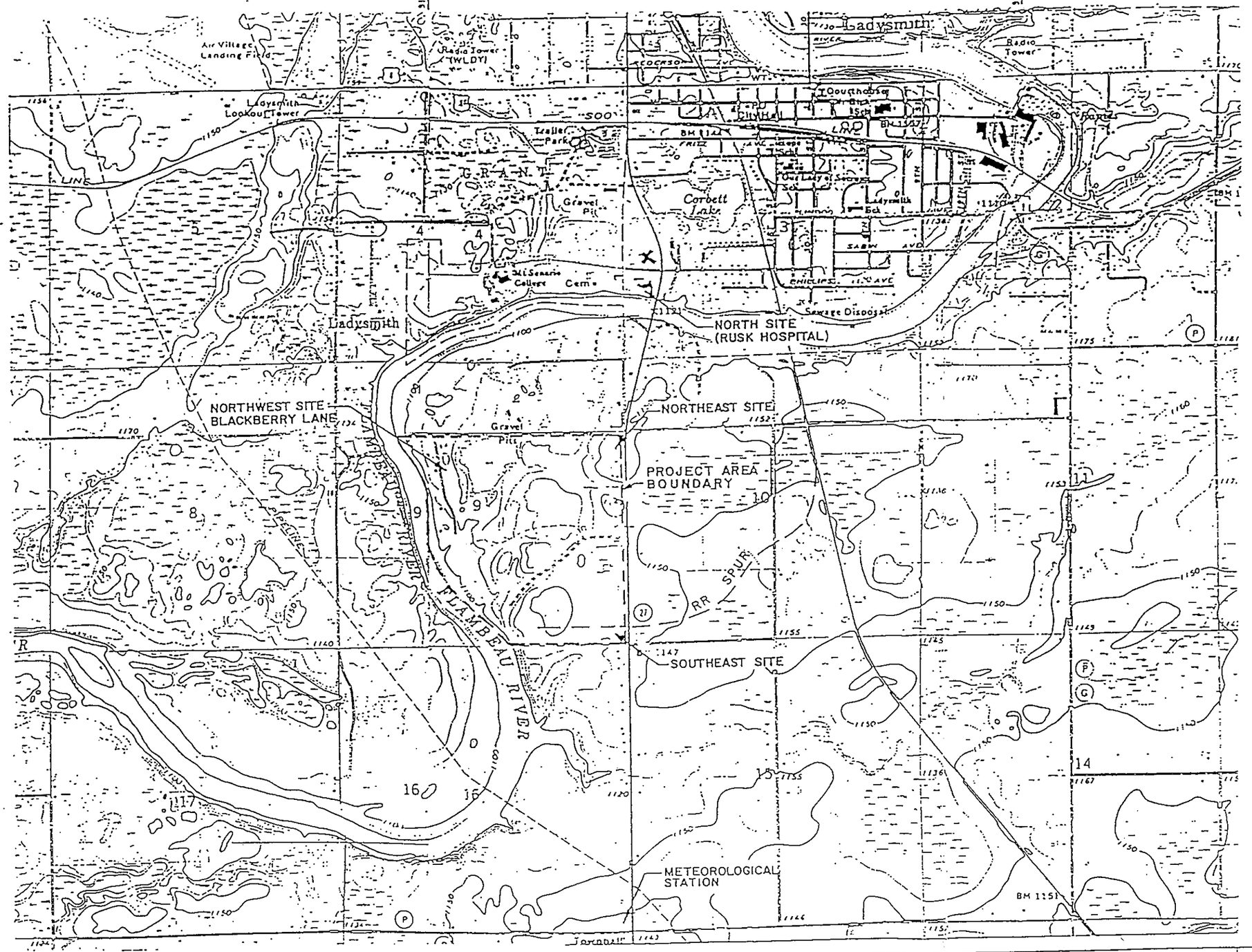


Figure 4-6


Flambeau Mining Co. TSP Data
Site 0005 - Northwest Site
TSP (ug/m3)
200
180
160
140
120
100
80
60
40
20
0
03-Jan-95
14-Feb-95
03-Apr-95
27-May-95
20-Jul-95
18-Sep-95
05-Nov-95
23-Dec-95
Date



NOTE: BASE MAP PREPARED FROM U.S.G.S. MAPS 7.5 MINUTE SERIES, LADYSMITH AND THORNAPPLE WISCONSIN QUADRANGLES

FOTH & VAN DYKE
GEOSCIENCES & ENVIRONMENTAL MANAGEMENT DIVISION
GREEN BAY, WISCONSIN

FLAMBEAU PROJECT
LADYSMITH, WISCONSIN

KENNECOTT MINERALS COMPANY
1515 WINDSOR SQUARE
SALT LAKE CITY, UTAH

Figure 4-7
TSP AND METEOROLOGICAL SITES

TABLE 4-10

QUARTERLY TSP FILTER METAL RESULTS SUMMARY (ug/m3)

	Arsenic	Beryllium	Cadmium	Chromium	Mercury	Nickel
North Site						
11/11/94-2/20/95	0.000783	<0.00000971	0.000252	<0.00597	<0.000715	0.000417
2/26/95-5/26/95	0.000532	<0.000215	<0.000140	<0.00534	<0.000014	0.00298
6/2/95-8/31/95	0.000665	<0.000219	0.000283	<0.00543	0.000029	0.00160
9/06/95-11/29/95	0.000680	<0.000224	<0.000159	<0.00556	<0.0000160	0.00128
Southeast Site						
11/11/94-2/20/95	0.000510	<0.00000869	0.000429	<0.00597	<0.000715	0.000724
2/26/95-5/26/95	0.000762	<0.000215	<0.000140	<0.00534	0.000027	0.00122
6/2/95-8/31/95	0.000763	<0.000219	0.000507	<0.00543	0.000018	0.00137
9/06/95-11/29/95	0.000685	<0.000224	<0.000151	<0.00556	0.0000180	0.000705

TABLE 4-10
(CONT'D)

	Arsenic	Beryllium	Cadmium	Chromium	Mercury	Nickel
Northwest Site						
11/11/94-2/20/95	0.000759	<0.00000862	0.000262	<0.00597	<0.000715	0.000652
2/26/95-5/26/95	0.000599	<0.000215	0.000213	<0.00534	<0.000014	0.00136
6/2/95-8/31/95	0.000574	<0.000219	<0.000142	<0.00543	<0.000014	0.000909
9/06/95-11/29/95	0.000636	<0.000224	<0.000156	<0.00556	0.0000230	0.00086
Northeast Site						
11/11/94-2/20/95	0.00119	<0.00000867	0.000211	<0.00597	<0.000715	0.000558
2/26/95-5/26/95	0.000540	<0.000215	<0.000163	<0.00534	0.000021	0.00118
6/2/95-8/31/95	0.000605	<0.000219	<0.000178	<0.00543	<0.000018	0.00163
9/06/95-11/29/95	0.000683	<0.000224	0.000233	<0.00556	0.0000290	0.000876

4.5 ASBESTIFORM FIBERS

The Mine Permit's Condition 4-5, requires ambient air quality monitoring for asbestiform fibers. The asbestiform monitoring for the mining operations during 1995 was initiated on May 16. Sampling and analysis was conducted in accordance with the Revised Mining Permit Quality Assurance/Quality Control Document for Asbestiform Sampling (February 1993). Samples were collected one eight-hour day per month during the period May through September.

Results of sampling and analyses were submitted to WDNR Air Monitoring Section on June 14, July 10, August 9, September 5 and October 9, 1995. These reports are incorporated into this annual report by reference. No fibers were detected in any samples collected downwind from the Flambeau site.

Condition 4-5 of the Mine Permit allows for the cessation of asbestiform monitoring if during the first three years of active mining asbestiform fibers are not detected from the mining operations. Upon completion of the 1995 asbestiform monitoring schedule without detects for asbestiform fibers, Flambeau provided notice to the WDNR as part of the October submittal that the requirement for asbestiform monitoring had been met and no further asbestiform monitoring will be performed.

4.6 OPERATIONAL MONITORING

Monitoring of the Type I collection lysimeter was performed on a quarterly basis throughout 1995. The analysis of the exfiltrate is to characterize the liquid. The four samples collected during 1995 had pH values which were comparable to shallow groundwater samples. Sample comparison shows that chromium, copper and iron values remain within the range anticipated by Prediction of Chromium, Copper and Iron Concentration in Vadose Zone Water Reaching the Water Table Beneath the Unlined Type I Stockpile for the Kennecott Flambeau Project (July 1989). Flow rates fluctuated seasonally during 1995. Data is summarized in Table 4-11.

Condition 4 of the Groundwater Withdrawal Permit requires tabulation of monthly totals for precipitation, surface water run-on, groundwater inflow and dewatering pumping to allow an evaluation of the water handling balance within the pit. Estimates of groundwater inflow into the open pit are made by calculating flow based on the pumping rate from the pit. Adjustments to the flow rate have been made for precipitation, evaporation and surface flow into the pit. The flow rates are summarized in Table 4-12. Pit development is summarized in Table 4-13. The estimated groundwater inflow was 96.8 MG in 1994, and 87.5 MG in 1995. The 1995 monthly average inflow of 7.3 MG was slightly lower than the 1994 monthly average of 8.1 MG. During 1995, general observations of groundwater seepage into the open pit did not show any significant change in seepage rates.

TABLE 4-11
TYPE I COLLECTION LYSIMETER MONITORING DATA
1995

PARAMETERS	UNIT	1Q JAN	2Q APR	3Q JUL	4Q OCT
Alkalinity	mg/l	160	160	140	170
Chromium	ug/l	<0.42	<0.60	<0.60	<0.60
Copper	ug/l	7.3	9.8	55 / 9.6[1]	9.4
Hardness	mg/l	200	140	140	170
Iron	mg/l	44 / 0.084[2]	0.10	0.02	0.11
Manganese	ug/l	270	240	51	240
pH, Lab	s.u.	6.5	6.0	5.9	6.2
pH, Field	s.u.	6.4	6.3	6.2	5.8
Diss Solids	mg/l	290	240	200	230
Sulfate	mg/l	13	11	15	18
Conductivity	micromho	336	401	296	370
Inflow	gpd	234	148	200	320

(1) Sampled 8/17/95 for second copper result

(2) Sampled 3/2/95 for second iron result.

TABLE 4-12

PIT INFLOW SUMMARY
1995
(Million Gallons)

	1993	1994	1995			
	Groundwater Inflow	Groundwater Inflow	Groundwater Inflow	Precipitation	Surface Water Run-on	Dewatering Pumping
January	NC	7.7	6.76	0.81	0.76	7.52
February	NC	6.2	6.11	0.54	0.37	6.48
March	NC	7.4	8.23	3.23	3.23	11.47
April	15.7	5.4	7.75	3.44	1.04	8.79
May	8.7	6.6	6.70	2.73	1.14	7.84
June	7.9	6.9	5.77	2.61	1.10	6.87
July	7.2	8.0	5.88	4.89	2.15	8.03
August	10.0	9.5	8.13	14.74	7.87	16.00
September	6.7	11.3	6.99	3.44	1.45	8.44
October	7.2	10.4	9.90	3.93	1.86	11.76
November	8.4	8.5	8.31	1.58	0.00	8.31
December	7.0	9.9	7.08	2.70	0.21	7.28
Estimated Yearly Groundwater Inflow:	78.8	96.8	87.6			

NC: Not Calculated. Previous to pit development.

TABLE 4-13

PIT DEVELOPMENT SUMMARY

Approximate Status of Pit Development During 1995														
Bench	Depth (ft)		Developed Mined Area (acres)											
		Dec-94	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1140	-40	5.4												
1130	-30	17												
1120	-20	23.7	23.93	23.93	23.93	23.93	23.93	23.93	23.93	23.93	24.52	24.52	24.52	24.52
1110	-10	25.8	25.80	25.80	25.80	25.80	25.80	25.80	25.80	25.80	27.09	27.09	27.09	27.09
1100	0	26.5	27.41	27.41	27.41	27.41	27.41	27.41	27.41	27.41	27.41	27.41	27.41	27.41
1090	10	22.9	24.01	24.01	24.01	24.01	24.01	24.01	24.01	24.01	24.06	24.06	24.06	24.06
1080	20	20.9	22.63	23.53	23.53	23.53	23.53	23.53	23.53	23.53	24.24	24.24	24.24	24.24
1070	30	12.1	16.36	17.70	19.40	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70
1060	40	9.9	9.90	12.04	13.16	17.05	21.18	21.18	21.18	21.18	21.18	21.18	21.18	21.18
1050	50	9.1	9.10	9.10	9.10	9.51	11.63	15.34	15.34	15.34	15.34	15.34	15.34	15.34
1040	60	7.8	7.80	7.80	7.80	7.80	8.18	10.06	11.25	11.25	11.25	11.25	11.25	11.25
1030	70	6.6	6.60	6.60	6.60	6.60	6.60	7.25	8.52	14.30	14.30	14.30	14.30	14.30
1020	80	5.1	5.21	5.21	5.21	5.21	5.21	5.21	6.44	6.51	8.64	9.95	9.95	9.95
1010	90	2.5	2.53	3.66	3.66	3.66	3.66	3.66	3.66	7.35	8.94	11.28	12.42	13.53
1000	100	0.1	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.99	2.32	3.21	4.50	5.90
990	110	0.1	0.10	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	1.44	2.31
980	120	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
970	130	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
960	140	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
950	150	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
940	160	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
930	170	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
920	180	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
910	190	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
900	200	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

During 1995 Flambeau retained services of Thomas A. Prickett & Associates and Engineering Technologies Associates to confirm the previous groundwater model predictions as related to operational impacts. The new three dimensional model was calibrated with actual groundwater data collected by Flambeau since 1989. The new model predicted pit inflows through the life of the mine to be comparable to the previous model and pit inflows experienced to date. Upon finalization, the Prickett report will be provided to the Department for informational purposes.

As the pit has deepened, continuation of groundwater level monitoring and periodic mapping of exposed rock defined groundwater inflow and slope stability issues. In 1995, mapping continued to show the presence of small rock parting related seeps at varying elevations on the west wall. However, as the pit was developed, the groundwater inflow has not substantially changed as compared to 1994. As each bench was developed, additional monitoring wells were installed to verify that pore pressures were within the design criteria defined to ensure wall stability. Investigations verify that wall pore pressures continue to remain within the defined criteria. Construction logs for all wells installed during 1995 are included in Appendix I.

Throughout 1996 additional information will continue to be gathered by pit mapping of inflows, the implementation of additional monitoring, and a continuing record of groundwater response through a full range of seasons.

Leachate from the Type II stockpile is treated within Flambeau's WWTP prior to discharge to the Flambeau River. The Type II leachate is collected on a quarterly basis and analyzed for quality. The 1995 quarterly samples show slightly decreasing pH values and increasing dissolved solids, conductivity, hardness, manganese and copper concentrations.

The four samples collected in 1995 show the leachate characteristics to be within the values predicted for leachate from rock chips (4.8% sulfur) during the Wet/Dry Leaching Study (Kennecott Environmental Impact Report, March 1989) with the exception of iron which remains below the predicted range. The leachate remained relatively neutral during 1995 with a slight decrease in pH. Data is summarized in Table 4-14.

An annual camera inspection of pipes between the Type II stockpile and the surge pond is required by Condition 2-14 of the Mine Permit. The 1995 inspection was performed on September 27. The pipe integrity was verified. A report of the inspection was submitted to the WDNR Mine Reclamation Unit on October 17, 1995 and is incorporated by reference.

While performing the camera inspection on September 27, the entrance manholes, access manholes, outlet, and the geomembrane-covered seam in the pipe junction prior to the outlet were also inspected to verify integrity. All were found to require no maintenance.

Annual inspection of the Type II leachate collection system was conducted August 31,1995 and September 1,1995. The leachate lines were flushed by draining approximately 3500 gallons of

TABLE 4-14
TYPE II LEACHATE MONITORING DATA
1995

PARAMETERS	UNIT	1Q JAN	2Q APR	3Q JUL	4Q OCT
Alkalinity	mg/l	25	26	16	21
Conductivity	micromho	488	597	684	925
Copper	ug/l	150	2600	2000	3900
Hardness	mg/l	290	260	310	440
Iron	mg/l	0.10	0.0093	0.01	0.18
Manganese	ug/l	140	640	540	1200
pH, Lab	s.u.	6.5	6.2	5.9	5.9
pH, Field	s.u.	7.2	6.6	6.6	6.9
Solids (Dissolved)	mg/l	430	510	520	680
Sulfate	mg/l	170	300	150	200

treated water into each cleanout riser along with a buoyant indicator object. The water flow along with the buoyant object were observed in the collection manhole (MH-1) to verify that the leachate lines were free of obstruction and pipe integrity was maintained.

The assessment indicated that the cleaning of CO#1 was necessary. On December 4, 1995 Visu-Sewer Clean & Seal, Inc. St. Louis Park, MN high pressure jetted the leachate line from CO#1 to MH-1. A partial obstruction 500-600 feet into the leachate line was cleared. The assessment verified that cleaning of the other leachate lines was not necessary.

Inspections of the sideslopes of the surge pond and runoff pond and the scuff strip below the outlet of the 36" pipe outlet in the surge pond were conducted by Cooper Engineering on April 28, 1995. No additional sloughing or deformation of the side slopes has occurred in the surge pond or runoff pond as compared to previous years. Monitoring of pond sideslopes including the area under the runoff pond 32-inch pipe continues on a routine basis. The scuff strip within the surge pond shows no signs of movement or displacement from its original installed location. Two small indentations which did not penetrate the liner were observed; one in each pond. The indentations did not warrant repair; however, they will be monitored and repaired if necessary. Reports of the Cooper Engineering inspection are included in Appendix B.

Minor liner repairs were required on two occasions during 1995. The WDNR was notified of the minor liner damage upon discovery and informed of the planned repairs. The first event occurred on March 17, 1995 when a backhoe was used to clear the drainage way between Phase 2 and Phase 1 of the Type II stockpile area. Measures were taken to minimize liner damage which included setting survey stakes to guide the backhoe operator. The operator inadvertently removed material in the wrong location which resulted in damage to the liner. A temporary HDPE patch was placed over the damaged liner until the permanent repair was made on March 21, 1995. The damaged area was located above drainage and no impounded water leaked into the subsoil below the liner. The second event occurred during dredging of the surge pond when the pond water level was inadvertently lowered during the early morning hours of October 7, 1995. As a result, the barge was allowed to come in contact with the liner. The damage was discovered that same morning and repairs immediately scheduled. Until the repairs were completed on October 9, 1995, water level in the surge pond was maintained below the level of the impacted liner.

Reports of the liner repairs were prepared by Cooper Engineering and Foth & Van Dyke; these reports are included in Appendix J.

Hydric soils were maintained in a wet condition, as specified in the Vegetative Aquascape Plan (May 1991) and the Topsoil and Hydric Soils Management Plan (May 1991). River water was introduced to the hydric soil stockpile during early August. A moisture measurement taken during 1995 showed that the hydric soils moisture content is 26%; a moisture content similar to previous years.

Aerial and color infrared photographs were taken of the mine project area and surrounding areas during the late summer on August 31 and September 1, 1995. The aerial photography followed procedures described in the Mine Permit Application (December 1989) and the Updated Monitoring Plan (July 1991). When comparing the 1995 color infrared photographs to 1991 photographs, there is no notable difference in terrestrial ecology surrounding the mine site. Aerial photographs were submitted to the Department on January 16, 1996 and are incorporated by reference.

REFERENCES

1995 Annual Reclamation Report	November 1995
Air Pollution Control Permit	January 1991
Construction Documentation Report Type II Stockpile Phase 2 Construction	October 1994
Environmental Impact Report for Kennecott Flambeau Project	March 1989
Groundwater Model for the Kennecott Flambeau Project	July 1989
Groundwater Withdrawal Permit	January 1991
Local Agreement	August 1988
Mining Permit	January 1991
Prediction of Chromium, Copper and Iron Concentration in Vadose Zone Water Reaching the Water Table Beneath the Unlined Type I Stockpile for the Kennecott Flambeau Project	July 1989
Revised Mining Permit Quality Assurance/Quality Control Plan	August 1991
Revised Mining Permit Quality Assurance/Quality Control Document for Asbestiform Sampling	February 1993
Topsoil and Hydric Soils Management Plan	May 1991
Updated Monitoring Plan	July 1991
Vegetative Aquascape Plan	May 1991
Type I & Type II Conditional Approval	March 1993
Mine Permit Application	December 1989
Construction Documentation Report Type I Settling Ponds Liner Construction	December 1995

SUBMITTALS

DOCUMENT	DATE	WDNR SUBMITTEE
Section 2.0 Operating Activities		
Drillhole Abandonment Reports	Throughout 1995	Ken Markart[1]
Discharge Monitor Report	Monthly 1995	Janet LaRose[2]
Well Construction Logs	Throughout 1995	Ken Markart[1]
Air Permit Application	January 1995	WDNR[3]
Whole Effluent Toxicity Report	Monthly 1995	Tom Bauman[4]
1994 Emission Inventory	February 1995	Brad Pyle[5]
1994 Hazardous Waste Report	February 1995	WDNR[6]
Phase 2 Type II Leachate Line Jetting Report	February 1995	Larry Lynch[1]
WPDES Permit Renewal Application	March 1995	Tom Bauman[4]
Wasterock Stockpile License Renewal Application	March 1995	Larry Lynch[1]
WPDES Permit Renewal Addendum	May 1995	Tom Bauman[4]
Type I Till Blanket Documentation	May 1995	Larry Lynch[1]
Technical Specifications for Lining Settling Ponds	September 1995	Tom Bauman[4]
Refinement Plans for Leachate Collection Line	October 1995	Bob Grefe[7]

SUBMITTALS (CONT'D)

DOCUMENT	DATE	WDNR SUBMITTEE
Section 3.0 Reclamation Activities		
List of 1995 Reclamation Activities	January 1995	Larry Lynch[1]
1995 Mid-summer Reclamation Report	October 1995	Larry Lynch[1]
1995 Annual Reclamation Report	November 1995	Larry Lynch[1]
Section 4.0 Site Monitoring		
Environmental Monitoring Ground Water Quality Results	Quarterly 1995	Larry Lynch[1]
Air Monitoring Results (TSP)	Monthly 1995	Steve Schuenemann[8]
Air Monitoring Project-TSP Filer Metal Analytical Results	Jan, June, Aug, Nov, 1995	Steve Schuenemann[8]
Asbestiform Air Monitoring Results	June-Oct 1995	Steve Schuenemann[8]
1995 Camera Inspection	October 1995	Larry Lynch[1]
1995 Leachate Line Assessment	December 1995	Larry Lynch[1]

SUBMITTALS (CONT'D)

1 Mine Reclamation Unit
Larry Lynch
Ken Markart

2 Wisconsin Dept. Of Natural Resources
Janet LaRose

3 Bureau of Air Management
WDNR

4 Bureau of Wastewater Management
Tom Bauman

5 Wisconsin Dept. Of Naural Resources
Brad Pyle

6 Bureau of Solid & Hazardous Waste Management
WDNR

7 Bureau of Solid Waste Management
Bob Grefe

8 Air Monitoring Section
Steve Schuenemann

APPENDIX A

LIST OF DEVIATIONS

LIST OF MODIFICATIONS & DEVIATIONS FROM APPROVED MINING PERMIT PLAN (PER CONDITION 2-4)

Permit/Application	Section	Modification or Deviation	Authorization		
			Method	Person	Date
Mine Permit Application (Dec. 1989) Final Engineering Report (Dec. 1989)	4.7.3.2.8 6.3.1	Lining of the Type I settling ponds with PVC liner to reduce inflow into the pit.	Approval Letter	Tom Bauman Michael Witt	10/3/95
Mine Permit Application (Dec. 1989)	4.7.3.2.1 4.10.14.1 Fig. 4-11	Design refinement and installation of ground support along the north wall of the pit.	Verbal	Larry Lynch Ken Markart	September 1995
Mine Permit Application (Dec. 1989)	4.10.14.1 4.7.3.2.1	Installation of three dewatering wells located along the northwest perimeter of the pit to control water inflow into the pit.	Approval Letter	William Rock	12/19/95
Mine Permit Application (Dec. 1989)	4.10.14.1 4.7.3.2.1	Installation of horizontal drains in the pit to control water inflow.	Verbal	Larry Lynch Ken Markart	September 1995
Construction Documentation Report, Type II Stockpile, Phase 2 Construction (Oct.94)	Appendix P Drawing 94048-02	Design refinement of two cleanout risers located on the southeast corner of the Type II stockpile. One cleanout riser has been completed; documentation of the construction activity will be submitted following completion of the second cleanout riser.	Appoval letter	Larry Lynch	10/18/95

APPENDIX B

SURGE POND & RUNOFF POND SIDE SLOPE EVALUATION

Cooper Engineering Company, Inc.
310 WEST SOUTH STREET • RICE LAKE, WI 54868-2420
TELEPHONE (715) 234-7008 FAX (715) 234-1025

May 11, 1995

Ms. Jana E. Murphy
Supervisor of Environmental Affairs
Flambeau Mining Company
N 4100 Highway 27
Ladysmith, WI 54848

RE: Surge and Runoff Ponds and Refueling Island Observations

Dear Ms. Murphy:

At your request, on April 28, 1995 Cooper Engineering Company, Inc. performed an inspection of the above sites in accordance with the March 9, 1993 Wisconsin Department of Natural Resources conditional approval of the lined facilities, items 13.a. and c.

Inspection of the lined sideslopes of the surge and runoff ponds did not find any sign of washout or slope deformation. Although the earthen slopes were saturated from spring thaw and runoff, they appeared stable.

Inspection of the HDPE liner material in the surge and runoff ponds and the refueling island did not find any damage since the last repairs and inspection on December 13, 1994.

Two indentations were observed that did not rupture the liner material and are not a serious concern for repair. However, both are recommended for a bead weld patch if and when other liner repairs must be made in the future. These are identified as:

Runoff pond - An indentation located on the east liner slope, 2nd full panel south of the northeast corner, mid panel, midway between toe and top of slope. See sketch and photo.

Surge pond - An indentation located on the south liner slope, 3rd full panel west of the southeast corner, west edge of panel just above the midpoint from toe to top of slope. See sketch and photo.

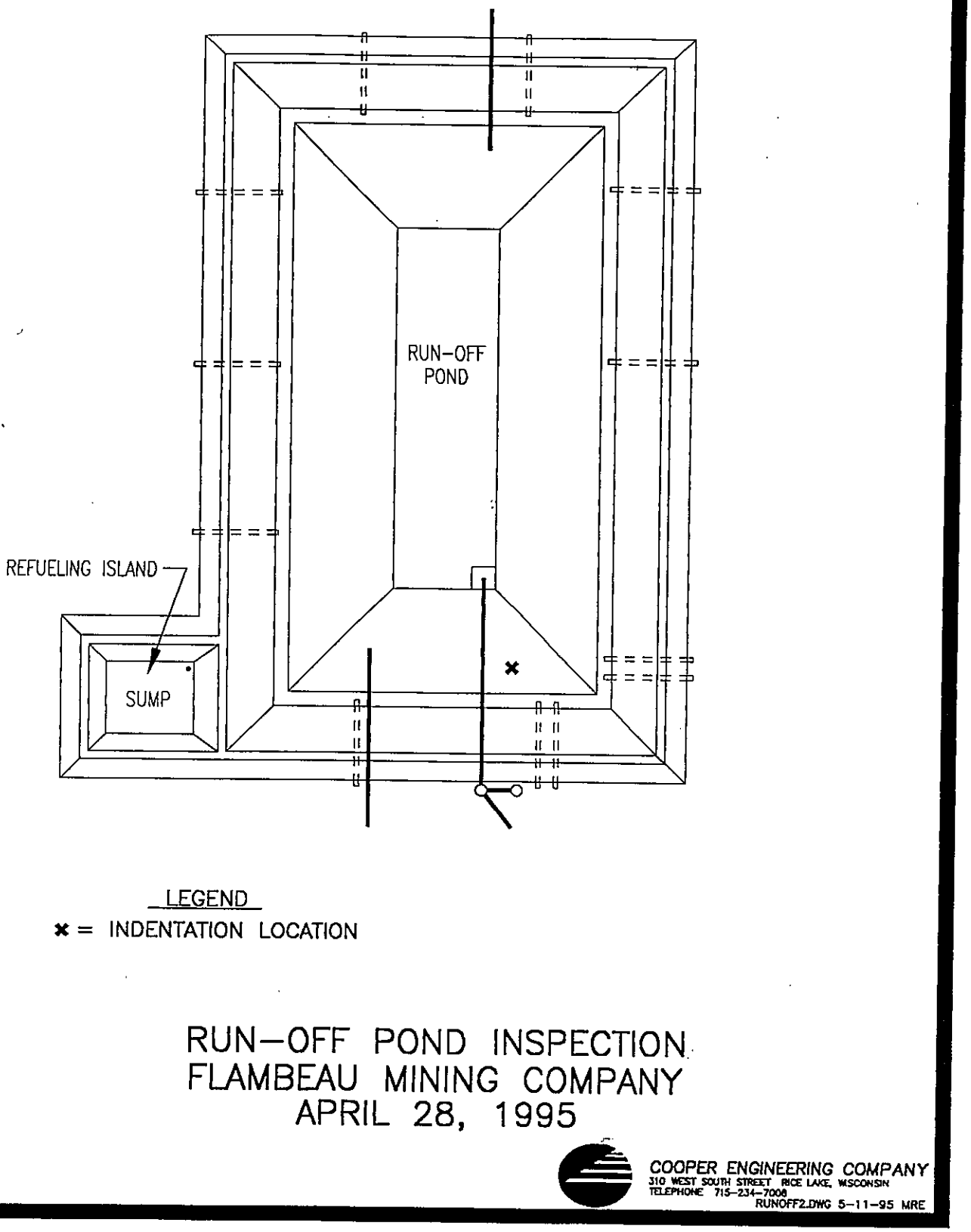
Particular attention was made to previous repairs documented July 27, October 26, and December 13, 1994. All repairs remain satisfactory.

Sincerely,

Craig Walkey P.E.

dp:CE94081

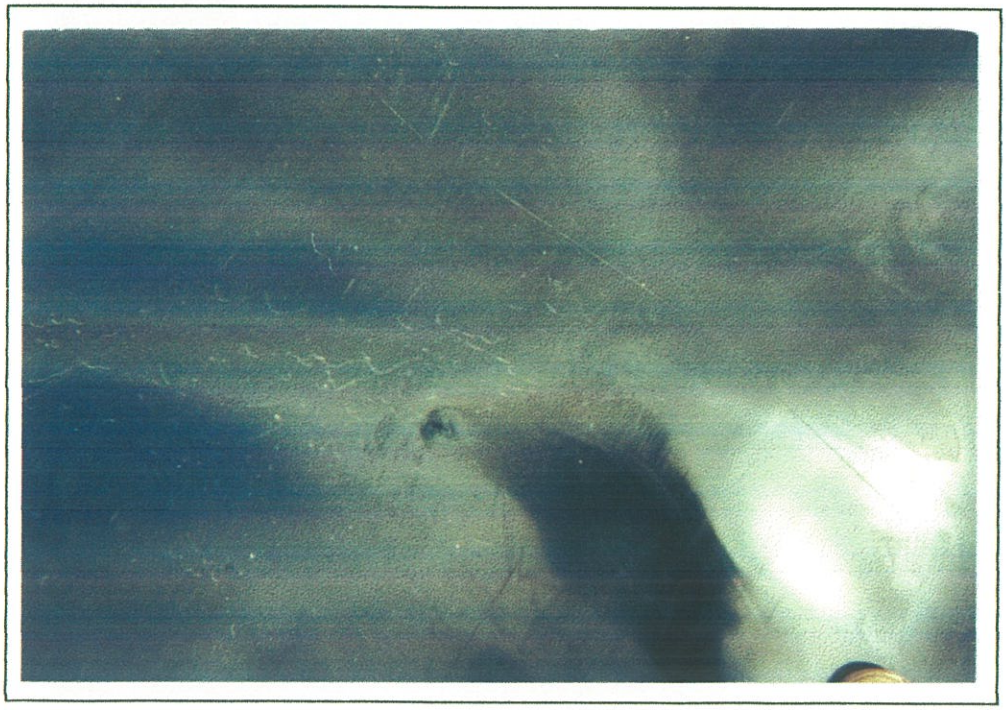
Enclosures


N
SCALE 1"=50'
RUN-OFF POND
REFUELING ISLAND
SUMP
LEGEND
✖ = INDENTATION LOCATION
RUN-OFF POND INSPECTION
FLAMBEAU MINING COMPANY
APRIL 28, 1995
COOPER ENGINEERING COMPANY
310 WEST SOUTH STREET RICE LAKE, WISCONSIN
TELEPHONE 715-234-7008
RUNOFF2.DWG 5-11-95 MRE

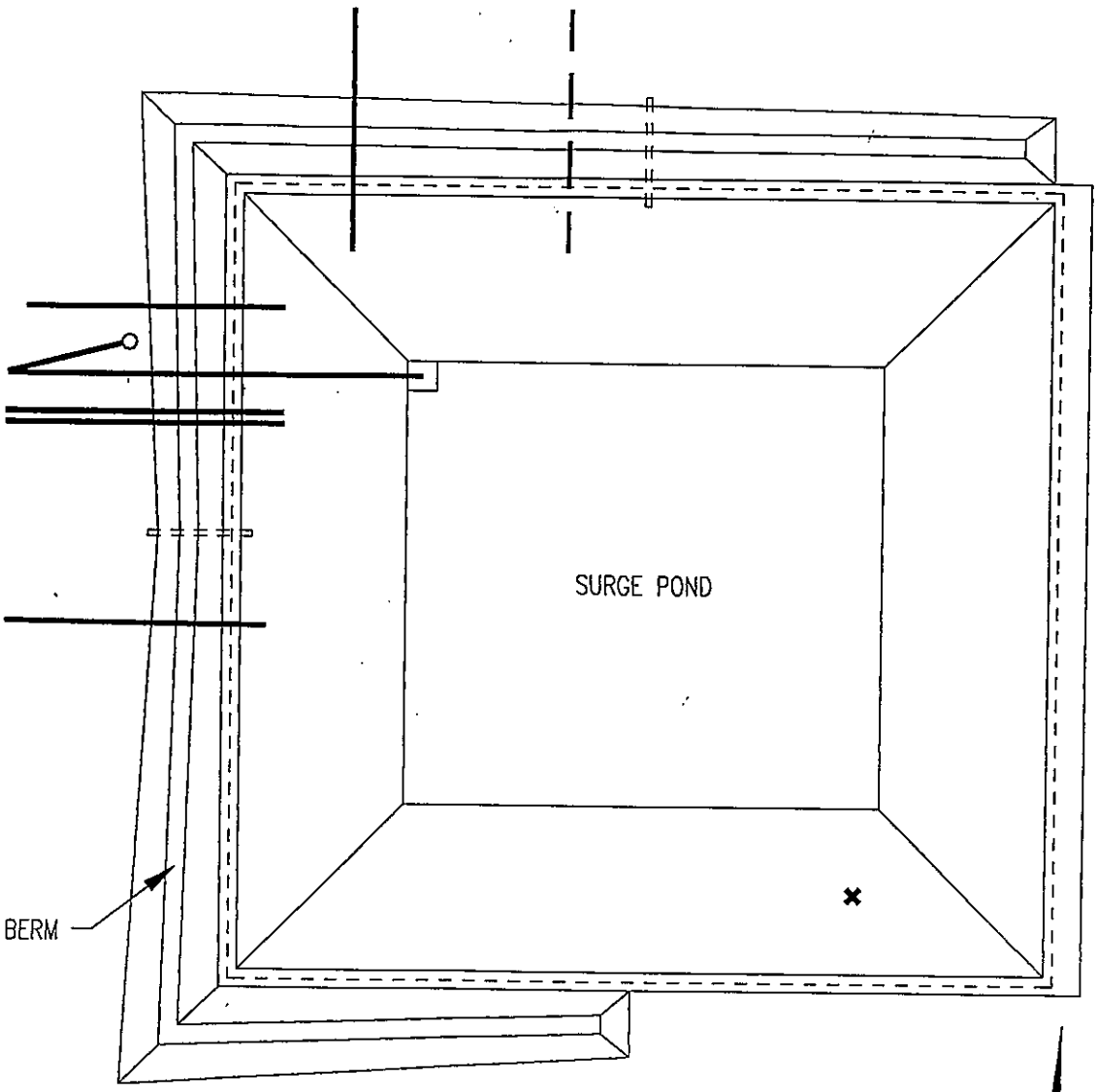
FLAMBEAU MINING CO.
LADYSMITH, WISCONSIN

RUNOFF POND LINER INSPECTION
APRIL, 1995

RUNOFF POND



RUNOFF POND HDPE LINER
INDENTATION



LEGEND

✖ = INDENTATION LOCATION

SCALE 1" =50'

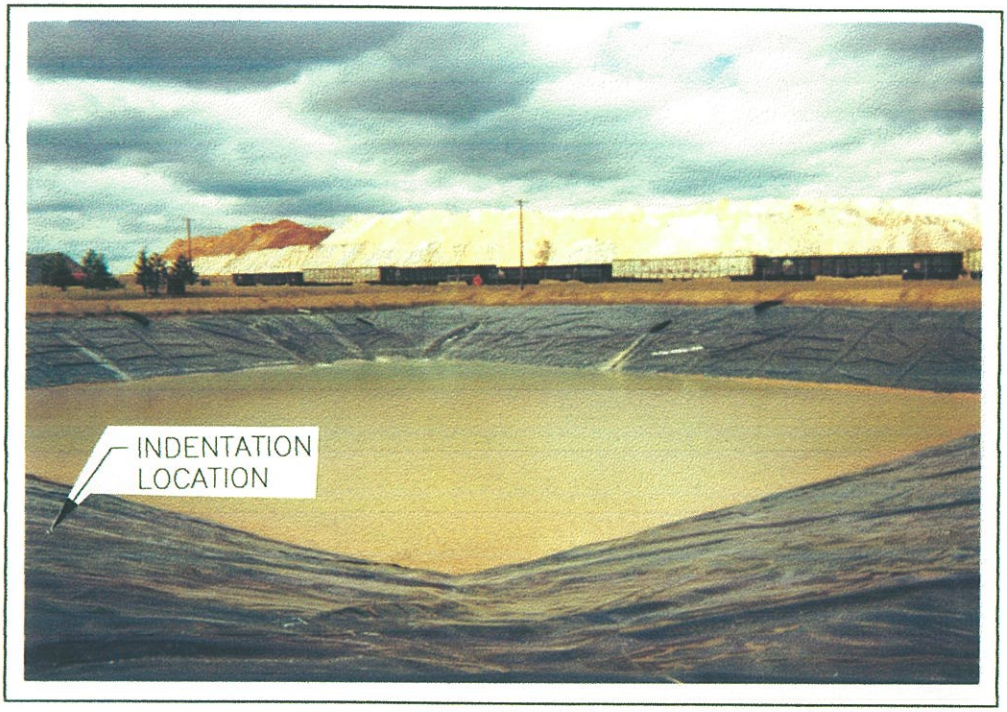
SURGE POND INSPECTION
FLAMBEAU MINING COMPANY
APRIL 28, 1995

COOPER ENGINEERING COMPANY
310 WEST SOUTH STREET RICE LAKE, WISCONSIN
TELEPHONE 715-234-7008

SURGE.DWG 5-11-95 MRE

FLAMBEAU MINING CO.
LADYSMITH, WISCONSIN

SURGE POND LINER INSPECTION
APRIL, 1995



SURGE POND

SURGE POND HDPE LINER
INDENTATION

APPENDIX C

GROUNDWATER QUALITY & ELEVATION

SURFACE WATER QUALITY

TRENDS

Foth & Van Dyke
Memorandum

January 16, 1996

TO: Jana Murphy

CC: Jim Hutchison
Jerry Sevick

FR: Steve Lehrke SL

RE: Flambeau Mining Company - 1995 Annual Report Groundwater and Surface Water Trends

Background

The groundwater and surface water sample results collected between July of 1991 and October of 1995 for the quarterly monitoring program have been graphically displayed and tested statistically to determine whether any significant increasing or decreasing trends are occurring in groundwater or surface water chemistry. July of 1991 was selected as the start date for the trend tests since this is when construction began on-site. Groundwater quality results during this time period are listed in Table 1, and surface water quality results during this time period are listed in Table 2. Trend graphs of the groundwater and surface water quality results are presented in Attachments 1 and 2, respectively. Trend graphs of groundwater elevations are presented in Attachment 3.

Statistical Methods

The non-parametric Mann-Kendall test for trend was used to statistically determine whether any trends were present in the data between July of 1991 and October 1995. This test was used rather than a parametric test such as regression analysis due to the non-normality of many of the data sets. In addition, the Mann-Kendall test determines whether any general trends are present, regardless if they are linear or curvilinear.

In order to minimize the site-wide false positive rate, the Type I error for each test was set to 0.01. Several parameters had initially high detection limits which were reduced in 1993 or 1994. This resulted in detections at lower levels than the initial detection limit. These parameters include copper (MW-1002, MW-1002G, MW-1005 and MW-1005P), iron (MW-1002G and MW-1004S), manganese (MW-1004S), and sulfate (MW-1004P, MW-1005P and MW-1005S). For these parameters and wells, only the results occurring after the reduction in the detection limit were included in the trend test. The procedure for the Mann-Kendall test is given in Gilbert (1987)[1].

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[1]Gilbert, Richard O. (1987) *Statistical Methods for Environmental Pollution Monitoring.* Van Nostrand Reinhold. New York, NY.

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Summary statistics for each parameter and well, along with the trend analysis results are given in Table 1 for groundwater and Table 2 for surface water. In the trend test results, a "+" indicates a statistically increasing trend and a "-" indicates a statistically decreasing trend. If neither a "+" or "-" is given, no significant trend is present.

Results

The following trends were present for groundwater:

Well	Parameter	Trend
MW-1000P	Conductivity	Decreasing
	Alkalinity	Decreasing
	Copper	Increasing
	Hardness	Decreasing
	Iron	Decreasing
	Manganese	Decreasing
	TDS	Decreasing
MW-1002	Alkalinity	Decreasing
	Hardness	Decreasing
MW-1002G	Sulfate	Increasing
MW-1005	Alkalinity	Decreasing
	Iron	Increasing
	Manganese	Increasing
MW-1005P	Iron	Decreasing
MW-1005S	Hardness	Decreasing
MW-1010P	Copper	Increasing
	Manganese	Decreasing

By observing the trend plots (Attachment 1) it can be seen that the decreasing trends of conductivity, alkalinity, hardness and iron in MW-1000P are due mainly to a drop in concentrations during the first quarter of 1994. The increasing trend of copper is due to an increase during the fourth quarter of 1994. Since then, copper concentrations in MW-1000P have remained relatively constant.

A decreasing trend was observed for manganese in MW-1010P and an increasing trend was observed for copper in MW-1010P. The increasing trend for copper began in October of 1994 and continued through October of 1995.

Monitoring wells MW-1000P and MW-1010P are located within the river pillar area between the open pit and the Flambeau River. The standing water levels recorded in MW-1000P and MW-1010P show that prior to July 1993 the water levels in the monitoring wells were greater than the average level of the Flambeau River thus indicating that groundwater flowed from the area of the open pit to the river. After July 1993 the water levels in both monitoring wells were lower than the average river level indicating that, as expected, a groundwater flow reversal had been created due to the operation of the pit. Therefore, after July 1993 groundwater in the river pillar area has flowed from the river towards the open pit. This change in flow direction would

be expected to lead to a gradual replacement of the background type groundwater with water similar to that found in the river.

Analyses of water samples collected from MW-1000P from October 1991 through October 1995 have shown a general decrease in conductivity (field) values, and alkalinity, hardness, iron, manganese and TDS concentrations. A general decrease in iron and manganese concentrations has been measured in the water collected from MW-1010P during the same time period. These changes are considered to be related to the progressive replacement of normal groundwater in the river pillar region with river water resulting from the changes in the groundwater flow direction.

Copper concentrations in MW-1000P generally ranged from 0.01 - 0.02 mg/l when detects were noted from July 1991 to October 1994, after which they have increased to a concentration range of 0.04 - 0.06 mg/l. Copper concentrations in MW-1010P generally ranged from 0.01 - 0.02 mg/l when detects were noted from July 1991 to July 1995 after which copper concentrations have increased to a range of 0.06 - 0.07 mg/l. The increases in copper concentrations are likely attributable to increased oxidation of the copper sulfide-bearing rocks which crop out in the river basin adjacent to the river pillar. During recent months lower river stages have been maintained by the operators of the Ladysmith dam which have likely led to periods of greater exposure, and thus potential oxidation of these minerals.

While there is an increasing trend in sulfate in MW-1002G, the trend plot illustrates that the change in actual sulfate concentrations is very slight (less than 5 mg/l). Note that sulfate concentrations in this well remain very low, at concentrations of less than 15 mg/l. Increasing trends were observed for iron and manganese in MW-1005, iron increasing from 17 mg/l in July of 1991 to 32 mg/l in October of 1995 and manganese increasing from 0.51 mg/l in July of 1991 to 0.7 mg/l in October of 1995.

A decreasing trend was found for iron in MW-1005P. In addition, although no overall statistical trend was determined, the graph of iron and manganese in MW-1004P illustrate a decrease in concentrations during April of 1993. Since then, concentrations have remained relatively consistent.

No statistically significant trends were present for any compounds at either the upgradient (SW-1) or downgradient (SW-2) surface water sampling points. Note that the surface water trend plots (Attachment 2) are characterized by only random variation.

The majority of groundwater wells exhibited a decrease in groundwater elevations (Attachment 3) beginning in late 1992 and stabilizing during mid to late 1994.

Conclusions

A total of nine compounds each in nine groundwater monitoring wells (81 tests) were tested statistically for overall trends in the quarterly monitoring results. Twelve decreasing trends were found and five increasing trends were found. The increasing trends were for copper in MW-1000P and MW-1010P, sulfate in MW-1002G and iron and manganese in MW-1005. However, the increasing trend of sulfate in MW-1002G was due only to a slight increase of actual sulfate concentrations which still remain at low levels. The increasing trends of copper in MW-1000P and MW-1010P began in October of 1994. Most likely, these increasing trends are attributable to a groundwater flow reversal, now flowing from the river towards the open pit, and

also increased oxidation of the copper sulfide-bearing rocks which crop out in the river basin. Future quarterly monitoring will determine whether these trends continue.

No trends, either increasing or decreasing, were observed for either the upgradient or downgradient surface water samples.

In considering the number of tests performed and the number of decreasing trends found, very few increasing trends were observed in the data.

Table 1

Groundwater Quality Results, Summary Statistics and Trend Analysis
July 1991 Through October 1995

Well/Parameter	Units	Jul-91	Oct-91	Jan-92	Apr-92	Jul-92	Oct-92	Jan-93	Apr-93	Jul-93
MW-1000P										
Conductivity(Field)	umhos	225	327	190	183.2	194	201	203	198	217
pH(Field)	S.U.	8.39	7.41	5.75	6.91	6.64	6.9	6.22	6.24	6.6
Alkalinity	mg/l	65	90	88	84	81	95	84	82	82
Copper	mg/l	< 0.014	< 0.014	< 0.014	< 0.014	0.014	< 0.014	< 0.014	0.02	0.016
Hardness	mg/l	84	110	110	88	120	100	88	90	86
Iron	mg/l	0.65	0.84	1.7	1.3	0.47	0.8	0.15	0.27	0.061
Manganese	mg/l	0.85	0.88	0.82	0.83	0.73	0.78	0.71	0.94	0.73
Sulfate	mg/l	< 10	< 10	11	14	12	12	< 10	12	15
TDS	mg/l	190	160	120	120	140	160	100	130	140
MW-1002										
Conductivity(Field)	umhos	157	189	138	145	118	181	127	136	273
pH(Field)	S.U.	8.33	6.78	6.88	6.05	5.61	6.94	6.96	6.33	6.83
Alkalinity	mg/l	50	49	47	49	41	53	53	66	42
Copper	mg/l	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.01	< 0.012
Hardness	mg/l	60	60	67	48	120	82	66	90	52
Iron	mg/l	0.99	< 0.055	< 0.055	< 0.055	< 0.055	< 0.055	0.059	< 0.01	0.034
Manganese	mg/l	0.0051	< 0.004	< 0.004	< 0.004	< 0.004	0.015	0.0047	< 0.004	< 0.004
Sulfate	mg/l	< 10	< 10	< 10	11	< 10	11	< 10	9	10
TDS	mg/l	160	170	100	85	87	130	90	120	100
MW-1002G										
Conductivity(Field)	umhos	277	272	221	199	198	254	197	239	480
pH(Field)	S.U.	7.56	6.98	6.93	6.25	6.02	6.94	7.14	6.13	6.72
Alkalinity	mg/l	86	88	80	84	79	85	75	44	64
Copper	mg/l	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.01	< 0.012
Hardness	mg/l	100	120	110	110	160	130	94	76	80
Iron	mg/l	< 0.055	< 0.055	< 0.055	< 0.055	< 0.055	< 0.055	< 0.055	< 0.01	< 0.015
Manganese	mg/l	0.0054	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Sulfate	mg/l	< 10	10	11	14	11	11	12	8	11
TDS	mg/l	240	280	140	150	150	180	98	74	140
MW-1004P										
Conductivity(Field)	umhos	175	352	302	282	295	342	291	329	347
pH(Field)	S.U.	8.15	7.15	6.8	6.88	6.74	7.46	6.24	7.74	7.4
Alkalinity	mg/l	160	170	160	170	160	190	170	170	170
Copper	mg/l	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.01	< 0.012
Hardness	mg/l	150	170	150	160	170	180	160	160	150
Iron	mg/l	0.33	0.22	0.32	0.37	0.38	0.32	0.39	< 0.01	0.042
Manganese	mg/l	0.13	0.13	0.12	0.14	0.13	0.13	0.14	< 0.004	0.022
Sulfate	mg/l	< 10	< 10	< 10	< 10	< 10	< 10	< 10	3	5
TDS	mg/l	210	310	160	180	180	260	160	160	180
MW-1004S										
Conductivity(Field)	umhos	161	135	146	153	175	258	174	168	178
pH(Field).	S.U.	8.64	7.25	7.03	6.7	6.5	6.96	6.37	7.77	7
Alkalinity	mg/l	50	49	27	60	74	100	73	51	24
Copper	mg/l	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.01	< 0.012
Hardness	mg/l	60	60	62	72	150	110	92	70	56
Iron	mg/l	< 0.055	< 0.055	< 0.055	< 0.055	< 0.055	< 0.055	< 0.055	< 0.01	< 0.015
Manganese	mg/l	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Sulfate	mg/l	< 10	10	11	12	< 10	< 10	< 10	11	11
TDS	mg/l	160	170	95	100	110	220	95	120	110

Table 1

Groundwater Quality Results, Summary Statistics and Trend Analysis
July 1991 Through October 1995

Well/Parameter	Units	Oct-93	Jan-94	Apr-94	Jul-94	Oct-94	Jan-95	Apr-95	Jul-95	Oct-95
MW-1000P										
Conductivity(Field)	umhos	233	135	124	133	116	116	106	116	119
pH(Field)	S.U.	7.03	6.9	7.7	7.5	7.2	7.1	7.4	8.1	7.3
Alkalinity	mg/l	62	43	44	39	34	30	38	34	36
Copper	mg/l	0.013	0.022	0.023	0.017	0.058	0.052	0.058	0.043	0.061
Hardness	mg/l	120	54	54	49	36	36	35	36	39
Iron	mg/l	0.032	< 0.015	0.021	0.026	0.047	0.12	0.026	0.0096	0.027
Manganese	mg/l	0.91	0.34	0.5	0.42	0.36	0.29	0.32	0.24	0.11
Sulfate	mg/l	12	12	12	11	17	9.0	14.0	10	11
TDS	mg/l	110	70	95	90	120	88	90	99	75
MW-1002										
Conductivity(Field)	umhos	138	151	105	109.4	122	143.2	106	99	120
pH(Field)	S.U.	7.52	7.5	7.5	7	7	6.7	7.4	7.2	6.6
Alkalinity	mg/l	42	39	35	31	38	38	42	33	30
Copper	mg/l	< 0.012	< 0.012	< 0.012	< 0.012	< 0.0016	< 0.0005	0.002	0.001	0.0016
Hardness	mg/l	52	50	45	44	46	47	42	35	38
Iron	mg/l	< 0.015	< 0.015	< 0.015	< 0.015	0.0056	0.0073	0.0039	< 0.0017	0.0040
Manganese	mg/l	< 0.004	< 0.004	< 0.004	< 0.004	< 0.0005	0.0027	0.0003	0.0004	0.0014
Sulfate	mg/l	6	7	7	6.6	6.1	6.2	7.3	5.3	7.9
TDS	mg/l	78	82	86	94	87	120	170	76	86
MW-1002G										
Conductivity(Field)	umhos	262	278	267	238	269	301	255	275	239
pH(Field)	S.U.	7.38	7	7.4	6.7	6.8	6.7	6.9	6.9	6.9
Alkalinity	mg/l	82	94	92	92	88	90	93	90	100
Copper	mg/l	< 0.012	< 0.012	< 0.012	< 0.012	< 0.0016	< 0.0005	0.0014	< 0.0007	< 0.0007
Hardness	mg/l	110	120	120	120	110	110	100	100	110
Iron	mg/l	< 0.015	< 0.015	< 0.015	< 0.015	0.0054	0.0072	0.0044	0.0019	< 0.0017
Manganese	mg/l	< 0.004	< 0.004	< 0.004	< 0.004	< 0.0005	0.0021	< 8.6E-05	< 8.6E-05	< 8.6E-05
Sulfate	mg/l	11	14	12	12	14	12	15	11	14
TDS	mg/l	190	180	170	170	200	240	170	190	160
MW-1004P										
Conductivity(Field)	umhos	329	371	287	317	303	315	292	317	308
pH(Field)	S.U.	7.61	7.3	7.4	7.1	7.1	6.7	7.4	7.2	7.0
Alkalinity	mg/l	170	140	160	160	170	170	170	170	170
Copper	mg/l	< 0.012	< 0.012	0.015	< 0.012	< 0.0016	0.0033	0.011	0.02	0.0043
Hardness	mg/l	160	150	150	150	160	150	130	130	150
Iron	mg/l	0.048	< 0.015	0.033	0.024	0.035	0.014	0.025	0.044	0.0086
Manganese	mg/l	0.04	0.02	0.045	0.028	0.029	0.029	0.031	0.077	0.028
Sulfate	mg/l	3	2	3	2.5	3.9	1.7	4.7	1.8	8.1
TDS	mg/l	230	160	180	190	200	190	250	190	170
MW-1004S										
Conductivity(Field)	umhos	186	123	109	200	124	142.4	131	126.3	144.9
pH(Field)	S.U.	7.41	7	7.8	6.8	6.7	6.2	6.7	6.9	6.3
Alkalinity	mg/l	32	42	38	140	44	100	55	50	79
Copper	mg/l	< 0.012	0.016	< 0.012	< 0.012	< 0.0016	0.0011	0.007	0.0066	0.0076
Hardness	mg/l	46	44	51	52	54	57	45	50	59
Iron	mg/l	< 0.015	< 0.015	< 0.015	< 0.015	0.0064	0.0049	0.0087	0.0031	0.0040
Manganese	mg/l	< 0.004	< 0.004	< 0.004	< 0.004	< 0.0005	0.0034	0.0009	0.0005	0.0013
Sulfate	mg/l	9	10	8	8	8.6	7.1	7.8	6.2	9.4
TDS	mg/l	98	74	100	100	150	140	150	110	110

Table 1

Groundwater Quality Results, Summary Statistics and Trend Analysis
July 1991 Through October 1995

Well/Parameter	Units	Jul-91	Oct-91	Jan-92	Apr-92	Jul-92	Oct-92	Jan-93	Apr-93	Jul-93
MW-1005										
Conductivity(Field)	umhos	1028	981	870	905	912	1013	945	971	110
pH(Field)	S.U.	7.73	7.34	6.12	6.32	6.01	6.13	6.21	6.11	6.12
Alkalinity	mg/l	84	92	86	90	90	110	94	78	74
Copper	mg/l	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.01	< 0.012
Hardness	mg/l	380	360	1000	520	440	420	400	500	410
Iron	mg/l	17	20	18	17	19	22	24	24	18
Manganese	mg/l	0.51	0.49	0.46	0.38	0.44	0.47	0.52	0.54	0.42
Sulfate	mg/l	15	12	14	16	15	15	23	15	18
TDS	mg/l	570	770	530	680	640	600	140	630	590
MW-1005P										
Conductivity(Field)	umhos	512	479	391	417	426	501	440	458	519
pH(Field)	S.U.	8.49	7.66	6.85	6.97	6.81	7.26	6.39	6.52	7.59
Alkalinity	mg/l	260	260	260	260	270	270	260	250	250
Copper	mg/l	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.01	< 0.012
Hardness	mg/l	230	230	240	240	260	260	240	250	230
Iron	mg/l	1.2	1	0.75	1	0.95	1.2	1.1	0.46	0.61
Manganese	mg/l	0.22	0.15	0.16	0.13	0.15	0.1	0.11	0.15	0.14
Sulfate	mg/l	< 10	< 10	< 10	< 10	< 10	< 10	< 10	2	3
TDS	mg/l	290	440	280	350	270	320	220	240	260
MW-1005S										
Conductivity(Field)	umhos	377	351	303	324	331	391	418	360	372
pH(Field)	S.U.	7.68	7.37	6.88	7.48	6.68	7.38	6.99	6.38	7.28
Alkalinity	mg/l	170	170	170	180	170	190	180	81	170
Copper	mg/l	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.01	< 0.012
Hardness	mg/l	170	170	250	290	220	270	180	210	160
Iron	mg/l	3	3.8	3.6	3.7	4.1	3.9	4.1	4.4	4.2
Manganese	mg/l	0.21	0.22	0.21	0.2	0.21	0.2	0.21	0.23	0.22
Sulfate	mg/l	< 10	< 10	< 10	< 10	< 10	< 10	10	8	9
TDS	mg/l	220	370	< 20	210	220	260	160	200	200
MW-1010P										
Conductivity(Field)	umhos	337	326	292	314	285	389	357	357	313
pH(Field)	S.U.	8.47	8.26	6.87	7.62	6.86	7.49	7.21	6.62	7.21
Alkalinity	mg/l	140	160	150	160	160	180	190	170	150
Copper	mg/l	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.012
Hardness	mg/l	140	130	130	140	180	160	130	130	130
Iron	mg/l	< 0.055	< 0.055	0.15	< 0.055	< 0.055	< 0.055	< 0.055	0.055	< 0.015
Manganese	mg/l	0.26	0.28	0.25	0.2	0.086	0.14	0.031	0.14	0.035
Sulfate	mg/l	< 10	10	16	14	< 10	< 10	32	28	11
TDS	mg/l	180	250	200	340	180	280	210	270	180

Table 1

Groundwater Quality Results, Summary Statistics and Trend Analysis
July 1991 Through October 1995

Well/Parameter	Units	Oct-93	Jan-94	Apr-94	Jul-94	Oct-94	Jan-95	Apr-95	Jul-95	Oct-95
MW-1005										
Conductivity(Field)	umhos	1005	1072	1082	1093	1028	1035	1014	1049	976
pH(Field)	S.U.	6.68	6.3	7.6	6.2	6.1	6.2	6.2	6.3	6.2
Alkalinity	mg/l	84	81	88	75	78	84	79	75	55
Copper	mg/l	< 0.012	< 0.012	< 0.012	< 0.012	< 0.0016	< 0.0005	0.0013	< 0.0007	< 0.0007
Hardness	mg/l	390	440	450	450	420	370	320	320	360
Iron	mg/l	25	24	24	31	28	29	28	28	32
Manganese	mg/l	0.61	0.53	0.54	0.69	0.63	0.65	0.6	0.64	0.7
Sulfate	mg/l	17	18	13	14	20	14	18	14	21
TDS	mg/l	680	560	620	600	820	660	770	730	740
MW-1005P										
Conductivity(Field)	umhos	462	487	487	456	452	511	420	454	470
pH(Field)	S.U.	7.53	7.3	7.2	6.9	7.2	7.1	7.5	7.2	7.2
Alkalinity	mg/l	250	250	250	240	250	270	270	280	260
Copper	mg/l	< 0.012	< 0.012	< 0.012	< 0.012	< 0.0016	0.0044	0.0037	0.0018	0.0021
Hardness	mg/l	220	230	230	230	250	230	200	200	230
Iron	mg/l	0.17	0.19	0.2	0.22	0.24	0.04	0.08	0.07	0.17
Manganese	mg/l	0.069	0.35	0.16	0.1	0.62	0.041	0.041	0.09	0.072
Sulfate	mg/l	< 2	< 2	< 2	< 2	2.5	< 0.56	< 0.56	< 0.56	5.3
TDS	mg/l	300	260	270	270	280	340	300	290	260
MW-1005S										
Conductivity(Field)	umhos	321	357	344	322	320	425	315	358	354
pH(Field)	S.U.	7.28	7.2	7.5	6.9	7.3	6.7	7.0	6.9	7.1
Alkalinity	mg/l	170	160	160	160	160	160	160	170	170
Copper	mg/l	< 0.012	< 0.012	< 0.012	< 0.012	< 0.0016	< 0.0005	< 0.0007	< 0.0007	< 0.0007
Hardness	mg/l	160	160	160	160	160	150	130	140	160
Iron	mg/l	4.2	4	4.1	4.1	3.7	4.2	4.0	3.8	4.3
Manganese	mg/l	0.24	0.2	0.2	0.2	0.19	0.22	0.2	0.2	0.22
Sulfate	mg/l	6	9	8	7.2	13	8.9	9.3	6.9	14
TDS	mg/l	220	190	200	210	240	240	190	220	220
MW-1010P										
Conductivity(Field)	umhos	294	283	276	322	309	337	311	315	291
pH(Field)	S.U.	7.51	7.3	7.4	7.2	7.5	7.6	7.4	7.6	7.4
Alkalinity	mg/l	160	160	160	160	160	160	170	160	140
Copper	mg/l	< 0.012	< 0.012	< 0.012	< 0.012	0.0032	0.0067	0.0097	0.021	0.063
Hardness	mg/l	130	150	150	150	150	160	130	130	140
Iron	mg/l	< 0.015	< 0.015	< 0.015	< 0.015	0.0046	0.0040	0.0050	0.0017	0.037
Manganese	mg/l	0.081	0.17	0.014	0.01	0.014	0.06	0.051	0.011	0.021
Sulfate	mg/l	5	3	3	3.4	4.5	3.3	5.0	2.4	9.6
TDS	mg/l	230	170	180	190	200	250	240	200	200

Table 1

Groundwater Quality Results, Summary Statistics and Trend Analysis
July 1991 Through October 1995

Well/Parameter	Units	Sample Size	Total Detections	Percent Detected	Mann-Kendall S	p-Level	
MW-1000P							
Conductivity(Field)	umhos	18	18	100.0%	-85	0	-
pH(Field)	S.U.	18	18	100.0%	42	0.122	
Alkalinity	mg/l	18	18	100.0%	-106	0	-
Copper	mg/l	18	12	66.7%	111	0	+
Hardness	mg/l	18	18	100.0%	-92	0	-
Iron	mg/l	18	17	94.4%	-94	0	-
Manganese	mg/l	18	18	100.0%	-106	0	-
Sulfate	mg/l	18	15	83.3%	19	0.5	
TDS	mg/l	18	18	100.0%	-89	0	-
MW-1002							
Conductivity(Field)	umhos	18	18	100.0%	-64	0.016	
pH(Field)	S.U.	18	18	100.0%	17	0.55	
Alkalinity	mg/l	18	18	100.0%	-85	0	-
Copper	mg/l	18	3	16.7%	5(1)	0.359(1)	
Hardness	mg/l	18	18	100.0%	-95	0	-
Iron	mg/l	18	7	38.9%	10	0.737	
Manganese	mg/l	18	7	38.9%	14	0.627	
Sulfate	mg/l	18	13	72.2%	25	0.368	
TDS	mg/l	18	18	100.0%	-36	0.188	
MW-1002G							
Conductivity(Field)	umhos	18	18	100.0%	22	0.432	
pH(Field)	S.U.	18	18	100.0%	-6	0.852	
Alkalinity	mg/l	18	18	100.0%	56	0.036	
Copper	mg/l	18	1	5.6%	0(1)	1(1)	
Hardness	mg/l	18	18	100.0%	-15	0.6	
Iron	mg/l	18	4	22.2%	-8(1)	0.084(1)	
Manganese	mg/l	18	2	11.1%	-7	0.822	
Sulfate	mg/l	18	17	94.4%	68	0.009	+
TDS	mg/l	18	18	100.0%	13	0.654	
MW-1004P							
Conductivity(Field)	umhos	18	18	100.0%	9	0.766	
pH(Field)	S.U.	18	18	100.0%	-19	0.5	
Alkalinity	mg/l	18	18	100.0%	16	0.575	
Copper	mg/l	18	5	27.8%	61	0.022	
Hardness	mg/l	18	18	100.0%	-61	0.022	
Iron	mg/l	18	16	88.9%	-67	0.01	
Manganese	mg/l	18	17	94.4%	-50	0.063	
Sulfate	mg/l	18	11	61.1%	0(2)	1(2)	
TDS	mg/l	18	18	100.0%	4	0.911	
MW-1004S							
Conductivity(Field)	umhos	18	18	100.0%	-23	0.41	
pH(Field)	S.U.	18	18	100.0%	-51	0.058	
Alkalinity	mg/l	18	18	100.0%	21	0.454	
Copper	mg/l	18	5	27.8%	59	0.026	
Hardness	mg/l	18	18	100.0%	-56	0.036	
Iron	mg/l	18	5	27.8%	-4(1)	0.484(1)	
Manganese	mg/l	18	4	22.2%	2(1)	0.816(1)	
Sulfate	mg/l	18	14	77.8%	-16	0.575	
TDS	mg/l	18	18	100.0%	0	1	

Table 1

Groundwater Quality Results, Summary Statistics and Trend Analysis
July 1991 Through October 1995

Well/Parameter	Units	Sample Size	Total Detections	Percent Detected	Mann-Kendall S	p-Level	
MW-1005							
Conductivity(Field)	umhos	18	18	100.0%	52	0.053	
pH(Field)	S.U.	18	18	100.0%	-15	0.6	
Alkalinity	mg/l	18	18	100.0%	-69	0.008	-
Copper	mg/l	18	1	5.6%	0(1)	1(1)	
Hardness	mg/l	18	18	100.0%	-48	0.075	
Iron	mg/l	18	18	100.0%	108	0	+
Manganese	mg/l	18	18	100.0%	94	0	+
Sulfate	mg/l	18	18	100.0%	30	0.277	
TDS	mg/l	18	18	100.0%	44	0.104	
MW-1005P							
Conductivity(Field)	umhos	18	18	100.0%	6	0.852	
pH(Field)	S.U.	18	18	100.0%	-8	0.794	
Alkalinity	mg/l	18	18	100.0%	-5	0.882	
Copper	mg/l	18	4	22.2%	0(1)	1(1)	
Hardness	mg/l	18	18	100.0%	-47	0.082	
Iron	mg/l	18	18	100.0%	-98	0	-
Manganese	mg/l	18	18	100.0%	-53	0.048	
Sulfate	mg/l	18	4	22.2%	-2(2)	0.94(2)	
TDS	mg/l	18	18	100.0%	-14	0.627	
MW-1005S							
Conductivity(Field)	umhos	18	18	100.0%	-13	0.654	
pH(Field)	S.U.	18	18	100.0%	-30	0.277	
Alkalinity	mg/l	18	18	100.0%	-41	0.132	
Copper	mg/l	18	0	0.0%	0	1	
Hardness	mg/l	18	18	100.0%	-91	0	-
Iron	mg/l	18	18	100.0%	46	0.089	
Manganese	mg/l	18	18	100.0%	-20	0.477	
Sulfate	mg/l	18	12	66.7%	6(3)	0.738(3)	
TDS	mg/l	18	17	94.4%	5	0.882	
MW-1010P							
Conductivity(Field)	umhos	18	18	100.0%	-31	0.26	
pH(Field)	S.U.	18	18	100.0%	1	1	
Alkalinity	mg/l	18	18	100.0%	7	0.822	
Copper	mg/l	18	5	27.8%	75	0.004	+
Hardness	mg/l	18	18	100.0%	9	0.766	
Iron	mg/l	18	7	38.9%	40	0.142	
Manganese	mg/l	18	18	100.0%	-93	0	-
Sulfate	mg/l	18	15	83.3%	-12	0.681	
TDS	mg/l	18	18	100.0%	-8	0.794	

+ : Implies Statistically Increasing Trend

- : Implies Statistically Decreasing Trend

(1) : Based on October 1994 Through October 1995 Results Only

(2) : Based on April 1993 Through October 1995 Results Only

(3) : Based on January 1993 Through October 1995 Results Only

Table 2

Surface Water Quality Results, Summary Statistics and Trend Analysis
July 1991 Through October 1995

Well/Parameter	Units	Jul-91	Oct-91	Jan-92	Apr-92	Jul-92	Oct-92	Jan-93	Apr-93	Jul-93
SW-1										
Conductivity(Field)	umhos	112	102	84	74	86	134	136	84	87
pH(Field)	S.U.	7.43	7.92	6.95	6.71	6.75	7.23	6.71	7.07	7.29
Aluminum	mg/l	< 0.4	0.08	0.7	0.75	0.14	0.42	0.11	0.13	0.18
Arsenic	mg/l	< 0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.0028
Beryllium	mg/l	< 0.2	< 0.2	< 0.2	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0004
Cadmium	mg/l	< 0.0002	0.001	< 0.0002	< 0.0002	0.0006	< 0.0002	0.0007	< 0.0002	< 0.0008
Chromium	mg/l	0.0027	< 0.002	0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.002
Chromium IV	mg/l	0.01	< 0.02	0.009	< 0.02	< 0.018	< 0.02	< 0.005	< 0.005	< 0.005
Copper	mg/l	< 0.003	0.004	0.003	0.005	0.002	0.004	< 0.002	< 0.002	< 0.012
Diss O2	mg/l	6.2	11	12	11.2	7.4	9.9	11	6.8	10
Hardness	mg/l	100	46	50	34	23	52	52	40	44
Lead	mg/l	0.0012	< 0.003	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.001	< 0.005
Mercury	mg/l	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Nickel	mg/l	< 0.05	< 0.016	< 0.05	< 0.02	< 0.018	< 0.02	< 0.02	< 0.02	< 0.016
Selenium	mg/l	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Silver	mg/l	< 0.0005	< 0.002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.002
Sulfide	mg/l									
TDS	mg/l	140	98	90	86	90	90	100	66	66
TSS	mg/l	< 1	14	4	< 1	9	4	< 1	2	5
Zinc	mg/l	0.02	24	0.008	0.011	0.006	< 0.003	0.007	< 0.003	< 0.003
SW-2										
Conductivity(Field)	umhos	120	104	144	69	85	117	158	85	100
pH(Field)	S.U.	7.92	8.01	7.09	6.19	7.1	7.11	7.05	7.25	7.14
Aluminum	mg/l	< 0.4	0.06	0.42	0.72	0.14	0.54	0.07	0.11	0.36
Arsenic	mg/l	< 0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.0027
Beryllium	mg/l	< 0.2	< 0.2	< 0.2	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0004
Cadmium	mg/l	< 0.0002	0.0005	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0008
Chromium	mg/l	0.0012	< 0.002	0.002	< 0.001	0.001	< 0.001	< 0.001	0.001	0.0021
Chromium IV	mg/l	0.009	< 0.02	0.007	< 0.02	< 0.013	< 0.02	< 0.005	< 0.005	< 0.005
Copper	mg/l	0.0042	< 0.002	0.004	< 0.002	< 0.002	0.004	0.004	0.002	< 0.012
Diss O2	mg/l	6.5	10	12	11.5	7.6	10	12	11	9.7
Hardness	mg/l	48	47	50	34	28	68	52	40	76
Lead	mg/l	0.0012	< 0.003	0.001	< 0.001	0.003	< 0.001	< 0.001	< 0.001	< 0.005
Mercury	mg/l	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Nickel	mg/l	< 0.05	< 0.016	< 0.05	< 0.02	< 0.018	< 0.02	< 0.02	< 0.02	< 0.016
Selenium	mg/l	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Silver	mg/l	< 0.0005	< 0.002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.002
Sulfide	mg/l									
TDS	mg/l	140	85	87	120	120	96	110	74	100
TSS	mg/l	< 1	4	< 1	< 1	7	5	< 1	1	11
Zinc	mg/l	0.02	< 3	0.004	0.009	0.008	< 0.003	0.008	< 0.003	0.009

Table 2

Surface Water Quality Results, Summary Statistics and Trend Analysis
July 1991 Through October 1995

Well/Parameter	Units	Nov-93	Jan-94	Apr-94	Jul-94	Oct-94	Jan-95	Apr-95	Jul-95	Oct-95
SW-1										
Conductivity(Field)	umhos	118.9	203	118	117	78	128.5	78.1	105.5	112.5
pH(Field)	S.U.	8.59	7.8	8	7.4	7.2	8.14	7.7	7.18	7.74
Aluminum	mg/l	0.047	0.12	0.29	0.07	0.2	0.059	0.093	0.06	0.096
Arsenic	mg/l	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.0014	< 0.0014	< 0.0018	< 0.0018
Beryllium	mg/l	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0003	< 0.0003	< 8.3E-05	0.0001
Cadmium	mg/l	< 0.0006	< 0.0002	0.0004	< 0.0002	< 0.0008	< 0.0005	0.0002	< 0.0002	0.0002
Chromium	mg/l	0.004	< 0.001	0.0018	0.0018	0.0025	< 0.0006	0.0043	< 0.0006	0.0014
Chromium IV	mg/l		< 0.005	< 0.005	< 0.005	< 0.0015	< 0.0015	< 0.0015	< 0.0015	< 0.006
Copper	mg/l	< 0.002	0.0044	< 0.002	0.0027	0.002	0.0078	< 0.0038	< 0.0017	0.0037
Diss O2	mg/l	9	11.9	5.8	8.5	10.1	9	9.3	9.1	8.2
Hardness	mg/l	56	64	43	48	36	48	36	43	40
Lead	mg/l	< 0.001	< 0.001	0.01	0.0025	0.0011	< 0.0008	0.0045	< 0.002	0.0082
Mercury	mg/l	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 9.5E-05	< 9.5E-05	< 9.5E-05	< 9.5E-05
Nickel	mg/l	< 0.016	< 0.016	< 0.016	< 0.016	< 0.016	< 0.0059	< 0.0059	< 0.0008	0.0026
Selenium	mg/l	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.0015	< 0.0015	< 0.0015	< 0.0015
Silver	mg/l	< 0.0015	< 0.0005	< 0.0005	< 0.0005	< 0.0025	0.0016	0.0013	< 0.0011	< 0.0011
Sulfide	mg/l	< 2			< 2	< 2	< 2	< 2	< 2	< 2
TDS	mg/l	91	93	84	96	100	120	100	80	120
TSS	mg/l	< 1	1	3	< 1	8	8	10	7	< 1
Zinc	mg/l	< 0.003	0.007	0.009	0.011	0.017	0.016	< 0.012	< 0.012	< 0.012
SW-2										
Conductivity(Field)	umhos	132.6	151	124	119	82	158	86	170	126
pH(Field)	S.U.	7.93	8.1	8	7.6	7.1	8.19	7.7	7.38	7.95
Aluminum	mg/l	0.072	0.036	0.31	0.14	0.22	0.26	0.12	0.043	0.12
Arsenic	mg/l	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.0014	< 0.0014	< 0.0018	< 0.0018
Beryllium	mg/l	< 0.001	< 0.001	< 0.001	0.0012	0.0012	0.0012	0.0006	< 8.3E-05	0.0001
Cadmium	mg/l	< 0.0006	< 0.0002	< 0.0002	0.0002	< 0.0008	< 0.0005	< 0.0016	< 0.0002	0.0003
Chromium	mg/l	0.004	< 0.001	0.0019	0.0023	0.0037	< 0.0006	0.0044	< 0.0006	0.002
Chromium IV	mg/l		< 0.005	< 0.005	< 0.005	< 0.0015	< 0.0015	< 0.0015	< 0.0015	< 0.006
Copper	mg/l	0.0032	< 0.002	0.0051	0.0036	0.0057	0.011	< 0.0038	< 0.0017	0.0043
Diss O2	mg/l	8.5	11.6	6.6	8.8	9.3	8.6	10.8	10.2	8.5
Hardness	mg/l	60	60	40	48	38	55	36	46	46
Lead	mg/l	< 0.001	< 0.001	< 0.001	0.0014	0.0015	0.0097	0.0061	< 0.002	0.0083
Mercury	mg/l	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 9.5E-05	< 9.5E-05	< 9.5E-05	< 9.5E-05
Nickel	mg/l	< 0.016	< 0.016	< 0.016	< 0.016	< 0.016	< 0.0059	< 0.0059	< 0.0008	0.0008
Selenium	mg/l	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.0015	< 0.0015	< 0.0015	< 0.0015
Silver	mg/l	< 0.0015	< 0.0005	< 0.0005	< 0.0005	< 0.0025	< 0.0009	0.0018	< 0.0011	< 0.0011
Sulfide	mg/l	< 2			< 2	< 2	< 2	< 2	< 2	< 2
TDS	mg/l	88	83	82	100	92	150	81	63	110
TSS	mg/l	< 1	< 1	13	10	8	6	< 1	6	3
Zinc	mg/l	0.004	0.05	0.007	0.009	0.023	0.021	< 0.012	< 0.012	0.013

Table 2

Surface Water Quality Results, Summary Statistics and Trend Analysis
July 1991 Through October 1995

Well/Parameter	Units	Sample Size	Total Detections	Percent Detected	Mann-Kendall S	p-Level
SW-1						
Conductivity(Field)	umhos	18	18	100.0%	10	0.737
pH(Field)	S.U.	18	18	100.0%	36	0.188
Aluminum	mg/l	18	17	94.4%	-29	0.294
Arsenic	mg/l	18	1	5.6%	-1	1
Beryllium	mg/l	18	1	5.6%	17	0.55
Cadmium	mg/l	18	6	33.3%	-7	0.822
Chromium	mg/l	18	8	44.4%	17	0.55
Chromium IV	mg/l	17	2	11.8%	-29	0.253
Copper	mg/l	18	10	55.6%	-9	0.766
Diss O2	mg/l	18	18	100.0%	-25	0.368
Hardness	mg/l	18	18	100.0%	-28	0.312
Lead	mg/l	18	7	38.9%	38	0.164
Mercury	mg/l	18	0	0.0%	0	1
Nickel	mg/l	18	1	5.6%	17	0.55
Selenium	mg/l	18	0	0.0%	0	1
Silver	mg/l	18	2	11.1%	23	0.41
Sulfide	mg/l	7	0	0.0%	0	1
TDS	mg/l	18	18	100.0%	21	0.454
TSS	mg/l	18	12	66.7%	10	0.737
Zinc	mg/l	18	11	61.1%	-34	0.215
SW-2						
Conductivity(Field)	umhos	18	18	100.0%	30	0.277
pH(Field)	S.U.	18	18	100.0%	44	0.104
Aluminum	mg/l	18	17	94.4%	-9	0.766
Arsenic	mg/l	18	1	5.6%	-1	1
Beryllium	mg/l	18	5	27.8%	50	0.063
Cadmium	mg/l	18	3	16.7%	8	0.794
Chromium	mg/l	18	10	55.6%	32	0.245
Chromium IV	mg/l	17	2	11.8%	-29	0.253
Copper	mg/l	18	11	61.1%	19	0.5
Diss O2	mg/l	18	18	100.0%	-18	0.525
Hardness	mg/l	18	18	100.0%	-11	0.708
Lead	mg/l	18	8	44.4%	36	0.188
Mercury	mg/l	18	0	0.0%	0	1
Nickel	mg/l	18	1	5.6%	17	0.55
Selenium	mg/l	18	0	0.0%	0	1
Silver	mg/l	18	1	5.6%	13	0.654
Sulfide	mg/l	7	0	0.0%	0	1
TDS	mg/l	18	18	100.0%	-32	0.245
TSS	mg/l	18	11	61.1%	27	0.33
Zinc	mg/l	18	13	72.2%	16	0.575

+ : Implies Statistically Increasing Trend

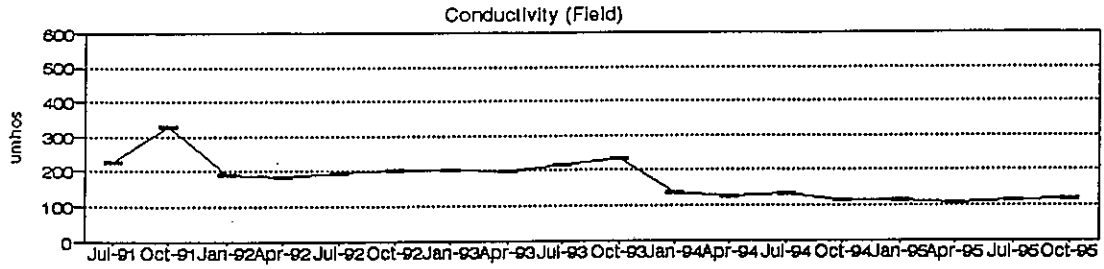
- : Implies Statistically Decreasing Trend

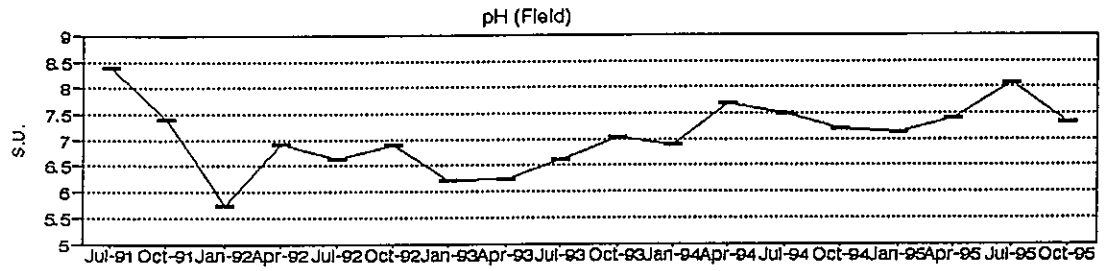
Attachment 1

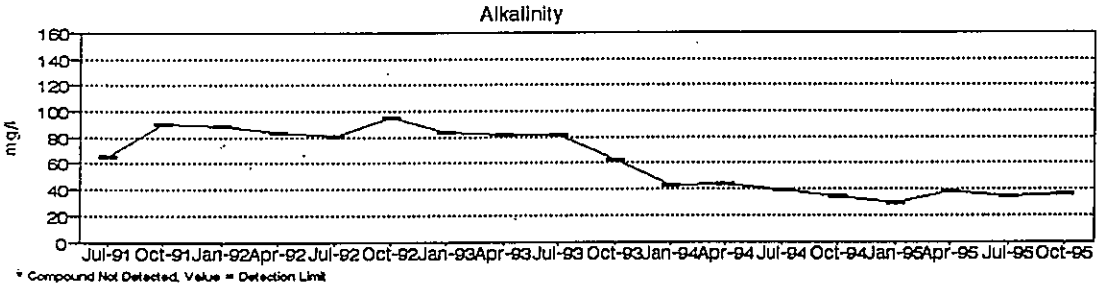
Historical Trend Plots
Groundwater

Flambeau Mining Company
Groundwater Quality Results

MW-1000P







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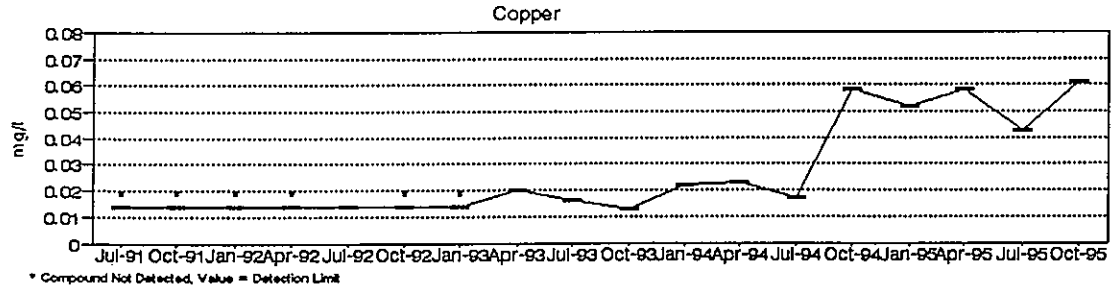

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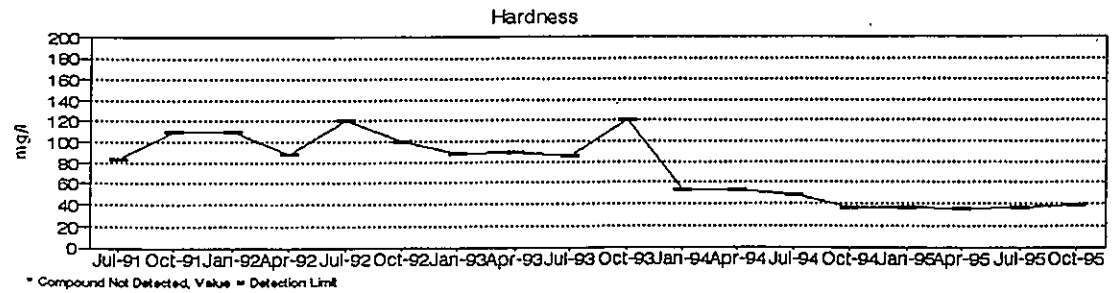

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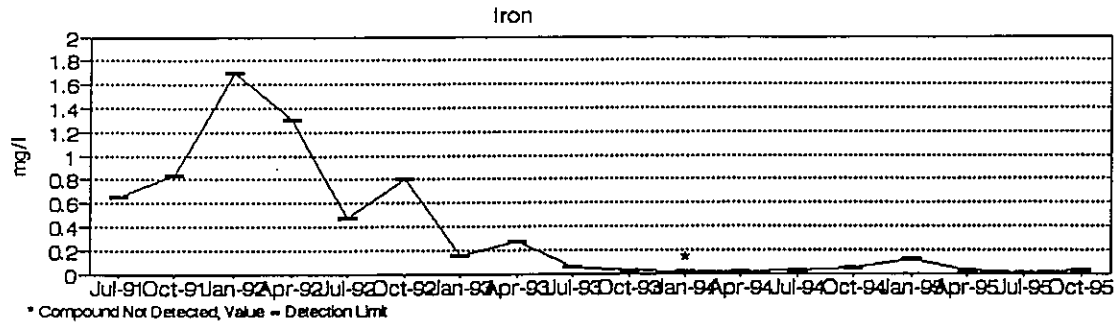
Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Groundwater Quality Results

MW-1000P



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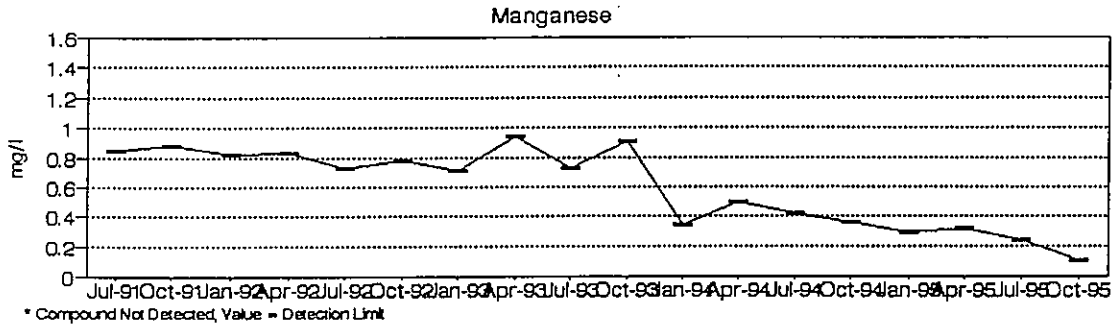

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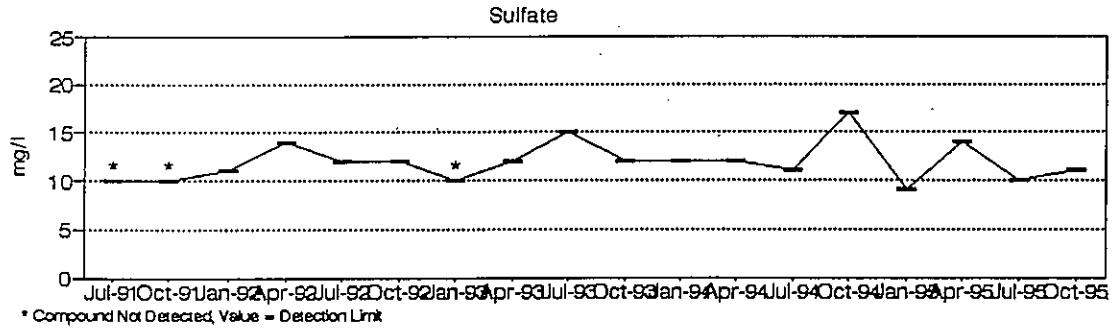

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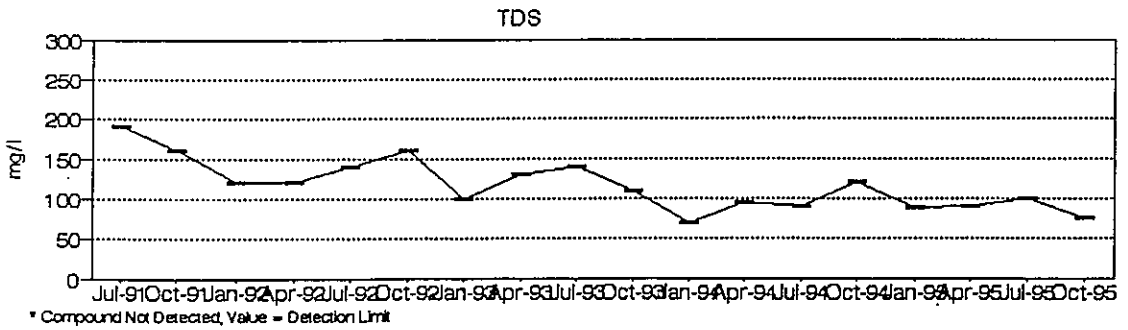

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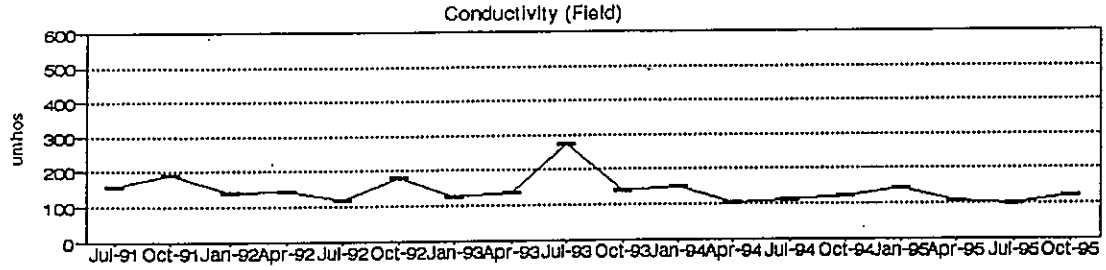
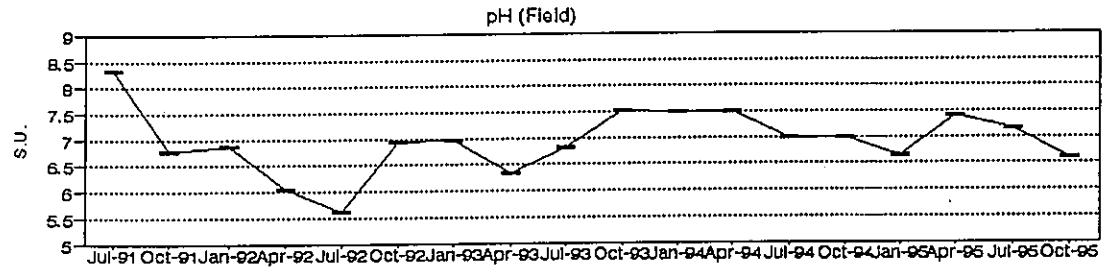
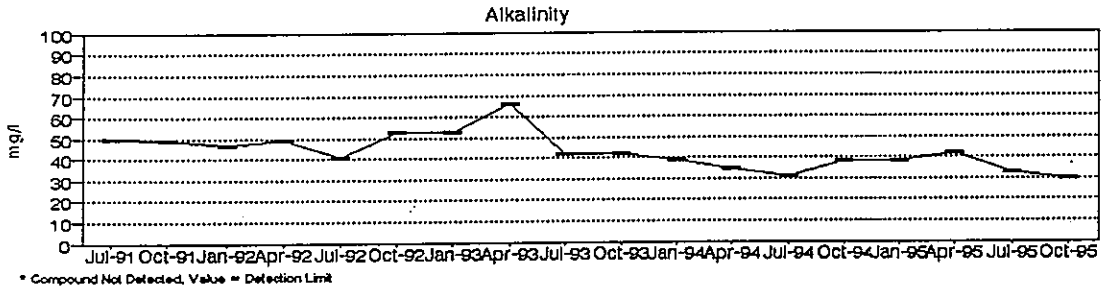
Prepared By: SGL Checked By: JBH1

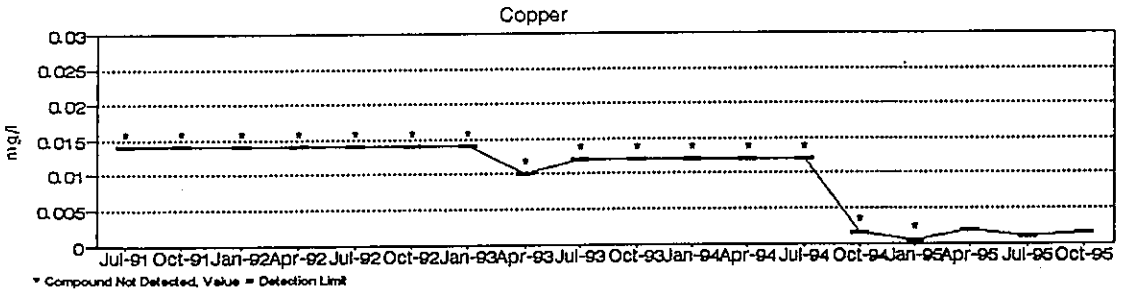
Flambeau Mining Company
Groundwater Quality Results

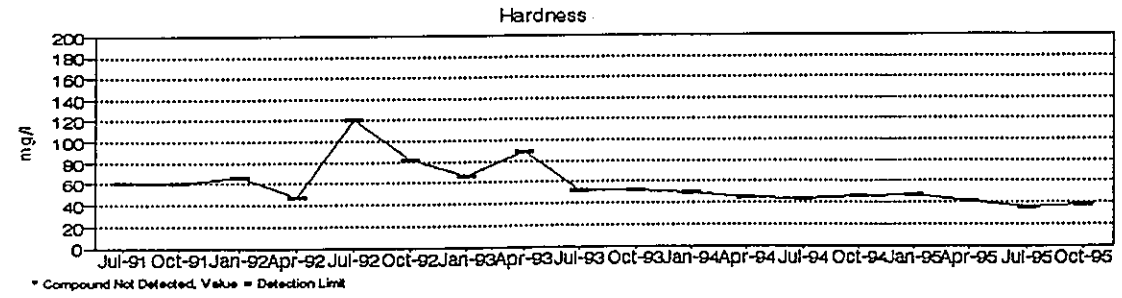
MW-1002







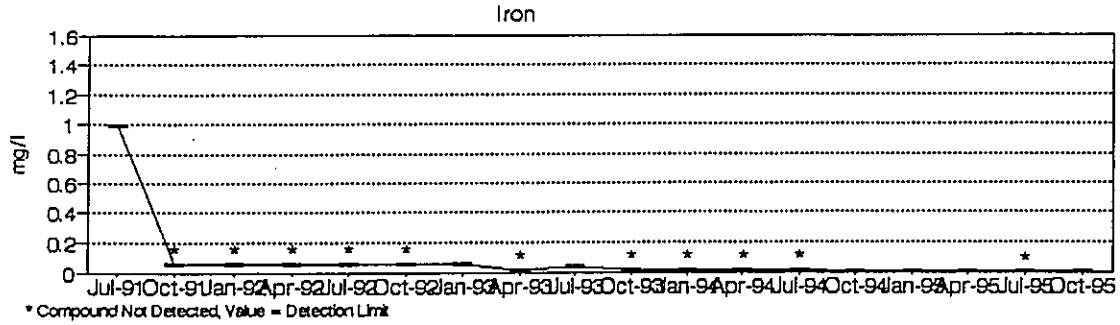




Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Groundwater Quality Results

MW-1002



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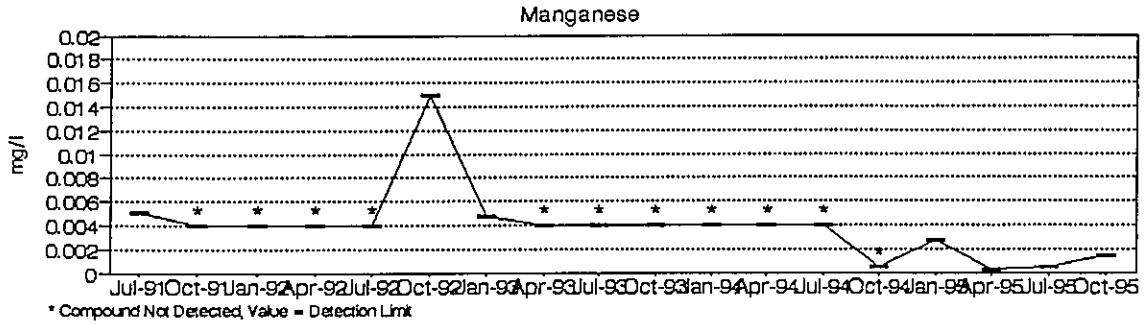

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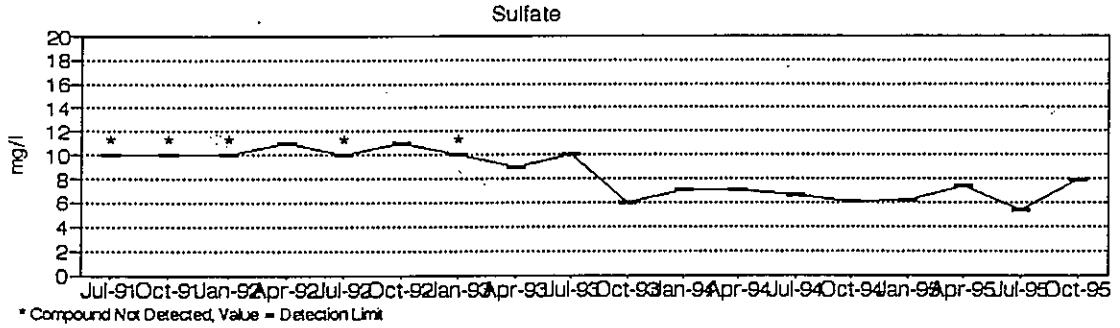

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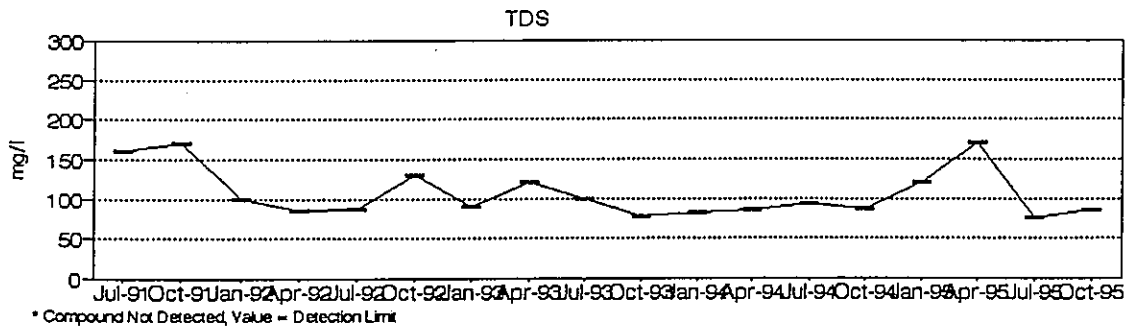

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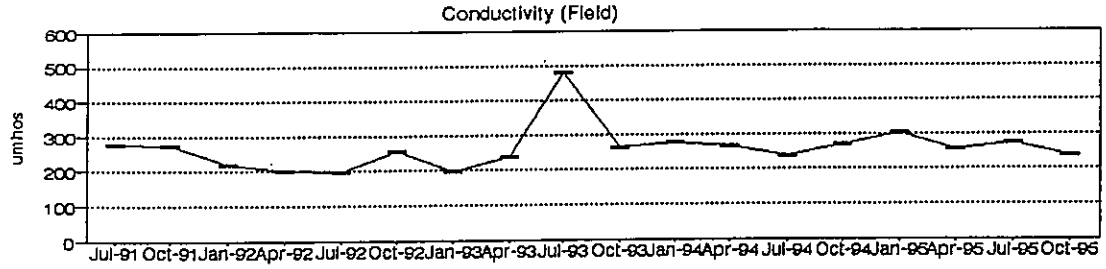
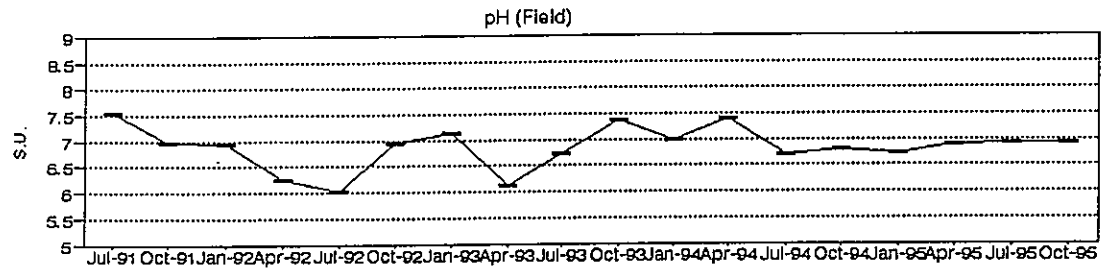
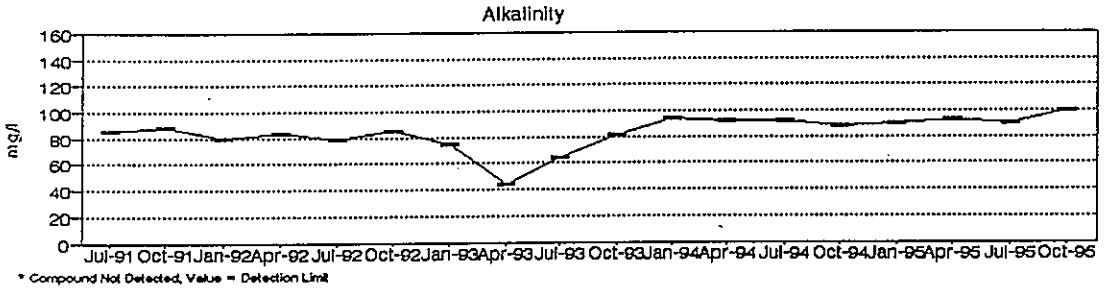
Prepared By: SGL Checked By: JBH1

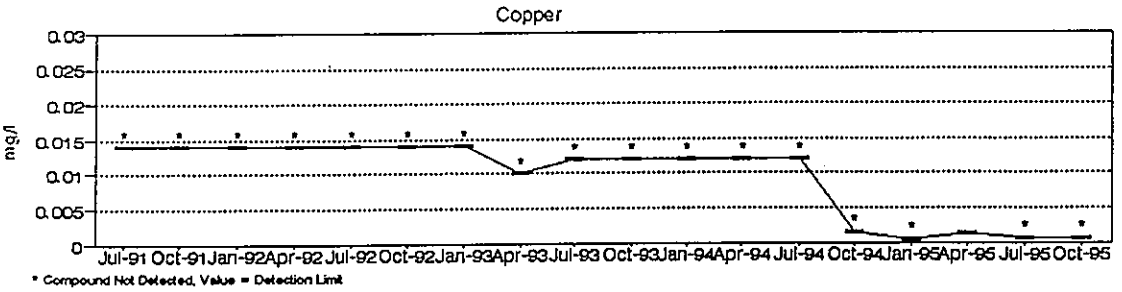
Flambeau Mining Company
Groundwater Quality Results

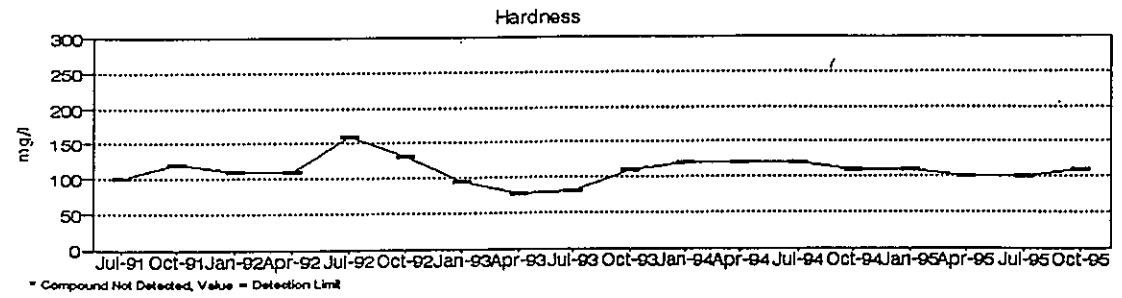
MW-1002G







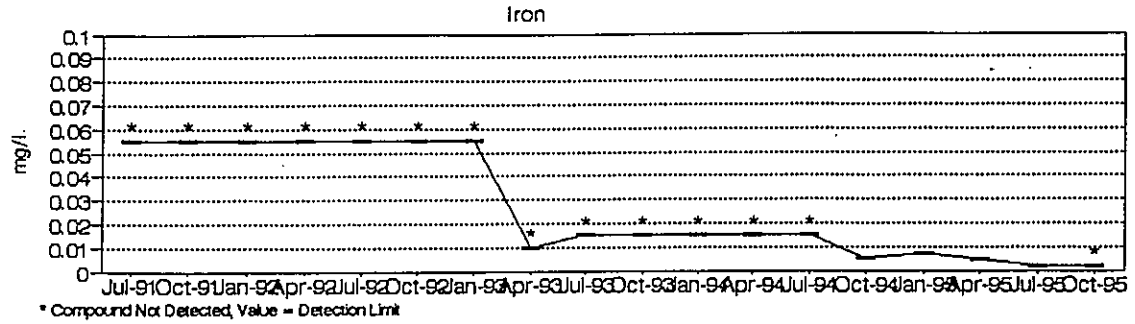




Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Groundwater Quality Results

MW-1002G



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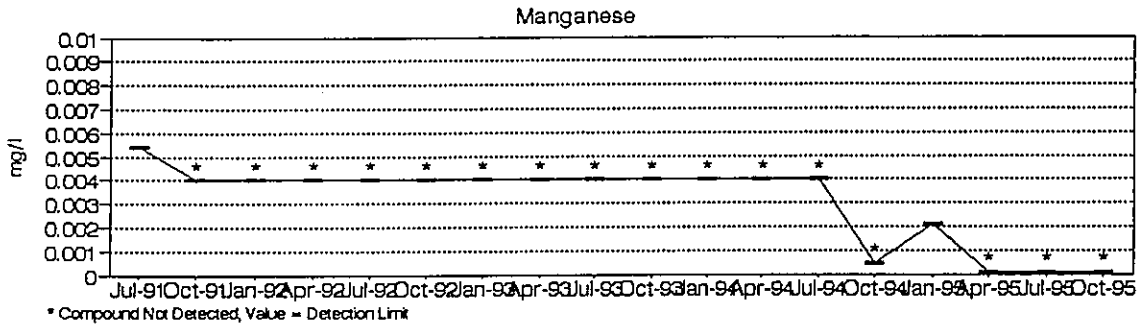

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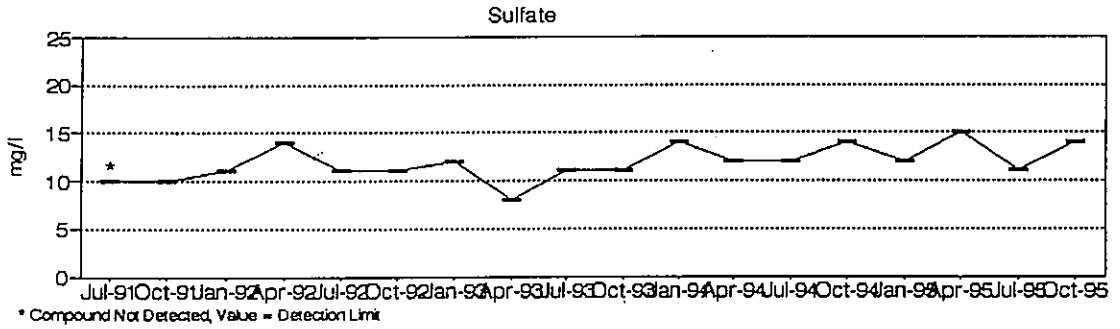

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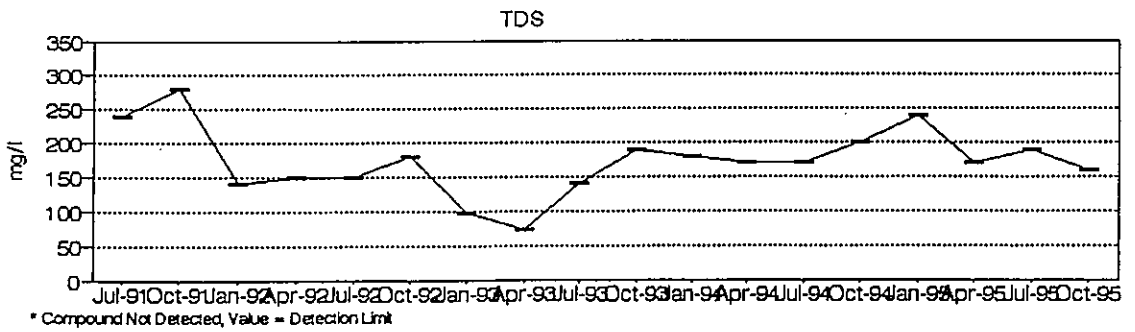

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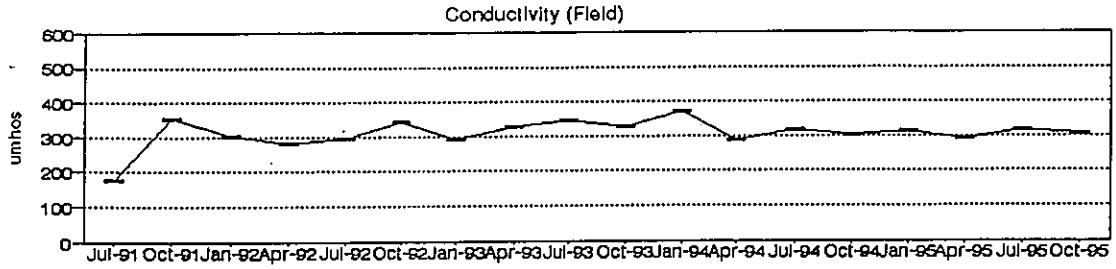
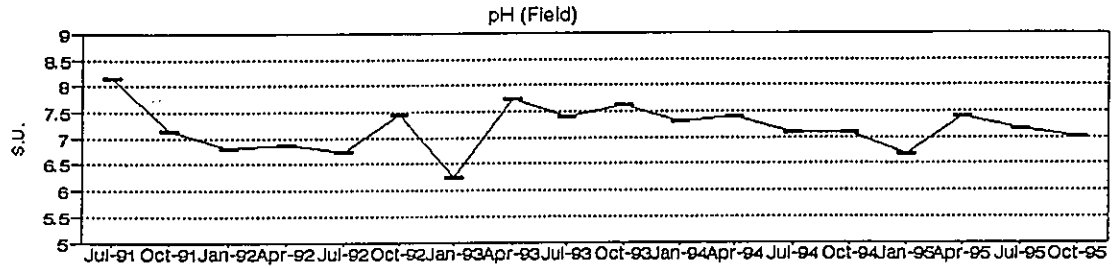
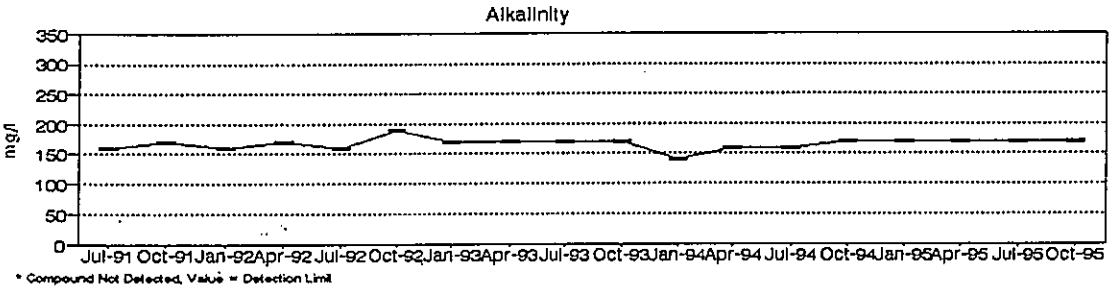
Prepared By: SGL Checked By: JBH1

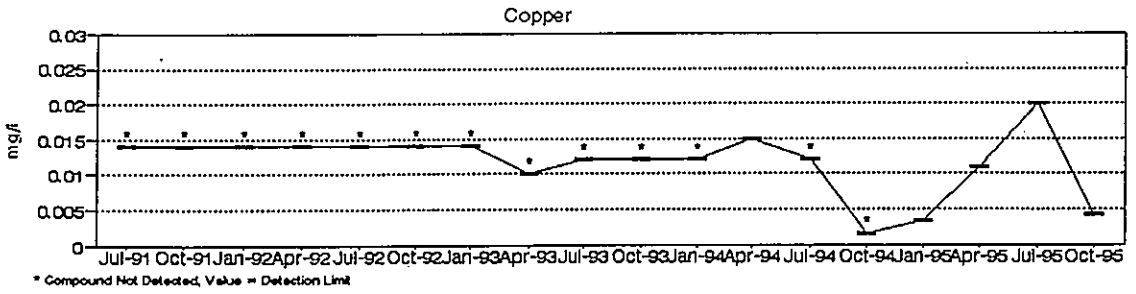
Flambeau Mining Company
Groundwater Quality Results

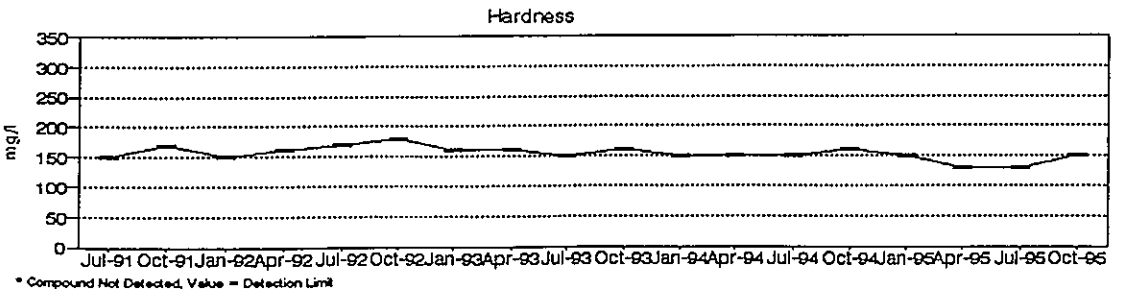
MW-1004P









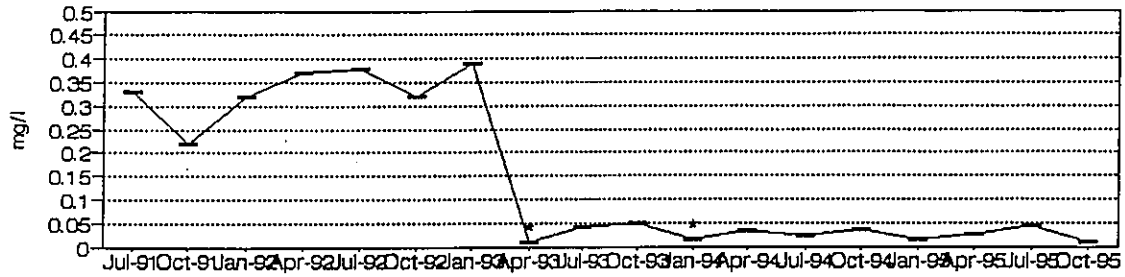


Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Groundwater Quality Results

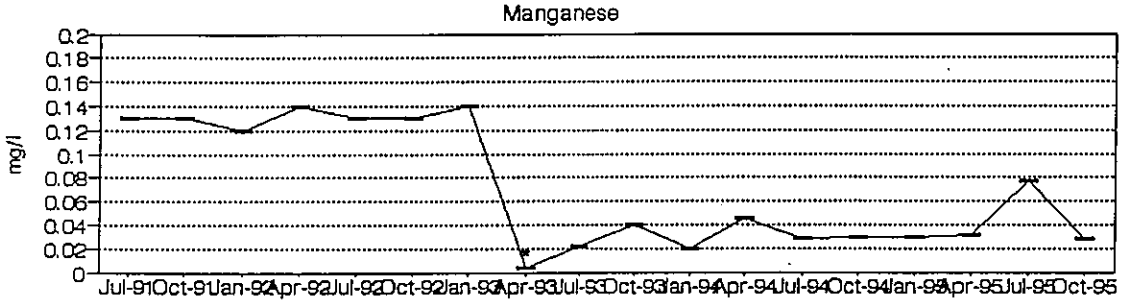
MW-1004P

Iron



* Compound Not Detected, Value = Detection Limit

Manganese



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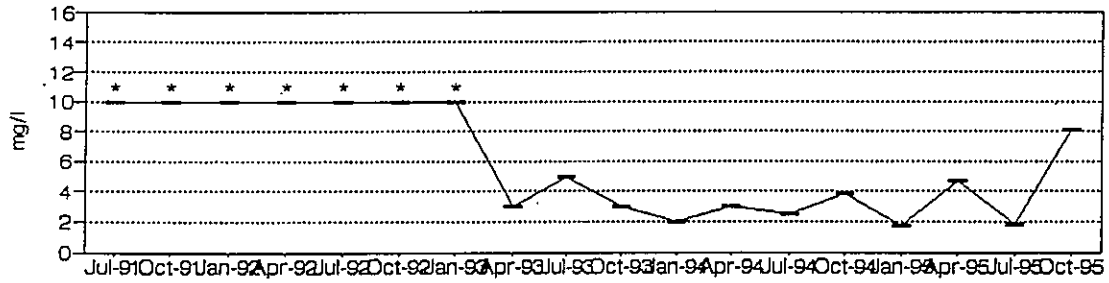
Sulfate



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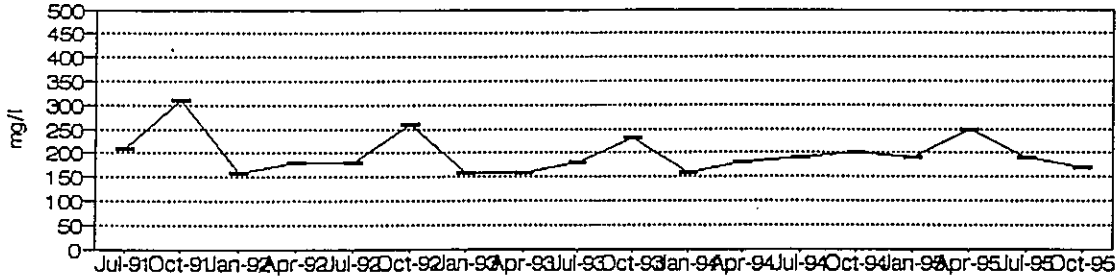
TDS

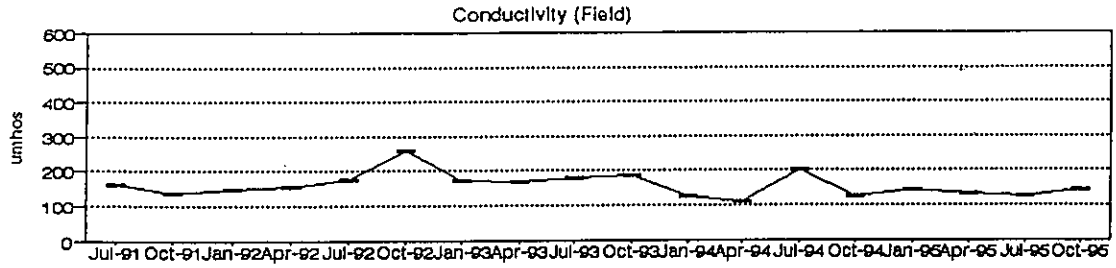


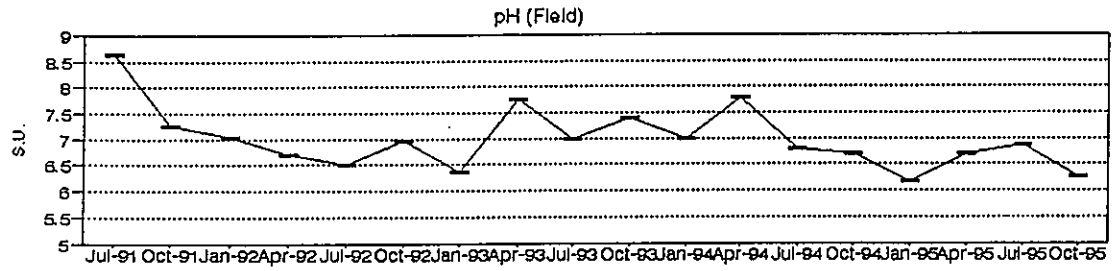
* Compound Not Detected, Value = Detection Limit

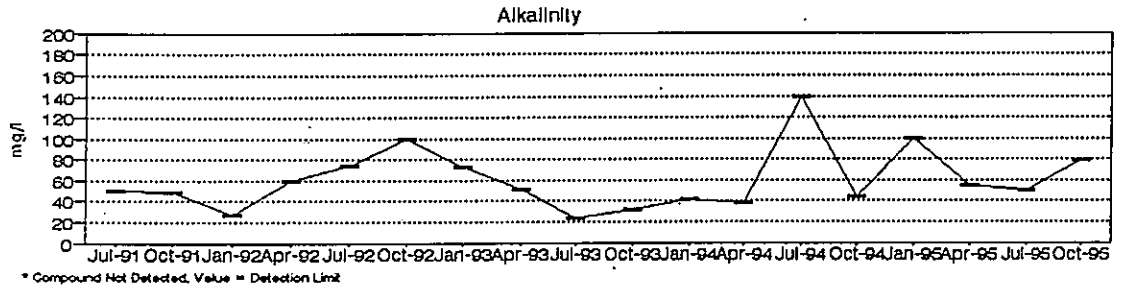
Prepared By: SGL Checked By: JBH1

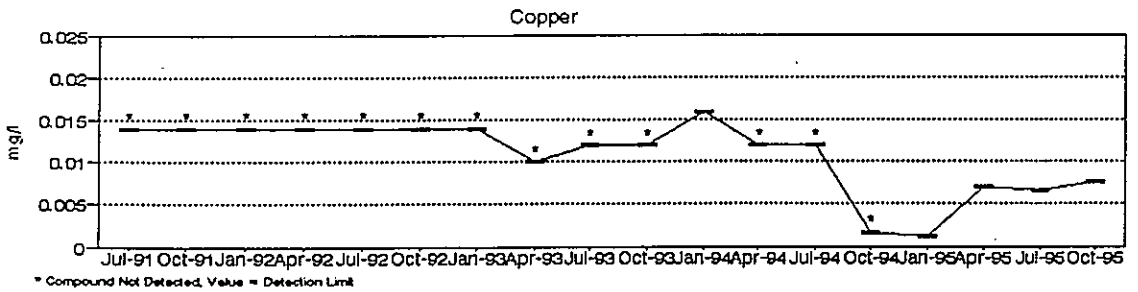
Flambeau Mining Company
Groundwater Quality Results

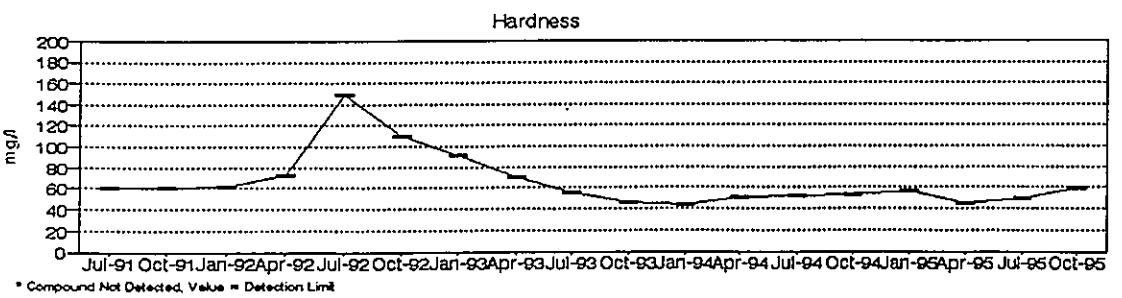
MW-1004S







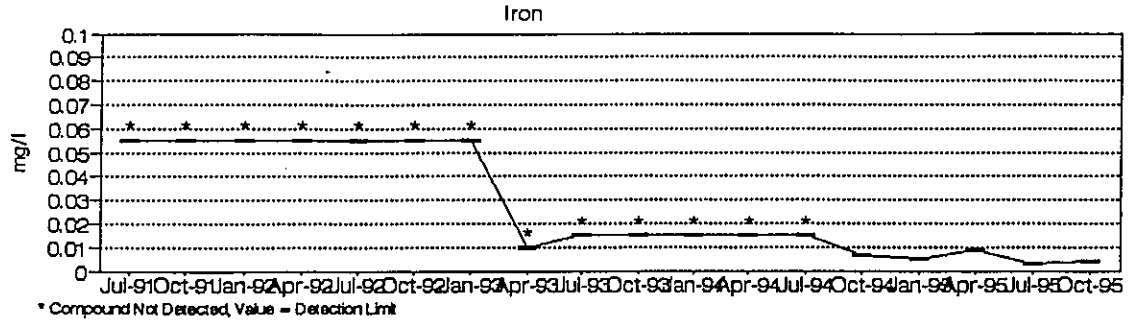




Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Groundwater Quality Results

MW-1004S



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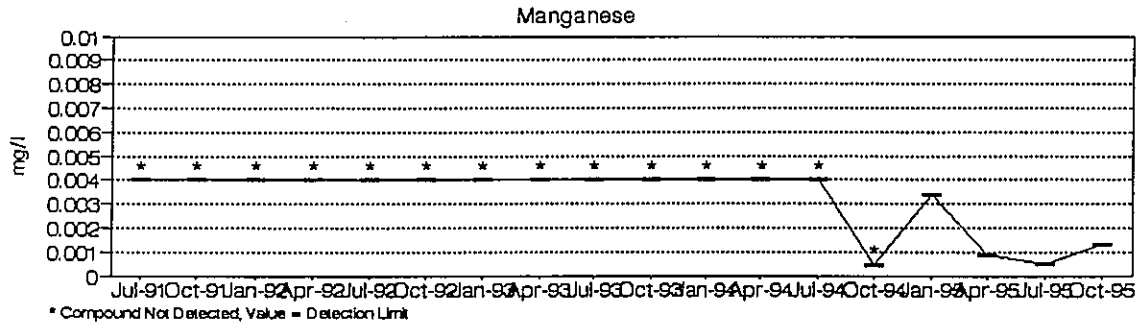

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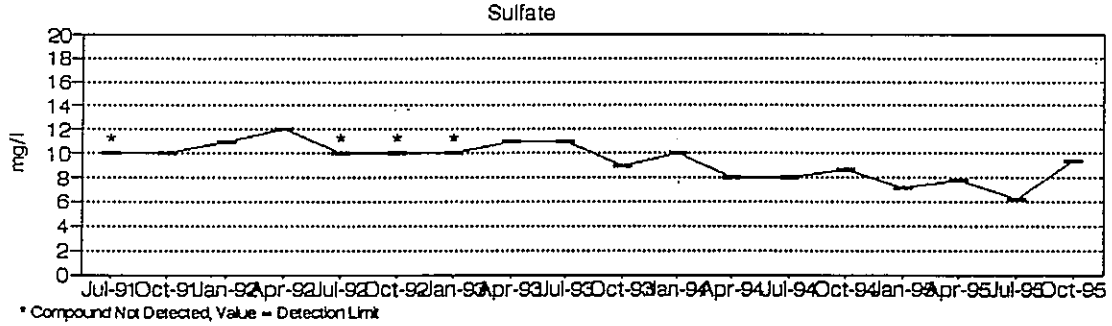

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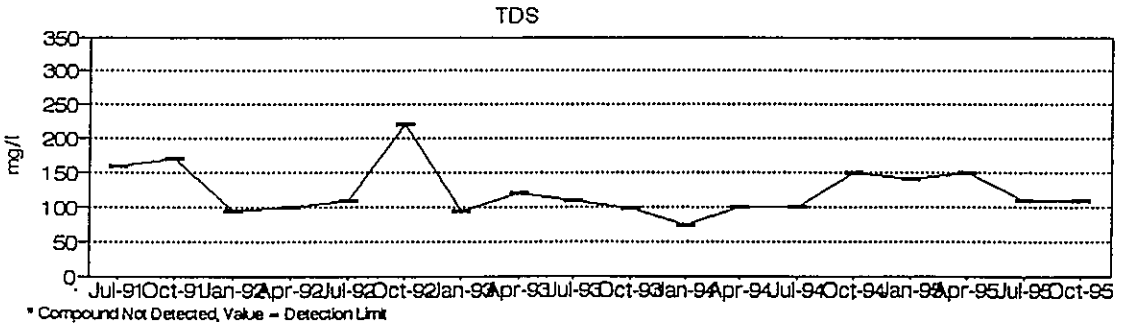
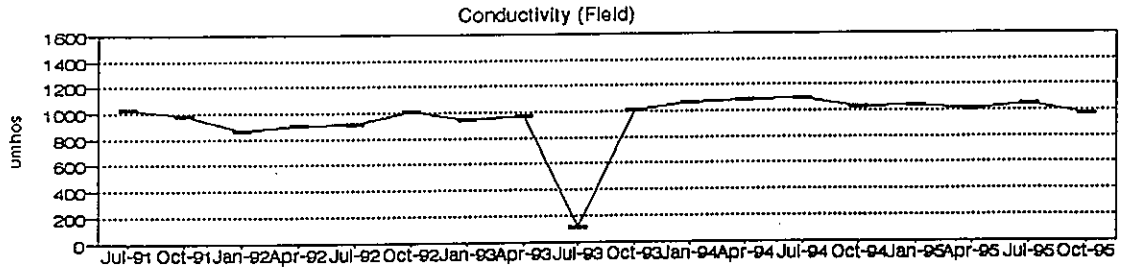


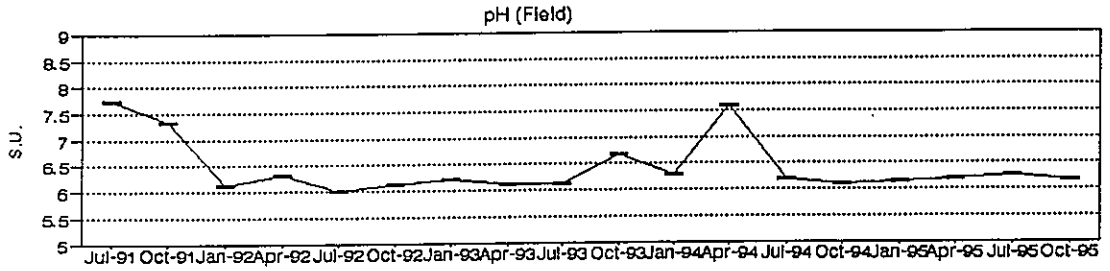
* Compound Not Detected, Value = Detection Limit

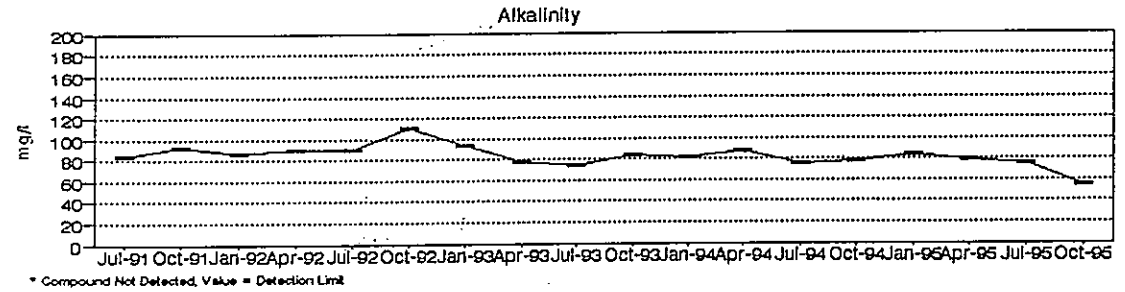
Prepared By: SGL Checked By: JBH1

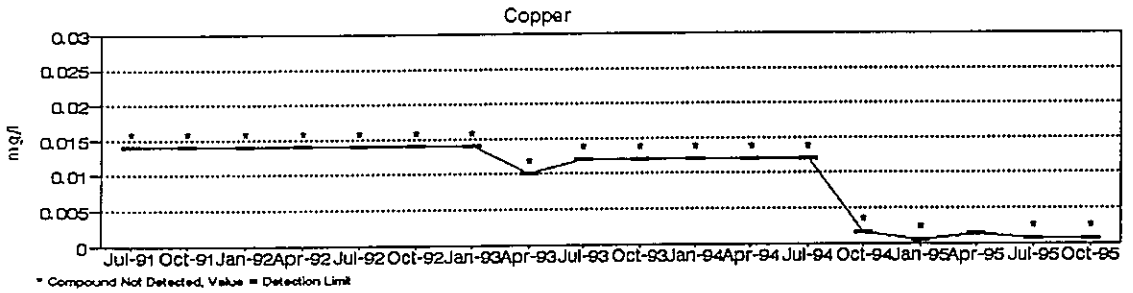
Flambeau Mining Company
Groundwater Quality Results

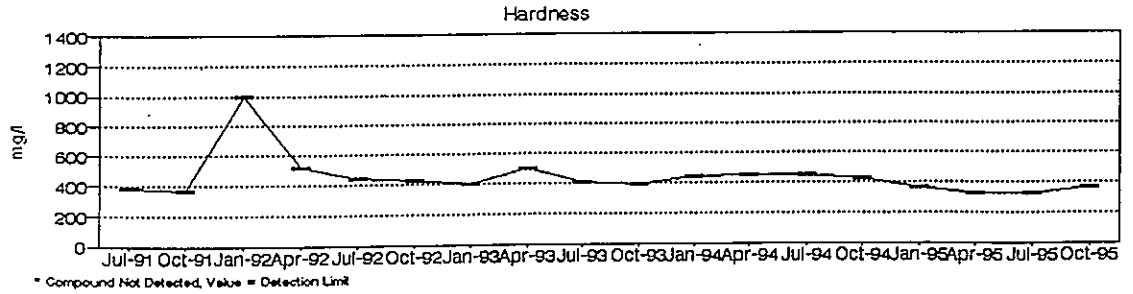
MW-1005







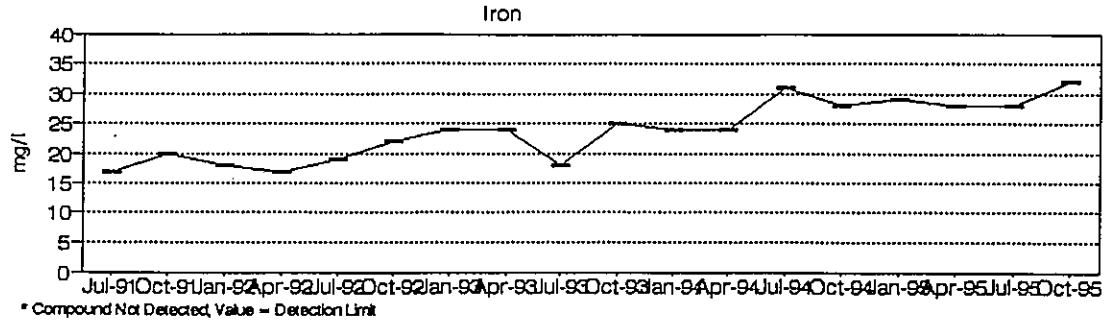




Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Groundwater Quality Results

MW-1005



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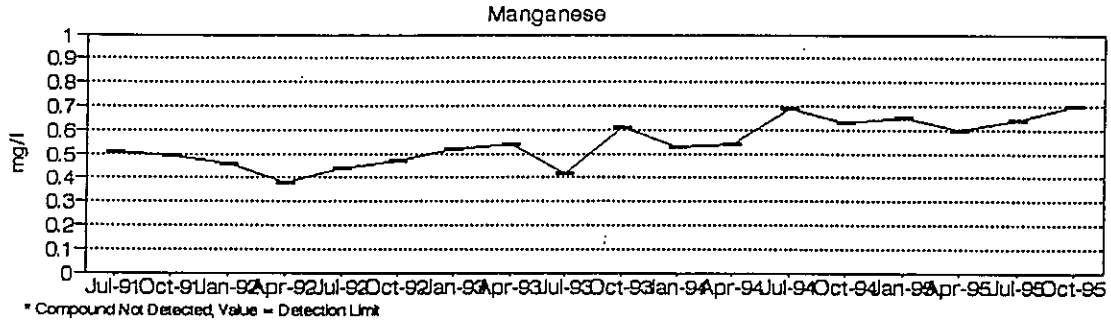

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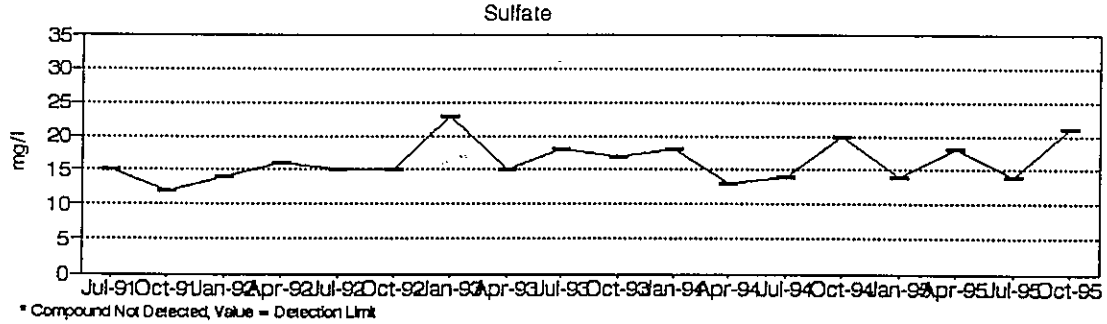

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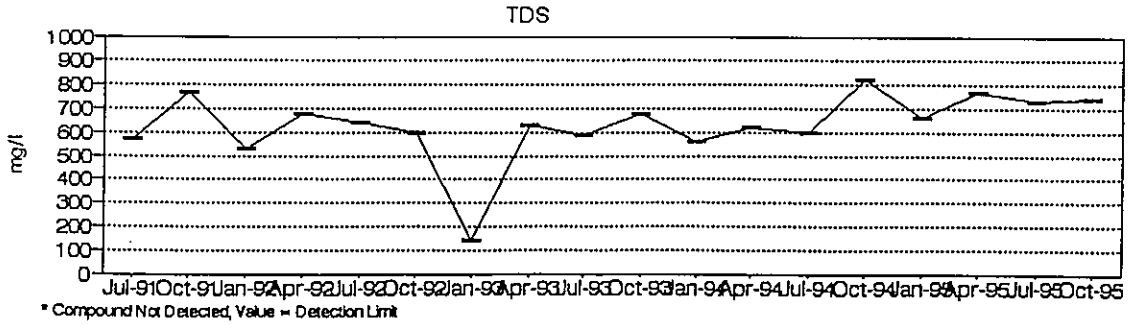
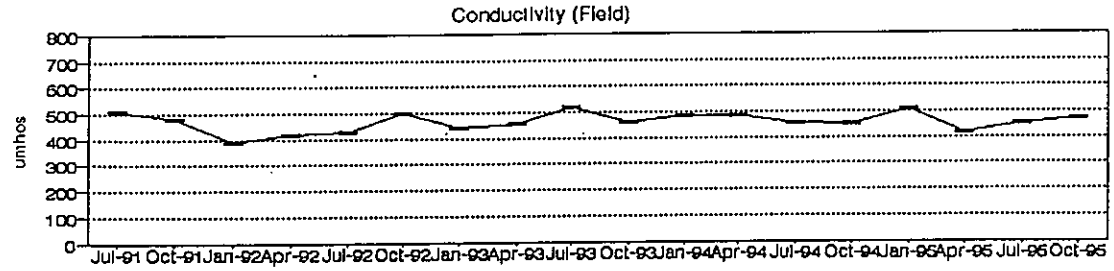


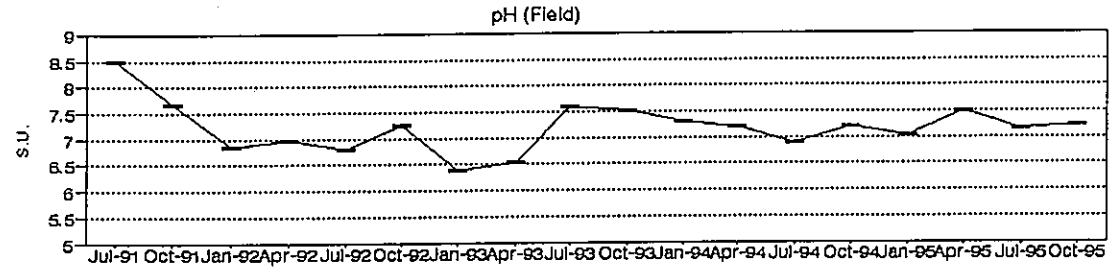
* Compound Not Detected, Value = Detection Limit

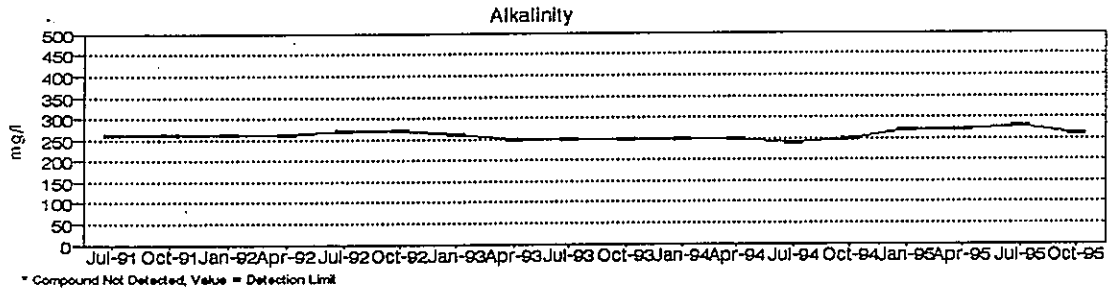
Prepared By: SGL Checked By: JBH1

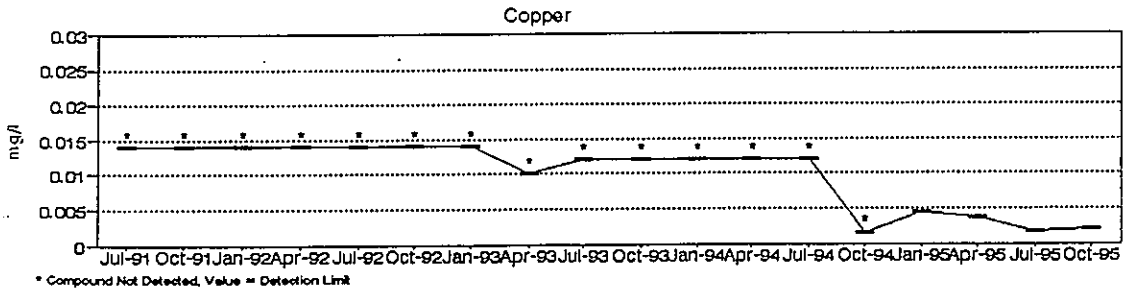
Flambeau Mining Company
Groundwater Quality Results

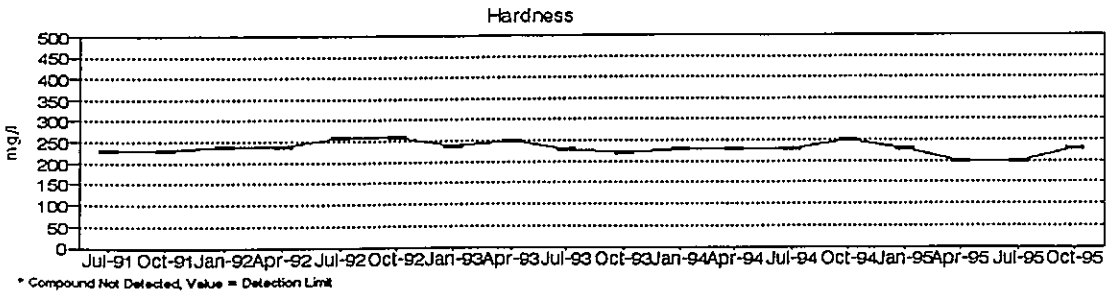
MW-1005P







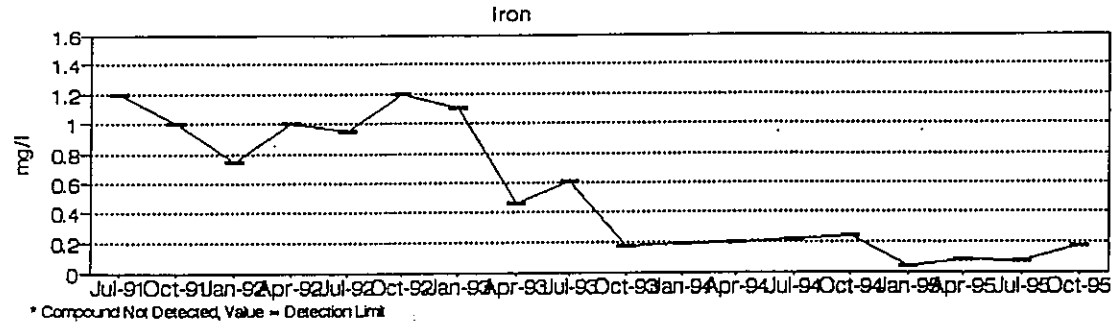




Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Groundwater Quality Results

MW-1005P



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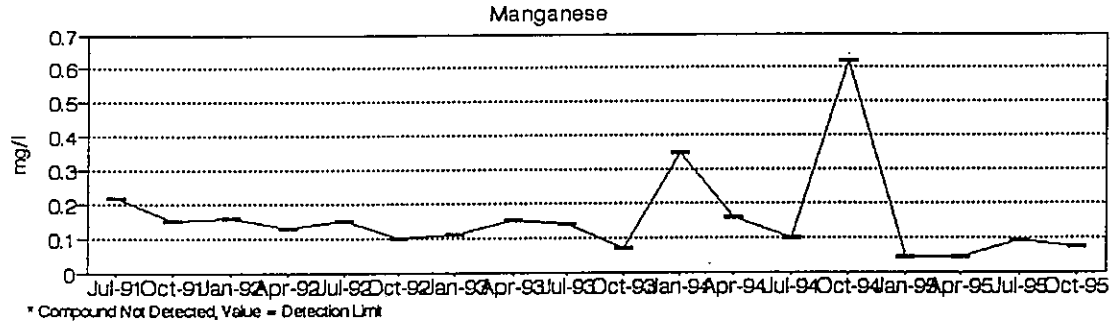

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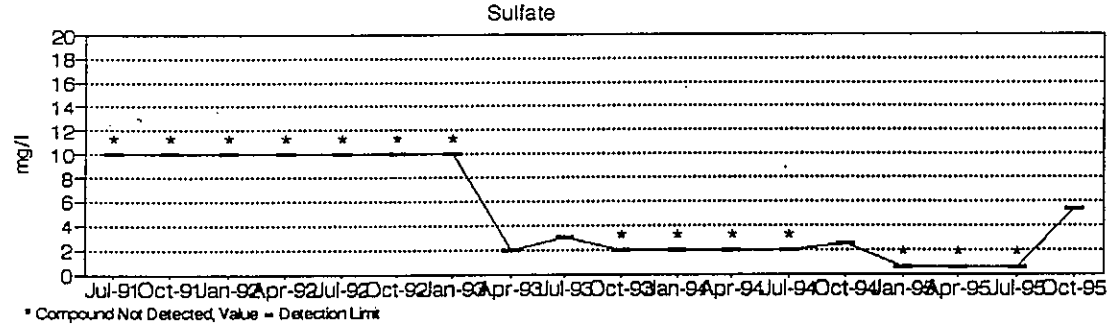

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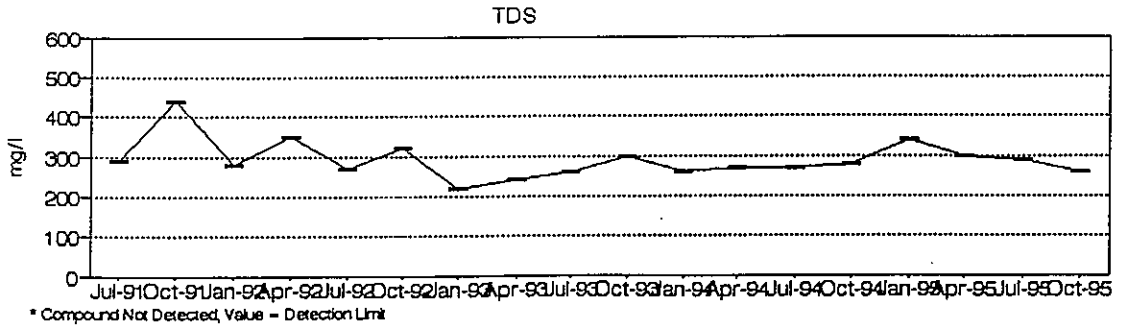

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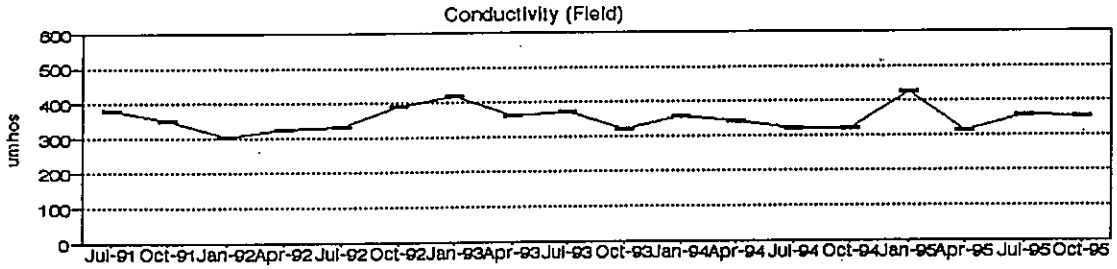
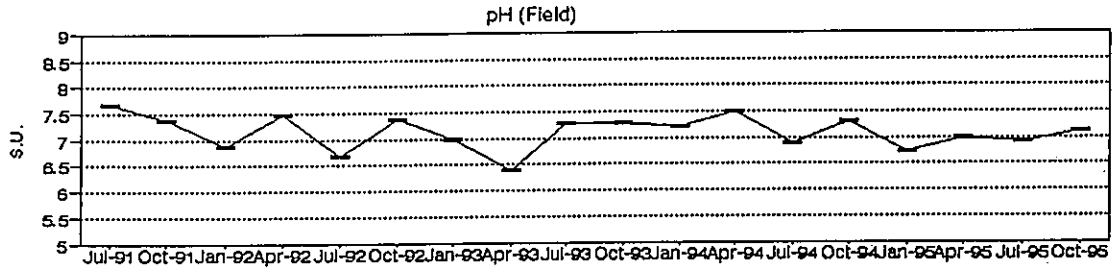
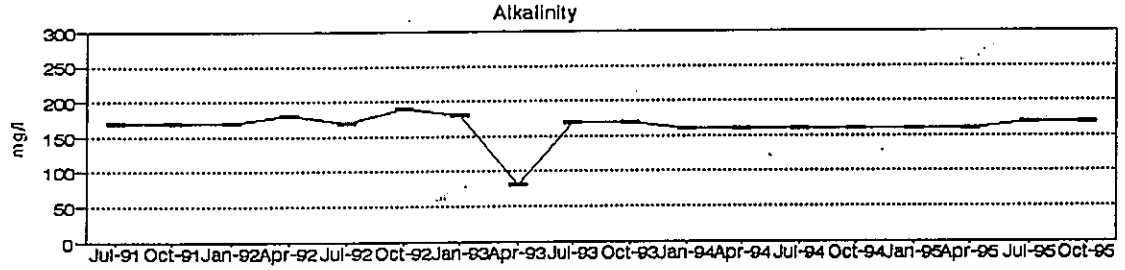
Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Groundwater Quality Results

MW-1005S







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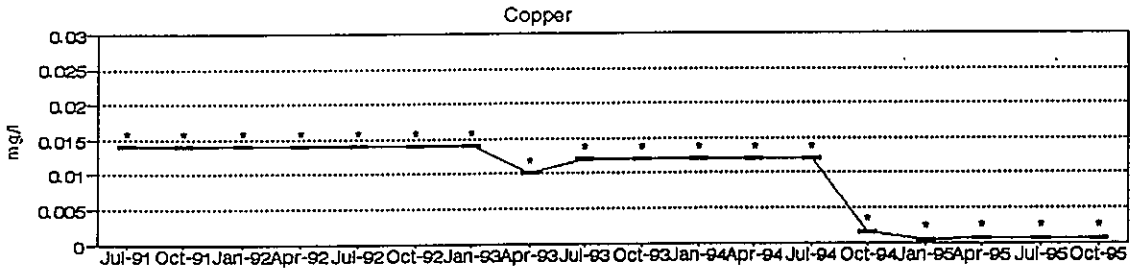

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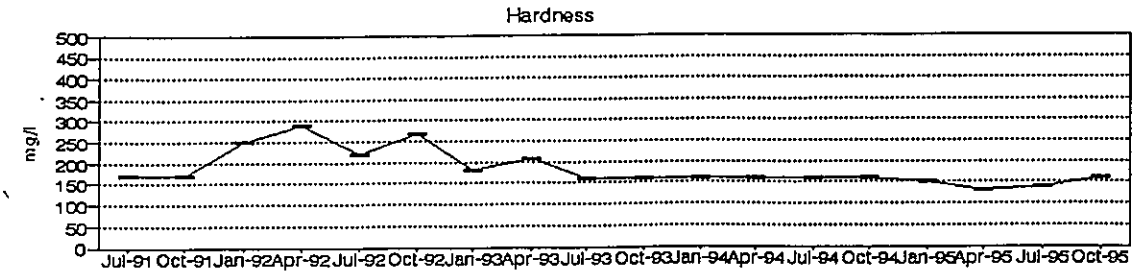

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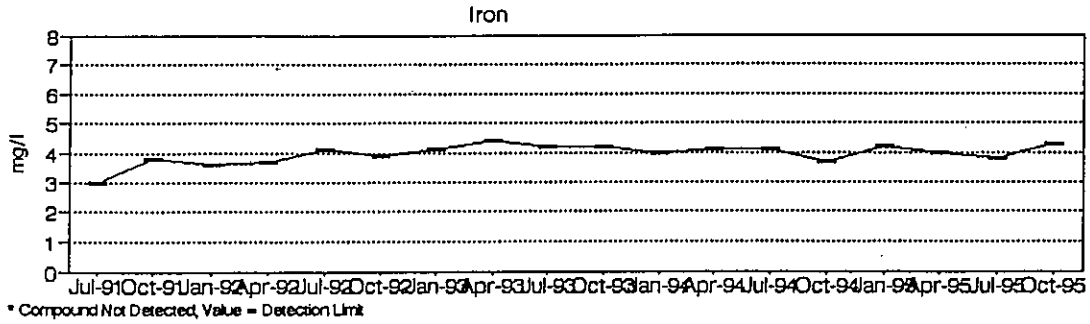
Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Groundwater Quality Results

MW-1005S



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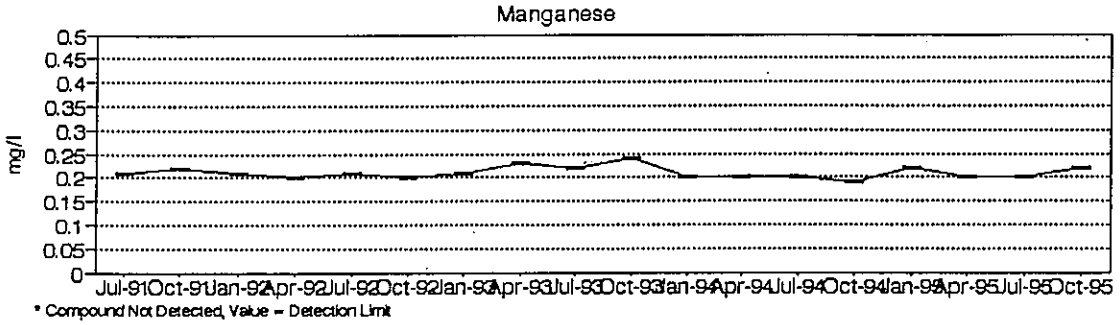

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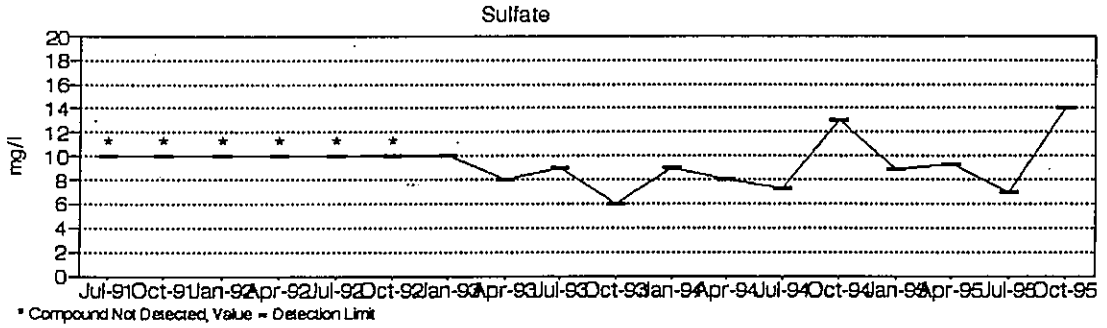

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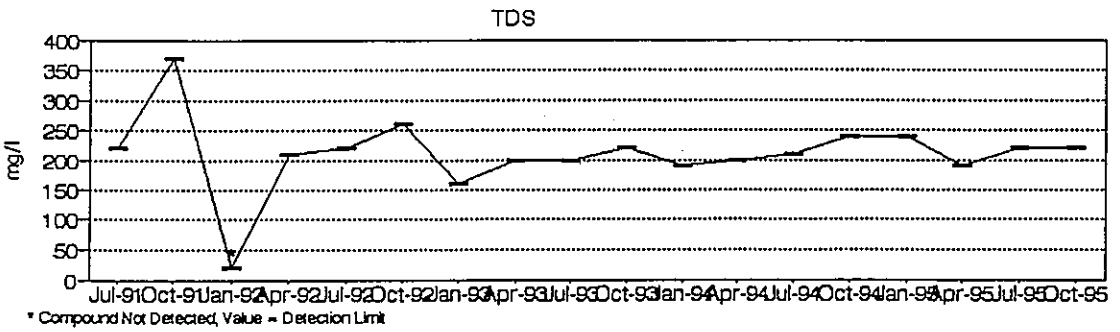

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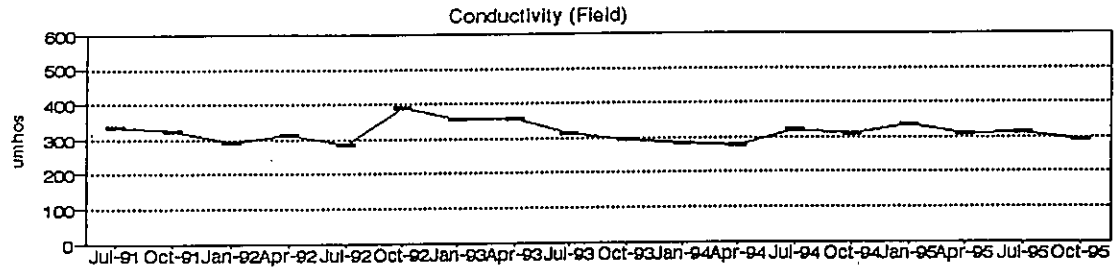
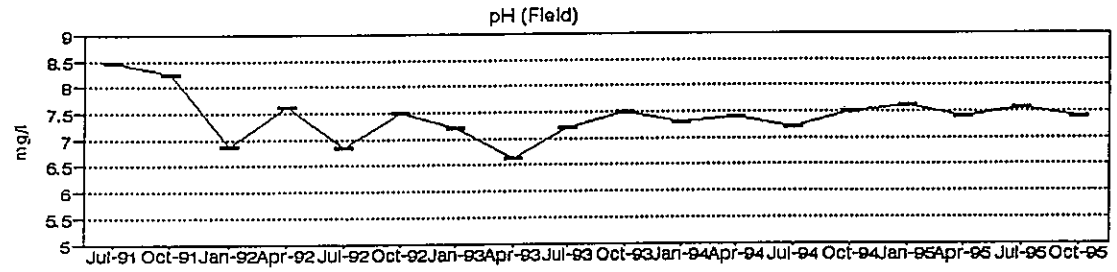
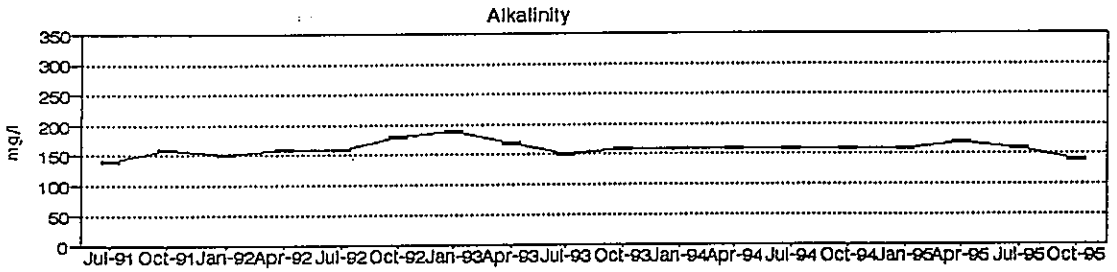
Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Groundwater Quality Results

MW-1010P







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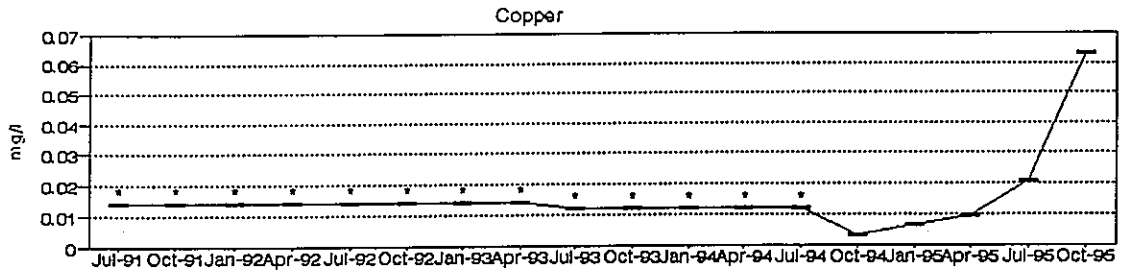

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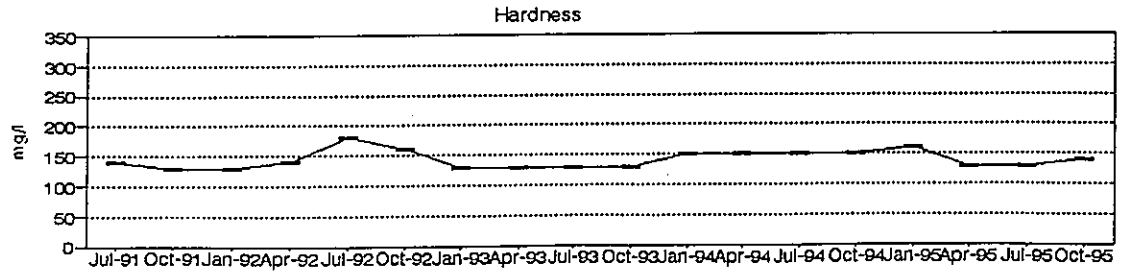


* Compound Not Detected, Value = Detection Limit

Prepared By: SGL Checked By: JBH1

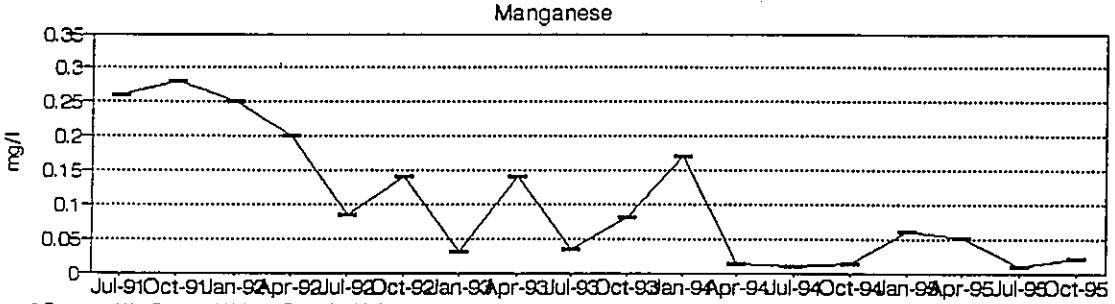
Flambeau Mining Company
Groundwater Quality Results

MW-1010P

Iron

* Compound Not Detected, Value = Detection Limit

Manganese



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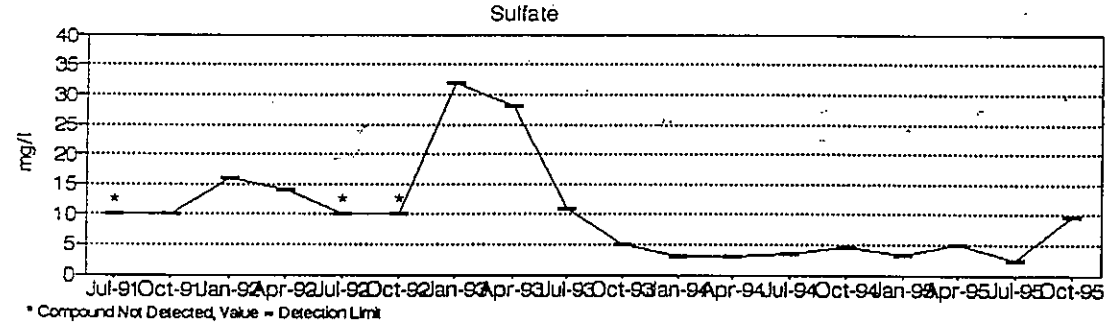
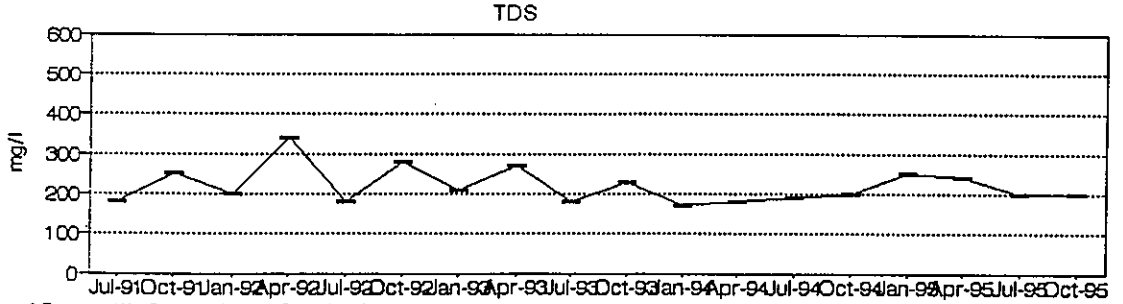
Sulfate



* Compound Not Detected, Value = Detection Limit

TDS



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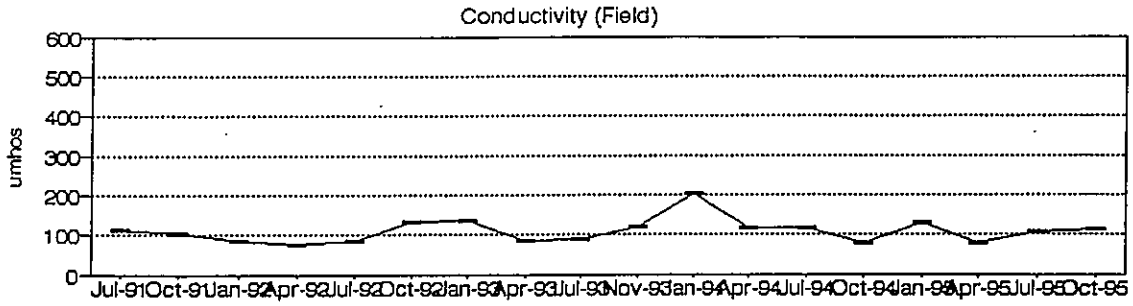
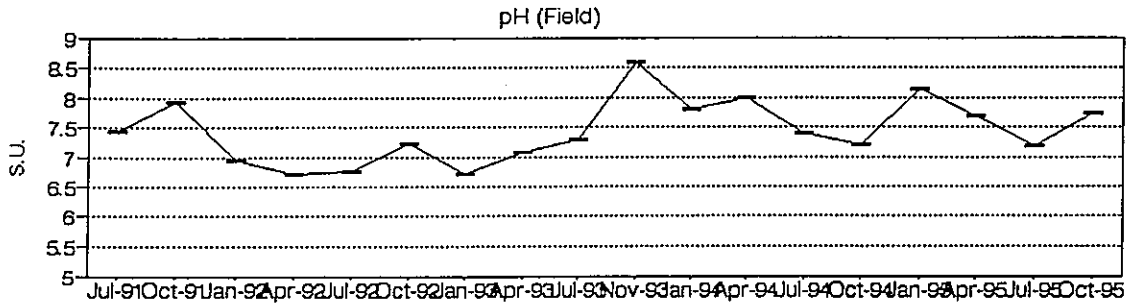
Attachment 2

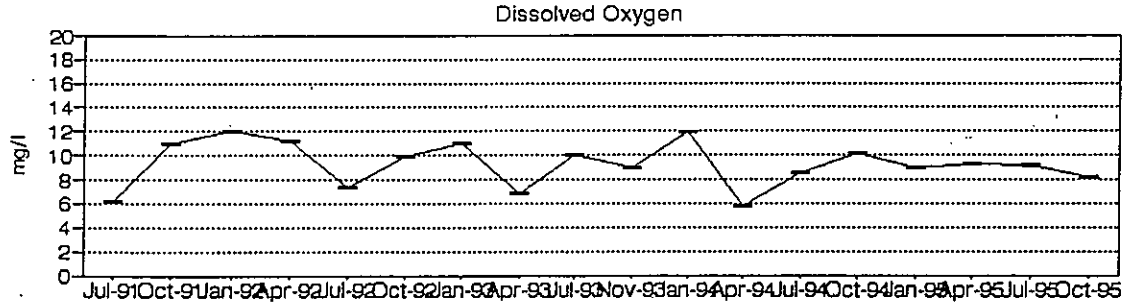
Historical Trend Plots
Surface Water

Flambeau Mining Company
Surface Water Quality Results

SW-1







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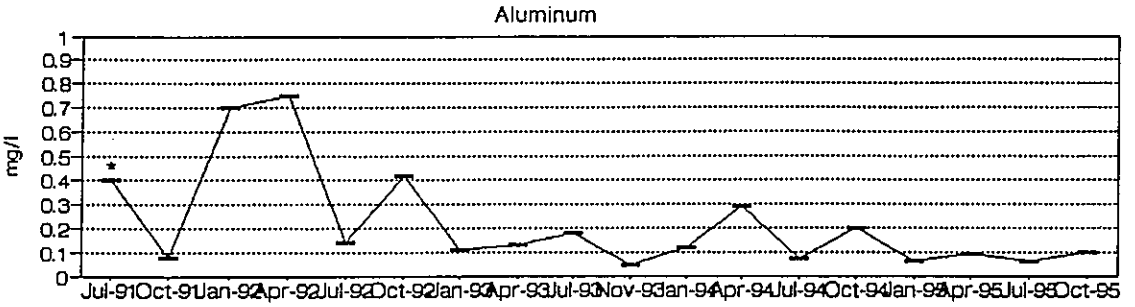

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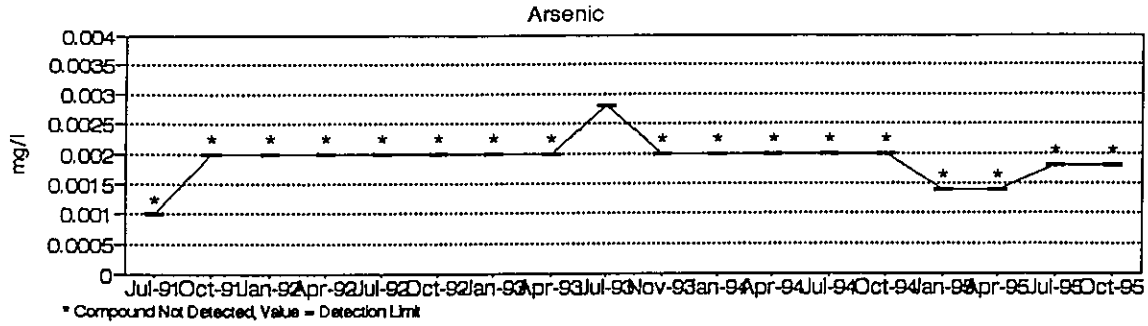
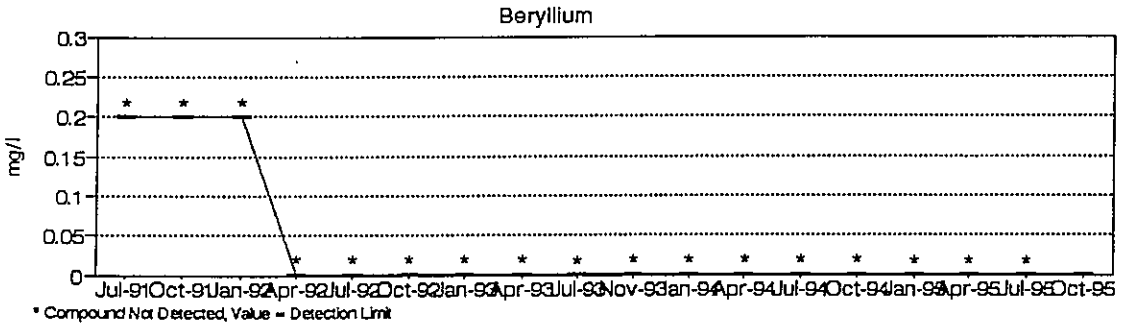
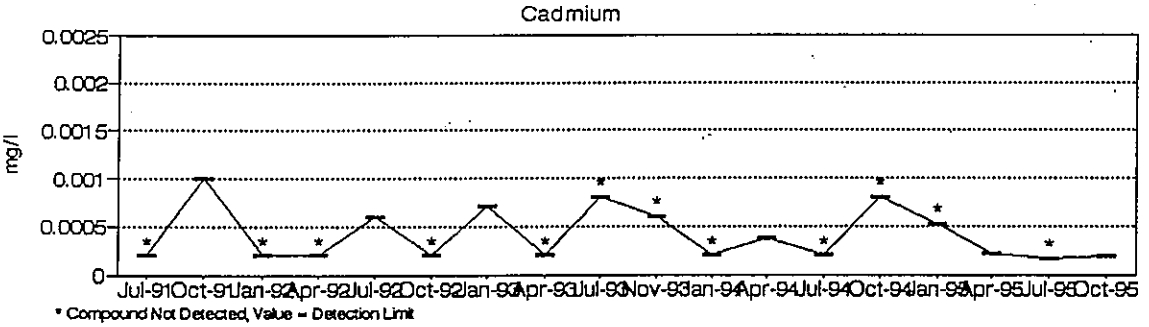
Prepared By: SGL Checked By: JBH1

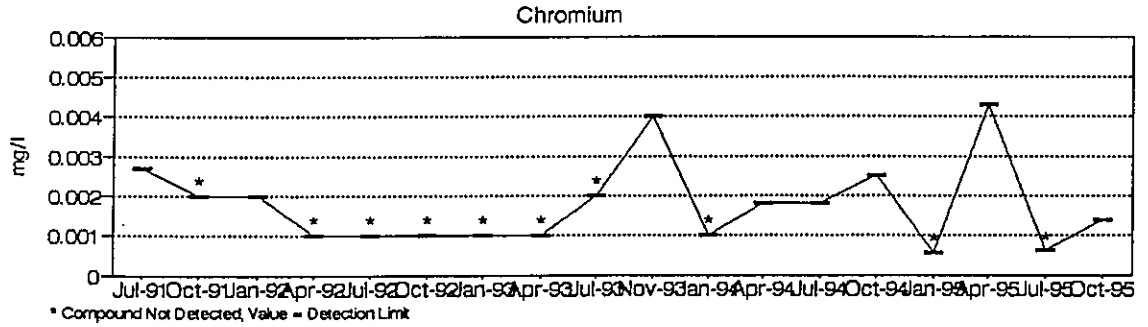
Flambeau Mining Company
Surface Water Quality Results

SW-1





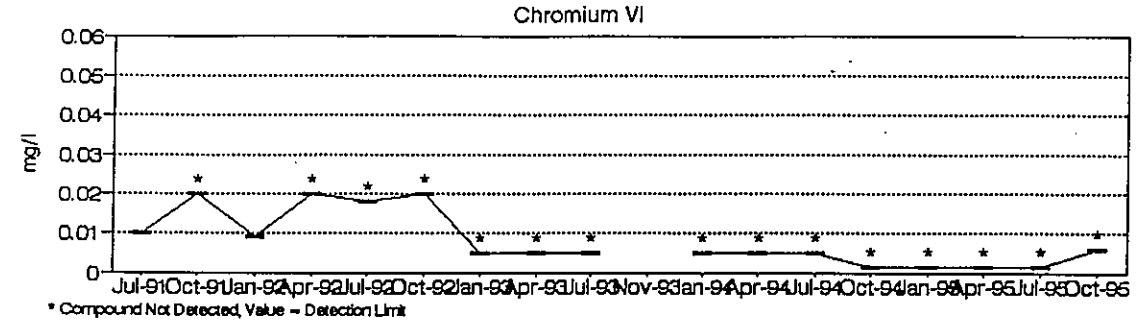




Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Surface Water Quality Results

SW-1



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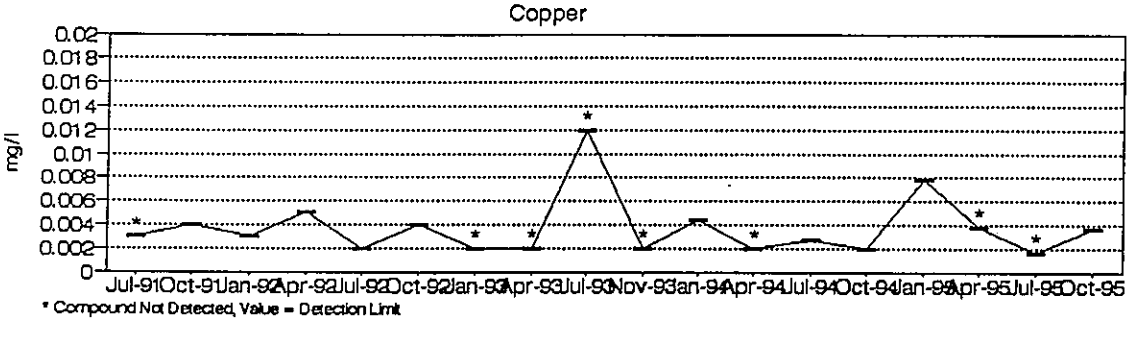

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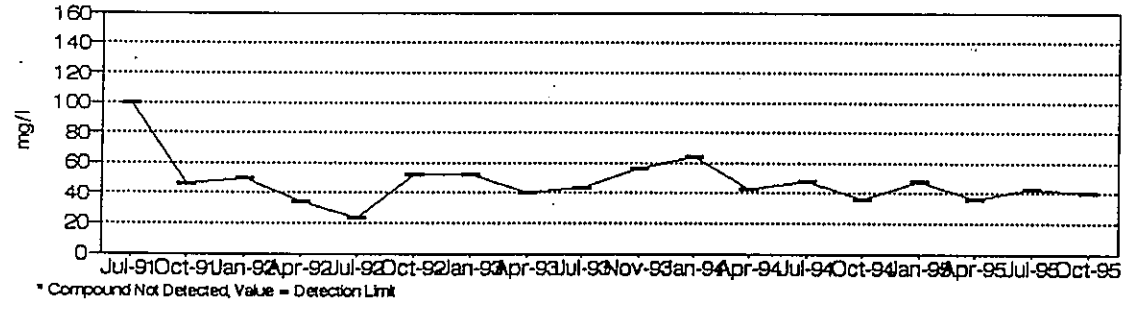

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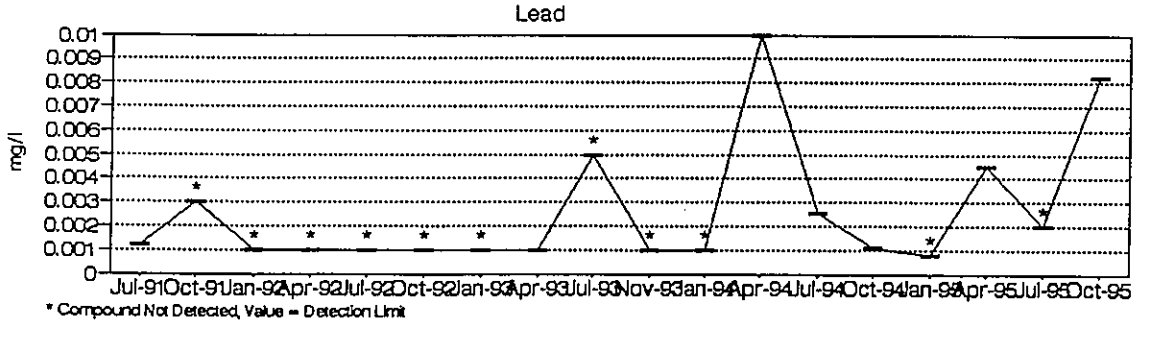

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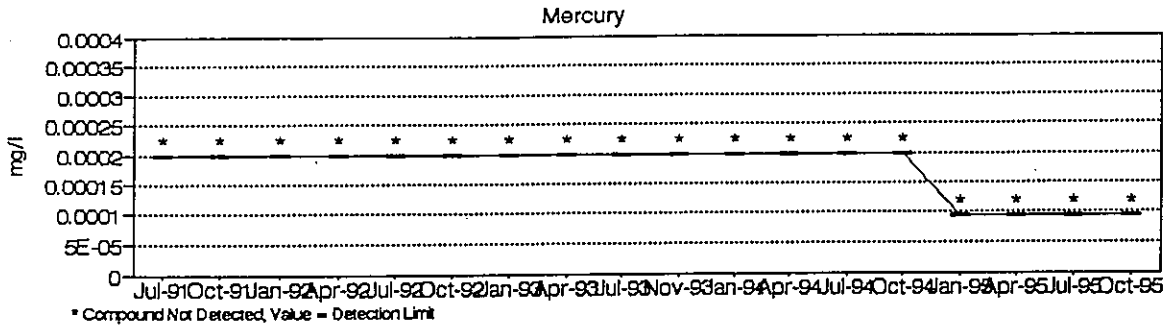
Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Surface Water Quality Results

SW-1



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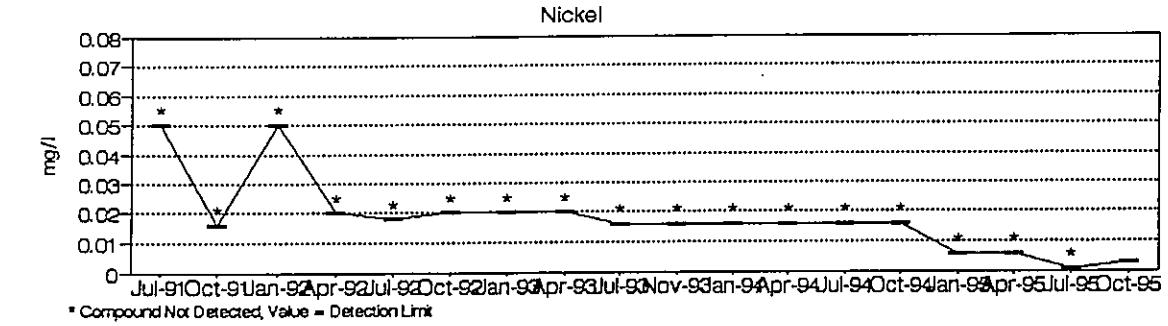

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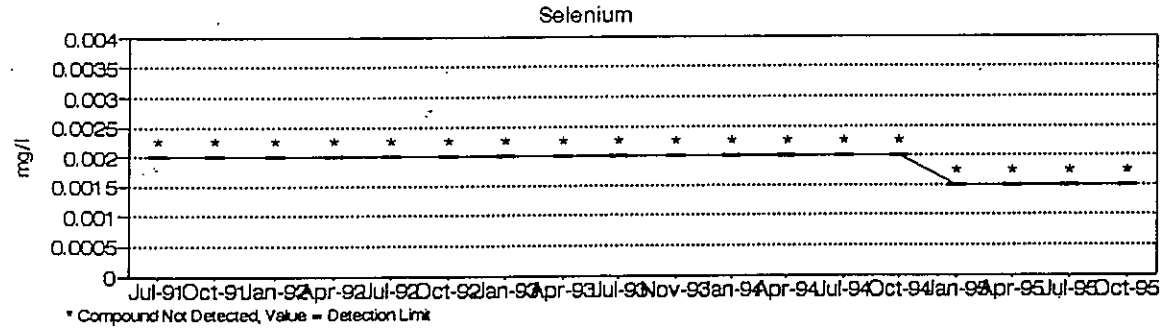

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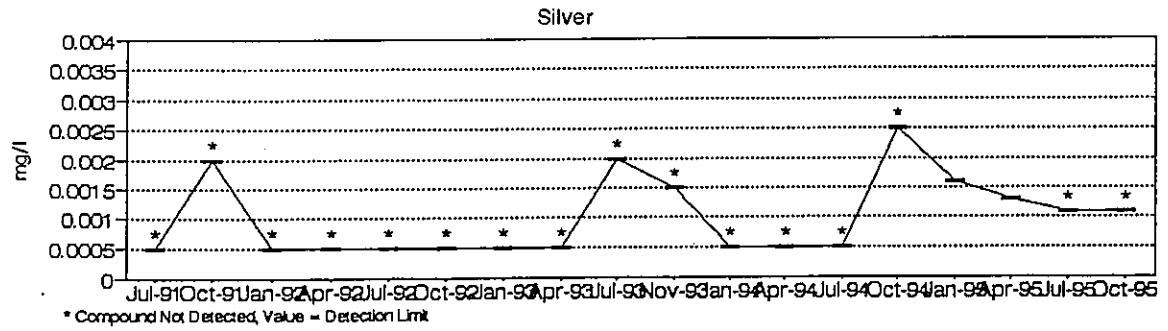

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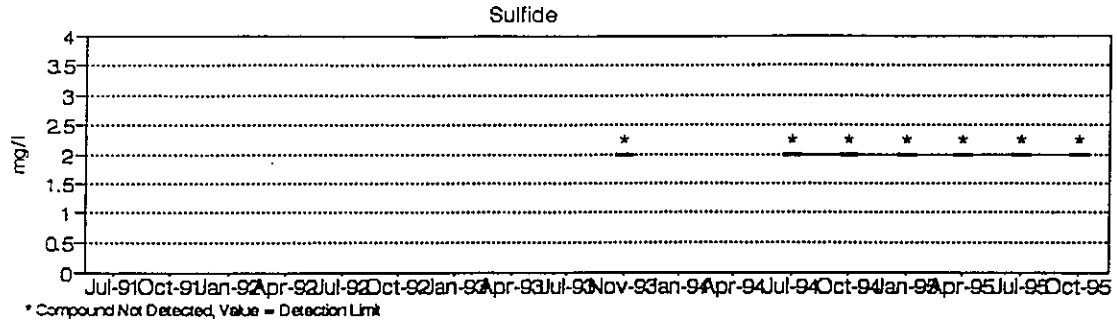
Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Surface Water Quality Results

SW-1



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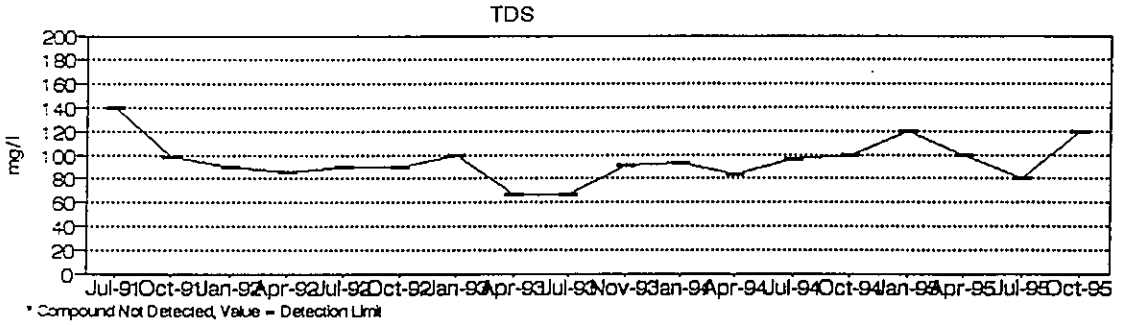

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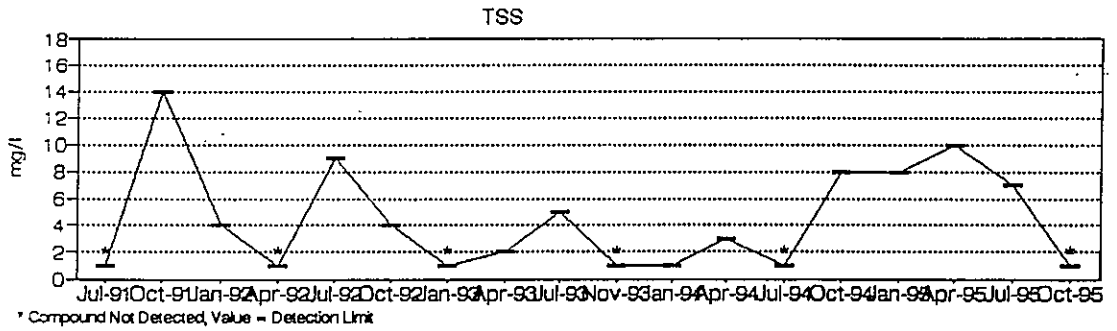

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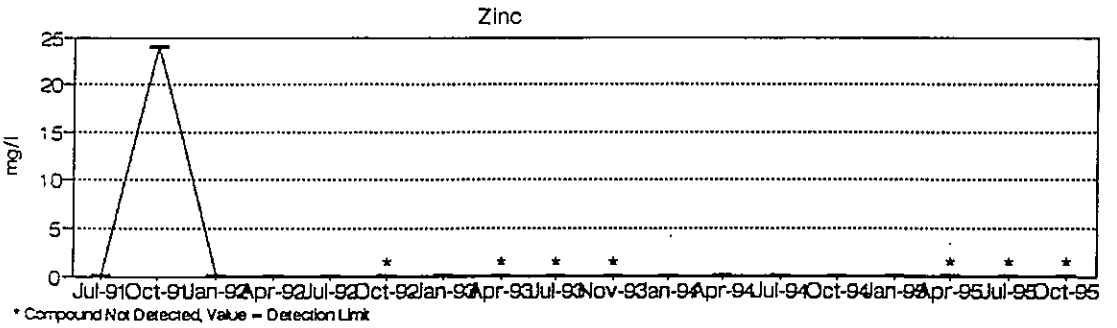
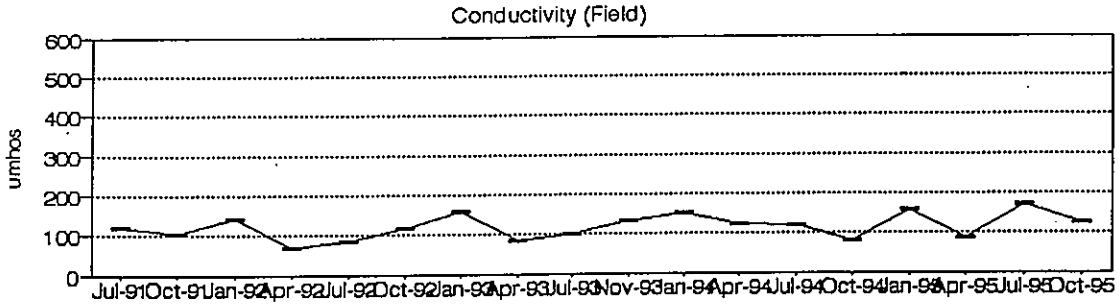


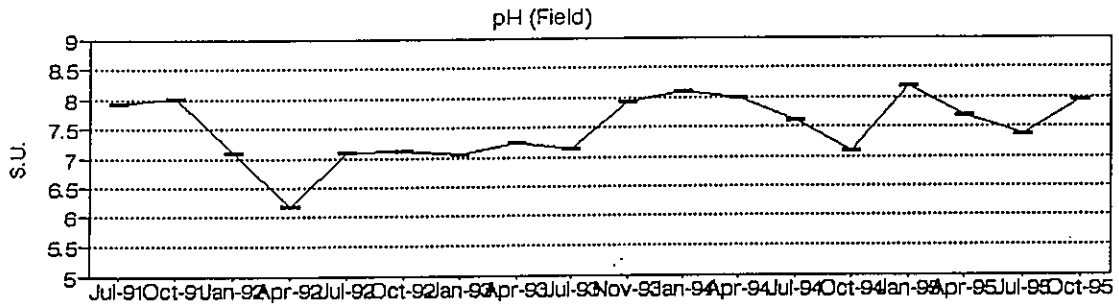
* Compound Not Detected, Value = Detection Limit

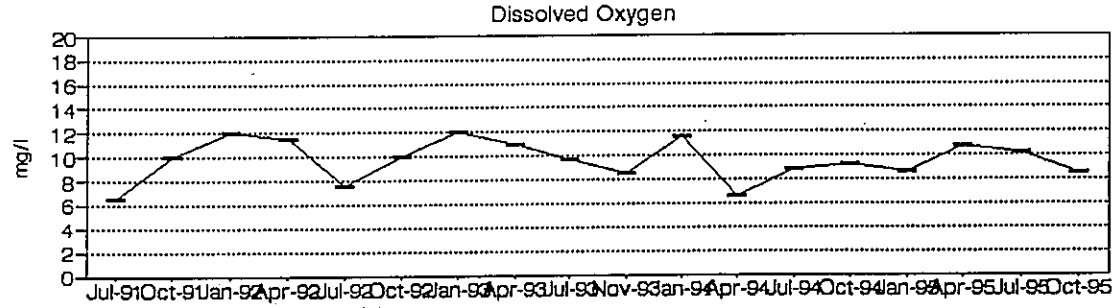
Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Surface Water Quality Results

SW-2







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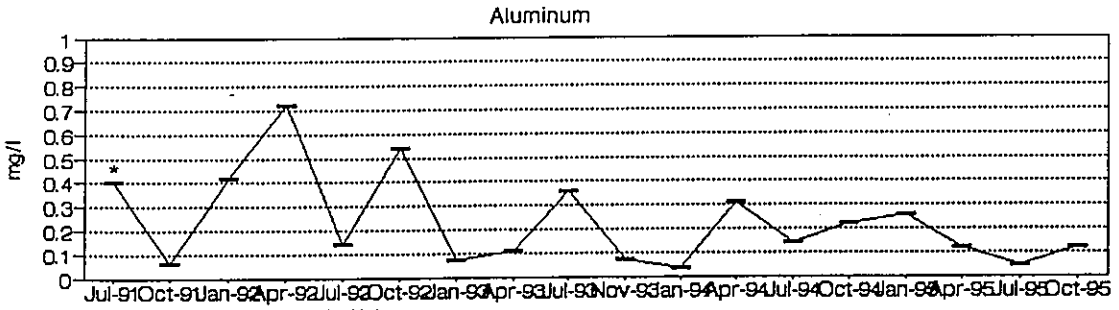
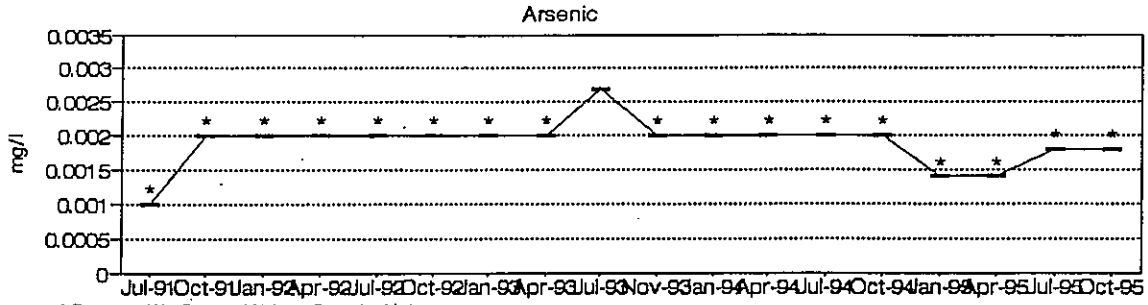


* Compound Not Detected, Value = Detection Limit

Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Surface Water Quality Results

SW-2



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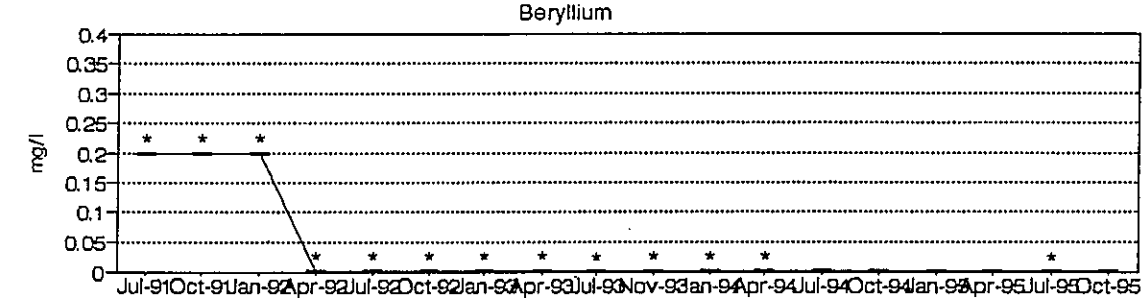

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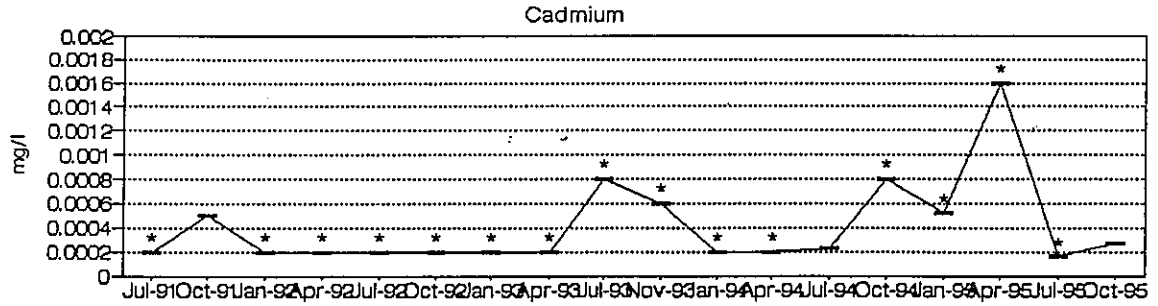

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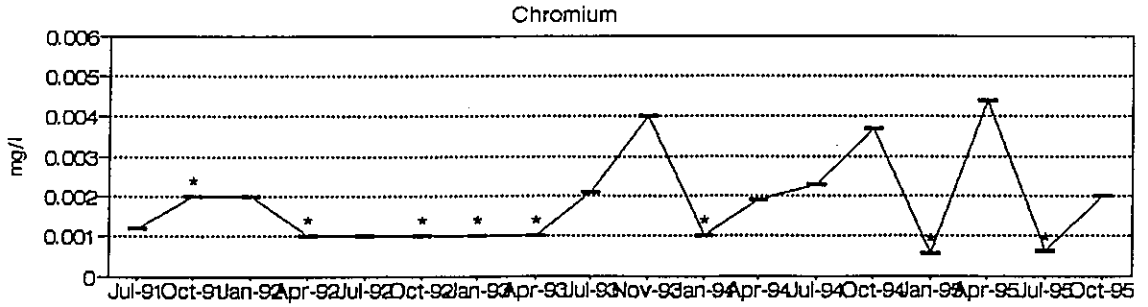

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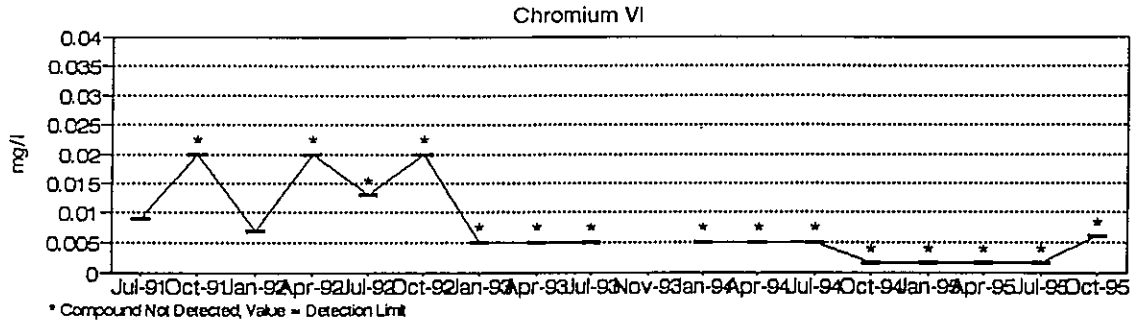
Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Surface Water Quality Results

SW-2



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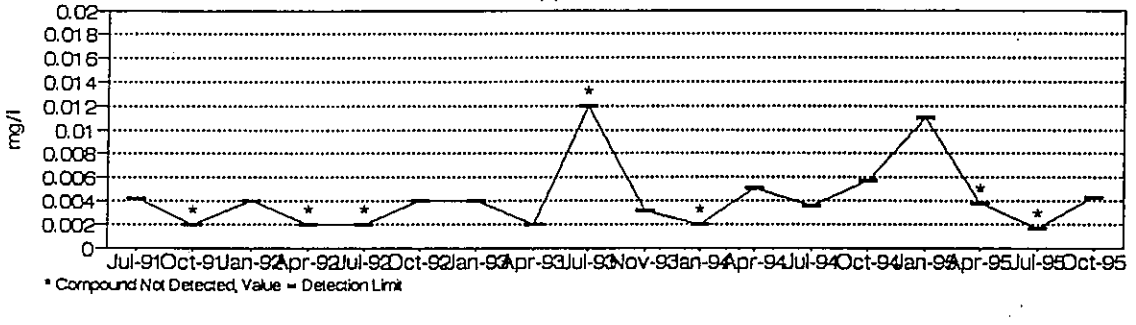

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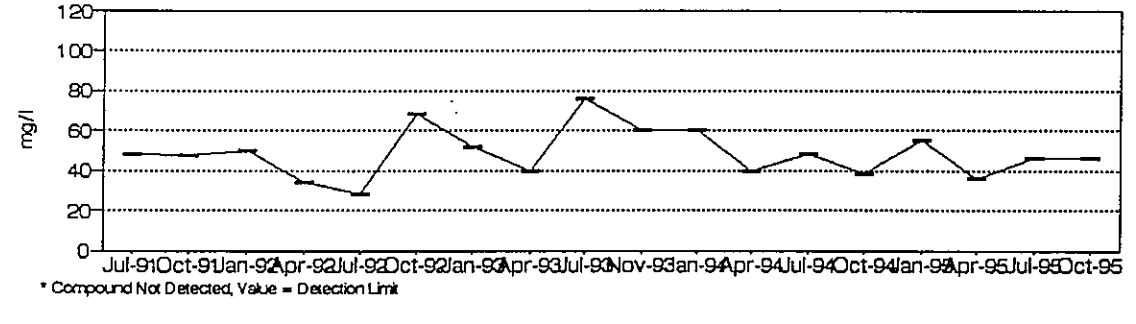
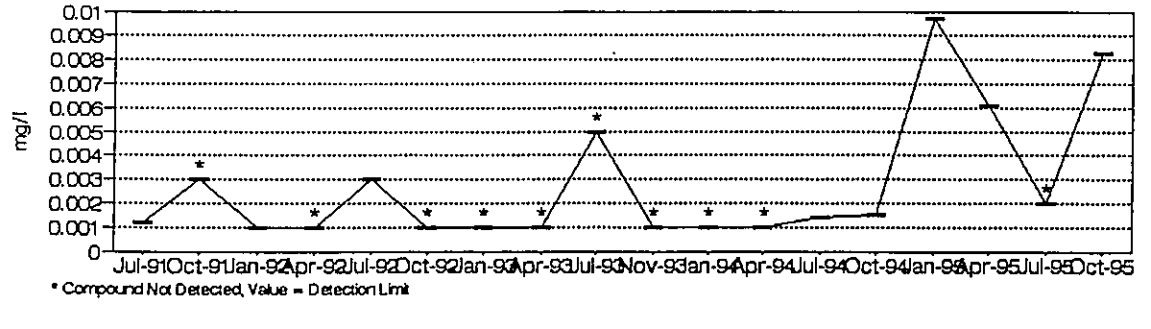


* Compound Not Detected, Value = Detection Limit

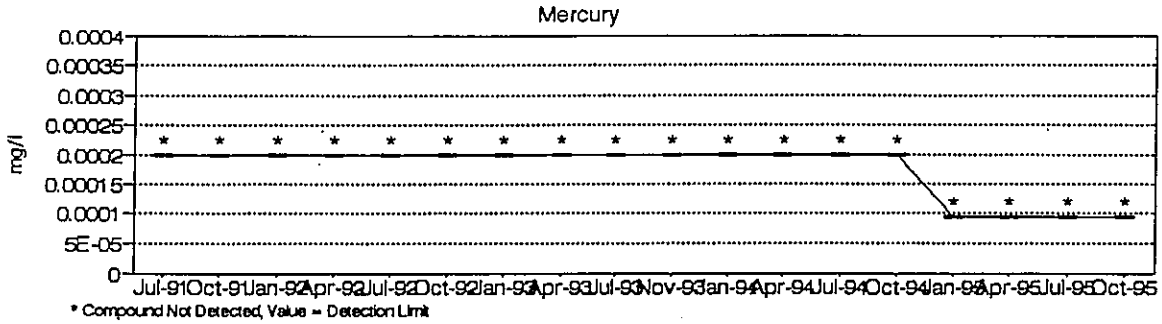


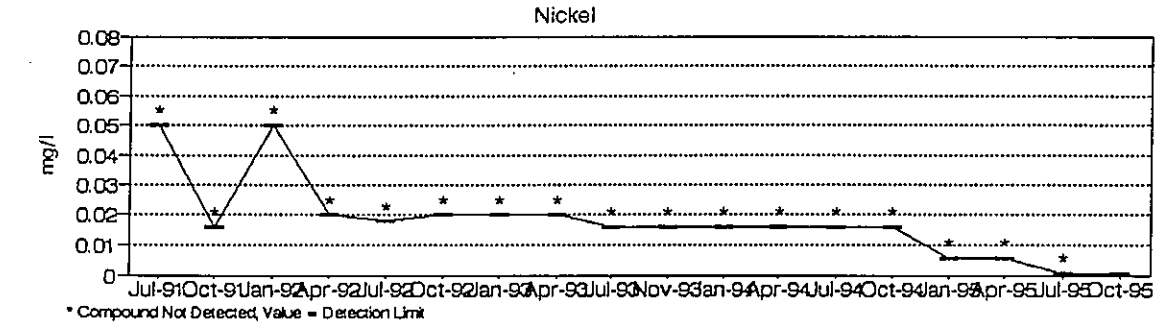
* Compound Not Detected, Value = Detection Limit

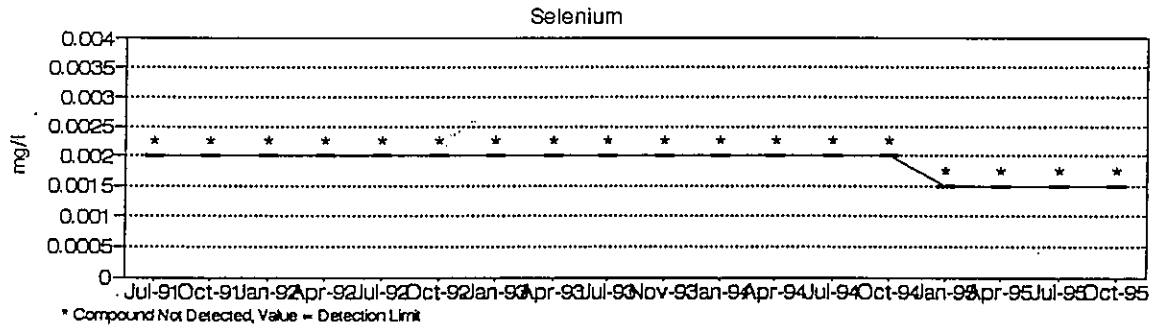
Prepared By: SGL Checked By: JBH1

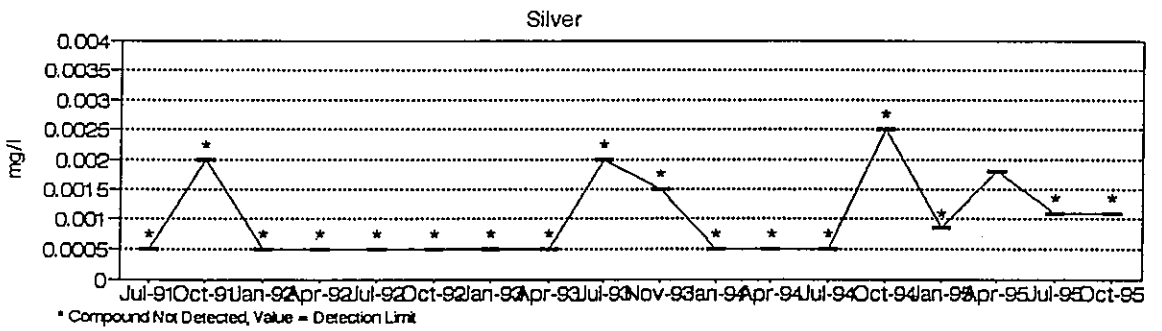
Flambeau Mining Company
Surface Water Quality Results

SW-2





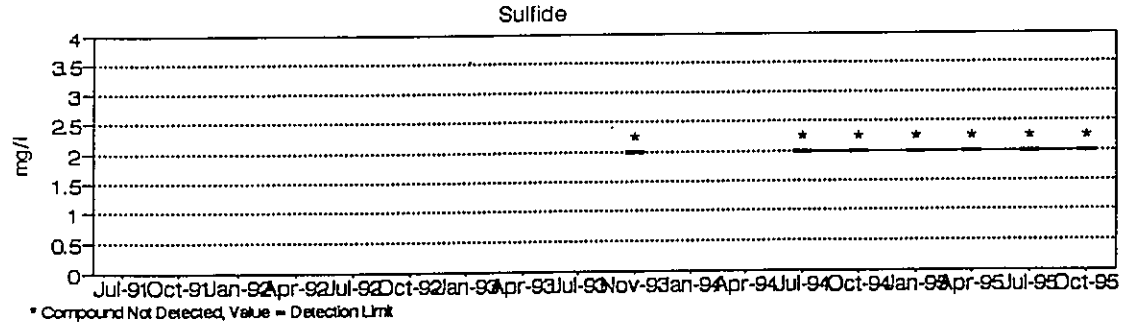




Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Surface Water Quality Results

SW-2



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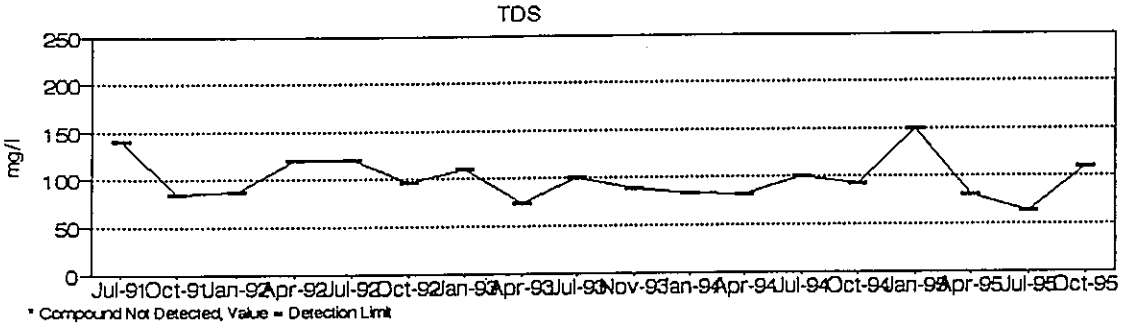

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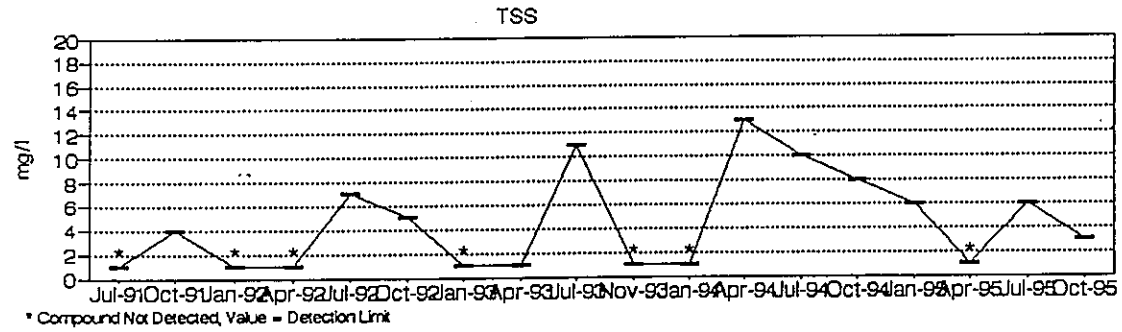

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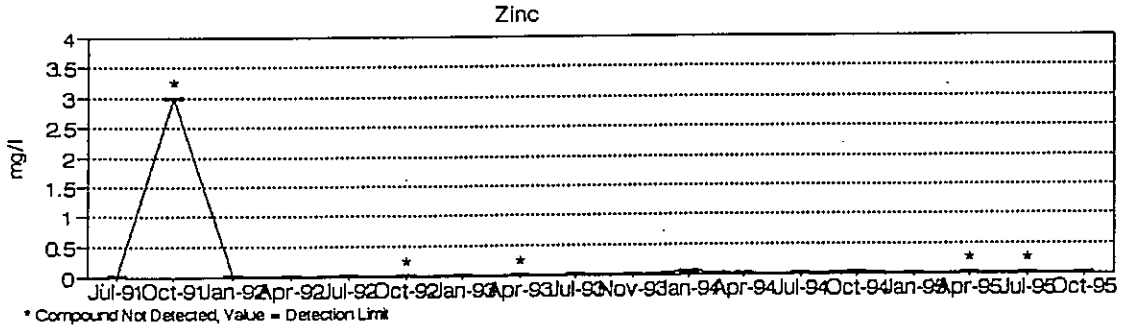


* Compound Not Detected, Value = Detection Limit

Prepared By: SGL Checked By: JBH1

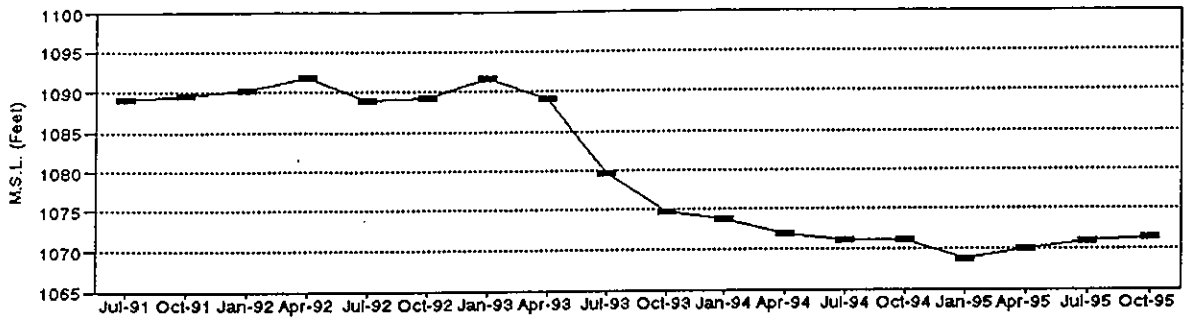
Attachment 3

Groundwater Elevation Trend Graphs

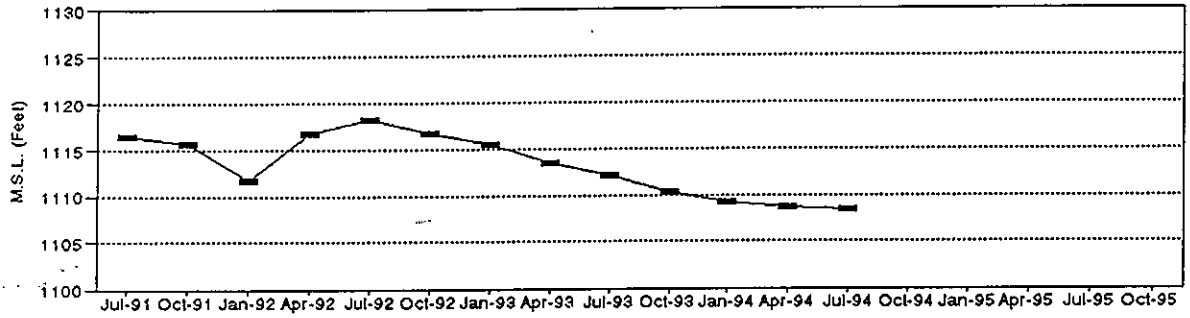
Flambeau Mining Company

Groundwater Elevation Results

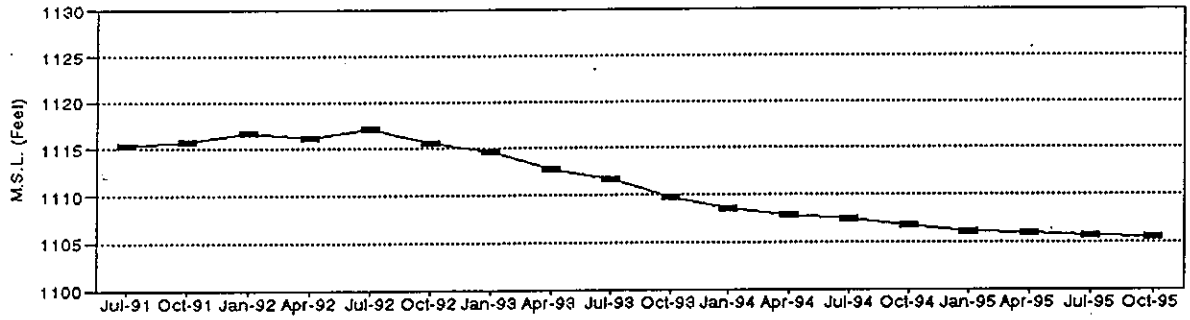
MW-1000P



MW-1001



MW-1001G



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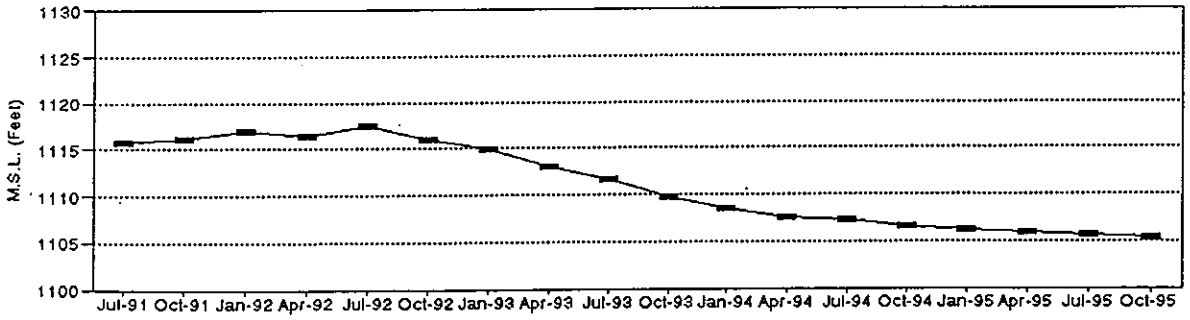
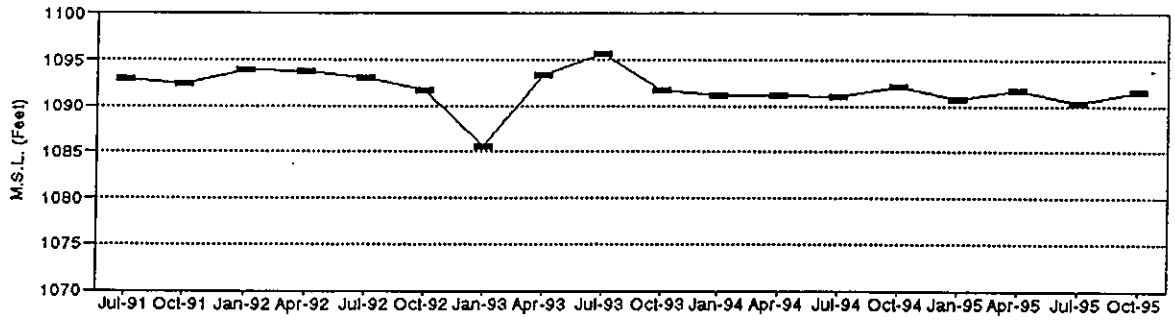


Flambeau Mining Company

Groundwater Elevation Results

MW-1002



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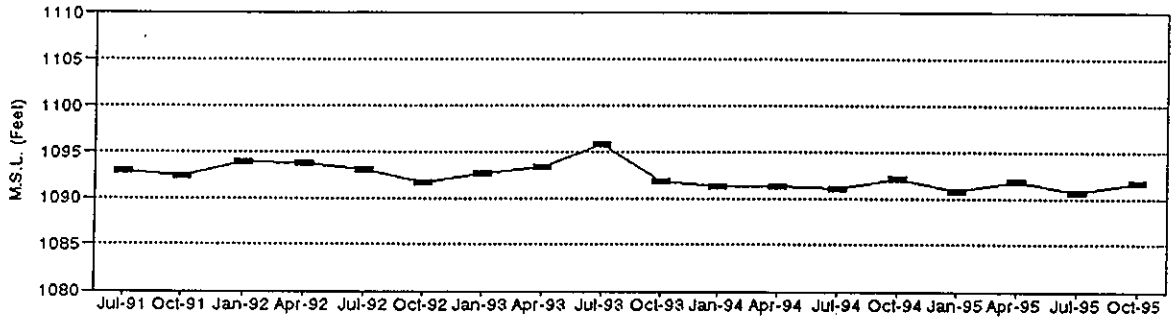
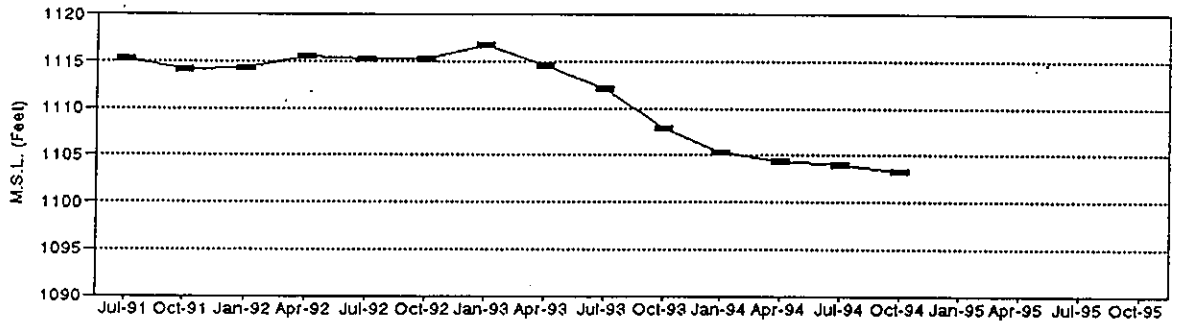
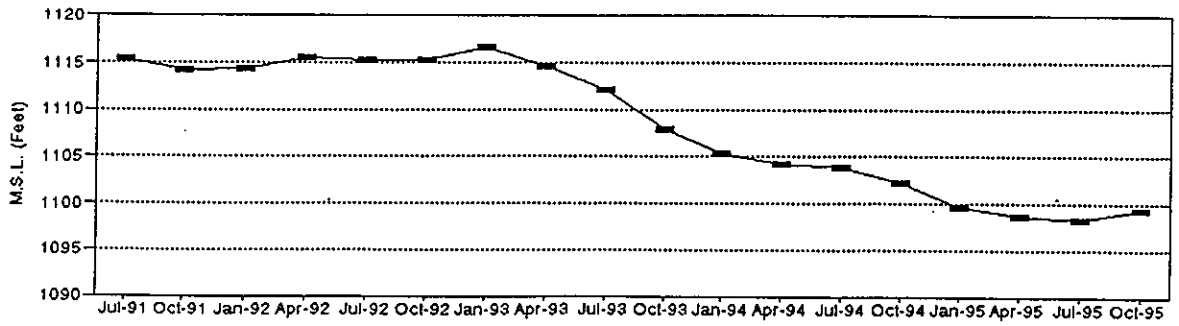


MW-1003



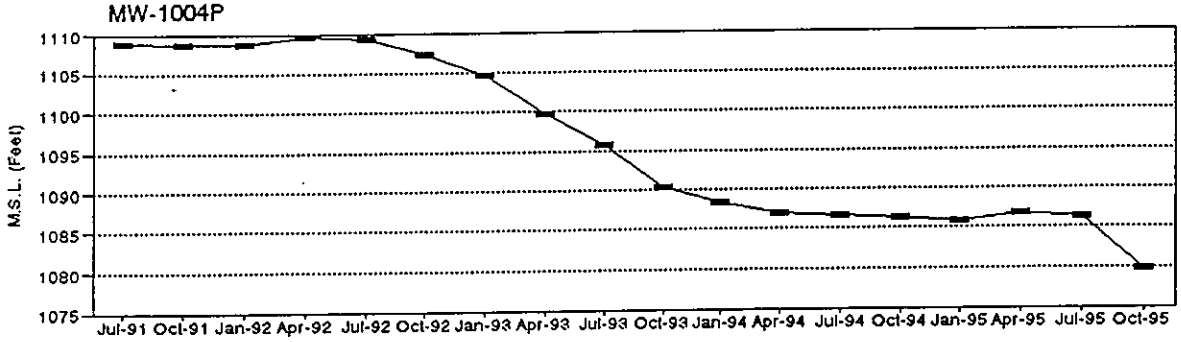
MW-1003P



Flambeau Mining Company

Groundwater Elevation Results

MW-1004P



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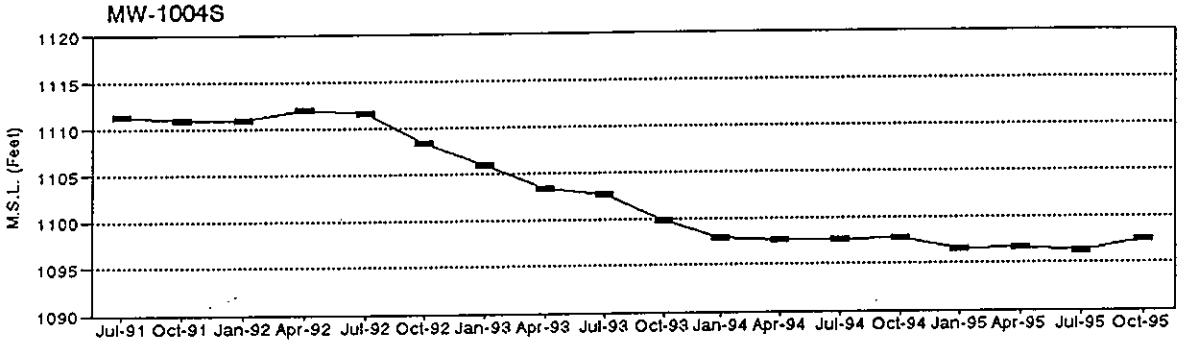

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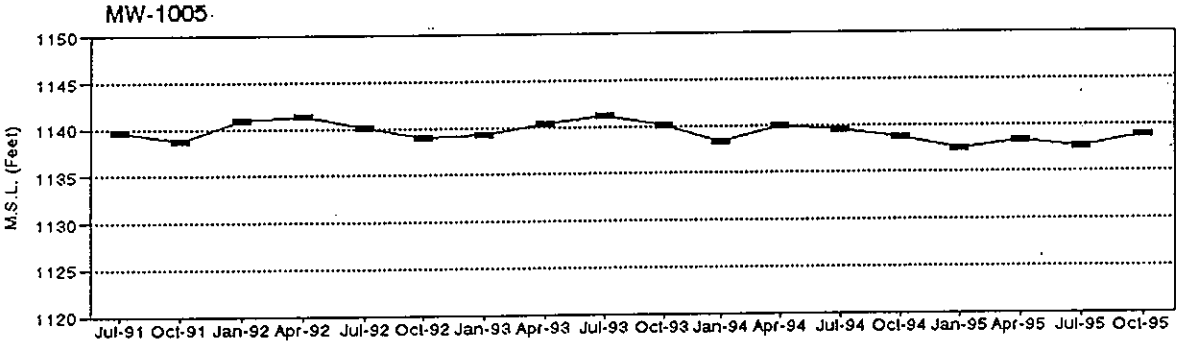

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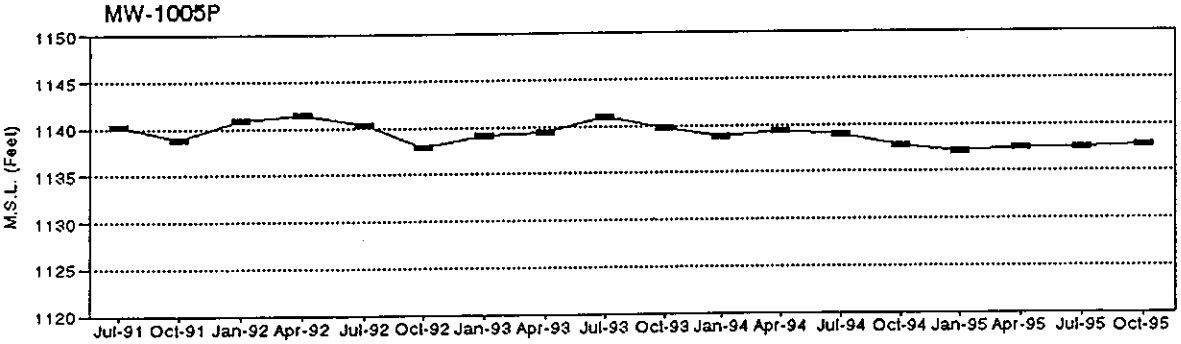
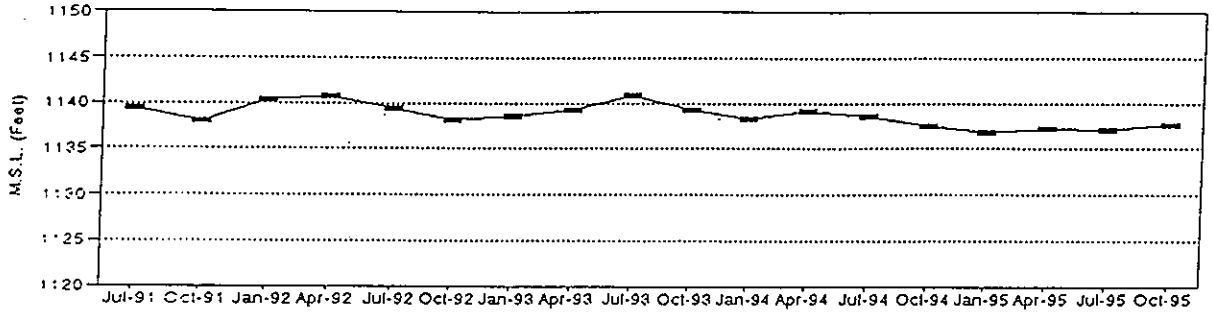


Flambeau Mining Company

Groundwater Elevation Results

MW-1005S



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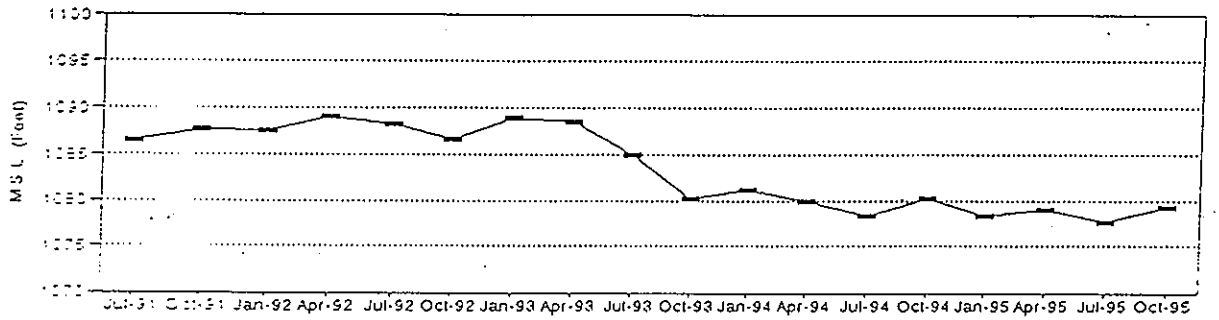
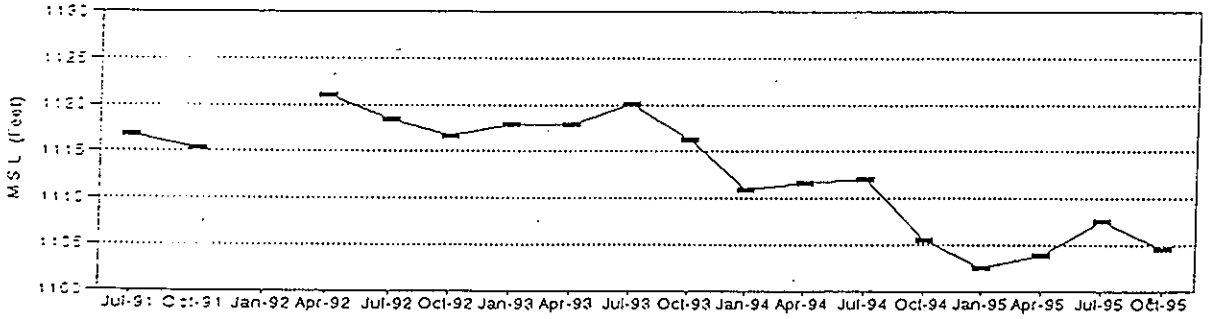
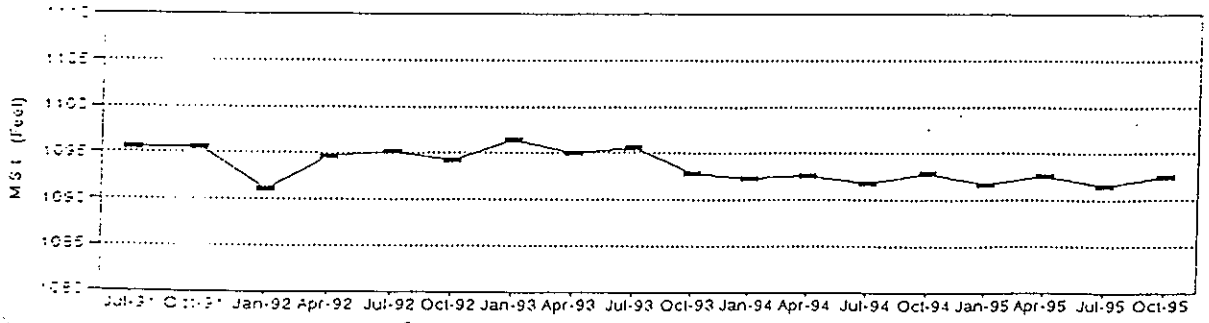


OW-7



January 1992 reading erratic. Validity disputable.

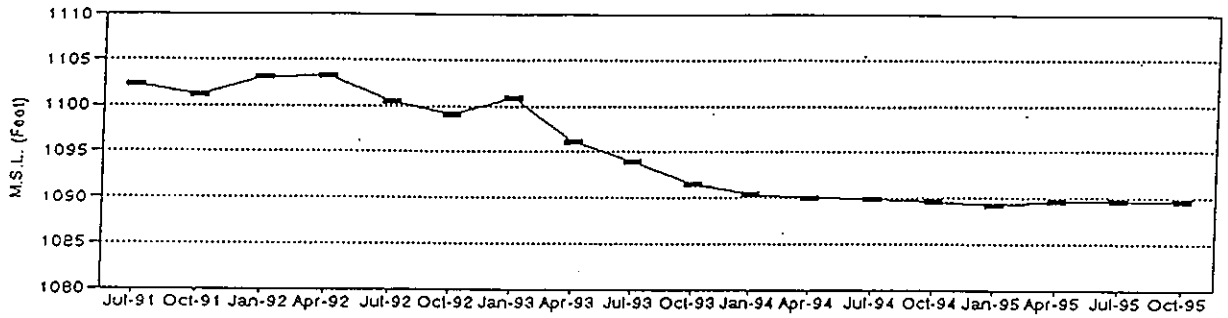
OW-10



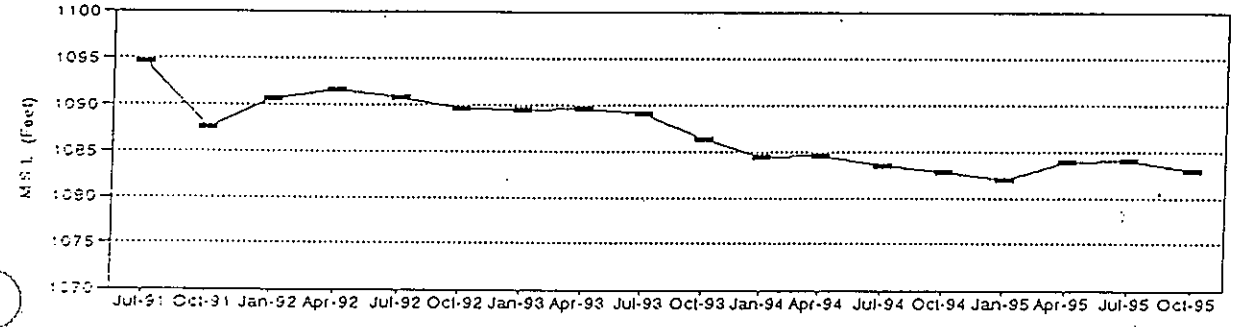
Flambeau Mining Company

Groundwater Elevation Results

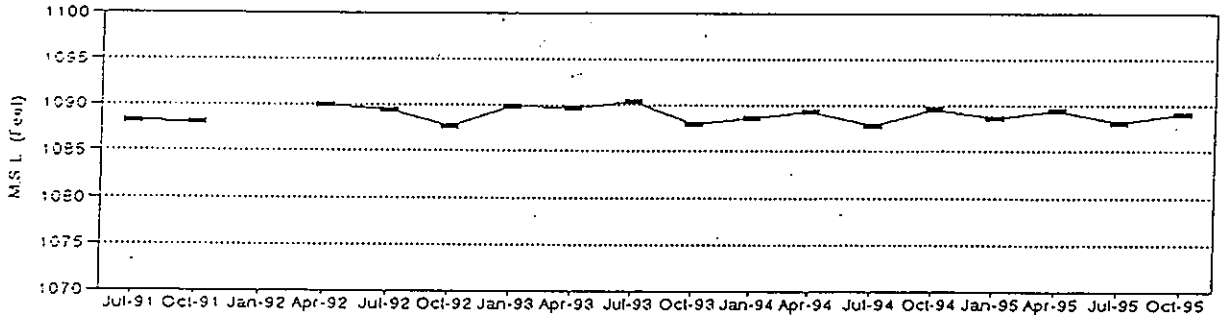
OW-39



OW-42

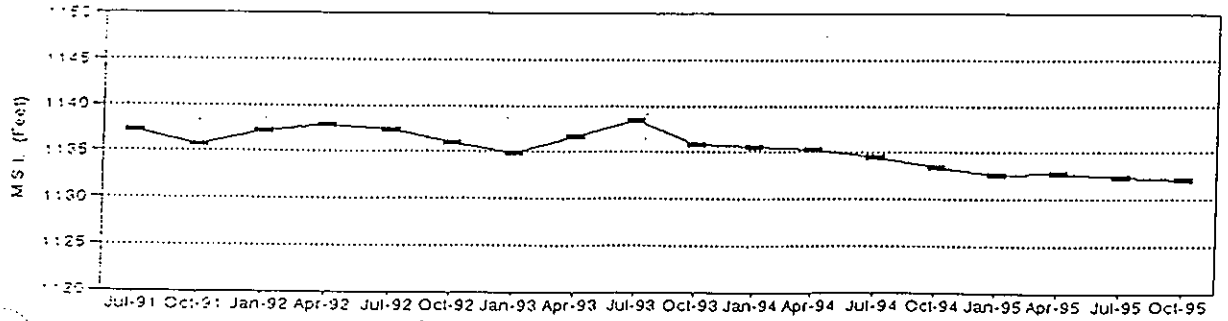


OW-43



January 1992 reading erratic. Validity disputable.

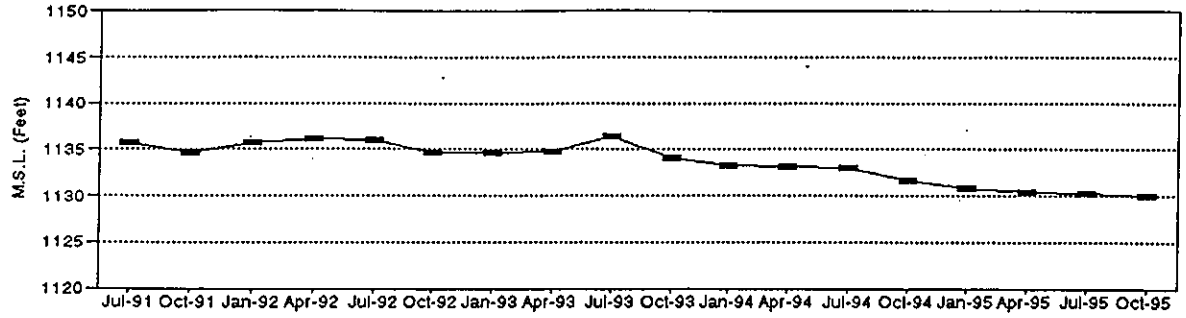
PZ-1006G



Flambeau Mining Company

Groundwater Elevation Results

PZ-1006S



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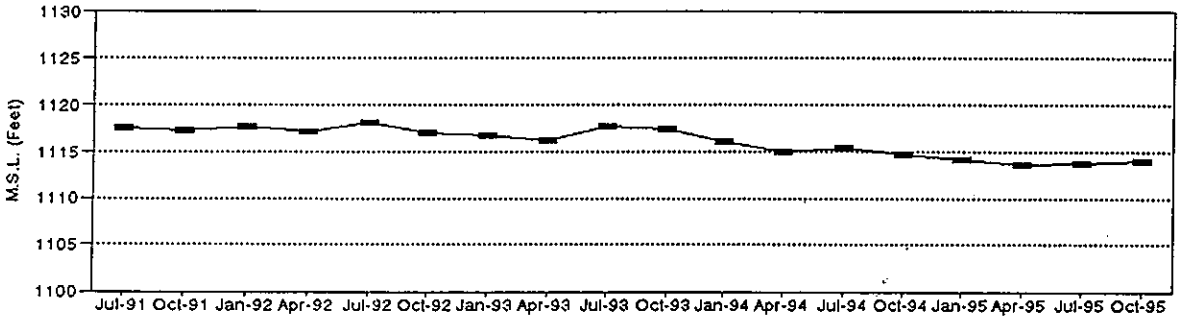
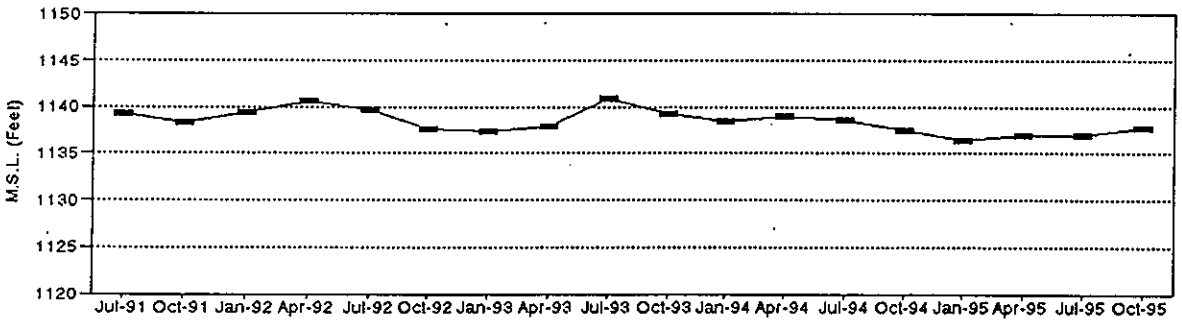
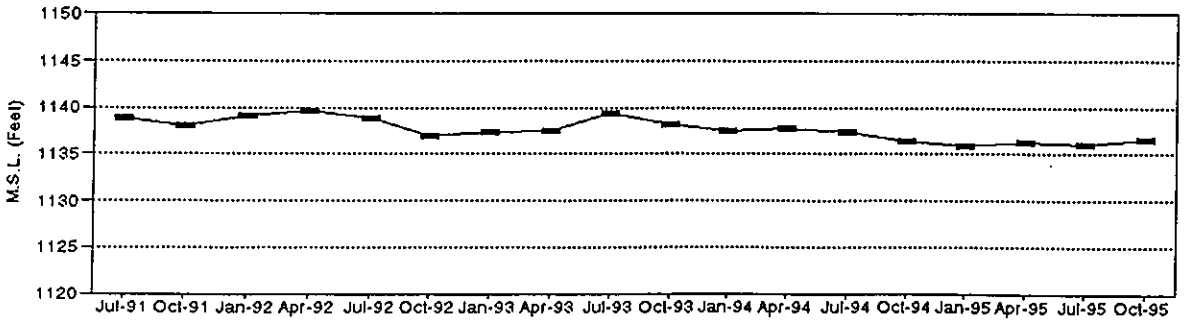


PZ-1008



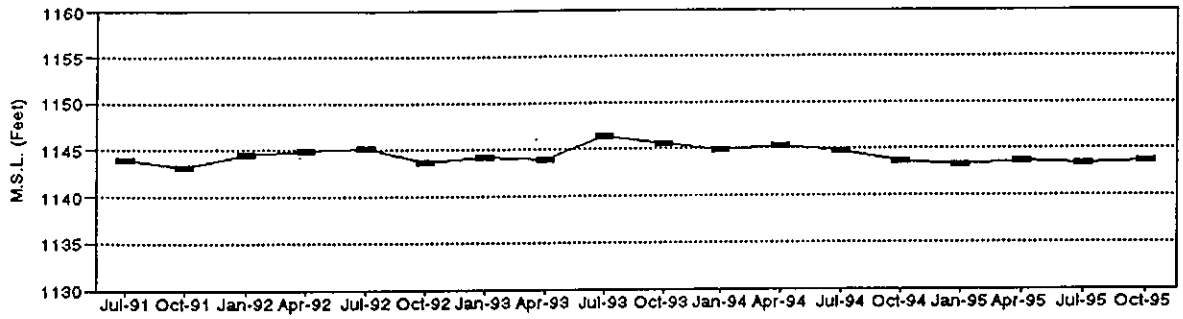
PZ-1008G



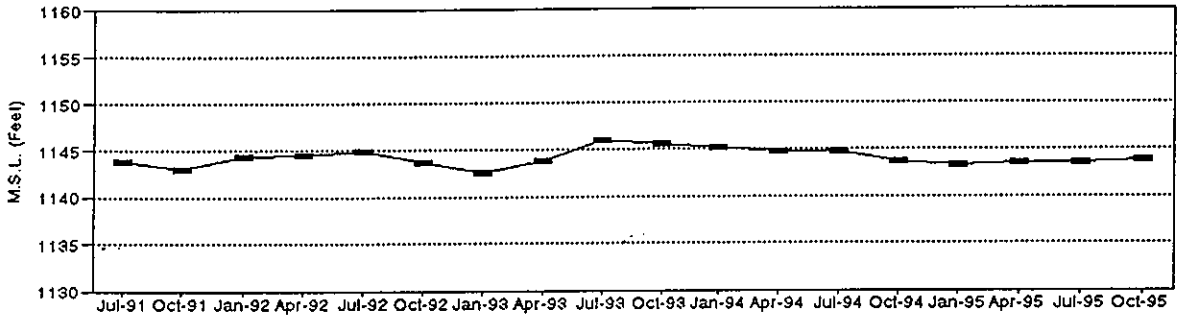
Flambeau Mining Company

Groundwater Elevation Results

PZ-1009



PZ-1009G



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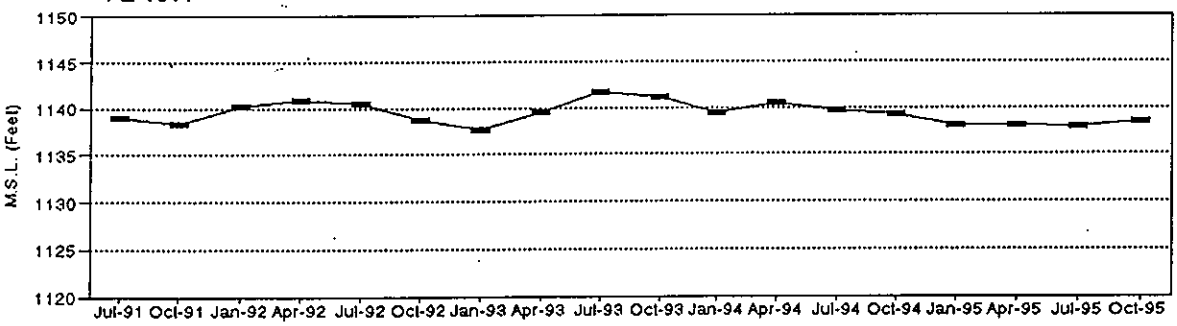
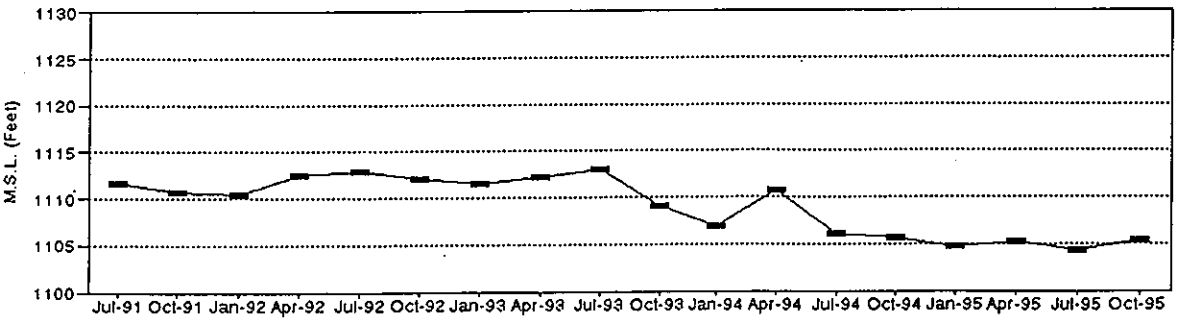


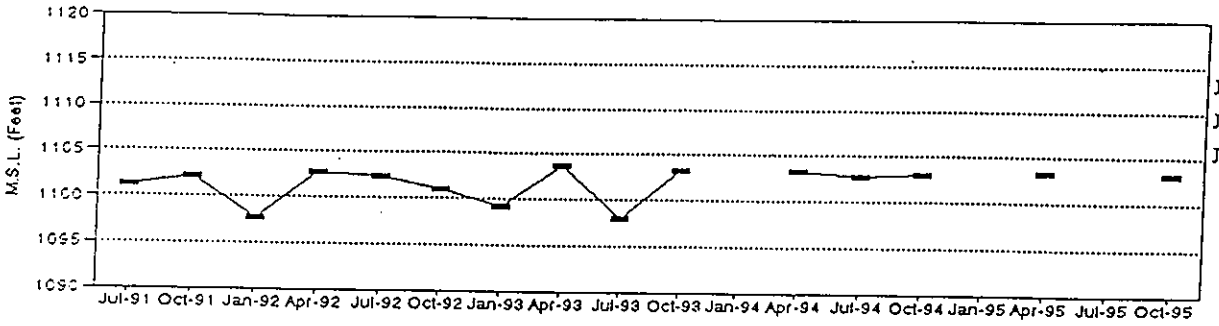
PZ-1012



Flambeau Mining Company

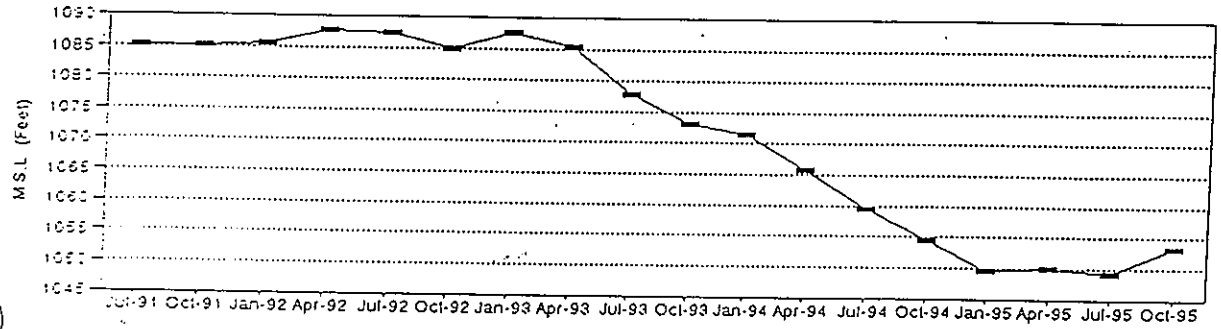
Groundwater Elevation Results

PZ-1B

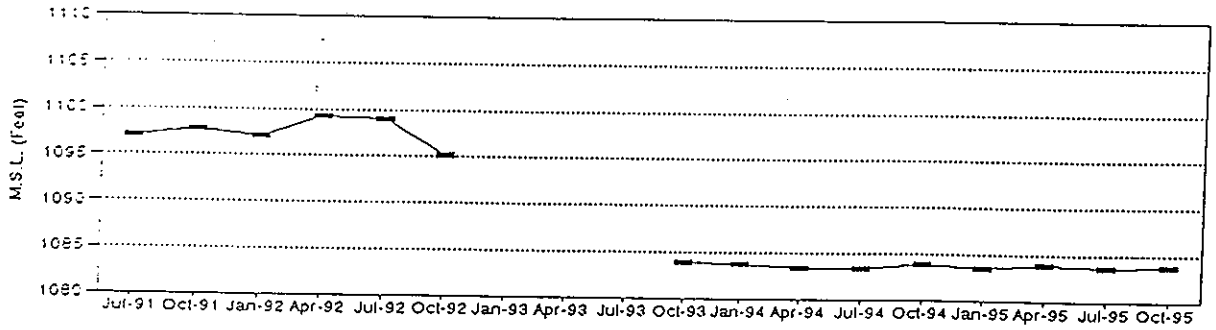


January 1994 - Dry
January 1995 - Dry
July 1995 - Dry

PZ-R1

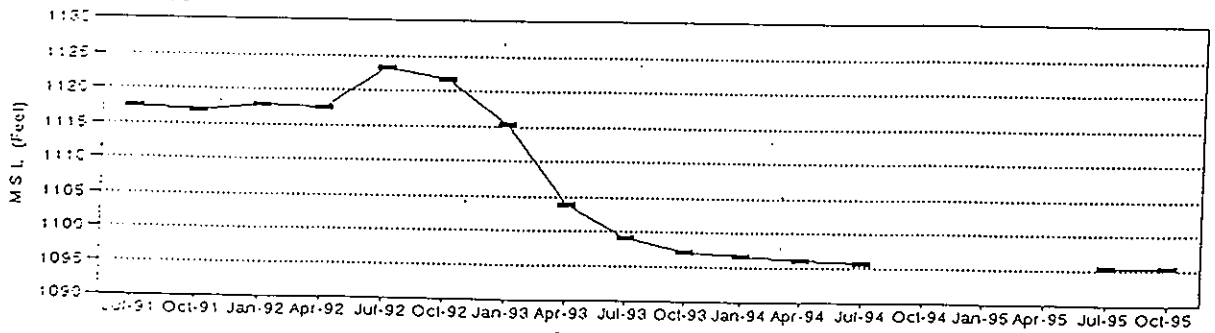


PZ-S1



January - July 1993
Damaged

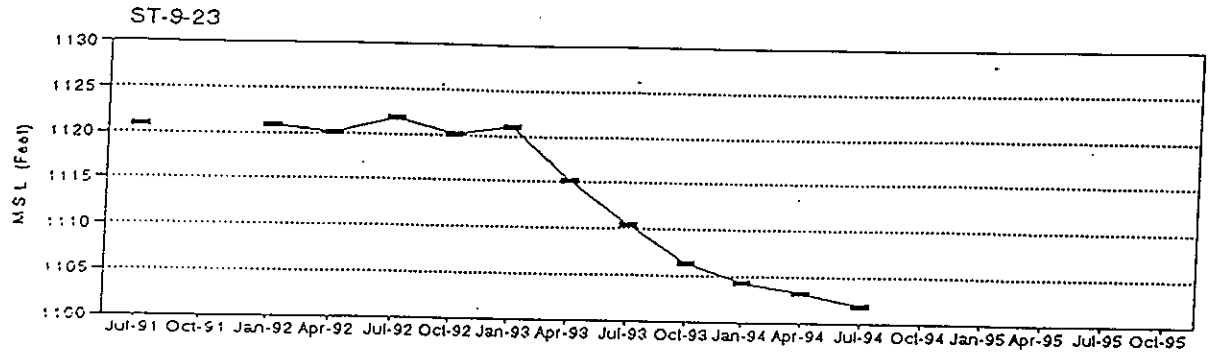
PZ-S3



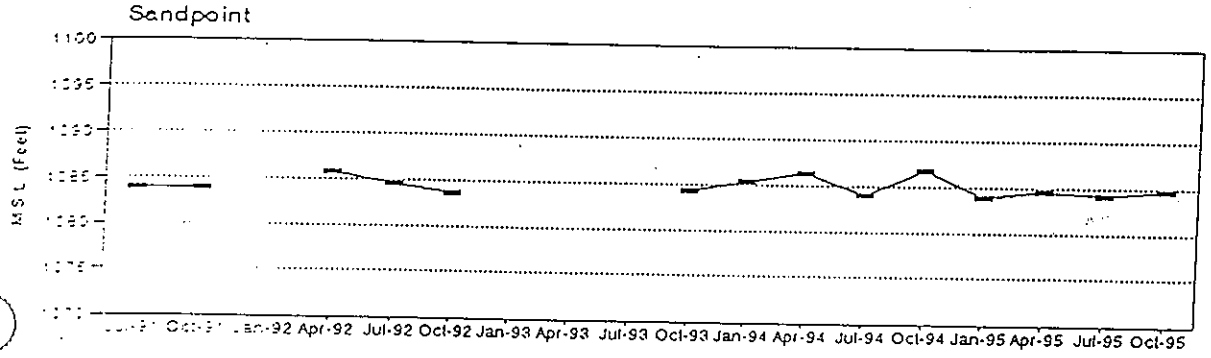
October 1994 - April 1995 - Dry

Flambeau Mining Company

Groundwater Elevation Results



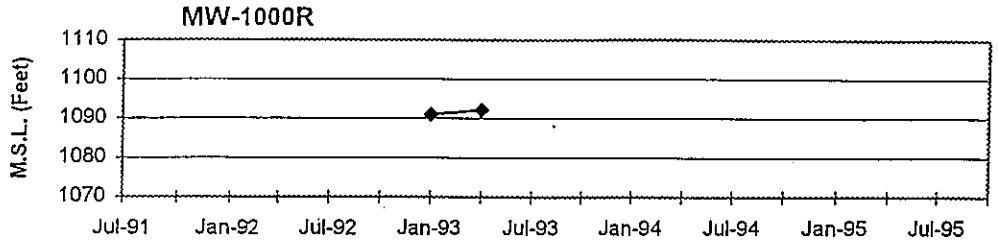
October 1994 reading erratic. Validity Disputable.



January 1992 - Frozen

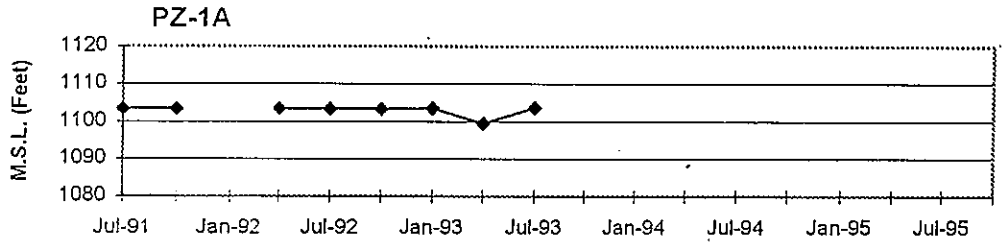
January - July 1993 Damaged

Repair completed in July 1993



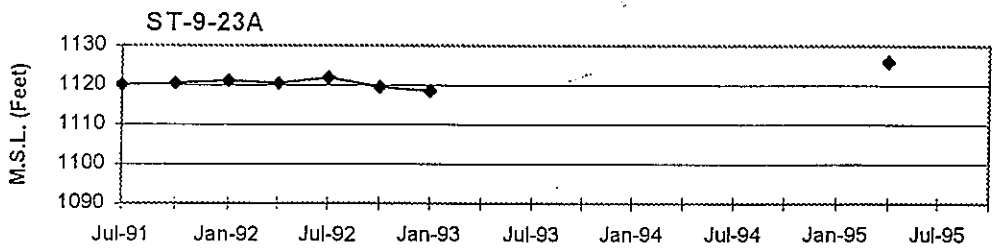
November 1992 - Installation

July 1993 - Present - Dry

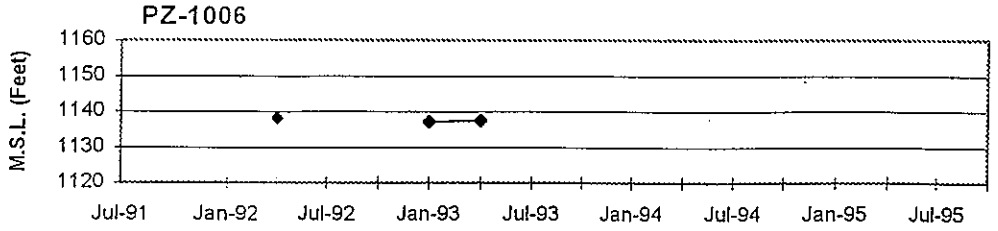


January 1992 - Frozen

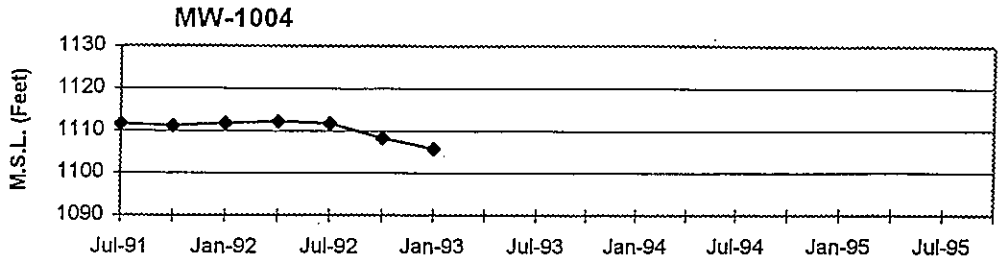
October 1993 - Present - Dry



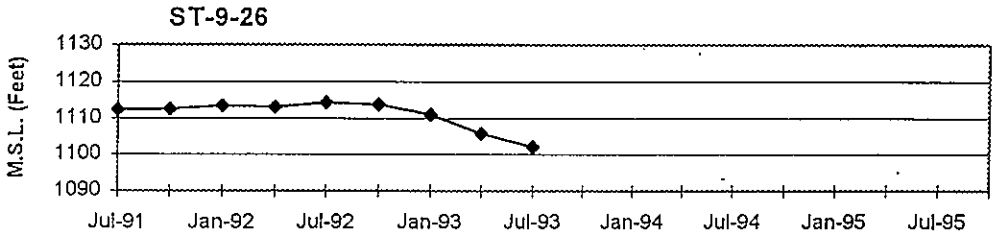
April 1993 - Present - Dry



Note: PZ - 1006 Typically Dry



April 1993 - Present - Dry



October 1993 - Present - Dry

APPENDIX D

SEDIMENT SAMPLING

Foth & Van Dyke
Memorandum

January 4, 1996

TO: Jana Murphy, Flambeau Mining Company

CC: Tom Myatt, Flambeau Mining Company
Jim Hutchison, Foth & Van Dyke
Jerry Sevick, Foth & Van Dyke

FR: Bill West, ECCI WMW
Joe Austin, Foth & Van Dyke JJA

RE: Report on Activities Associated with 1995 Sediment Sampling
Flambeau River, Ladysmith, Wisconsin

Introduction

On June 12, 1995, Bill West of Environmental Compliance Consultants, Inc., and Joe Austin of Foth & Van Dyke were accompanied by Jack Christman of Flambeau Mining Company (Flambeau) for the purpose of installing sediment traps in the Flambeau River. This activity was part of the routine site monitoring required by the Flambeau Mining Permit.

Four individual sampling containers were positioned in two locations in the Flambeau River. One of these locations (Site S-1) was positioned above the Flambeau discharge channels (Outfall 001 & 002) at the Blackberry Lane access. The second (Site S-3) was located downstream of mining site discharge channels near the Sister's farm. These sampling locations were the same as those sampled in 1993 and 1994. Sample containers were removed from the river after an exposure period of eight weeks when sufficient sediment samples were collected.

Methodology

Sediment traps were installed upstream (Site S-1) and downstream (Site S-3) of the Flambeau discharge locations as illustrated in Figure 1. Sample containers consisted of one-quart wide mouth mason jars which were acid washed prior to installation.

At each sampling location, a set of four sample jars were placed in the river, each secured by rebar and surrounded by a concrete half block. Rebar was driven into the substrate to the point of being flush with the top of the block. Sinking the rebar flush with the block was accomplished to minimize the collection of debris which may cover the jar opening. Observations of sediment traps at the time of trap removal from the river in 1994 indicated that this technique was successful in keeping debris from accumulating on and around the traps.

Quart jars inserted into the submerged half block openings were positioned so that the top of each jar was either flush with the top of the block or slightly below it. This positioning was designed to reduce the potential for breakage due to an encounter with water-borne debris.

With every four jar set, the outer most jar (most distal to the shore) was positioned approximately 45 degrees upstream of the second jar. The second, third, and fourth jars were similarly placed at 45 degrees and downstream of the previously placed jar. When placing jars in the block, the upstream jar was positioned first, followed by the second, third and fourth descending downstream. In this manner, the chance of impacting downstream jars while placing the upstream jars was minimized.

As in 1994, a nitex screen with ½-inch mesh was fitted over each of the jars and secured with plastic ties. This technique was used to prevent the colonization of the traps by crayfish and/or other aquatic inhabitants.

Sample containers were retrieved on August 14, 1995. At each site care was taken to retrieve the container furthest downstream first, followed by the next upstream sample and so on until each of the four were collected. Collecting samples in this manner prevented the downstream samples from being contaminated by the upstream sample collection. These sampling procedures avoided the trapping of sediments disturbed during the collection process.

During sample collection, the plastic tie and mesh screen were removed from the sample jar while a sheet of parafilm was placed over the jar opening. Following this, the jars were fitted with a lid and ring seal and placed on ice prior to being taken directly to Northern Lake Service in Crandon, Wisconsin, for analysis. At the laboratory, samples collected at each site were composited into a single sample, S-1 for the upstream sample and S-3 for the downstream sample.

Observations

Sample consistency from the upstream sample site (S-1) compared to the downstream sample site (S-3) was fairly uniform, though Site S-1 had proportionately greater sediment accumulation. Sediment accumulations in the Site S-3 jars were from ⅓ to ½ of the jar capacity at the time of collection, while accumulations in the jars located at Site S-1 were about 90 percent of the jar capacity. It was also noted that jar accumulations at Site S-1 contained a higher percentage of sand than at Site S-3. This discrepancy could be attributed to a rain event during which the increased flow may have carried a sediment load downstream from the Ladysmith Dam which may have impacted the sediment traps as far downstream as Blackberry Lane (S-1).

Results and Discussions

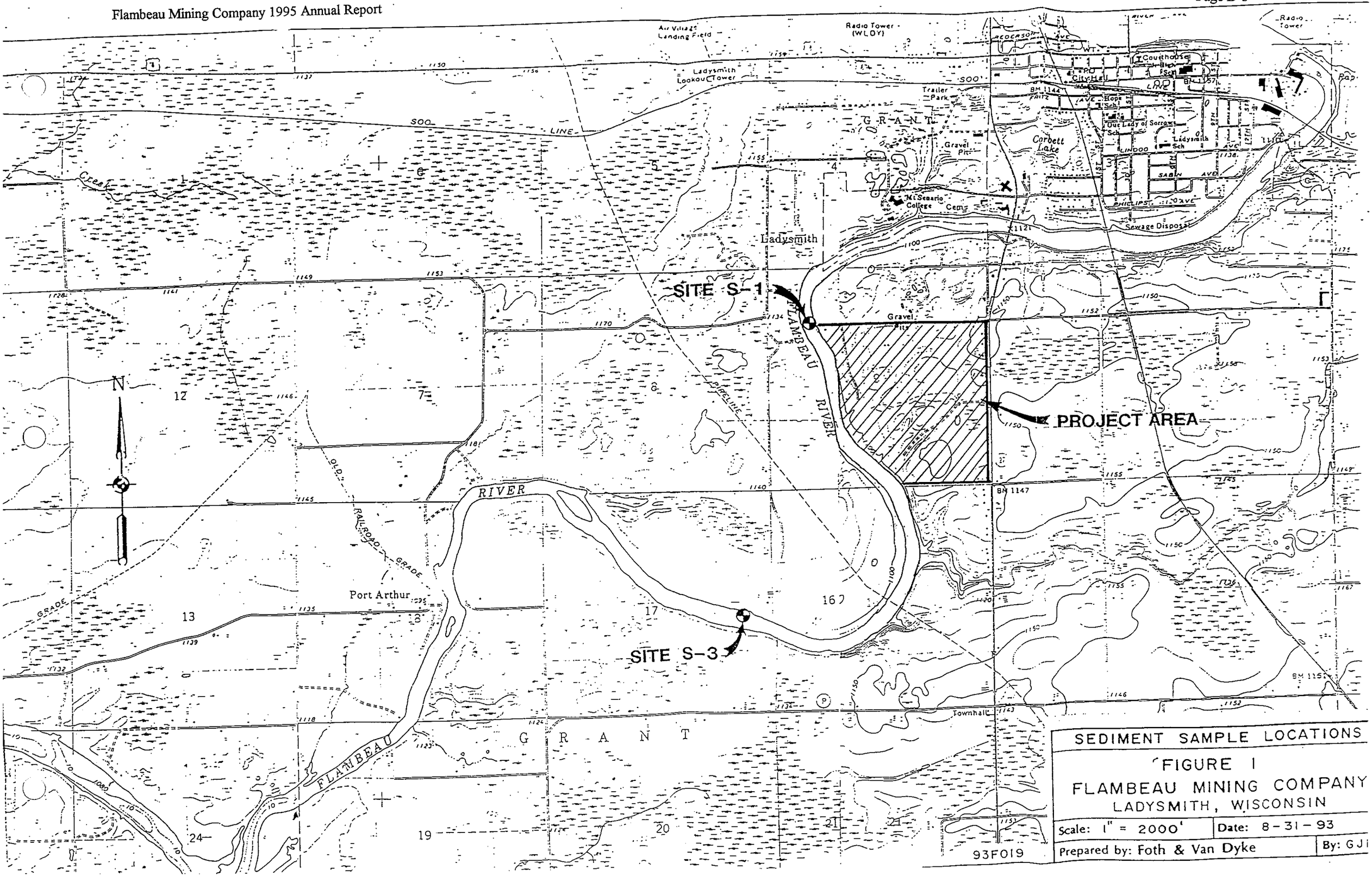
A summary of results of the laboratory analysis of the sediment samples from the two sampling sites are shown in Table 1. Individual sample analysis reports including sediment gradation results are attached.

The 1995 results of particle size analysis indicate little difference in sediment composition when compared to those results obtained during the 1993 monitoring activities (particle size was omitted during 1994 due to insufficient sample mass). During both years the sediment collected at site S-1 was dominated by poorly graded sand. Likewise, at Site S-3 the samples were composed primarily of poorly graded sand with silt throughout the monitoring period.

Data from the first five years of sediment metal concentration analysis indicates that, in general, no increase or decrease in parameter concentration in sediments is occurring. Moreover, downstream samples continue to compare favorably with upstream sediment samples indicating no impacts due to mine activities.

JJA:jse

Attachment



SEDIMENT SAMPLE LOCATIONS

FIGURE 1

FLAMBEAU MINING COMPANY

LADYSMITH, WISCONSIN

Scale: 1" = 2000'	Date: 8-31-93
Prepared by: Foth & Van Dyke	By: GJ

Table 1

Flambeau River Sediment Sampling Results
1991 - 1995

Parameter (mg/L)	Sample Location/Number										
	Blackberry Lane (S-1)					Port Arthur Dam (S-2 & S-3)					
	S-1-01 (1991)	S-1-02 (1992)	S-1-03 (1993)	S-1-04 (1994)	S-1-05 (1995)	S-2-01 (1991)	S-2-02 (1992)	S-2-03 (1993)	S-3-03 (1993)	S-3-04 (1994)	S-3-05 (1995)
Silver	<1.2	<1.1	0.057	<0.21	<0.05	<1.1	<2.6	0.086	0.58	<0.08	0.04
Aluminum	3800.0	3300.0	4000.0	3900	2900	4000.0	12000.0	1500	4400	4000	3600
Arsenic	2.2	2.2	1.4	<4.2	<0.41	1.5	4.1	<0.55	0.71	<1.6	1.5
Cadmium	<0.7	<0.6	<0.06	<0.42	<0.03	0.6	<1.4	<0.055	0.11	0.13	0.085
Chromium	11.0	10.0	11	10	4.4	13.0	24.0	23.8	9.6	10	6.6
Copper	7.3	6.0	7.0	5.8	6.4	7.2	24.0	2.1	6.7	7.1	7.0
Iron	18000.0	16000.0	15000	11000	4800	16000	25000	3100	8200	7700	7300
Mercury	0.1	<0.1	<0.045	<0.04	<0.02	0.1	<0.3	<0.057	<0.07	<0.03	<0.06
Manganese	1900.0	1000.0	1300	1500	600	1600.0	570.0	610	830	860	780
Nickel	5.8	6.1	8.4	7.4	6.1	7.3	12.0	1.7	6.5	6.2	5.0
Lead	6.0	5.8	8.5	3.3	3.3	6.9	20.0	2.6	8.3	7.8	7.5
Selenium	0.4	<0.4	<0.32	4.2	<0.44	0.4	<0.9	<0.28	<0.26	<1.6	<0.27
Zinc	47.0	33.0	38	34	18	45.0	79.0	9.6	33	46	26
Total Solids %	73.0	78.6	79.2	NA*	76.7	76.8	35.0	32	56	NA*	44.8
Total Volatile Solids %	1.80	1.60	0.77	NA*	<2	2.5	12.0	5.8	6.24	NA*	6.9
Field Temp. C	25.0	16.2	15.0	NA*	25.0	25.0	15.8	15.5	15.5	NA*	25.0

*Solids data not available due to insufficient sample.

IMC\JSE\95f004\GBAPP\21382\5000

Prepared by: JJA
Checked by: XXC

APPENDIX E

FISH SAMPLING

Foth & Van Dyke
Memorandum

January 4, 1996

TO: Jana Murphy, Flambeau Mining Company

CC: Tom Myatt, Flambeau Mining Company
Jim Hutchison, Foth & Van Dyke
Jerry Sevick, Foth & Van Dyke

FR: Joseph Austin, Foth & Van Dyke JJA

RE: Report on Activities, 1995 Fish Collection and Analysis, Flambeau River, Ladysmith, Wisconsin

Introduction

On September 18 and 19, 1995, representatives of EA Associates, Deerfield, Illinois and Foth & Van Dyke, electroshocked two impoundments on the Flambeau River located above and below the Flambeau Mine discharge channels. These impoundments included the flowage above the Ladysmith Dam, Ladysmith, Wisconsin (upstream sample), and the flowage above the Thornapple Dam (downstream sample). The purpose of the sampling event was to collect walleye and submit walleye fillets for tissue (metals) analysis. In addition to this, other fish species encountered were documented.

Fish Sampling

Acceptable sampling methods include hook and line, electroshocking, and fyke netting. As in previous years, electroshocking was used for the collection of walleye. The objective of the electroshocking effort is to collect walleye in the following size ranges:

- 10 to 12 inches - one fish
- 12 to 15 inches - two fish
- 15 to 18 inches - three fish
- 18 to 22 inches - two fish
- greater than 22 inches - one fish

Electrofishing was conducted on the Thornapple Flowage on September 18, 1995 and on the Ladysmith Flowage on September 19, 1995 using a pulsed DC electrofishing boat.

Fillets of walleye were tested for total mercury. The livers of the fish collected at each of the two sampling stations were composited into one upstream (with respect to the mine discharge channels) and one downstream sample. Each composited sample was analyzed for metal parameters. Individual walleyes were weighed, measured for total length, sexed, and their stomach contents were noted. The age of each walleye was also determined by examining their annular scale, and spine cross sectional growth. The physical characteristics of each walleye are

found in Table 1. The stomach analyses results of the walleye are found in Table 2. Tables 3 and 4 show the results of the liver and tissue analyses. Laboratory data associated with the walleye liver and tissue evaluation is attached.

The species observed during the collection event were consistent with those collected during previous sampling efforts. A list of the species encountered during the sampling efforts at both the upstream and downstream sample sites are given in Table 5. As was the case in previous years, there was some difficulty collecting all of the walleye for each of the larger size classes.

Interpretation of Results of Fish Data

Tissue analysis of walleye from the Ladysmith Flowage (site upstream of the mining discharge channels) indicated an increase in mercury concentration from 1991 to 1992 but decreases in all years thereafter including 1995. Walleye collected from the Thornapple Flowage (site downstream of the mining discharge channels) contained levels of mercury that consistently decreased over the five years monitored. 1995 average concentrations of mercury in the fillets of walleyes collected from both sites were low compared to the results from previous years. Mercury levels in fish tissue collected from the site located above mining discharge channels, however, were slightly higher than those observed at the downstream site.

No increasing or decreasing chemical concentration trends can be observed between the upstream and downstream samples of walleye liver.

The results indicate that the activities at the Flambeau mine site are having little impact on the growth and accumulation of metals in the walleyes inhabiting the Flambeau River.

JJA:jse

Attachment

Table 1

Physical Data of Walleye
Flambeau River, Ladysmith, Wisconsin
September 1995

ID No.	Length (mm)	Weight (g)	Sex	Age
		Thornapple Flowage		
WE-TA-01	278	195	F	2+
WE-TA-02	324	260	F	3+
WE-TA-03	340	325	F	3+
WE-TA-04	406	570	F	4+
WE-TA-05	413	550	F	4+
WE-TA-06	421	595	F	5+
WE-TA-07	468	980	F	6+
WE-TA-08	473	1050	F	6+
WE-TA-09	516	1190	F	7+
		Ladysmith Flowage		
WE-LS-01	281	165	F	3+
WE-LS-02	311	255	F	3+
WE-LS-03	318	285	F	3+
WE-LS-04	386	430	M	4+
WE-LS-05	390	550	F	3+
WE-LS-06	398	580	M	4+
WE-LS-07	412	640	M	4+
WE-LS-08	417	610	F	4+
WE-LS-09	492	1130	F	6+

Table 2

Stomach Analysis of Walleye
Flambeau River, Ladysmith, Wisconsin
September 1995

Sample ID	Percent Full	Type of Content	General Comments
		Thornapple Flowage	
WE-TA-01	100	1 Fish-55 mm 1 Fish-65 mm	Partially Digested
WE-TA-02	90	1 Fish-45 mm	Partially Digested
WE-TA-03	80	1 Partial Fish, Vegetation	Mostly Digested
WE-TA-04	0	Empty	None
WE-TA-05	100	1 Fish-62 mm	Partially Digested
WE-TA-06	0	Empty	None
WE-TA-07	80	1 Fish-67 mm	Undigested Walleye
WE-TA-08	95	1 Lamprey-112 mm	Partially Digested, Several Tapeworms Present
WE-TA-09	30	1 Fish, Vegetation	Nearly Completely Digested
		Ladysmith Flowage	
WE-LS-01	0	Empty	None
WE-LS-02	20	1 Fish-15 mm	Nearly Completely Digested
WE-LS-03	100	1 Fish-64 mm	Mostly Digested
WE-LS-04	40	1 Fish	Nearly Completely Digested
WE-LS-05	70	1 Fish-50 mm	Mostly Digested
WE-LS-06	0	Empty	None
WE-LS-07	0	Empty	None
WE-LS-08	10	Vegetation	None
WE-LS-09	0	Empty	None

Table 3

Fish Tissue Analysis
Mercury 1991 - 1995
Results in mg/kg

Fish ID No.	Year				
	1991	1992	1993	1994	1995
		Thornapple Flowage			
WE-TA-01	0.09	0.78	0.40	0.10	0.08
WE-TA-02	1.00	0.55	0.40	0.18	0.10
WE-TA-03	0.60	0.59	0.20	0.19	0.09
WE-TA-04	0.80	0.52	0.48	0.21	0.13
WE-TA-05	0.40	0.68	0.39	0.37	0.12
WE-TA-06	0.70	0.76	0.33	0.88	0.12
WE-TA-07	0.60	0.44	1.10	0.59	0.14
WE-TA-08	0.80	0.47	0.63	0.29	0.13
WE-TA-09	0.60	0.38	0.91	0.32	0.13
Average Concentration	0.71	0.57	0.54	0.35	0.12
		Ladysmith Flowage			
WE-LS-01	0.90	0.99	0.68	0.35	0.19
WE-LS-02	0.80	0.94	0.67	0.45	0.12
WE-LS-03	0.80	0.79	0.55	0.31	0.18
WE-LS-04	0.70	0.85	0.44	0.25	0.16
WE-LS-05	0.90	0.81	0.81	0.53	0.15
WE-LS-06	0.60	0.91	0.66	0.35	0.15
WE-LS-07	0.80	0.82	0.71	0.25	0.29
WE-LS-08	0.60	0.96	0.76	0.18	0.25
WE-LS-09	0.60	0.55	0.77	0.31	0.29
Average Concentration	0.67	0.84	0.67	0.33	0.20

Table 4

Metals Analysis of Walleye
Flambeau River, Ladysmith, WI
Results in mg/kg
1991-1995

Sample ID	Cd	Cr	Cu	Ni	Pb	Zn	Al	Hg	As	Se	Ag	Fe	Mn
Fish Liver													
WE-TA-1-9 1991	0.1	0.2	1.5	0.4	1.3	17	1.1	0.3	0.02	0.51	0.2	73	1.5
WE-TA-1-9 1992	<0.1	<0.1	1.6	<0.2	<0.1	33	15	0.2	<0.04	0.6	<0.1	96	1.6
WE-TA-1-9-1993	0.10	<0.10	4.3	<0.2	<0.05	21	1.6	0.45	<0.09	0.70	0.03	110	1.6
WE-TA-1-9-1994	<0.27	<0.63	1.2	<0.72	<3.9	16	7.9	0.12	<1.3	<1.3	<0.45	140	1.4
WE-TA-1-9-1995	<0.094	<0.12	3.6	0.34	<1.1	14	1.8	0.07	<0.60	<0.65	<0.30	99	1.6
WE-LS-1-9 1991	0.1	0.3	6.0	0.5	1.2	18	2.9	0.3	0.02	0.48	0.2	67	1.4
WE-LS-1-9 1992	0.2	0.2	9.6	<0.2	<0.1	37	14	0.4	<0.05	0.6	<0.1	59	2.0
WE-LS-1-9-1993	0.19	<0.08	17	0.17	<0.04	22	1.6	0.28	<0.09	0.64	0.07	63	1.3
WE-LS-1-9-1994	0.32	<0.58	3.1	<0.67	<3.7	19	4.0	0.19	<1.4	<1.4	<0.42	76	1.6
WE-LS-1-9-1995	<0.10	<0.13	13	0.47	<1.2	18	1.5	0.26	<0.54	1.2	<0.33	56	1.3

Prepared by: JJA
Checked by: XXC

Table 5

Species of Fish Encountered Electroshocking Flambeau River, Ladysmith, Wisconsin September 1995

Thornapple Flowage	Ladysmith Flowage
Lamprey sp.	Northern pike
Northern pike	Muskellunge
Muskellunge	Shorthead redhorse
Golden shiner	White sucker
Silver redhorse	Trout-perch
Golden redhorse	Rock bass
White sucker	Bluegill
Trout-perch	Black crappie
Rock bass	Smallmouth bass
Bluegill	Logperch
Pumpkinseed sunfish	Johnny darter
Hybrid sunfish	Yellow perch
Black crappie	
Smallmouth bass	
Yellow perch	

APPENDIX F

MACROINVERTEBRATE SAMPLING

Foth & Van Dyke
Memorandum

January 5, 1996

TO: Jana Murphy

CC: Tom Myatt, Flambeau Mining Company
Jim Hutchison, Foth & Van Dyke
Jerry Sevick, Foth & Van Dyke

FR: Bill West, ECCI
Joe Austin, Foth & Van Dyke

RE: Report of Activities Associated with Collection and Analysis of Crayfish from the Flambeau River, Ladysmith, Wisconsin

Introduction

On August 14, 1995, Bill West of Environmental Compliance Consultants, Inc. (ECCI), accompanied by Joe Austin of Foth & Van Dyke, completed crayfish collection activities at three sites located on the Flambeau River downstream of the City of Ladysmith, Wisconsin. The purpose of these activities was to fulfill the requirements of the Flambeau Mining Permit which requires Flambeau Mining Company (Flambeau) to conduct metals analysis of crayfish collected at selected sites located upstream and downstream of the mine discharge channels (Outfall 001 and Outfall 002). A minimum of 25 crayfish were to be collected at the following sites:

- The Flambeau River at the Blackberry Lane access (upstream site)
- The Flambeau River at Meadowbrook Creek (downstream site)
- The Flambeau River at the site of the former Port Arthur Dam (downstream site)

The time of year of crayfish collection is not defined. However, from past experience, the best time to collect appears to be mid to late summer when crayfish are active and easily obtained. This is also the time to obtain larger size crayfish which would provide better information on potential metals uptake in macroinvertebrates over time.

Methodology

All samples were collected using an 8 by 18-inch rectangular kick seine net with 800 to 900 micron mesh. Individual crayfish were collected by using the kick seine method which appeared to be particularly effective during high flow conditions due to decreased visibility (higher turbidity) and increased water velocity.

Crayfish were collected during the following time windows:

Site Location	Time of Collection	Number of Crayfish
Port Arthur Dam	10:00 - 10:40 a.m.	38
Meadowbrook Creek	11:00 - 11:45 a.m.	26
Blackberry Lane	12:05 - 12:40 p.m.	36

Specimens were composited for each site in a Ziploc bag and placed on ice. Following this, the samples were transported to Northern Lake Service, Crandon, Wisconsin, for metals analysis.

Results and Discussion

The results of the analysis of the crayfish appear in Table 1. The laboratory analytical reports corresponding to these results are attached. The results represent a composite from all crayfish collected per site. Whole bodies were used for analysis. A review of the data indicates no relative differences in parameter concentrations when comparing upstream locations to downstream locations.

There does however appear to be some cycling of the aluminum concentration results, i.e., the results of the first year in all samples were low followed by an increase in all samples during the second year. The third year witnessed another low set of results in all sites followed by two successive years of increases. These results do not coincide with similar fluctuations in sediment analyses results and could, therefore, be the result of many situations, including instrumental analysis and differing laboratory detection limits.

JJA:jse

Attachment

Table 1

Metals Analysis of Crayfish
Flambeau River, Ladysmith, Wisconsin
Results in mg/kg
1991 - 1995

Sample ID	Cadmium	Chromium	Copper	Nickel	Lead	Zinc	Aluminum	Mercury	Arsenic	Selenium	Silver
Blackberry Lane											
1991	0.1	1.0	17	0.4	1.2	23	36	0.1	0.24	0.14	0.2
1992	<0.1	0.4	16	<0.2	0.1	43	46	0.1	0.30	0.13	<0.1
1993	0.03	<0.09	15	0.2	<0.05	16	28	<0.2	<0.09	<0.19	0.06
1994	0.02	0.92	9.9	<0.22	<0.05	12	17	<0.02	<0.75	<1.93	<0.09
1995	<0.04	0.96	21	<0.19	<0.23	21	48	<0.05	<0.41	<0.44	<0.05
Meadowbrook Creek											
1991	0.1	1.6	20	0.5	1.3	27	36	0.1	0.29	0.15	0.2
1992	<0.1	0.5	19	<0.2	0.2	39	82	0.11	0.4	0.12	<0.1
1993	0.04	<0.09	15	0.2	<0.04	15	18	<0.20	<0.08	<0.35	0.08
1994	0.02	0.74	22	<0.29	<0.09	17	31	<0.03	<0.66	<1.64	<0.08
1995	<0.06	0.71	27	<0.23	<0.33	19	69	<0.06	<0.60	<0.64	<0.07
Port Arthur											
1991	0.1	1.6	20	0.5	1.2	21	27	0.3	0.28	0.15	0.2
1992	<0.1	0.4	14	1.5	0.2	33	430	0.1	0.34	0.14	<0.1
1993	0.03	<0.09	12	<0.15	<0.04	11	22	<0.2	<0.1	<0.36	0.09
1994	0.04	0.92	18	<1.4	<0.10	15	28	<0.02	<0.76	<1.88	<0.09
1995	<0.04	4.5	24	0.5	<0.25	16	130	<0.06	<0.45	<0.48	<0.06

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Prepared by: JJA
Checked by: XXC

Foth & Van Dyke
Memorandum

January 4, 1996

TO: Jana Murphy, Flambeau Mining Company

CC: Tom Myatt, Flambeau Mining Company
Jim Hutchison, Foth & Van Dyke
Jerry Sevick, Foth & Van Dyke

FR: Bill West, Environmental Compliance Consultants, Inc. (ECCI) WMW
Joe Austin, Foth & Van Dyke JJA

RE: Summary of Activities, 1995, Macroinvertebrate Collection
Flambeau River, Ladysmith, Wisconsin

Introduction

On September 20, 1995, Bill West of ECCI accompanied by Joe Austin, Foth & Van Dyke, completed the 1995 macroinvertebrate collection activities for the Flambeau Mine Project. These activities are a requirement of the project's Mining Permit. Three locations, one upstream of the mine discharge locations and two downstream of the discharges, are required to be sampled annually. Sampling locations include the end of Blackberry Lane (upstream), the Flambeau River at the confluence with Meadowbrook Creek and at the site of the former Port Arthur Dam - the latter two sites being the downstream sites. This report describes the collection activities and records observations noted on the day of collection.

Site Conditions

Water stage at all three sites was extremely low - up to 30 feet of shoreline was exposed at Blackberry Lane at 6:30 a.m. The air temperature was near freezing on September 20 and below freezing on September 21. Low water levels coupled with low temperatures suggested that macroinvertebrate numbers might be lower than previous years. In addition, because of the low water, samples in 1995 would be collected at a much greater distance from shore than in previous years. This may have had a marked effect on samples taken at Blackberry Lane where at least some of the previous year's macroinvertebrate specimens were obtained from sweeping overhanging submerged vegetation.

Methods

Macroinvertebrate samples were collected using a net with an 8 by 18-inch opening and a 800 to 900 micron mesh size. In-stream sampling methods consisted of kick seining supplemented by sweep netting along the shore. Sweep netting could only be done in limited areas. These two techniques are appropriate for obtaining the necessary macroinvertebrate samples for this project.

At each of the three sites, in-stream sampling was conducted for two and one half manhours. This time window included sorting of collected specimens from debris. Specimens were preserved in 10 percent formalin.

After being collected and preserved, the samples were sent to EA Engineering, Deerbrook, Illinois, for identification and enumeration.

Site-Specific Observations and Conditions

Blackberry Lane

Sampling was initiated at the river access located at the end of Blackberry Lane at 10:20 a.m. and was terminated at 11:40 a.m. Water temperature at the time of sample collection was 16° centigrade. The water level at that time was approximately at bank stage but low when compared to observations made in previous years. On that particular day it was noted that the river stage was very low at 6:00 a.m. The water's edge was observed to be approximately 30 feet from the bank at that hour. Bank stage was observed to occur at 10:30 a.m., when the stream edge met the bank. In previous years, the river stage was observed to be at least 2 feet up the bank vertically but not over the bank.

The bank vegetation downstream of the Blackberry Lane access is made up of grass/sedge with a significant amount of overhang at the water edge. Usually this is an excellent habitat from which to collect macroinvertebrates particularly certain beetles, water scorpions, water striders, and damselflies. The lack of these species and/or reduction in their number could be a reflection of the loss of submerged habitat in this reach of the river. This condition was not observed to affect the other sampling stations to the same extent because of the lack of similar habitat at those sites.

Meadowbrook Creek

Sampling at Meadowbrook Creek was conducted between the hours of 7:15 and 8:30 a.m. Water temperature at the time of sample collection was 14° centigrade. Water stage was very low, approximately 15 feet from shore to the water's edge. Because of the steeper grades of the stream bed in this area, less exposed substrate was present at this site as compared to Blackberry Lane.

The substrate of the Meadowbrook Creek sampling site is characterized as rock/cobble with some boulder. Collections were concentrated in a portion of the Flambeau River immediately above the confluence of the Flambeau River with Meadowbrook Creek.

Port Arthur Dam

Sampling at Port Arthur Dam was conducted from 12:25 to 1:40 p.m. Water temperature at the time of sampling was 16° centigrade. Water stage was lower than previous years but still at bank stage.

The substrate of the Flambeau River at this site is characterized as being dominated by rock in the cobble size category.

Results and Discussion

Containers with all collected specimens were sent to EA Engineering for enumeration and identification. Table 1 contains a list of organisms collected during the 1995 sampling event.

In general, the total taxa collected in 1995 were similar to those numbers of taxa collected in 1994, though the total taxa collected at the Port Arthur Dam site were somewhat lower. The numbers of organisms collected in 1994 were considerably lower than those collected during the two previous years at all sites. This was attributed to the severe floodings which also occurred immediately prior to the 1994 collection effort. The low water conditions experienced in 1995 may also have been partially responsible for the continued lower number of organisms collected. In addition to this, the low water conditions restricted the ability to effectively utilize sweep netting techniques at Blackberry lane. It is also suggested that reduced flow at the Port Arthur Dam site reduced the effectiveness of the kick seine collection method in general. This is because the larger rock size limits the collection effort to kick seining techniques but lower flow velocity allows more organisms to avoid being carried downstream into a seine.

Because collection results at Blackberry Lane and Meadowbrook Creek have been relatively similar throughout the duration of the project, is believed changes in total taxa collected are attributed to river dynamics, natural causes, and possibly river stage fluctuation. There is no evidence at this time that discharges from the Flambeau Mine treatment facility are having any impact on the macroinvertebrate populations of the Flambeau River.

JJA:lmc:jse

Table 1

Macroinvertebrates Collected from Three Locations Near the Flambeau River Mine Site September 1995

Taxa	Blackberry Lane	Meadowbrook Creek	Port Arthur Dam
Decapoda			
Orconectes sp.	6	7	8
Isopoda			
Caecidotea sp.	-	1	-
Ephemeroptera			
Ephemera simulans	-	6	26
Isonychia (Isonychia) sp.	10	10	4
Anthopotamus verticis	123	99	72
Stenonema mediopunctatum	11	18	17
Stenonoma vicarium	4	41	37
Stenonema terminatum	-	2	3
Lecrocuta sp.	-	3	1
Procloeon sp.	-	1	-
Baetis intercalaris	13	2	1
Odonata			
Argia sp.	-	1	-
Calopteryx sp.	-	-	1
Ophiogomphus rupinsulensis	5	3	1
Hylogomphus sp.	-	-	1
Megaloptera			
Nigronia serricornis	-	5	10
Plecoptera			
Acroneuria abnormis	3	2	5
Neoperla clymene	15	3	23
Agnetina capitata	32	4	10
Hemiptera			
Belostoma sp.	1	2	-
Ranatra sp.	1	-	-
Metrobates sp.	1	-	-
Rhagovelia sp.	1	-	-
Hesperocorixa sp.	-	-	6

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Prepared by: JJA
Checked by: XXC

Table 1 *(Continued)*

Taxa	Blackberry Lane	Meadowbrook Creek	Port Arthur Dam
Tricoptera			
Cheumatopsyche sp.	46	50	14
Ceratopsyche morosa	39	3	2
Chimarra obscura	8	-	-
Macrostemum zebratum	13	-	-
Polycentropus senu lato	1	1	-
Coleoptera			
Ectopria nervosa	-	1	1
Stenelmis sp.	25	12	4
Oligochaeta			
Limnodrilus hoffmeisteri	-	-	1
Nais behningi	1	-	-
Aulodrilus pluriseta	-	1	-
Immature tubificid w/o hair chaetae	-	2	-
Lumbriculus variegatus	-	1	-
Diptera			
Atherix sp.	2	1	-
Hexatoma sp.	-	1	-
Tabanus sp.	-	1	-
Rheotanytarsus sp.	-	1	-
Cricotopus sp.	-	2	1
Stictochironomus sp.	-	9	1
Thienemannimyia sp grp.	-	1	-
Tyetenia sp.	-	-	1
Total Taxa	22	33	25

APPENDIX G

HABITAT CHARACTERIZATION

Foth & Van Dyke
Memorandum

January 4, 1996

TO: Jana Murphy, Flambeau Mining Company

CC: Tom Myatt, Flambeau Mining Company
Jim Hutchison, Foth & Van Dyke
Jerry Sevick, Foth & Van Dyke

FR: Bill West, Environmental Compliance Consultants, Inc. WMW
Joe Austin, Foth & Van Dyke JA

RE: Report on 1995 Habitat Characterization, Flambeau River, Ladysmith, Wisconsin

Introduction

On September 21, 1995, Bill West of Environmental Compliance Consultants, Inc. (ECCI), and Joseph Austin of Foth & Van Dyke (F&VD), conducted a habitat characterization of the Flambeau River in an area adjacent to the Flambeau Mine site. The purpose of the characterization was to provide an assessment of the habitat in the Flambeau River above and below the mining site and to compare conditions in the river to those documented prior to the initiation of discharges from the mines two discharge channels. Habitat characterization study requirements are described in the mining application (December 1989) and approved pursuant to Docket No. IH-89-14. This report described the habitat/substrate along the east bank of the Flambeau River from a point 100 yards above the mine discharge channel Outfall 002 to a point 1,000 yards downstream of discharge Outfall 001.

Methodology

On September 21, 1995, substrates along the east bank of the Flambeau River were noted and characterized. The area of study is identified in Figure 1.

The study was initiated at 6:15 a.m. above the mining site. Observations made the previous day indicated that the river would be at a low stage prior to daybreak until about 8:00 a.m. Water stage at 6:15 a.m. was observed to have receded approximately 30 feet horizontally with respect to bank stage.

The stream assessment included a walk of the entire distance from above the mine discharge channels to the natural gas pipeline crossing located approximately 1000 yards downstream of Outfall 001 (the southernmost discharge channel). This assessment was conducted in order to physically determine the condition of the substrate and document any possible changes in sediment deposition (amount, particle size) that may have occurred.

LMC\JSE\95F004\GBAPP\21380\5000

Summary of Findings

Substrate descriptions were previously documented in a report submitted in January 1993 titled *Flambeau Mining Company 1992 Annual Report* (Appendix K). Conditions observed in 1995 were similar to the conditions noted in 1992 (Figure 2) except where noted below. In general, no appreciable differences in river substrate habit were observed that could be attributed to mining impacts.

Because of the low stage of the river during the assessment, an opportunity to observe exposed shoreline was afforded. With the exception of the naturally erodible shoreline immediately adjacent to the mine, most shoreline along the study area was exposed horizontally at least ten feet and in many places up to 30 feet or more. Photo #1 which was taken downstream of Blackberry Lane provides a view of the extent of the low flow conditions at 6:30 a.m.

The existence of a beaver hut upstream of the northernmost mine discharge channel (Outfall 002) was noted in 1994. Remnants of this structure persist in the same location with some deposition of sediment observable in the river downstream of the structure.

A new portable intake line was observed entering the river at the point of this discharge channel's confluence with the Flambeau River. This portable intake pipe was temporarily used to supply water to the hydric soil stockpile located on the mine site and provide a source of water for emergency dust suppression. The intake pipe, which is shown in Photo #2 also provides an indication of the amount of aquatic vegetation which was observed floating downstream. The majority of this vegetation was *Vallisneria sp.*

The water near the shoreline adjacent to the mine was observed to be substantially deeper than that seen in previous years due to naturally occuring erosion near the bank. Approximately one to two feet of water depth was present throughout the distance spanning from immediately above the northern most discharge channel to about 100 feet below the southern most discharge channel (the naturally erodible section of the Flambeau River within the study reach).

There are many large logs submerged in position along this naturally erodible bank. These logs have been located there throughout the duration of the project. As noted in previous assessments, these logs encourage the deposition of sediment, and, because they are prevalent along the naturally erodible bank, tend to trap sediment that typically erodes from the bank.

No sediment was observed deposited on the riprap of either of the mine discharge channels as a result of water flow from these outfalls (Photos #2 and #3). However, high water stains from deposited minerals and periphyton growth were observed encroaching the riprap from the Flambeau River at the southernmost mine discharge channel.

The construction of a new beaver hut was observed on shore upstream of Meadowbrook Creek. Slight deposition of sediment was observed in the vicinity of the hut. This hut is shown in Photo #4.

Photo #5 shows the point where Stream C meets the Flambeau River. This picture was taken in the early morning during a low flow period. Photos #6 and #7 are of the area where macroinvertebrates are sampled annually at Meadowbrook Creek. In Photo #6, the flow reduction is obvious in the area between the rock and the shoreline vegetation where

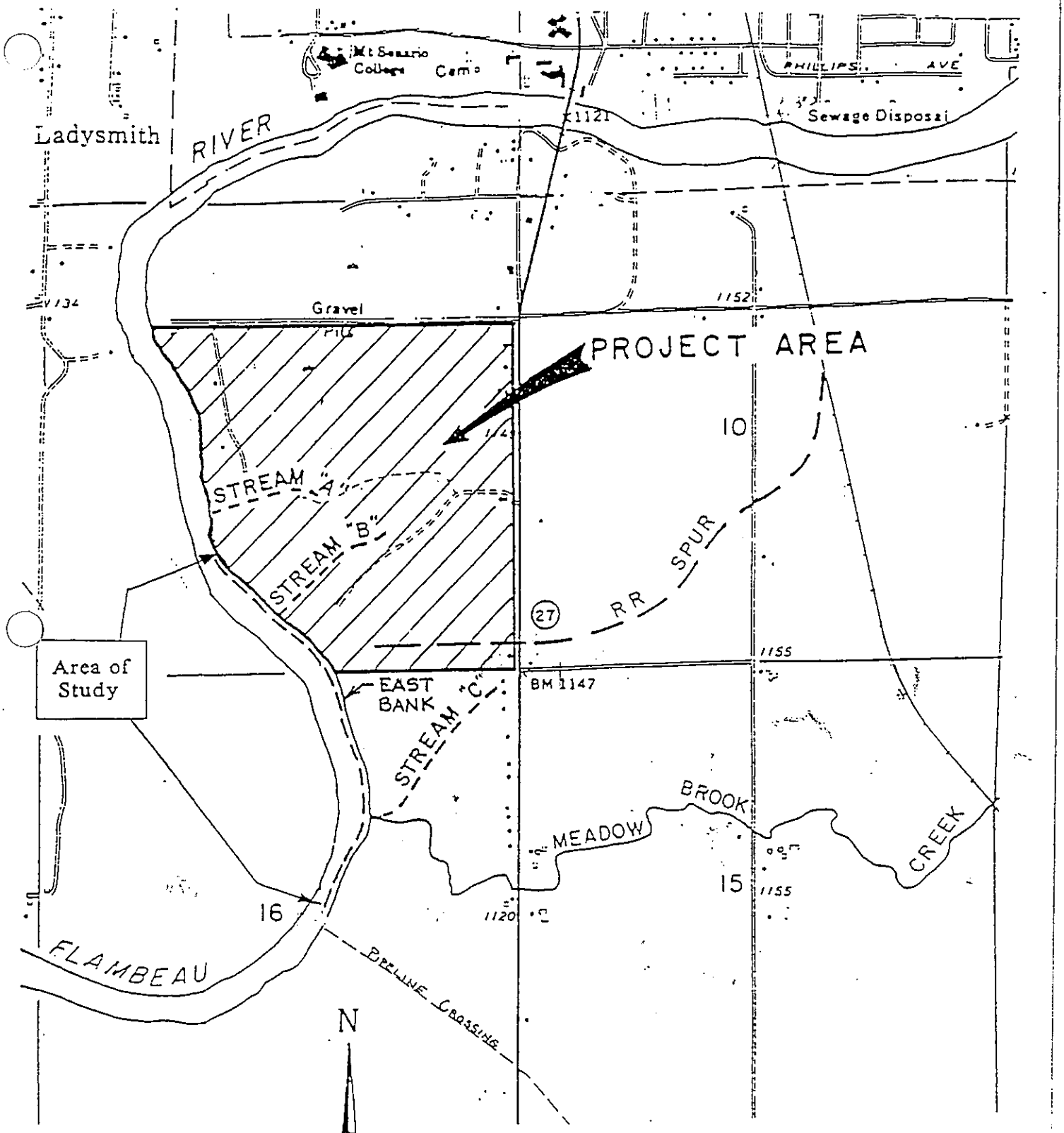
macroinvertebrates are normally collected. Photo #7 was taken after flows in the Flambeau River increased. Note that the area around the two big rocks is again submerged.

In the past, a bed of *Elodea sp.* was observed in a bay immediately downstream of Meadowbrook Creek. This bay is normally sheltered from the main current of the river. No *Elodea sp.* was observed in this location in 1995. The bed was likely eliminated by the flood which occurred in September 1994.

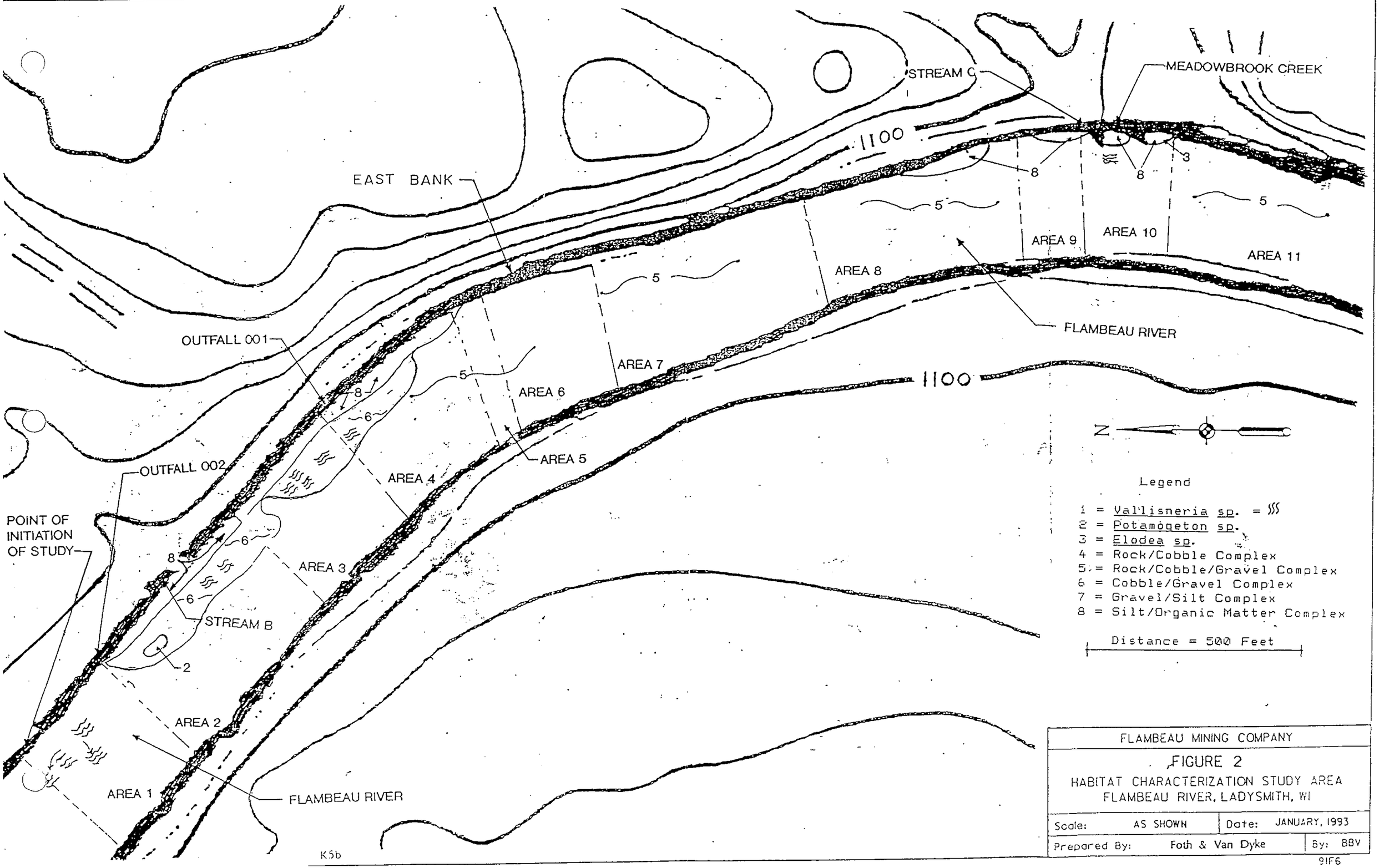
Photo #8 shows the left bank (left facing downstream) of the Flambeau River at the point of the pipeline crossing. The riffle area, which extends across the entire width of the river, designates the approximate location of the pipeline. Note the mat of *Vallisneria sp.* in the foreground which was commonly seen being carried downstream.

JJA:jse

Attachment



FLAMBEAU MINING COMPANY		
FIGURE 1 HABITAT CHARACTERIZATION GENERAL SITE LOCATION		
Scale: NONE	Date: JANUARY, 1993	
K5a Prepared By: Foth & Van Dyke		By: BSV



K5b

FLAMBEAU MINING COMPANY

FIGURE 2

HABITAT CHARACTERIZATION STUDY AREA
FLAMBEAU RIVER, LADYSMITH, WI

Scale: AS SHOWN	Date: JANUARY, 1993
Prepared By: Foth & Van Dyke	By: BBV

91F6

Photograph 1 September 1995
Flambeau River near Blackberry Lane (6:30 a.m.) depicting extent of river low flow condition experienced overnight.

Photograph 2 September 1995
Mine discharge channel outfall 002 with temporary intake pipe for hydric soil recharge and emergency dust suppression in-place.

Photograph 3 September 1995
Outfall 001 showing no signs of deposition of sediments from the discharge of treated effluent.

Photograph 4 September 1995
Flambeau River upstream of Meadowbrook Creek showing remnants of beaver hut.

Photograph 5 September 1995
Flambeau River at the point of discharge of Stream C. Low river stage shows exposed stream bed at the confluence.

Photograph 6 September 1995
Flambeau River immediately upstream of Meadowbrook Creek. The area between the large rock and shore is the normal location for small macroinvertebrate.

Photograph 7 September 1995
Flambeau River immediately upstream of Meadowbrook Creek with macroinvertebrate sampling area re-submerged (area from round rock to shore).

Photograph 8 September 1995
Flambeau River at pipeline crossing. Exposed riffle area and rocks are normally submerged.

APPENDIX H

RESULTS OF WETLAND MONITORING EFFORTS

Foth & Van Dyke
engineers · architects · scientists

August 24, 1995

Ms. Jana Murphy
Flambeau Mining Company
N4100 Highway 27
Ladysmith, WI 54848

Dear Ms. Murphy:

Re: Mitigation Plans for Wetland No. 1

On Friday, August 4, 1995 I visited the mine site to evaluate the conditions in Wetland No. 1 together with Tim De Troie, Jack Christman and Jim Parker. The purpose of this letter is to document the results of our investigation and to outline a recommended mitigation plan to provide supplementary surface water flow to Wetland No. 1.

The investigation revealed that the hydric soils in Wetland No. 1 continue to hold free water and to support the existing wetland plant community. However, the soils along the eastern perimeter of Wetland No. 1 are not as moist as they were during 1994. The cause of these lower than expected soil moisture conditions can be attributed to the lower than average precipitation during previous months and/or the drying up of the groundwater seep along the eastern parameter of Wetland No. 1. Therefore, it is our recommendation that the Flambeau Mining Company implement a plan to provide supplementary water to the surface of the wetland at three points along the eastern perimeter and at one point on the northern end of the wetland. These points are labeled 1 through 4 on the attached map.

The recommended mitigation plan includes the following features:

1. A pump and piping system should be installed to transport water from the Flambeau River to the four locations along the eastern and northern edge of Wetland No. 1. Discharge rates at each of these four locations should be in the range of 10 to 30 gallons/minute. At each location the configuration of the discharge should include perforated pipe deployed so that the discharge water is distributed along its length. The perforated pipe should be oriented with a "T" or "Y" fitting with between 20 and 40 total feet of discharge pipe extending from each leg. The pipe should be oriented so that the water bubbles from the pipe upward so that there is no scouring of the wetland soils at the discharge points. During the August 4 field visit lathe was installed at each of these four locations.

JAP1\94F006\NO6MITIGATION

2737 South Ridge Road · P.O. Box 19012 · Green Bay, WI 54307-9012 · 414-497-2500 · Fax: 414-497-8516

2. The header pipe from the pump should include five laterals including one that will allow for discharge to the hydric soil stockpile area as well.

3. We recommend installing control valves at each of the five locations so that the discharge can be regulated by hand.

4. It is the objective of this mitigation plan to saturate the soils in Wetland No. 1. We recommend pumping to these wetland locations until both of the following conditions are met:

   - There is flow in Stream A at Point 5 indicated on the attached map.

   - The hydric soils in the wetland immediately east of Point 5 are saturated. A measure of saturation will be that there is standing water in the low spots within the wetland or the soils are wet enough such that there is standing water in footprints left in these hydric soils as you walk through it.

If the capacity of the installed system will not allow simultaneous discharge at all four locations an acceptable alternative will be to discharge at fewer than four locations at any given point in time. Under these conditions the valves installed at each discharge location should be regulated manually so that each discharge location receives some water on a weekly basis. We recommend pumping until Condition 4 above is met.

During my visit on August 4 there was some concern expressed about seepage through the wetland soils into the formation that is currently providing groundwater that is seeping into the open pit. Although the recommended program may contribute some amount of water to the sand and gravel soils beneath the hydric soils of Wetland No. 1, we expect that this volume will be of minor significance and that the majority of the water that is discharged on top of the hydric soils will be retained in those soils or flow to the Flambeau River via Stream A. In order to reduce the likelihood of groundwater discharge resulting from the mitigation program for Wetland No. 1 it is important to locate the discharge laterals over the hydric soil. This will be accomplished if the discharge locations are located at the lathe installed in the field during the August 4 visit.

We also recommend that the header pipe from the pump location to each of the four laterals and discharge to the hydric soil stockpile be located near the fence line along the

western portion of the site. The header should be installed so that the low points can be drained every fall.

We believe that the mitigation system should be installed as soon as practicable and operated from May to October each year until reclamation is complete or until the original groundwater seep is re-established along the eastern parameter of Wetland No. 1. During the period from May to October of each year, the system should be operated when there is no longer any flow in Stream A. Operation should continue until conditions defined in Item No. 4 above are met. Once these conditions are met, the system should be shut-off for thirty days. After thirty days if conditions in Item No. 4 are not met, pumping should be resumed until they are.

In conclusion, it is the objective of this mitigation plan to provide surface water flows to Wetland No. 1 such that the hydric soils will be saturated (contain free water) for the majority of the year. If you have any questions or comments about the intent or the implementation of these recommendations, please feel free to give us a call.

Photo documentation of the pipeline, the discharge points, and conditions at location No. 5 should be added to the environmental monitoring program for the Flambeau Mine site. It would be advisable for you to notify the WDNR of your proposed plan. Also pursuant to Wisconsin Admin Code NR142 the WDNR District office should be notified regarding the removal of water from the Flambeau River for use in the mitigation program. We have attached a copy of NR142 for your review.

Sincerely,

Foth & Van Dyke

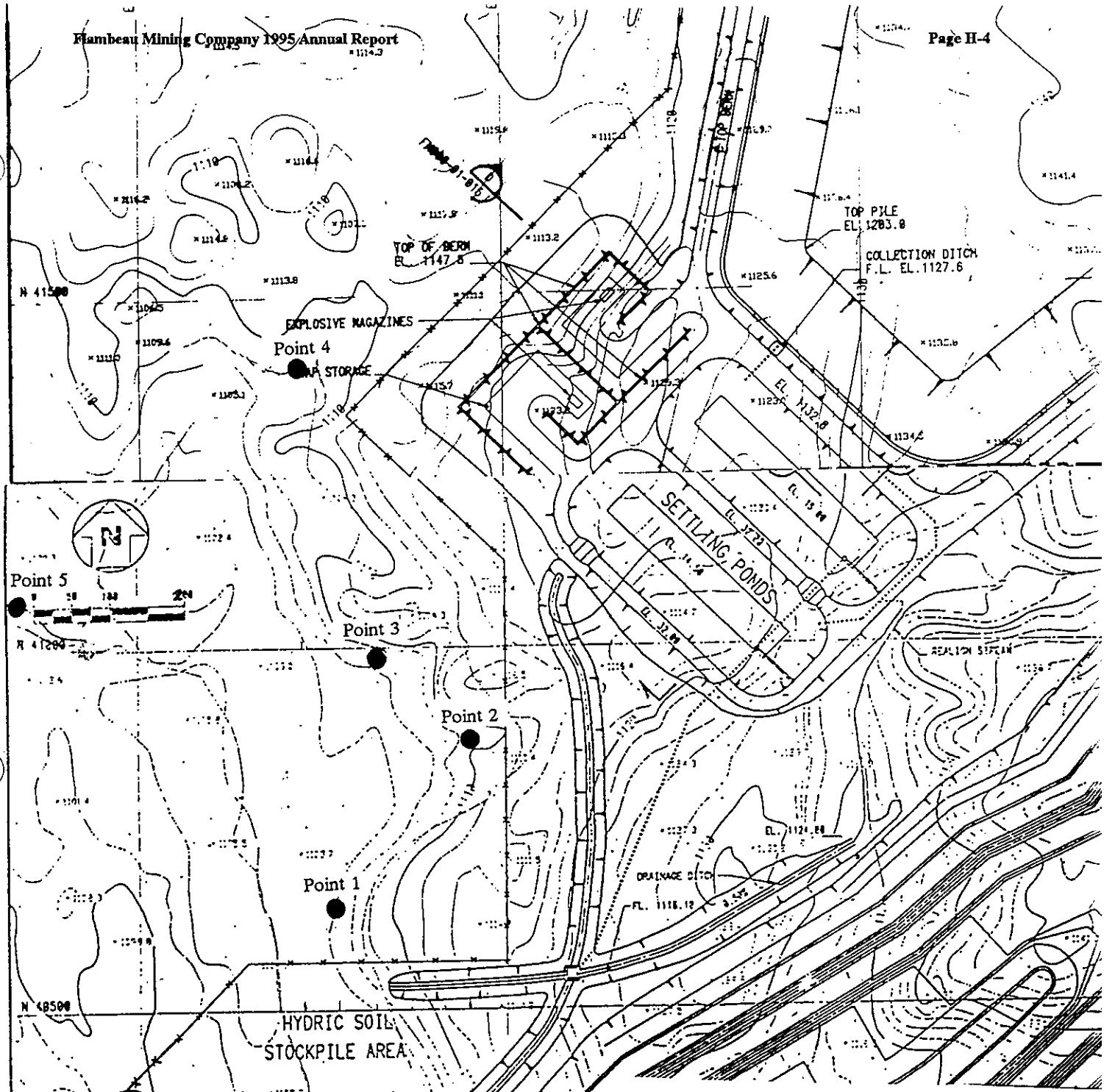
Tim J. Weyenberg

Tim J. Weyenberg
Vice-President/COO

TJW:jap

cc: Mr. Jim Hutchison, Foth & Van Dyke
Mr. Jerry Sevick, Foth & Van Dyke

JAP1\94F006\NO6MITIGATION



Flambeau Mining Company
Proposed Wetland Mitigation
Water Recharge Points
95F004

Point No.	Coordinates*		Elevation*
	East	North	
1	38779.660	40644.012	1103.777
2	38960.078	40876.738	1109.045
3	38827.820	40990.250	1106.327
4	38723.090	41396.629	1107.705
5	Intermittent Stream "A"		

* Coordinates and elevations provided by Flambeau Mining Company (August, 1995).

APPENDIX I

WELL CONSTRUCTION LOGS

SEP 06 '95 13:13 EES P.2

State of Wisconsin
Department of Natural Resources

WELL/DRILLHOLE/BOREHOLE ABANDONMENT

Form 3300-5W 11-89

All abandonment work shall be performed in accordance with the provisions of Chapters NR 111, NR 112 or NR 141, Wis. Admin. Code, whichever is applicable. Also, see instructions on back.

GENERAL INFORMATION

Well/Drillhole/Borehole Location: 03780 | County: RUSK

NW 1/4 of SE 1/4 of Sec. 9 : T. 34 N R. 6 ☐ E ☒ W

(If applicable) _____ Gov't Lot _____ Grid Number

Grid Location: 41,036.1 ft. ☒ N. ☐ S., 39,653.3 ft. ☒ E. ☐ W.

Civil Town Name

Street Address of Well

City, Village

(2) FACILITY NAME

Original Well Owner (If Known): W.W. 23

Present Well Owner: FLAMBEAU MINING CO.

Street or Route: N4100 HWY 27

City, State, Zip Code: LADYSMITH, WI. 54848

Facility Well No. and/or Name (If Applicable) | WI Unique Well No.

Reason For Abandonment: PIT LAY BACK

Date of Abandonment: 10/05/95

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On (Date): 08/08/95

☒ Monitoring Well
☐ Water Well
☐ Drillhole
☐ Borehole

Construction Report Available? ☒ Yes ☐ No

Construction Type:
☐ Drilled ☐ Driven (Sandpoint) ☐ Dug
☒ Other (Specify): HOLLOW STEM AUGER

Formation Type:
☐ Unconsolidated Formation ☒ Bedrock

Total Well Depth (ft.) 465 Casing Diameter (ins.) 2.02
(From groundsurface)

Casing Depth (ft.) _____

Was Well Annular Space Grouted? ☐ Yes ☒ No ☐ Unknown
If Yes, To What Depth? _____ Feet

(4) Depth to Water (Feet) 31.80

Pump & Piping Removed?	☐ Yes	☐ No	☐ Not Applicable
Liner(s) Removed?	☐ Yes	☐ No	☐ Not Applicable
Screen Removed?	☐ Yes	☒ No	☐ Not Applicable
Casing Left in Place?	☒ Yes	☐ No	

If No, Explain: LAY BACK OR PIT WILL TAKE out WELL

Was Casing Cut Off Below Surface?	☐ Yes	☒ No
Did Sealing Material Rise to Surface?	☐ Yes	☐ No
Did Material Settle After 24 Hours?	☐ Yes	☒ No
If Yes, Was Hole Retopped?	☐ Yes	☐ No

(5) Required Method of Placing Sealing Material
☒ Conductor Pipe-Gravity ☐ Conductor Pipe-Pumped
☐ Dump Bailer ☐ Other (Explain)

(6) Sealing Materials
☐ Neat Cement Grout
☐ Sand-Cement (Concrete) Grout
☐ Concrete
☐ Clay-Sand Slurry
☐ Bentonite-Sand Slurry
☒ Chipped Bentonite

For monitoring wells and monitoring well boreholes only
☐ Bentonite Pellets
☐ Granular Bentonite
☐ Bentonite - Cement Grout

(7) Sealing Material Used	From (Ft.)	To (Ft.)	No. Yards, Sacks Sealant or Volume	Mix Ratio or Mud Weight
BENTONITE CHIPS	Surface 1131.5	47.1 1084.1	2	

(8) Comments:

(9) Name of Person or Firm Doing Sealing Work: JACK D. POWERS

Signature of Person Doing Work	Date Signed
	10/05/95
Street or Route: N4100 HWY 27	Telephone Number: (715) 532-6690
City, State, Zip Code: LADYSMITH, WI 54848	

(10) FOR DNR OR COUNTY USE ONLY

Date Received/Inspected	District/County
Reviewer/Inspector	
Follow-up Necessary	

DNR/COUNTY

State of Wisconsin
Department of Natural Resources

WELL/DRILLHOLE/BOREHOLE ABANDONMENT

Form 3300-5W 11-89

All abandonment work shall be performed in accordance with the provisions of Chapters NR 111, NR 112 or NR 141, Wis. Admin. Code, whichever is applicable. Also, see instructions on back.

GENERAL INFORMATION

Well/Drillhole/Borehole Location: 03180

County: RUSK

NW 1/4 of SE 1/4 of Sec. 9 : T. 34 N; R. 6 ☐ E ☒ W

(If applicable) Gov't Lot _____ Grid Number _____

Grid Location: 4,186.3 ft. ☒ N. ☐ S., 39,803.2 ft. ☒ E. ☐ W.

Civil Town Name

Street Address of Well

City, Village

(2) FACILITY NAME

Original Well Owner (If Known): WW-24

Present Well Owner: FLAMBEAU MINING C

Street or Route: N4100 Hwy 27

City, State, Zip Code: LADYSMITH WI 54848

Facility Well No. and/or Name (If Applicable)

WI Unique Well No.

Reason For Abandonment: LAY BACK IN PIT AREA

Date of Abandonment: 10/5/95

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On

(Date) 08/08/95

☒ Monitoring Well
☐ Water Well
☐ Drillhole
☐ Borehole

Construction Report Available? ☒ Yes ☐ No

Construction Type:
☐ Drilled ☐ Driven (Sandpoint) ☐ Dug
☒ Other (Specify) Hollow Stem Auger

Formation Type:
☐ Unconsolidated Formation ☒ Bedrock

Total Well Depth (ft.) 60.4 Casing Diameter (ins.) 2.02
(From groundsurface)

Casing Depth (ft.) 57.5

Was Well Annular Space Grouted? ☐ Yes ☒ No ☐ Unknown
If Yes, To What Depth? _____ Feet

(4) Depth to Water (Feet) _____

Pump & Piping Removed?	☐ Yes	☐ No	☐ Not Applicable
Liner(s) Removed?	☐ Yes	☐ No	☐ Not Applicable
Screen Removed?	☐ Yes	☒ No	☐ Not Applicable
Casing Left in Place?	☒ Yes	☐ No	

If No, Explain: LAY BACK OF PIT WILL TAKE OUT WELL

Was Casing Cut Off Below Surface?	☐ Yes	☐ No
Did Sealing Material Rise to Surface?	☐ Yes	☐ No
Did Material Settle After 24 Hours?	☐ Yes	☒ No
If Yes, Was Hole Retopped?	☐ Yes	☐ No

(5) Required Method of Placing Sealing Material
☒ Conductor Pipe-Gravity ☐ Conductor Pipe-Pumped
☐ Dump Bailer ☐ Other (Explain)

(6) Sealing Materials
☐ Neat Cement Grout
☐ Sand-Cement (Concrete) Grout
☐ Concrete
☐ Clay-Sand Slurry
☐ Bentonite-Sand Slurry
☒ Chipped Bentonite

For monitoring wells and monitoring well boreholes only
☐ Bentonite Pellets
☐ Granular Bentonite
☐ Bentonite - Cement Grout

(7) Sealing Material Used	From (Ft.)	To (Ft.)	No. Yards, Sacks Sealant or Volume	Mix Ratio or Mud Weight
BENTONITE CHIPS	Surface 1126.97	1066	2	

(8) Comments:

(9) Name of Person or Firm Doing Sealing Work: JACK D SAWYERS

Signature of Person Doing Work: Jack Sawyers

Date Signed: 10/05/95

Street or Route: N4100 Hwy 27

Telephone Number: (715) 532-6690

City, State, Zip Code: LADYSMITH, WI 54848

(10) FOR DNR OR COUNTY USE ONLY

Date Received/Inspected: _____ District/County: _____

Reviewer/Inspector: _____

Follow-up Necessary: _____

DNR/COUNTY

SEP 06 '95 13:13 EES P.2

State of Wisconsin
Department of Natural Resources

WELL/DRILLHOLE/BOREHOLE ABANDONMENT

Form 3300-5W 11-89

All abandonment work shall be performed in accordance with the provisions of Chapters NR 111, NR 112 or NR 141, Wis. Admin. Code, whichever is applicable. Also, see instructions on back.

GENERAL INFORMATION

(1) Well/Drillhole/Borehole Location: FLAMBEAU — County: RUSK

NW 1/4 of SE 1/4 of Sec. 9 ; T. 34 N; R. 6 ☐ E ■ W

(If applicable) Gov't Lot ____ Grid Number ____

Grid Location 40,744.2 ft. ■ N. ☐ S., 39,339 ft. ■ E. ☐ W.

Civil Town Name

Street Address of Well

City, Village

(2) FACILITY NAME

Original Well Owner (If Known): WW-1

Present Well Owner: FLAMBEAU MINING CO

Street or Route: N 410 HWY 27

City, State, Zip Code: LADYSMITH, WI 54848

Facility Well No. and/or Name (If Applicable) | WI Unique Well No.

Reason For Abandonment: LAY BACK OF HIGH WALL

Date of Abandonment: 9/13/95

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On (Date): 05/05/94

■ Monitoring Well
☐ Water Well
☐ Drillhole
☐ Borehole

Construction Report Available? ■ Yes ☐ No

Construction Type:
■ Drilled ☐ Driven (Sandpoint) ☐ Dug
☐ Other (Specify)

Formation Type:
☐ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft.) 474 (From groundsurface) Casing Diameter (ins.) 6.00

Casing Depth (ft.) 20'

Was Well Annular Space Grouted? ■ Yes ☐ No ☐ Unknown
If Yes, To What Depth? - 20' Feet

(4) Depth to Water (Feet) 16'

Pump & Piping Removed?	☐ Yes	☐ No	☐ Not Applicable
Liner(s) Removed?	☐ Yes	☐ No	☐ Not Applicable
Screen Removed?	☐ Yes	■ No	☐ Not Applicable
Casing Left in Place?	■ Yes	☐ No	

If No, Explain: DURING LAY BACK CASING WILL BE REMOVED

Was Casing Cut Off Below Surface?	☐ Yes	■ No
Did Sealing Material Rise to Surface?	☐ Yes	■ No
Did Material Settle After 24 Hours?	☐ Yes	■ No
If Yes, Was Hole Retopped?	☐ Yes	☐ No

(5) Required Method of Placing Sealing Material
■ Conductor Pipe-Gravity ☐ Conductor Pipe-Pumped
☐ Dump Bailer ☐ Other (Explain)

(6) Sealing Materials
☐ Neat Cement Grout
☐ Sand-Cement (Concrete) Grout
☐ Concrete
☐ Clay-Sand Slurry
☐ Bentonite-Sand Slurry
■ Chipped Bentonite

For monitoring wells and monitoring well boreholes only
☐ Bentonite Pellets
☐ Granular Bentonite
☐ Bentonite - Cement Grout

(7) Sealing Material Used	From (Ft.)	To (Ft.)	No. Yards, Sacks Sealant or Volume	Mix Ratio or Mud Weight
3/8 BENTONITE CHIPS	Surface	10	11	

(8) Comments:

(9) Name of Person or Firm Doing Sealing Work: L.D. DRILLING

Signature of Person Doing Work: [signature] Date Signed: 9/13/95

Street or Route: 7395 S. POPLAR Telephone Number: (414) 829-5690

City, State, Zip Code: LENA, WI 54139

(10) FOR DNR OR COUNTY USE ONLY

Date Received/Inspected | District/County

Reviewer/Inspector

Follow-up Necessary

State of Wisconsin
Department of Natural Resources

WELL/DRILLHOLE/BOREHOLE ABANDONMENT

Form 3300-5W 11-89

All abandonment work shall be performed in accordance with the provisions of Chapters NR 111, NR 112 or NR 141, Wis. Admin. Code, whichever is applicable. Also, see instructions on back.

(1) GENERAL INFORMATION

Well/Drillhole/Borehole Location: FLAMBEAU
County: RUSK

NW 1/4 of SE 1/4 of Sec. 9 ; T. 34 N; R. 6 ☐ E ☒ W
(If applicable) Gov't Lot ____ Grid Number ____

Grid Location: 49671.4 ft. ☒ N. ☐ S., 39253.2 ft. ☒ E. ☐ W.

Civil Town Name:

Street Address of Well:

City, Village:

(2) FACILITY NAME

Original Well Owner (If Known): WW-2

Present Well Owner: FLAMBEAU Mining Co

Street or Route: N 400 Hwy 27

City, State, Zip Code: LADYSMITH, WI 54848

Facility Well No. and/or Name (If Applicable):

WI Unique Well No.:

Reason For Abandonment: LAY BACK OF HIGH WALL

Date of Abandonment: 9/13/95

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On (Date): ____

☒ Monitoring Well
☐ Water Well
☐ Drillhole
☐ Borehole

Construction Report Available? ☒ Yes ☐ No

Construction Type:
☒ Drilled ☐ Driven (Sandpoint) ☐ Dug
☐ Other (Specify)

Formation Type:
☐ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft.) 36' (From groundsurface) Casing Diameter (ins.) 6.00

Casing Depth (ft.) 20'

Was Well Annular Space Grouted? ☒ Yes ☐ No ☐ Unknown
If Yes, To What Depth? ____ Feet

(4) Depth to Water (Feet) ____

Pump & Piping Removed?	☐ Yes	☐ No	☐ Not Applicable
Liner(s) Removed?	☐ Yes	☐ No	☐ Not Applicable
Screen Removed?	☐ Yes	☐ No	☐ Not Applicable
Casing Left in Place?	☒ Yes	☐ No	

If No, Explain: ____

Was Casing Cut Off Below Surface?	☐ Yes	☐ No
Did Sealing Material Rise to Surface?	☐ Yes	☐ No
Did Material Settle After 24 Hours?	☐ Yes	☐ No
If Yes, Was Hole Retopped?	☐ Yes	☐ No

(5) Required Method of Placing Sealing Material
☒ Conductor Pipe-Gravity ☐ Conductor Pipe-Pumped
☐ Dump Bailer ☐ Other (Explain)

(6) Sealing Materials
☐ Neat Cement Grout
☐ Sand-Cement (Concrete) Grout
☐ Concrete
☐ Clay-Sand Slurry
☐ Bentonite-Sand Slurry
☒ Chipped Bentonite

For monitoring wells and monitoring well boreholes only
☐ Bentonite Pellets
☐ Granular Bentonite
☐ Bentonite - Cement Grout

Sealing Material Used	From (Ft.)	To (Ft.)	No. Yards, Sacks Sealant or Volume	Mix Ratio or Mud Weight
3/8 BENTONITE CHIPS	Surface	1083	11	

Comments: ____

Name of Person or Firm Doing Sealing Work: I.D. DRILLING

Signature of Person Doing Work: Keith Meyer — Date Signed: 9/13/95

Street or Route: 3915 PORCUPINE DR. — Telephone Number: (414) 829-5690

City, State, Zip Code: IRMA, WI 54139

(10) FOR DNR OR COUNTY USE ONLY

Date Received/Inspected: ____ District/County: ____

Reviewer/Inspector: ____

Follow-up Necessary: ____

DNR/COUNTY

State of Wisconsin
Department of Natural Resources

WELL/DRILLHOLE/BOREHOLE ABANDONMENT

Form 3300-5W 11-89

All abandonment work shall be performed in accordance with the provisions of Chapters NR 111, NR 112 or NR 141, Wis. Admin. Code, whichever is applicable. Also, see instructions on back.

(1) GENERAL INFORMATION

Well/Drillhole/Borehole Location: FLAMBEAU
County: RUSK
NW 1/4 of SE 1/4 of Sec. 9 ; T. 34 N; R. 6 E W
(If applicable) Gov't Lot ____ Grid Number ____
Grid Location 4090.9 ft. N. S., 3952.2 ft. E. W.
Civil Town Name
Street Address of Well
City, Village

(2) FACILITY NAME

Original Well Owner (If Known): W W-8
Present Well Owner: FLAMBEAU MINING CO.
Street or Route: N400 HWY 27
City, State, Zip Code: LADYSMITH, WI 54848
Facility Well No. and/or Name (If Applicable)
WI Unique Well No.
Reason For Abandonment: LAY BACK OF PIT AREA
Date of Abandonment: 9/13/95

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On (Date): 01/06/95

- [x] Monitoring Well
- [ ] Water Well
- [ ] Drillhole
- [ ] Borehole

Construction Report Available? [ ] Yes [ ] No

Construction Type:
- [ ] Drilled
- [ ] Driven (Sandpoint)
- [ ] Dug
- [x] Other (Specify): HOLLOW STEM AUGER

Formation Type:
- [ ] Unconsolidated Formation
- [ ] Bedrock

Total Well Depth (ft.) 29.8 (From groundsurface)
Casing Diameter (ins.) ____
Casing Depth (ft.) 7

Was Well Annular Space Grouted? [ ] Yes [x] No [ ] Unknown
If Yes, To What Depth? - 7' Feet

(4) Depth to Water (Feet) ____

Pump & Piping Removed?	[ ] Yes	[ ] No	[ ] Not Applicable
Liner(s) Removed?	[ ] Yes	[ ] No	[ ] Not Applicable
Screen Removed?	[ ] Yes	[x] No	[ ] Not Applicable
Casing Left in Place?	[x] Yes	[ ] No	

If No, Explain: LAY BACK OF PIT WILL TAKE OUT WELL

Was Casing Cut Off Below Surface?	[ ] Yes	[ ] No
Did Sealing Material Rise to Surface?	[x] Yes	[ ] No
Did Material Settle After 24 Hours?	[ ] Yes	[x] No
If Yes, Was Hole Retopped?	[ ] Yes	[ ] No

(5) Required Method of Placing Sealing Material
- [x] Conductor Pipe-Gravity
- [ ] Conductor Pipe-Pumped
- [ ] Dump Bailer
- [ ] Other (Explain)

(6) Sealing Materials
- [ ] Neat Cement Grout
- [ ] Sand-Cement (Concrete) Grout
- [ ] Concrete
- [ ] Clay-Sand Slurry
- [ ] Bentonite-Sand Slurry
- [x] Chipped Bentonite

For monitoring wells and monitoring well boreholes only
- [ ] Bentonite Pellets
- [ ] Granular Bentonite
- [ ] Bentonite - Cement Grout

(7) Sealing Material Used	From (Ft.)	To (Ft.)	No. Yards, Sacks Sealant or Volume	Mix Ratio or Mud Weight
3/8" BENTONITE CHIPS	Surface 1115.0	29.8'	2	

(8) Comments:

(9) Name of Person or Firm Doing Sealing Work: J.D. DRILLING
Signature of Person Doing Work: Keith Meyer
Date Signed: 9/13/95
Street or Route: 7391 S. LOCUSTA RD
Telephone Number: (414) 829-5690
City, State, Zip Code: LENA, WI 54139

(10) FOR DNR OR COUNTY USE ONLY
Date Received/Inspected
District/County
Reviewer/Inspector
Follow-up Necessary

State of Wisconsin
Department of Natural Resources

WELL/DRILLHOLE/BOREHOLE ABANDONMENT

Form 3300-5W 11-89

All abandonment work shall be performed in accordance with the provisions of Chapters NR 111, NR 112 or NR 141, Wis. Admin. Code, whichever is applicable. Also, see instructions on back.

(1) GENERAL INFORMATION

Well/Drillhole/Borehole Location: FLAMBEAU
County: RUSK

NW 1/4 of SE 1/4 of Sec. 9 ; T. 34 N. R. 6 ☐ E ☒ W
(If applicable)
Gov't Lot ________ Grid Number ________

Grid Location
40902.9 ft. ☒ N. ☐ S., 39520.2 ft. ☒ E. ☐ W.

Civil Town Name:

Street Address of Well:

City, Village:

(2) FACILITY NAME

Original Well Owner (If Known): WW-9

Present Well Owner: FLAMBEAU MINING Co

Street or Route: N 4100 HWY 27

City, State, Zip Code: LADYSMITH, WI 54848

Facility Well No. and/or Name (If Applicable):
WI Unique Well No.:

Reason For Abandonment: LAY BACK OF PIT AREA

Date of Abandonment: 9/13/95

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On (Date): 01/06/95

☒ Monitoring Well
☐ Water Well
☐ Drillhole
☐ Borehole

Construction Report Available? ☐ Yes ☐ No

Construction Type:
☐ Drilled ☐ Driven (Sandpoint) ☐ Dug
☒ Other (Specify): HOLLOW STEM AUGER

Formation Type:
☐ Unconsolidated Formation ☒ Bedrock

Total Well Depth (ft.) (From groundsurface): 33.5
Casing Diameter (ins.): 2.02

Casing Depth (ft.): 7'

Was Well Annular Space Grouted? ☐ Yes ☒ No ☐ Unknown
If Yes, To What Depth? — Feet

(4) Depth to Water (Feet): 8.6

Pump & Piping Removed? ☐ Yes ☐ No ☐ Not Applicable
Liner(s) Removed? ☐ Yes ☐ No ☐ Not Applicable
Screen Removed? ☐ Yes ☒ No ☐ Not Applicable
Casing Left in Place? ☒ Yes ☐ No
If No, Explain: LAY BACK OF PIT AREA WILL REMOVE WELL

Was Casing Cut Off Below Surface? ☐ Yes ☐ No
Did Sealing Material Rise to Surface? ☒ Yes ☐ No
Did Material Settle After 24 Hours? ☐ Yes ☒ No
If Yes, Was Hole Retopped? ☐ Yes ☐ No

(5) Required Method of Placing Sealing Material
☐ Conductor Pipe-Gravity ☐ Conductor Pipe-Pumped
☐ Dump Bailer ☐ Other (Explain)

(6) Sealing Materials
☐ Neat Cement Grout
☐ Sand-Cement (Concrete) Grout
☐ Concrete
☐ Clay-Sand Slurry
☐ Bentonite-Sand Slurry
☒ Chipped Bentonite

For monitoring wells and monitoring well boreholes only
☐ Bentonite Pellets
☐ Granular Bentonite
☐ Bentonite - Cement Grout

(7)

Sealing Material Used	From (Ft.)	To (Ft.)	No. Yards, Sacks Sealant or Volume	Mix Ratio or Mud Weight
3/8" BENTONITE CHIPS	Surface 1162	33.5	2	

(8) Comments:

(9) Name of Person or Firm Doing Sealing Work: L.D. Bruning

Signature of Person Doing Work: [signature]
Date Signed: 9/13/95

Street or Route: 7391 S. PORCUPINE RD
Telephone Number: (414) 829-5690

City, State, Zip Code: LENA, WI 54139

(10) FOR DNR OR COUNTY USE ONLY
Date Received/Inspected | District/County
Reviewer/Inspector
Follow-up Necessary

DNR/COUNTY

State of Wisconsin
Department of Natural Resources

WELL/DRILLHOLE/BOREHOLE ABANDONMENT

Similar to Form 3300-5B — Rev. 12-91

All abandonment work shall be performed in accordance with the provisions of Chapters NR 111, NR 112 or NR 141, Wis. Admin. Code, whichever is applicable. Also, see instructions on back.

GENERAL INFORMATION

Well/Drillhole/Borehole Location

County: Rusk

☐E ■W

NW 1/4 of SE 1/4 of Sec. 9 ; T. 34 N; R. 6

(if applicable) _____ Gov't Lot _____ Grid Number

Grid Location _____ ft. ☐ N. ☐ S., _____ ft. ☐ E. ☐ W.

Civil Town Name

Street Address of Well

City, Village

(2) FACILITY NAME

Original Well Owner (If Known): B

Present Well Owner: Flambeau Mining Company

Street or Route: N4100 Highway 27

City, State, Zip Code: Ladysmith, WI 54848

Facility Well No. and/or Name (If Applicable): Runoff Water 1

WI Unique Well No.: _ _ _ _ _ _

Reason For Abandonment: Discontinued Use

Date of Abandonment: 8/10/95

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On (Date) 8/10/95

☐ Monitoring Well
☐ Water Well
■ Drillhole
☐ Borehole

Construction Report Available? ■ Yes ☐ No

Construction Type:
■ Drilled ☐ Driven (Sandpoint) ☐ Dug
☐ Other (Specify) _____

Formation Type:
■ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft.) 15.3 Casing Diameter (ins.) 8.0
(From groundsurface)

Casing Depth (ft.) 14.5

Was Well Annular Space Grouted? ☐ Yes ■ No ☐ Unknown
If Yes, To What Depth? _____ Feet

(4) Depth to Water (Feet) _____

Pump & Piping Removed?	☐ Yes	☐ No	■ N/A
Liner(s) Removed?	☐ Yes	☐ No	■ N/A
Screen Removed?	☐ Yes	☐ No	■ N/A
Casing Left in Place?	☐ Yes	■ No	☐ N/A

If No, Explain None Installed

Was Casing Cut Off Below Surface?	☐ Yes	■ No
Did Sealing Material Rise to Surface?	☐ Yes	■ No
Did Material Settle After 24 Hours?	☐ Yes	■ No
If Yes, Was Hole Retopped?	☐ Yes	■ No

(5) Required Method of Placing Sealing Material
■ Conductor Pipe-Gravity ☐ Conductor Pipe-Pumped
☐ Dump Bailer ☐ Other (Explain)

(6) Sealing Materials
☐ Neat Cement Grout
☐ Sand-Cement (Concrete) Grout
☐ Concrete
☐ Clay-Sand Slurry
☐ Bentonite-Sand Slurry
■ Chipped Bentonite

For monitoring wells and monitoring well boreholes only
☐ Bentonite Pellets
☐ Granular Bentonite
☐ Bentonite-Cement Grout

(7) Sealing Material Used	From (Ft.)	To (Ft.)	No. Yards, Sacks Sealant or Volume	Mix Ratio or Mud Weight
Backfill	Surface	0.5		
Bentonite Chips	0.5	13.0		
Cave-In	13.0	15.3		

(8) Comments: #8100-95-0586

(9) Name of Person or Firm Doing Sealing Work
Maxim Technologies, Inc.

Signature of Person Doing Work: el Kramer
Date Signed: 9-13-95

Street or Route: 555 South 72nd Avenue
Telephone Number: (715) 845-4100

City, State, Zip Code: Wausau, WI 54401

(10) FOR DNR OR COUNTY USE ONLY

Date Received/Inspected
District/County
Reviewer/Inspector
☐ Complying Work
☐ Noncomplying Work
Follow-up Necessary

Copies To: DNR/County - Well/Drillhole Owner - Person Completing Abandonment

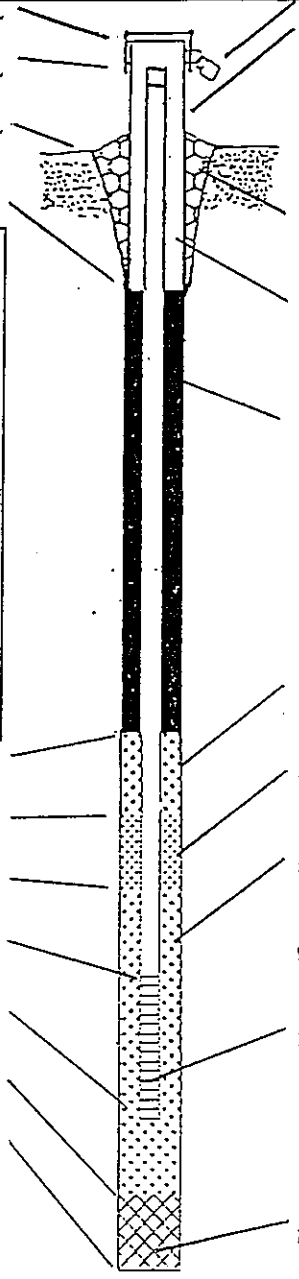
State of Wisconsin
Department of Natural Resources

Route to: Solid Waste ☐ Haz. Waste ☐ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ ____

MONITORING WELL CONSTRUCTION

Similar to Form 4400-113A Rev 4-90

Facility/Project Name Flambeau Mine	Local Grid Location of Well ■ N. 40,901.7 ft. ☐ S. ■ E. 39,169.3 ft. ☐ W.	Well Name WW22
Facility License, Permit or Monitoring Number __ __ 0 3 1 8 0	Grid Origin Location Lat. ___ ___ ___ Long. ___ ___ ___ or St. Plane _____ ft. N. _____ ft. E.	Wis. Unique Well Number _____ DNR Well Number ___ ___
Type of Well Water Table Observation Well ☐ 11 Piezometer ■ 12	Section Location of Waste/Source ☐ E. NW 1/4 of SE1/4 of Sec. 9, T. 34N, R. 6 ■ W.	Date Well Installed 0 8 / 0 7 / 9 5 m m d d y y
Distance Well is From Waste/Source Boundary ft.	Location of Well Relative to Waste/Source u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known	Well Installed By: (Persons Name and Firm) Joel Kramer Maxim Technologies, Inc.
Is Well A Point of Enforcement Std. Application? ☐ Yes ☐ No		



A. Protective pipe, top elevation 1 1 1 8 . 7 5 ft. MSL

B. Well casing, top elevation 1 1 1 8 . 6 7 ft. MSL

C. Land surface elevation 1 1 1 5 . 9 0 ft. MSL

D. Surface seal, bottom 1 1 1 1 . 0 ft. MSL or _ 4 . 0 ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ■
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ■

13. Sieve analysis attached? ☐ Yes ☐ No

14. Drilling method used: Rotary ☐ 50
Hollow Stem Auger ■ 41
_____ Other ☐ ___

15. Drilling fluid used: Water ☐ 02 Air ☐ 01
Drilling Mud ☐ 03 None ☐ 99

16. Drilling additives used? ☐ Yes ■ No
Describe _____

17. Source of water (attach analysis):
City of Ladysmith

E. Bentonite seal, top 1 1 1 1 . 9 ft. MSL or _ _ 4 . 0 ft.

F. Fine sand, top 1 0 9 5 . 9 ft. MSL or _ 2 0 . 0 ft.

G. Filter pack, top 1 0 9 3 . 9 ft. MSL or _ 2 2 . 0 ft.

H. Screen joint, top 1 0 9 1 . 9 ft. MSL or _ 2 4 . 0 ft.

I. Well bottom 1 0 8 1 . 9 ft. MSL or _ 3 4 . 0 ft.

J. Filter pack, bottom 1 0 7 9 . 7 ft. MSL or _ 3 6 . 2 ft.

K. Borehole, bottom 1 0 7 9 . 7 ft. MSL or _ 3 6 . 2 ft.

L. Borehole, diameter _ 8 . 0 in.

M. O.D. well casing _ 2 . 3 7 in.

N. I.D. well casing _ 2 . 0 2 in.

1. Cap and lock? ■ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: _ 4 . 0 in.
b. Length: _ 2 . 0 ft.
c. Material: Steel ■ 04
_____ Other ☐ ___
d. Additional protection? ☐ Yes ■ No
If yes, describe: _____

3. Surface seal: Bentonite ☐ 30
Concrete ■ 01
_____ Other ☐ ___

4. Material between well casing and protective pipe:
Bentonite ■ 30
Annular space seal ☐ ___
_____ Other ___

5. Annual space seal: a. Granular Bentonite ■ 33
b. ____ lbs/gal mud weight..Bentonite-sand slurry ☐ 35
c. ____ lbs/gal mud weight..... Bentonite slurry ☐ 31
d. ____ % Bentonite..... Bentonite-cement grout ☐ 50
e. ____ Ft³ volume added for any of the above
f. How installed Tremie ☐ 01
Tremie pumped ☐ 02
Gravity ■ 08

6. Bentonite seal: a. Bentonite granules ☐ 33
b. ☐1/4 in. ■3/8 in. ☐1/2 in. Bentonite pellets ☐ 32
c. _____ Other ☐ ___

7. Fine sand material: mfr, product name & mesh size
a. Badger Mining Corporation, Silica #7
b. Volume added _____ ft³

8. Filter pack material: mfr, product name and mesh size
a. American Materials, Red Flint #30 ___
b. Volume added _____ ft³

9. Well casing: Flush threaded PVC schedule 40 ■ 23
Flush threaded PVC schedule 80 ☐ 24
_____ Other ☐ ___

10. Screen material: _____
a. Screen type: Factory cut ■ 11
Continuous slot ☐ 01
_____ Other ☐ ___
b. Manufacturer Brainard Killman
c. Slot size: 0. 0 1 0 in.
d. Slotted length: 0 5 . 0 ft.

11. Backfill material (below filter pack): None ■ 14
_____ Other ☐ ___

I hereby certify that the information on this form is true and correct to the best of my knowledge

Signature	Firm
Joel Kramer	Maxim Technologies, Inc. (Maxim) #8100-95-0586

Please complete both sides of this form and return to the appropriate DNR office listed at the top of this form as required by chs. 144, 147 and 160, Wis. Stats., and ch. NR 141, Wis. Ad. Code. In accordance with ch. 144, Wis. Stats., failure to file this form amy results in a forfeiture of not less than $10, nor more than $5000 for each day of violation. In accordance with ch. 147, Wis. Stats., failure to file this form may results in a forfeiture of not more than $10,000 for each day of violation. NOTE: Shaded areas are for DNR use only. See instructions for more information including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

Route to: Solid Waste ☐ Haz. Waste ☐ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ ____

MONITORING WELL CONSTRUCTION

Similar to Form 4400-113A Rev 4-90

Facility/Project Name Flambeau Mine	Local Grid Location of Well ■ N. 41,036.1 ft. ☐ S. ■ E. 39,651.3 ft. ☐ W.	Well Name WW23
Facility License, Permit or Monitoring Number __ __ 0 3 1 8 0	Grid Origin Location Lat. ___ ___ ___ Long. ___ ___ ___ or St. Plane ____ ft. N. ____ ft. E.	Wis. Unique Well Number __ __ __ __ __ __ DNR Well Number __ __ __
Type of Well Water Table Observation Well ☐ 11 Piezometer ■ 12	Section Location of Waste/Source ☐ E. ■ W. NW 1/4 of SE 1/4 of Sec. 9, T. 34 N, R. 6	Date Well Installed 0 8 / 0 8 / 9 5 m m d d y y
Distance Well is From Waste/Source Boundary ft.	Location of Well Relative to Waste/Source u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known	Well Installed By: (Persons Name and Firm) Joel Kramer Maxim Technologies, Inc.
Is Well A Point of Enforcement Std. Application? ☐ Yes ☐ No		

A. Protective pipe, top elevation 1 1 3 1 . 6 4 ft. MSL

B. Well casing, top elevation 1 1 3 1 . 5 0 ft. MSL

C. Land surface elevation 1 1 2 8 . 9 2 ft. MSL

D. Surface seal, bottom 1 1 2 4 . 9 ft. MSL or _ 4 . 0 ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ■
SM ■ SC ☐ ML ☐ MH ☐ CL ■ CH ☐
Bedrock ■

13. Sieve analysis attached? ☐ Yes ☐ No

14. Drilling method used: Rotary ☐ 50
Hollow Stem Auger ■ 41
____ Other ☐

15. Drilling fluid used: Water ☐ 02 Air ☐ 01
Drilling Mud ☐ 03 None ☐ 99

16. Drilling additives used? ☐ Yes ■ No
Describe ____

17. Source of water (attach analysis):
City of Ladysmith

E. Bentonite seal, top 1 1 2 4 . 9 ft. MSL or _ _ 4 . 0 ft.

F. Fine sand, top 1 0 9 8 . 4 ft. MSL or _ 3 0 . 5 ft.

G. Filter pack, top 1 0 9 6 . 4 ft. MSL or _ 3 2 . 5 ft.

H. Screen joint, top 1 0 9 4 . 4 ft. MSL or _ 3 4 . 5 ft.

I. Well bottom 1 0 8 4 . 4 ft. MSL or _ 4 4 . 5 ft.

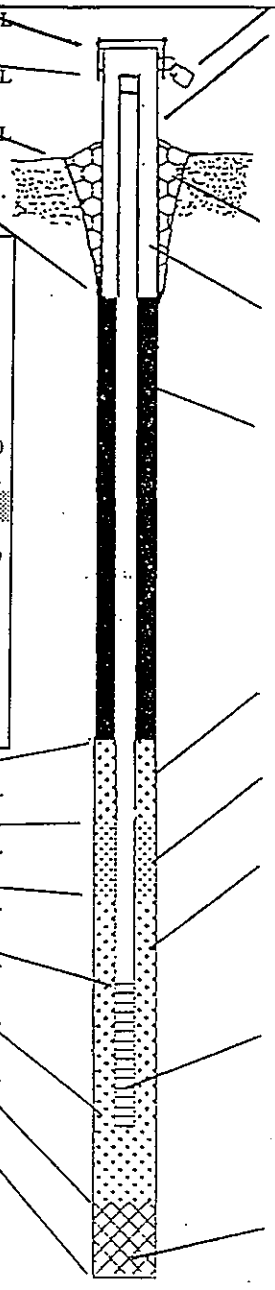
J. Filter pack, bottom 1 0 8 8 . 4 ft. MSL or _ 4 6 . 5 ft.

K. Borehole, bottom 1 0 8 8 . 4 ft. MSL or _ 4 6 . 5 ft.

L. Borehole, diameter _ 8 . 0 in.

M. O.D. well casing _ 2 . 3 7 in.

N. I.D. well casing _ 2 . 0 2 in.



1. Cap and lock? ■ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: _ 4 . 0 in.
b. Length: _ 2 . 0 ft.
c. Material: Steel ■ 04
____ Other ☐
d. Additional protection? ☐ Yes ■ No
If yes, describe: ____
3. Surface seal: Bentonite ☐ 30
Concrete ■ 01
____ Other ☐
4. Material between well casing and protective pipe:
Bentonite ■ 30
Annular space seal ☐
____ Other
5. Annual space seal: a. Granular Bentonite ■ 33
b. ____ lbs/gal mud weight..Bentonite-sand slurry ☐ 35
c. ____ lbs/gal mud weight..... Bentonite slurry ☐ 31
d. ____ % Bentonite..... Bentonite-cement grout ☐ 50
e. ____ Ft³ volume added for any of the above
f. How installed Tremie ☐ 01
Tremie pumped ☐ 02
Gravity ■ 08
6. Bentonite seal: a. Bentonite granules ☐ 33
b. ☐1/4 in. ■3/8 in. ☐1/2 in. Bentonite pellets ☐ 32
c. ____ Other ☐
7. Fine sand material: mfr, product name & mesh size
a. Badger Mining Corporation, Silica #7
b. Volume added ____ ft³
8. Filter pack material: mfr, product name and mesh size
a. American Materials, Red Flint #30
b. Volume added ____ ft³
9. Well casing: Flush threaded PVC schedule 40 ■ 23
Flush threaded PVC schedule 80 ☐ 24
____ Other ☐
10. Screen material: ____
a. Screen type: Factory cut ■ 11
Continuous slot ☐ 01
____ Other ☐
b. Manufacturer Brainard Killman
c. Slot size: 0. 0 1 0 in.
d. Slotted length: 0 5 . 0 ft.
11. Backfill material (below filter pack): None ■ 14
____ Other ☐

I hereby certify that the information on this form is true and correct to the best of my knowledge

Signature	Firm
Joel Kramer	Maxim Technologies, Inc. (Maxim) #8100-95-0586

Please complete both sides of this form and return to the appropriate DNR office listed at the top of this form as required by chs. 144, 147 and 160, Wis. Stats., and ch. NR 141, Wis. Ad. Code. In accordance with ch. 144, Wis. Stats., failure to file this form amy results in a forfeiture of not less than $10, nor more than $5000 for each day of violation. In accordance with ch. 147, Wis. Stats., failure to file this form may results in a forfeiture of not more than $10,000 for each day of violation. NOTE: Shaded areas are for DNR use only. See instructions for more information including where the completed form should be sent.

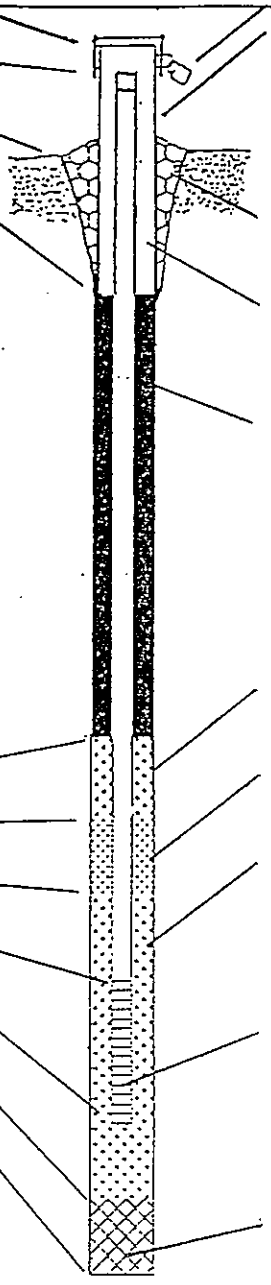
State of Wisconsin
Department of Natural Resources

Route to: Solid Waste ☐ Haz. Waste ☐ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ ____

MONITORING WELL CONSTRUCTION

Similar to Form 4400-113A Rev 4-90

Facility/Project Name Flambeau Mine	Local Grid Location of Well ■ N. 41,186.3 ft. ☐ S. ■ E. 39,803.2 ft. ☐ W.	Well Name WW24
Facility License, Permit or Monitoring Number __ __ 0 3 1 8 0	Grid Origin Location Lat. ___ ___ ___ Long. ___ ___ ___ or St. Plane _____ ft. N. _____ ft. E.	Wis. Unique Well Number / DNR Well Number _____ / ____
Type of Well Water Table Observation Well ☐ 11 Piezometer ■ 12	Section Location of Waste/Source ☐ E. ■ W. NW1/4 of SE 1/4 of Sec. 9, T. 34N, R. 6	Date Well Installed 0 8 / 0 8 / 9 5 m m d d y y
Distance Well is From Waste/Source Boundary ft.	Location of Well Relative to Waste/Source u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known	Well Installed By: (Persons Name and Firm) Joel Kramer Maxim Technologies, Inc.
Is Well A Point of Enforcement Std. Application? ☐ Yes ☐ No		



A. Protective pipe, top elevation 1 1 2 9 . 3 4 ft. MSL

B. Well casing, top elevation 1 1 2 9 . 4 0 ft. MSL

C. Land surface elevation 1 1 2 6 . 9 7 ft. MSL

D. Surface seal, bottom 1 1 2 3 . 0 ft. MSL or _ 4 . 0 ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☐ No

14. Drilling method used: Rotary ☐ 50; Hollow Stem Auger ■ 41; Other ☐ __

15. Drilling fluid used: Water ☐ 02; Air ☐ 01; Drilling Mud ☐ 03; None ☐ 99

16. Drilling additives used? ☐ Yes ■ No
Describe _____

17. Source of water (attach analysis):
City of Ladysmith

E. Bentonite seal, top 1 1 2 3 . 0 ft. MSL or _ _ 4 . 0 ft.

F. Fine sand, top 1 0 8 3 . 5 ft. MSL or _ 4 3 . 5 ft.

G. Filter pack, top 1 0 8 1 . 5 ft. MSL or _ 4 5 . 5 ft.

H. Screen joint, top 1 0 7 9 . 5 ft. MSL or _ 4 7 . 5 ft.

I. Well bottom 1 0 6 9 . 5 ft. MSL or _ 5 7 . 5 ft.

J. Filter pack, bottom 1 0 6 6 . 6 ft. MSL or _ 6 0 . 4 ft.

K. Borehole, bottom 1 0 6 6 . 6 ft. MSL or _ 6 0 . 4 ft.

L. Borehole, diameter _ 8 . 0 in.

M. O.D. well casing _ 2 . 3 7 in.

N. I.D. well casing _ 2 . 0 2 in.

1. Cap and lock? ■ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: _ 4 . 0 in.
b. Length: _ 2 . 0 ft.
c. Material: Steel ■ 04; Other ☐ __
_____
d. Additional protection? ☐ Yes ■ No
If yes, describe: _____

3. Surface seal: Bentonite ☐ 30; Concrete ■ 01; Other ☐ __
_____

4. Material between well casing and protective pipe: Bentonite ■ 30; Annular space seal ☐ __; Other __
_____

5. Annual space seal: a. Granular Bentonite ■ 33
b. ____ lbs/gal mud weight..Bentonite-sand slurry ☐ 35
c. ____ lbs/gal mud weight..... Bentonite slurry ☐ 31
d. ____ % Bentonite..... Bentonite-cement grout ☐ 50
e. ____ Ft³ volume added for any of the above
f. How installed: Tremie ☐ 01; Tremie pumped ☐ 02; Gravity ■ 08

6. Bentonite seal: a. Bentonite granules ☐ 33
b. ☐1/4 in. ■3/8 in. ☐1/2 in. Bentonite pellets ☐ 32
c. _____ Other ☐ __

7. Fine sand material: mfr, product name & mesh size
a. Badger Mining Corporation, Silica #7
b. Volume added _____ ft³

8. Filter pack material: mfr, product name and mesh size
a. American Materials, Red Flint #30
b. Volume added _____ ft³

9. Well casing: Flush threaded PVC schedule 40 ■ 23; Flush threaded PVC schedule 80 ☐ 24
_____ Other ☐ __

10. Screen material: _____
a. Screen type: Factory cut ■ 11; Continuous slot ☐ 01
_____ Other ☐ __
b. Manufacturer Brainard Killman
c. Slot size: 0. 0 1 0 in.
d. Slotted length: 0 5 . 0 ft.

11. Backfill material (below filter pack): None ■ 14
_____ Other ☐ __

I hereby certify that the information on this form is true and correct to the best of my knowledge

Signature	Firm
Joel Kramer	Maxim Technologies, Inc. (Maxim) #8100-95-0586

Please complete both sides of this form and return to the appropriate DNR office listed at the top of this form as required by chs. 144, 147 and 160, Wis. Stats., and ch. NR 141, Wis. Ad. Code. In accordance with ch. 144, Wis. Stats., failure to file this form amy results in a forfeiture of not less than $10, nor more than $5000 for each day of violation. In accordance with ch. 147, Wis. Stats., failure to file this form may results in a forfeiture of not more than $10,000 for each day of violation. NOTE: Shaded areas are for DNR use only. See instructions for more information including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

Route to: Solid Waste ☐ Haz. Waste ☐ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ ____

MONITORING WELL CONSTRUCTION

Similar to Form 4400-113A Rev 4-90

Facility/Project Name Flambeau Mine	Local Grid Location of Well ■ N. 41,228.0 ft. ☐ S. ■ E. 39,557.1 ft. ☐ W.	Well Name WW25
Facility License, Permit or Monitoring Number __ __ 0 3 1 8 0	Grid Origin Location Lat. ___ ___ ___ Long. ___ ___ ___ or St. Plane _____ ft. N. _____ ft. E.	Wis. Unique Well Number _____ DNR Well Number _____
Type of Well Water Table Observation Well ☐ 11 Piezometer ■ 12	Section Location of Waste/Source ☐ E. NW1/4 of SE1/4 of Sec. 9, T. 34N, R. 6 ■ W.	Date Well Installed 0 8 / 0 9 / 9 5 m m d d y y
Distance Well is From Waste/Source Boundary ft.	Location of Well Relative to Waste/Source u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known	Well Installed By: (Persons Name and Firm) Joel Kramer Maxim Technologies, Inc.
Is Well A Point of Enforcement Std. Application? ☐ Yes ☐ No		

A. Protective pipe, top elevation 1 1 3 3 . 9 2 ft. MSL

B. Well casing, top elevation 1 1 3 3 . 5 1 ft. MSL

C. Land surface elevation 1 1 3 1 . 8 9 ft. MSL

D. Surface seal, bottom 1 1 2 7 . 3 ft. MSL or _ 4 . 0 ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ■ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ■

13. Sieve analysis attached? ☐ Yes ☐ No

14. Drilling method used: Rotary ☐ 50
Hollow Stem Auger ■ 41
_____ Other ☐

15. Drilling fluid used: Water ☐ 02 Air ☐ 01
Drilling Mud ☐ 03 None ☐ 99

16. Drilling additives used? ☐ Yes ■ No
Describe _____

17. Source of water (attach analysis):
City of Ladysmith

E. Bentonite seal, top 1 1 2 7 . 3 ft. MSL or _ _ 4 . 0 ft.

F. Fine sand, top 1 0 9 9 . 3 ft. MSL or _ 3 2 . 0 ft.

G. Filter pack, top 1 0 9 7 . 3 ft. MSL or _ 3 4 . 0 ft.

H. Screen joint, top 1 0 9 5 . 3 ft. MSL or _ 3 6 . 0 ft.

I. Well bottom 1 0 8 5 . 3 ft. MSL or _ 4 6 . 0 ft.

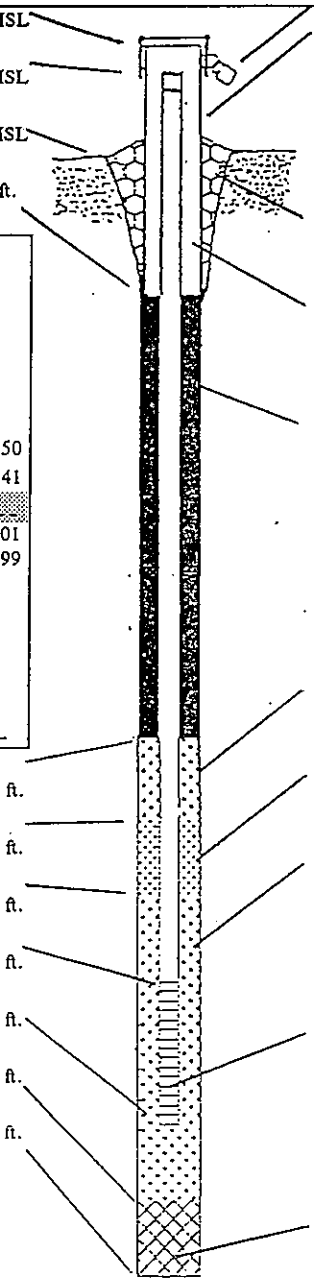
J. Filter pack, bottom 1 0 8 3 . 3 ft. MSL or _ 4 8 . 0 ft.

K. Borehole, bottom 1 0 8 3 . 3 ft. MSL or _ 4 8 . 0 ft.

L. Borehole, diameter _ 8 . 0 in.

M. O.D. well casing _ 2 . 3 7 in.

N. I.D. well casing _ 2 . 0 2 in.



1. Cap and lock? ■ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: _ 4 . 0 in.
b. Length: _ 2 . 0 ft.
c. Material: Steel ■ 04
_____ Other ☐
d. Additional protection? ☐ Yes ■ No
If yes, describe: _____
3. Surface seal: Bentonite ☐ 30
Concrete ■ 01
_____ Other ☐
4. Material between well casing and protective pipe:
Bentonite ■ 30
Annular space seal ☐
_____ Other
5. Annual space seal: a. Granular Bentonite ■ 33
b. ____ lbs/gal mud weight..Bentonite-sand slurry ☐ 35
c. ____ lbs/gal mud weight..... Bentonite slurry ☐ 31
d. ____ % Bentonite..... Bentonite-cement grout ☐ 50
e. ____ Ft³ volume added for any of the above
f. How installed Tremie ☐ 01
Tremie pumped ☐ 02
Gravity ■ 08
6. Bentonite seal: a. Bentonite granules ☐ 33
b. ☐1/4 in. ■3/8 in. ☐1/2 in. Bentonite pellets ☐ 32
c. _____ Other ☐
7. Fine sand material: mfr, product name & mesh size
a. Badger Mining Corporation, Silica #7
b. Volume added _____ ft³
8. Filter pack material: mfr, product name and mesh size
a. American Materials, Red Flint #30
b. Volume added _____ ft³
9. Well casing: Flush threaded PVC schedule 40 ■ 23
Flush threaded PVC schedule 80 ☐ 24
_____ Other ☐
10. Screen material: _____
a. Screen type: Factory cut ■ 11
Continuous slot ☐ 01
_____ Other ☐
b. Manufacturer Brainard Killman
c. Slot size: 0. 0 1 0 in.
d. Slotted length: 0 5 . 0 ft.
11. Backfill material (below filter pack): None ■ 14
_____ Other ☐

I hereby certify that the information on this form is true and correct to the best of my knowledge

Signature Joel Kramer
Firm Maxim Technologies, Inc. (Maxim) #8100-95-0586

Please complete both sides of this form and return to the appropriate DNR office listed at the top of this form as required by chs. 144, 147 and 160, Wis. Stats., and ch. NR 141, Wis. Ad. Code. In accordance with ch. 144, Wis. Stats., failure to file this form amy results in a forfeiture of not less than $10, nor more than $5000 for each day of violation. In accordance with ch. 147, Wis. Stats., failure to file this form may results in a forfeiture of not more than $10,000 for each day of violation. NOTE: Shaded areas are for DNR use only. See instructions for more information including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

Route to: Solid Waste ☐ Haz. Waste ☐ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 4-90

Facility/Project Name: FLAMBEAU MINE	Local Grid Location of Well: 19989.72 ft. ■N. ☐S. 40125 ft. ■E. ☐W.	Well Name: MW-1
Facility License, Permit or Monitoring Number: 03180	Grid Origin Location: Lat. _____ Long. _____ or St. Plane _____ ft. N, _____ ft. E.	Wis. Unique Well Number / DNR Well Number: _____
Type of Well: Water Table Observation Well ☐ 11; Piezometer ■ 12	Section Location of Waste/Source: NW 1/4 of SE 1/4 of Sec. 9, T. 34 N, R. 6 ■ E. ☐ W.	Date Well Installed: 09/07/95 (m m d d y y)
Distance Well Is From Waste/Source Boundary: _____ ft.	Location of Well Relative to Waste/Source: u ■ Upgradient s ☐ Sidegradient; d ☐ Downgradient n ☐ Not Known	Well Installed By: (Person's Name and Firm) KEITH MEYERS / T.D. DRILLING
Is Well A Point of Enforcement Std. Application? ☐ Yes ☐ No		

A. Protective pipe, top elevation 1014.55 ft. MSL
B. Well casing, top elevation 1014.42 ft. MSL
C. Land surface elevation 1010.89 ft. MSL
D. Surface seal, bottom _____ ft. MSL or _____ ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☐ No

14. Drilling method used: Rotary ■ 50; Hollow Stem Auger ☐ 41; Other ☐
ROTARY AIR

15. Drilling fluid used: Water ☐ 02; Air ■ 01; Drilling Mud ☐ 03; None ☐ 99

16. Drilling additives used? ☐ Yes ■ No

Describe _____
Source of water (attach analysis): _____

E. Bentonite seal, top 4' ft. MSL or _____ ft.
F. Fine sand, top 35' ft. MSL or _____ ft.
G. Filter pack, top 36' ft. MSL or _____ ft.
H. Screen joint, top 38' ft. MSL or _____ ft.
I. Well bottom 43' ft. MSL or _____ ft.
J. Filter pack, bottom 44' ft. MSL or _____ ft.
K. Borehole, bottom 44' ft. MSL or _____ ft.
L. Borehole, diameter 6.50 in.
M. O.D. well casing 2.50 in.
N. I.D. well casing 1.98 in.

1. Cap and lock? ■ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 4 in.
b. Length: 7 ft.
c. Material: Steel ■ 04; Other ☐ _____
d. Additional protection? ☐ Yes ■ No
If yes, describe: _____
3. Surface seal: Bentonite ☐ 30; Concrete ■ 01; Other ☐ _____
4. Material between well casing and protective pipe: Bentonite ■ 30; Annular space seal ☐; Other ☐ _____
5. Annular space seal: a. Granular Bentonite ■ 33
b. _____ Lbs/gal mud weight . . . Bentonite-sand slurry ☐ 35
c. _____ Lbs/gal mud weight . . . . . Bentonite slurry ☐ 31
d. _____ % Bentonite . . . . . Bentonite-cement grout ☐ 50
e. _____ Ft^3 volume added for any of the above
f. How installed: Tremie ☐ 01; Tremie pumped ☐ 02; Gravity ■ 08
6. Bentonite seal: a. Bentonite granules ■ 33
b. ☐1/4 in. ■3/8 in. ☐1/2 in. Bentonite pellets ☐ 32
c. CHIPS Other ☐
7. Fine sand material: Manufacturer, product name & mesh size
a. AMC
b. Volume added 1 ft^3
8. Filter pack material: Manufacturer, product name and mesh size
a. AMC 30 #
b. Volume added 3.5 ft^3
9. Well casing: Flush threaded PVC schedule 40 ☐ 23; Flush threaded PVC schedule 80 ■ 24; Other ☐ _____
10. Screen material: PVC
a. Screen type: Factory cut ☐ 11; Continuous slot ☐ 01; Other ☐ _____
b. Manufacturer NORTHERN AIR
c. Slot size: 0.10 in.
d. Slotted length: 5 ft.
11. Backfill material (below filter pack): None ■ 14; Other ☐ _____

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: Jack Downers | Firm: CONSULTING FIRM

Please complete both sides of this form and return to the appropriate DNR office listed at the top of this form as required by chs. 144, 147 and 160, Wis. Stats., ch. NR 141, Wis. Ad. Code. In accordance with ch.144, Wis Stats., failure to file this form may result in a forfeiture of not less than $10, nor more than $00 for each day of violation. In accordance with ch. 147, Wis. Stats., failure to file this form may result in a forfeiture of not more than $10,000 for each day of violation. NOTE: Shaded areas are for DNR use only. See instructions for more information including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

Route to: Solid Waste ☐ Haz. Waste ☐ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 4-90

Facility/Project Name: Flambeau Mine	Local Grid Location of Well: 2000858 ft. ■ N. ☐ S. 4012057 ft. ■ E. ☐ W.	Well Name: 101-2
Facility License, Permit or Monitoring Number: 03180	Grid Origin Location: Lat. ____ Long. ____ or	Wis. Unique Well Number / DNR Well Number: ____ / ____
Type of Well: Water Table Observation Well ☐ 11; Piezometer ■ 12	St. Plane ____ ft. N, ____ ft. E.	Date Well Installed: 09/07/95 (m m d d y y)
Distance Well Is From Waste/Source Boundary: ____ ft.	Section Location of Waste/Source: NW 1/4 of SE 1/4 of Sec. 9, T. 34 N, R. 6 ☐ E. ■ W.	Well Installed By: (Person's Name and Firm): Keith Meyers / T.D. Deicing
Is Well A Point of Enforcement Std. Application? ☐ Yes ☐ No	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known	

A. Protective pipe, top elevation 1013.39 ft. MSL
B. Well casing, top elevation 1013.27 ft. MSL
C. Land surface elevation 1010.00 ft. MSL
D. Surface seal, bottom ____ ft. MSL or ____ ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☐ No

14. Drilling method used: Rotary ☐ 50; Hollow Stem Auger ☐ 41; Other ☐ ____

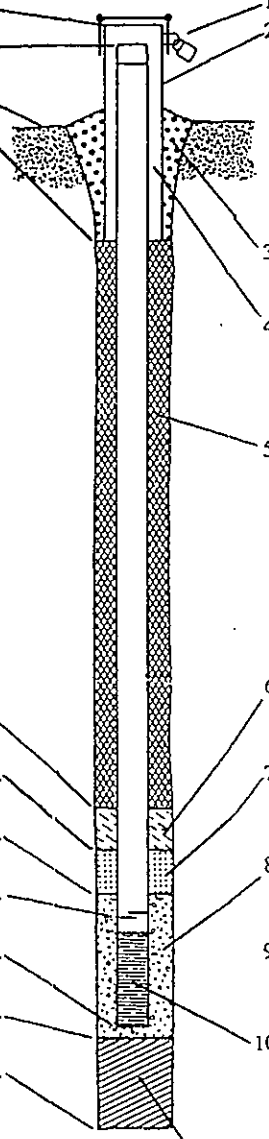
15. Drilling fluid used: Water ☐ 02; Air ☐ 01; Drilling Mud ☐ 03; None ☐ 99

16. Drilling additives used? ☐ Yes ☐ No

Describe ____

17. Source of water (attach analysis):

E. Bentonite seal, top 4' ft. MSL or ____ ft.
F. Fine sand, top 35' ft. MSL or ____ ft.
G. Filter pack, top 36' ft. MSL or ____ ft.
H. Screen joint, top 38' ft. MSL or ____ ft.
I. Well bottom 43' ft. MSL or ____ ft.
J. Filter pack, bottom 44' ft. MSL or ____ ft.
K. Borehole, bottom 44' ft. MSL or ____ ft.
L. Borehole, diameter 6.50 in.
M. O.D. well casing 2.50 in.
N. I.D. well casing 1.98 in.



1. Cap and lock? ■ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 4. in.
b. Length: 7. ft.
c. Material: Steel ■ 04; Other ☐ ____
d. Additional protection? ☐ Yes ■ No
If yes, describe: ____
3. Surface seal: Bentonite ☐ 30; Concrete ■ 01; Other ☐ ____
4. Material between well casing and protective pipe: Bentonite ■ 30; Annular space seal ☐ ____; Other ☐ ____
5. Annular space seal: a. Granular Bentonite ■ 33
b. ____ Lbs/gal mud weight . . . Bentonite-sand slurry ☐ 35
c. ____ Lbs/gal mud weight . . . . . Bentonite slurry ☐ 31
d. ____ % Bentonite . . . . . Bentonite-cement grout ☐ 50
e. ____ Ft^3 volume added for any of the above
f. How installed: Tremie ☐ 01; Tremie pumped ☐ 02; Gravity ■ 08
6. Bentonite seal: a. Bentonite granules ■ 33
b. ☐ 1/4 in. ■ 3/8 in. ☐ 1/2 in. Bentonite pellets ☐ 32
c. CHIPS Other ☐ ____
7. Fine sand material: Manufacturer, product name & mesh size
a. AMC
b. Volume added 1 ft^3
8. Filter pack material: Manufacturer, product name and mesh size
a. AMC
b. Volume added 3.5 ft^3
9. Well casing: Flush threaded PVC schedule 40 ☐ 23; Flush threaded PVC schedule 80 ■ 24; Other ☐ ____
10. Screen material: PVC
a. Screen type: Factory cut ☐ 11; Continuous slot ☐ 01; Other ☐ ____
b. Manufacturer Northern Aire
c. Slot size: 0.10 in.
d. Slotted length: 45 ft.
11. Backfill material (below filter pack): None ■ 14; Other ☐ ____

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
rockowers	

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State of Wisconsin
Department of Natural Resources

Route to: Solid Waste ☐ Haz. Waste ☐ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 4-90

Facility/Project Name: FLAMBEAU	Local Grid Location of Well: 20074.48 ft. ■ N. ☐ S. 40121.08 ft. ■ E. ☐ W.	Well Name: 101-3
Facility License, Permit or Monitoring Number: 03180	Grid Origin Location: Lat. ____ Long. ____ or St. Plane ____ ft. N, ____ ft. E.	Wis. Unique Well Number / DNR Well Number
Type of Well: Water Table Observation Well ☐ 11; Piezometer ☐ 12	Section Location of Waste/Source: ___1/4 of ___ 1/4 of Sec. ___, T. ___ N, R. ___ ☐ E. ☐ W.	Date Well Installed: m m / d d / y y
Distance Well Is From Waste/Source Boundary: ____ ft.	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient; d ☐ Downgradient n ☐ Not Known	Well Installed By: (Person's Name and Firm)
Is Well A Point of Enforcement Std. Application? ☐ Yes ☐ No		

A. Protective pipe, top elevation 1013.48 ft. MSL
B. Well casing, top elevation 1013.24 ft. MSL
C. Land surface elevation 1010.76 ft. MSL
D. Surface seal, bottom ____ ft. MSL or ____ ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☐ No

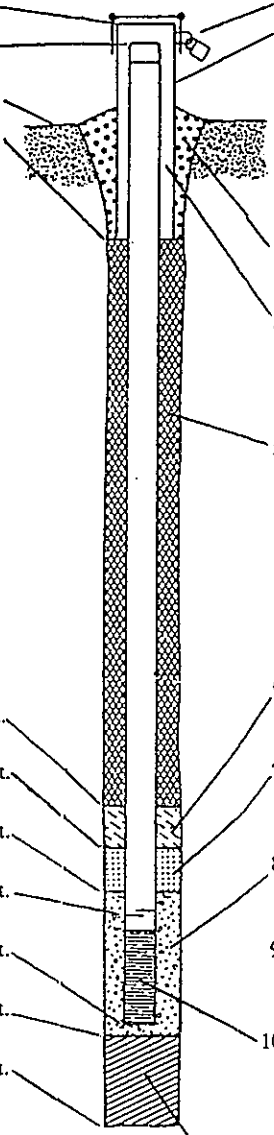
14. Drilling method used: Rotary ■ 50; Hollow Stem Auger ☐ 41; Other ☐ ____

15. Drilling fluid used: Water ☐ 02; Air ■ 01; Drilling Mud ☐ 03; None ☐ 99

16. Drilling additives used? ☐ Yes ■ No
Describe ____

17. Source of water (attach analysis): ____

E. Bentonite seal, top 41 ft. MSL or ____ ft.
F. Fine sand, top 35 ft. MSL or ____ ft.
G. Filter pack, top 36 ft. MSL or ____ ft.
H. Screen joint, top 38 ft. MSL or ____ ft.
I. Well bottom 43 ft. MSL or ____ ft.
J. Filter pack, bottom 44 ft. MSL or ____ ft.
K. Borehole, bottom 44 ft. MSL or ____ ft.
L. Borehole, diameter 6.50 in.
M. O.D. well casing 2.50 in.
N. I.D. well casing 1.98 in.



1. Cap and lock? ■ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 4. in.
b. Length: 7. ft.
c. Material: Steel ■ 04; Other ☐ ____
d. Additional protection? ☐ Yes ☐ No
If yes, describe: ____
3. Surface seal: Bentonite ☐ 30; Concrete ■ 01; Other ☐ ____
4. Material between well casing and protective pipe: Bentonite ■ 30; Annular space seal ☐ ____; Other ☐ ____
5. Annular space seal: a. Granular Bentonite ■ 33
b. ____Lbs/gal mud weight . . . Bentonite-sand slurry ☐ 35
c. ____Lbs/gal mud weight . . . . . Bentonite slurry ☐ 31
d. ____% Bentonite . . . . . Bentonite-cement grout ☐ 50
e. ____ Ft^3 volume added for any of the above
f. How installed: Tremie ☐ 01; Tremie pumped ☐ 02; Gravity ■ 08
6. Bentonite seal: a. Bentonite granules ■ 33
b. ☐ 1/4 in. ■ 3/8 in. ☐ 1/2 in. Bentonite pellets ☐ 32
c. CHIPS Other ☐ ____
7. Fine sand material: Manufacturer, product name & mesh size
a. AMC
b. Volume added 1 ft^3
8. Filter pack material: Manufacturer, product name and mesh size
a. AMC 30 x 70
b. Volume added 3.5 ft^3
9. Well casing: Flush threaded PVC schedule 40 ☐ 23; Flush threaded PVC schedule 80 ■ 24; Other ☐ ____
10. Screen material: PVC
a. Screen type: Factory cut ☐ 11; Continuous slot ☐ 01; Other ☐ ____
b. Manufacturer JOHNSON PUMP
c. Slot size: 0.10 in.
d. Slotted length: 45 ft.
11. Backfill material (below filter pack): None ■ 14; Other ☐ ____

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: [signature] Firm: CONSULTING ENGR

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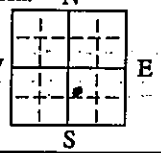
Well Construction Report For WISCONSIN UNIQUE WELL NUMBER IW-1 KT 001

State of Wisconsin
Private Water Supply - WS/2
Department of Natural Resources
Box 7921
Madison, WI 53707 (Please type or print using a black pen.)

Property Owner: Flambeau Mining Co.	Telephone Number: (715) 532-6690
Mailing Address: N4100 Hwy 27	
City: Ladysmith	State: WI Zip Code: 54848
County of Well Location: Rusk	Co. Well Permit No. W
Well Completion Date (mm-dd-yy): 12-22-95	

Well Constructor (Business Name): Denny's Drilling Inc. License #:
Address: 5211 LaVaque Jct. Rd.
City: Duluth State: MN Zip Code: 55811
*Mine Pit Dewatering

2. Mark well location with a dot in correct 40-acre parcel of section.



1. Well Location — Please use decimals instead of fractions.
☐ Town ☒ City ☐ Village of Ladysmith — Fire # (If avail.)
Grid or Street Address or Road Name and Number (If avail.): N40459.52 E38973.31
Subdivision Name — Lot # — Block #
Gov't Lot # ____ or NW 1/4 of SE 1/4 of
Section 9, T 34 N; R 6 ☐ E ☒ W

3. Well Type ☒ New ☐ Replacement ☐ Reconstruct
of previous unique well # ____ constructed in 19 ____
Reason for new, replaced or reconstructed well?

4. Well serves ____ # of homes and or Dewater Open Pit Wall (Ex: barn, restaurant, church, school, industry, etc.)
High Capacity: Well? ☐ Yes ☑ No *Property? ☑ Yes ☐ No
☒ Drilled ☒ Driven Point ☐ Jetted ☐ Other ____

5. Well located on highest point of property, consistent with the general layout and surroundings? ☒ Yes ☐ No If no, explain on back side.

Well located in floodplain? ☐ Yes ☑ No
Distance in Feet From Well To Nearest:

____ 1. Landfill	____ 9. Downspout/Yard Hydrant	____ 17. Wastewater Sump	
____ 2. Building Overhang	____ 10. Privy	____ 18. Paved Animal Barn Pen	
____ 3. Septic or Holding Tank (circle one)	____ 11. Foundation Drain to Clearwater	____ 19. Animal Yard or Shelter	
____ 4. Sewage Absorption Unit	____ 12. Foundation Drain to Sewer	____ 20. Silo - Type ____	
____ 5. Nonconforming Pit	____ 13. Building Drain ☐ Cast Iron or Plastic ☐ Other	____ 21. Barn Gutter	
____ 6. Buried Home Heating Oil Tank	____ 14. Building Sewer ☐ Gravity ☐ Pressure ☐ Cast Iron or Plastic ☐ Other	____ 22. Manure Pipe ☐ Gravity ☐ Pressure ☐ Cast Iron or Plastic ☐ Other	
____ 7. Buried Petroleum Tank	____ 15. Collector or Street Sewer	____ 23. Other Manure Storage ____ Other NR 112 Waste Source	
____ 8. Shoreline/Swimming Pool	____ 16. Clearwater Sump	____ 24. ____	

6. Drillhole Dimensions

Dia. (in.)	From (ft.)	To (ft.)
8	surface	37.9

Method of constructing upper enlarged drillhole only.
☐ 1. Rotary - Mud Circulation
☒ 2. Rotary - Air
☐ 3. Rotary - Foam
☐ 4. Reverse Rotary
☐ 5. Cable-tool Bit ____ in. dia.
☐ 6. Temp. Outer Casing ____ in. dia. Removed? ☐ Yes ☐ No If no, explain ____
☐ 7. Other ____

DNR USE ONLY

9. Geology — Type, Caving/Noncaving, Color, Hardness, Etc.

Type, Caving/Noncaving, Color, Hardness, Etc.	From (ft.)	To (ft.)
Till	Surface	16
Sand Yellow	16	20
Sand White & Hard	20	35.5
Clay Yellow & Red	35.5	37.

7. Casing, Liner, Screen Material, Weight, Specification Manufacturer & Method of Assembly

Dia. (in.)		From (ft.)	To (ft.)
4	T & C Schedule 40	surface	27.9
5	Johnson Tele. Stainless screen type, material & slot size .020	27.9	37.9

8. Grout or Other Sealing Material

Method: 5/8' hole plug — Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
3/8 Hole Plug	surface	21	9

10. Static Water Level
____ ft. above ground surface
24 ft. below ground surface

11. Pump Test
Pumping Level 30' ft. below surface
Pumping at 8 GPM for 2 hours

12. Well Is:
☒ Above ☐ Below Grade 37 in.
Developed? ☒ Yes ☐ No
Disinfected? ☐ Yes ☒ No
Capped? ☒ Yes ☐ No

13. Did you permanently seal all unused, noncomplying, or unsafe wells? ☐ Yes ☐ No If no, explain ____

14. Signature of Point Driver or Licensed Supervisory Driller — Date Signed

Signature of Drill Rig Operator (Mandatory unless same as above) — Date Signed
Jan 9, 19

Make additional comments on reverse side about geology, additional screens, water quality, etc.
Comments on reverse side ____ (Check √, if yes)

DNR

WELL CONSTRUCTION REPORT
Form 3300-77A Rev. 7-93

Well Construction Report For WISCONSIN UNIQUE WELL NUMBER IW-2 KT 002

State of Wisconsin
Private Water Supply - WS/2
Department of Natural Resources
Box 7921
Madison, WI 53707 (Please type or print using a black pen.)

Property Owner: Flambeau Mining Co.
Telephone Number: (715) 532-6690
Mailing Address: N4100 Hwy 27
City: Ladysmith
State: WI
Zip Code: 54848
County of Well Location: Rusk
Co. Well Permit No. W
Well Completion Date (mm-dd-yy): 12-24-95

Well Constructor (Business Name): Denny's Drilling Co.
License #:
Address: 5211 LaVague Jct. Rd.
City: Duluth
State: MN
Zip Code: 55811

*Mine Pit Dewatering

2. Mark well location with a dot in correct 40-acre parcel of section. N / W / E / S

1. Well Location: ☐ Town ☒ City ☐ Village of Ladysmith
Fire # (If avail.)
Grid or Street Address or Road Name and Number (If avail.): N4050556 E39000.24
Subdivision Name / Lot # / Block #
Gov't Lot # ____ or NW 1/4 of SE 1/4 of Section 9, T 34 N; R 6 ☐ E ☒ W

3. Well Type: ☒ New ☐ Replacement ☐ Reconstruction
of previous unique well # ____ constructed in 19 ____
Reason for new, replaced or reconstructed well?

4. Well serves ____ # of homes and or Dewater Open Pit Wall (Ex: barn, restaurant, church, school, industry, etc.)
High Capacity: Well? ☐ Yes ☑ No *Property? ☑ Yes ☐ No

☒ Drilled ☐ Driven Point ☐ Jetted ☐ Other ____

5. Well located on highest point of property, consistent with the general layout and surroundings? ☒ Yes ☐ No If no, explain on back side.

Well located in floodplain? ☐ Yes ☒ No
Distance in Feet From Well To Nearest:
____ 1. Landfill
____ 2. Building Overhang
____ 3. Septic or Holding Tank (circle one)
____ 4. Sewage Absorption Unit
____ 5. Nonconforming Pit
____ 6. Buried Home Heating Oil Tank
____ 7. Buried Petroleum Tank
____ 8. Shoreline/Swimming Pool
____ 9. Downspout/Yard Hydrant
____ 10. Privy
____ 11. Foundation Drain to Clearwater
____ 12. Foundation Drain to Sewer
____ 13. Building Drain ☐ Cast Iron or Plastic ☐ Other
____ 14. Building Sewer ☐ Gravity ☐ Pressure ☐ Cast Iron or Plastic ☐ Other
____ 15. Collector or Street Sewer
____ 16. Clearwater Sump
____ 17. Wastewater Sump
____ 18. Paved Animal Barn Pen
____ 19. Animal Yard or Shelter
____ 20. Silo - Type ____
____ 21. Barn Gutter
____ 22. Manure Pipe ☐ Gravity ☐ Pressure ☐ Cast Iron or Plastic ☐ Other
____ 23. Other Manure Storage ____
Other NR 112 Waste Source
____ 24. ____

6. Drillhole Dimensions

Dia. (in.)	From (ft.)	To (ft.)
8	surface	36.9

Method of constructing upper enlarged drillhole only.
☐ 1. Rotary - Mud Circulation
☒ 2. Rotary - Air
☐ 3. Rotary - Foam
☐ 4. Reverse Rotary
☐ 5. Cable-tool Bit ____ in. dia.
☐ 6. Temp. Outer Casing ____ in. dia. Removed? ☐ Yes ☐ No If no, explain ____
☐ 7. Other ____

DNR USE ONLY

9. Geology

Type, Caving/Noncaving, Color, Hardness, Etc.	From (ft.)	To (ft.)
Till	Surface	17
Sand & Till	17	19
Sand Stone	19	33
Clay	33	36.9

7. Casing, Liner, Screen

Dia. (in.)	Material, Weight, Specification Manufacturer & Method of Assembly	From (ft.)	To (ft.)
4"	T&C Schedule 40	surface 0	27
5"	10' Screen THD Plate Bottom		

Dia. (in.)	screen type, material & slot size	From	To
5"	Johnson Tell - stainless .020	27	36.9

8. Grout or Other Sealing Material

Method / Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
3/8" Hole Plug	surface	19	11

10. Static Water Level
____ ft. above ground surface
24.5 ft. below ground surface

11. Pump Test
Pumping Level 30' ft. below surface
Pumping at 8.5 GPM for 3 hours

12. Well Is:
☒ Above ☐ Below Grade
36 in.
Developed? ☒ Yes ☐ No
Disinfected? ☐ Yes ☒ No
Capped? ☒ Yes ☐ No

13. Did you permanently seal all unused, noncomplying, or unsafe wells?
☐ Yes ☐ No If no, explain ____

14. Signature of Point Driver or Licensed Supervisory Driller / Date Signed

Signature of Drill Rig Operator (Mandatory unless same as above) / Date Signed
Jan 17, 199

Make additional comments on reverse side about geology, additional screens, water quality, etc.
Comments on reverse side ____ (Check √, if yes)

DNR

WELL CONSTRUCTION REPORT
Form 3300-77A Rev. 7-93

Well Construction Report For WISCONSIN UNIQUE WELL NUMBER IW-3 KT 003

State of Wisconsin
Private Water Supply - WS/2
Department of Natural Resources
Box 7921
Madison, WI 53707 (Please type or print using a black pen.)

Property Owner: Flambeau Mining Co. | Telephone Number: (715) 532-6690
Mailing Address: N4100 Hwy 27
City: Ladysmith | State: WI | Zip Code: 54848
County of Well Location: Rusk | Co. Well Permit No. W | Well Completion Date (mm-dd-yy): 12-23-95

Well Constructor (Business Name): Denny's Drilling Coc. | License #
Address: 5211 LaVaque Jct. Rd.
City: Duluth | State: MN | Zip Code: 55811

*Mine Pit Dewatering

2. Mark well location with a dot in correct 40-acre parcel of section. N / W / E / S

1. Well Location — Please use decimals instead of fractions.
☐ Town ☒ City ☐ Village of Ladysmith | Fire # (If avail.)
Grid or Street Address or Road Name and Number (If avail.)
N40551.86 E39047.86
Subdivision Name | Lot # | Block #
Gov't Lot # ____ or NW 1/4 of SE 1/4 of Section 9, T 34 N; R 6 ☐ E ☒ W

3. Well Type ☒ New ☐ Replacement ☐ Reconstruction
of previous unique well # ____ constructed in 19 ____
Reason for new, replaced or reconstructed well?

4. Well serves ____ # of homes and or NA (Ex: barn, restaurant, church, school, industry, etc.)
DEWATER OPEN PIT WELL
High Capacity: Well? ☐ Yes ☑ No *Property? ☑ Yes ☐ No
☒ Drilled ☐ Driven Point ☐ Jetted ☐ Other

5. Well located on highest point of property, consistent with the general layout and surroundings? ☒ Yes ☐ No If no, explain on back side.

Well located in floodplain? ☐ Yes ☑ No
Distance in Feet From Well To Nearest:
____ 1. Landfill
____ 2. Building Overhang
____ 3. Septic or Holding Tank (circle one)
____ 4. Sewage Absorption Unit
____ 5. Nonconforming Pit
____ 6. Buried Home Heating Oil Tank
____ 7. Buried Petroleum Tank
____ 8. Shoreline/Swimming Pool
____ 9. Downspout/Yard Hydrant
____ 10. Privy
____ 11. Foundation Drain to Clearwater
____ 12. Foundation Drain to Sewer
____ 13. Building Drain ☐ Cast Iron or Plastic ☐ Other
____ 14. Building Sewer ☐ Gravity ☐ Pressure ☐ Cast Iron or Plastic ☐ Other
____ 15. Collector or Street Sewer
____ 16. Clearwater Sump
____ 17. Wastewater Sump
____ 18. Paved Animal Barn Pen
____ 19. Animal Yard or Shelter
____ 20. Silo - Type
____ 21. Barn Gutter
____ 22. Manure Pipe ☐ Gravity ☐ Pressure ☐ Cast Iron or Plastic ☐ Other
____ 23. Other Manure Storage
Other NR 112 Waste Source
____ 24.

6. Drillhole Dimensions

Dia. (in.)	From (ft.)	To (ft.)
8	surface	39.5

Method of constructing upper enlarged drillhole only.
☐ 1. Rotary - Mud Circulation
☒ 2. Rotary - Air
☐ 3. Rotary - Foam
☐ 4. Reverse Rotary
☐ 5. Cable-tool Bit ____ in. dia.
☐ 6. Temp. Outer Casing ____ in. dia. Removed? ☐ Yes ☐ No If no, explain ____
☐ 7. Other ____

7. Casing, Liner, Screen

Dia. (in.)	Material, Weight, Specification, Manufacturer & Method of Assembly	From (ft.)	To (ft.)
4		surface	29
5	screen type, material & slot size .020 Johnaon Telescopic Stainless	29	39.5

8. Grout or Other Sealing Material

Method 3/4 Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
3/4 Hole Plug	surface	24	12

DNR USE ONLY

9. Geology

Type, Caving/Noncaving, Color, Hardness, Etc.	From (ft.)	To (ft.)
Till	Surface	26
Sand Yellow Brn.	26	35
Clay	35	39.5

10. Static Water Level: ____ ft. above ground surface; 27.5 ft. below ground surface

11. Pump Test: Pumping Level 30 ft. below surface; Pumping at 3.5 GPM for 2 hours

12. Well Is: ☒ Above / ☐ Below Grade 30 in.
Developed? ☒ Yes ☐ No
Disinfected? ☐ Yes ☒ No
Capped? ☒ Yes ☐ No

13. Did you permanently seal all unused, noncomplying, or unsafe wells? ☐ Yes ☐ No If no, explain ____

14. Signature of Point Driver or Licensed Supervisory Driller | Date Signed

Signature of Drill Rig Operator (Mandatory unless same as above) | Date Signed: Jan 16 1996

Make additional comments on reverse side about geology, additional screens, water quality, etc.
Comments on reverse side ____ (Check √, if yes)

DNR

WELL CONSTRUCTION REPORT
Form 3300-77A Rev. 7-93

APPENDIX J

LINER REPAIR DOCUMENTATION

Cooper Engineering Company, Inc.
310 WEST SOUTH STREET • RICE LAKE, WI 54868-2420
TELEPHONE (715) 234-7008 FAX (715) 234-1025

April 6, 1995

Ms. Jana E. Murphy
Supervisor of Environmental Affairs
Flambeau Mining Company
N4100 Hwy 27
Ladysmith, WI 54848

RE: Type II Stockpile, Phase 2

Dear Ms. Murphy:

Per your request, Craig Walkey, Cooper Engineering Company, Inc., arrived at the mine at 9:30 a.m., March 21, 1995 to inspect the HDPE liner repair made by GSI, Inc. The repair was completed by 11:30 a.m. and is documented in the attached sketchs and photograph.

DESCRIPTION
The location of the repair is on the northeast face of the north slope of the emergency overflow located at the southwest corner of Type II Stockpile Phase 2.

We understand that the damage to the liner was caused by a backhoe tearing an approximate 2 ft. x 4½ ft. section from the HDPE liner. The damage occurred on March 17 when the backhoe was used to clear rubble away from the surface water drainage way from Phase 2 into Phase 1. The damaged area was located above the drainage and no impounded surface waters leaked into the subsoil below the liner. A temporary HDPE patch was placed over the damaged liner by mine employees and was monitored until the permanent repair was made.

REPAIR
The permanent repair was made by extrusion welding a patch from the surplus certified Phase 2 HDPE liner material stored in the building at H&H gate. The patch was tested using the vacuum box method. It is our opinion that the permanent repair is satisfactory and that the integrity of the liner is not affected.

RECOMMENDATION

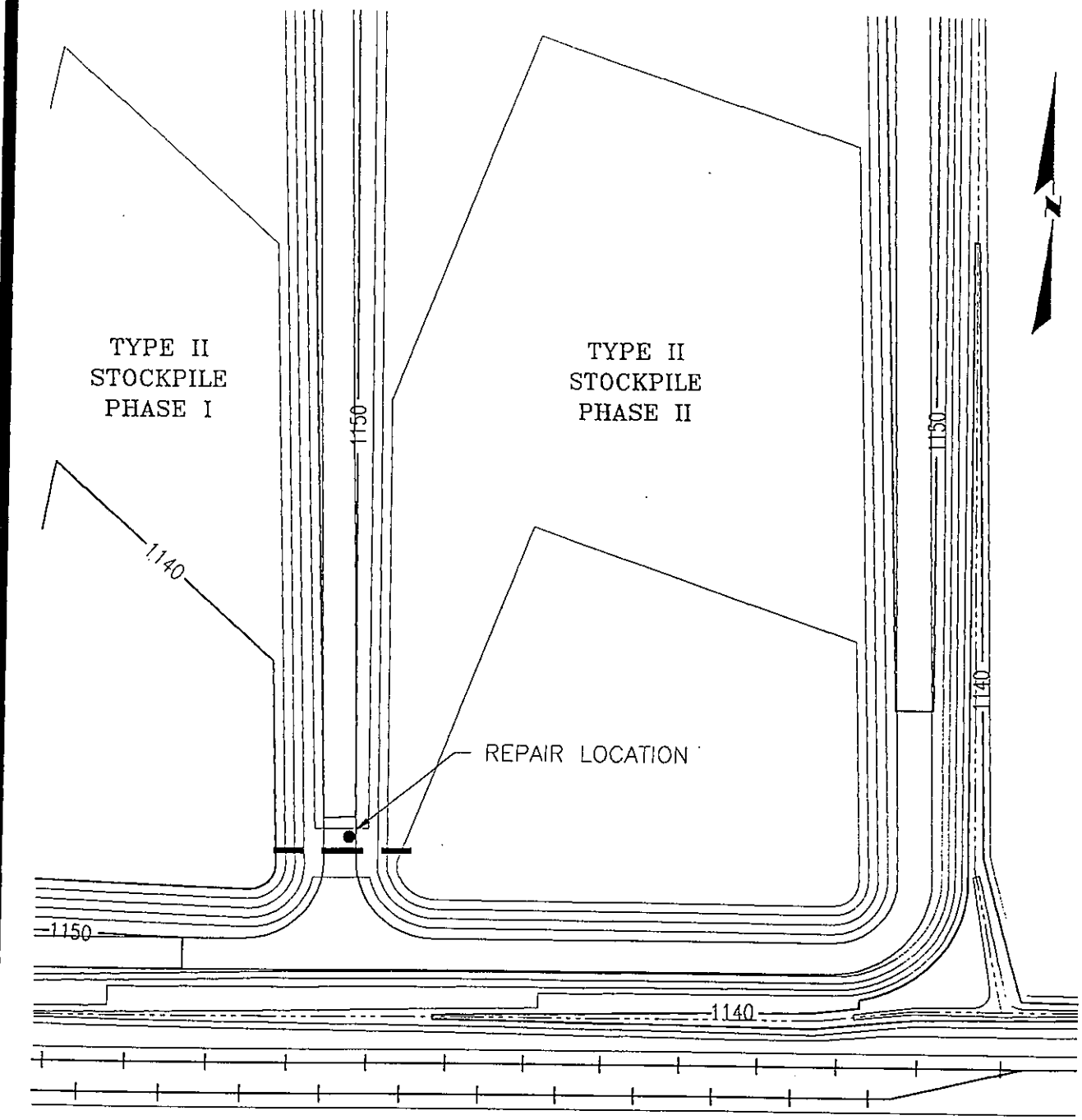
Quick communication between Flambeau Mining Company, Cooper Engineering Company, and GSI allowed for quick response and repair of the liner system.

Sincerely,

Craig Walkey, P.E.

dp:CS94081\Murphy.15

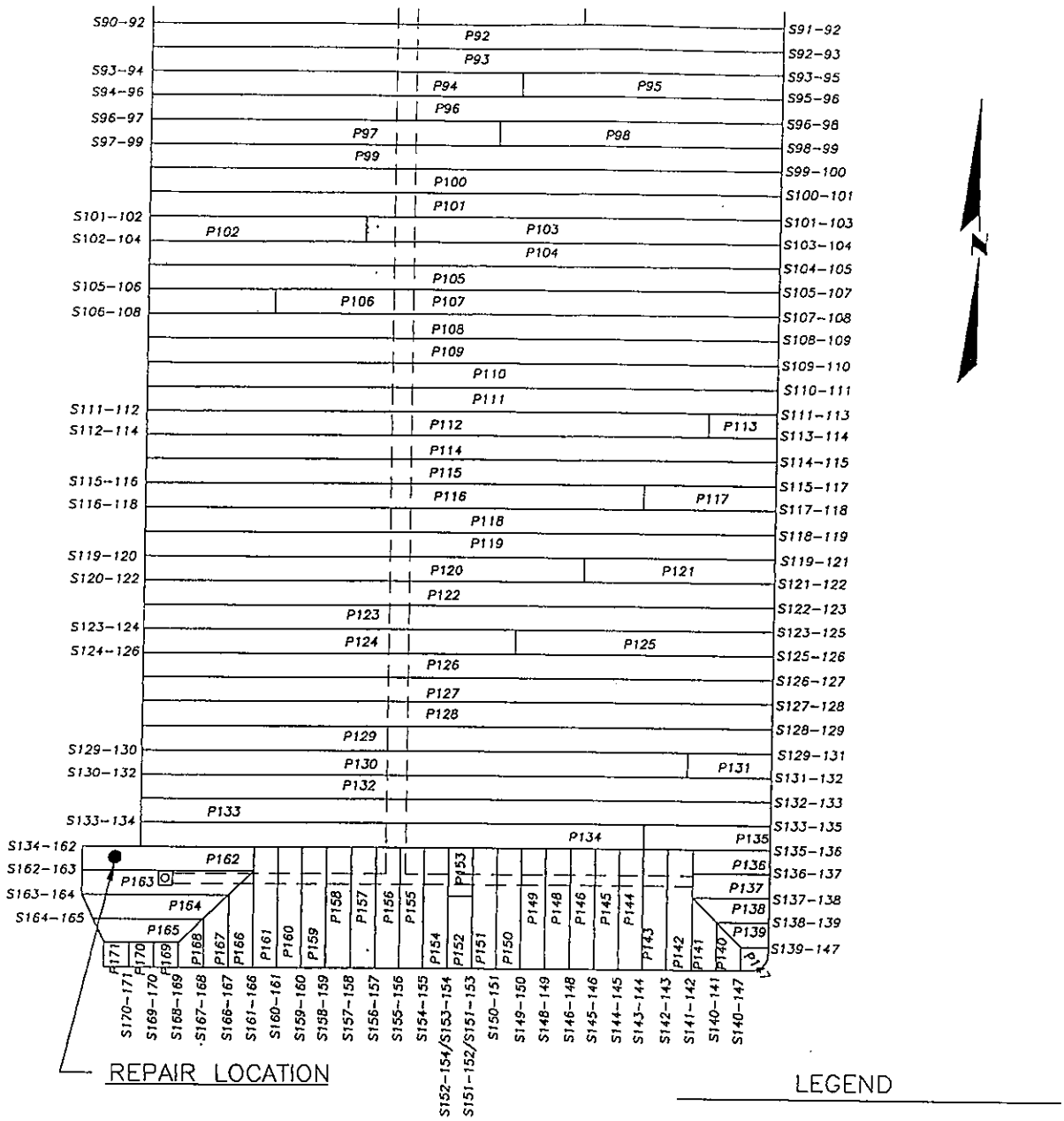
Enclosures



TYPE II STOCKPILE PHASE II LINER REPAIR
MARCH 21, 1995
FLAMBEAU MINING COMPANY
LADYSMITH, WISCONSIN

GRAPHIC SCALE
100 0 50 100
1 INCH = 100 FT.

COOPER ENGINEERING COMPANY
310 WEST SOUTH STREET RICE LAKE, WISCONSIN
TELEPHONE 715-234-7008
LINERFX2.DWG 4-6-95 MRE



TYPE II STOCKPILE PHASE II LINER REPAIR
MARCH 21, 1995
FLAMBEAU MINING COMPANY
LADYSMITH, WISCONSIN

GRAPHIC SCALE
100 0 50 100
1 INCH = 100 FT.

COOPER ENGINEERING COMPANY
310 WEST SOUTH STREET RICE LAKE, WISCONSIN
TELEPHONE 715-234-7008

LINERFX1.DWG 4-6-95 MRE

TYPE II STOCKPILE PHASE II LINER REPAIR
MARCH 21, 1995

FLAMBEAU MINING COMPANY
LADYSMITH, WISCONSIN

COOPER ENGINEERING COMPANY
310 WEST SOUTH STREET RICE LAKE, WISCONSIN
TELEPHONE 715-234-7008

FOTO495.DWG 4-6-95 MRE

Foth & Van Dyke
engineers · architects · scientists

December 7, 1995

Ms. Jana E. Murphy
Supervisor of Environmental Affairs
Flambeau Mining Company
N4100 Highway 27
Ladysmith, WI 54848

Dear Ms. Murphy:

Re: Geomembrane Liner Repair Documentation
Surge Pond, Flambeau Mine
Ladysmith, Wisconsin
Scope ID 94F004

This letter serves to document the repairs made to the 60 mil high density polyethylene (HDPE) liner located in the surge pond at the Flambeau Mining Company (Flambeau) site in Ladysmith, Wisconsin on October 9, 1995. Attached to this letter is the Construction Observation Report and photographs of the repairs.

As requested by Flambeau, Clayton Messelt of Foth & Van Dyke (F&VD) arrived at the above referenced site at 10:00 a.m., October 9, 1995 to observe and document the repair to the liner. The liner was damaged during dredging of the surge pond. It is our understanding that the liner was damaged by the dredging barge during the early morning hours of Saturday, October 7, 1995. The barge was tied up to shore and the surge pond water level was inadvertently lowered, which allowed the barge to come in contact with the liner. Flambeau personnel noticed the damage Saturday morning and immediately contacted Foth & Van Dyke to schedule repairs as soon as possible. Geo-Synthetic Construction Inc. (GSCI) was contacted and arrangements were made to repair the liner Monday, October 9, 1995. The water level in the surge pond was maintained below the level of the impacted liner until the liner was repaired.

Von Shanks and Dennis Brandstatter of the Flambeau, Joe Waite of GSCI and Clayton Messelt of Foth & Van Dyke met to view the damaged areas of the liner Monday morning, October 9, 1995. It was observed that the damage to the liner consisted of three (3) creases, one (1) penetration approximately 1½ inches long (photograph #1) and one (1) point penetration (photograph #2). The damaged areas had been located and marked by Flambeau personnel prior to Foth & Van Dyke's arrival on site. The damaged areas were located above the water level in the west berm approximately 40' south of the north berm top (photograph #3).

LRM\95F004\GBAPP\1753\8700

2737 South Ridge Road · P.O. Box 19012 · Green Bay, WI 54307-9012 · 414-497-2500 · Fax: 414-497-8516

On October 9, 1995, GSCI removed the two (2) damaged areas, each one less than one (1) square foot in size (photographs #1 and #2).

Flambeau, which had saved extra liner material from the installation of the HDPE liner, provided the 60 HDPE material and extrusion rod for patching the damaged areas of the liner. The damaged areas were identified as SP-1 and SP-2 (photograph #3). GSCI heat tacked the HDPE patches over the damaged areas and then extrusion welded (photograph #3) the patch's perimeter (photograph #4 and #5). The welds was spark tested for continuity of the weld and were observed to be satisfactory.

At the request of Flambeau, GSCI observed the remainder of the exposed liner for damage. During the observation, two (2) stress cracks were noted above small diameter influent pipes to the surge pond. The pipes are located above the surge pond effluent line. The stress cracks were extrusion welded (photograph #6). Surface scratches were noted at numerous locations, however, they were very shallow and not considered worthy of repair.

GSCI recommended that Flambeau employees continue to take precautions to protect the liner whenever the possibility of scratching or abrading of the liner may occur. As shown by the quick response to this situation, the Flambeau employees are performing an effective routine liner inspection and providing immediate response to situations requiring immediate attention.

Sincerely,

Foth & Van Dyke

Clayton E. Messelt, P.E.
Construction Project Engineer

James B. Hutchison, P.E.
Project Manager

CEM:lrm

Enclosures

LRM\95F004\GBAPP\1753\8700

Foth & Van Dyke

Client: FLAMBEAU MINING CO Scope ID: 95F004
Project: LINER REPAIR Page:
Prepared By: CEM Date: 10/4/95

CONSTRUCTION OBSERVATION REPORT

Location LADYSMITH, WI

WEATHER	Temp (° F)		Sky Cond.	Precip. (in.)			Site Conditions (describe)	
	Low	High	Clear		Rain	Snow	Dry	Muddy
	50's		Pt. Cldy	(None)			WET	✓
			(Cloudy)					

Contractors on site *(include no. of personnel per contractor)*
GSI - GEOSYNTHETICS, INC. - JOE WAITE
LIQUID WASTE TECHNOLOGY - 3 EMPLOYEES

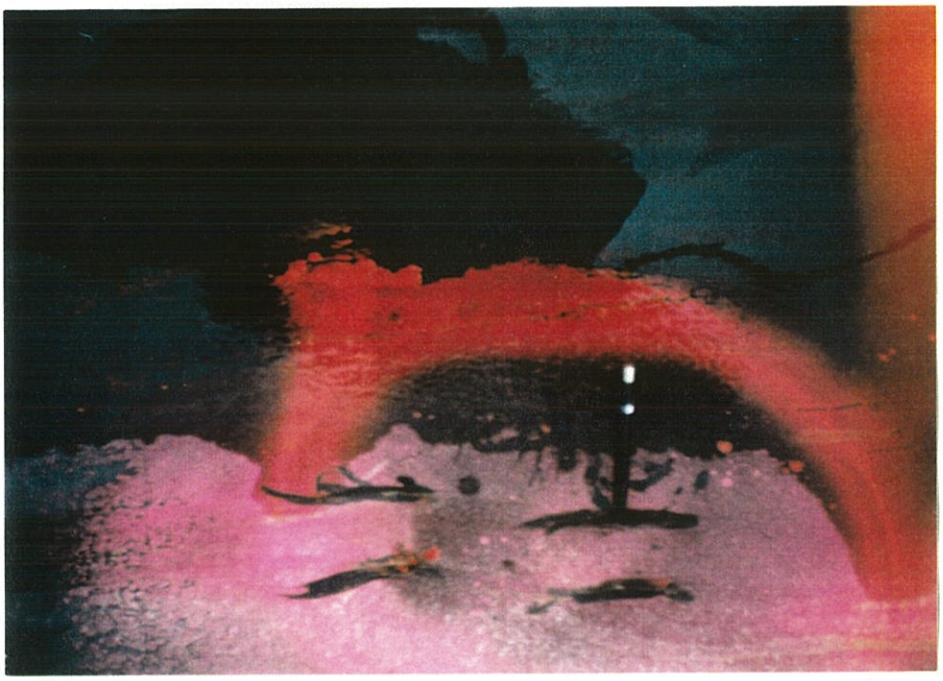
Other personnel on site	Purpose
DENNIS BRANDSTATTER - FLAMBEAU	TO OBSERVE PATCHING PROCESS
VON SHANKS - FLAMBEAU MINING	" " " "

Work observation report, comments: - ARRIVED ON-SITE @ 10:00 A.M.
- GSI ARRIVED ON-SITE @ 10:20 A.M.
- JOE WAITE & I VIEWED THE CREASES AND PUNCTURES. TOOK PHOTOS OF THE TWO AREAS (USING BODY HARNESS & LIFE LINES.)
- CALLED JIM HUTCHISON AND EXPLAINED THE CREASES, CUT AND PUNCTURE TO HIM. HE REQUESTED THAT THE TWO AREAS BE CUT OUT AND PATCHED. ALL CUT AREAS AND PATCHES TO HAVE ROUNDED CORNERS (NO SQUARE CUTS).
- RELAYED INFO TO JOE WAITE WHO CUT OUT THE AREAS AND PATCHED THEM. TOOK PHOTOS OF THE PATCHING OPERATION AND THE FINISHED PATCHES. ALSO TOOK PHOTOS OF BOTH SIDES OF THE CUT OUT PIECES OF LINER MATERIAL.
- AT VON'S REQUEST, JOE WAITE AND MYSELF WALKED THE PERIMETER OF THE LINER AREA. WE WERE JOINED BY DENNIS. TWO (2) STRESS CRACKS WERE NOTED IN A PATCH ABOVE SMALL INFLUENT PIPES ABOVE THE POND OVERFLOW LEVEL. THESE CRACKS WERE GROUND AND HEATED HDPE MATERIAL APPLIED TO THEM WITH THE APPLICATION TOOL.
- THE PATCHED AREAS WERE (2 EA.) SPARK TESTED. THERE WAS NO EVIDENCE OF PIN HOLES OF FLAWS.
- IT WAS NOTED DURING THE PERIMETER INSPECTION THAT THERE WERE SEVERAL AREAS WHERE THE HDPE WAS SCRATCHED. JOE STRESSED THAT CARE SHOULD BE TAKEN TO PREVENT SCRATCHES AND ABRASION TO THE LINER.
- GSI LEFT THE SITE @ 12:15 P.M. Clayton S. Mundt

For additional comments, include additional sheets

White: Files Yellow: Owner Pink: Field

FORM CEC030 (11/94)

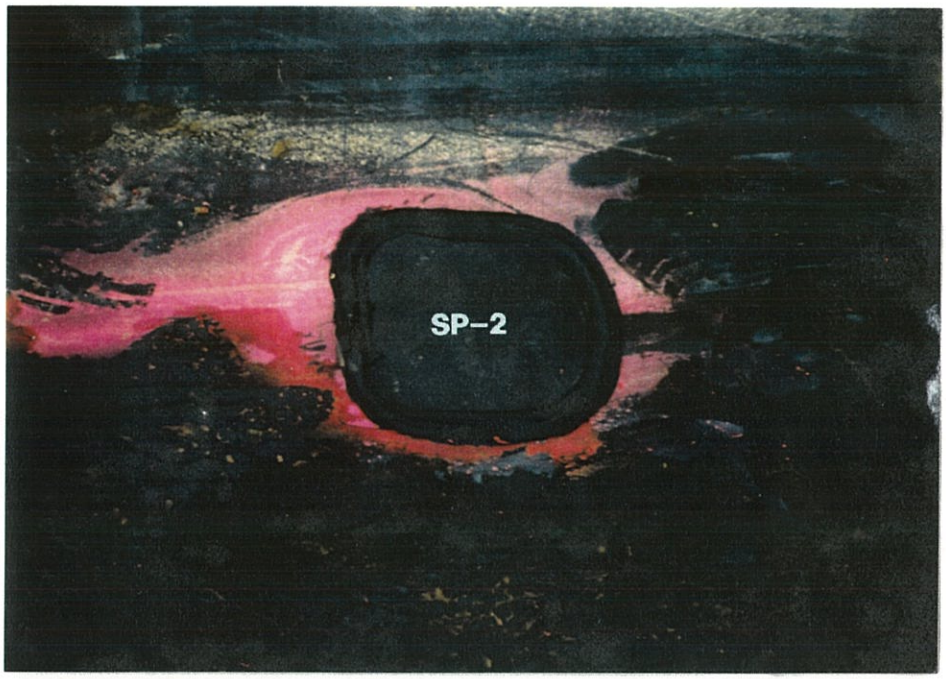


Photograph 1 October 9, 1995
Location: Surge Pond Liner-Repair
Description: Puncture No. SP-1

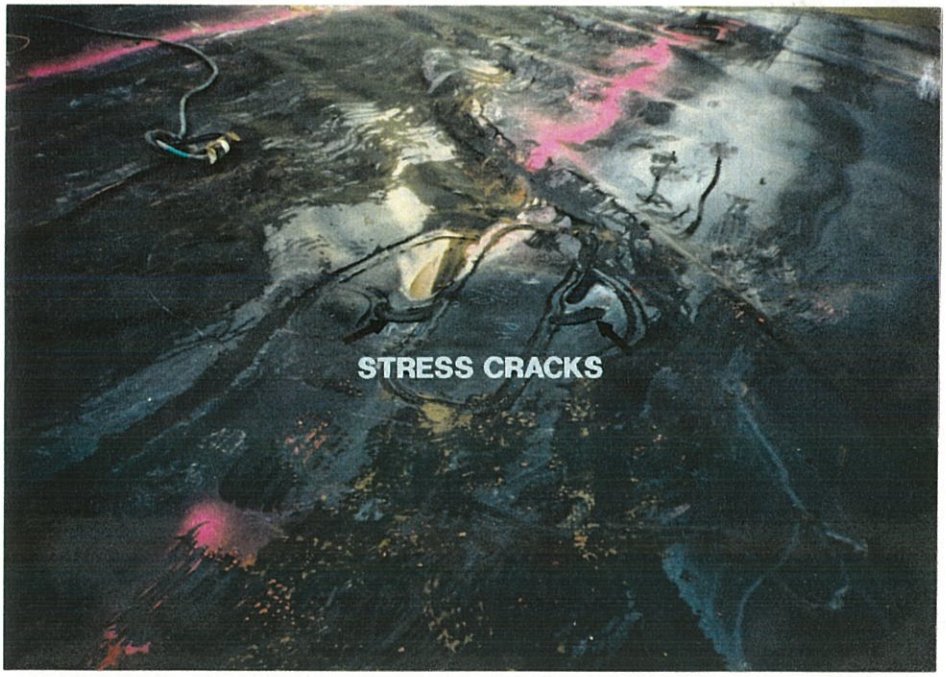
Photograph 2 October 9, 1995
Location: Surge Pond Liner-Repair
Description: Puncture No. SP2 (after removal). Note: HDPE cut out containing the puncture was placed on a light colored pipe for photographing.

Photograph 3 October 9, 1995
Location: Surge Pond Liner-Repair
Description: Extrusion welding repair SP-2

Photograph 4 October 9, 1995
Location: Surge Pond Liner-Repair
Description: Repaired Puncture SP-1.



Photograph 5 October 9, 1995
Location: Surge Pond Liner-Repair
Description: Repaired Puncture SP-2



Photograph 6 October 9, 1995
Location: Surge Pond Liner-Repair
Description: Extrusion repair of stress cracks at pond influent pipes. Note: Stress cracks were observed during the repair of SP-1 and SP-2.