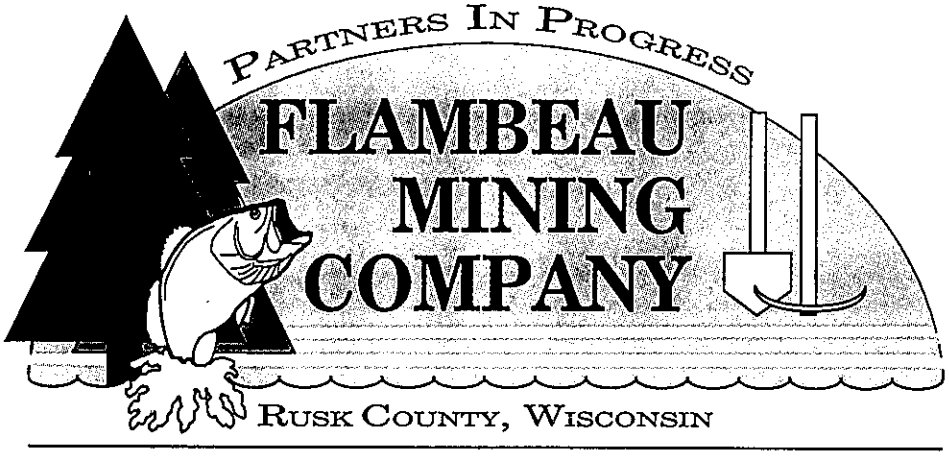
1994 Annual Report



January 1995

Flambeau Mining Company
Subsidiary of Kennecott Corporation
N4100 Highway 27
Ladysmith, WI 54848
(715) 532-6690
FAX (715) 532-6885

Kennecott

January 30, 1995

Mr. Lawrence J. Lynch
Mine Reclamation Unit
Bureau of Solid & Hazardous Waste Management
101 South Webster Street, GEF II
Madison, WI 53707

Dear Mr. Lynch:

Flambeau Mining Company (Flambeau) is submitting 12 copies of the attached 1994 Annual Report pursuant to Part 1-8 of the conditions of the Flambeau Mine Permit (Docket No. IH-89-14). This submittal also addresses other requirements of the Mining Permit and associated approvals.

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

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
1	Bernice Dukerschein, Chairperson Rusk County Board of Supervisors 311 East Miner Avenue Ladysmith, WI 54848
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FLAMBEAU MINING COMPANY
1994 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 1994 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 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 1994 SUMMARY

Construction of the Flambeau Mining Company (Flambeau) Type II/Phase II stockpile was completed during 1994 in accordance with plans approved in the Mine Permit. The document titled "Construction Documentation Report Type II Stockpile Phase 2 Construction" dated October 26, 1994 was submitted to the Wisconsin Department of Natural Resources (WDNR) Mine Reclamation Unit for review. Final approval of the construction document was granted by the WDNR on December 22, 1994.

During January 1994 mine production continued in the Phase I portion of the pit (west half) at the 1050 elevation and by year's end the mine had reached the 1000 elevation. Overburden removal in Phase II commenced during the second quarter of 1994 and reached the 1080 elevation by the end of the year. A total of 1,170,000 tons of Type I material, 694,600 tons of Type II material and 430,990 tons of ore were removed from the open pit in 1994.

Shipments of ore sent to Canada for processing totaled 449,900 tons. Shipments during 1994 were supplemented with 19,000 tons from the on-site ore stockpile generated during 1993. Mill ore shipped to Timmins, Ontario total 292,400 tons and the remaining 157,500 tons of ore were shipped to Rouyn-Noranda, Quebec as either direct smelter ore (DSO) or as gossan ore.

During May 1994 a second shift of contractor personnel was added to meet production requirements. The second shift continued through to the end of 1994. The percentage of all mine personnel consisting of local content as defined by the Local Agreement ranged from 78% to 82% throughout the year. The operational workforce ranged from a high of 85 in August (including contractors) to a low of 50 in March. As of the end of the year there were 64 employees.

The wastewater treatment plant (WWTP) discharged an average 500,400 gallons per day through Outfall 001 to the Flambeau River. No difficulties were experienced in achieving the required effluent standards.

In December 1993 Flambeau initiated a Toxicity Reduction Evaluation (TRE) which was the result of the second acute reaction experienced by *Ceriodaphnia dubia* (*C. dubia*) in 100% effluent within a twelve month period. While the WWTP effluent discharge was in complete compliance with chemical specific limitations, the effluent was deficient in constituents which reduce the bioavailability of metal ions. As a result, *C. dubia* was affected by metal ions at low concentrations in 100% effluent. However, through research it was realized that *C. dubia* was not affected by metal ions at these same concentrations within the Flambeau River water. The reason being that the Flambeau River contains naturally occurring constituents which reduce the bioavailability of metal ions. Flambeau proposed simulating this characteristic of the Flambeau River within the WWTP treatment process. Following extensive research, Flambeau found that by utilizing citric acid as part of the pH adjustment in the sulfide precipitation process, the

bioavailability of metal ions is reduced as in the Flambeau River. Following WDNR approval, Flambeau initiated the use of citric acid within the WWTP process during September 1994. Bioassays performed in the remainder of 1994 have resulted in no acute reaction for any of the three test species in 100% effluent.

During 1994, effluent discharge to the river was greater than the 1993 level by 16% at 129.1 million gallons; the increase is due to three additional months of operation as compared to 1993. The average monthly discharge of 10.8 million gallons per month during 1994 remained relatively constant as compared to 1993. As evident in Figure 2-1, effluent discharge peaked during September due to excessive precipitation events producing a 100-year flood condition for the Flambeau River on September 15. 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. During September an average of 808,000 gallons per day was treated within the WWTP. The plant capacity is 1.152 million gallons per day.

During the Flambeau River flood the mine was not in danger, however, precautions were taken on the night of September 15 to protect the pit in the event the 100-year flood was substantially exceeded. A temporary three to four foot berm was constructed around the mine's west end at the 1100 elevation. The berm was removed subsequent to the flood.

While no river water entered the pit, approximately four million gallons of mine site surface runoff flooded the pit bottom. The surface runoff was the result of rains during the time period September 12-16. Copper ore production was able to recommence on September 21. The WWTP treated the stored water within the pit and normal operating conditions resumed September 27.

Reclamation activities throughout the year included routine inspection and maintenance of vegetation throughout the project area. The construction associated with the Type II/Phase II stockpile required erosion control and establishment of vegetation. The erosion control measures were effective in minimizing off-site sedimentation and will remain in place until stabilization is evident. 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. The buffer screen between the mine site and the Flambeau River required 110 trees to be planted to replace trees damaged by natural occurrences such as damage from deer.

During 1994 there was one lost time accident involving a contractor employee. As of the end of the year the operation has worked 184 days accident free.

A significant effort was devoted to general monitoring of the air, groundwater, surface water and the biological environment with the subsequent generation of reports. This Annual Report summarizes much of the collected data, most of which has been submitted to the WDNR throughout the year.

FLAMBEAU MINING COMPANY
PIT PUMPING \ WATER DISCHARGED

1994 MONTH	PIT PUMPING	WATER DISCHARGED
JAN	7.71	8.35
FEB	7.56	8.93
MAR	8.66	11.08
APR	9.15	10.08
MAY	7.20	9.86
JUN	8.63	11.19
JUL	10.63	10.86
AUG	10.65	12.26
SEPT	16.09	21.00
OCT	11.65	12.52
NOV	9.20	10.62
DEC	9.03	9.65

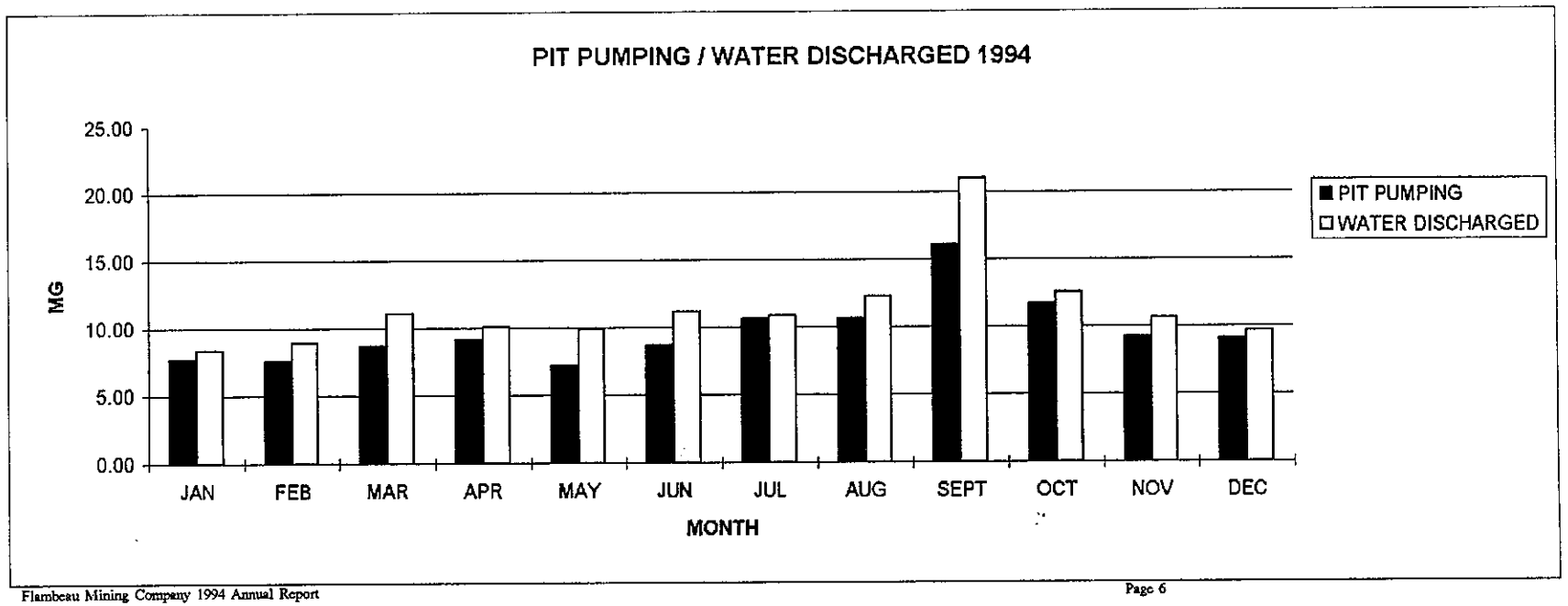


Figure 2-1

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

○ Reinitiated Phase II Open Pit Development	May 1994
○ Net Proceeds Tax Early Payment to Local Governments	June 15
○ WDNR Approval of Increased Production	August 17
○ TSP Air Monitoring Schedule Reduced	August 18
○ Flambeau River Flood	September 15
○ WWTP Citric Acid Feed Implemented	September 28
○ WDNR Approval of Type II/Phase II Construction	December 22

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 1994 Flambeau had requested a modification of the Mining Permit to increase the production rate from 320,000 tons/year to 450,000 tons/year. The WDNR solicited input from the County, City and Town governments to determine the significance of the requested change. The WDNR determined that the requested change did not constitute a substantial modification of the project and would not result in significant additional impacts in the area. The WDNR issued the requested modification in their letter dated August 17, 1994.

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 the modifications and deviations for 1994 is included in Appendix A.

2.3 CONSTRUCTION REPORTS

One construction documentation report was submitted in 1994 to complete the construction reporting required by the Mine Permit for the Type II/Phase II stockpile. "Construction Documentation Report Type II Stockpile Phase 2 Construction" (October 1994) 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. A summary of incidents reported to the environmental compliance staff is included in Table 2-1. Spills are reported in accordance with s. 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. Two drilling programs were either completed or commenced in 1994. The first program commenced March 24, 1994 and was completed on June 15. Three holes were drilled for a total footage of 3,993 consisting of 574 feet of rotary and 3,419 of cored volcanic "greenstone" rock. All holes were permanently abandoned with neat cement.

The second program was commenced on December 7, 1994 and will be completed the first quarter of 1995. The hole for the second program was drilled to a depth of 470 feet but permanently abandoned on December 10 due to severe hole wandering. The replacement hole has been hammer drilled to 970 feet during 1994 and will be completed during 1995.

TABLE 2-1
FLAMBEAU MINING COMPANY
1994 INCIDENT LOG

DATE	INCIDENT	ACTION
6/10/94	10-15 gal. waste oil spill into Surge Pond due to overflow of oil/water separator.	Contaminated material contained and cleaned up. Operator training of correct management of oil/water separator. WDNR official notified 6/10/94.
12/02/94	14-15 gal. hydraulic fluid spill due to haul truck hydraulic lines bursting.	Contaminated material contained and cleaned up. Continued inspection and replacement of hydraulic lines as necessary. WDNR notified on 12/02/94.
12/14/94	Dozer rolled onto its side resulting in 5 gal. anti-freeze solution and 1 gal. oil spilled.	Contaminated material contained and cleaned up. Reinforce safe dozer operation. National Response Center, Wisconsin Division of Emergency Government, and WDNR notified on 12/15/94.

3.0 RECLAMATION ACTIVITIES

As required by the Mine Permit Section 3, reports on progress of reclamation are prepared throughout the year. An annual report is required by Condition 3-26(d). The 1994 Annual Reclamation Report dated November 14 was submitted to the WDNR and is incorporated by reference. Other reclamation updates submitted on January 28 and September 26, 1994 are incorporated by reference. Reclamation activities reported in the November 1994 report included removal of woodchips from topsoil stockpile, erosion control associated with Type II/Phase II stockpile, prairie seed test plot and aquascape assessment, buffer screen tree planting and remedial seeding.

Additional reclamation activities completed subsequent to the November 14 submittal included alterations to the Outfall 002 discharge channel within the mine site. The alterations were made to maintain the quality of effluent discharges through Outfall 002. Additionally, the reconfiguration of the roadway accessing the west wall improved safe operating conditions.

The open discharge channels to Outfall 002 and the hydric topsoil stockpile were converted to 12-inch diameter buried HDPE pipe. The buried pipe to Outfall 002 terminates at a point approximately 30 feet from the flow metering weir. In-line valves divert flow to Outfall 002 and/or the hydric soil stockpile. The valves will be normally open to the hydric soil stockpile and closed to Outfall 002.

Straw bales were placed adjacent to the hydric soil stockpile to minimize sedimentation from the disturbed areas. Silt fence installation and seeding will occur when weather conditions permit.

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 9, June 23, September 9 and December 21, 1994. 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 statistically significant trends:

MW1000P	Iron	(Downward Trend)
	Alkalinity	(Downward Trend)
	Copper	(Upward Trend)
MW1010P	Manganese	(Downward Trend)
MW1005	Iron	(Upward Trend)

Iron and alkalinity showed a slight downward trend in MW1000P. The trends are not consequential because iron concentrations vary by less than 2 mg/l and alkalinity values vary by less than 80 mg/l sitewide. As the open pit develops, the hydraulic gradient will be toward the pit which may slightly impact these wells within the west wall. Copper showed a slight upward trend in MW1000P. The trend analysis may have been influenced by a single result which could prove to be anomalous. The sitewide variability of copper results has been less than 50 ug/l which is not consequential.

MW1005 shows an upward trend for iron concentrations. The Ladysmith area is known to have higher concentrations of iron in shallow wells than is typical for other areas. MW1005 serves as a background well since it is upgradient from the mine site in regards to groundwater flow. Groundwater quality from MW1005 will continue to be monitored for continuing trends.

The trend analysis for manganese in MW1010P also suggests a slight downward trend; the difference between the highest and lowest manganese values is 0.27 mg/l. Therefore the trend appears not to be consequential.

Iron, TDS and manganese standards contained in Condition 1-9 of the Mine Permit were inadvertently established well below some background levels at the site. The WDNR agreed that these standards should be corrected. Flambeau submitted a report to the WDNR on August 17, 1994 requesting a correction of the iron, manganese and TDS groundwater standards.

Elevations of groundwater in wells and piezometers near the pit continue to 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-42, 1004, 1004S, 1004P, 1001, 1001G, 1001P, OW-7, 1003, 1003P, ST-9-23, ST-9-23A, PZ-S3, ST-9-26, OW-39, PZ-1A and PZ-R1. Those wells located within close proximity of the pit are either dry or continue to show a strong downward trend in groundwater elevations as the pit is developed. Figure 4-1 presents the locations of monitoring wells. Graphs and further discussion on groundwater elevations are included in Appendix C.

During September 1994, the Flambeau River level exceeded a 100-year flood level. While the pit was not in danger, reports of upstream dam instability caused Flambeau to take immediate action to construct a supplementary flood control berm on the west pit wall at the 1100 elevation. During the berm construction, MW1000P was carefully cut off at ground level and covered by a metal plate to prevent materials from entering the well. Following verification that materials had not filled MW1000P, the well was reconstructed with a casing elevation of 1101.88. The well was redeveloped by purging until clean water was produced.

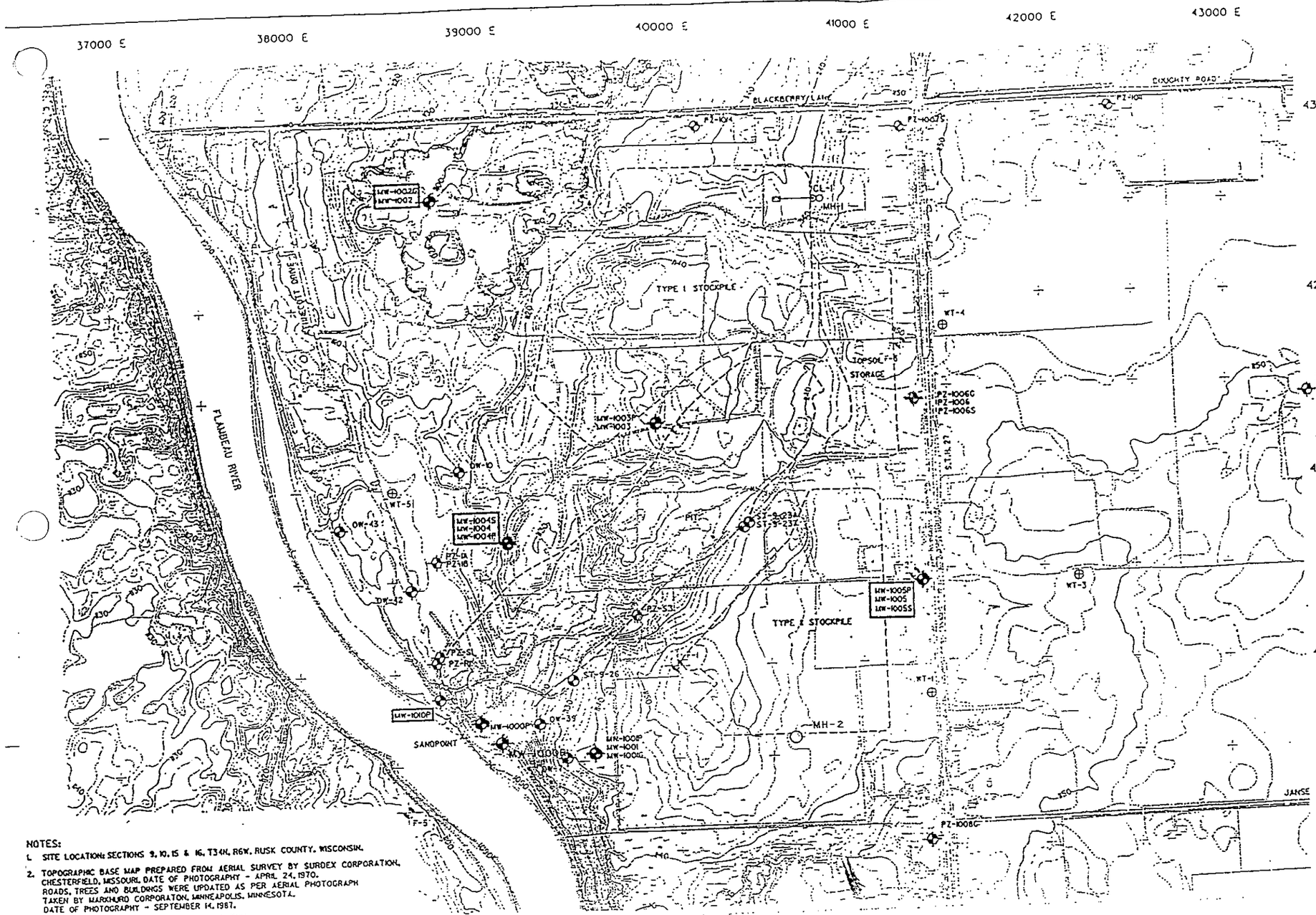
4.2 SURFACE WATER

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 on July 11, 1994 and retrieved a month later on August 9, 1994. WDNR was advised of the installations and collection dates prior to installation.

During 1993, a third sediment sample location (S-3) had been established approximately 9,500 feet upstream from the Port Arthur Dam sample location (S-2) to evaluate the need for



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 CORPORATION, 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 =	567,357.8887 N
40000 E =	1,713,516.1229 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

- 800 — EXISTING CONTOUR
- EXISTING PAVED ROADWAY
- EXISTING TRAIL/GRAVEL SURFACE
- TREES AND/OR BRUSH
- FENCE
- F-1 CONTROL MONUMENT
- MW-1005 MONITORING WELL
- PZ-R3 PIEZOMETER
- MW-1005 WELL ON THE WATER QUALITY MONITORING PROGRAM
- WT-5 WETLAND STAFF GAUGE
- MH-2 LEACHATE MANHOLE

N

0 300' 600'
SCALE

GROUNDWATER AND COLLECTION LYSIMETER CONSTRUCTION AND OPERATION MONITORING PROGRAM

COLLECTION LYSIMETER/ CELL/PIEZOMETER NUMBER	ELEVATION OF SCREENED INTERVAL (FT. MSL)	GEOLOGIC UNIT	PARAMETER*
MW-1000R	1095-1085	PRECAMBRIAN, TILL	1, 2
MW-1000P	1049-1044	PRECAMBRIAN	1, 2
MW-1001	1118-1108	TILL	1
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	1112-1102	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-R3	1067-1062	PRECAMBRIAN	1
PZ-S1	1100-1095	SANDSTONE	1
PZ-S3	1084-1082	SAND & GRAVEL	1
SANDPOINT	1106-1101	SANDSTONE	1
ST-9-23	1125-1120	SAND & GRAVEL	1
ST-9-23A	1106-1101	TILL	1
ST-9-26	1099-1097	SAND & GRAVEL	1
PZ-1A	1103-1101	SAND & GRAVEL	1
PZ-1B	1088-1078	TILL	1
OW-7	1069-1059	TILL	1
OW-10	1107-1073	TILL	1
OW-39	1090-1058	SAND & GRAVEL	1
OW-42	1090-1022	SAND & GRAVEL	1
OW-43	N.A.	N.A.	3
MH-2	N.A.	N.A.	3
CL-1			

*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)

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

NO.	DATE	REVISIONS	BY	CHK'D	ENG'R

NO.	DATE	REVISIONS	BY	CHK'D	ENG'R

	BY	DATE
DESIGN	DHS	12/89
DRAWN		
PROJECT MGR.		
QA/QC		

FLAMBEAU PROJECT
LADYSMITH, WISCONSIN

KENNECOTT MINERALS COMPANY

FIGURE NO. 4-1
CONSTRUCTION AND OPERATION

MICROFILM JOB
DRAWING NO. REV.
DIVISION DRAWING NO. —

replacement of S-2. The substrates in the vicinity of the Port Arthur Dam sample location had been determined to be very dissimilar to substrates of the Blackberry sample location (S-1) upstream from the mine site. The highly erodible banks located in the vicinity of Port Arthur Dam may contribute to the differing substrate characteristics. The comparison of data between these two locations would be difficult due to the differing nature of the substrates. Following 1993 sediment sampling, S-3 was determined to be suitable for downstream sampling and replaces S-2. Sample point S-3 is located near the Sister's Farm downstream from Outfall 001.

Figure 4-2 shows the sediment sampling locations. Results from both downstream sample sites 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.

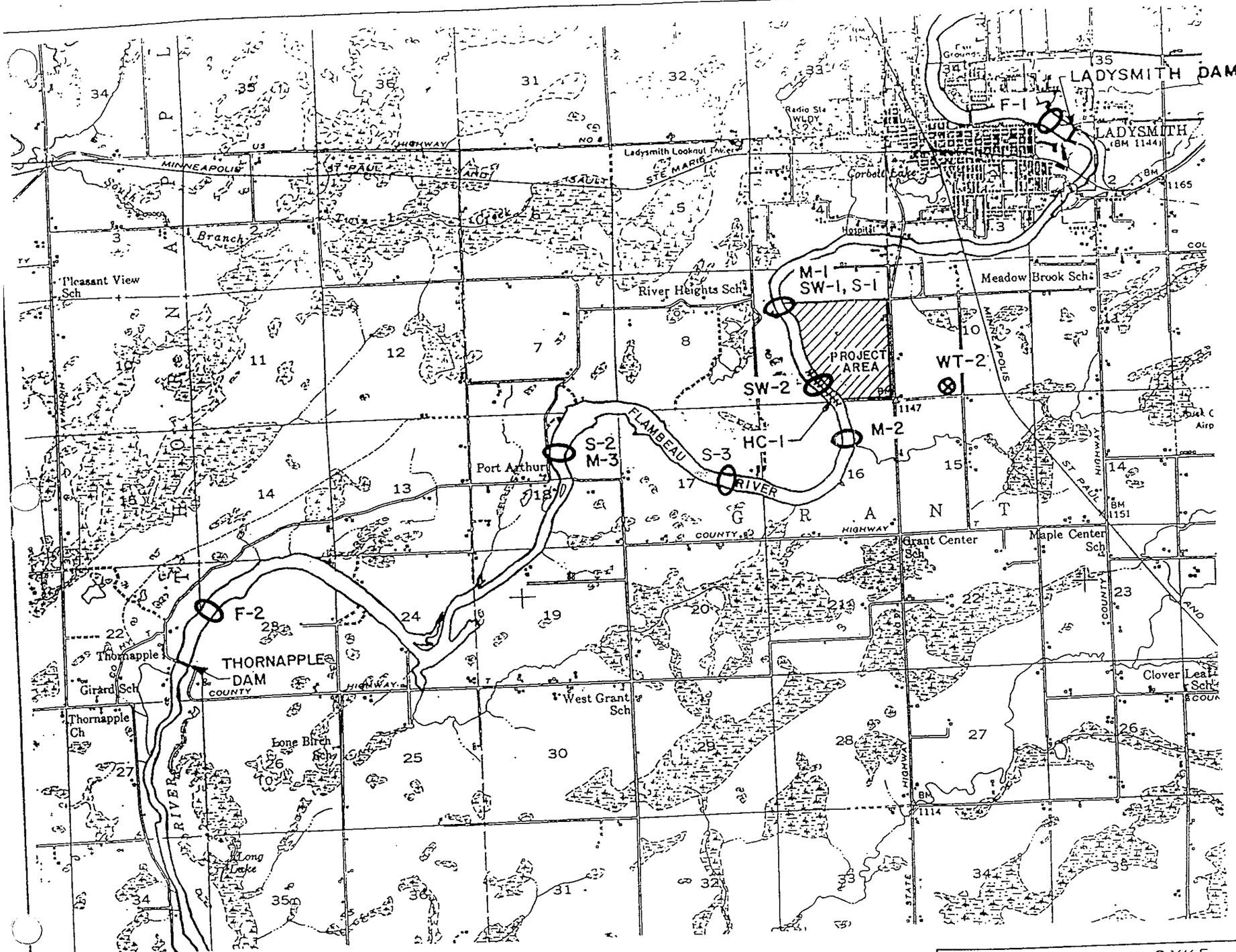
In general, samples collected in 1994 were uniform in consistency being made up of soft sediment with no gravel. The lack of gravel can be attributed to a change in collection methodology. Inert screen had been placed over the sample containers to prevent crayfish from importing gravel as had been experienced in the previous year's samples. In comparing 1994 analyses to previous years, slight variability can be seen in individual parameters. For example, iron continues to appear to decrease in upstream and downstream samples compared to previous years; the change does not necessarily indicate a trend. 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 no 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. Metals are analyzed from samples of fish tissue, while length, sex and stomach contents of each fish are noted. In 1994, fish were collected on October 16 and 17 using a boat mounted with an electroshocker. Collection had originally been scheduled for September, however, significant flooding of the Flambeau River during September required rescheduling. Procedures described in the 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 walleye collected were either empty or contained minnows which tend to be a fall diet. 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 have decreased during 1994 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.

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



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

FLAMBEAU PROJECT
LADYSMITH, WISCONSIN

KENNECOTT MINERALS COMPANY
1515 MINERAL SQUARE
SALT LAKE CITY, UTAH

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

DRAWN DHS 12/89

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)
aluminum	NA	4000	12000	1500	4400	4000
arsenic	1.1	1.5	4.1	<0.55	0.71	<1.6
cadmium	<0.5	0.6	<1.4	<0.055	0.11	0.13
chromium	4.8	13.0	24.0	3.8	9.6	10.0
copper	2.6	7.2	24.0	2.1	6.7	7.1
iron	2200	16000	25000	3100	8200	7700
lead	<4.5	6.9	20.0	2.6	8.3	7.8
manganese	63	1600	570	610	830	860
mercury	<.01	0.1	<0.3	<0.06	<0.07	<0.03
nickel	NA	7.3	12.0	1.7	6.5	6.2
selenium	NA	0.4	<0.9	<0.3	<0.3	<1.6
silver	NA	<1.1	<2.6	0.09	0.58	<0.08
zinc	28.0	45.0	79.0	9.60	33.0	46.0
Other						
Total Solids (%)	69.0	76.8	35.0	32.0	56.0	NA
Total Volatile Solids (%)	NA	2.5	12.0	5.1	6.2	NA

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
aluminum	NA	3800	3300	4000	3900
arsenic	0.9	2.2	2.2	1.4	<4.2
cadmium	<0.5	<0.7	<0.6	<0.6	<0.42
chromium	5.5	11.0	10.0	11.0	10.0
copper	2.8	7.3	6.0	7.0	5.8
iron	3000	18000	16000	15000	11000
lead	<4.5	6.0	5.8	8.5	3.3
manganese	130	1900	1000	1300	1500
mercury	<.01	0.1	<0.1	<0.05	<0.04
nickel	NA	5.8	6.1	8.4	7.4
selenium	NA	0.4	<0.4	<0.3	4.2
silver	NA	<1.2	<1.1	0.06	<0.21
zinc	16	47.0	33.0	38.0	34.0
Other					
Total Solids (%)	85	73.0	78.6	79.2	NA
Total Volatile Solids (%)	NA	1.8	1.6	0.8	NA

NA = Not Analyzed
[1] Environmental Impact Report, March 3, 1989, p. 3.7-1.1

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 8, 1994. Whole bodies were used for analysis and the results represent a composite for all crayfish collected per site. The analytical data indicates that no relative difference in parameter concentrations when comparing upstream to downstream locations is evident.

Samples were collected on October 3 to identify macroinvertebrate fauna. The results show that the severe flooding of the Flambeau River during September and into October have likely had an impact upon the macroinvertebrate fauna. Macroinvertebrate samples collected above and below the mine site were significantly lower in diversity and abundance as compared to previous years. 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 9, June 23, September 9 and December 21, 1994. Those submittals are incorporated by reference.

A summary of the 1994 surface water quality results are included on Table 4-3. The results from 1994 are consistent with data collected from the same locations in 1992-1993 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 August 8, 1994. The characterization followed procedures described in the Updated Monitoring Plan (July 1991) and the Revised Mining Quality Assurance/Quality Control Document (August 1991).

The Flambeau River substrate conditions were consistent with 1992 conditions. There was no sign of sedimentation or erosion associated with discharge from Outfall 001. Water-borne

TABLE 4-3
1994 QUARTERLY SURFACE WATER QUALITY DATA SUMMARY

	SW-1				SW-2			
	1/94	4/94	7/94	10/94	1/94	4/94	7/94	10/94
aluminum (ug/l)	120	290	70	200	36	310	140	220
arsenic (ug/l)	<2	<2	<2	<2	<2	<2	<2	<2
beryllium (ug/l)	<1	<1	<1	<1	<1	<1	1.2	1.2
cadmium (ug/l)	<0.2	0.38	<0.2	<0.8	<0.2	<0.2	0.22	<0.08
chromium VI (ug/l)	<5	<5	<5	<1.5	<5	<5	<5	<1.5
chromium (ug/l)	<1	1.8	1.8	2.5	<1	1.9	2.3	3.7
copper (ug/l)	4.4	<2	2.7	2	<2	5.1	3.6	5.7
conductivity (field)	203	118	117	78	151	124	119	82
DO (mg/l)	11.9	5.8	8.5	10.1	11.6	6.6	8.8	9.3
hardness (mg/l)	64	43	48	36	60	40	48	38
lead (ug/l)	<1	10	2.5	1.1	<1	<1	1.4	1.5
mercury (ug/l)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
nickel (ug/l)	<16	<16	<16	<16	<16	<16	<16	<16
pH (lab)	7.2	7.4	7.6	6.8	7.2	7.4	7.8	6.9
pH (field)	7.8	8.0	7.4	7.2	8.1	8.0	7.6	7.1
selenium (ug/l)	<2	<2	<2	<2	<2	<2	<2	<2
silver (ug/l)	<0.5	<0.5	<0.5	<2.5	<0.5	<0.5	<0.5	<2.5
sulfide (mg/l)			<2	<2			<2	<2
TDS (mg/l)	93	84	96	100	83	82	100	92
TSS (mg/l)	1.0	3.0	<1	8.0	<1	13	10	8
zinc (ug/l)	7.0	9.0	11	17	50	7.0	9.0	23.0

sediment had in the past been deposited on Outfall 001 as the river carried sediment up and onto the Outfall's riprap. Again during 1994, the only sediment noted at Outfall 001 was that which was due to river action.

Significant beaver activity was noted upstream from Outfall 002. Clusters of logs were located along the east bank which enhanced sedimentation. Sediment in excess of one foot had accumulated at each log cluster. The bank in this area is erodible and this characteristic continues past Outfall 001.

Immediately above Meadowbrook Creek, dozens of middens (shells of mussels) were observed in the shallow water. The area below Meadowbrook Creek where previously Elodea had been located, remained, though the area covered by Elodea seemed to be expanding downstream.

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.

Measurements were provided to WDNR Mine Reclamation Unit on March 9, June 23, September 9 and December 21, 1994; 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 similar readings to previous years. Wetland 1 experienced limited periods of standing water during 1994. During previous years fluctuating levels were experienced and had been predicted in the Wetland Inventory and Assessment (March 1989). Wetland 1 is supported chiefly by spring flow along its eastern edge. It had been previously predicted that dewatering the open pit would decrease or eliminate the groundwater discharge into this wetland. Upon realizing the pit drawdown had decreased the spring flow into Wetland 1, routine observations were made to assess any impacts upon Wetland 1.

Wetland 1 assessments were performed during May, July and early September 1994. Soil conditions and general state of existing vegetation indicated that there were no adverse effects to Wetland 1. These observations indicate that Wetland 1 is "perched" and not directly connected to the underlying groundwater table. The addition of mitigation water to Wetland 1 was not necessary during 1994. Wetland 1 will continue to be routinely monitored during 1995 with appropriate action taken if conditions warrant. Results of wetland monitoring efforts for 1994 are included in Appendix H.

TABLE 4-4

MONTHLY WETLAND STAFF GAUGE READING SUMMARY

Staff Gauge Location/
Water Level (MSL)

WETLAND 5C

(WT-1)

	1991	1992	1993	1994
MAR	--	1140.62	NRT	NRT
APR	--	1140.47	1140.60	1140.73
MAY	1140.84	1140.21	1140.47	1140.22
JUN	1140.78	NSW	1140.34	1140.06
JUL	1140.05	NSW	NSW	NSW
AUG	NSW	NSW	1140.48	NSW
SEP	1140.21	1140.09	1140.51	1140.34
OCT	NSW	1140.68	1140.46	1140.28
NOV	NRT	NRT	NRT	NRT
DEC	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
MAR	--	1146.90	NRT	NRT
APR	--	1146.72	NRT	1146.89
MAY	1147.05	NSW	1146.78	NSW
JUN	NSW	NSW	1146.66	NSW
JUL	NSW	NSW	NSW	NSW
AUG	NSW	NSW	NSW	NSW
SEP	NSW	NSW	NSW	NSW
OCT	NSW	NSW	NSW	NSW
NOV	NRT	NRT	NRT	NRT
DEC	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
MAR	--	1153.85	NRT	NRT
APR	--	1153.74	1153.82	1153.89
MAY	1154.00	1153.62	1153.57	1153.49
JUN	1153.58	1153.37	1153.64	1153.37
JUL	1153.51	1153.16	1153.46	1153.13
AUG	1153.15	1153.15	1153.56	NSW
SEP	1153.52	1153.06	1153.57	1153.48
OCT	1153.44	1153.16	1153.51	1153.49
NOV	NRT	NRT	NRT	NRT
DEC	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
MAR	--	1146.76	NRT	NRT
APR	--	1146.58	1146.74	1146.86
MAY	1146.81	1146.46	1146.57	1146.48
JUN	NSW	1146.16	1146.55	1146.39
JUL	1146.11	1145.91	1146.41	1146.18
AUG	NSW	1146.00	1146.55	1145.80
SEP	1146.26	1146.12	1146.57	1146.45
OCT	1146.10	1146.34	1146.53	1146.43
NOV	NRT	NRT	NRT	NRT
DEC	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
MAR	--	1102.32	NRT	NRT
APR	--	1102.29	1102.49	1102.18
MAY	1102.35	1102.25	1102.03	NSW
JUN	1102.28	1102.26	NSW	NSW
JUL	1102.23	1101.90	NSW	NSW
AUG	NSW	1102.21	NSW	NSW
SEP	1102.33	1102.46	1101.92	NSW
OCT	1102.32	1102.37	NSW	NSW
NOV	NRT	NRT	NRT	NRT
DEC	NRT	NRT	NRT	NRT

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

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). On August 25, 1994 WDNR performed an audit upon the meteorological station. Wind speed and wind direction sensors were found to be operating within an acceptable range. 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), TSP was measured every second day upon initiation of the operation phase of the Flambeau Mine during 1993. Flambeau's Mine Permit, Part 3, Condition 4(b) 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.

There were no TSP measurements during 1994 which were greater than the ambient air quality standard for particulate matter which is 150 ug/m^3. The highest reading of the four monitoring sites was attributed to construction involving reroofing the hospital at the North site. The second highest result at the North site was 72 ug/m^3 which is well below the ambient air quality standard for particulate matter. The highest result from the remaining three monitoring stations was 96 ug/m^3 which is also well below the required standard. The annual geometric mean of TSP measurements for air monitoring stations ranged from 16 ug/m^3 to 24 ug/m^3.

TSP monitoring results were submitted to the WDNR Air Monitoring Section each month during 1994 as required in the Mine Permit Condition 4-9. The reports were submitted on the following dates: February 11, March 14, May 2, May 18, June 23, July 23, August 17, September 12, October 13, November 23 and December 24, 1994 and January 12, 1995. Copies of the reports are incorporated by reference.

Table 4-9 is a summary of the TSP monitoring results for 1994. Figures 4-3 to 4-6 present 1994 trends for TSP at the Flambeau air monitoring stations. Air monitoring station locations are shown on Figure 4-7.

TABLE 4-9

FLAMBEAU MINING COMPANY
TSP DATA SUMMARY (ug/m3)

Date	0001 North Site	0003 Southeast Site	0004 Northeast Site	0005 Northwest Site
1/2/94	10	1	10	9
1/4/94	11	15	20	8
1/6/94	7	7	8	8
1/8/94	14	9	7	6
1/10/94	18	23	22	22
1/12/94	21	31	32	29
1/14/94	9	16	11	5
1/16/94	11	13	11	11
1/18/94	8	13	7	8
1/20/94	29	23	24	22
1/22/94	17	19	19	15
1/24/94	15	19	17	10
1/26/94	9	13	12	18
1/28/94	12	13	11	8
1/30/94	11	10	8	3
2/1/94	28	NS	28	21
2/3/94	10	13	11	11
2/5/94	13	18	13	11
2/7/94	14	14	10	9
2/9/94	28	20	23	11
2/11/94	31	35	32	33
2/13/94	26	27	26	21
2/15/94	12	47	13	10
2/17/94	56	62	64	48
2/19/94	30	31	29	29
2/21/94	14	96	12	10
2/23/94	13	28	9	13
2/25/94	8	12	6	8
2/27/94	16	17	15	15
3/1/94	39	NS	42	37
3/3/94	44	47	44	44

TABLE 4-9 (CONT.)

Date	0001 North Site	0003 Southeast Site	0004 Northeast Site	0005 Northwest Site
3/5/94	27	29	30	23
3/7/94	21	58	47	15
3/9/94	18	NS	20	14
3/11/94	28	NS	40	36
3/13/94	18	NS	18	17
3/15/94	21	20	12	11
3/17/94	23	33	23	66
3/19/94	23	24	22	19
3/21/94	8	21	8	8
3/23/94	9	15	11	9
3/25/94	16	24	12	8
3/27/94	11	12	11	12
3/29/94	8	8	9	5
3/31/94	21	29	31	20
4/2/94	10	16	8	8
4/4/94	12	12	16	9
4/6/94	22	39	18	12
4/8/94	34	35	34	47
4/10/94	17	14	NS	11
4/12/94	24	21	24	25
4/14/94	25	26	27	21
4/16/94	12	22	13	11
4/18/94	35	NS	45	NS
4/20/94	19	35	18	16
4/22/94	26	37	36	25
4/24/94	45	44	51	42
4/26/94	22	26	21	21
4/28/94	10	12	7	3
4/30/94	14	12	13	10
5/2/94	24	27	27	18
5/4/94	42	42	58	33

TABLE 4-9 (CONT.)

Date	0001 North Site	0003 Southeast Site	0004 Northeast Site	0005 Northwest Site
5/6/94	13	13	15	10
5/8/94	34	39	44	34
5/10/94	37	36	37	31
5/12/94	22	35	24	16
5/14/94	39	38	36	35
5/16/94	11	19	16	14
5/18/94	40	47	50	36
5/20/94	62	63	75	64
5/22/94	29	30	30	27
5/24/94	33	50	36	29
5/26/94	22	23	23	18
5/28/94	51	51	56	52
5/30/94	42	NS	41	13
6/1/94	17	22	21	13
6/3/94	30	32	44	25
6/5/94	22	21	21	21
6/7/94	20	19	23	18
6/9/94	30	27	42	28
6/11/94	21	27	28	22
6/13/94	16	19	15	19
6/15/94	71	66	80	57
6/17/94	50	94	52	35
6/19/94	31	30	30	NS
6/21/94	20	34	30	17
6/23/94	37	41	40	NS
6/25/94	23	34	24	NS
6/27/94	27	31	26	NS
6/29/94	18	NS	18	17
7/1/94	20	44	20	NS
7/3/94	24	26	24	25
7/5/94	17	19	20	16

TABLE 4-9 (CONT.)

Date	0001 North Site	0003 Southeast Site	0004 Northeast Site	0005 Northwest Site
7/7/94	18	22	19	19
7/9/94	10	14	22	9
7/11/94	31	31	44	27
7/13/94	17	19	19	21
7/15/94	22	21	28	15
7/17/94	14	16	15	13
7/19/94	26	28	25	25
7/21/94	16	16	14	13
7/23/94	17	24	19	16
7/25/94	14	46	14	13
7/27/94	16	59	26	13
7/29/94	58	55	71	47
7/31/94	37	NS	36	34
8/2/94	41	42	48	35
8/4/94	16	30	20	13
8/6/94	24	23	22	18
8/8/94	8	24	9	5
8/10/94	16	17	18	20
8/12/94	30	23	49	18
8/18/94	33	36	53	NS
8/24/94	39	47	57	30
8/30/94	15	NS	18	16
9/5/94	12	17	13	11
9/11/94	41	43	44	41
9/17/94	16	18	15	13
9/23/94	26	31	29	23
9/29/94	18	19	21	12
10/5/94	143	27	32	20
10/11/94	NS	29	31	20
10/17/94	22	NS	23	22
10/23/94	7	12	7	6

TABLE 4-9 (CONT.)

Date	0001 North Site	0003 Southeast Site	0004 Northeast Site	0005 Northwest Site
10/29/94	20	24	21	18
11/4/94	11	12	13	8
11/10/94	31	35	33	22
11/16/94	19	21	21	17
11/22/94	NS	30	90	10
11/28/94	8	11	5	7
12/4/94	72	21	22	20
12/10/94	21	50	26	19
12/16/94	37	23	25	23
12/22/94	12	16	16	11
12/28/94	8	69	7	5

NS: No Sample

Figure 4-3

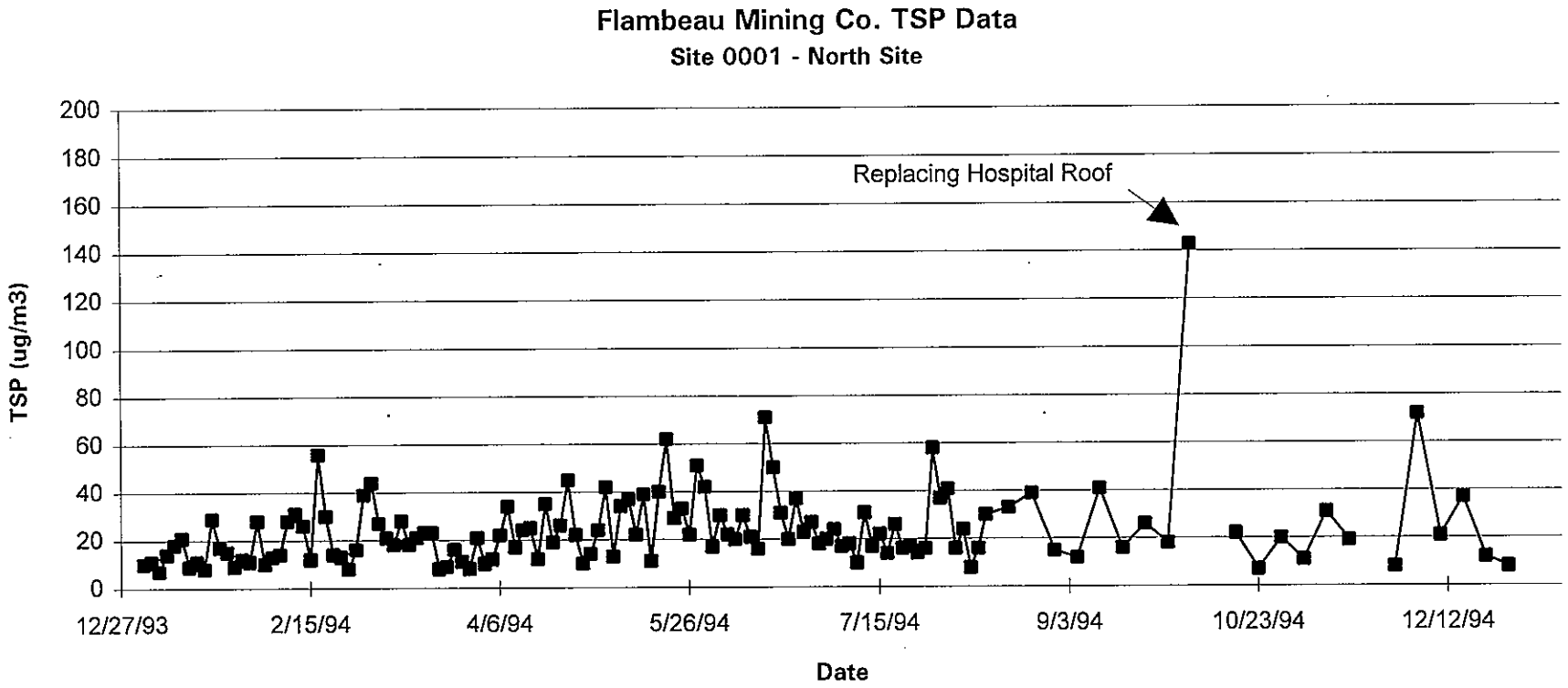

Flambeau Mining Co. TSP Data
Site 0001 - North Site
TSP (ug/m3)
200
180
160
140
120
100
80
60
40
20
0
Replacing Hospital Roof
12/27/93
2/15/94
4/6/94
5/26/94
7/15/94
9/3/94
10/23/94
12/12/94
Date

Figure 4-4

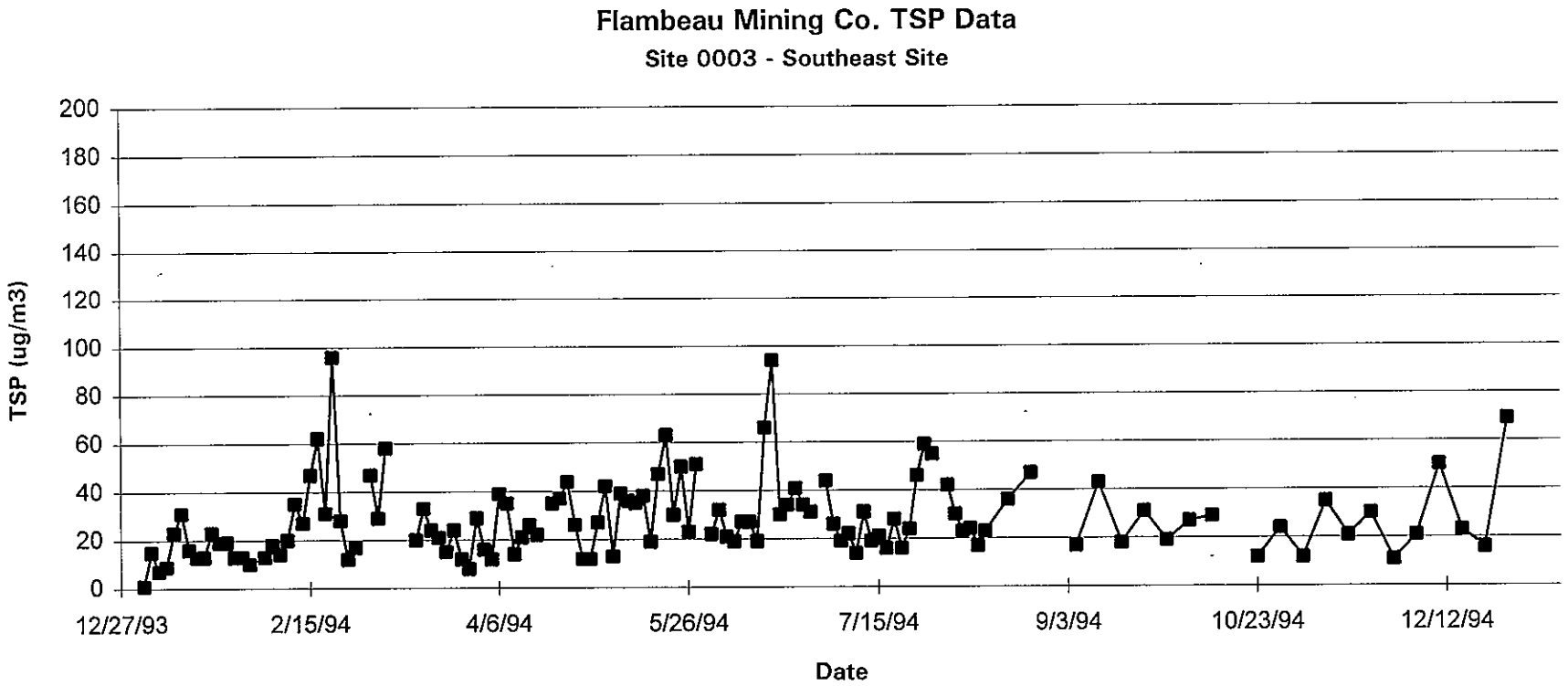

Flambeau Mining Co. TSP Data
Site 0003 - Southeast Site
TSP (ug/m3)
200
180
160
140
120
100
80
60
40
20
0
12/27/93
2/15/94
4/6/94
5/26/94
7/15/94
9/3/94
10/23/94
12/12/94
Date

Figure 4-5

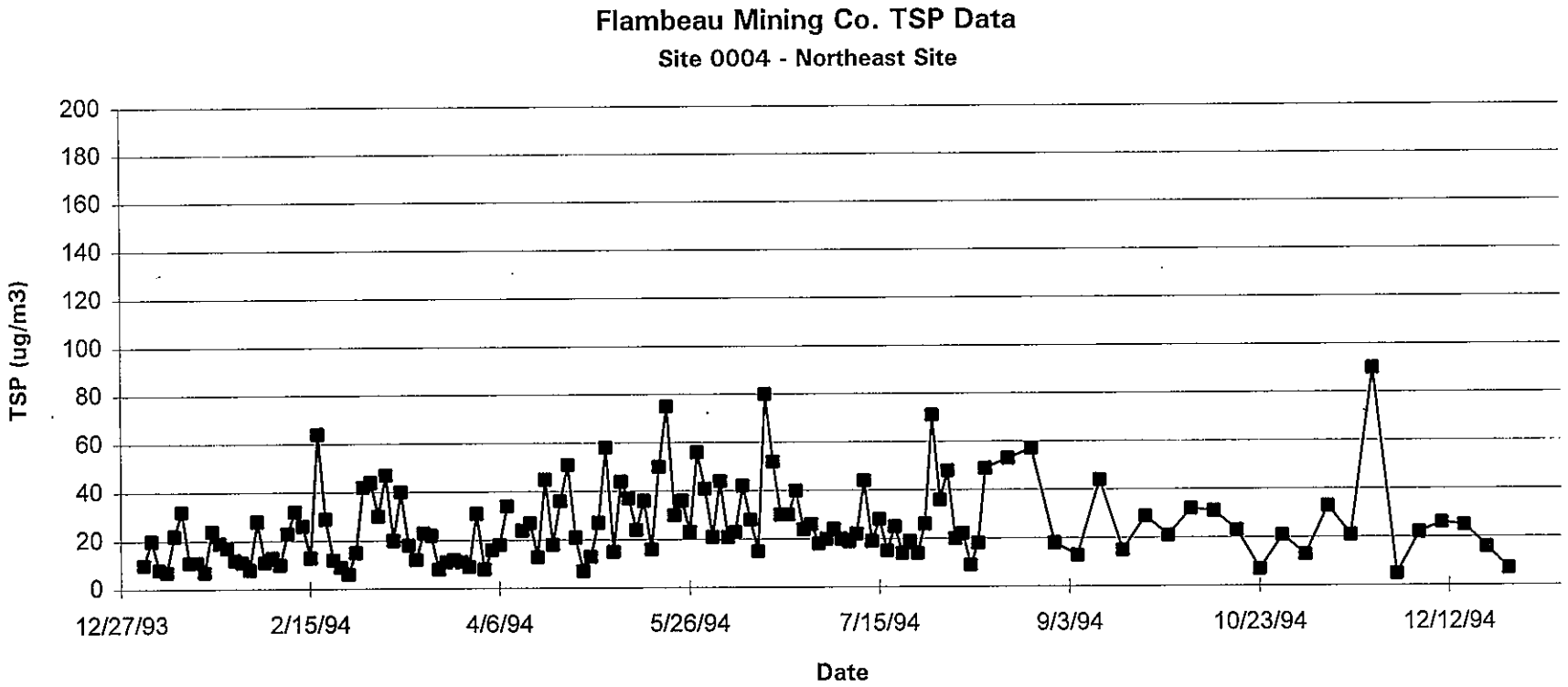
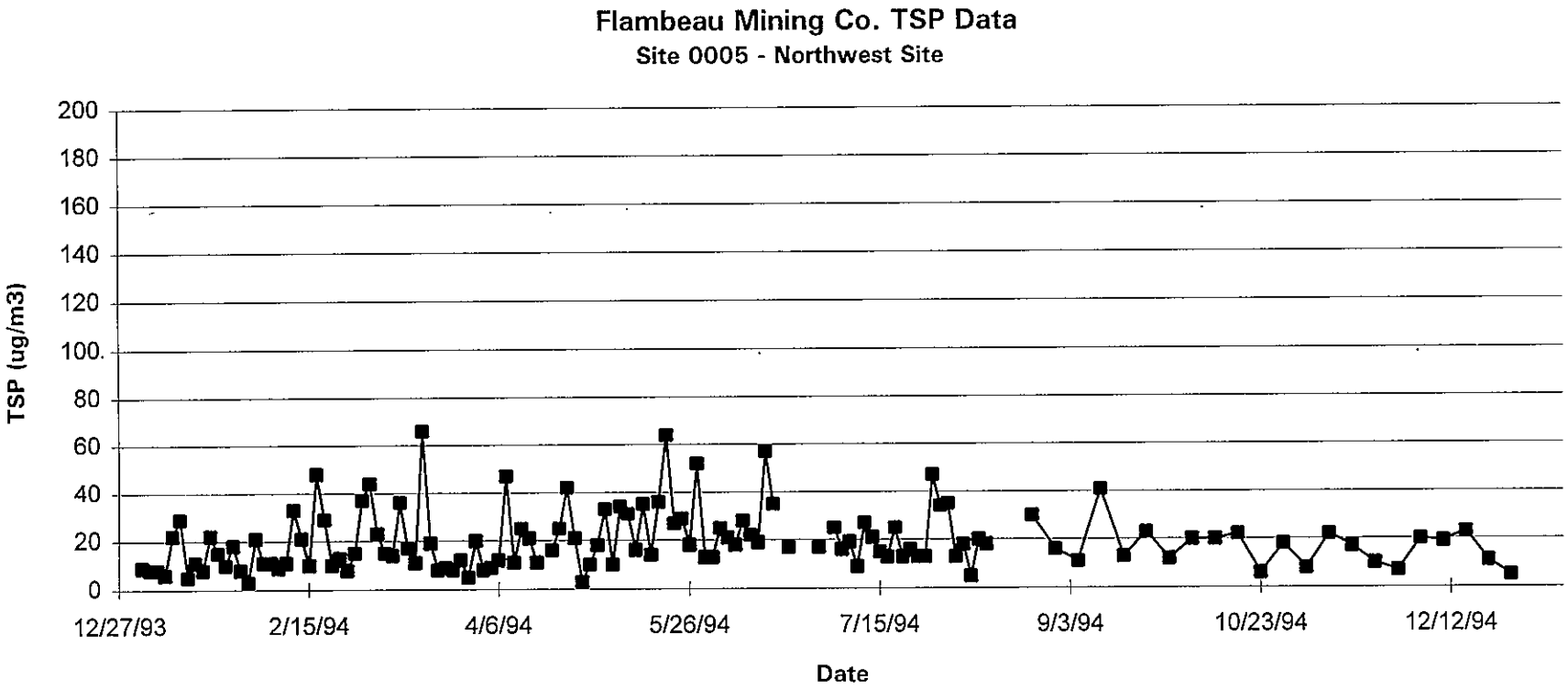
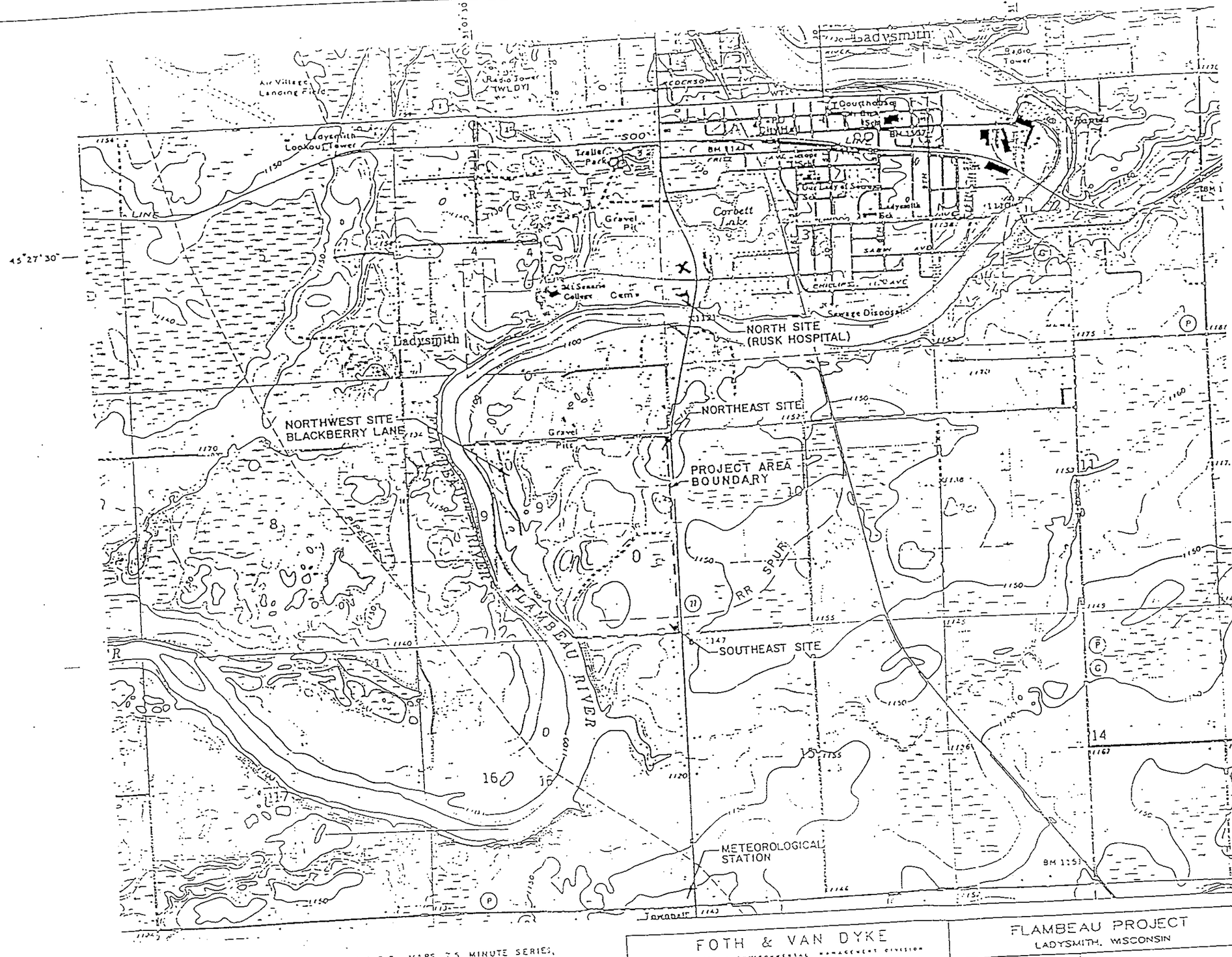

Flambeau Mining Co. TSP Data
Site 0004 - Northeast Site
TSP (ug/m3)
200
180
160
140
120
100
80
60
40
20
0
12/27/93
2/15/94
4/6/94
5/26/94
7/15/94
9/3/94
10/23/94
12/12/94
Date

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
12/27/93
2/15/94
4/6/94
5/26/94
7/15/94
9/3/94
10/23/94
12/12/94
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

Figure 4-7
TSP AND METEOROLOGICAL SITES

15J-12/89

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 1994 are incorporated by reference and are summarized in Table 4-10. Analyses resulted in very low or non-detectable concentrations of these metals.

The Air Pollution Control Permit, Condition B.3. requires that source performance tests be conducted upon initiation of mine operation to document compliance with the visible emission limitations. Source performance tests which were conducted August 12-13, 1993 showed site operation to be well below the visual opacity limits of 10% and 20%. In a letter dated January 12, 1994 the WDNR granted a Release for Permanent Operation of the Flambeau Mine.

4.5 ASBESTIFORM FIBERS

The Mine Permit, in Condition 4-5, requires ambient air quality monitoring for asbestiform fibers. The asbestiform monitoring for the mining operations during 1994 was initiated on May 20. 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 21, July 7, August 9, September 19 and October 17, 1994. 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 will provide notice to the WDNR that the requirement for asbestiform monitoring has been met and no further asbestiform monitoring will be performed.

4.6 OPERATIONAL MONITORING

The Mine Permit and Updated Monitoring Plan call for monitoring of operational activities. These include exfiltrate from the Type I stockpile, pit inflows, Type II stockpile leachate, equipment inspection and hydric soils monitoring. All samples were collected and analyzed in accordance with procedures in the Updated Monitoring Plan (July 1991) and Revised Mining Permit Quality Assurance/Quality Control Document (August 1991). Results of exfiltrate and leachate analyses have been submitted to the WDNR Mine Reclamation Unit on March 9, June 23, September 9, and December 21, 1994. These reports are incorporated by reference.

TABLE 4-10

QUARTERLY TSP FILTER METAL RESULTS SUMMARY (ug/m3)

	Arsenic	Beryllium	Cadmium	Chromium	Mercury	Nickel
North Site						
5/1/93-8/6/93	0.000471	<0.0000129	<0.0000774	<0.00888[1]	<0.0000129	0.00108
8/7/93-11/3/93	0.000422	<0.0000113	<0.0000905	<0.00888[1]	<0.0000188	0.00121
11/5/93-2/1/94	0.000641	<0.0000114	0.000211	<0.0126[1]	0.0000151	0.00165
2/3/94-5/2/94	0.000538	<0.000011	0.000258	<0.0072[1]	<0.0000101	0.000912
5/4/94-7/31/94	0.000521	<0.0000115	0.000157	<0.0486[1]	<0.0000115	<0.0327[1]
8/2/94-11/10/94	0.000335	0.000180	0.000232	<0.00625[1]	<0.0000122	0.00149
Southeast Site						
5/1/93-8/6/93	0.000540	<0.0000141	<0.0000985	<0.00888[1]	<0.0000141	0.00148
8/7/93-11/3/93	0.000491	<0.0000188	<0.0000707	<0.00888[1]	0.0000180	0.000933
11/5/93-2/1/94	0.000489	<0.0000111	0.000223	<0.0126[1]	0.0000285	0.00163
2/3/94-5/2/94	0.000713	<0.0000123	0.000241	0.00160	<0.0000123	0.00619
5/4/94-7/31/94	0.000567	<0.0000126	0.000123	<0.0486[1]	<0.0000126	<0.0327[1]
8/2/94-11/10/94	0.000429	<0.00000751	0.000161	<0.00625[1]	0.0000168	0.00113

TABLE 4-10
(CONT'D)

	Arsenic	Beryllium	Cadmium	Chromium	Mercury	Nickel
Northwest Site						
5/1/93-8/6/93	0.000914	<0.0000127	<0.0000761	<0.00888[1]	<0.0000127	0.00115
8/7/93-11/3/93	0.000433	<0.0000109	0.0000652	<0.00888[1]	<0.0000109	0.00102
11/5/93-2/1/94	0.000569	<0.0000111	0.000172	<0.0126[1]	0.0000147	0.00955
2/3/94-5/2/94	0.000465	<0.0000111	0.000246	<0.0072[1]	<0.0000111	0.00110
5/4/94-7/31/94	0.00044	<0.0000119	0.000148	<0.0486[1]	<0.0000119	<0.0327[1]
8/2/94-11/10/94	0.000388	0.0000291	0.000218	<0.00625[1]	0.0000224	0.000995
Northeast Site						
5/1/93-8/6/93	0.000402	<0.0000125	<0.0000751	<0.00888[1]	<0.0000125	0.00100
8/7/93-11/3/93	0.000383	<0.0000108	0.0000759	<0.00888[1]	0.0000132	0.000748
11/5/93-2/1/94	0.000553	<0.0000103	0.000188	<0.0126[1]	0.0000164	0.00852
2/3/94-5/2/94	0.000548	<0.0000112	0.000264	<0.0072[1]	<0.0000112	0.000974
5/4/94-7/31/94	0.00049	0.0000208	0.000148	<0.0486[1]	0.0000131	0.0327[1]
8/2/94-11/10/94	0.000328	<0.00000655	0.000164	<0.00625[1]	<0.0000111	0.000866

[1] Chromium and nickel were detected in blank unexposed filters which resulted in an elevated detection limit

Monitoring of the Type I collection lysimeter was performed on a quarterly basis throughout 1994. The analysis of the exfiltrate is to characterize the liquid. The four samples collected during 1994 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). Manganese concentrations have shown a significant decrease since sampling was initiated in 1993. Flow rates remained relatively constant through 1994. 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. For the period April to December, the estimated groundwater inflow was 78.8 MG in 1993, and 96.8 MG for all of 1994. The 1994 monthly average inflow of 8.1 MG was slightly lower than the 1993 monthly average of 8.8 MG.

Coupled with groundwater level monitoring as the pit has deepened, exposed rock has been periodically mapped to better define groundwater inflow occurrences and assess slope stability issues. In 1994, this wall mapping showed the presence of small rock parting related seeps at varying elevations on the west wall. Additional investigation and monitoring wells were installed to verify that pore pressures were within the design criteria defined to ensure wall stability. The investigations verified that wall pore pressures continue to remain within the defined criteria. Construction logs for those wells installed during 1994 are included in Appendix I.

The new west wall monitoring wells were in place prior to the extraordinary flood of September 1994. As a consequence of this additional monitoring being available, a very detailed and valuable record of major flood impacts upon the groundwater systems was obtained. The monitoring showed that the pressure increases that occurred during the flooding at no time threatened pit wall stability. The WWTP has sufficient capacity that it was able to treat, to required standards, in a short space of time, all of the flood induced increase in groundwater inflow and precipitation to the pit area.

Throughout 1995 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 1994 fourth quarter sample shows an increase for all parameters including pH.

TABLE 4-11

TYPE I COLLECTION LYSIMETER MONITORING DATA

1994

PARAMETERS	UNIT	1Q JAN	2Q APR	3Q JUL	4Q OCT
Alkalinity	mg/l	94	80	92	150
Chromium (Dissolved)	ug/l	<1	<1	<1	1.2
Copper (Dissolved)	ug/l	<12	<12	<12	23
Flow Rate	gpd	307	339	256	280
Hardness	mg/l	150	120	120	150
Iron (Dissolved)	mg/l	0.110	0.017	0.052	0.240
Manganese (Dissolved)	mg/l	2200	920	73	340
pH, Field	s.u.	6.7	6.8	6.0	6.4
pH, Laboratory	s.u.	6.4	6.3	6.1	6.0
Solids (Dissolved)	mg/l	200	170	170	220
Specific Conductance	umho	311	288	302	351
Sulfate	mg/l	48.0	27.0	22	18

TABLE 4-12

PIT INFLOW SUMMARY
1994
(Million Gallons)

	1993	1994			
	Groundwater Inflow	Groundwater Inflow	Precipitation	Surface Water Run-on	Dewatering Pumping
January		7.71	1.06	0.00	7.71
February		6.23	0.54	1.33	7.56
March		7.41	0.71	1.24	8.66
April	15.7	5.39	4.19	1.62	7.01
May	8.7	6.58	1.73	0.62	7.20
June	7.9	6.92	5.30	1.71	8.63
July	7.2	7.95	6.77	2.68	10.63
August	10.0	9.54	3.42	1.12	10.65
September	6.7	11.32	10.68	4.77	16.09
October	7.2	10.39	3.57	1.26	11.65
November	8.4	8.45	3.62	0.75	9.20
December	7.0	8.89	0.75	0.76	9.65
Estimated Yearly Groundwater Inflow:	78.8	96.8			

TABLE 4-13
PIT DEVELOPMENT SUMMARY

Approximate Status of Pit Development During 1994													
Bench	Depth (ft)	Mined Area (acres)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1140	-40	4.5	4.5	4.5	4.5	5.0	5.0	5.0	5.0	5.1	5.4	5.4	5.4
1130	-30	10.2	10.2	10.2	10.2	12.6	13.7	13.7	14.1	14.8	16.3	16.4	17.0
1120	-20	15.5	15.5	15.5	15.5	16.3	18.5	19.4	19.4	21.1	22.1	22.4	23.7
1110	-10	18.3	18.3	18.3	18.3	18.3	19.8	21.4	21.8	22.5	22.5	22.6	25.8
1100	0	18.1	18.1	18.1	18.1	18.1	18.7	19.7	22.5	22.9	22.9	22.9	26.5
1090	10	15.9	15.9	15.9	15.9	15.9	16.1	16.1	16.8	18.3	18.8	18.8	22.9
1080	20	14.7	14.7	14.7	14.7	14.7	14.7	14.7	15.3	16.7	16.9	16.9	20.9
1070	30	11.0	11.1	11.3	11.3	11.4	11.4	11.4	11.4	11.4	11.4	11.4	12.1
1060	40	7.7	9.2	9.8	9.8	9.8	9.8	9.9	9.9	9.9	9.9	9.9	9.9
1050	50	1.7	1.9	5.2	8.0	9.0	9.0	9.1	9.1	9.1	9.1	9.1	9.1
1040	60	0.1	0.2	1.4	4.5	5.5	6.4	7.3	7.7	7.7	7.8	7.8	7.8
1030	70	0.0	0.0	0.2	0.2	2.0	3.0	3.8	5.2	5.8	6.6	6.6	6.6
1020	80	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.4	1.4	3.9	5.1	5.1
1010	90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	1.0	1.0	2.5
1000	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
990	110	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
980	120	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
970	130	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
960	140	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
950	150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
940	160	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
930	170	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
920	180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
910	190	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
900	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

In spite of this increase, all four samples collected in 1994 show the leachate characteristics to remain below the values predicted for leachate from rock chips (4.8% sulfur) during the Wet/Dry Leaching Study (Kennecott Environmental Report, April 1989) with the exception of manganese and sulfate which are within the predicted range. The pH of the leachate remained relatively neutral during 1994. Data is summarized in Table 4-14.

An annual camera inspection of outfall pipes between the Type II stockpile and the surge pond is required by Condition 2-14 of the Mine Permit. The 1994 inspection was performed on August 22 and September 10. The pipe integrity was verified. A report of the inspection was submitted to the WDNR Mine Reclamation Unit on September 16, 1994 and is incorporated by reference.

While performing the camera inspection on August 22, 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 October 13. The leachate lines were flushed by draining approximately 3500 gallons of 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 verified that cleaning of the pipes was not necessary.

Routine maintenance inspections of the HDPE lined areas were conducted periodically during 1994. Repairs were made in the surge pond and runoff pond liner and Type II/Phase I stockpile liner as follow up to inspections. The WDNR was notified of the minor liner damage upon discovery and informed of the planned repairs. Reports of the repairs were prepared by STS Consultants Ltd. and Cooper Engineering; these reports are included in Appendix J.

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 STS on June 23, 1994. No additional sloughing or deformation of the side slopes has occurred in the surge pond or runoff pond with the exception of a limited area under the 32-inch pipe on the west side of the runoff pond. However, there was no visible stress on the liner which would warrant action. 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. A small tear in the scuff strip was repaired. Preventive maintenance included placement of scuff strips below the corrugated HDPE pipes within the surge pond and runoff pond. Liner repairs and placement of additional scuff strips are documented in Appendix I. Reports of the STS inspection are included in Appendix B.

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). A moisture measurement taken during 1994 showed that the hydric soils moisture content is 27%.

TABLE 4-14

TYPE II LEACHATE MONITORING DATA

1994

PARAMETERS	UNIT	1Q JAN	2Q APR	3Q JUL	4Q OCT
Alkalinity	mg/l	28	16	21	19
Conductivity	umho	134	124	304	539
Copper (Dissolved)	ug/l	14	22	32	2100
Hardness	mg/l	51	40	120	270
Iron (Dissolved)	mg/l	<0.015	<0.015	0.074	<0.015
Manganese (Dissolved)	mg/l	10	130	450	770
pH, Field	s.u.	7.2	8.0	5.9	6.9
pH, Laboratory	s.u.	6.8	7.0	6.4	8.7
Solids (Dissolved)	mg/l	88	62	190	490
Sulfate	mg/l	16	20	88	220

REFERENCES

1994 Annual Reclamation Report	November 1994
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
Operational Phase and Long Term Care Quality Assurance Plan	November 1993
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
Wetland Inventory and Assessment	March 1989

SUBMITTALS

DOCUMENT	DATE	WDNR SUBMITTEE
Section 2.0 Operating Activities		
Construction Documentation Report Type II Site Phase 2 Construction	October 1994	Larry Lynch[1]
Preconstruction Report Type II Stockpile, Phase 2	May 1994	Larry Lynch[1]
Phase 2, Type II Stockpile Construction Status Report	July-September 1994	Larry Lynch[1]
Toxicity Reduction Evaluation Reports	Jan, Mar, Jun, Aug, Sept & Dec 1994	Tom Bauman[2]
Mining Permit Modification Request-Production Increase	January 1994	Larry Lynch[1]
Flambeau Project-Modification to the Mining Permit	August 1994	Larry Lynch[1]
Toxic & Hazardous Spill Report	Jun & Dec 1994	Jerry Carow[3]
Drillhole Abandonment Reports	Throughout 1994	Ken Markart[1]
Notice of Intent to Drill	Jan & Oct 1994	Larry Lynch[1]
Section 3.0 Reclamation Activities		
1994 Reclamation Annual Report	November 1994	Larry Lynch[1]
List of 1994 Reclamation Activities	January 1994	Larry Lynch[1]
Environmental Monitoring Ground Water Quality Results	Quarterly 1994	Larry Lynch[1]
Air Monitoring Results (TSP)	Monthly 1994	Steve Schuenemann[4]

SUBMITTALS (CONT'D)

DOCUMENT	DATE	WDNR SUBMITTEE
Air Monitoring Project-STP Filer Metal Analytical Results	Apr, May, Jul, Sept 1994 Jan 1995	Steve Schuenemann[4]
Asbestiform Air Monitoring Results	May-Sept 1994	Steve Schuenemann[4]
1994 Camera Inspection	September 1994	Larry Lynch[1]
1994 Leachate Line Assessment	October 1994	Larry Lynch[1]

1 Mine Reclamation Unit
Larry Lynch
Ken Markart

2 Bureau of Wastewater Management
Tom Bauman

3 WDNR Ladysmith Ranger Station
Jerry Carow

4 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	2-2	Modification to increase production to 450,000 tons ore per year.	Approval letter	Paul Didier	8/17/94
002 Outfall Plans & Specifications	2.2.5	Buried 12 inch diameter HDPE pipe replaces open 002 discharge channel.	Planned changes submitted in 1994 Annual Reclamation Report		
Mining Permit Application	4.7.4.5	Move security fence on west wall west approximately 10 feet.	Verbal	Larry Lynch	Fall 94
Flambeau Project Drawings	210-C-002 210-C-004	Ditch cut between haul road and topsoil stockpile to divert uncontaminated/off site water to Stream A.	Verbal	Larry Lynch	Spring 94
Final Engineering Report for Wastewater Treatment Facilities	6.2.3.2	Sulfide precipitation process altered to include citric acid for pH adjustment.	Conditional Approval Letter	Tom Bauman	Sept 94

Appendix B

Surge Pond/Runoff Pond Side Slope Evaluation

July 13, 1994

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

Re: Surge and Runoff Ponds Observations, Type II Stockpile (Phase 1), Flambeau Mine, Ladysmith, Wisconsin -- STS Project No. 20961XF

Dear Ms. Murphy:

As you requested, STS Consultants, Ltd., (STS) was at the above referenced site on June 23, 1994, to document the following as required by the Wisconsin Department of Natural Resources conditional approval of the lined facilities:

- observation of the surge pond and runoff pond sideslopes for sign of washout or deformation;

- observation of the 36-inch 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. We understand that Flambeau Mining personnel will perform the visual review of the entrance manhole and the access manholes;

- observation of the scuff strip below the outlet of the 36-inch diameter pipe outlet in the surge pond;

The sideslopes of the surge pond and runoff pond did not show any sign of washout or deformation with the exception of the soils under the 32-inch diameter pipe on the west side of the runoff pond which have sloughed down slope and created a void in the area immediately below the pipe. However, at low water level, no visible stress on the geomembrane liner was observed at this time. STS recommends continued monitoring of this area to observe if any changes of stress on the liner occur.

The weld collar for the 36-inch diameter discharge line in the surge pond was observed to have curled and induced tension on the overlying geomembrane liner. Additionally, the liner had broken away from the weld collar for a length of approximately 9 inches. Refer to STS' July 12, 1994, report regarding repairs performed in this area.

STS Consultants Ltd.
Consulting Engineers

1035 Kepler Drive
Green Bay, Wisconsin 54311
414.468.1978/Fax 414.468.3312

The geomembrane patch in the pipe junction prior to the outlet appeared to be in good condition.

The scuff sheet below the 36-inch diameter pipe outlet in the surge pond appeared to be in good condition with the exception of a small tear in the sheet near the high water mark. The underlying geomembrane liner did not appear to have been damaged. The tear may have been caused by ice formation inducing stress on the scuff sheet at the heat bond. STS recommends continuous extrusion welding of the scuff sheet to the liner to eliminate the effect of ice formation.

Additionally, STS recommends placement of scuff sheets beneath the corrugated pipes in the surge pond to minimize potential damage to the geomembrane liner.

Attached to this correspondence are copies of the STS technician's field reports. If you have any questions or comment, please contact us.

Sincerely,

STS CONSULTANTS LTD.

Michael J. Pretti, P.E.
Project Engineer

Dean A. Sylla, P.E.
Principal

MJP/lmh

Enclosure:
June 23, 1994, Field Technician Report

STS Construction Technology Group
Field Report

PAGE 1 OF 3

NOTE: The responsibilities and authority of STS and STS' Field Personnel include neither the responsibilities nor the authority of the "Competent Person" for the Project Site as defined by OSHA Regulations: 29 CFR 1926 Subpart P.

Project No. _____

Project FLAMBEAU MINING COMPANY - SURGE POND. Day/Date THURSDAY, JUNE 23, 1994

Location LADYSMITH, WI Weather/Temp. CLOUDY, 74°

Contractor GSI Client FMC

(1 OF 3 REPORTS FOR 6.23)

Project Competent Person per 29 CFR Part 1926 (Subpart P)

NAME: _____

FIRM: _____

FIRM ADDRESS: _____

PHONE: _____

Present on Site ☐ YES ☐ NO

Equipment Rental —

Tolls $ _____

Parking $ _____

Mileage 210

Arrive Job 11:00 12:30

Depart Job 12:00 3:30

Total Hours on Job 9.0

Travel Time 4.5

Project Preparation Time .5

TOTAL CHARGEABLE HOURS 4 HOUR MINIMUM

9.0

Summary of Technical and/or Engineering Services Performed, including Field Test Data. Locations, Elevations and Depth are Estimated.

I MET WITH JANA MURPHY & VON SHANKS OF FMC UPON ARRIVAL. WE WENT TO THE SURGE POND FACILITY TO OBSERVE THE EXTENT OF THE LINER DAMAGE. COOPER ENGINEERING & FMC EMPLOYEES WERE REPAIRING THE UNSUPPORTED AREAS AROUND THE PIPE TO SUPPORT THE LINER FOR REPAIR. THE LOCATION IS THE NORTH SLOPE, WEST PORTION, IN PANEL 48, 19' SOUTH OF THE ANCHOR TRENCH. THE LINER HAS BROKEN AWAY FROM THE WELD ON THE PIPE COLLAR. COOPER ENG. CUT A HOLE BELOW THE PIPE OUTLET TO FACILITATE BACKFILLING THE UNSUPPORTED AREA.

COOPER ENG. USED A DRY SAND-BENTONITE MIXTURE FOR BACKFILLING THE UNSUPPORTED AREA. SEE COOPER REPORT FOR SOILS DETAILS.

ALSO, AT THE 36" OUTLET, A HARD SPOT IN THE LINER WAS OBSERVED BY COOPER & CUT OPEN BY COOPER TO FIND THE WELD COLLAR UNDER THE LINER HAD CURLED & TENSIONED THE LINER ALSO, THE LINER HAD BROKEN AWAY (LENGTH 9") FROM THE WELD COLLAR. (CONT. PAGE 2)

☐ Field Test Data is Estimated Pending Final Laboratory Test Results.

Site Sketch: Indicate North

Representative Jana E. Murphy

Position ENV. SUPERVISOR

Company Flambeau Mining Co.

By MJ Moroni

Title SR. ENG. TECH.

STS Consultants, Ltd.

2 WHITE – Office YELLOW – Time Card WHITE – Field

STS Construction Technology Group
Field Report

PAGE 2 of 3

NOTE: The responsibilities and authority of STS and STS' Field Personnel include neither the responsibilities nor the authority of the "Competent Person" for the Project Site as defined by OSHA Regulations: 29 CFR 1926 Subpart P.

Project No. _____

Project FLAMBEAU MINING CO. Day/Date THURSDAY, JUNE 23, 1994

Location _____ Weather/Temp. _____

Contractor _____ Client _____

Project Competent Person per 29 CFR Part 1926 (Subpart P)

NAME: _____

FIRM: _____

FIRM ADDRESS: _____

PHONE: _____

Present on Site ☐ YES ☐ NO

Equipment Rental _____ Arrive Job _____

Tolls $ _____ Depart Job _____

Parking $ _____ Total Hours on Job _____

Mileage _____ Travel Time _____

Project Preparation Time _____

TOTAL CHARGEABLE HOURS
4 HOUR MINIMUM

SEE PAGE 1

Summary of Technical and/or Engineering Services Performed, including Field Test Data. Locations, Elevations and Depth are Estimated.

A DEEP SCRATCH WAS ALSO OBSERVED IN PANEL 49, 3' SOUTH OF THE ANCHOR TRENCH & 5' EAST OF SEAM 45. OTHER MINOR SURFACE ~~SCRATCHES~~ SCRATCHES ARE NOTED IN THIS AREA, WHICH ADJACENT TO THE ACCESS GATE FOR THE POND. THE SCRATCH WAS REPAIRED BY GSI BY WELDING A PATCH OVER THE AREA.

GSI ALSO REPAIR THE EARLIER MENTIONED DAMAGE AREAS BY WELDING PATCHES OVER THE CUTS AND & GRINDING & REWELDING THE LINERS TO THE PIPE COLLARS. SEE TRIAL WELD FORM & REPAIR DATA FORM FOR SPECIFIC ~~INFO~~ INFORMATION ON THE REPAIRS. GSI & VACUUM TESTED THE PATCHES & SPARK TESTED THE PIPE CONNECTIONS & FOUND NO LEAKS.

I ALSO OBSERVED THE PATCH IN THE 36" PIPE & IT APPEARED TO BE IN GOOD CONDITION.

THE ~~SIDE~~ CONDITION BENEATH THE PIPES DOESN'T SHOW ANY SLOUGHING OF SOILS, EXCEPT FOR THE PIPE OUTFLOW ~~OR~~ AREA ~~OF~~ REPAIRED TODAY.

* ☐ Field Test Data is Estimated Pending Final Laboratory Test Results.

Site Sketch: Indicate North (CONT. PAGE 3).

Representative _____

Position _____

Company _____

By M J Marone

Title SR. ENG. TECH.

STS Consultants, Ltd.

STS Construction Technology Group
Field Report

PAGE 3 of 3

NOTE: The responsibilities and authority of STS and STS' Field Personnel include neither the responsibilities nor the authority of the "Competent Person" for the Project Site as defined by OSHA Regulations: 29 CFR 1926 Subpart P.

Project FLAMBEAU MINING CO - SURGE POND.

Project No. _____

Day/Date THURSDAY, JUNE 23, 1994.

Location _____

Weather/Temp. _____

Contractor _____

Client _____

Project Competent Person per 29 CFR Part 1926 (Subpart P)

NAME: _____

FIRM: _____

FIRM ADDRESS: _____

PHONE: _____

Present on Site ☐ YES ☐ NO

Equipment Rental _____

Tolls $ _____

Parking $ _____

Mileage _____

Arrive Job _____

Depart Job _____

Total Hours on Job _____

Travel Time _____

Project Preparation Time _____

TOTAL CHARGEABLE HOURS
4 HOUR MINIMUM

SEE PAGE 1

Summary of Technical and/or Engineering Services Performed, including Field Test Data. Locations, Elevations and Depth are Estimated.

THE SCUFF SHEET BELOW THE 36" PIPE IS IN GOOD CONDITION. HOWEVER, I DID NOTICE A SMALL TEAR IN THE SCUFF SHEET NEAR THE HIGH WATER MARK. THE LINER ITSELF IS NOT DAMAGED. THE TEAR QUITE POSSIBLY COULD HAVE BEEN CAUSED BY ICE ACTION ONE THE WINTER.

IT WOULD BE A GOOD IDEA TO PLACE SCUFF STRIPS UNDER THE CORRUGATED PIPES THAT ARE LAYING ON THE LINER. SOME MINOR SCRATCH WAS OBSERVED IN THESE AREAS, AND A SCUFF STRIP WOULD PREVENT ANY SCRATCHING DAMAGE TO THE LINER.

THE 60 MIL HDPE MATERIAL & EXTRUSION ROD WAS SUPPLIED BY FLAMBEAU MINING FOR REPAIRS MADE. MATERIAL CERTS. AVAILABLE FROM FMC. MATERIAL WAS CLEAN & DRY. ITS IS MATERIAL LEFT OVER FROM PREVIOUS LINER CONSTRUCTION.

* ☐ Field Test Data is Estimated Pending Final Laboratory Test Results.

Site Sketch: Indicate North

Representative _____

Position _____

Company _____

By _____

Title SR. ENG. TECH.

STS Consultants, Ltd.

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8/92PP15

STS Construction Technology Group
Field Report

NOTE: The responsibilities and authority of STS and STS' Field Personnel include neither the responsibilities nor the authority of the "Competent Person" for the Project Site as defined by OSHA Regulations: 29 CFR 1926 Subpart P.

Project No. _____

Project FLAMBEAU MINING COMPANY - RUNOFF POND. Day/Date THURSDAY, JUNE 23, 1994

Location LADYSMITH, WI Weather/Temp. CLOUDY, 74°

Contractor GSI Client FMC.

Project Competent Person per 29 CFR Part 1926 (Subpart P)

NAME: _____

FIRM: _____

FIRM ADDRESS: _____

PHONE: _____

Present on Site ☐ YES ☐ NO

Equipment Rental _____

Tolls $ _____

Parking $ _____

Mileage _____

Arrive Job 12:00 4:00

Depart Job 12:30 5:00

Total Hours on Job 1.5

Travel Time —

—

Project Preparation Time _____

TOTAL CHARGEABLE HOURS
4 HOUR MINIMUM

1.5

Summary of Technical and/or Engineering Services Performed, including Field Test Data. Locations, Elevations and Depth are Estimated.

I MADE AN OBSERVATION TOUR OF THE RUN OFF POND TO OBSERVE THE PERFORMANCE OF THE LINER.

I FOUND A PUNCTURE IN THE LINER & A SMALL MEDIUM CREASE IN THE LINER IN THE SOUTH WEST CORNER. (P.339) GSI PATCHED BOTH OF THESE LOCATIONS WITH 60 mil HDPE & EXTRUSION ROD SUPPLIED BY FLAMBEAU MINING. SEE TRIAL WELD LOG & REPAIR SUMMARY FOR SPECIFIC WELDING DATA. GSI VACUUM TESTED THE REPAIRS & FOUND NO LEAKS.

I NOTICED THAT THE SOILS UNDER THE 32" PIPE ON THE WEST SIDE OF THE POND HAVE SLOUGHED DOWN & CREATED A VOID IN THE AREA IMMEDIATELY BELOW THE PIPE. HOWEVER, AT LOW WATER, THERE WAS NO VISIBLE STRESS ON THE LINER AT THIS TIME.

ALSO, SCUFF STRIPS ARE RECOMMENDED UNDER EACH OF THE CORRUGATED PIPES TO PREVENT SCRATCHING THE LINER. SOME MINOR SCRATCHING IS EVIDENT AT EACH PIPE LOCATION.

* ☐ Field Test Data is Estimated Pending Final Laboratory Test Results.

Site Sketch: Indicate North

Representative Jana E. Murphy

Position ENV. SUPERVISOR

Company Flambeau Mining Co.

By M J Moroney

Title SR. ENGR. TECH.

STS Consultants, Ltd.

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8/92PP151

Appendix C

Groundwater Quality & Elevation

Surface Water Quality

Trends

Foth & Van Dyke
Memorandum

January 16, 1995

TO: Jana Murphy, Flambeau Mining Company

CC: Jim Hutchison, Foth & Van Dyke
Jerry Sevick, Foth & Van Dyke

FR: Steve Lehrke, Foth & Van Dyke SL

RE: Flambeau Mining Company - 1994 Annual Report

Groundwater quality results associated with samples collected between July of 1991 and October of 1994 are listed in Table 1. Surface water quality results collected between July of 1991 and October of 1994 are listed in Table 2. The trends of the groundwater and surface water quality results are illustrated graphically in Attachments 1 and 2, respectively.

The groundwater concentration graphs (Attachment 1) indicate that, in general, very few overall trends are occurring in the groundwater quality. However, several isolated trends in the data can be seen. Alkalinity in MW-1000P has been following a decreasing trend. The October 1994 result of copper in MW-1000P was somewhat higher than past results. Iron in MW-1000P and MW-1005P dropped appreciably from 1991 to 1993, and has been holding steady since. Iron in MW-1004P had a significant reduction in concentrations between January and April of 1993. Iron in MW-1005 has been following a generally increasing trend.

Similar to iron in MW-1004P, manganese also had a significant reduction in concentrations between January and April of 1993. Somewhat higher than normal levels of manganese were observed in MW-1005P during January and October 1994. Manganese in MW-1010P has had a generally decreasing trend since 1991. Sulfate in MW-1010P had a decreasing trend from January of 1993 to January of 1994, but has been holding steady since.

In addition to presenting the trends graphically, a statistical trend test was performed on the results for each compound within each well. The nonparametric Mann-Kendall test for trend was used. This test, applied to the data, indicates whether a general overall increasing or decreasing trend between July of 1991 and October of 1994 is present. Since many tests were performed (one for each compound and well) the type I error rate, or false positive rate, was set to 0.01. The procedure for the Mann-Kendall test for trend is given in Gilbert (1987).

Summary statistics for each compound and well, along with the trend analysis results for groundwater are given in Table 1. The tests confirmed the above mentioned decreasing trends of alkalinity and iron in MW-1000P and manganese in MW-1010P, and the above mentioned increasing trends of copper in MW-1000P and iron in MW-1005. No other groundwater trends were found to be statistically significant.

{32-18}94F005

Historical trend plots of groundwater elevations are also presented in Attachment 1. The groundwater elevation in many of the monitoring wells began to decline in late 1992, and continued to decline through 1993. These wells include MW-1000P, MW-1001, MW-1001G, MW-1001P, MW-1003, MW-1003P, MW-1004P, MW-1004S, MW-1010P, OW-7, OW-39, OW-42, PZ-R1, PZ-S3 and ST-9-23. During 1994, however, the declining trend of groundwater elevations in most of these wells began to slow, and elevations remained somewhat consistent. The only well which continues to show the same rate of decrease is PZ-R1.

The trend graphs of the surface water quality results (Attachment 2) indicate no general increasing or decreasing trends between July of 1991 and October of 1994. A statistical trend analysis using the Mann-Kendall test was also performed for surface water, and the results are shown in Table 2. No compounds measured at either of the two surface water sampling locations were determined to have a statistically increasing or decreasing trend.

In summary, both the trend graphs and the statistical trend analysis indicate no overall trends between July 1991 and October 1994 for surface water, and only isolated occurrences of trends over this time period for groundwater. Of the trends present in the groundwater data, both increasing and decreasing trends are represented.

Reference

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

SGL:lmc

Groundwater Quality Results, Summary Statistics and Trend Analysis
July 1991 Through October 1994

Well	Parameter	Units	Jul-91	Oct-91	Jan-92	Apr-92	Jul-92	Oct-92	Jan-93	Apr-93	Jul-93	Oct-93	Jan-94	Apr-94	Jul-94	Oct-94
MW-1000P	Alkalinity	mg/l	65	90	88	84	81	95	84	82	82	62	43	44	39	34
MW-1000P	Copper	mg/l	< 0.014	< 0.014	< 0.014	< 0.014	0.014	< 0.014	< 0.014	0.02	0.016	0.013	0.022	0.023	0.017	0.058
MW-1000P	Hardness	mg/l	84	110	110	88	120	100	88	90	86	120	54	54	49	36
MW-1000P	Iron	mg/l	0.65	0.84	1.7	1.3	0.47	0.8	0.15	0.27	0.061	0.032	< 0.015	0.021	0.026	0.047
MW-1000P	Manganese	mg/l	0.85	0.88	0.82	0.83	0.73	0.78	0.71	0.94	0.73	0.91	0.34	0.5	0.42	0.36
MW-1000P	Sulfate	mg/l	< 10	< 10	11	14	12	12	< 10	12	15	12	12	12	11	17
MW-1000P	TDS	mg/l	190	160	120	120	140	160	100	130	140	110	70	95	90	120
MW-1000P	pH(Field)	S.U.	8.39	7.41	5.75	6.91	6.64	6.9	6.22	6.24	6.6	7.03	6.9	7.7	7.5	7.2
MW-1002	Alkalinity	mg/l	50	49	47	49	41	53	53	66	42	42	39	35	31	38
MW-1002	Copper	mg/l	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.01	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.0016
MW-1002	Hardness	mg/l	60	60	67	48	120	82	66	90	52	52	50	45	44	46
MW-1002	Iron	mg/l	0.99	< 0.055	< 0.055	< 0.055	< 0.055	0.055	0.059	< 0.01	0.034	< 0.015	< 0.015	< 0.015	< 0.015	0.0056
MW-1002	Manganese	mg/l	0.0051	< 0.004	< 0.004	< 0.004	< 0.004	0.015	0.0047	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.00047
MW-1002	Sulfate	mg/l	< 10	< 10	< 10	11	< 10	11	< 10	9	10	6	7	7	6.6	6.1
MW-1002	TDS	mg/l	160	170	100	85	87	130	90	120	100	78	82	86	94	87
MW-1002	pH(Field)	S.U.	8.33	6.78	6.88	6.05	5.61	6.94	6.96	6.33	6.8	7.52	7.5	7.5	7	7
MW-1002G	Alkalinity	mg/l	86	88	80	84	79	85	75	44	64	82	94	92	92	88
MW-1002G	Copper	mg/l	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.01	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.0016
MW-1002G	Hardness	mg/l	100	120	110	110	160	130	94	76	80	110	120	120	120	110
MW-1002G	Iron	mg/l	< 0.055	< 0.055	< 0.055	< 0.055	< 0.055	< 0.055	< 0.055	< 0.01	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	0.0054
MW-1002G	Manganese	mg/l	0.0054	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.00047
MW-1002G	Sulfate	mg/l	< 10	10	11	14	11	11	12	8	11	11	14	12	12	14
MW-1002G	TDS	mg/l	240	280	140	150	150	180	98	74	140	190	180	170	170	200
MW-1002G	pH(Field)	S.U.	7.56	6.98	6.93	6.25	6.02	6.94	7.14	6.13	6.7	7.38	7	7.4	6.7	6.8
MW-1004P	Alkalinity	mg/l	160	170	160	170	160	190	170	170	170	170	140	160	160	170
MW-1004P	Copper	mg/l	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.01	< 0.012	< 0.012	< 0.012	0.015	< 0.012	< 0.0016
MW-1004P	Hardness	mg/l	150	170	150	160	170	180	160	160	150	160	150	150	150	160
MW-1004P	Iron	mg/l	0.33	0.22	0.32	0.37	0.38	0.32	0.39	< 0.01	0.042	0.048	< 0.015	0.033	0.024	0.035
MW-1004P	Manganese	mg/l	0.13	0.13	0.12	0.14	0.13	0.13	0.14	< 0.004	0.022	0.04	0.02	0.045	0.028	0.029
MW-1004P	Sulfate	mg/l	< 10	< 10	< 10	< 10	< 10	< 10	< 10	3	5	3	2	3	2.5	3.9
MW-1004P	TDS	mg/l	210	310	160	180	180	260	160	160	180	230	160	180	190	200
MW-1004P	pH(Field)	S.U.	8.15	7.15	6.8	6.88	6.74	7.46	6.24	7.74	7.4	7.61	7.3	7.4	7.1	7.1
MW-1004S	Alkalinity	mg/l	50	49	27	60	74	100	73	51	24	32	42	38	140	44
MW-1004S	Copper	mg/l	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.01	< 0.012	< 0.012	0.016	< 0.012	< 0.012	< 0.0016
MW-1004S	Hardness	mg/l	60	60	62	72	150	110	92	70	56	46	44	51	52	54
MW-1004S	Iron	mg/l	< 0.055	< 0.055	< 0.055	< 0.055	< 0.055	< 0.055	< 0.055	< 0.01	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	0.0064
MW-1004S	Manganese	mg/l	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.00047
MW-1004S	Sulfate	mg/l	< 10	10	11	12	< 10	< 10	< 10	11	11	9	10	8	8	8.6
MW-1004S	TDS	mg/l	160	170	95	100	110	220	95	120	110	98	74	100	100	150
MW-1004S	pH(Field)	S.U.	8.64	7.25	7.03	6.7	6.5	6.96	6.37	7.77	7	7.41	7	7.8	6.8	6.7

Prepared By: SGL Checked By: JBH1

Table 1, continued

Well	Parameter	Units	Jul-91	Oct-91	Jan-92	Apr-92	Jul-92	Oct-92	Jan-93	Apr-93	Jul-93	Oct-93	Jan-94	Apr-94	Jul-94	Oct-94
MW-1005	Alkalinity	mg/l	84	92	86	90	90	110	94	78	74	84	81	88	75	78
MW-1005	Copper	mg/l	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.01	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.0016
MW-1005	Hardness	mg/l	380	360	1000	520	440	420	400	500	410	390	440	450	450	420
MW-1005	Iron	mg/l	17	20	18	17	19	22	24	24	18	25	24	24	31	28
MW-1005	Manganese	mg/l	0.51	0.49	0.46	0.38	0.44	0.47	0.52	0.54	0.42	0.61	0.53	0.54	0.69	0.63
MW-1005	Sulfate	mg/l	15	12	14	16	15	15	23	15	18	17	18	13	14	20
MW-1005	TDS	mg/l	570	770	530	680	640	600	140	630	590	680	560	620	600	820
MW-1005	pH(Field)	S.U.	7.73	7.34	6.12	6.32	6.01	6.13	6.21	6.11	6.1	6.68	6.3	7.6	6.2	6.1
MW-1005P	Alkalinity	mg/l	260	260	260	260	270	270	260	250	250	250	250	250	240	250
MW-1005P	Copper	mg/l	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.01	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.0016
MW-1005P	Hardness	mg/l	230	230	240	240	260	260	240	250	230	220	230	230	230	250
MW-1005P	Iron	mg/l	1.2	1	0.75	1	0.95	1.2	1.1	0.46	0.61	0.17	0.19	0.2	0.22	0.24
MW-1005P	Manganese	mg/l	0.22	0.15	0.16	0.13	0.15	0.1	0.11	0.15	0.14	0.069	0.35	0.16	0.1	0.62
MW-1005P	Sulfate	mg/l	< 10	< 10	< 10	< 10	< 10	< 10	< 10	2	3	< 2	< 2	< 2	< 2	2.5
MW-1005P	TDS	mg/l	290	440	280	350	270	320	220	240	260	300	260	270	270	280
MW-1005P	pH(Field)	S.U.	8.49	7.66	6.85	6.97	6.81	7.26	6.39	6.52	7.6	7.53	7.3	7.2	6.9	7.2
MW-1005S	Alkalinity	mg/l	170	170	170	180	170	190	180	81	170	170	160	160	160	160
MW-1005S	Copper	mg/l	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.01	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.0016
MW-1005S	Hardness	mg/l	170	170	250	290	220	270	180	210	160	160	160	160	160	160
MW-1005S	Iron	mg/l	3	3.8	3.6	3.7	4.1	3.9	4.1	4.4	4.2	4.2	4	4.1	4.1	3.7
MW-1005S	Manganese	mg/l	0.21	0.22	0.21	0.2	0.21	0.2	0.21	0.23	0.22	0.24	0.2	0.2	0.2	0.19
MW-1005S	Sulfate	mg/l	< 10	< 10	< 10	< 10	< 10	< 10	10	8	9	6	9	8	7.2	13
MW-1005S	TDS	mg/l	220	370	< 20	210	220	260	160	200	200	220	190	200	210	240
MW-1005S	pH(Field)	S.U.	7.68	7.37	6.88	7.48	6.68	7.38	6.09	6.38	7.3	7.28	7.2	7.5	6.9	7.3
MW-1010P	Alkalinity	mg/l	140	160	150	160	160	180	190	170	150	160	160	160	160	160
MW-1010P	Copper	mg/l	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	0.0032
MW-1010P	Hardness	mg/l	140	130	130	140	180	160	130	130	130	130	150	150	150	150
MW-1010P	Iron	mg/l	< 0.055	< 0.055	0.15	< 0.055	< 0.055	< 0.055	< 0.055	0.055	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	0.0046
MW-1010P	Manganese	mg/l	0.26	0.28	0.25	0.2	0.086	0.14	0.031	0.14	0.035	0.081	0.17	0.014	0.01	0.014
MW-1010P	Sulfate	mg/l	< 10	10	16	14	< 10	< 10	32	28	11	5	3	3	3.4	4.5
MW-1010P	TDS	mg/l	180	250	200	340	180	280	210	270	180	230	170	180	190	200
MW-1010P	pH(Field)	S.U.	8.47	8.26	6.87	7.62	6.86	7.49	7.21	6.62	7.2	7.51	7.3	7.4	7.2	7.5

Table 1, continued

Well	Parameter	Units	Sample Size	Total Detections	Percent Detected	Mann-Kendall S	p-Level	
MW-1000P	Alkalinity	mg/l	14	14	100%	-57	0.002	*
MW-1000P	Copper	mg/l	14	8	57%	58	0.001	*
MW-1000P	Hardness	mg/l	14	14	100%	-43	0.02	
MW-1000P	Iron	mg/l	14	13	93%	-61	0	*
MW-1000P	Manganese	mg/l	14	14	100%	-46	0.012	
MW-1000P	Sulfate	mg/l	14	11	79%	30	0.113	
MW-1000P	TDS	mg/l	14	14	100%	-46	0.012	
MW-1000P	pH(Field)	S.U.	14	14	100%	12	0.554	
MW-1002	Alkalinity	mg/l	14	14	100%	-44	0.017	
MW-1002	Copper	mg/l	14	0	0%	0	1	
MW-1002	Hardness	mg/l	14	14	100%	-41	0.026	
MW-1002	Iron	mg/l	14	4	29%	-4	0.872	
MW-1002	Manganese	mg/l	14	3	21%	-18	0.359	
MW-1002	Sulfate	mg/l	14	9	64%	15	0.45	
MW-1002	TDS	mg/l	14	14	100%	-33	0.08	
MW-1002	pH(Field)	S.U.	14	14	100%	23	0.234	
MW-1002G	Alkalinity	mg/l	14	14	100%	11	0.59	
MW-1002G	Copper	mg/l	14	0	0%	0	1	
MW-1002G	Hardness	mg/l	14	14	100%	3	0.914	
MW-1002G	Iron	mg/l	14	1	7%	13	0.518	
MW-1002G	Manganese	mg/l	14	1	7%	-13	0.518	
MW-1002G	Sulfate	mg/l	14	13	93%	41	0.026	
MW-1002G	TDS	mg/l	14	14	100%	1	1	
MW-1002G	pH(Field)	S.U.	14	14	100%	0	1	
MW-1004P	Alkalinity	mg/l	14	14	100%	-4	0.872	
MW-1004P	Copper	mg/l	14	1	7%	9	0.668	
MW-1004P	Hardness	mg/l	14	14	100%	-17	0.388	
MW-1004P	Iron	mg/l	14	12	86%	-37	0.048	
MW-1004P	Manganese	mg/l	14	13	93%	-34	0.071	
MW-1004P	Sulfate	mg/l	14	7	50%	47	0.01	
MW-1004P	TDS	mg/l	14	14	100%	-3	0.914	
MW-1004P	pH(Field)	S.U.	14	14	100%	-5	0.83	
MW-1004S	Alkalinity	mg/l	14	14	100%	-3	0.914	
MW-1004S	Copper	mg/l	14	1	7%	7	0.748	
MW-1004S	Hardness	mg/l	14	14	100%	-32	0.09	
MW-1004S	Iron	mg/l	14	1	7%	13	0.518	
MW-1004S	Manganese	mg/l	14	0	0%	0	1	
MW-1004S	Sulfate	mg/l	14	10	71%	-2	0.957	
MW-1004S	TDS	mg/l	14	14	100%	-14	0.484	
MW-1004S	pH(Field)	S.U.	14	14	100%	-13	0.518	

* Indicates Statistically Significant Trend

Table 1, continued

Well	Parameter	Units	Sample Size	Total Detections	Percent Detected	Mann-Kendall S	p-Level	
MW-1005	Alkalinity	mg/l	14	14	100%	-30	0.113	
MW-1005	Copper	mg/l	14	0	0%	0	1	
MW-1005	Hardness	mg/l	14	14	100%	6	0.789	
MW-1005	Iron	mg/l	14	14	100%	59	0	*
MW-1005	Manganese	mg/l	14	14	100%	46	0.012	
MW-1005	Sulfate	mg/l	14	14	100%	23	0.234	
MW-1005	TDS	mg/l	14	14	100%	5	0.83	
MW-1005	pH(Field)	S.U.	14	14	100%	-16	0.419	
MW-1005P	Alkalinity	mg/l	14	14	100%	-47	0.01	
MW-1005P	Copper	mg/l	14	0	0%	0	1	
MW-1005P	Hardness	mg/l	14	14	100%	-7	0.748	
MW-1005P	Iron	mg/l	14	14	100%	-47	0.01	
MW-1005P	Manganese	mg/l	14	14	100%	-4	0.872	
MW-1005P	Sulfate	mg/l	14	3	21%	18	0.359	
MW-1005P	TDS	mg/l	14	14	100%	-22	0.257	
MW-1005P	pH(Field)	S.U.	14	14	100%	-14	0.484	
MW-1005S	Alkalinity	mg/l	14	14	100%	-33	0.08	
MW-1005S	Copper	mg/l	14	0	0%	0	1	
MW-1005S	Hardness	mg/l	14	14	100%	-43	0.02	
MW-1005S	Iron	mg/l	14	14	100%	31	0.1	
MW-1005S	Manganese	mg/l	14	14	100%	-22	0.257	
MW-1005S	Sulfate	mg/l	14	8	57%	46	0.012	
MW-1005S	TDS	mg/l	14	13	93%	-4	0.872	
MW-1005S	pH(Field)	S.U.	14	14	100%	-12	0.554	
MW-1010P	Alkalinity	mg/l	14	14	100%	14	0.484	
MW-1010P	Copper	mg/l	14	1	7%	13	0.518	
MW-1010P	Hardness	mg/l	14	14	100%	15	0.45	
MW-1010P	Iron	mg/l	14	3	21%	2	0.957	
MW-1010P	Manganese	mg/l	14	14	100%	-61	0	*
MW-1010P	Sulfate	mg/l	14	11	79%	-5	0.83	
MW-1010P	TDS	mg/l	14	14	100%	-16	0.419	
MW-1010P	pH(Field)	S.U.	14	14	100%	-16	0.419	

* Indicates Statistically Significant Trend

Surface Water Quality Results, Summary Statistics and Trend Analysis
July 1991 Through October 1994

Station	Parameter	Units	Jul-91	Oct-91	Jan-92	Apr-92	Jul-92	Oct-92	Jan-93	Apr-93	Jul-93	Nov-93	Jan-94	Apr-94	Jul-94	Oct-94
SW-1	Aluminum	mg/l	< 0.4	0.08	0.7	0.75	0.14	0.42	0.11	0.13	0.18	0.047	0.12	0.29	0.07	0.2
SW-1	Arsenic	mg/l	< 0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.0028	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
SW-1	Beryllium	mg/l	< 0.2	< 0.2	< 0.2	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0004	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
SW-1	Cadmium	mg/l	< 0.0002	0.001	< 0.0002	< 0.0002	0.0006	< 0.0002	0.0007	< 0.0002	< 0.0008	< 0.0006	< 0.0002	0.00038	< 0.0002	< 0.0008
SW-1	Chromium	mg/l	0.0027	< 0.002	0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.002	0.004	< 0.001	0.0018	0.0018	0.0025
SW-1	Chromium VI	mg/l	0.01	< 0.02	0.009	< 0.02	< 0.018	< 0.02	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.0015
SW-1	Copper	mg/l	< 0.003	0.004	0.003	0.005	0.002	0.004	< 0.002	< 0.002	< 0.012	< 0.002	0.0044	< 0.002	0.0027	0.002
SW-1	Diss O2	mg/l	6.2	11	12	11.2	7.4	9.9	11	10	10	9	11.9	5.8	8.5	10.1
SW-1	Hardness	mg/l	100	46	50	34	23	52	52	40	44	56	64	43	48	36
SW-1	Lead	mg/l	0.0012	< 0.003	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.001	< 0.005	< 0.001	< 0.001	0.01	0.0025	0.0011
SW-1	Mercury	mg/l	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
SW-1	Nickel	mg/l	< 0.05	< 0.016	< 0.05	< 0.02	< 0.018	< 0.02	< 0.02	< 0.02	< 0.016	< 0.016	< 0.016	< 0.016	< 0.016	< 0.016
SW-1	Selenium	mg/l	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
SW-1	Silver	mg/l	< 0.0005	< 0.002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.002	< 0.0015	< 0.0005	< 0.0005	< 0.0005	< 0.0025
SW-1	Sulfide	mg/l										< 2			< 2	< 2
SW-1	TDS	mg/l	140	98	90	86	90	90	100	66	66	91	93	84	96	100
SW-1	TSS	mg/l	< 1	14	4	< 1	9	4	< 1	2	5	< 1	1	3	< 1	8
SW-1	Zinc	mg/l	0.02	24	0.008	0.011	0.006	< 0.003	0.007	< 0.003	< 0.003	< 0.003	0.007	0.009	0.011	0.017
SW-1	pH(Field)	S.U.	7.43	7.92	6.95	6.71	6.75	7.23	6.71	7.07	7.3	8.59	7.8	8	7.4	7.2
SW-2	Aluminum	mg/l	< 0.4	0.06	0.42	0.72	0.14	0.54	0.07	0.11	0.36	0.072	0.036	0.31	0.14	0.22
SW-2	Arsenic	mg/l	< 0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.0027	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
SW-2	Beryllium	mg/l	< 0.2	< 0.2	< 0.2	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0004	< 0.001	< 0.001	< 0.001	0.0012	0.0012
SW-2	Cadmium	mg/l	< 0.0002	0.0005	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0008	< 0.0006	< 0.0002	< 0.0002	< 0.00022	< 0.0008
SW-2	Chromium	mg/l	0.0012	< 0.002	0.002	< 0.001	0.001	< 0.001	< 0.001	< 0.001	0.0021	0.004	< 0.001	0.0019	0.0023	0.0037
SW-2	Chromium VI	mg/l	0.009	< 0.02	0.007	< 0.02	< 0.013	< 0.02	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.0015
SW-2	Copper	mg/l	0.0042	< 0.002	0.004	< 0.002	< 0.002	0.004	0.004	0.002	< 0.012	0.0032	< 0.002	0.0051	0.0036	0.0057
SW-2	Diss O2	mg/l	6.5	10	12	11.5	7.6	10	12	11	9.7	8.5	11.6	6.6	8.8	9.3
SW-2	Hardness	mg/l	48	47	50	34	28	68	52	40	76	60	60	40	48	38
SW-2	Lead	mg/l	0.0012	< 0.003	0.001	< 0.001	0.003	< 0.001	< 0.001	< 0.001	< 0.005	< 0.001	< 0.001	< 0.001	0.0014	0.0015
SW-2	Mercury	mg/l	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
SW-2	Nickel	mg/l	< 0.05	< 0.016	< 0.05	< 0.02	< 0.018	< 0.02	< 0.02	< 0.02	< 0.016	< 0.016	< 0.016	< 0.016	< 0.016	< 0.016
SW-2	Selenium	mg/l	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
SW-2	Silver	mg/l	< 0.0005	< 0.002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.002	< 0.0015	< 0.0005	< 0.0005	< 0.0005	< 0.0025
SW-2	Sulfide	mg/l										< 2			< 2	< 2
SW-2	TDS	mg/l	140	85	87	120	120	96	110	74	100	88	83	82	100	92
SW-2	TSS	mg/l	< 1	4	< 1	< 1	7	5	< 1	1	11	< 1	< 1	13	10	8
SW-2	Zinc	mg/l	0.02	< 3	0.004	0.009	0.008	< 0.003	0.008	< 0.003	0.009	0.004	0.05	0.007	0.009	0.023
SW-2	pH(Field)	S.U.	7.92	8.01	7.09	6.19	7.1	7.11	7.05	7.25	7.1	7.93	8.1	8	7.6	7.1

Prepared By: SGL Checked By: JBH1

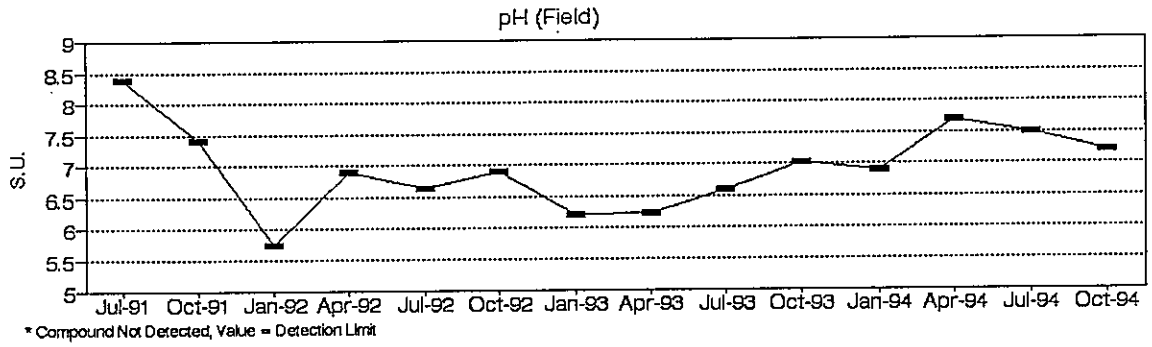
Table 2, continued

Station	Parameter	Units	Sample Size	Total Detections	Percent Detected	Mann-Kendall S	p-Level
SW-1	Aluminum	mg/l	14	13	93%	-1	1
SW-1	Arsenic	mg/l	14	1	7%	3	0.914
SW-1	Beryllium	mg/l	14	0	0%	0	1
SW-1	Cadmium	mg/l	14	4	29%	-12	0.554
SW-1	Chromium	mg/l	14	6	43%	12	0.554
SW-1	Chromium VI	mg/l	13	2	15%	-21	0.228
SW-1	Copper	mg/l	14	8	57%	-12	0.554
SW-1	Diss O2	mg/l	14	14	100%	-11	0.59
SW-1	Hardness	mg/l	14	14	100%	-6	0.789
SW-1	Lead	mg/l	14	5	36%	21	0.28
SW-1	Mercury	mg/l	14	0	0%	0	1
SW-1	Nickel	mg/l	14	0	0%	0	1
SW-1	Selenium	mg/l	14	0	0%	0	1
SW-1	Silver	mg/l	14	0	0%	0	1
SW-1	Sulfide	mg/l	3	0	0%	0	1
SW-1	TDS	mg/l	14	14	100%	-2	0.957
SW-1	TSS	mg/l	14	9	64%	-6	0.789
SW-1	Zinc	mg/l	14	10	71%	-9	0.668
SW-1	pH(Field)	S.U.	14	14	100%	18	0.359
SW-2	Aluminum	mg/l	14	13	93%	4	0.872
SW-2	Arsenic	mg/l	14	1	7%	3	0.914
SW-2	Beryllium	mg/l	14	2	14%	24	0.213
SW-2	Cadmium	mg/l	14	2	14%	-1	1
SW-2	Chromium	mg/l	14	8	57%	28	0.142
SW-2	Chromium VI	mg/l	13	2	15%	-21	0.228
SW-2	Copper	mg/l	14	9	64%	14	0.484
SW-2	Diss O2	mg/l	14	14	100%	-11	0.59
SW-2	Hardness	mg/l	14	14	100%	2	0.957
SW-2	Lead	mg/l	14	5	36%	1	1
SW-2	Mercury	mg/l	14	0	0%	0	1
SW-2	Nickel	mg/l	14	0	0%	0	1
SW-2	Selenium	mg/l	14	0	0%	0	1
SW-2	Silver	mg/l	14	0	0%	0	1
SW-2	Sulfide	mg/l	3	0	0%	0	1
SW-2	TDS	mg/l	14	14	100%	-25	0.192
SW-2	TSS	mg/l	14	8	57%	28	0.142
SW-2	Zinc	mg/l	14	11	79%	21	0.28
SW-2	pH(Field)	S.U.	14	14	100%	16	0.419

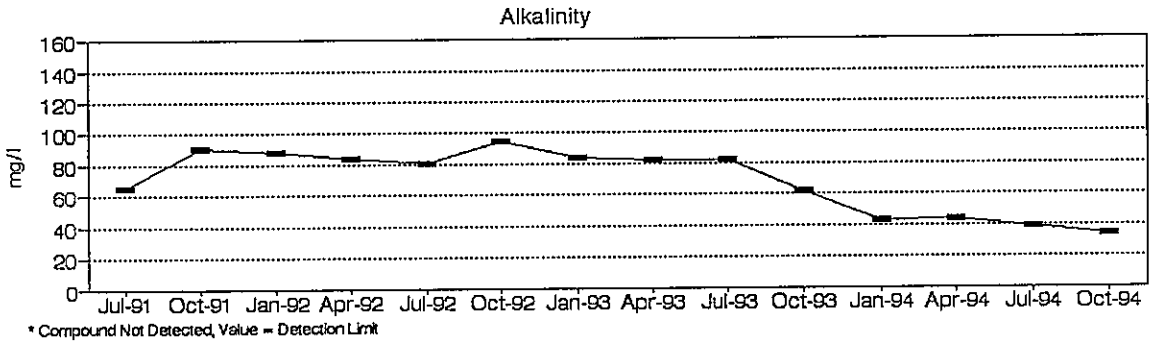
Attachment 1

Flambeau Mining Company
Groundwater Quality Results

MW-1000P



* Compound Not Detected, Value = Detection Limit



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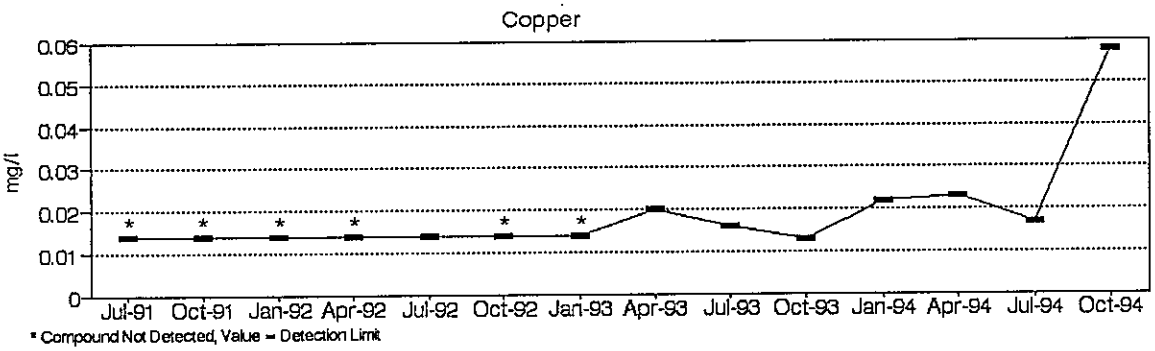

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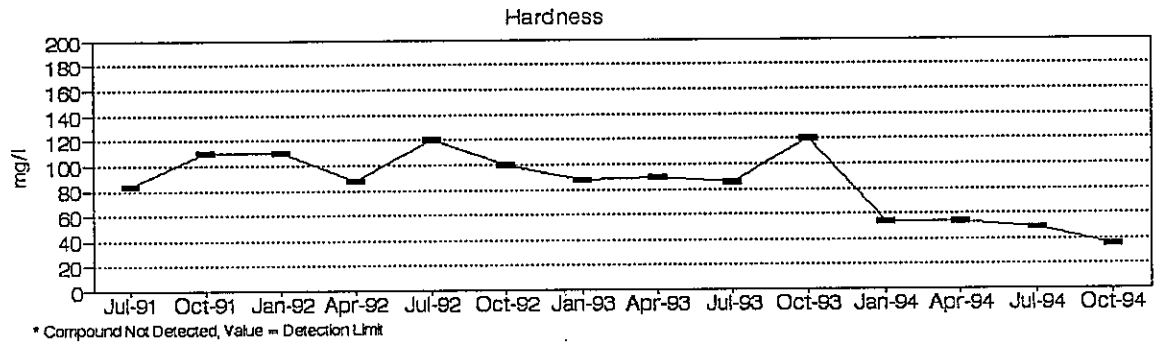
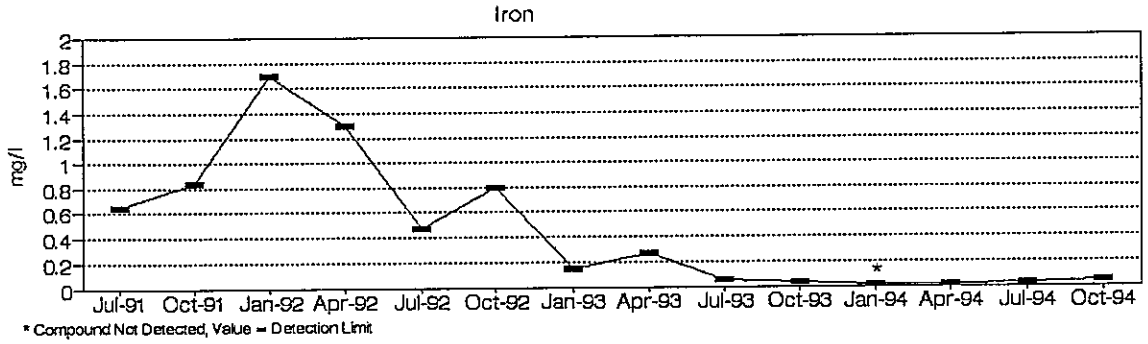


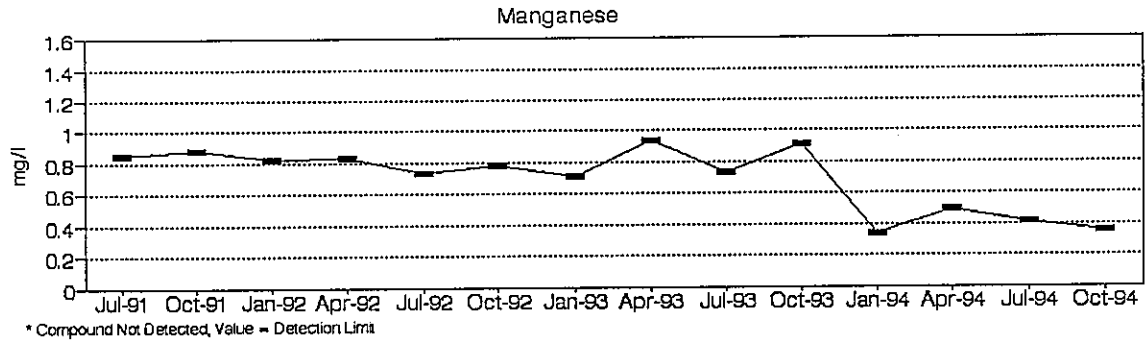
* Compound Not Detected, Value = Detection Limit

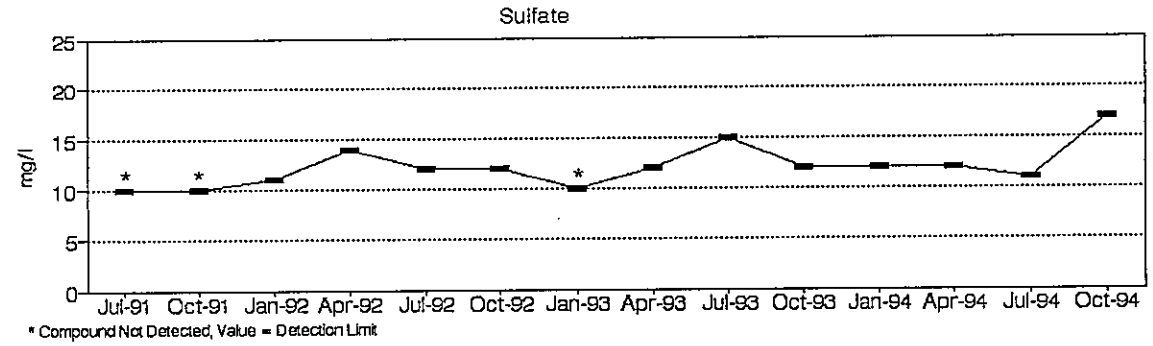
Prepared By: SGL Checked By: JBH1

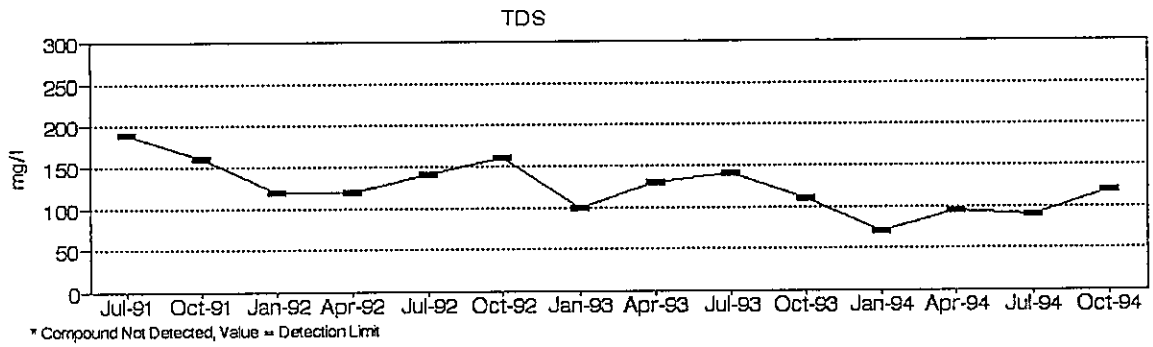
Flambeau Mining Company
Groundwater Quality Results

MW-1000P





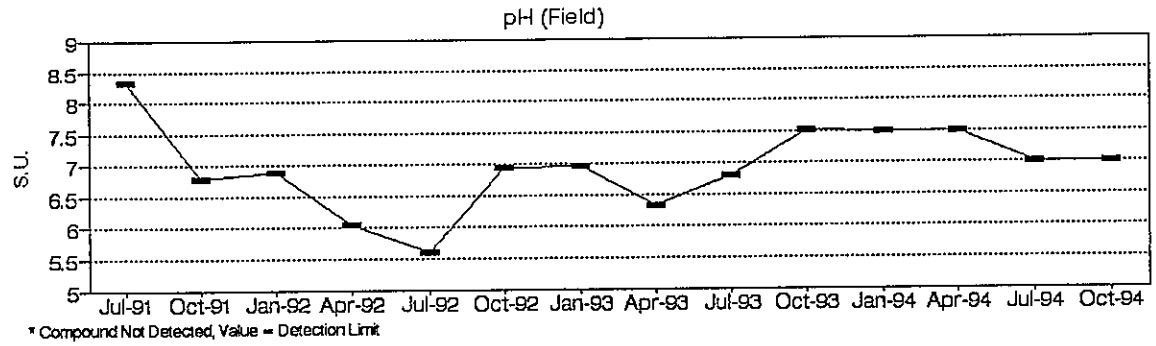




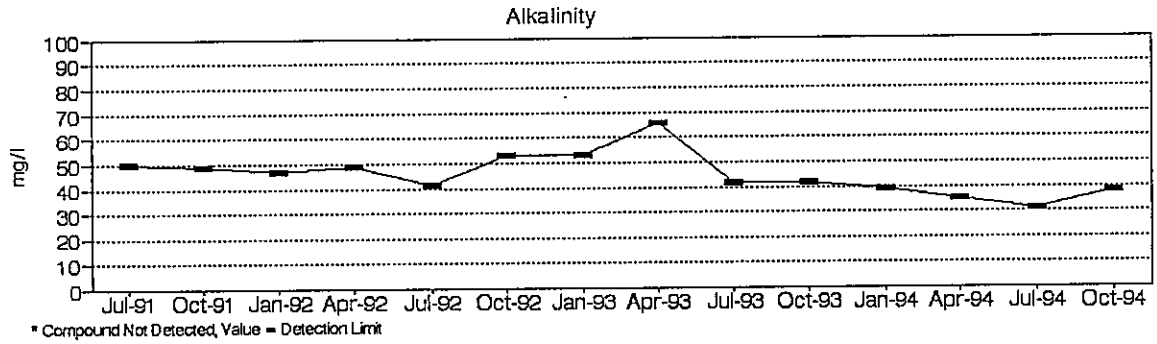
Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Groundwater Quality Results

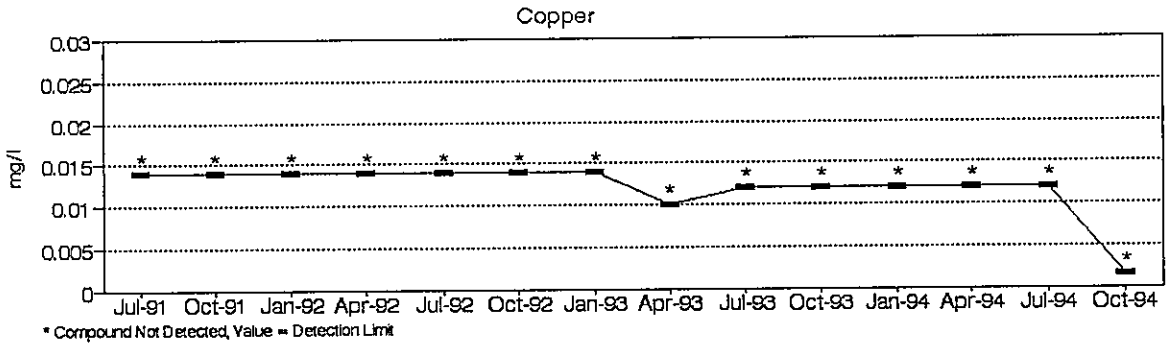
MW-1002



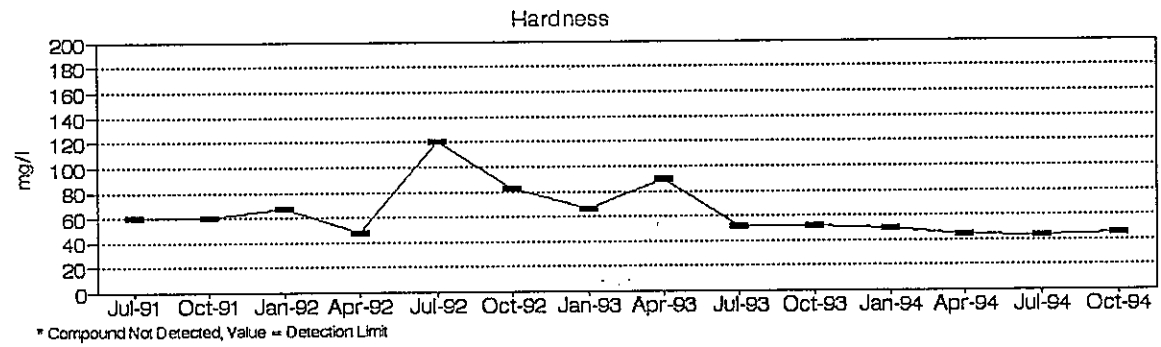
* Compound Not Detected, Value = Detection Limit



* Compound Not Detected, Value = Detection Limit



* Compound Not Detected, Value = Detection Limit



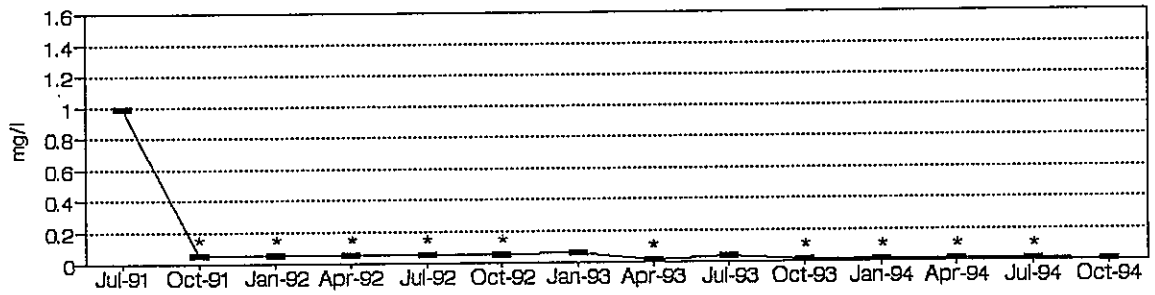
* Compound Not Detected, Value = Detection Limit

Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Groundwater Quality Results

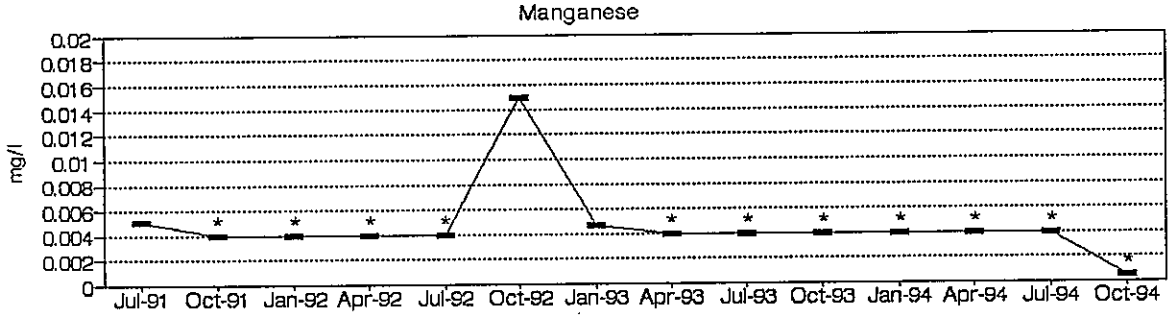
MW-1002

Iron



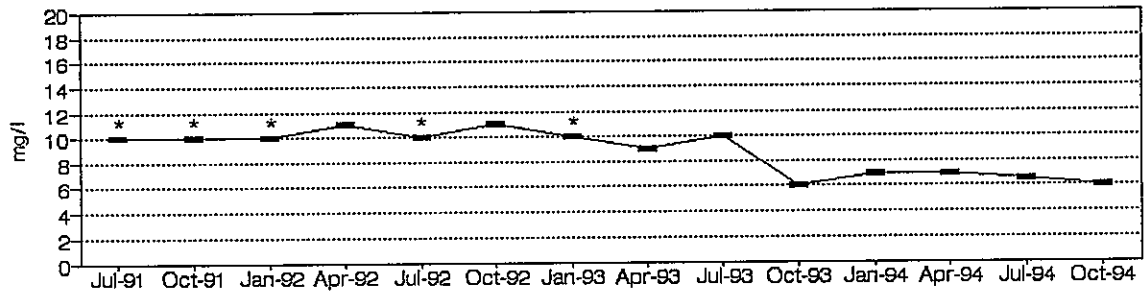
* Compound Not Detected, Value = Detection Limit

Manganese



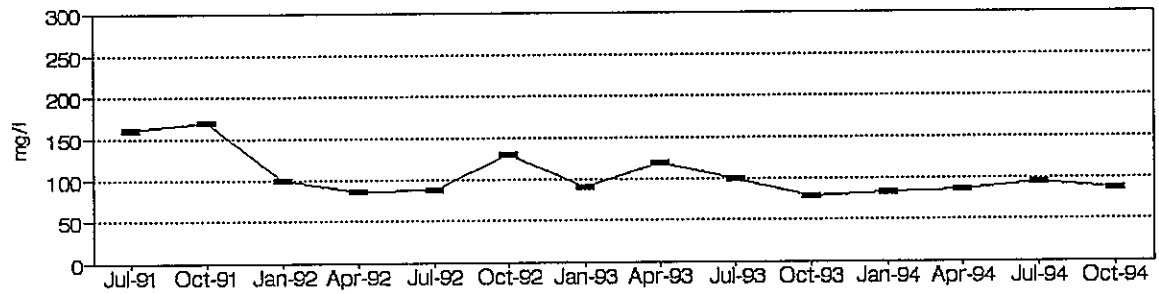
* Compound Not Detected, Value = Detection Limit

Sulfate



* Compound Not Detected, Value = Detection Limit

TDS



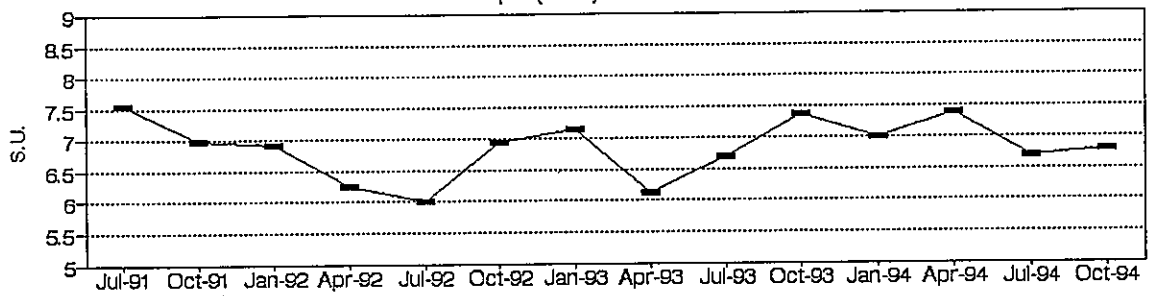
* Compound Not Detected, Value = Detection Limit

Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Groundwater Quality Results

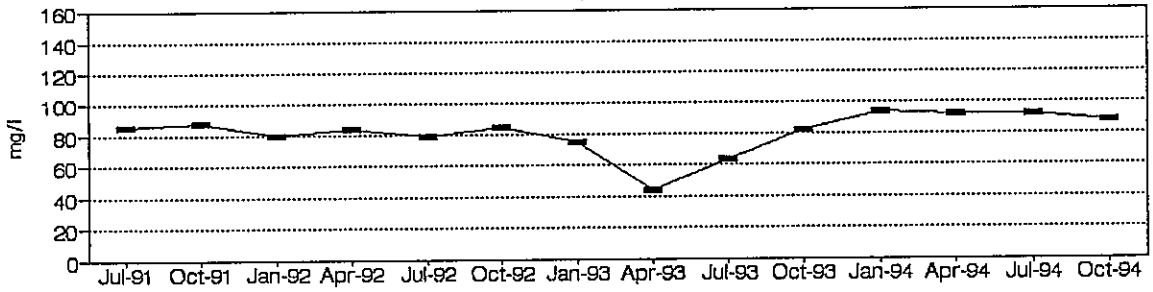
MW-1002G

pH (Field)



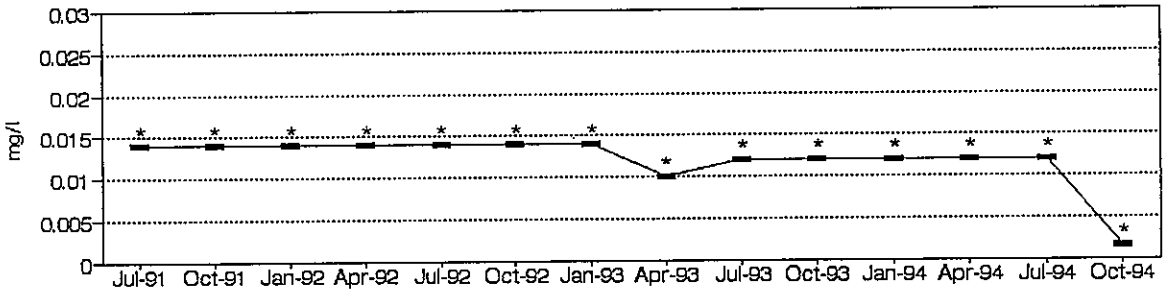
* Compound Not Detected, Value = Detection Limit

Alkalinity



* Compound Not Detected, Value = Detection Limit

Copper



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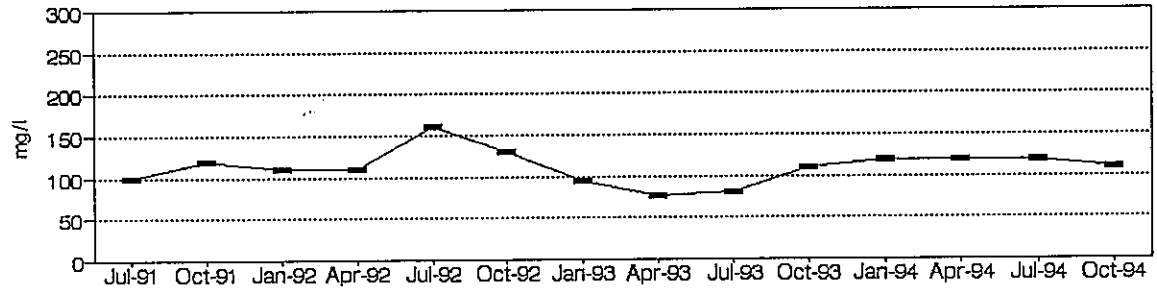
Hardness



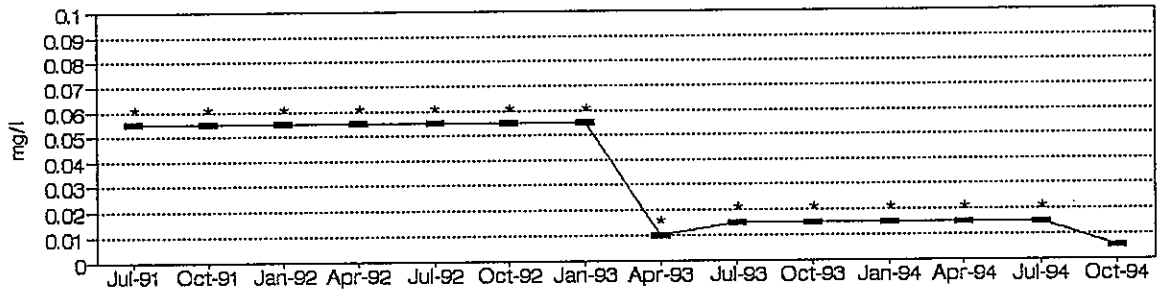
* Compound Not Detected, Value = Detection Limit

Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Groundwater Quality Results

MW-1002G

Iron



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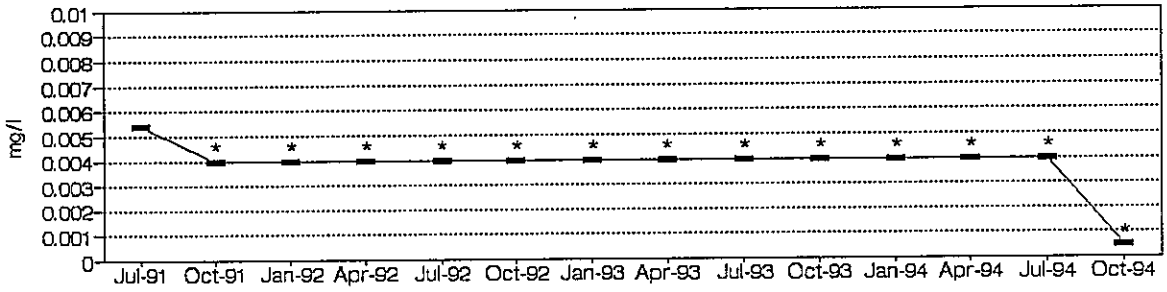
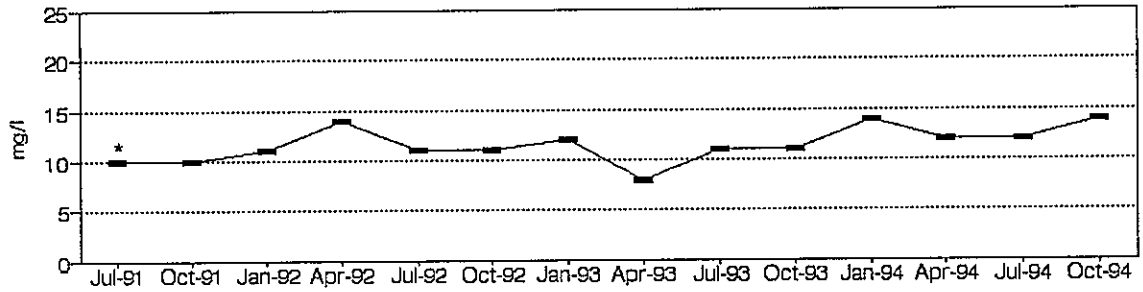
Manganese



* Compound Not Detected, Value = Detection Limit

Sulfate



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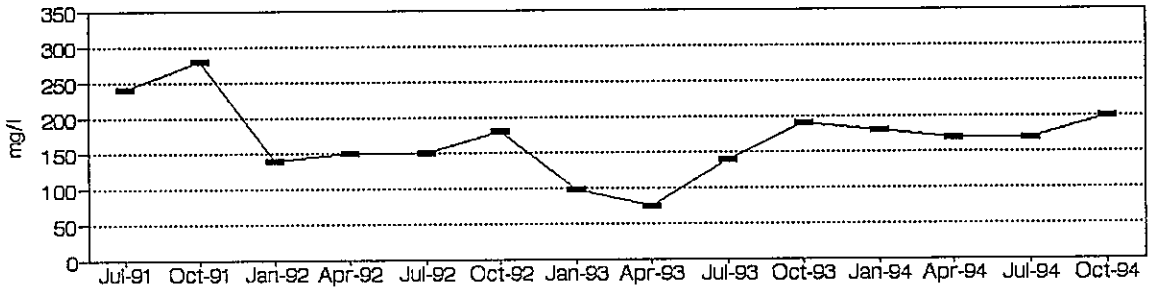
TDS

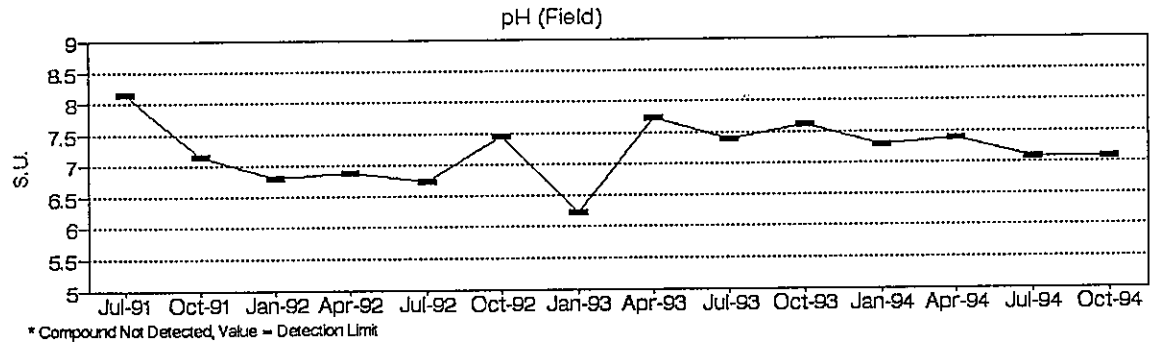


* Compound Not Detected, Value = Detection Limit

Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Groundwater Quality Results

MW-1004P



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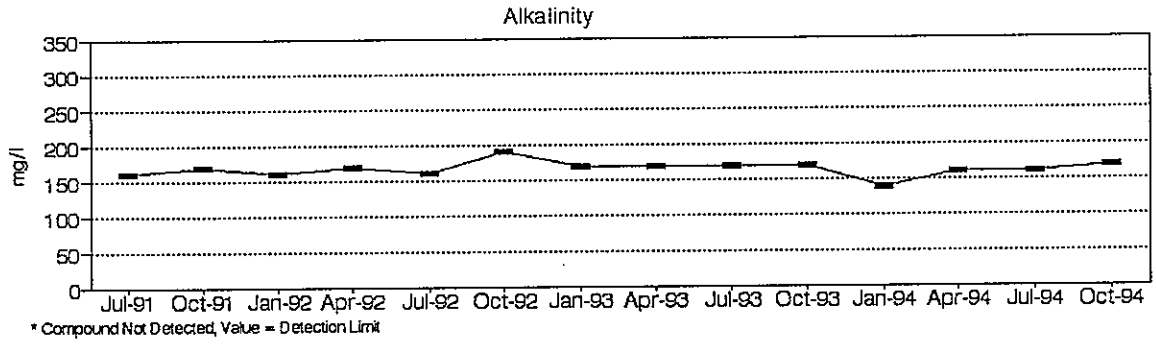

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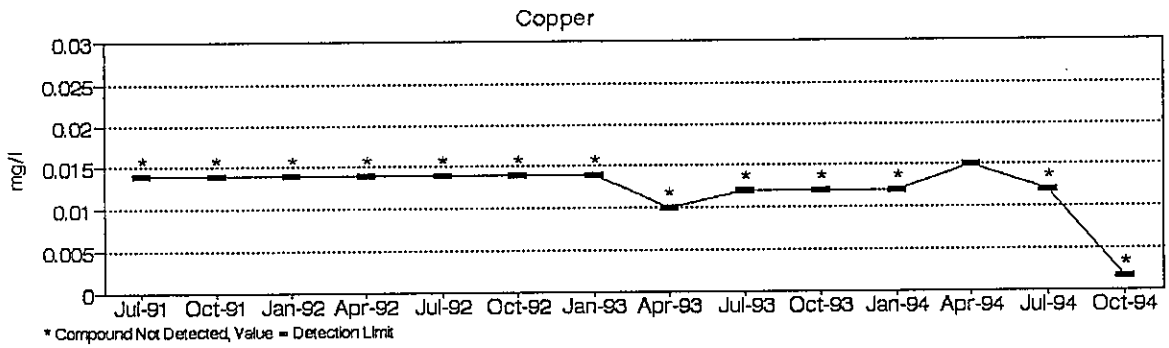

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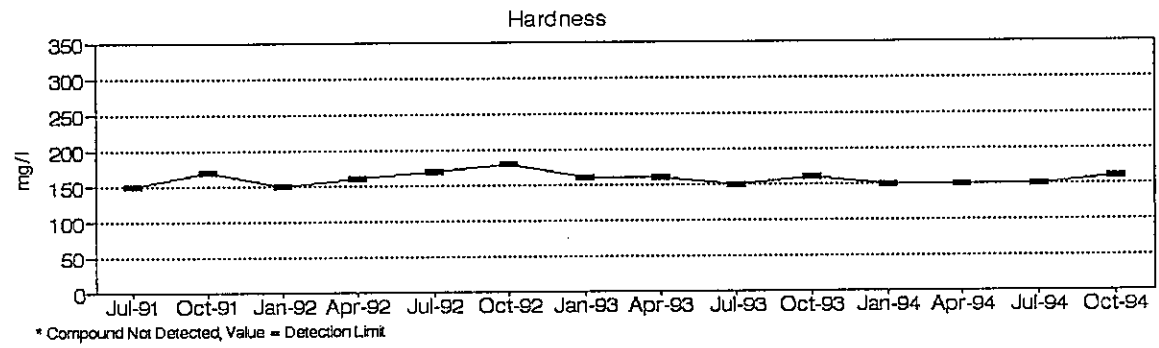


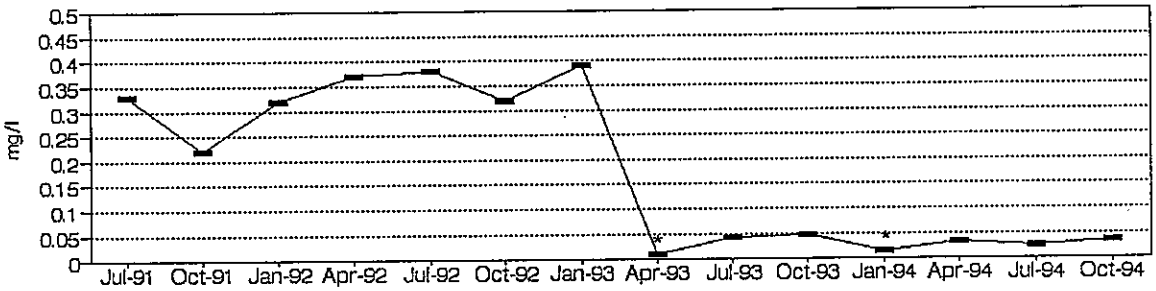
* Compound Not Detected, Value = Detection Limit

Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Groundwater Quality Results

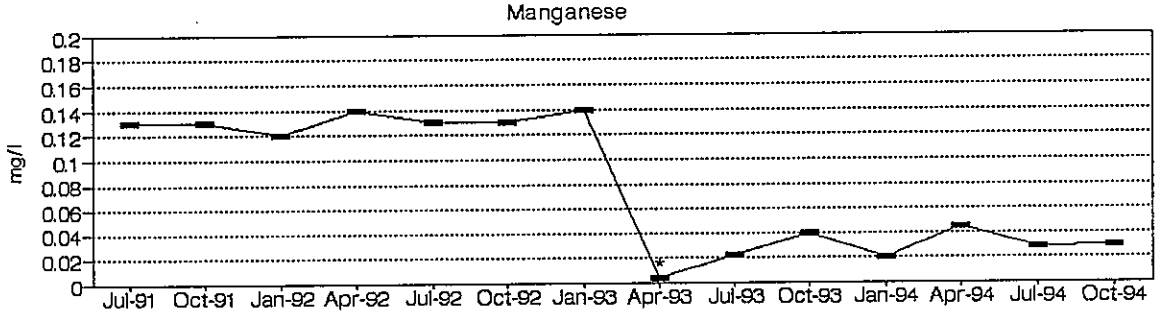
MW-1004P

Iron



* Compound Not Detected, Value = Detection Limit

Manganese



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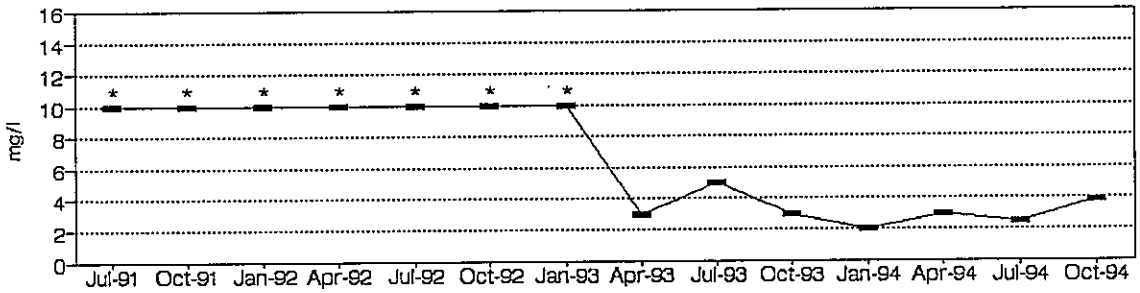
Sulfate



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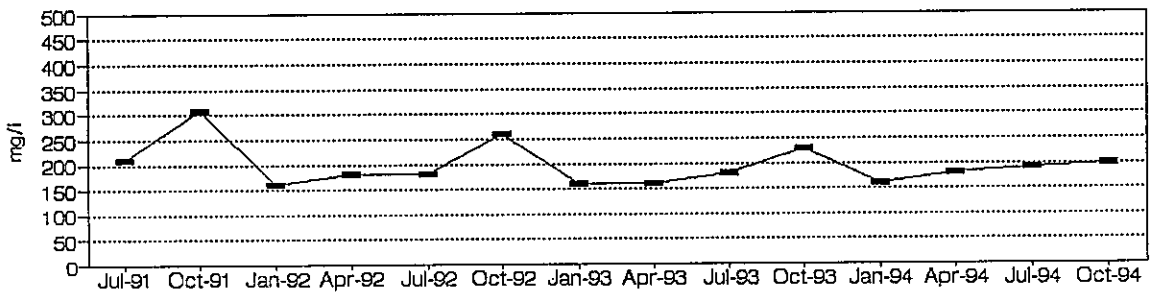
TDS



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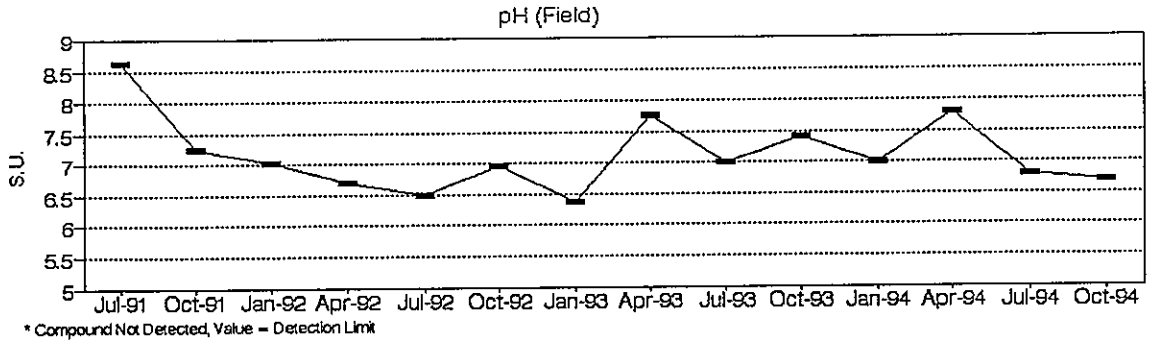
Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Groundwater Quality Results

MW-1004S



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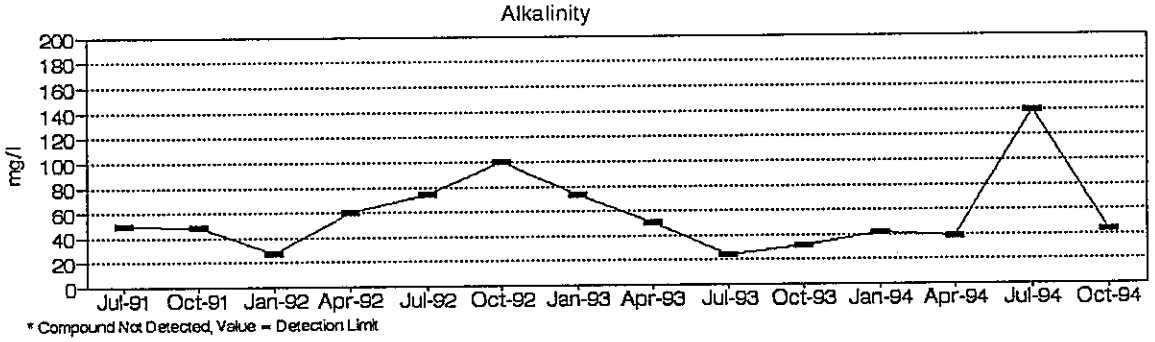

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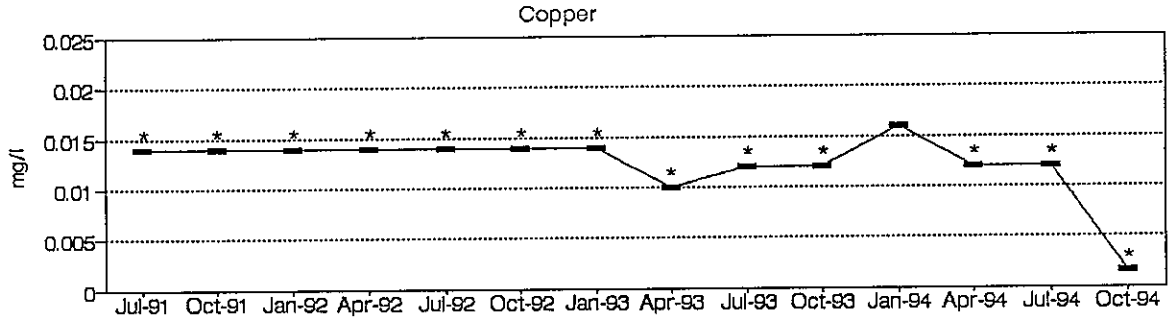

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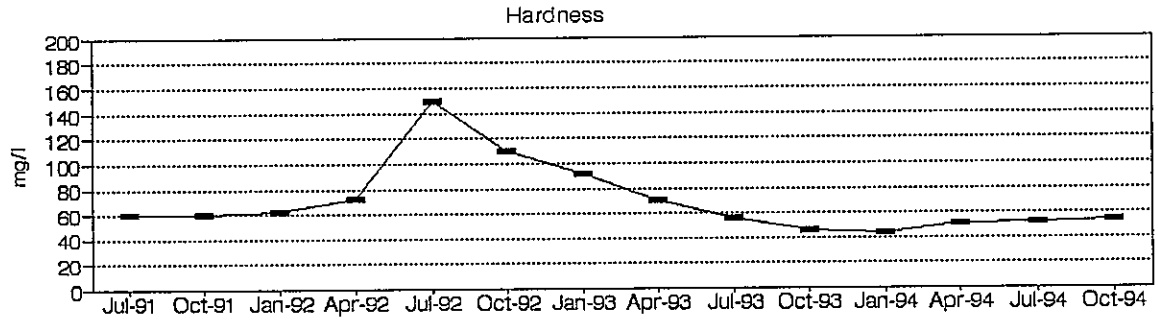

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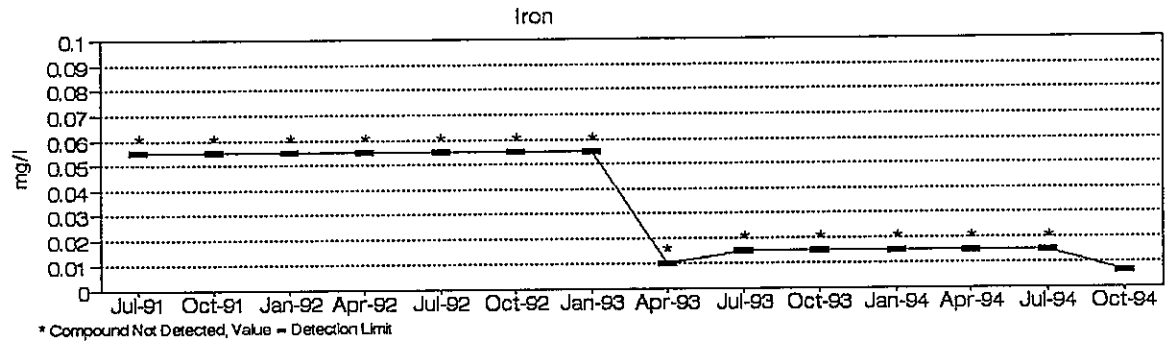
Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Groundwater Quality Results

MW-1004S



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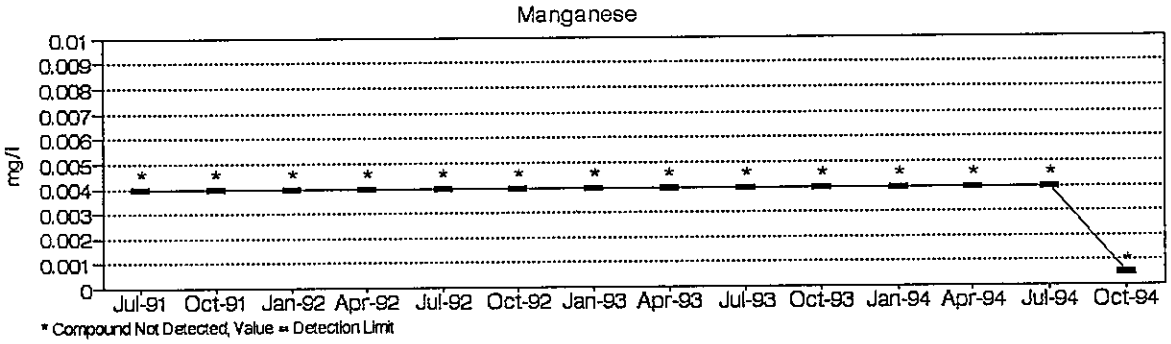

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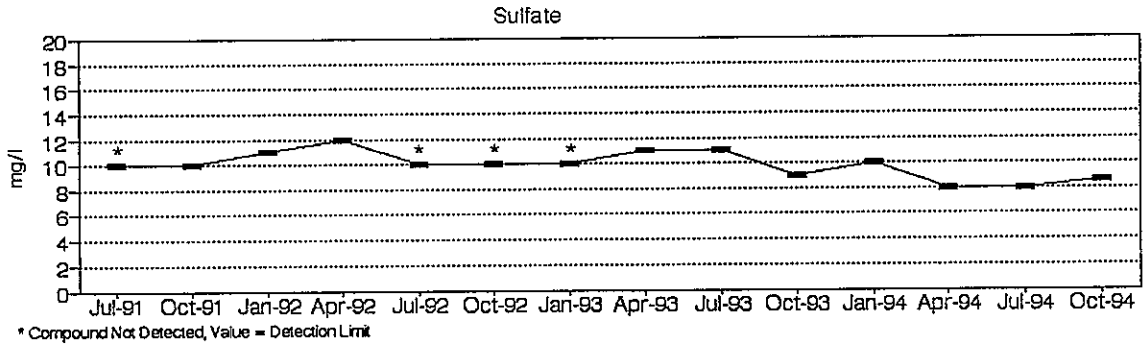

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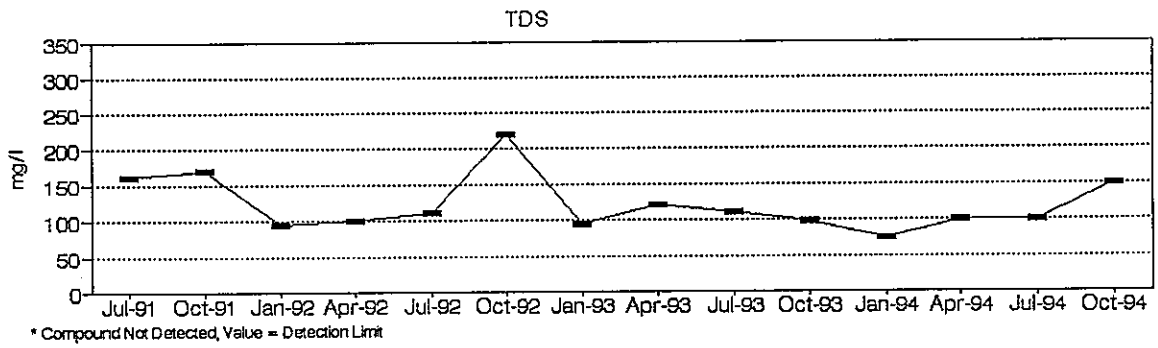

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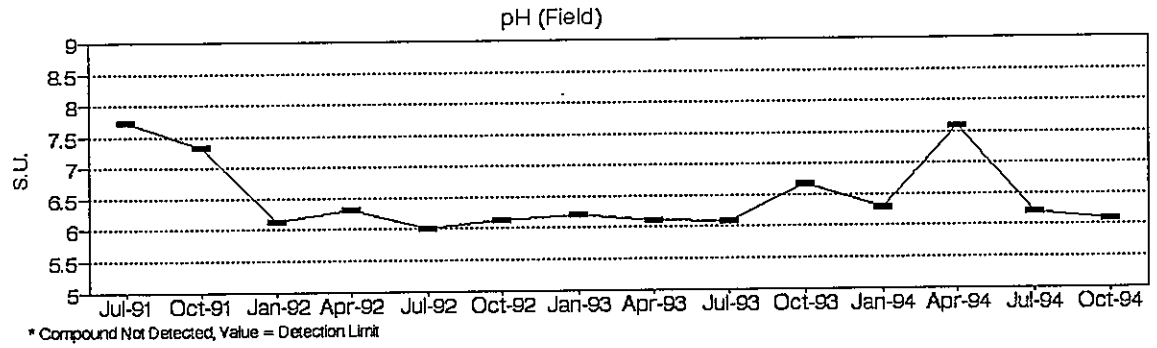
Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Groundwater Quality Results

MW-1005



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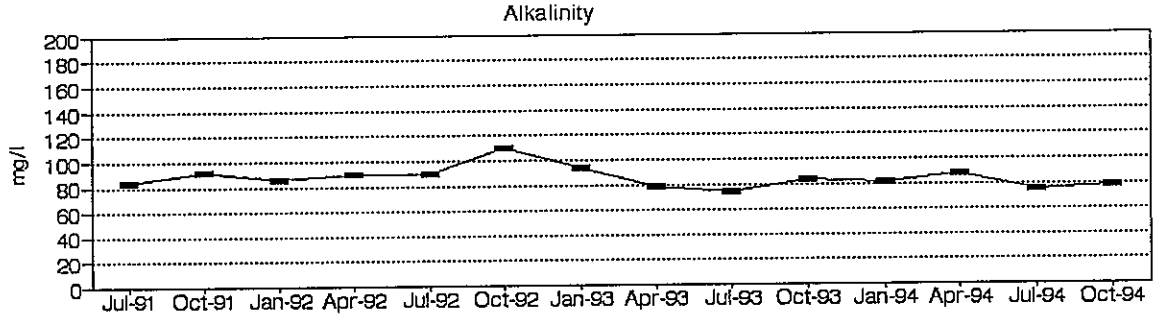

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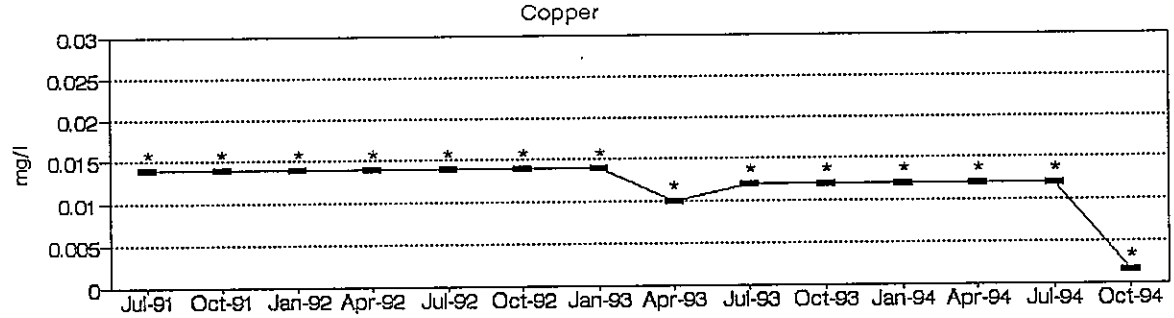

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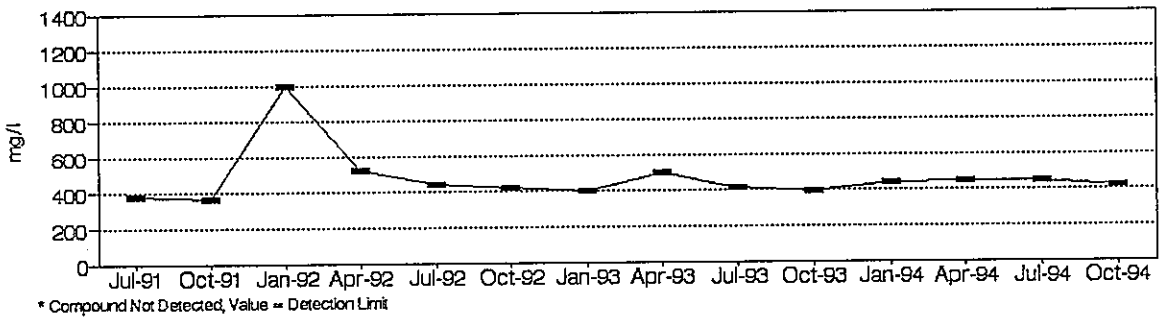

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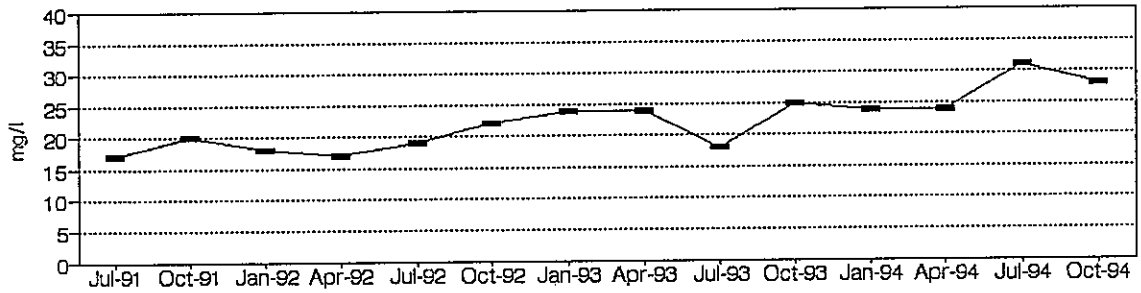
Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Groundwater Quality Results

MW-1005

Iron



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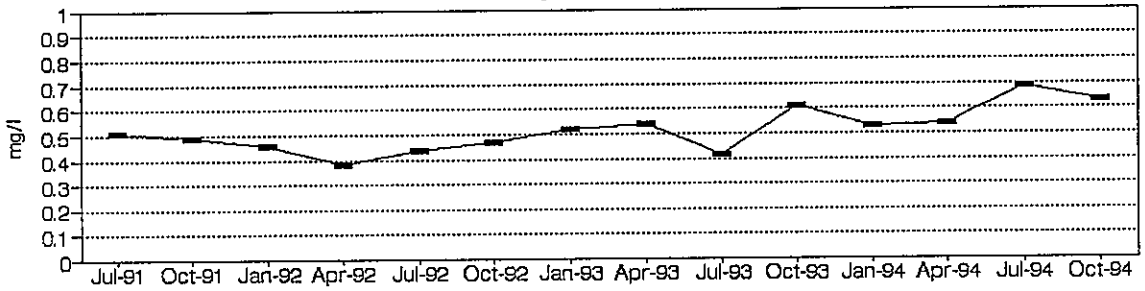
Manganese



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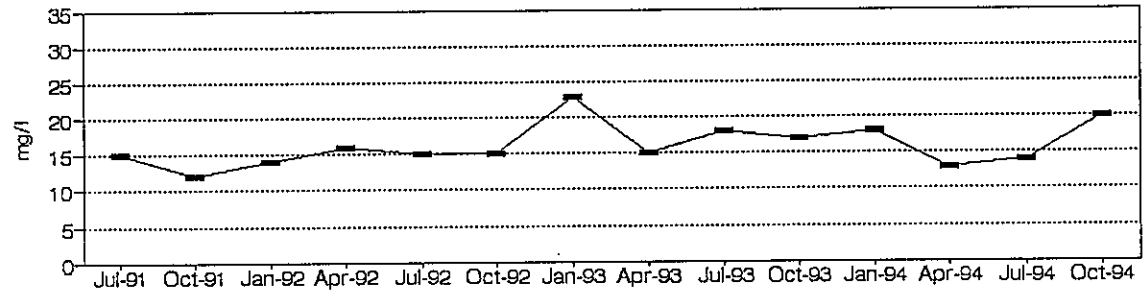
Sulfate



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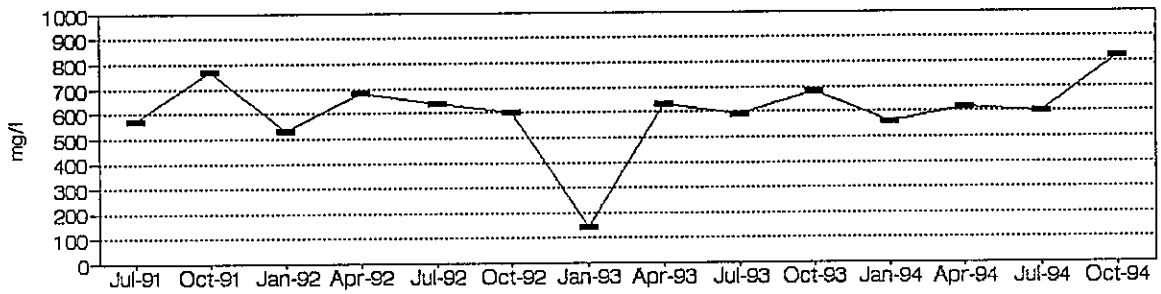
TDS



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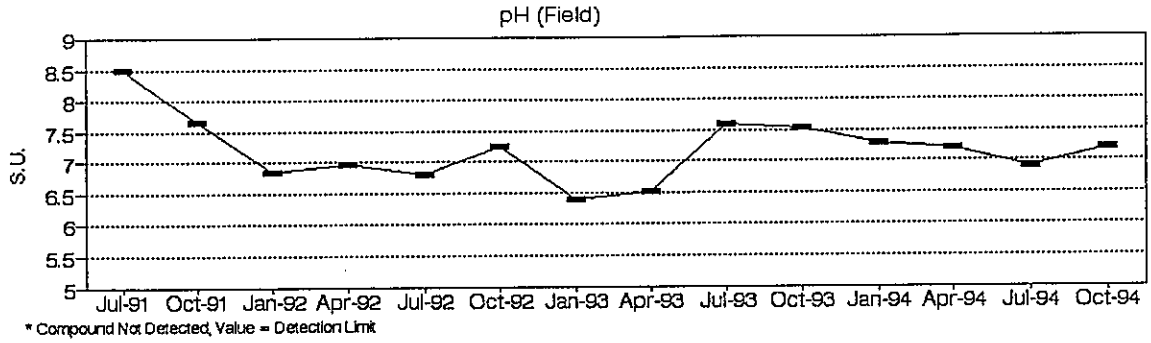
Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Groundwater Quality Results

MW-1005P



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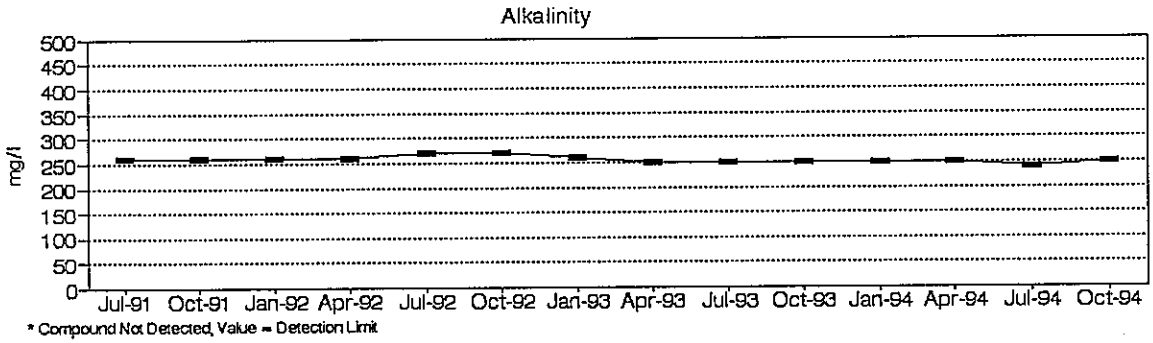

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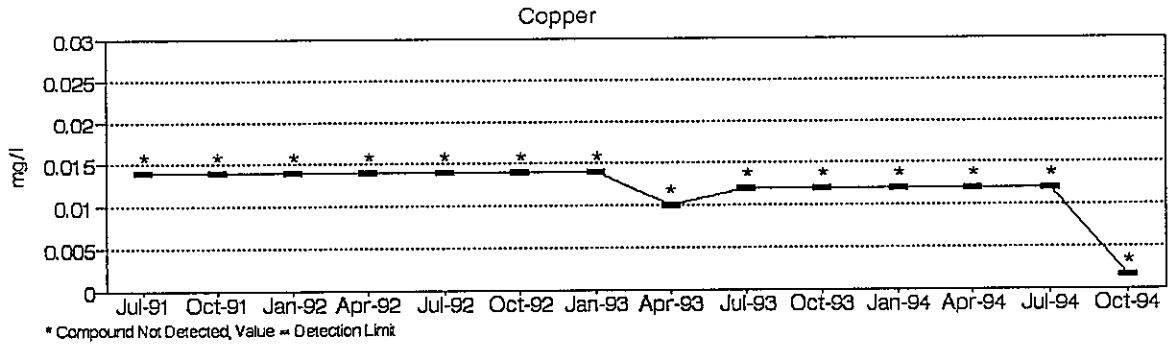

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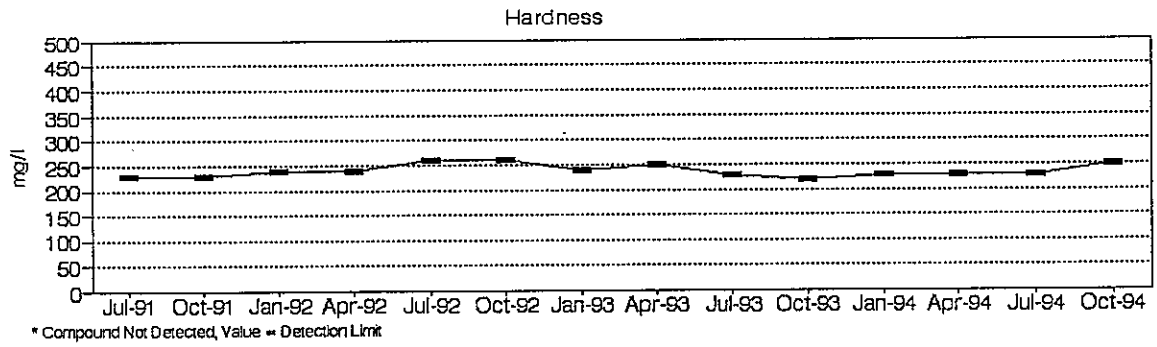

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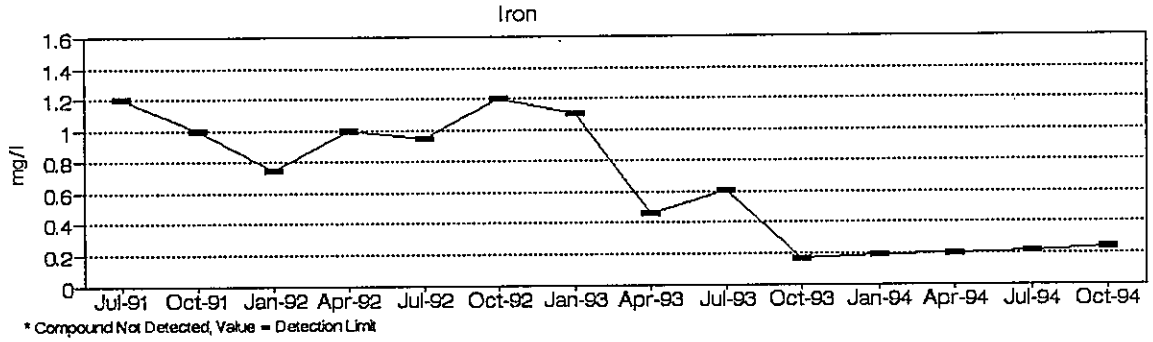
Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Groundwater Quality Results

MW-1005P



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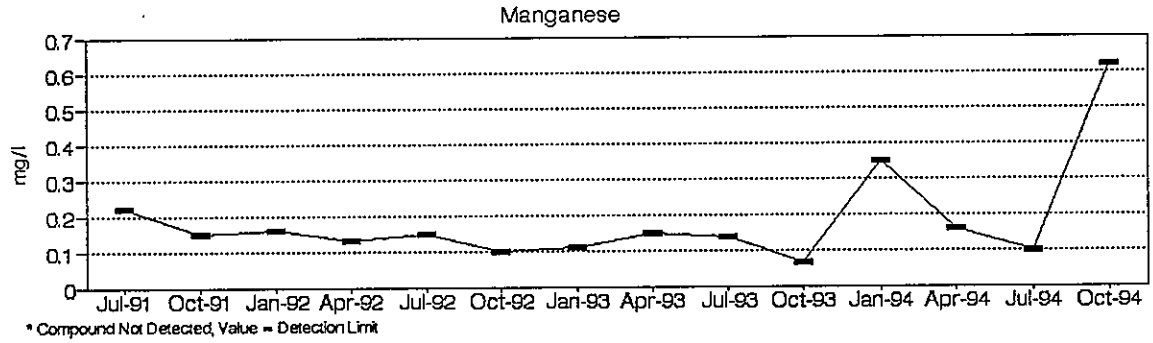

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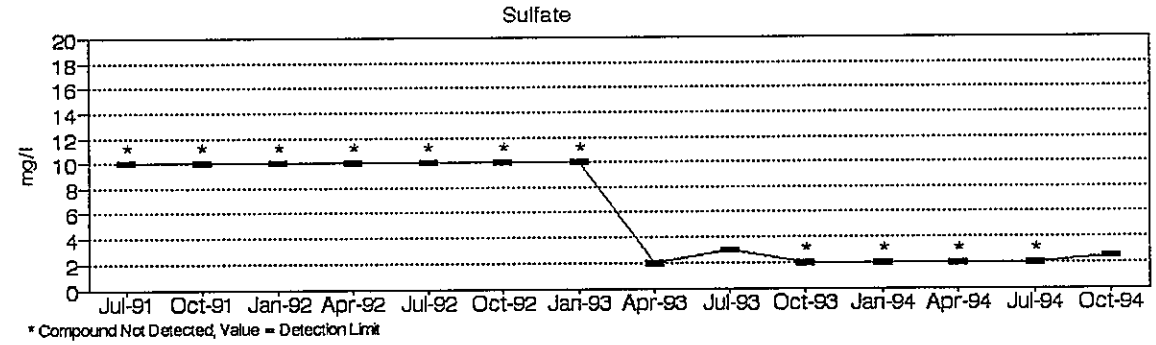

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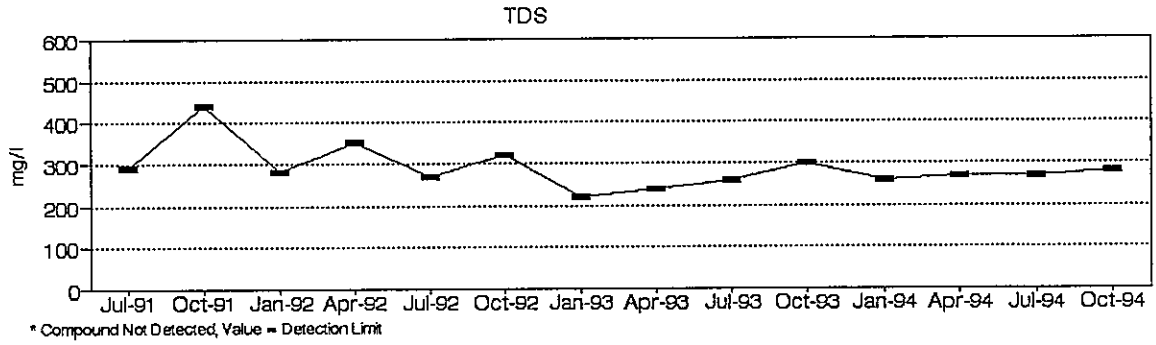
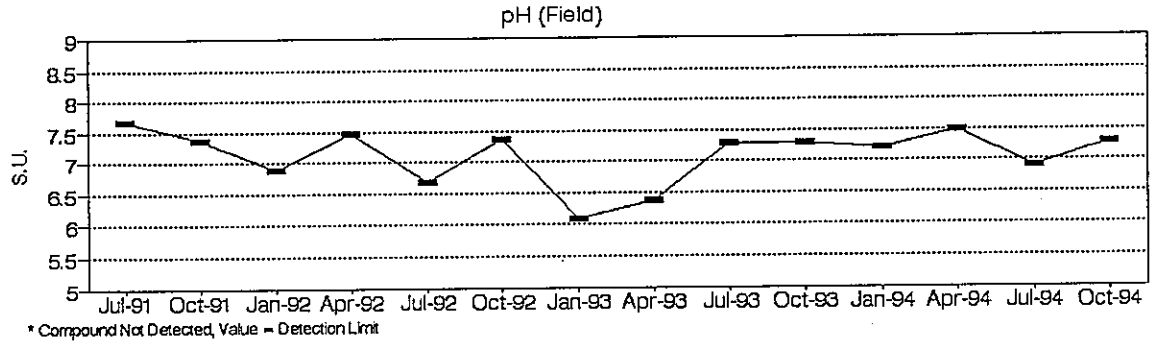


* Compound Not Detected, Value = Detection Limit

Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Groundwater Quality Results

MW-1005S



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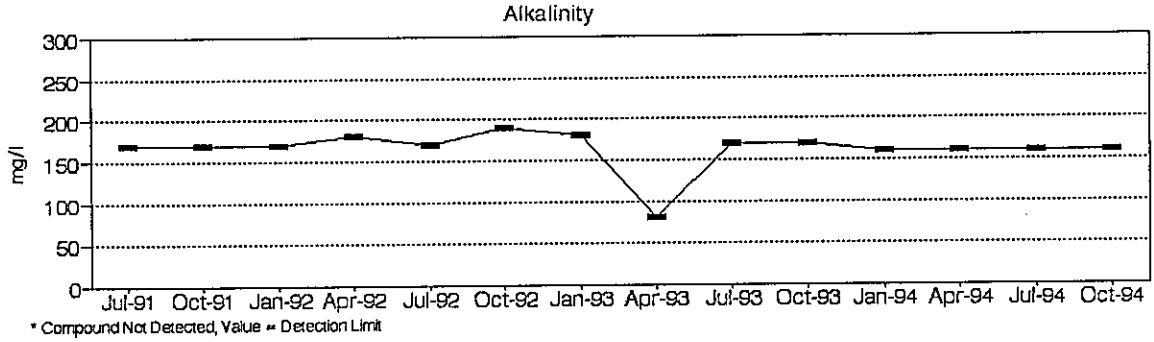

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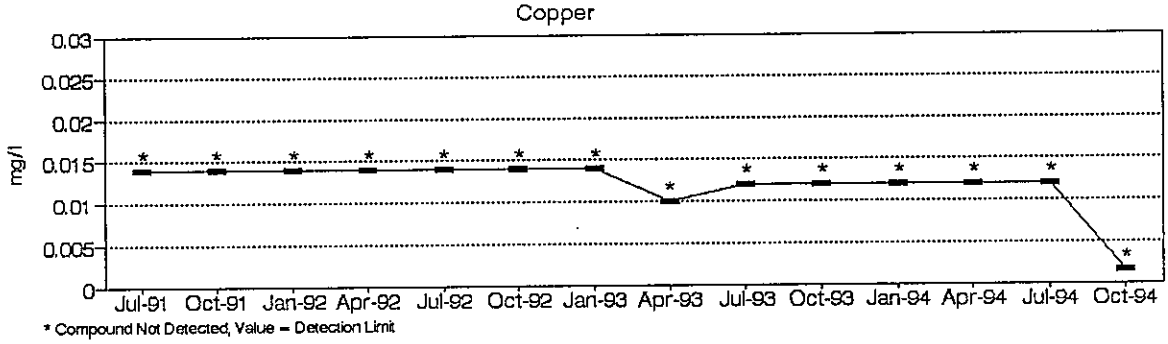

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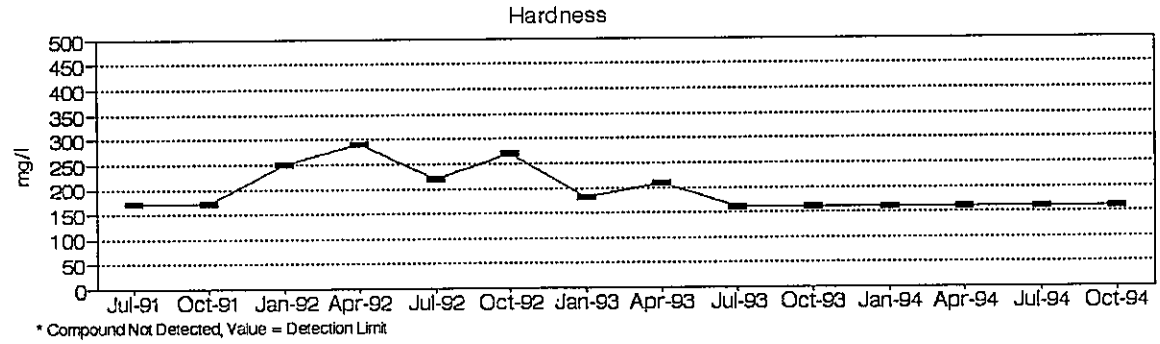
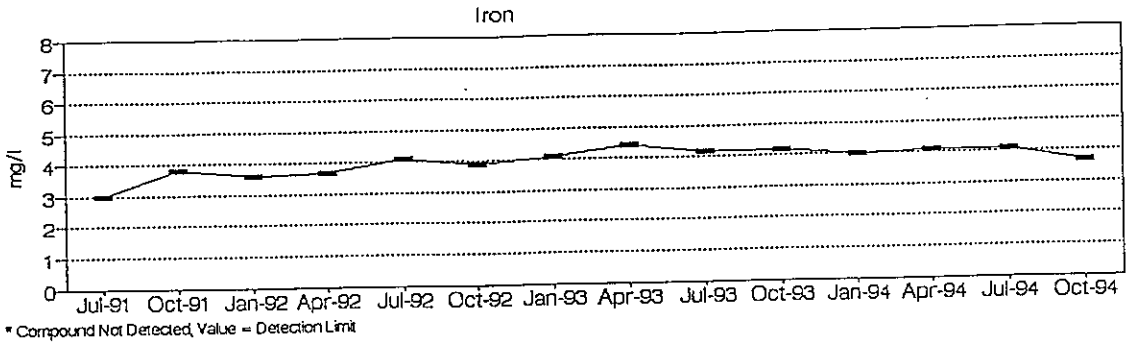


* Compound Not Detected, Value = Detection Limit

Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Groundwater Quality Results

MW-1005S



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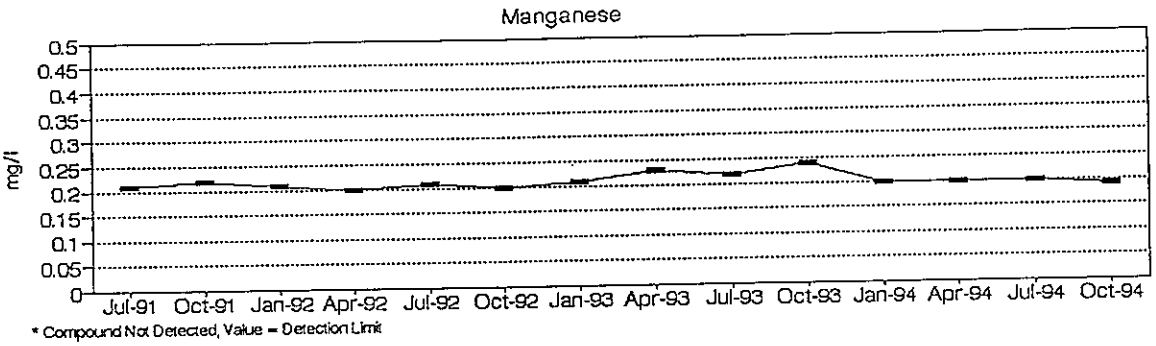

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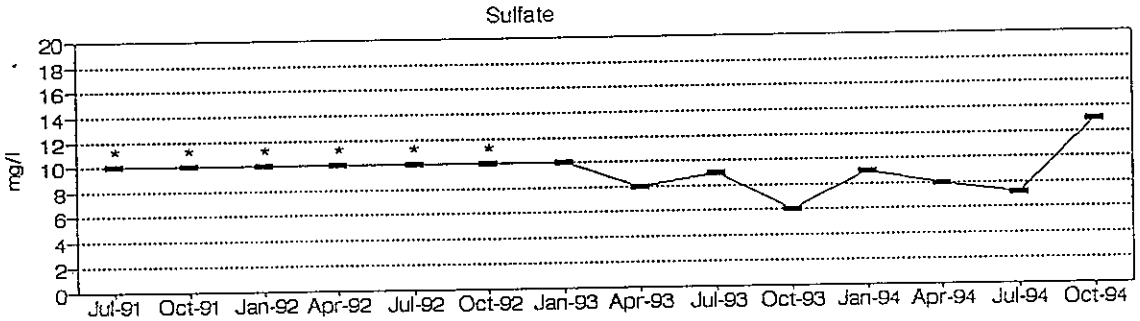

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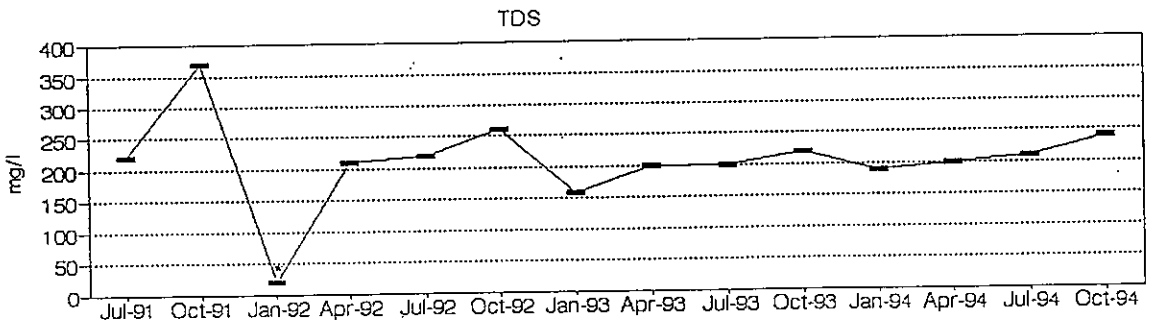
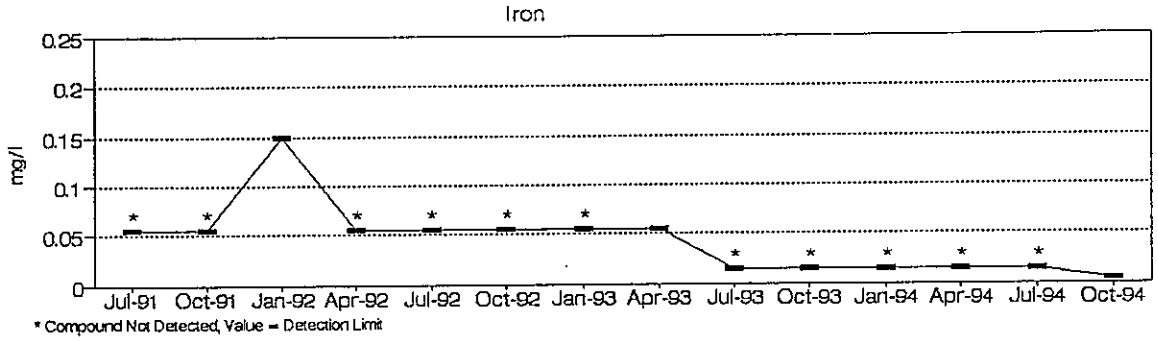


* Compound Not Detected, Value = Detection Limit

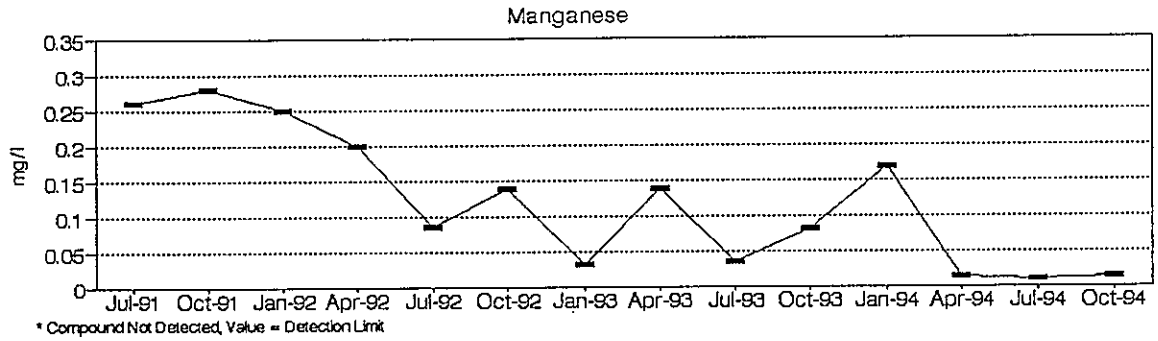
Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Groundwater Quality Results

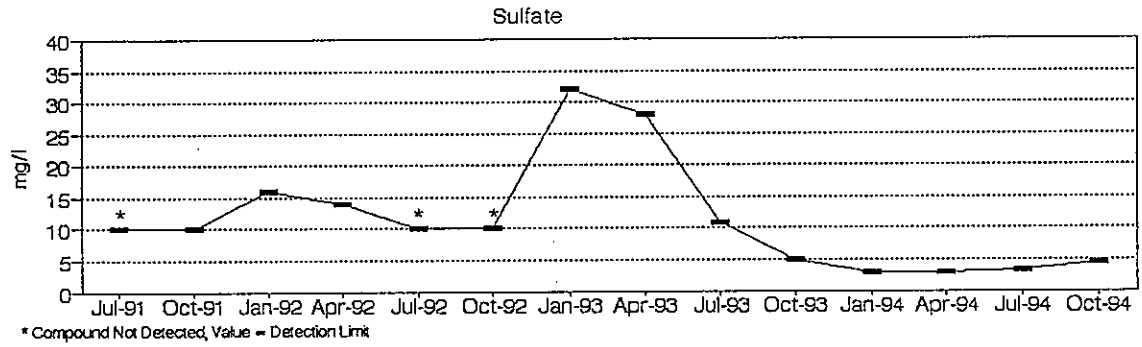
MW-1010P



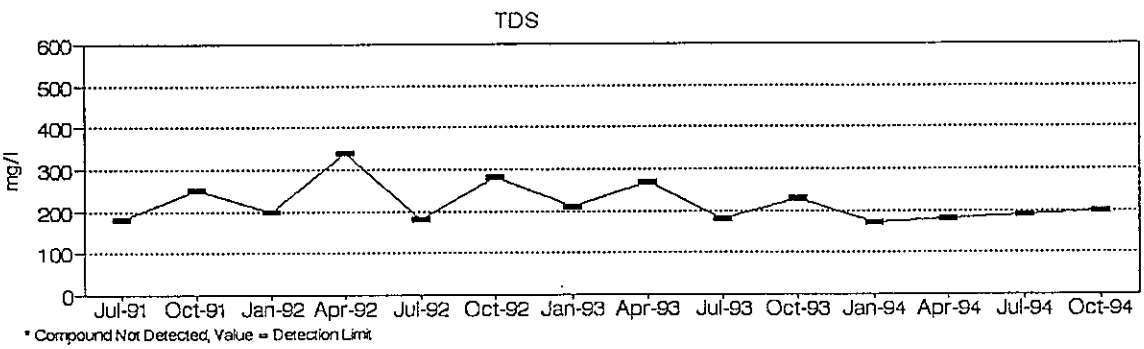
* Compound Not Detected, Value = Detection Limit



* Compound Not Detected, Value = Detection Limit



* Compound Not Detected, Value = Detection Limit

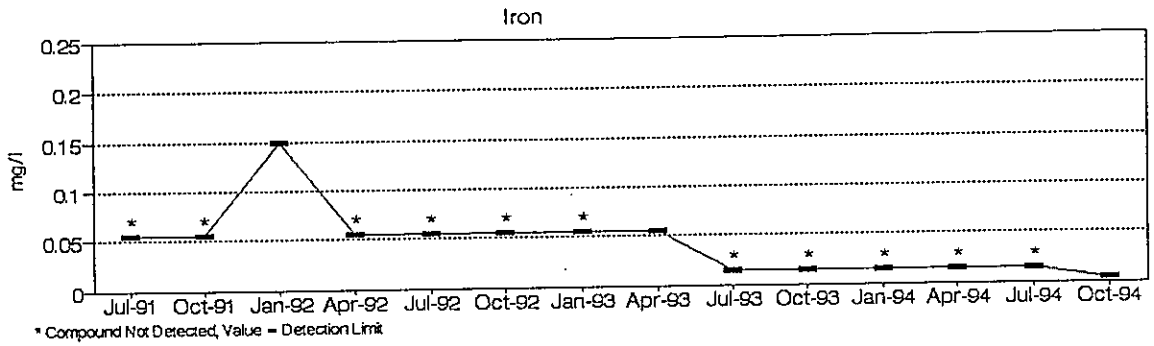


* Compound Not Detected, Value = Detection Limit

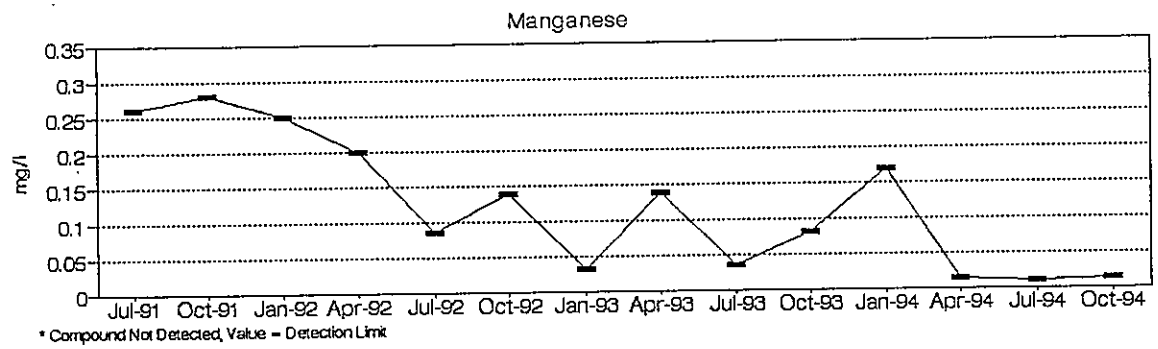
Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Groundwater Quality Results

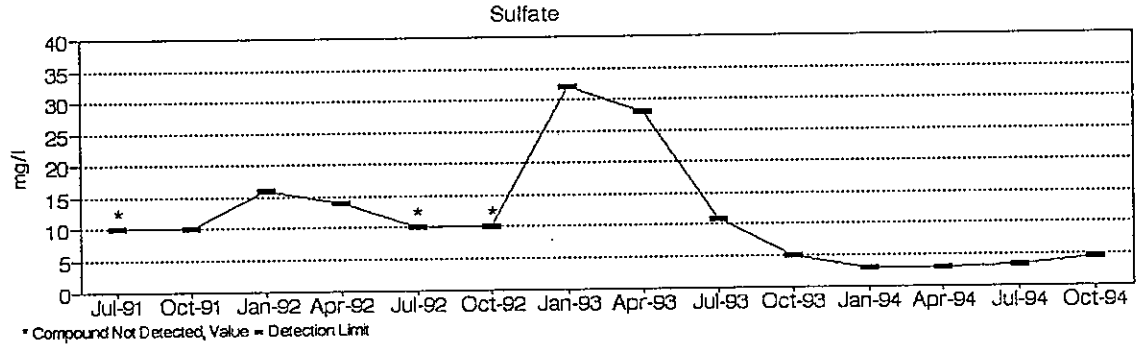
MW-1010P



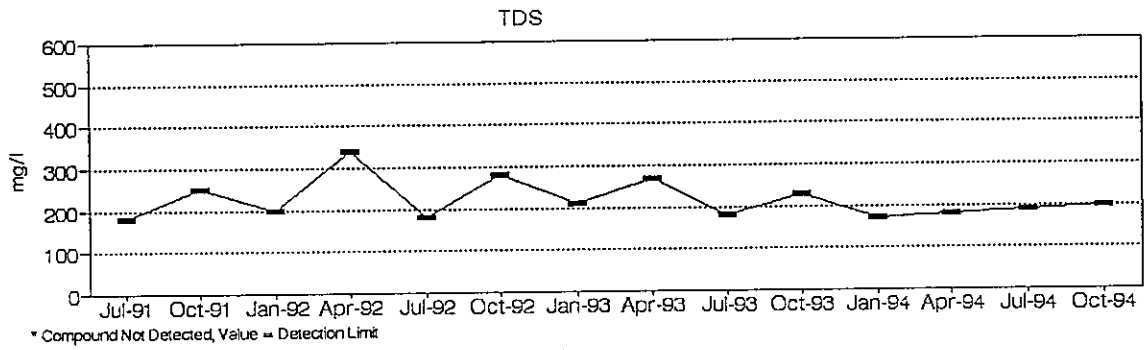
* Compound Not Detected, Value = Detection Limit



* Compound Not Detected, Value = Detection Limit



* Compound Not Detected, Value = Detection Limit



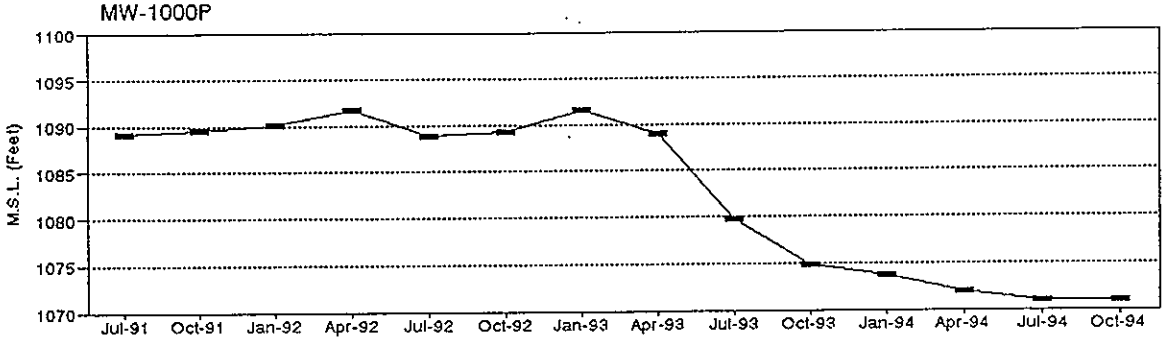
* Compound Not Detected, Value = Detection Limit

Prepared By: SGL Checked By: JBH1

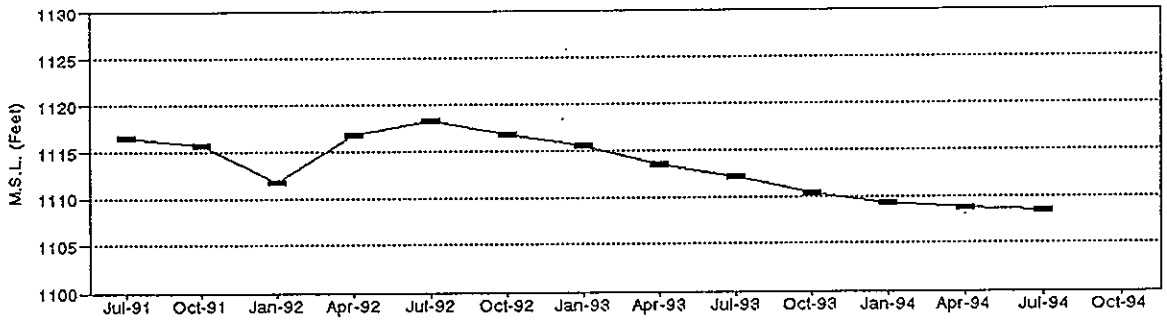
Flambeau Mining Company

Groundwater Elevation Results

MW-1000P

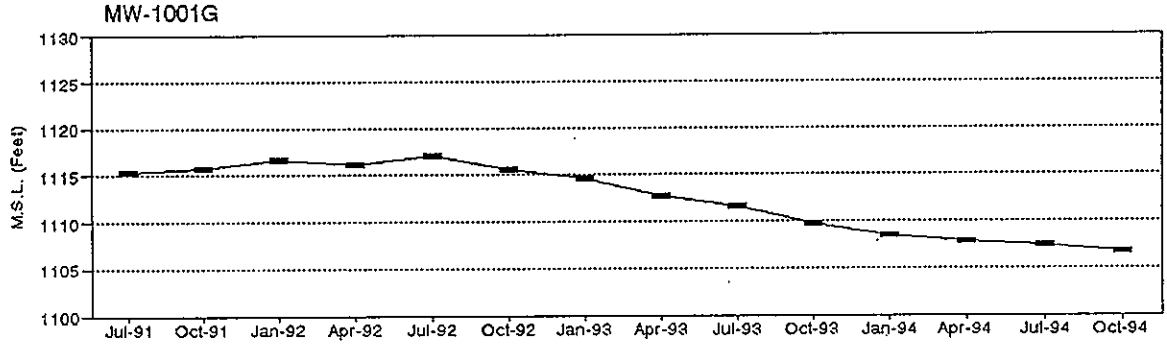


MW-1001

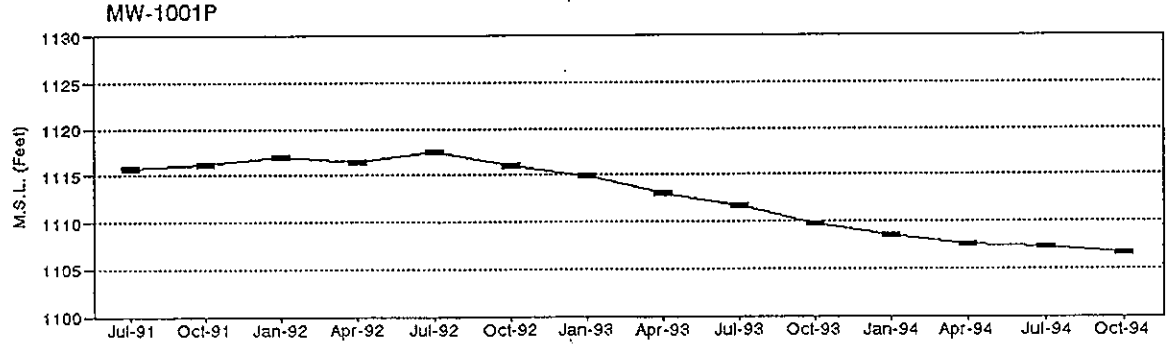


October 1994-Dry

MW-1001G



MW-1001P

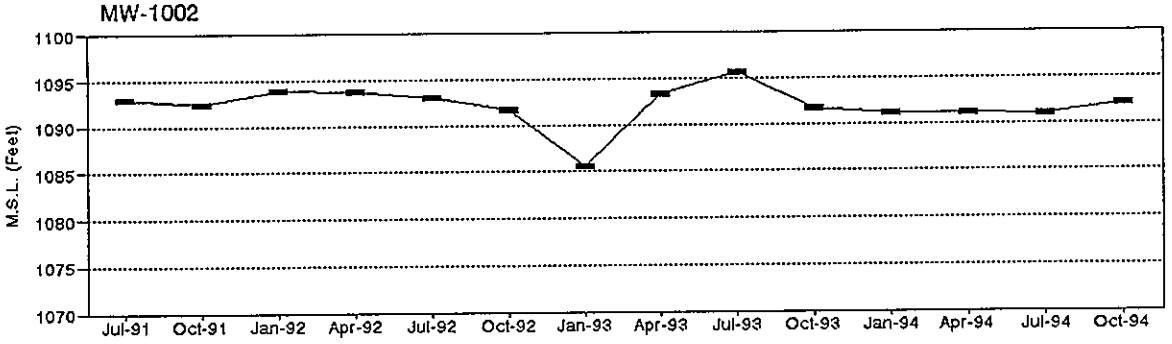


Prepared By: SGL Checked By: JBH1

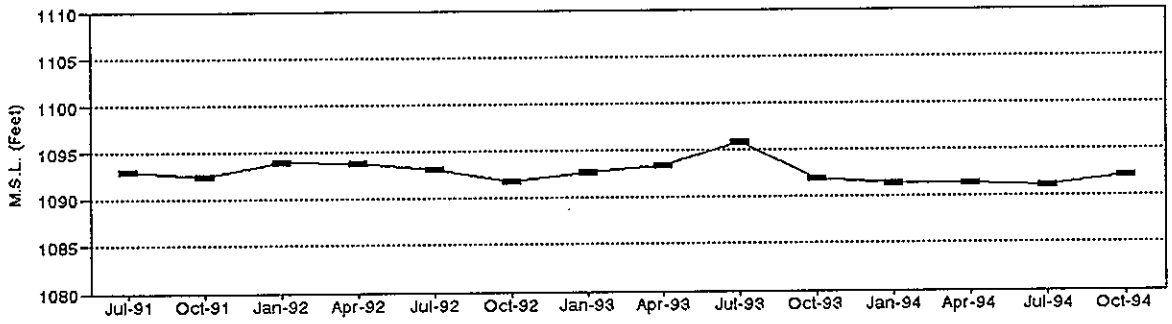
Flambeau Mining Company

Groundwater Elevation Results

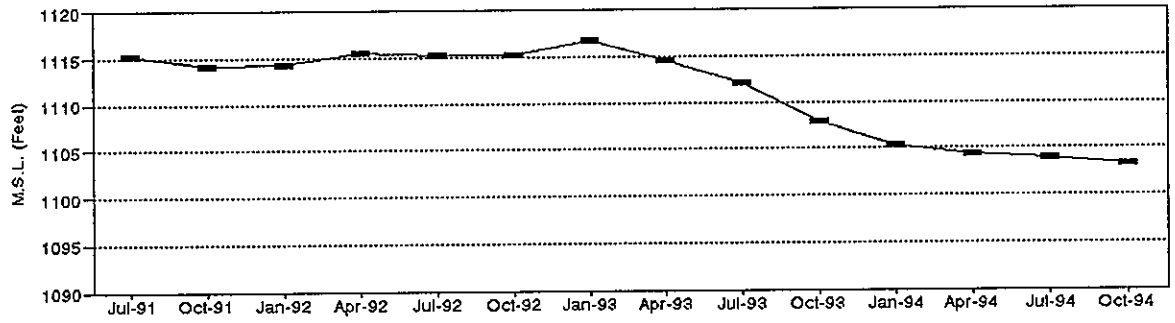
MW-1002



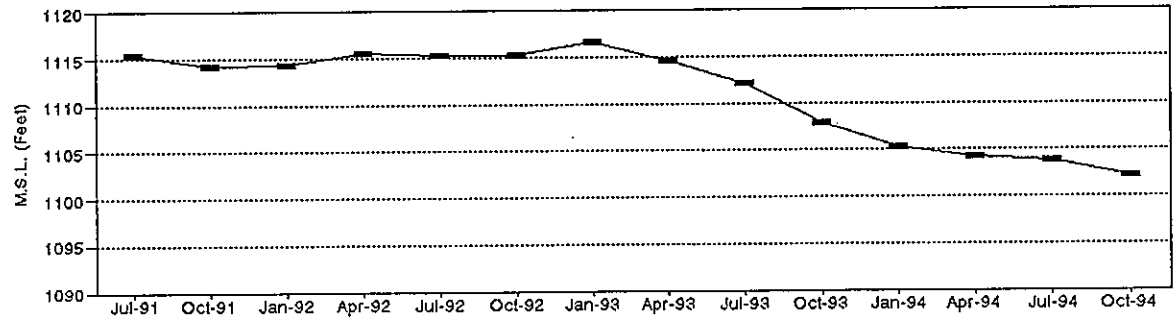
MW-1002G



MW-1003



MW-1003P

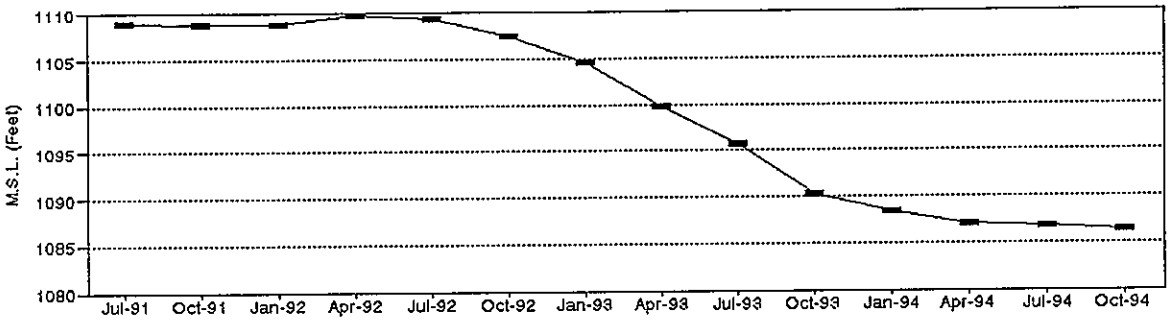


Prepared By: SGL Checked By: JBH1

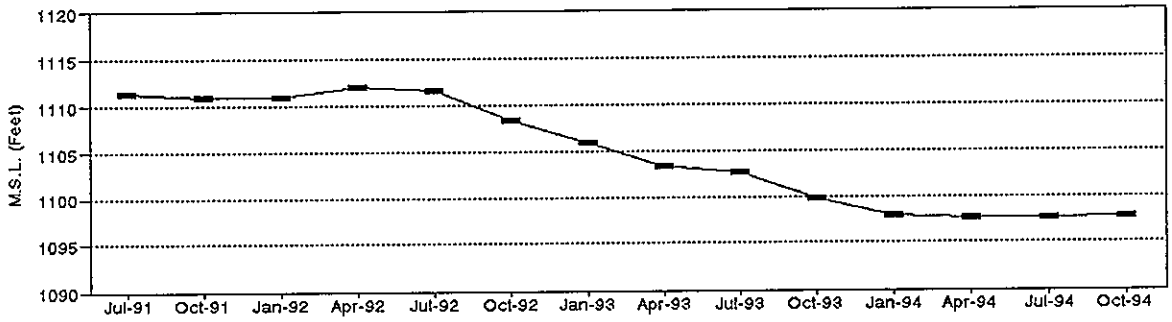
Flambeau Mining Company

Groundwater Elevation Results

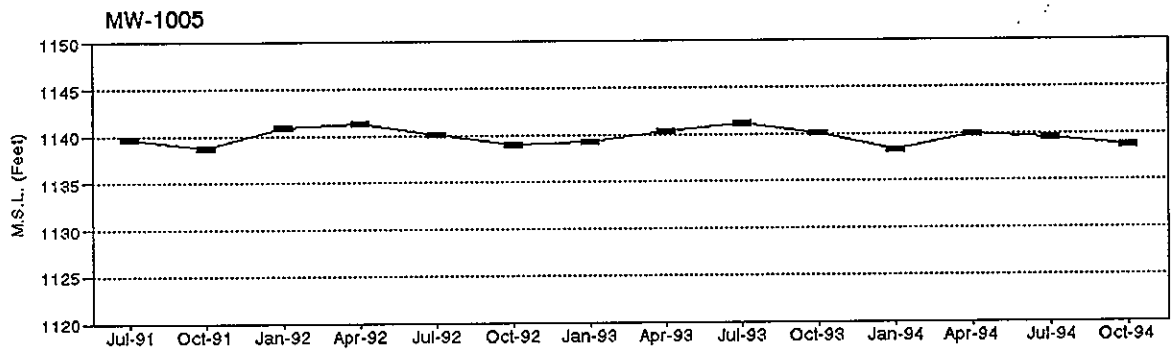
MW-1004P



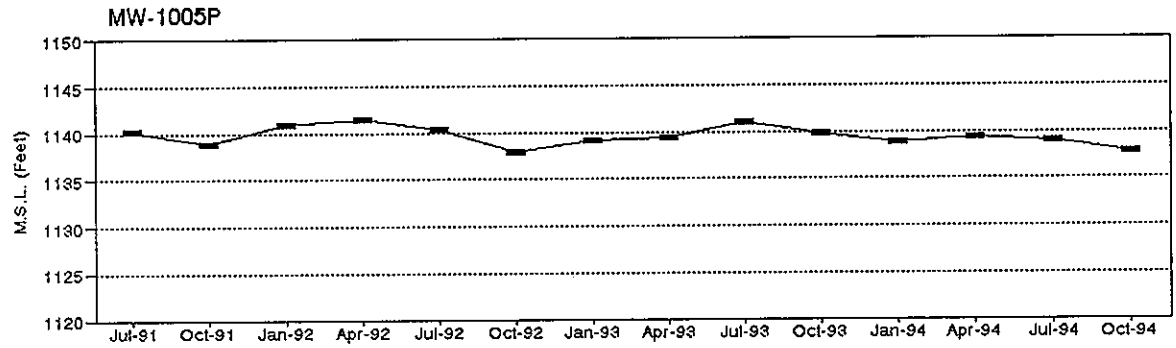
MW-1004S



MW-1005



MW-1005P

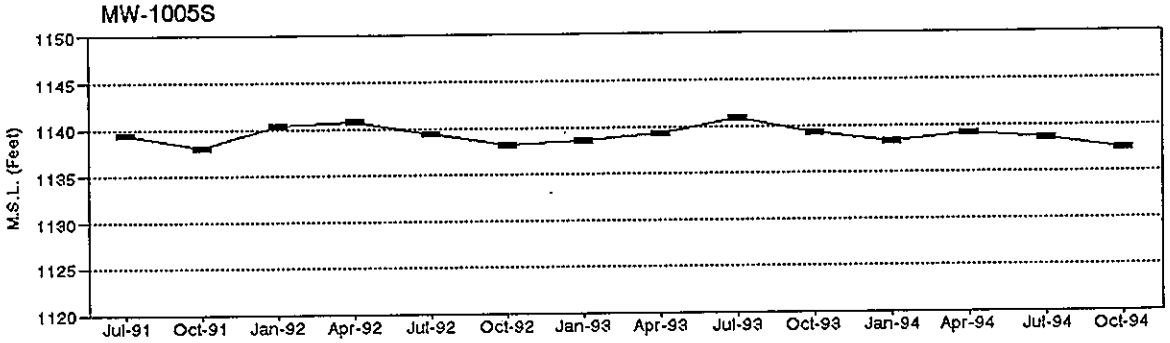


Prepared By: SGL Checked By: JBH1

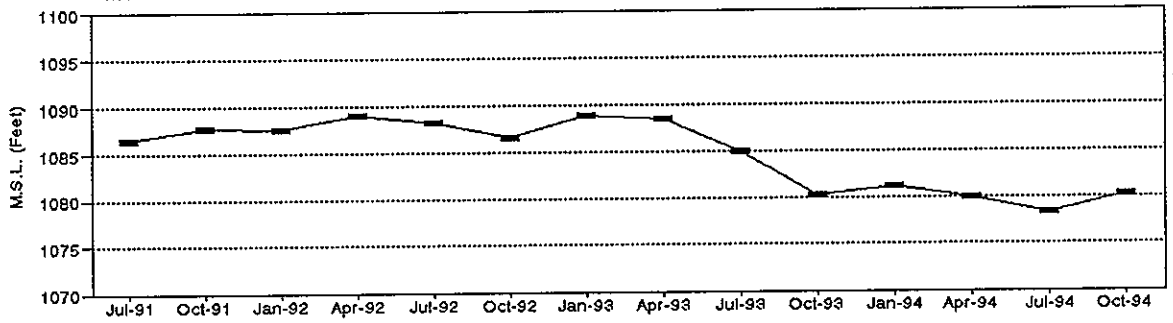
Flambeau Mining Company

Groundwater Elevation Results

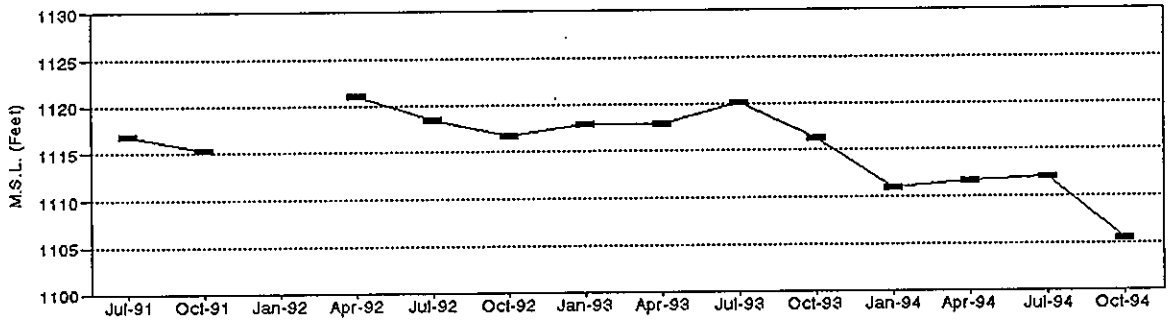
MW-1005S



MW-1010P

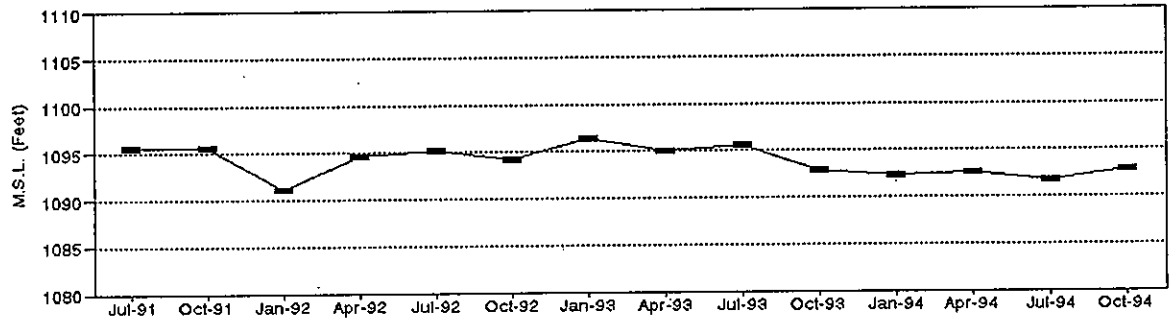


OW-7



January 1992 reading erratic. Validity disputable.

OW-10

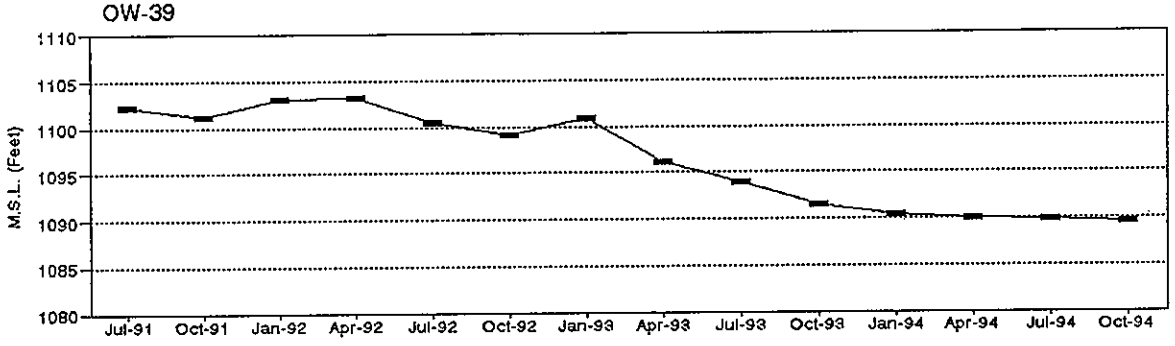


Prepared By: SGL Checked By: JBH1

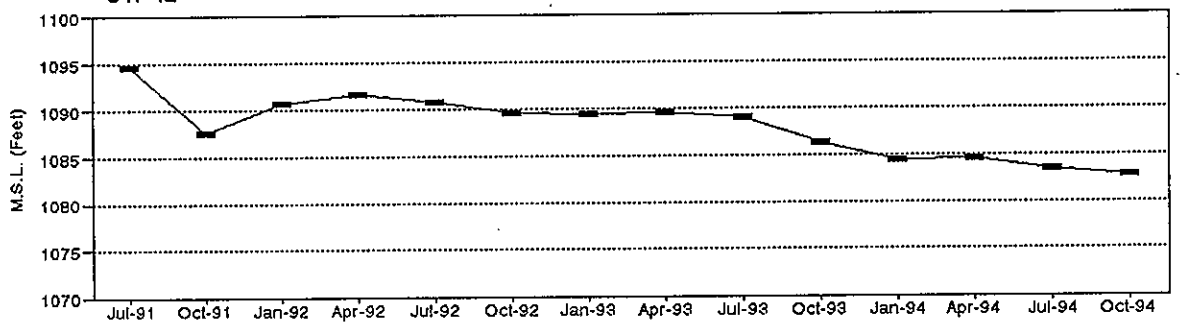
Flambeau Mining Company

Groundwater Elevation Results

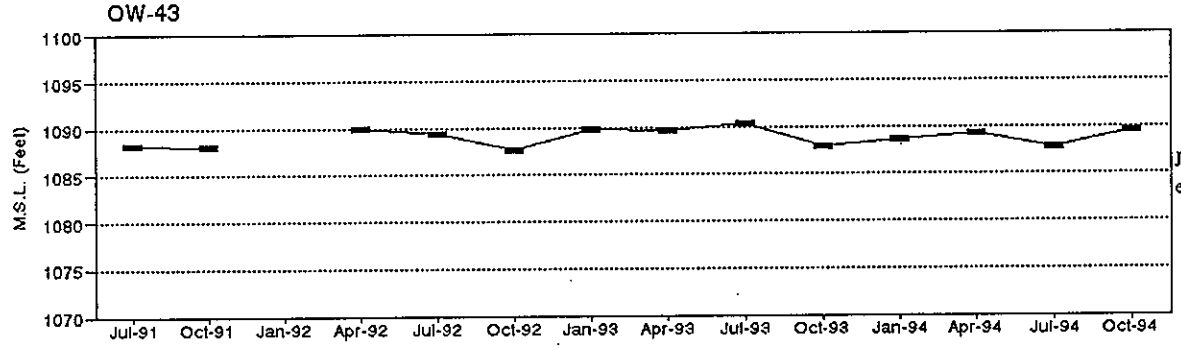
OW-39



OW-42

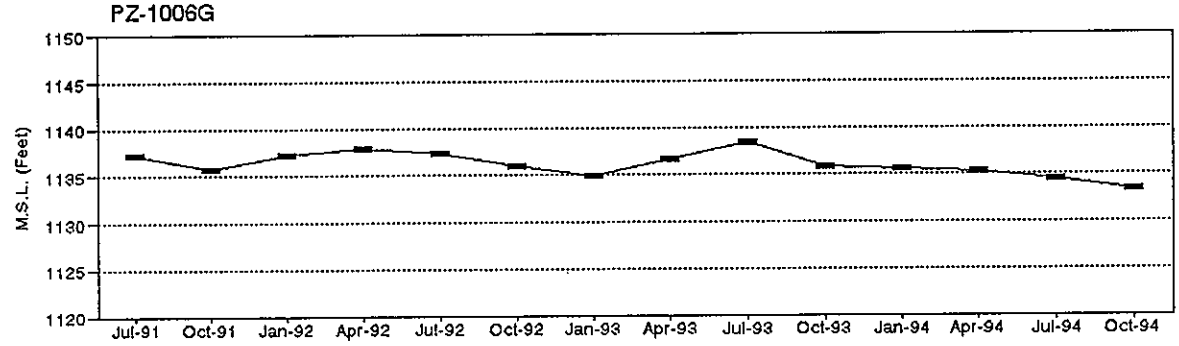


OW-43



January 1992 reading erratic. Validity disputable.

PZ-1006G

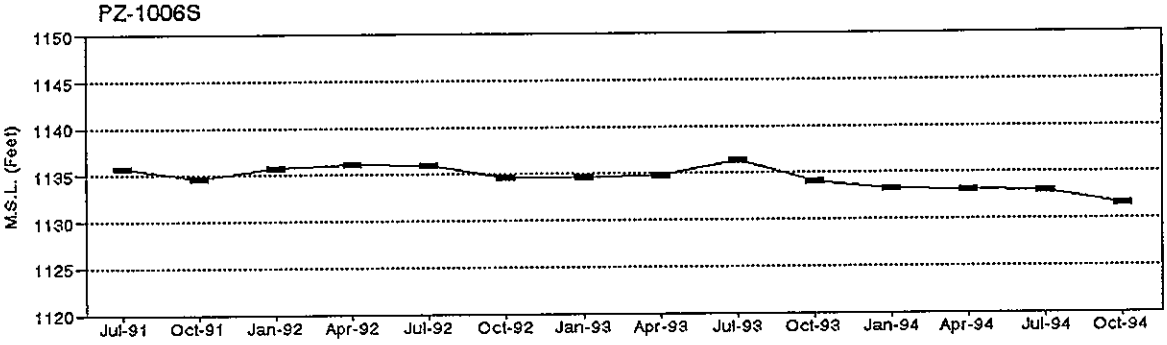


Prepared By: SGL Checked By: JBH1

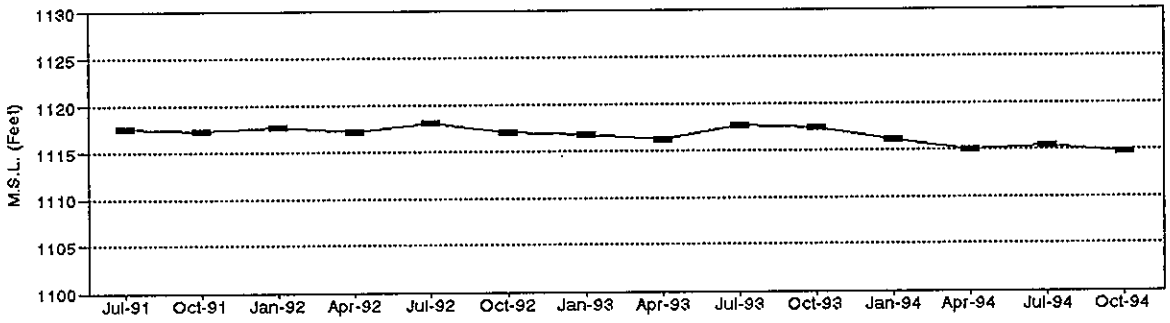
Flambeau Mining Company

Groundwater Elevation Results

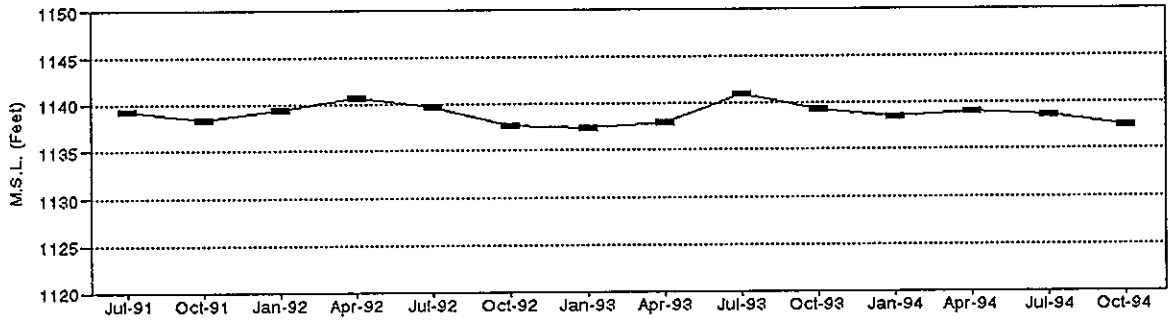
PZ-1006S



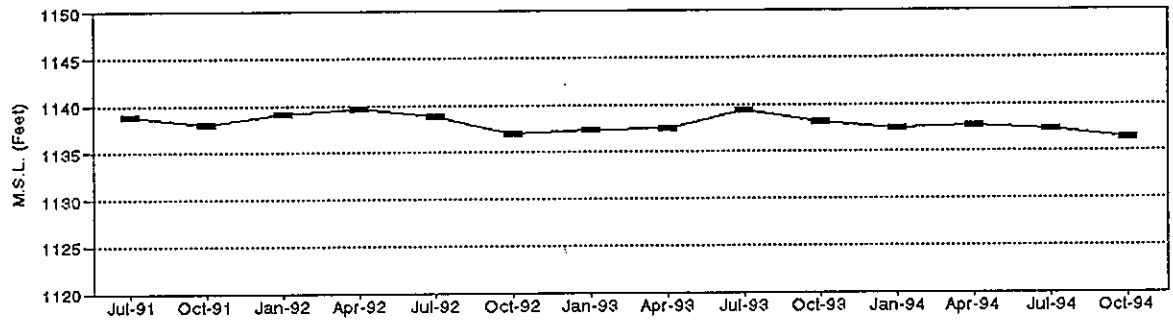
PZ-1007S



PZ-1008



PZ-1008G

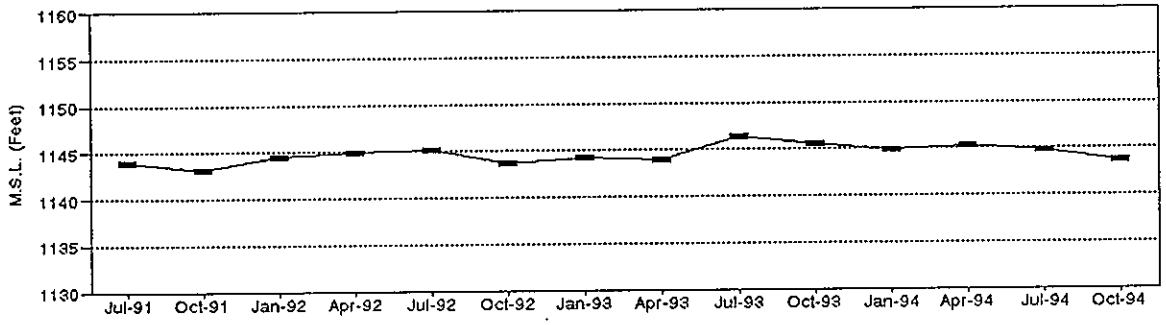


Prepared By: SGL Checked By: JBH1

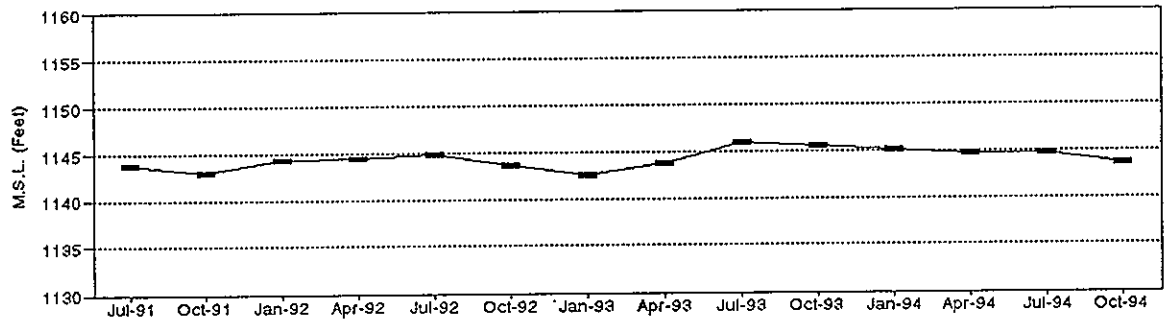
Flambeau Mining Company

Groundwater Elevation Results

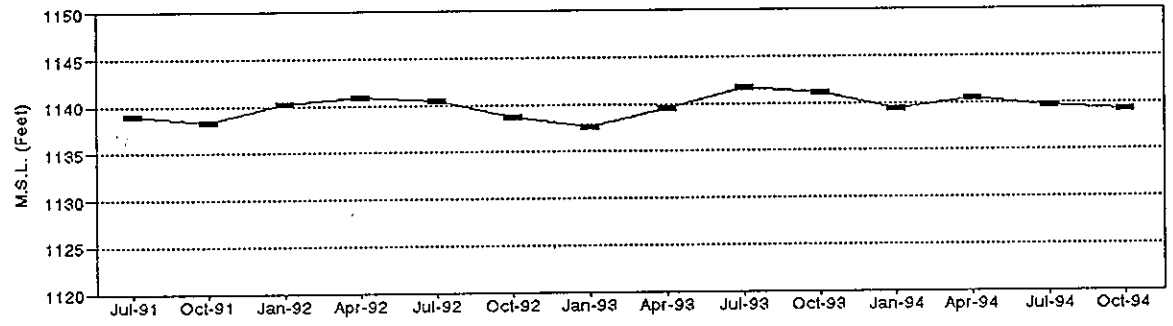
PZ-1009



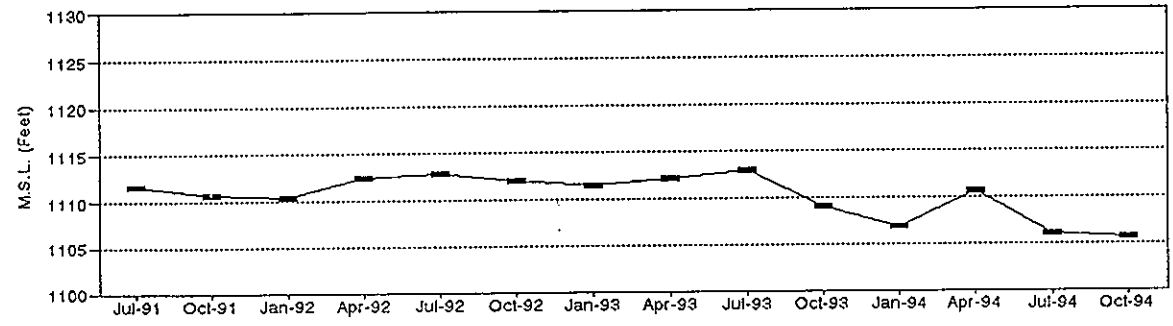
PZ-1009G



PZ-1011



PZ-1012

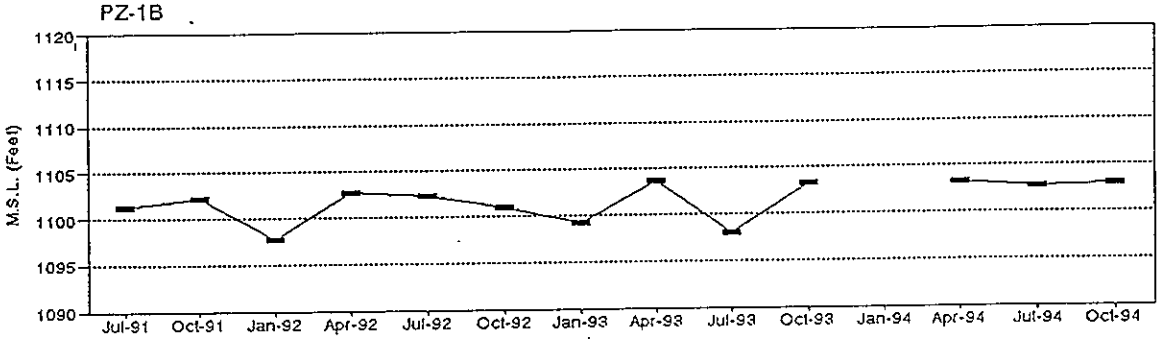


Prepared By: SGL Checked By: JBH1

Flambeau Mining Company

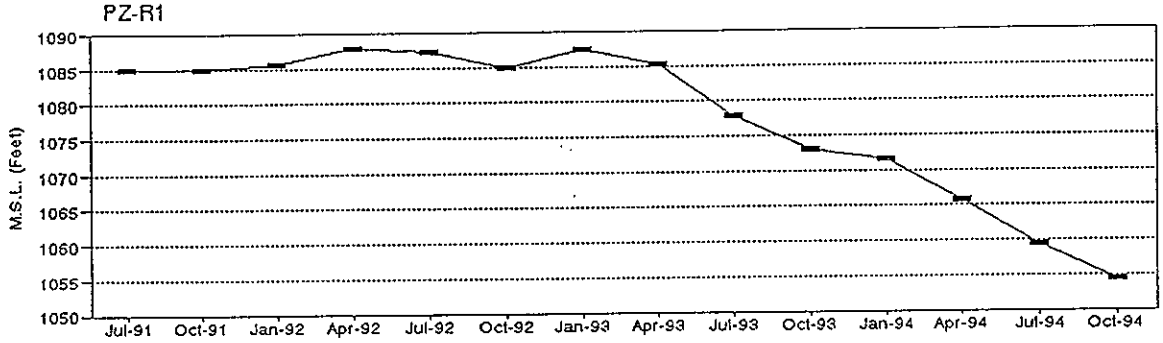
Groundwater Elevation Results

PZ-1B

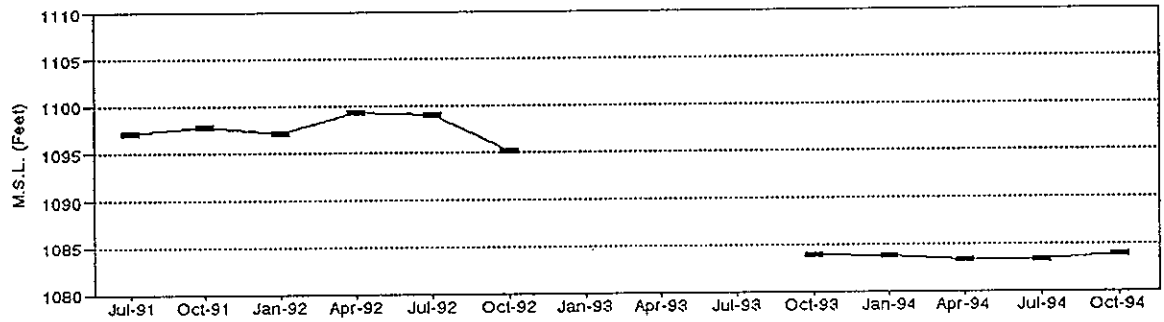


January 1994-Dry

PZ-R1

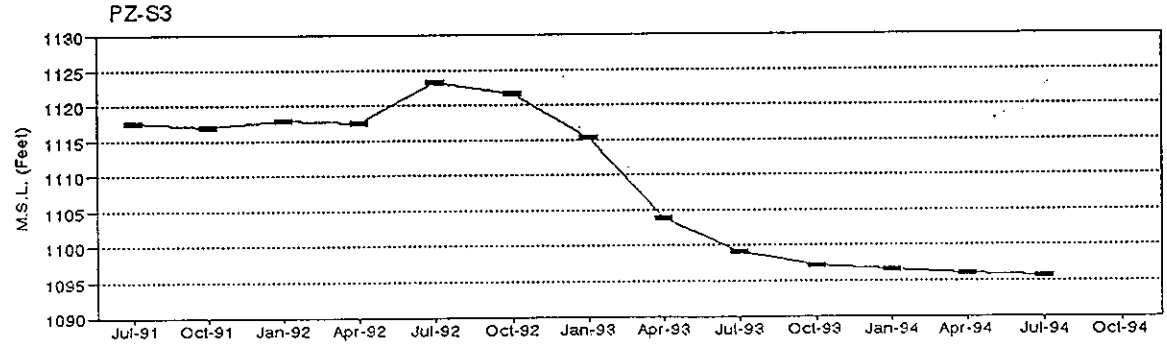


PZ-S1



January - July 1993
Damaged

PZ-S3



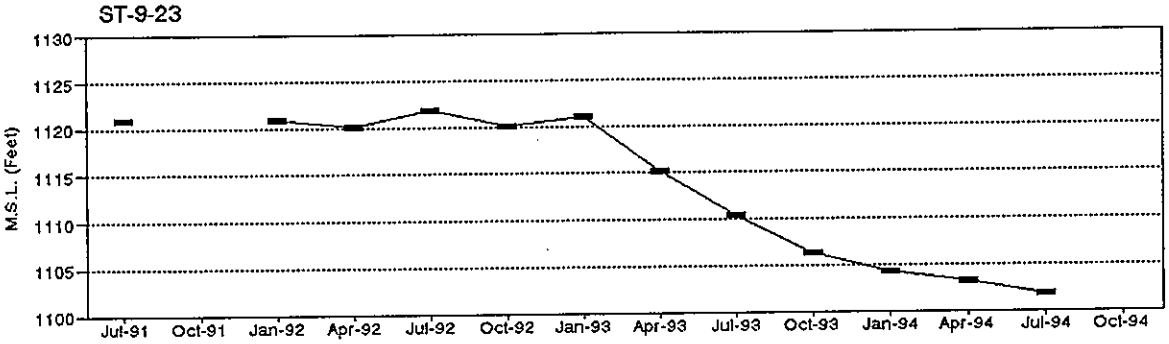
October 1994-Dry

Prepared By: SGL Checked By: JBH1

Flambeau Mining Company

Groundwater Elevation Results

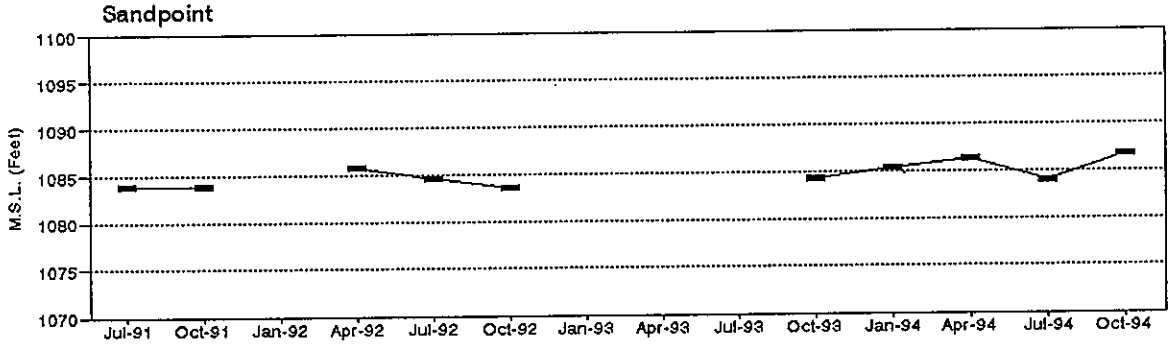
ST-9-23



October 1991 reading erratic. Validity disputable.

October 1994-Dry

Sandpoint



January 1992-Frozen

January - July 1993 Damaged

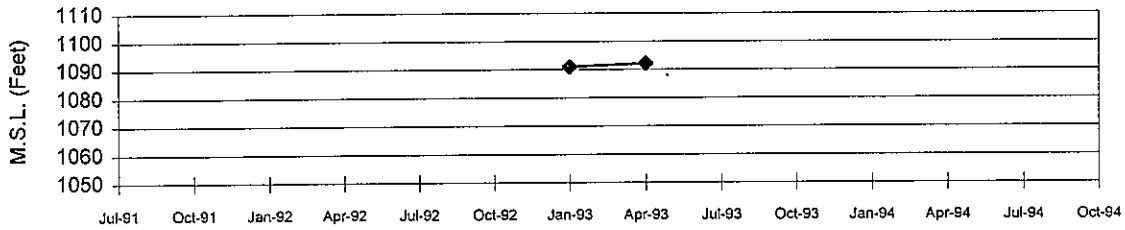
Repair completed in July 1993

Prepared By: SGL Checked By: JBH1

Flambeau Mining Company

Groundwater Elevation Results

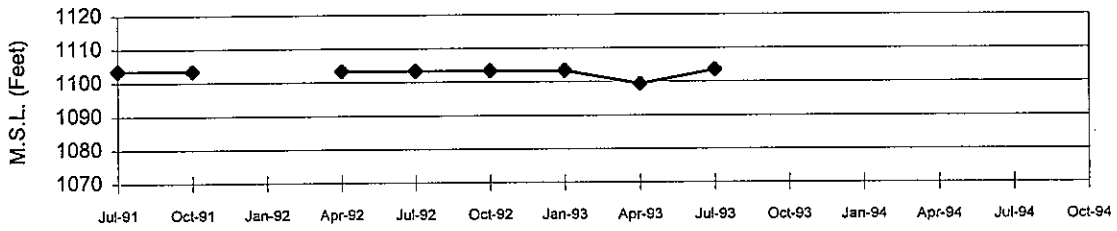
MW-1000R



November 1992 - Installation

July 1993-Present - Dry

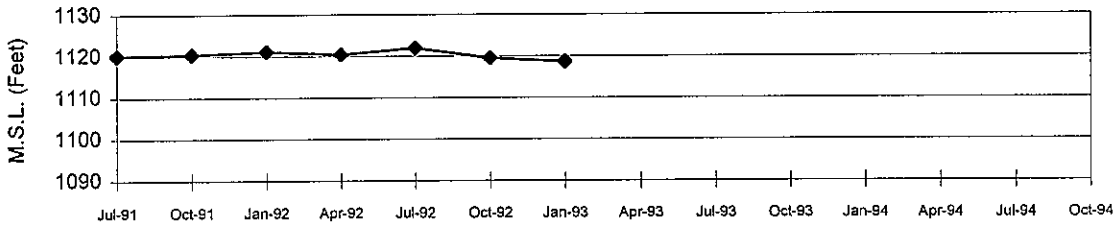
PZ-1A



January 1992 - Frozen

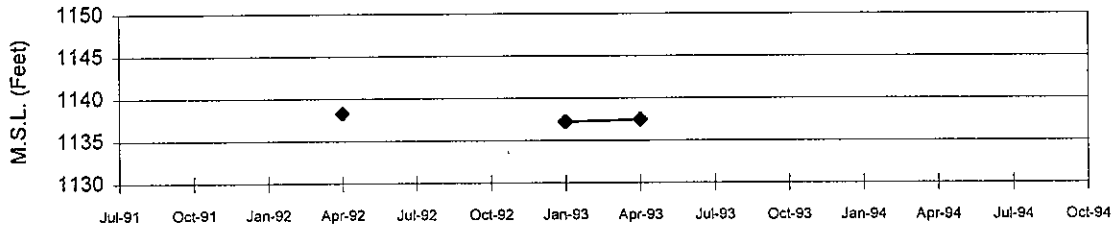
October 1993-Present - Dry

ST-9-23A



April 1993-Present - Dry

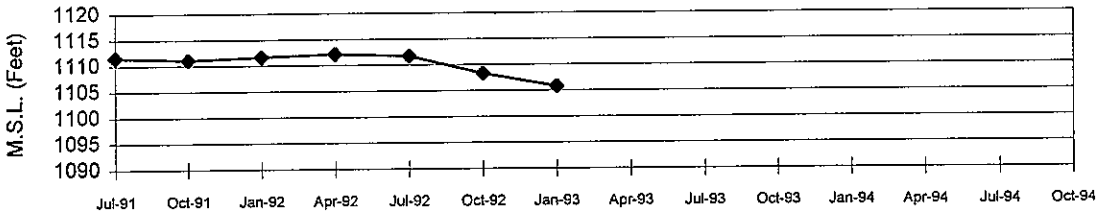
PZ-1006



Note: PZ-1006 Typically Dry

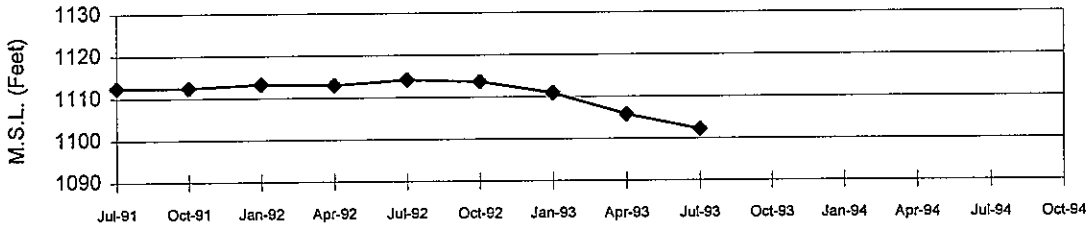
Groundwater Elevation Results

MW-1004



April 1993-Present - Dry

ST-9-26



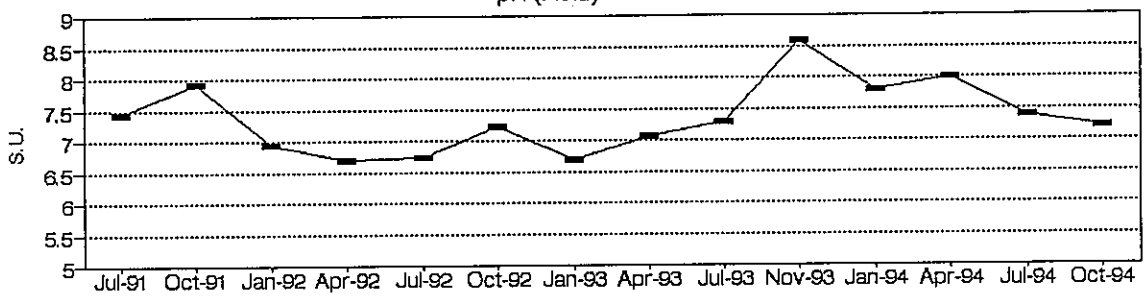
October 1993-Present - Dry

Attachment 2

Flambeau Mining Company
Surface Water Quality Results

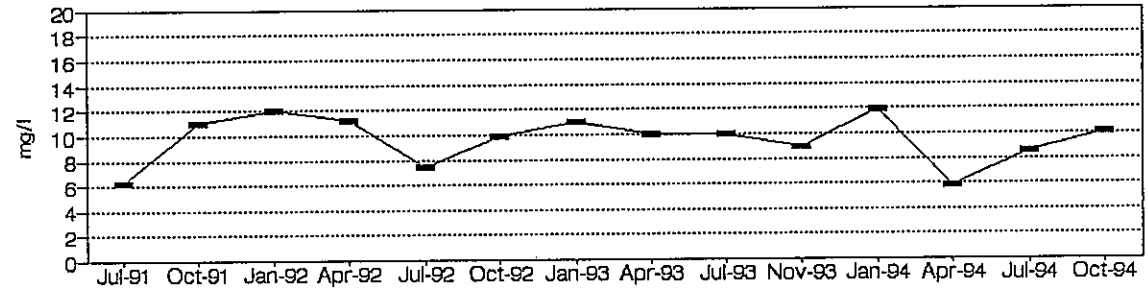
SW-1

pH (Field)



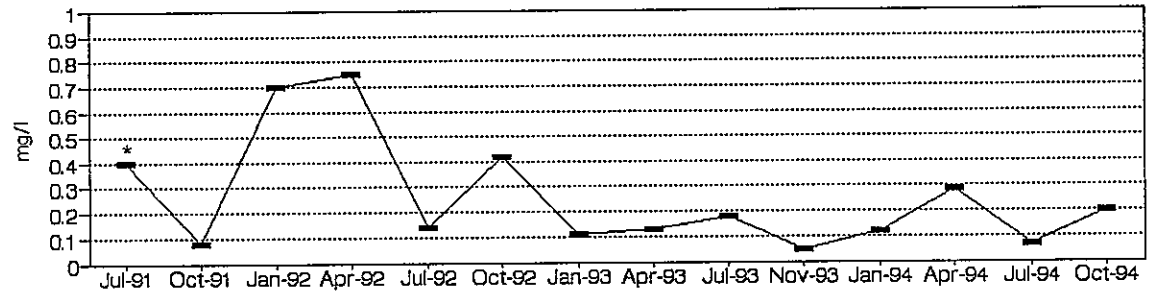
* Compound Not Detected, Value = Detection Limit

Dissolved Oxygen



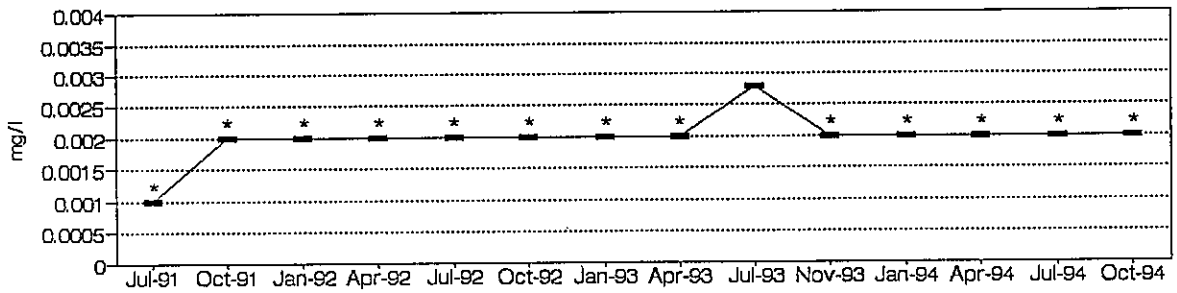
* Compound Not Detected, Value = Detection Limit

Aluminum



* Compound Not Detected, Value = Detection Limit

Arsenic

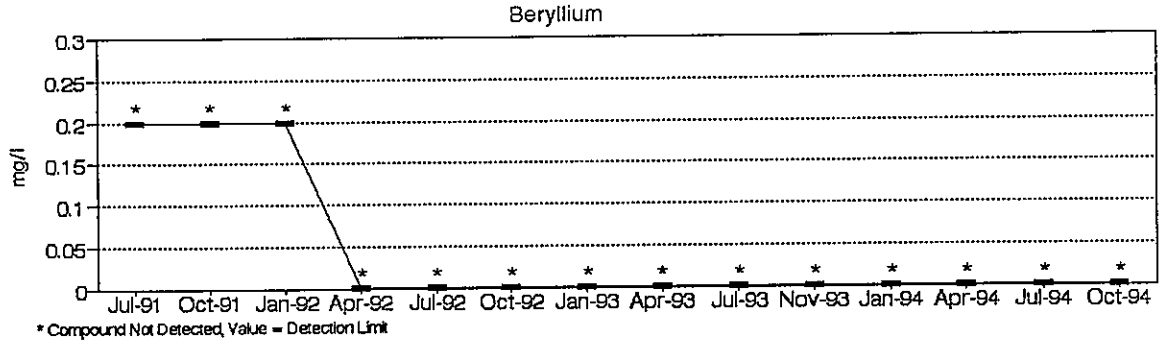


* Compound Not Detected, Value = Detection Limit

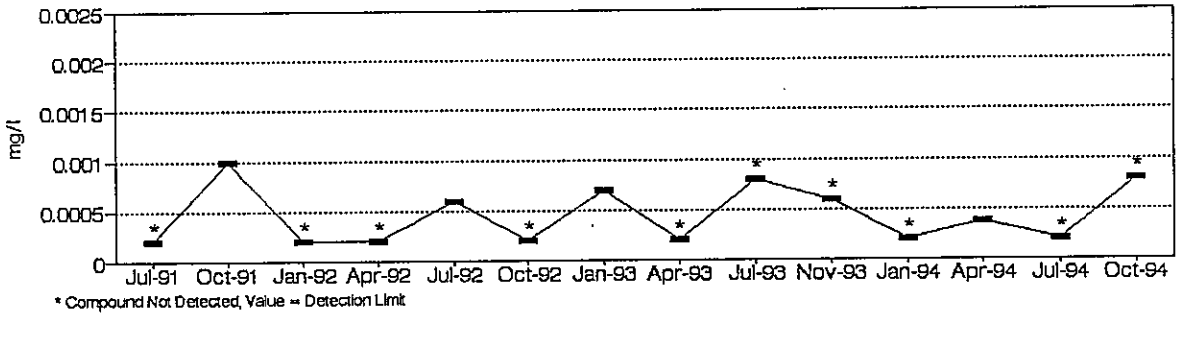
Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Surface Water Quality Results

SW-1



* Compound Not Detected, Value = Detection Limit



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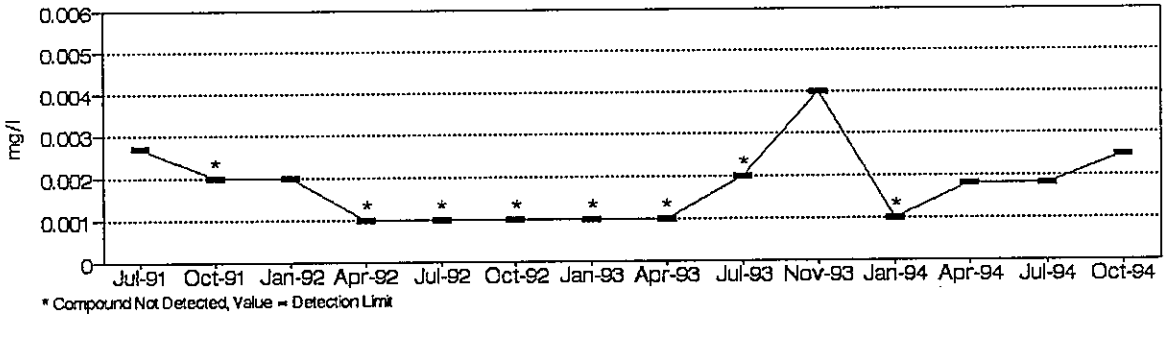

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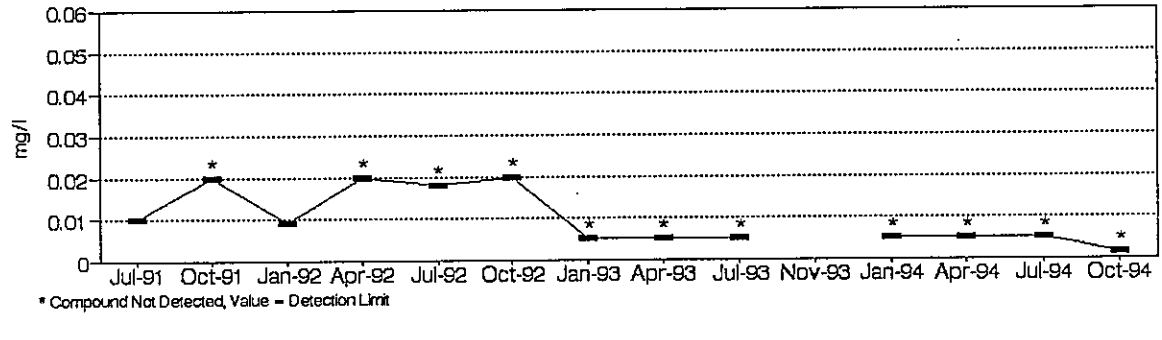

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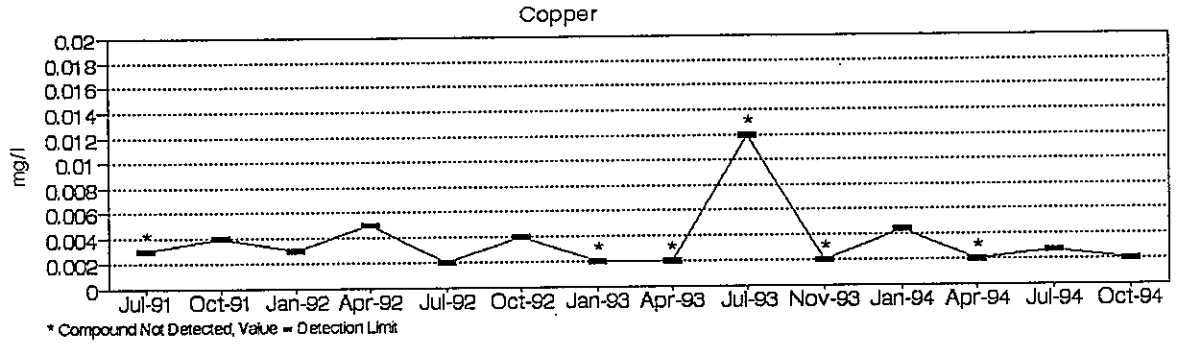
Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Surface Water Quality Results

SW-1



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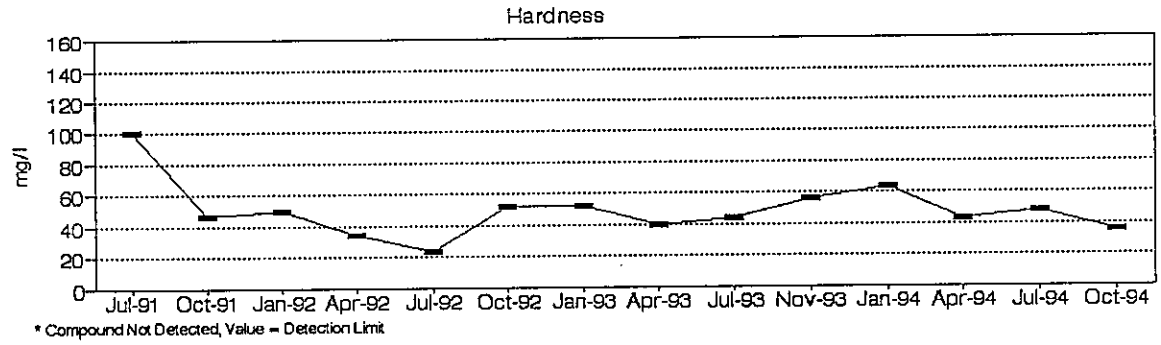

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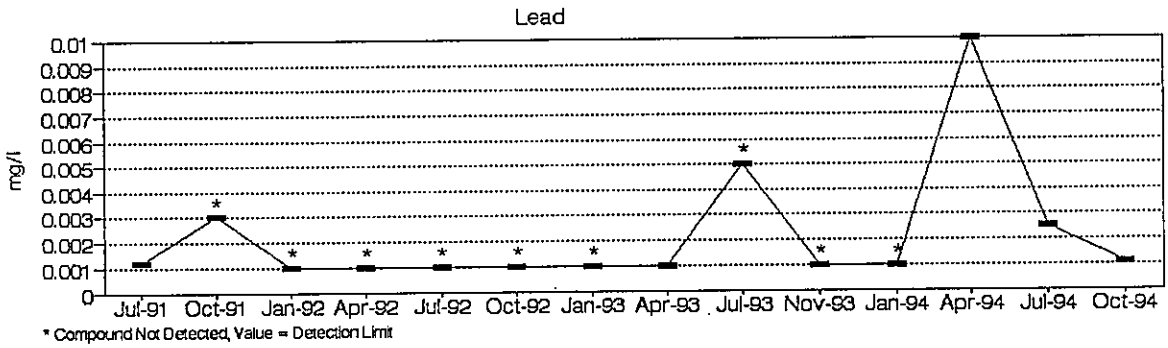

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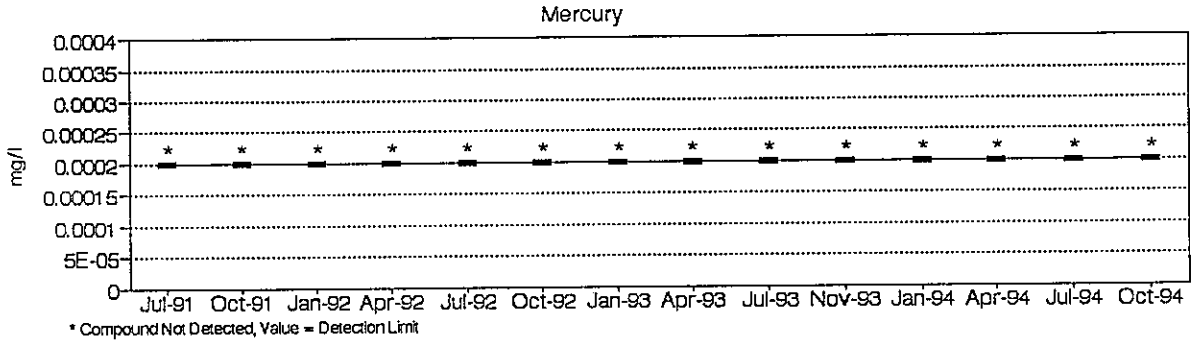

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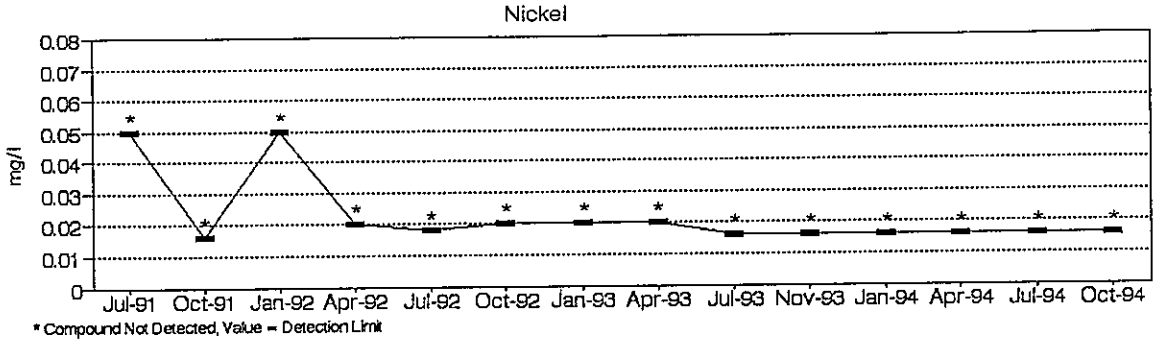
Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Surface Water Quality Results

SW-1



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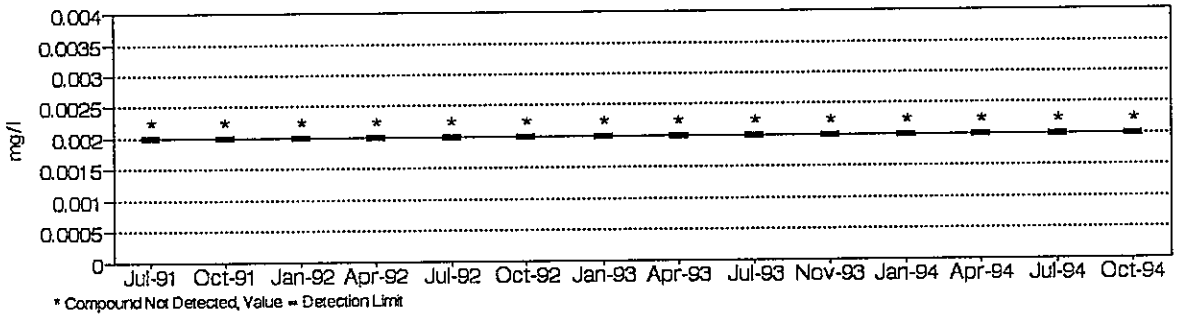

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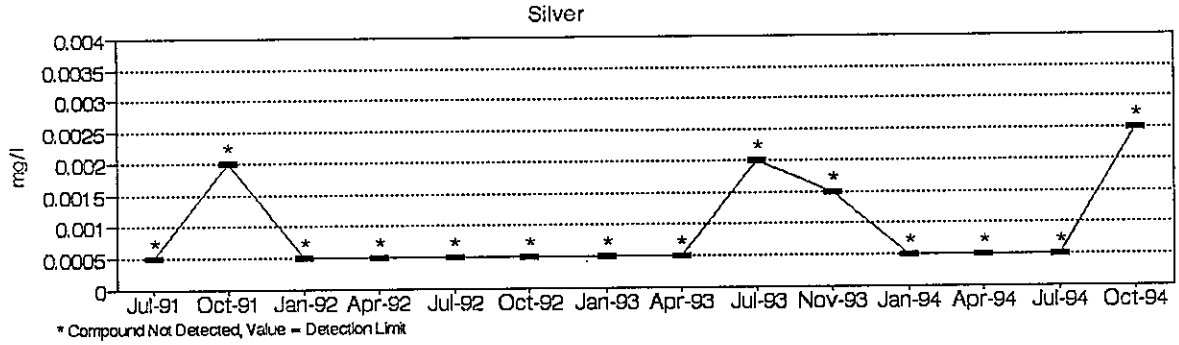

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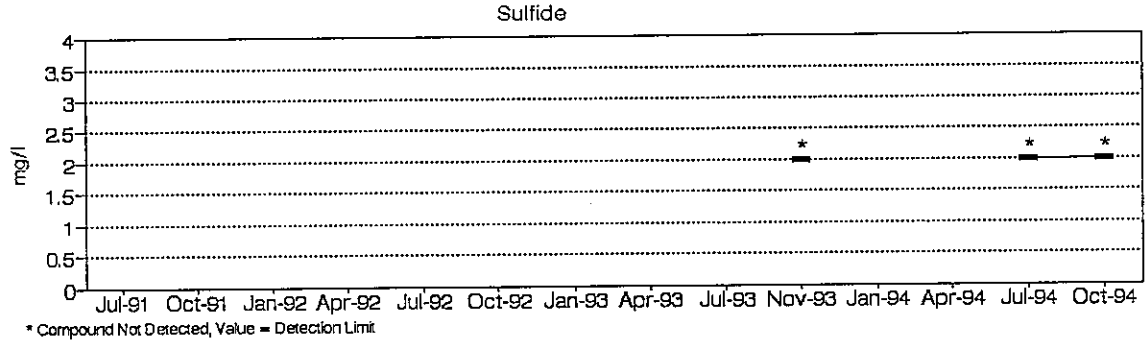

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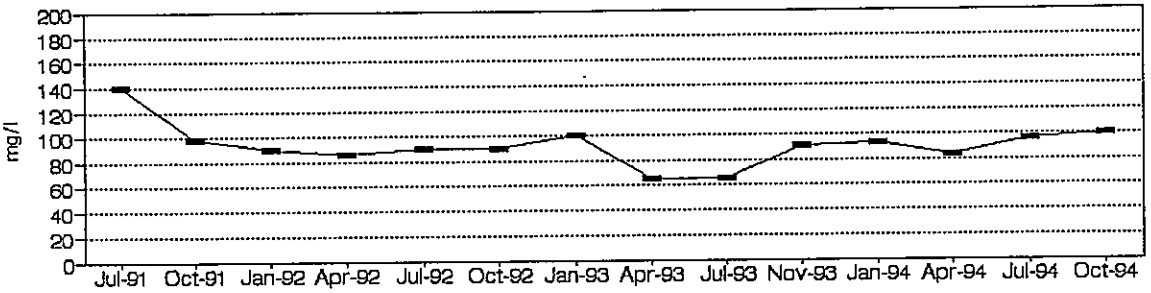
Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Surface Water Quality Results

SW-1

TDS



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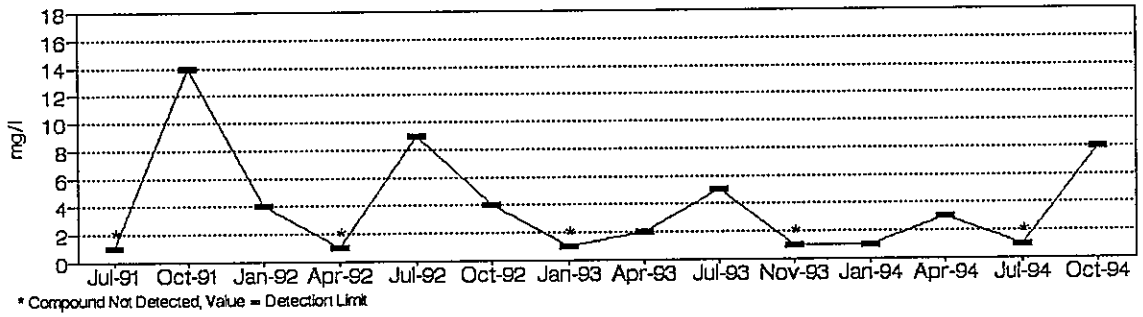

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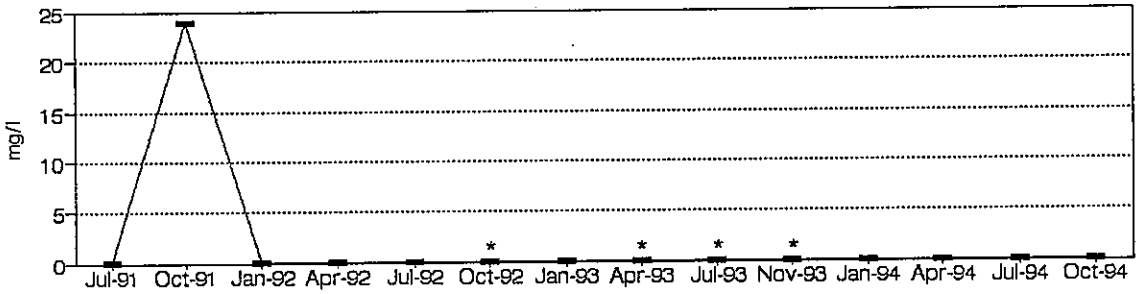
Zinc



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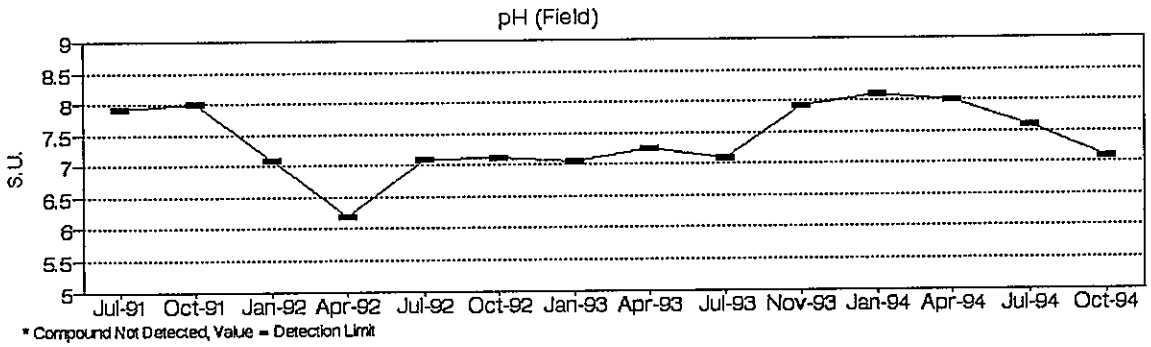
Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Surface Water Quality Results

SW-2



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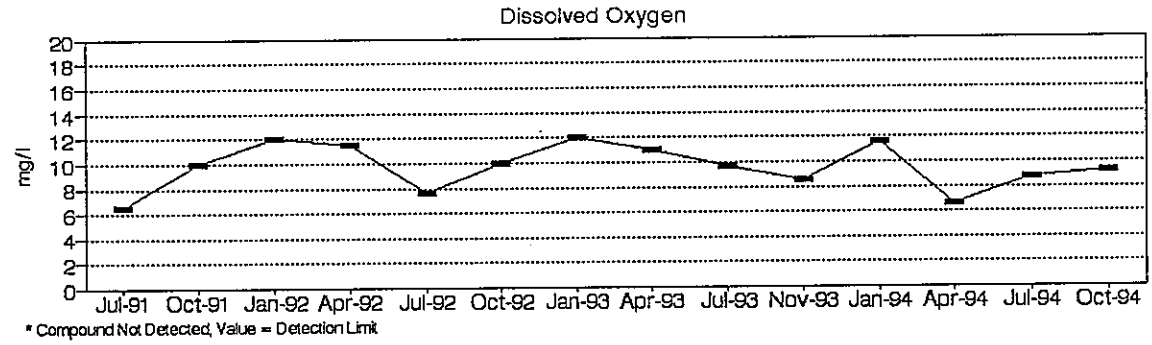

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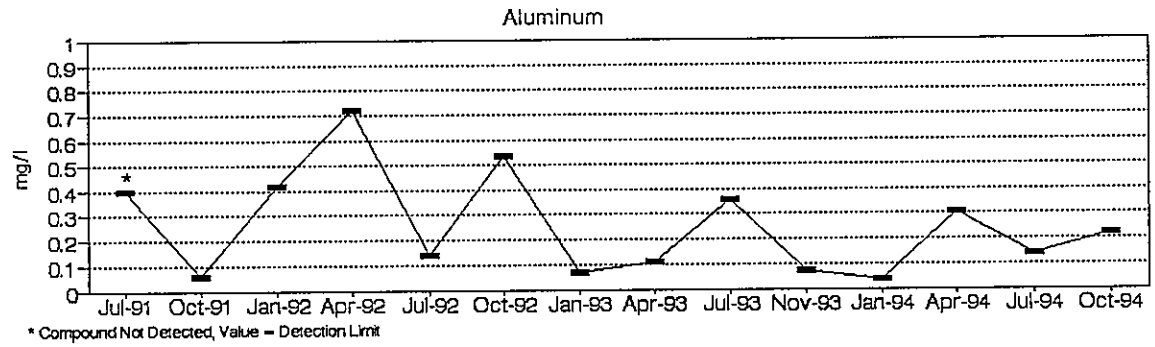

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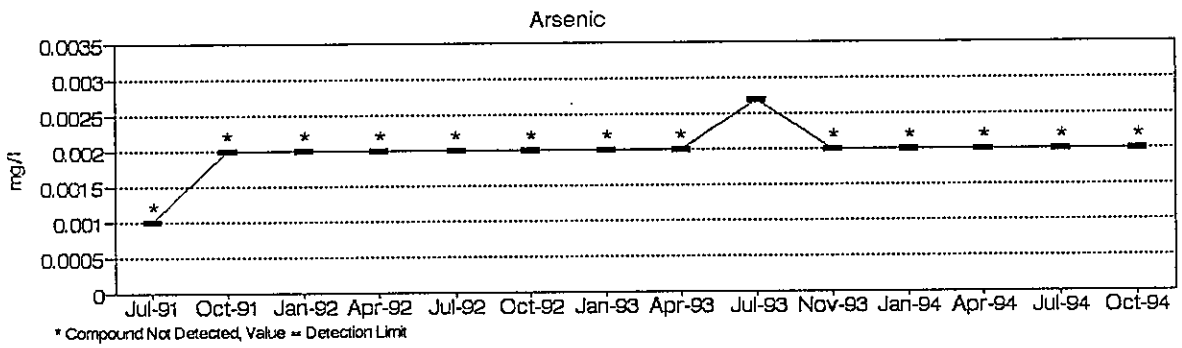

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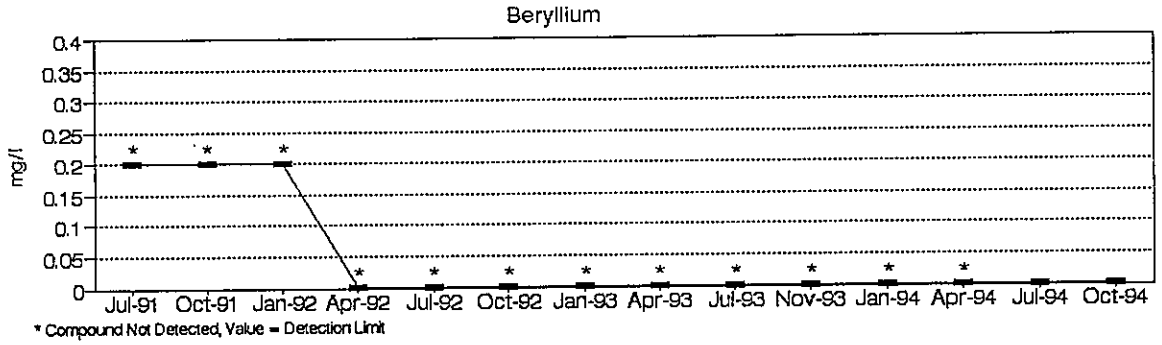
Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Surface Water Quality Results

SW-2



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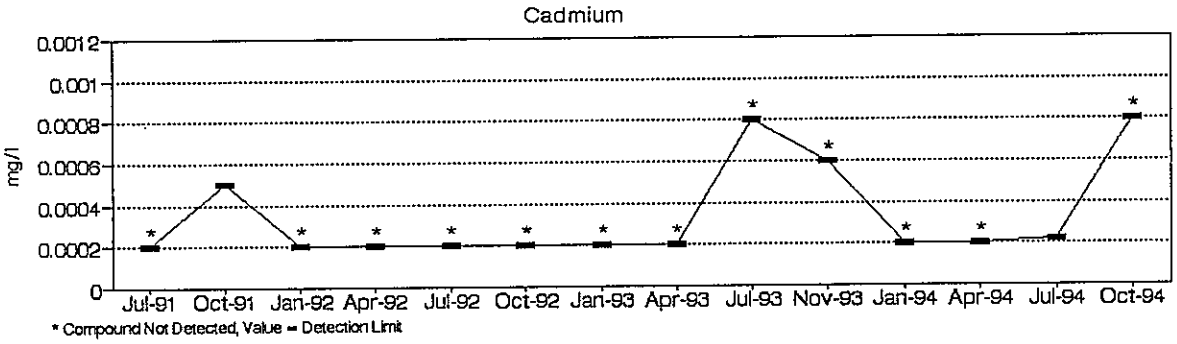

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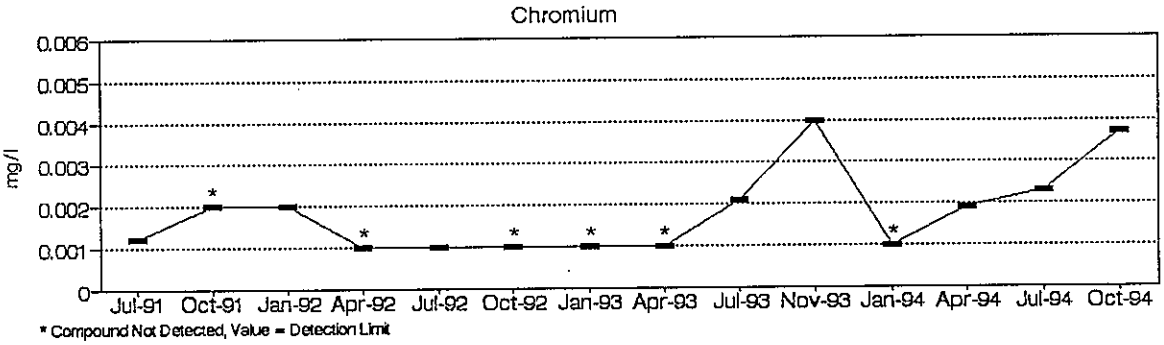

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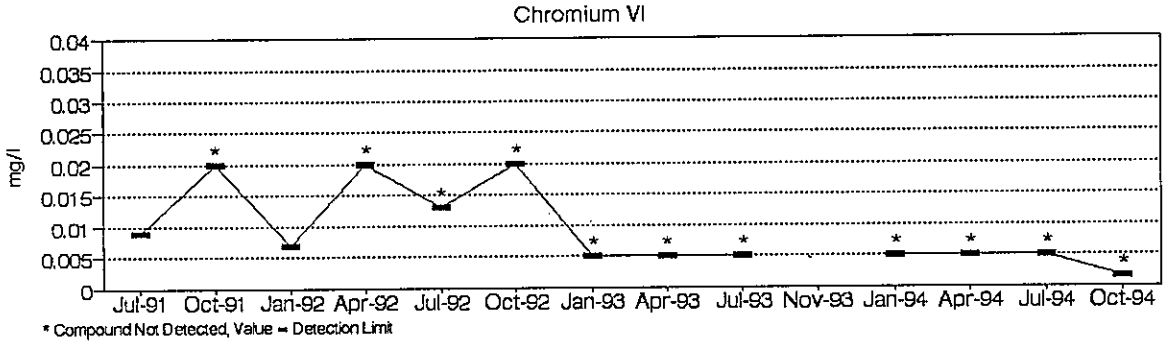

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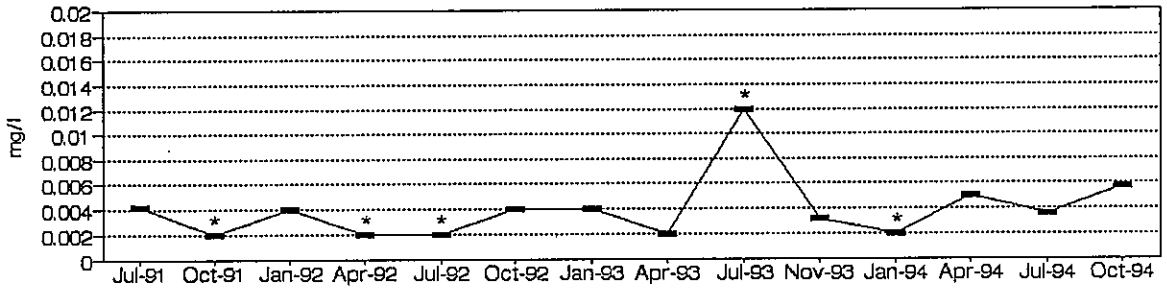
Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Surface Water Quality Results

SW-2

Copper



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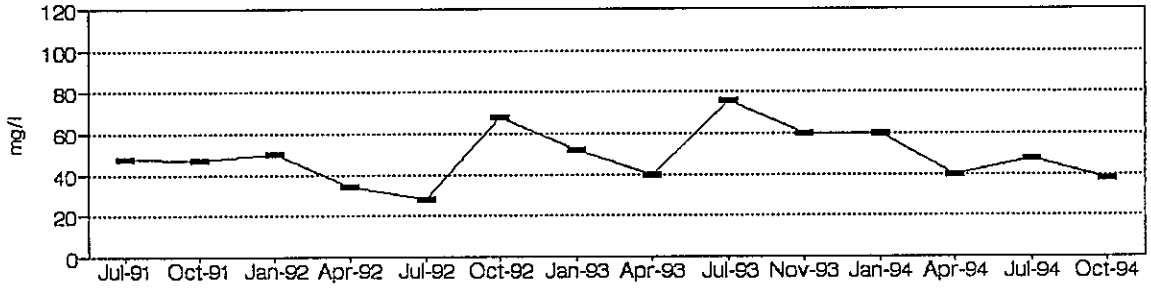
Hardness



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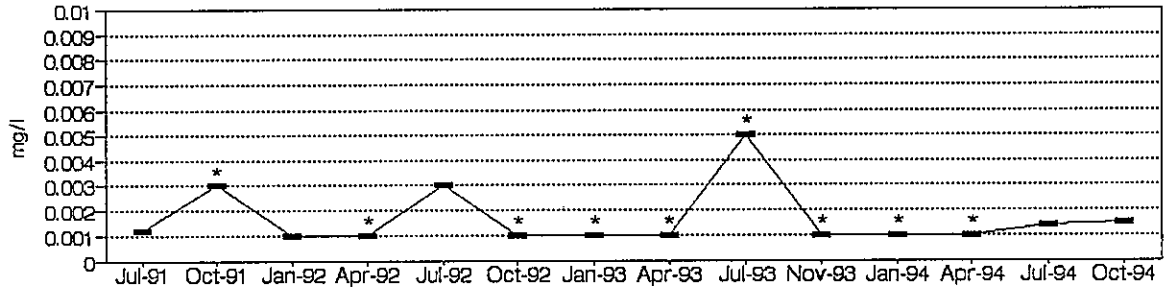
Lead



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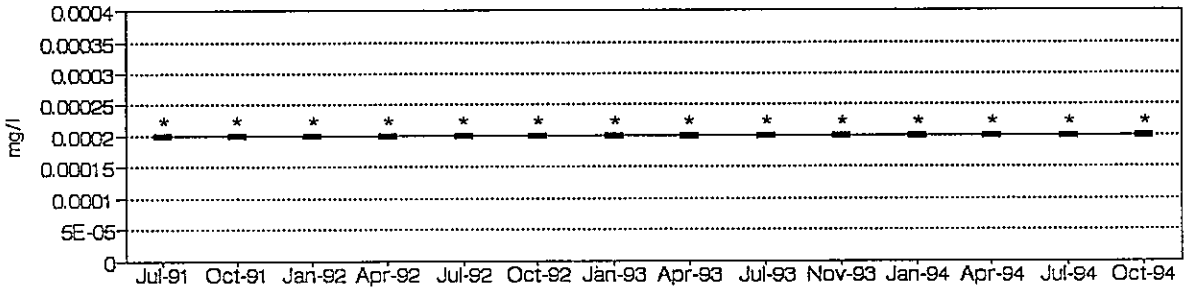
Mercury



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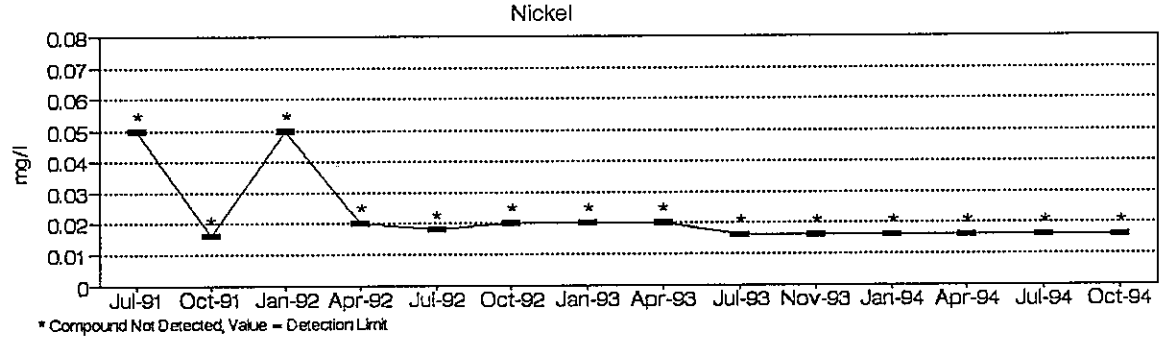
Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Surface Water Quality Results

SW-2



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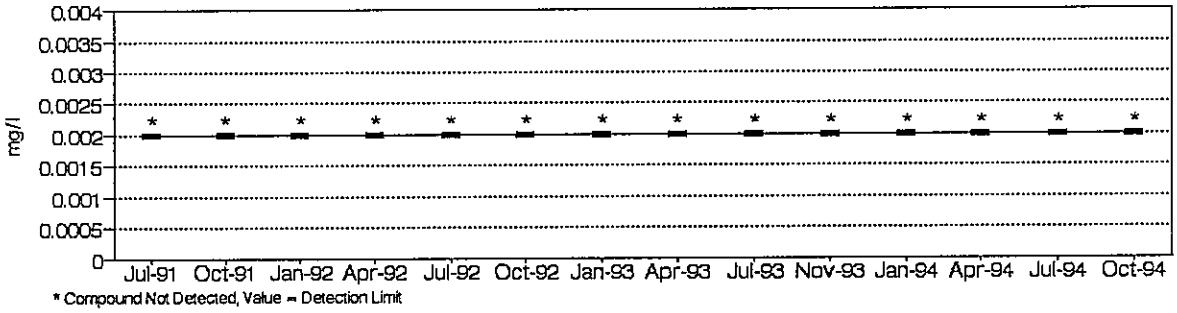

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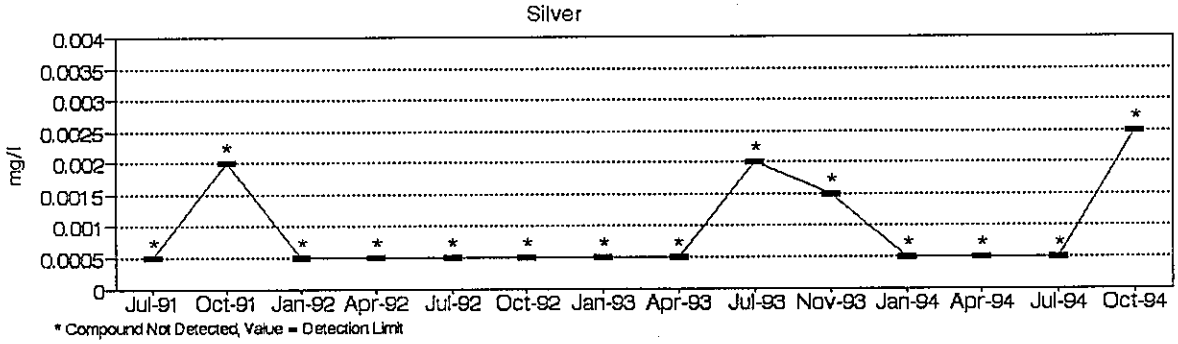

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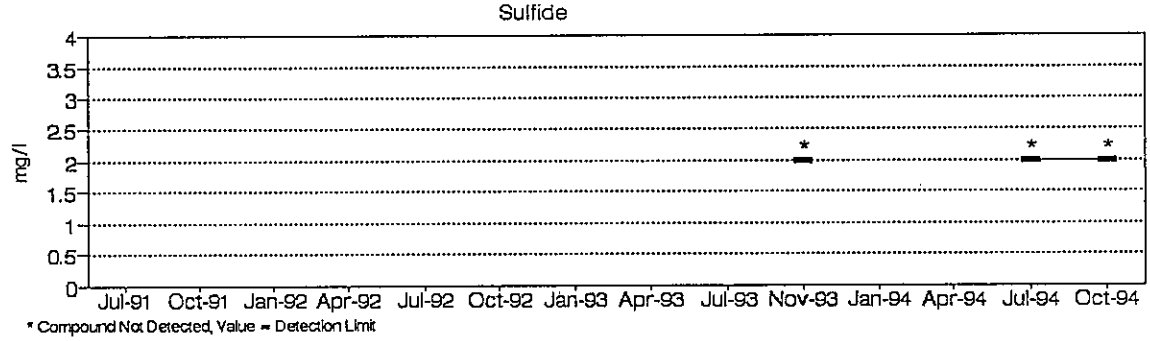

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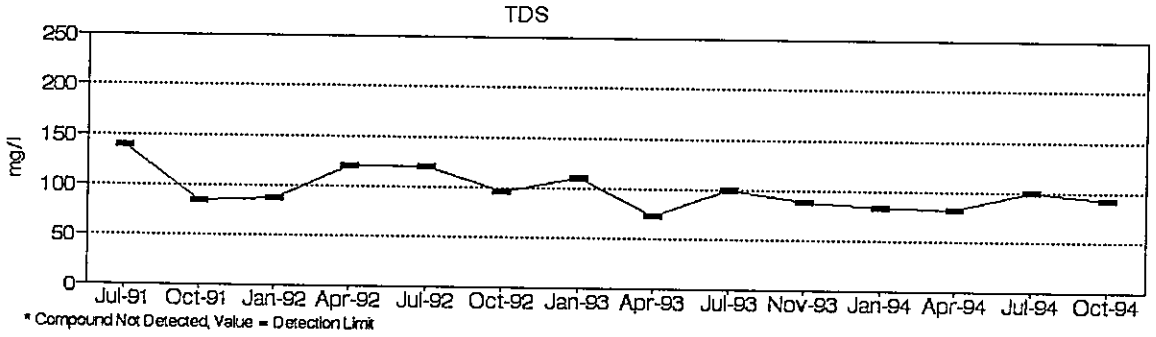
Prepared By: SGL Checked By: JBH1

Flambeau Mining Company
Surface Water Quality Results

SW-2



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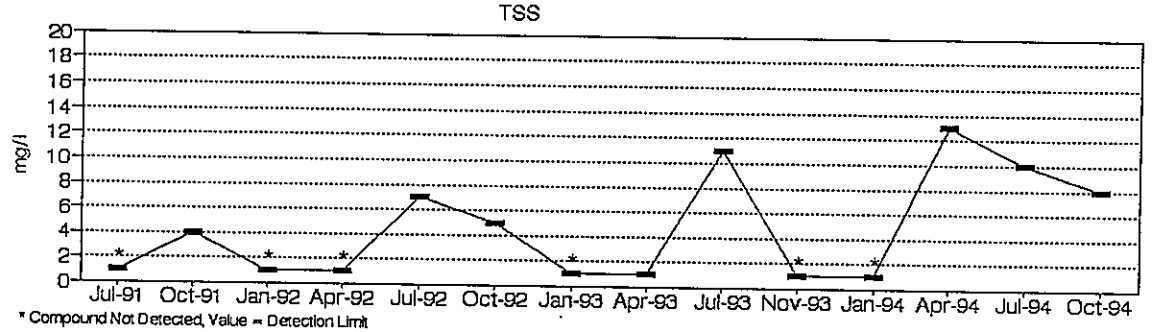

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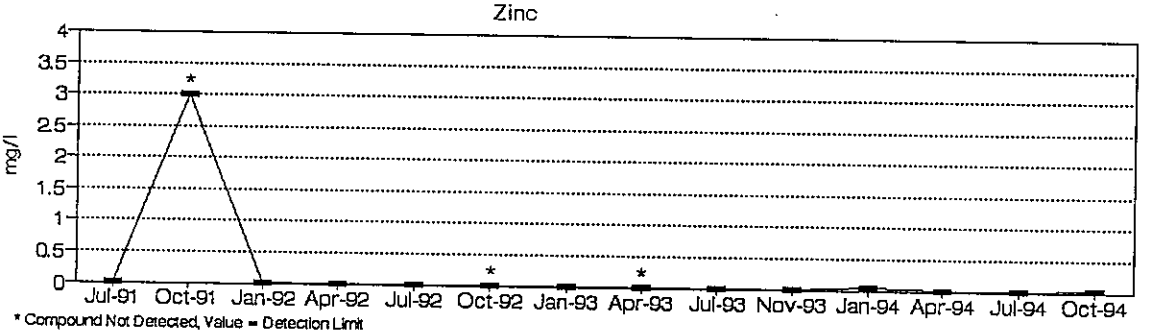

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Prepared By: SGL Checked By: JBH1

Appendix D

Sediment Sampling

Foth & Van Dyke
Memorandum

January 9, 1995

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, Foth & Van Dyke WMW

RE: Report on Activities Associated with 1994 Sediment Sampling
Flambeau River, Ladysmith, Wisconsin

Introduction

On July 11, 1994, Bill West of Foth & Van Dyke was accompanied by Jack Christman of Flambeau Mining Company (Flambeau) for the purpose of installing sediment traps in the Flambeau River. This activity is part of routine site monitoring required of the Flambeau Mining Permit.

Triplicate sediment collection containers were positioned in two locations in the Flambeau River. One location was above the Flambeau discharge Outfall 001 at the Blackberry Lane access. The second location was downstream of mining site Outfall 001 near the Sister's farm. The sampling locations were the same locations sampled in 1993. Sample containers were removed from the river after an exposure period of four weeks.

Methodology

Sediment traps were installed upstream and downstream 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 three 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 discourages the collection of debris which may cover the jar opening.

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

With every three jar set, the outer most jar (most distal to the shore) was positioned approximately 45 degrees upstream of the second jar. The proximal jar was 45 degrees downstream of the middle jar. The jars were separated in the stream by a minimum of three feet. When placing jars, the upstream jar was positioned first followed by the middle jar then finally the downstream jar. In this manner, the chance of impacting downstream jars while placing the upstream jars was eliminated.

Based on observations noted from 1993 sediment collection activities, minor method modifications were added to the 1994 protocol. First, only one rebar was used to secure the half block. This could be accomplished by rotating each block so that a corner faced upstream. This practice reduces the side pressure on the block allowing use of a single rebar section to secure the block. Second, it was noted that crayfish and small fish were able to take up residence in the jars over the exposure period. It was observed in 1993 that jars which contained crayfish also contained significant amount of gravel and pebbles. Also, the movements of crayfish and fish actually stirred up the collected sediment resulting in loss of the very sediment which was to be collected. Therefore, in 1994, ½-inch mesh nitex screening was placed over each of the jars. The screening was secured on the rim of the jar using plastic ties. The screen was of sufficient mesh size to discourage colonization by fish and crayfish and large enough to allow sediment to pass. Initial concerns over the possibility of algal growth covering the mesh and preventing the transfer of sediment to the jar were unfounded as little algal growth was observed in the one month exposure period.

Sample containers were retrieved on August 9, 1994. At each site, the container furthest downstream of the three sample set was removed first followed by the middle jar and finally the furthest upstream jar. In this manner contamination of downstream jars was avoided.

To secure the sample, the plastic tie and mesh were first removed. A sheet of parafilm was stretched over the jar opening to seal the sediments and water. This seal was followed by lid and ring. Samples were iced and taken directly to Northern Lake Service in Crandon, Wisconsin for analysis. At the laboratory the sediment in the three jars at each sampling location were combined into samples S-1 (upstream) and S-3 (downstream).

Observations

Sample consistency from the upstream site (S-1) and downstream site (S-3) were very uniform, *i.e.*, soft sediment with no gravel. It was noted that no fish or crayfish were captured in the sample containers. It was also observed that little if any gravel or pebbles were contained in the sample containers and that contrary to previous years, all collected material appeared to be made up of soft water-borne sediment. Some macroinvertebrates were successful in colonizing the sample containers. Caddisfly casings can be seen attached to the jar walls in Figures 2 and 3. Also, it was noted that containers from Site S-3 had nearly twice the amount of collected sediment as did jars from Site S-1. This might be expected since Blackberry Lane (Site S-1) is characterized by low relief, shallow water where samplers could be located 30 to 50 feet off shore while the Sister's Farm location is of steep gradient with samplers located 10 to 20 feet off shore. There is a higher degree of probability that near shore sediments or on shore sediments at S-3 could become disturbed and available for capture in the S-3 containers.

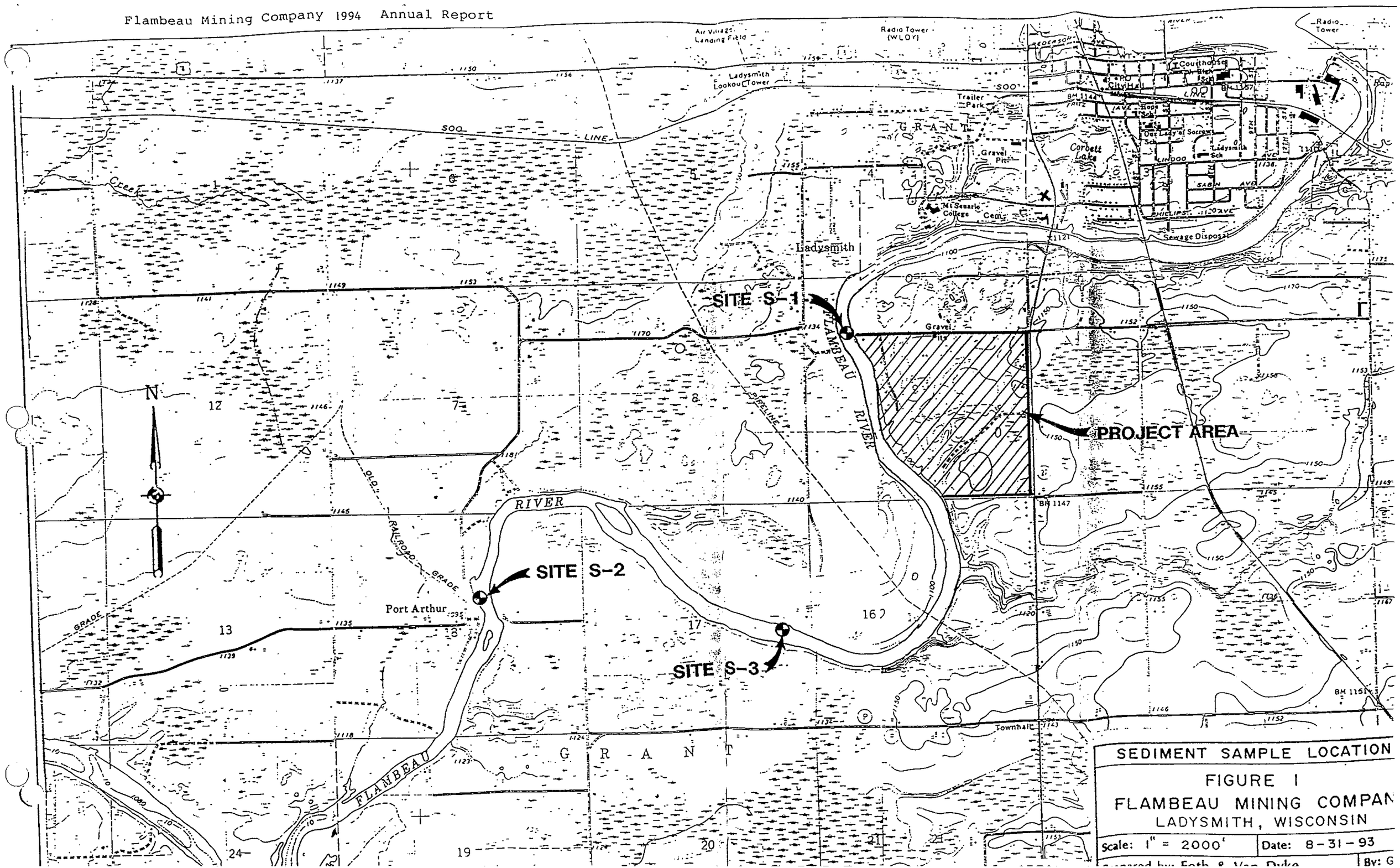
Results

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

Discussion

Data from the first four years of sediment 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.

Because Foth & Van Dyke was successful in eliminating biota (crayfish and fish) from the jars during the collection period, sediment quantities collected were reduced. This aspect resulted in having insufficient samples to conduct total solids and total volatile solids analyses. To alleviate this problem, Foth & Van Dyke will add additional sediment traps in 1995.



SEDIMENT SAMPLE LOCATION

FIGURE 1

FLAMBEAU MINING COMPAN

LADYSMITH, WISCONSIN

Scale: 1" = 2000' | Date: 8-31-93

Prepared by: Foth & Van Dyke | By: G

Figure 2 Triplicate Sediment Samples from Site S-1

Figure 3 Triplicate Sediment Samples from Site S-3

Table 1

Flambeau River Sediment Sampling Results
1991 - 1994

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

*Solids data not available due to insufficient sample.

[32-10/WMW/18]94F005

Prepared by: WMW
Checked by: JJA

Appendix E

Fish Sampling

Foth & Van Dyke
Memorandum

January 9, 1995

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, Foth & Van Dyke

RE: Report on Activities, 1994 Fish Collection and Analysis, Flambeau River, Ladysmith, Wisconsin

Introduction

On October 16 and 17, 1994, representatives of EA Associates, Deerfield, Illinois and Foth & Van Dyke, electroshocked two impoundments on the Flambeau River located above and below the Flambeau Mine Site. 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.

The sampling event took place approximately one month after severe flooding was experienced on the Flambeau River. Flooding was so severe that a breach of the sidewall of the dam in Ladysmith occurred. This led to the release of the majority of the water in the impoundment at Ladysmith. Data from 1994 should be viewed in light of the fact that formerly impounded walleye at the Ladysmith Dam could very well make up some of the fish shocked at the Thornapple Dam.

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 October 16 and 17, and on the Ladysmith Flowage on October 17, 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 and one downstream sample. Each was analyzed for metal parameters. Each walleye was measured for total length, sexed, and the stomach contents noted. The age of each walleye was determined. Physical characteristics of each walleye are found in Table 1. The stomach analyses of the walleye are found in Table 2. Tables 3 and 4 show the results of the liver and tissue analyses.

In previous years, Foth & Van Dyke had included a table which listed species of fish, other than walleye, which were encountered during the walleye collection activities. Because of the severe flooding during the proposed collection period, the walleye collection effort had to be postponed several times. When the collections were conducted, the necessary identification specialists were not available. Therefore, the fish species list does not appear in this report.

Species observed during the collection event were consistent with those collected in previous collection efforts. 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

Since shocking activities were targeting walleye, no attempt was made to use the shocking procedure as a quantitative or qualitative measure of fish species.

Tissue analysis of walleye from the Ladysmith Flowage indicated an increase in mercury from 1991 to 1992 but decreases thereafter. The Thornapple Flowage also shows decreases in mercury over the four years monitored. Average concentrations of mercury in 1994 in fish tissue are nearly identical in both upstream and downstream samples.

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

Table 1

Physical Data of Walleye
Flambeau River, Ladysmith, Wisconsin
October 1994

ID No.	Length (mm)	Weight (g)	Sex	Age
		Thornapple Flowage		
WE-TA-01	297	215	M	2+
WE-TA-02	373	530	F	3+
WE-TA-03	374	490	M	3+
WE-TA-04	382	575	F	3+
WE-TA-05	427	755	M	5+
WE-TA-06	435	790	M	5+
WE-TA-07	462	985	M	6+
WE-TA-08	394	620	F	4+
WE-TA-09	408	640	F	4+
		Ladysmith Flowage		
WE-LS-01	296	240	M	3+
WE-LS-02	311	290	F	3+
WE-LS-03	334	320	F	4+
WE-LS-04	344	375	F	3+
WE-LS-05	373	520	F	4+
WE-LS-06	376	565	F	4+
WE-LS-07	383	540	F	4+
WE-LS-08	392	495	F	4+
WE-LS-09	516	1440	F	7+

[32-15/10/18]94F005

Prepared by: WMW
Checked by: JJA

Table 2

Stomach Analysis of Walleye
Flambeau River, Ladysmith, Wisconsin
October 1994

Sample ID	Percent Full	Type of Content	General Comments
		Thornapple Flowage	
WE-TA-01	0	Empty	None
WE-TA-02	20	Some vegetation	Nearly all digested
WE-TA-03	0	Empty	None
WE-TA-04	95	1 Fish 60mm	Mostly digested
WE-TA-05	0	Empty	None
WE-TA-06	0	Empty	1 Tapeworm noted
WE-TA-07	0	Empty	None
WE-TA-08	85	1 Fish 80mm	Mostly digested, unidentifiable
WE-TA-09	0	Empty	None
		Ladysmith Flowage	
WE-LS-01	10	Fish parts	Nearly all digested
WE-LS-02	100	1 Fish 60mm	Partly digested
WE-LS-03	50	1 Fish	Nearly all digested
WE-LS-04	0	Empty	None
WE-LS-05	0	Empty	None
WE-LS-06	0	Empty	None
WE-LS-07	55	1 Fish 45mm	Smallmouth bass Slightly digested
WE-LS-08	0	Empty	None
WE-LS-09	0	Empty	None

[32-15/10/18]94F005

Prepared by: WMW
Checked by: JJA

Table 3

Fish Tissue Analysis
Mercury 1991 - 1994
Results in mg/kg

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

[32-15/10/18]94F005

Prepared by: WMW
Checked by: JJA

Table 4

Metals Analysis of Walleye
Flambeau River, Ladysmith, WI
Results in mg/kg
1991-1994

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-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

[32-15/10/18]94F005

Prepared by: ___
Checked by: ___

Appendix F

Macroinvertebrate Sampling

Foth & Van Dyke
Memorandum

January 9, 1995

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, Foth & Van Dyke BWW

RE: Summary of Activities, 1994, Macroinvertebrate Collection
Flambeau River, Ladysmith, Wisconsin

Introduction

On October 3, 1994, Bill West of Foth & Van Dyke completed the 1994 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 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 high—one to two feet above bank stage. This condition was noted to persist throughout the entire day and was apparently caused by major flooding from a storm occurring in the middle of September. The storm water caused a breach in the earthen portion of the dam in the city of Ladysmith located upstream of the project. Based on noted debris in the vegetation along shore, water stage appeared to have been eight to ten feet above bank stage during flooding. A coffer dam built to temporarily correct the problem allowed the Ladysmith pool to raise to near normal stage. However, because of the excess water in the Flambeau River system following the storm, all water discharged through the Dairyland Dam was passed directly through the Ladysmith Dam, hence, the consistently high water flow throughout the day of field collection.

Methodology

Macroinvertebrate samples were collected using a net with an 8 by 18-inch opening and a mesh size of 800 to 900 micron mesh size. In-stream sampling methods consisted of kick seining supplemented by sweep netting along the shore. 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 a minimum of one hour. The kick seining effort included a period of kicking, which lasted about five minutes per kick (longer if few organisms were observed to be collected), followed by sample washing, sorting (removal of debris), and containerization of specimens. Specimens were preserved in alcohol as they were collected.

About ten minutes were required for each kick seine effort. At least one ten-minute effort was devoted to sweep netting along the near shore vegetation at each site with the exception of Meadowbrook Creek which lacks such vegetation.

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

Site-Specific Observations and Conditions

Blackberry Lane

Sampling was initiated at the end of Blackberry Lane at 12:30 p.m. and was terminated at 2:00 p.m. Water temperature was 58°F. Water stage was one to two feet above bank stage. Substrate at Blackberry lane is characterized as predominantly cobble and smaller (typically less than four inches in diameter).

Bank vegetation immediately downstream of the Blackberry lane access is predominantly grass/sedge with a significant amount of overhang at the water edge. This sedge/grass complex was common to only this site of the three sampled. The bank vegetation was mostly submerged and, depending on the extent and severity of the recent flooding, may have lost a significant amount of the local fauna. Sweep netting in this area normally would pick up water strider, whirligig, water scorpion, water beetle and late instar Odonata, which may not be as common in downstream sampling sites.

Meadowbrook Creek

Sampling at Meadowbrook Creek was conducted from 10:30 a.m. to noon. Water temperature was 56°F. Water stage was about one foot over bank stage and covered the gravel bars along the bank immediately upstream of Meadowbrook Creek. Stream C which is upstream of Meadowbrook Creek was not flowing, however, river water was backed up into Stream C a distance of about 30 feet.

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 8:45 to 9:45 a.m. Water temperature was 56°F. Water stage was one to one and one half feet above bank stage.

The substrate of the Flambeau River at this site is characterized as rock in the four to twelve inch size category. It was noted that many of the rocks were very loose, possibly recently rolled by the flooding. As a note, it is probable that habitat in the vicinity may have moved around in the recent past with a resultant shift in local faunal populations.

Data Evaluation

Samples were sent to EA Engineering for enumeration and identification. Table 1 is a list of organisms collected during the 1994 sampling event.

Total taxa collected and reported in 1994 were significantly lower in diversity and abundance as compared to previous years. This condition holds true for samples collected both above and below the Flambeau Mining outfall. Lower numbers of organisms collected are likely attributed to the severe flooding which occurred in the middle of September and continued into October.

Table 1

Macroinvertebrates Collected From Three Locations Near the Flambeau Mine Site October 1994

Taxa	Blackberry Lane	Meadowbrook Creek	Port Arthur Dam
Decapoda			
Orconectes sp.	5	4	4
Isopoda			
Caecidotea sp.(1)	-	1	1
Amphipoda			
Hyallela azteca	-	1	4
Ephemeroptera			
Caenis sp.	-	1	-
Ephemera simulans	-	15	41
Ephemerella sp.	-	1	1
Isonychia (Isonychia) sp.	16	17	28
Anthopotamus verticis(2)	13	98	53
Stenacron sp.	-	-	5
Stenonema mediopunctatum	-	10	19
Stenonema vicarium	-	9	20
Stenonema sp.	1	1	21
Odonata			
Calopteryx sp.	-	-	5
Ophiogomphus rupinsulensis	12	3	3
Ophiogomphus howei	-	-	1
Hylogomphus sp.	1	1	4
Plecoptera			
Acroneuria abnormis	1	1	12
Neoperla clymene	1	2	9
Agnetina capitata(3)	35	126	64
Pteronarcys sp.	1	-	-
Hemiptera			
Hesperocorixa sp.	-	-	2
Megaloptera			
Nigronia serricornis	2	1	7

[32-10/15/WMW]94F005

Prepared by: JJA
Checked by: WMW

Taxa	Blackberry Lane	Meadowbrook Creek	Port Arthur Dam
Sialis sp.	-	1	1
Tricoptera			
Cheumatopsyche sp.	6	19	21
Chimarra obscura	-	-	1
Hydropsyche phalerata	2	3	3
Hydropsyche sp.	37	27	25
Macrostemum zebratum(4)	1	-	4
Polycentropus senu lato	-	-	2
Setodes sp.	1	-	-
Coleoptera			
Dineutus sp.	1	-	1
Dubiraphia sp.	-	-	2
Ectopria nervosa	1	2	2
Gyrinus sp.	-	-	1
Stenelmis sp.	7	1	1
Diptera			
Atherix sp.	1	1	1
Hexatoma sp.	1	-	-
Tabanus sp.	2	-	-
Chironomidae			
Cryptochironomus sp.	1	-	-
Epoicladius sp.	-	-	8
Microtendipes sp.	-	7	-
Nanocladius sp.	-	-	2
Stictochironomus sp.	4	-	-
Thienemannimyia sp. group	-	1	-
Chironomini	-	1	-
Total Taxa	24	27	35

(1) Caecodotea sp. formerly reported as Acellus sp.
(2) Anthopotamus verticis formerly reported as Potamanthus verticis.
(3) Agnetina capitata formerly reported as Phasganophora capitata.
(4) Macrostemum zebratum formerly reported as Macronema zebratum.

Foth & Van Dyke
Memorandum

January 9, 1995

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, Foth & Van Dyke

RE: Report on Activities, 1994 Crayfish Collection for Tissue Analysis
Flambeau River, Ladysmith, Wisconsin

Introduction

On August 8, 1994, Bill West of Foth & Van Dyke completed crayfish collection activities at three sites on the Flambeau River downstream of Ladysmith, Wisconsin. The purpose of this activity was to fulfill requirements of the Flambeau Mining Permit which requires Flambeau Mining Company (Flambeau) to conduct metals analysis of crayfish at selected sites upstream and downstream of the mining discharge point (Outfall 001). A minimum of 25 crayfish are to be collected at the following sites:

1. The Flambeau River at the access point off Blackberry Lane (upstream site).
2. The Flambeau River at Meadowbrook Creek (downstream site).
3. The Flambeau River at the site of the former Port Arthur Dam (downstream site).

The time of year of 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 metals uptake in macroinvertebrates over time.

Methodology

All samples were collected using a 8 by 18-inch rectangular net with 800 to 900 micron mesh size. Crayfish were collected by using a kick seine method or by locating feeding crayfish and literally spooking them backwards into the net. The former method was used at the Port Arthur Dam and Meadowbrook Creek sites because water is deeper. At Blackberry Lane the latter method works well because the shallow water allows for easy observation of feeding crayfish.

Crayfish were collected during the following time windows:

Site Location	Time of Collection	Number of Crayfish
Port Arthur Dam	9:20 a.m. - 10:50 a.m.	26
Meadowbrook Creek	11:35 A.m. - 1:05 p.m.	25
Blackberry Lane	2:35 p.m. - 4:30 p.m.	28

Specimens were composited for each site in a Ziploc© bag and placed on ice. Specimens 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 results represent a composite for all crayfish collected per site. Whole bodies were used for analysis. A review of the data indicates that no relative difference in parameter concentrations from upstream locations to downstream locations is evident.

Table 1

Metals Analysis of Crayfish
Flambeau River, Ladysmith, WI
Results in mg/kg
1991 - 1994

Sample ID	Cd	Cr	Cu	Ni	Pb	Zn	Al	Hg	As	Se	Ag
Blackberry 1991	0.1	1.0	17	0.4	1.2	23	36	0.1	0.24	0.14	0.2
Blackberry 1992	<0.1	0.4	16	<0.2	0.1	43	46	0.1	0.30	0.13	<0.1
Blackberry 1993	0.03	<0.09	15	0.2	<0.05	16	28	<0.2	<0.09	<0.19	0.06
Blackberry 1994	0.02	0.92	9.9	<0.22	<0.05	12	17	<0.02	<0.75	<1.93	<0.09
Meadowbrook 1991	0.1	1.6	20	0.5	1.3	27	36	0.1	0.29	0.15	0.2
Meadowbrook 1992	<0.1	0.5	19	<0.2	0.2	39	82	0.11	0.4	0.12	<0.1
Meadowbrook 1993	0.04	<0.09	15	0.2	<0.04	15	18	<0.20	<0.08	<0.35	0.08
Meadowbrook 1994	0.02	0.74	22	<0.29	<0.09	17	31	<0.03	<0.66	<1.64	<0.08
Port Arthur 1991	0.1	1.6	20	0.5	1.2	21	27	0.3	0.28	0.15	0.2
Port Arthur 1992	<0.1	0.4	14	1.5	0.2	33	430	0.1	0.34	0.14	<0.1
Port Arthur 1993	0.03	<0.09	12	<0.15	<0.04	11	22	<0.2	<0.1	<0.36	0.09
Port Arthur 1994	0.04	0.92	18	<1.4	<0.10	15	28	<0.02	<0.76	<1.88	<0.09

Appendix G

Habitat Characterization

Foth & Van Dyke
Memorandum

January 9, 1995

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, Foth & Van Dyke

RE: Report on 1994 Habitat Characterization, Flambeau River, Ladysmith, Wisconsin

Introduction

On August 8, 1994, Bill West of Foth & Van Dyke 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 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. Habitat characterization study requirements are described in the mining application (December 1989) and approved pursuant to Docket No. IH-89-14. This report describes the habitat/substrate along the east bank of the Flambeau River from a point 100 yards above Outfall 002 to a point 1000 yards downstream of discharge Outfall 001.

Methodology

On August 8, 1994, 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 4:30 p.m. above the mining site. River stage was about four inches below bank stage and had been dropping since mid-day. Water depth and clarity were suitable to accommodate the substrate evaluation.

Stream assessment required that the stream segment between the pipeline crossing and a point 100 yards upstream of Outfall 002 be waded to physically determine condition of the substrate, amount of deposition, if any, and type of deposition, e.g., silt or larger.

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 1994 were consistent with those documented in 1992 (Figure 2).

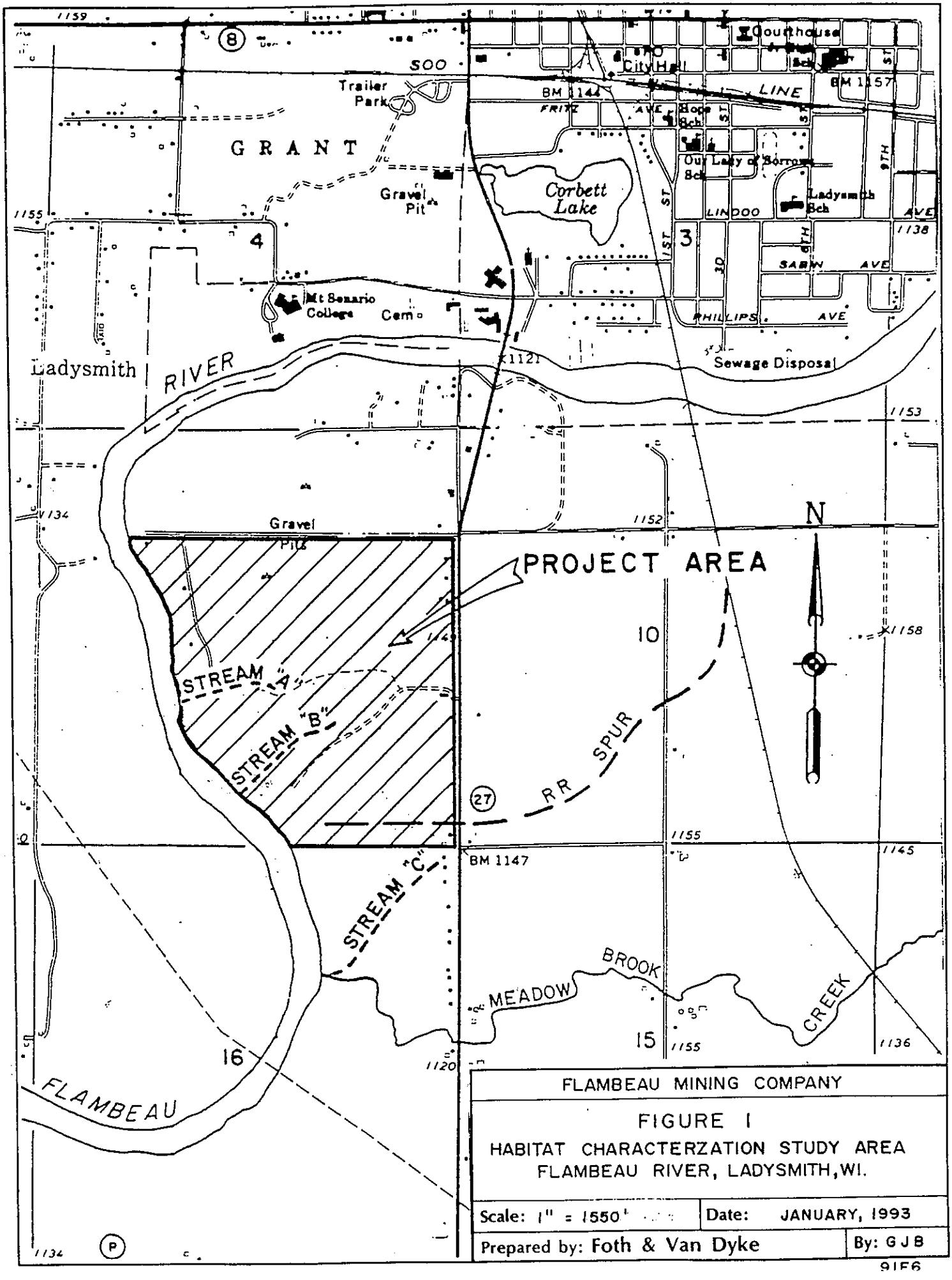
During 1994 field observations, it was noted that a significant amount of beaver activity had occurred above Outfall 002. The remnants of a beaver hut was located along the bank about 60 to 80 yards upstream of Outfall 002. At this same point a cluster of logs was noted in the water along the bank. Another series of logs were located about 20 yards upstream of Outfall 002. At each log cluster sediment in excess of one foot had accumulated. Photograph 1 shows the remnant of the beaver hut with cluster of logs from the hut downstream (foreground). Note also the erodible bank in this area. This bank type is continuous throughout the distance from above the beaver hut past Outfall 001. Also note that at the time of the picture, the stage had fallen about a foot and a half from levels earlier in the day.

Photograph 2 shows Outfall 002. There is no sediment on rocks throughout the entire length of the outfall. Some algae has colonized in the riprap in the wetted area of the outfall. Algal growth is consistent on rocks which are near shore as shown in Photograph 3 (near Meadowbrook Creek) and Photograph 4 (just upstream of Meadowbrook Creek). Photograph 4 is a closeup of the rock/cobble substrate showing the sand and gravel mix in the interstices.

As in previous years, the area above Outfall 002 downstream to about 150 yards below Outfall 001 is highly erodible. Soft sediments exist along shore from the bank outward from three to five feet.

The only sediment noted at Outfall 001 was that which was due to river action. Water-borne sediment had in the past been deposited on Outfall 001 as the river carried sediment up and onto the Outfall's riprap.

No sediment differences were observed from 1992 through this observation period in the area from Outfall 001 to the pipeline crossing. Stream C at Meadowbrook Creek was observed to be dry. Immediately above Meadowbrook Creek, dozens of middens (shells of mussels) were observed in the shallow water. The area below Meadowbrook Creek where previously Elodea had been located, remained, though the area covered by Elodea seemed to be expanding downstream.



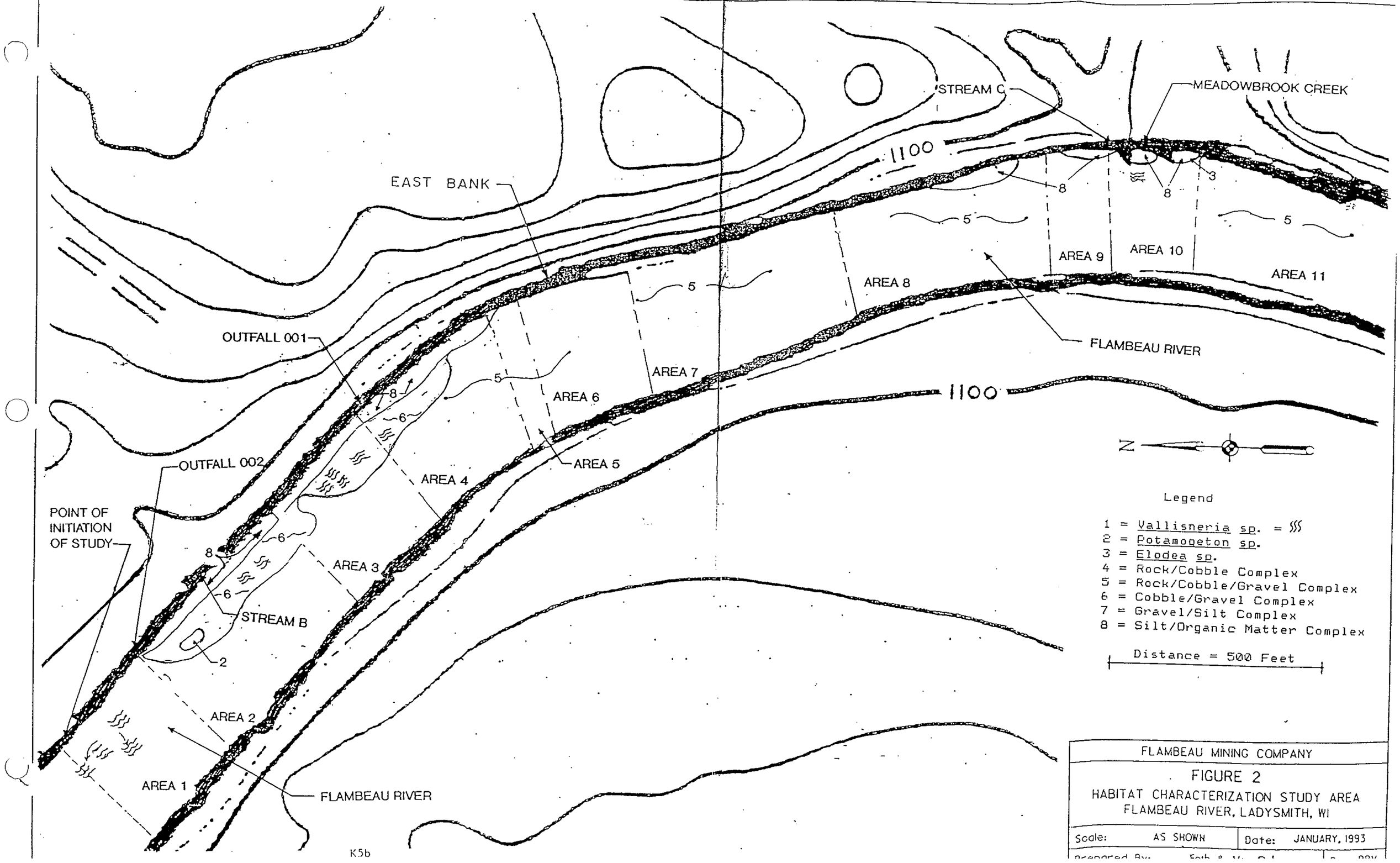
FLAMBEAU MINING COMPANY

FIGURE 1

HABITAT CHARACTERZATION STUDY AREA
FLAMBEAU RIVER, LADYSMITH, WI.

Scale: 1" = 1550'	Date: JANUARY, 1993
Prepared by: Foth & Van Dyke	By: GJB

91E6



Legend

1 = Vallisneria sp. = ≋
2 = Potamogeton sp.
3 = Elodea sp.
4 = Rock/Cobble Complex
5 = Rock/Cobble/Gravel Complex
6 = Cobble/Gravel Complex
7 = Gravel/Silt Complex
8 = Silt/Organic Matter Complex

Distance = 500 Feet

FLAMBEAU MINING COMPANY	
FIGURE 2 HABITAT CHARACTERIZATION STUDY AREA FLAMBEAU RIVER, LADYSMITH, WI	
Scale: AS SHOWN	Date: JANUARY, 1993
Prepared By: Foth & Van Dyke	Rev. RRV

K5b

Photograph 1 August 1994
Flambeau River upstream of Flambeau Mining Company Outfall 001. Note erodible bank and remnants of beaver hut with debris and sediment trailing downstream.

Photograph 2 August 1994
Flambeau River at Flambeau Mining Company outfall 002. Note no sediment from outfall but some deposition from action of river washing sediment across the mouth of outfall.

Photograph 3 August 1994
Flambeau River downstream of Flambeau Mining Company Outfall 001, looking downstream toward confluence with Meadowbrook Creek.

Photograph 4 August 1994
Typical Flambeau River substrate - rock/cobble/gravel substrate with washed sediment filling interstices.

Appendix H

Results of Wetland Monitoring Efforts

Foth & Van Dyke

2737 S. Ridge Road
P. O. Box 19012
Green Bay, WI 54307-9012
414/497-2500
FAX: 414/497-8516

September 12, 1994

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

Dear Jana:

RE: Results of Wetland Monitoring Efforts for 1994

During 1994 I visited the mine site on three separate occasions to monitor the conditions of Wetland No. 1 and to assess the need for special mitigation measures at Wetland No. 1 located to the north and northwest of the open pit. These visits were made during the months of May, July, and early September. During all three visits soil conditions and general state of existing vegetation indicated that there were no adverse affects of the groundwater drawdown at Wetland No. 1 and other wetlands in the immediate vicinity of the mine site. The only exception was the lack of flow in a spring located close to the eastern border of Wetland No. 1 that had continuous flow during prior years. These observations strongly indicate that Wetland No. 1 is "perched" and vertical permeability of wetland soils is very low.

As a result of these observations it is my opinion that there is no immediate need to implement any mitigation efforts that would provide additional surface water flow to Wetland No. 1. This opinion is based upon conditions observed throughout the year at Wetland No. 1 and surrounding wetlands that are not within the area affected by the groundwater drawdown associated with the open pit. Wetlands throughout the region that previously (1987 and 1988) had some standing water interspersed throughout their area were virtually devoid of standing water at the times during 1994 when site visits were made. Staff gauge readings during 1994 indicate that conditions observed during this year were within the natural variation of conditions observed at other wetlands in the region.

Therefore the addition of mitigation water to Wetland No. 1 is not being recommended at this time. However, we believe that conditions need to be continuosly monitored. A site visit in early 1995 when snow melt and spring runoff are at their peak is recommended. At that time the Flambeau Mining Company should be prepared to provide supplemental flow to the eastern side of Wetland No. 1 should conditions at that time warrant the additional water.

Sincerely,

Foth & Van Dyke

Tim J. Weyenberg
Vice President
Client Services

TJW:jap

(a3s12)91F6.flwp

Appendix I

Monitoring Well/Piezometer Construction Logs

of Wisconsin
rtment 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

ty/ ct Name: Flambeau Mine

License, Permit or Monitoring Number: 03180

Type of Well: Water Table Observation Well ■ 11; Piezometer ☐ 12

Distance Well Is From Waste/Source Boundary: _____ ft.

Well A Point of Enforcement Std. Application? ☐ Yes ☐ No

Local Grid Location of Well: 40744.2 ft. ■ N. ☐ S. 39,353.9 ft. ■ E. ☐ W.

Grid Origin Location: Lat. _____ Long. _____ or St. Plane _____ ft. N, _____ ft. E.

Section Location of Waste/Source: ☐ E. ■ W.
NW 1/4 of SE 1/4 of Sec. 9, T. 34 N, R. 6

Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known

Well Name: WW-1

Wis. Unique Well Number: _____ DNR Well Number: _____

Date Well Installed: 05/05/94 (m m d d y y)

Well Installed By: (Person's Name and Firm)
Richard Kastner
Kramer Well Drilling, Inc

■ Yes ☐ No

Protective pipe, top elevation 1112.98 ft. MSL

Well casing, top elevation _____ ft. MSL

Ground surface elevation 1110.6 ft. MSL

Surface seal, bottom 1108.6 ft. MSL or 2.0 ft.

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

Sieve analysis attached? ☐ Yes ☐ No

Drilling method used: Rotary ☐ 50; Hollow Stem Auger ☐ 41; Other ■ Air Hammer

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

Drilling additives used? ☐ Yes ■ No

Describe NA

Source of water (attach analysis): NA

Bentonite seal, top _____ ft. MSL or _____ ft.

Fine sand, top _____ ft. MSL or _____ ft.

Filter pack, top _____ ft. MSL or _____ ft.

Screen joint, top _____ ft. MSL or _____ ft.

Well bottom _____ ft. MSL or _____ ft.

Filter pack, bottom _____ ft. MSL or _____ ft.

Borehole, bottom 1076.5 ft. MSL or 36.0 ft.

Borehole, diameter 7.0 in.

O.D. well casing 6.23 in.

Well casing 6.00 in.

1. Cap and lock? ■ Yes ☐ No
2. Protective cover pipe:
   a. Inside diameter: 6.0 in.
   b. Length: 17.0 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. 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. _____ Other ☐ _____
7. Fine sand material: Manufacturer, product name & mesh size
   a. _____
   b. Volume added _____ ft^3
8. Filter pack material: Manufacturer, product name and mesh size
   a. _____
   b. Volume added _____ ft^3
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 _____
    c. Slot size: 0.___ in.
    d. Slotted length: ___.__ 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: Jerrade R. May Firm: Consulting Mining Geologist

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 may result 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 result in a forfeiture of not more than $10,000 for each

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Flambeau Mining Company 1994 Annual Report

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 4-90

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

Facility/Project Name	County Name	Well Name
Flambeau Mine	Rusk	WW-1
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
03180	53	

	Before Development	After Development
1. Can this well be purged dry?	☐ Yes ■ No	
11. Depth to Water (from top of well casing)	a. 16.00 ft.	18.92 ft.
Date	b. 05/05/94 (m m d d y y)	05/05/94 (m m d d y y)
Time	c. 4:00 ☐ a.m. ■ p.m.	5:00 ☐ a.m. ■ p.m.
12. Sediment in well bottom	inches	inches
13. Water clarity	Clear ☐ 10 Turbid ■ 15 (Describe) muddy	Clear ☐ 20 Turbid ☐ 25 (Describe) almost clear.

2. Well development method

surged with bailer and bailed	☐ 41
surged with bailer and pumped	☐ 61
surged with block and bailed	☐ 42
surged with block and pumped	☐ 62
surged with block, bailed and pumped	☐ 70
compressed air	■ 20
bailed only	☐ 10
pumped only	☐ 51
pumped slowly	☐ 50
Other _____	☐ __

3. Time spent developing well 60 min.

4. Depth of well (from top of well casisng) 36.0 ft.

5. Inside diameter of well ____.__ in.

6. Volume of water in filter pack and well casing ____.__ gal.

7. Volume of water removed from well ____.__ gal.

8. Volume of water added (if any) ____.__ gal.

9. Source of water added _____

10. Analysis performed on water added? ☐ Yes ☐ No
(If yes, attach results)

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____ mg/l	____ mg/l
15. COD	____ mg/l	____ mg/l

16. Additional comments on development:
Hole not completed with installation of screen due to lack of H_2O production.

Well developer or Person's Name and Firm

Name: Richard Kastner

Firm: Kramer Well Drilling, Inc

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

Signature: Evrade R. May

Print Initials: E R M

Firm: Consulting Mining Geologist

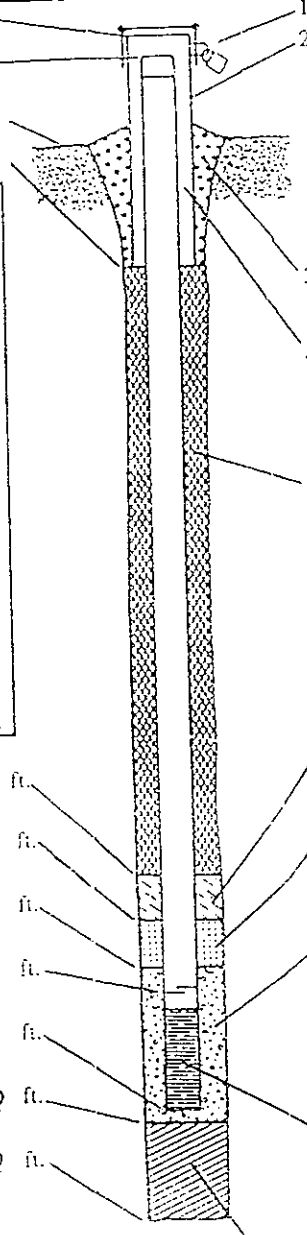
NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

of Wisconsin
rtment 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

ity/ t Name: Flambeau Mine	Local Grid Location of Well: 40671.4 ft. ■ N. ☐ S. 39,253.2 ft. ■ E. ☐ W.	Well Name: WW-2
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: ____ / ____
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: 05/06/94 (m m d d y y)
nce 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): Richard Kastner, Kramer Well Drilling Inc
ell A Point of Enforcement Std. Application? ☐ Yes ☐ No		■ Yes ☐ No



otective pipe, top elevation 1120.19 ft. MSL
Well casing, top elevation ____ ft. MSL
and surface elevation 1119.0 ft. MSL
urface seal, bottom 1117.0 ft. MSL or 2.0 ft.

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

Sieve analysis attached? ☐ Yes ☐ No

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

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

ng additives used? ☐ Yes ☐ No

Describe ____

Source of water (attach analysis):

Bentonite seal, top 1082.8 ft. MSL or ____ ft.
Fine sand, top 1080.8 ft. MSL or ____ ft.
Filter pack, top 1078.8 ft. MSL or ____ ft.
Screen joint, top 1077.8 ft. MSL or ____ ft.
Well bottom 1072.8 ft. MSL or 36.0 ft.
Filter pack, bottom 1072.8 ft. MSL or 36.0 ft.
Borehole, bottom 1072.8 ft. MSL or 36.0 ft.
Borehole, diameter 7.0 in.
O.D. well casing 6.23 in.
ell casing 6.00 in.

1. Cap and lock? ■ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 6.0 in.
b. Length: 370 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. ____ Other ☐ __
7. Fine sand material: Manufacturer, product name & mesh size
a. Badger Silica Sand #20-#40
b. Volume added ____ ft^3
8. Filter pack material: Manufacturer, product name and mesh size
a. 0.25" Washed Pea Gravel
b. Volume added ____ ft^3
9. Well casing: Flush threaded PVC schedule 40 ☐ 23; Flush threaded PVC schedule 80 ☐ 24; Other ■ __
Steel
10. Screen material: Stainless Steel
a. Screen type: Factory cut ■ 11; Continuous slot ☐ 01; Other ☐ __
b. Manufacturer Johnson
c. Slot size: 0.150 in.
d. Slotted length: 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: Rhonda R. May
Firm: Consulting Mining Geologist

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 may result in a forfeiture of not less than $10, nor more than $10,000 for each

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Flambeau Mining Company 1994 Annual Report

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 4-90

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

Facility/Project Name	County Name	Well Name
Flambeau Mine	Rusk	WW-2
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
031 80	55	

		Before Development	After Development
1. Can this well be purged dry?	☐ Yes ■ No		
2. Well development method			
surged with bailer and bailed	☐ 41		
surged with bailer and pumped	☐ 61		
surged with block and bailed	☐ 42		
surged with block and pumped	☐ 62		
surged with block, bailed and pumped	☐ 70		
compressed air	■ 20		
bailed only	☐ 10		
pumped only	☐ 51		
pumped slowly	☐ 50		
Other _____	☐ 99		
11. Depth to Water (from top of well casing)		a. 25.5 ft.	28.65 ft.
Date		b. 05/06/94 (m m d d y y)	05/06/94 (m m d d y y)
Time		c. 11:30 ■ a.m. ☐ p.m.	12:00 ■ a.m. ☐ p.m.
12. Sediment in well bottom		___ inches	___ inches
13. Water clarity		Clear ☐ 10 Turbid ■ 15 (Describe) Muddy	Clear ☐ 20 Turbid ■ 25 (Describe) Muddy
3. Time spent developing well	30 min.		
4. Depth of well (from top of well casing)	47.4 ft.		
5. Inside diameter of well	6.00 in.		
6. Volume of water in filter pack and well casing	0.0 gal.		
7. Volume of water removed from well	230.0 gal.		
8. Volume of water added (if any)	0.0 gal.		
9. Source of water added	NA		
10. Analysis performed on water added? (If yes, attach results)	☐ Yes ■ No		
Fill in if drilling fluids were used and well is at solid waste facility:			
14. Total suspended solids		____ mg/l	____ mg/l
15. COD		____ mg/l	____ mg/l

16. Additional comments on development:

Well developer's Person's Name and Firm

Name: Richard Kastner

Firm: Kramer Well Drilling, Inc

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

Signature: Rhonda R. May

Print Initials: E R M

Firm: Consulting Mining Geologist

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

of Wisconsin
rtment 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

ity/Project Name: F[illegible]beau Mine

Local Grid Location of Well: 39754.0 ft. ■ N. ☐ S. 39018.4 ft. ■ E. ☐ W.

Well Name: 104 - 9

i. [illegible]nse, Permit or Monitoring Number: 03180__

Grid Origin Location: Lat. ____ Long. ____ or St. Plane ____ ft. N, ____ ft. E.

Wis. Unique Well Number | DNR Well Number

: of Well: Water Table Observation Well ■ 11; Piezometer ☐ 12

Section Location of Waste/Source: ☐ E. ■ W. SW1/4 of SE 1/4 of Sec. 9, T. 34 N, R. 6

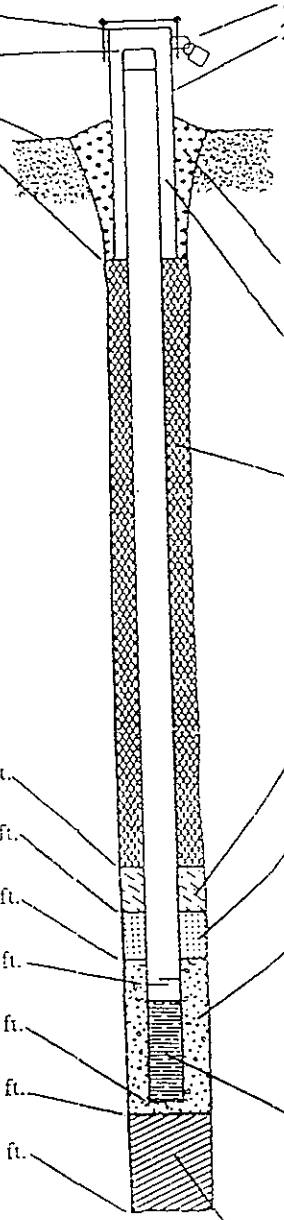
Date Well Installed: 08/22/94 (m m / d d / y y)

ince 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)
Jim Hackney
Amas Construction Co

'ell A Point of Enforcement Std. Application? ☐ Yes ☐ No



'rotective pipe, top elevation _____ ft. MSL

Well casing, top elevation 1045.73 ft. MSL

and surface elevation 1042.0 ft. MSL

Surface seal, bottom ____ ft. MSL or 0.0 ft.

1. Cap and lock? capped ■ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: ____ in.
b. Length: ____ ft.
c. Material: None — 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:
entire hole — Bentonite ☐ 30; Annular space seal ☐ __
0.25" Washed Pea Gravel — 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. _____ Other ☐ __

7. Fine sand material: Manufacturer, product name & mesh size
a. _____ __
b. Volume added _____ ft^3

8. Filter pack material: Manufacturer, product name and mesh size
a. _____ __
b. Volume added _____ 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
0.25" hole drilled every 4" — Other ■
b. Manufacturer _____
c. Slot size: ____ in.
d. Slotted length: ____ ft.

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

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

. Sieve analysis attached? ☐ Yes ■ No

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

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

. [illegible] additives used? ☐ Yes ■ No
Describe NA

7. Source of water (attach analysis):
NA

. Bentonite seal, top ____ ft. MSL or ____ ft.

. Fine sand, top ____ ft. MSL or ____ ft.

. Filter pack, top ____ ft. MSL or ____ ft.

. Screen joint, top ____ ft. MSL or ____ ft.

. Well bottom ____ ft. MSL or 46.0 ft.

. Filter pack, bottom ____ ft. MSL or 46.0 ft.

. Borehole, bottom ____ ft. MSL or 46.0 ft.

. Borehole, diameter 3.5 in.

M. O.D. well casing 2.37 in.

N. [illegible] well casing 2.02 in.

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

Signature: Lowell R. May — Firm: Consulting Mining Geologist

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 may result 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 result in a forfeiture of not more than $10,000 for each [illegible] for DNR use only. See instructions for more information including where the completed form should be sent.

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Flambeau Mining Company 1994 Annual Report

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT
Form 4400-113B Rev. 4-90

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

Facility/Project Name	County Name	Well Name
Flambeau Mine	Rusk	104-9
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number**	**DNR Well Number**
03180	55		

	Before Development	After Development
1. Can this well be purged dry?	☐ Yes ■ No	
11. Depth to Water (from top of well casing)	a. 10.00 ft.	00.00 ft.
Date	b. 08/22/94 (m m d d y y)	__/__/__ (m m d d y y)
Time	c. __:__ ☐ a.m. ☐ p.m.	__:__ ☐ a.m. ☐ p.m.
12. Sediment in well bottom	___.__ inches	___.__ inches
13. Water clarity	Clear ☐ 10 Turbid ☐ 15 (Describe)	Clear ☐ 20 Turbid ☐ 25 (Describe)

2. Well development method

surged with bailer and bailed	☐ 41
surged with bailer and pumped	☐ 61
surged with block and bailed	☐ 42
surged with block and pumped	☐ 62
surged with block, bailed and pumped	☐ 70
compressed air	☐ 20
bailed only	☐ 10
pumped only	☐ 51
pumped slowly	☐ 50
Other _____	☐

3. Time spent developing well ___0___ min.

4. Depth of well (from top of well casisng) __46.0__ ft.

5. Inside diameter of well __2.02__ in.

6. Volume of water in filter pack and well casing ____.__ gal.

7. Volume of water removed from well ____.__ gal.

8. Volume of water added (if any) ____.__ gal.

9. Source of water added _____

10. Analysis performed on water added? ☐ Yes ☐ No
(If yes, attach results)

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

16. Additional comments on development:
Drilled into Footwall of "B" Lens - close to (within 5') of "B"

Well developed by: Person's Name and Firm

Name: Jim Hackney

Firm: Ames Construction Co

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

Signature: Brooke R. Mary

Print Initials: E R M

Firm: Consulting Mining Geologist

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

of Wisconsin
rtment 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

ity/Project Name: Flambeau Mine

Local Grid Location of Well: 39757.1 ft. ■ N. ☐ S. 39012.8 ft. ■ E. ☐ W.

Well Name: 104-10

Wis. Unique Well Number / DNR Well Number:

Date Well Installed: 08/23/94 (m m / d d / y y)

Grid Origin Location: Lat. _____ Long. _____ or St. Plane _____ ft. N, _____ ft. E.

Section Location of Waste/Source: ☐ E. ■ W. SW 1/4 of SE 1/4 of Sec. 9, T. 34 N, R. 6

Well Installed By: (Person's Name and Firm)
Jim Hackney
Ames Construction Co

Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known

ft. Well A Point of Enforcement Std. Application? ☐ Yes ☐ No

Protective pipe, top elevation _____ ft. MSL
Well casing, top elevation 1044.08 ft. MSL
Land surface elevation 1041.6 ft. MSL
Surface seal, bottom _____ ft. MSL or _____ ft.

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

Sieve analysis attached? ☐ Yes ■ No

Drilling method used: Rotary ☐ 50 Hollow Stem Auger ☐ 41 Other ■
Air Hammer

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

Drilling additives used? ☐ Yes ■ No

Describe NA

Source of water (attach analysis):
NA

Bentonite seal, top _____ ft. MSL or _____ ft.
Fine sand, top _____ ft. MSL or _____ ft.
Filter pack, top _____ ft. MSL or _____ ft.
Screen joint, top _____ ft. MSL or _____ ft.
Well bottom _____ ft. MSL or 42.0 ft.
Filter pack, bottom _____ ft. MSL or 47.0 ft.
Borehole, bottom _____ ft. MSL or 47.0 ft.

Borehole, diameter 8.5 in.
O.D. well casing 2.37 in.
I.D. well casing 2.02 in.

1. Cap and lock? Capped ■ Yes ☐ No
2. Protective cover pipe:
   a. Inside diameter: _____ in.
   b. Length: _____ ft.
   c. Material: NONE 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
   Entire Hole Annular space seal ☐ _____
   0.25" washed Pea Gravel 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. _____ Other ☐ _____
7. Fine sand material: Manufacturer, product name & mesh size
   a. _____
   b. Volume added _____ ft^3
8. Filter pack material: Manufacturer, product name and mesh size
   a. _____
   b. Volume added _____ 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
    0.25" hole drilled every 4" Other ■
    b. Manufacturer _____
    c. Slot size: 0.___ in.
    d. Slotted length: ___.__ 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: Charles R. May. Firm: Consulting mining Geologist

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 may result 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 result in a forfeiture of not more than $10,000 for each day of violation. See instructions for more information including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT
Form 4400-113B Rev. 4-90

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

Facility/Project Name	County Name	Well Name
Flambeau Mine	Rusk	104 - 10
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
03180__	53	____ / ____

	Before Development	After Development
1. Can this well be purged dry?	☐ Yes ■ No	
11. Depth to Water (from top of well casing)	a. 18.00 ft.	00.00 ft.
Date	b. 08/23/94 (m m d d y y)	__/__/__ (m m d d y y)
Time	c. __:__ ☐ a.m. ☐ p.m.	__:__ ☐ a.m. ☐ p.m.
12. Sediment in well bottom	__.__ inches	__.__ inches
13. Water clarity	Clear ■ 10 Turbid ☐ 15 (Describe)	Clear ☐ 20 Turbid ☐ 25 (Describe)

2. Well development method

surged with bailer and bailed	☐ 41
surged with bailer and pumped	☐ 61
surged with block and bailed	☐ 42
surged with block and pumped	☐ 62
surged with block, bailed and pumped	☐ 70
compressed air	☐ 20
bailed only	☐ 10
pumped only	☐ 51
pumped slowly	☐ 50
Other _____	☐

3. Time spent developing well 0 min.

4. Depth of well (from top of well casisng) 47.0 ft.

5. Inside diameter of well 2.02 in.

6. Volume of water in filter pack and well casing 0 gal.

7 Volume of water removed from well 0 gal.

8 Volume of water added (if any) 0 gal.

9 Source of water added N4

10. Analysis performed on water added? ☐ Yes ■ No
(If yes, attach results)

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

16. Additional comments on development:
Artesian ≈ 0.2 gpm visual estimate. Drilled into "B"

Well developed by: Person's Name and Firm	I hereby certify that the above information is true and correct to the best of my knowledge.
Name: Jim Hackney	Signature: Thomas R May
Firm: Amas Construction Co	Print Initials: E R M
	Firm: Consulting ~~Geo~~ Mine Geologist

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

of Wisconsin
rtment 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

ity/Project Name: mbeau Mine

Well Name: 104 - 11

Local Grid Location of Well: 39761.6 ft. ■ N. ☐ S. 39007.5 ft. ■ E. ☐ W.

Wis. Unique Well Number / DNR Well Number

Grid Origin Location: Lat. ____ Long. ____ or St. Plane ____ ft. N, ____ ft. E.

Date Well Installed: 08/23/94 (m m d d y y)

Section Location of Waste/Source: SW 1/4 of SE 1/4 of Sec. 9, T. 34 N, R. 6 ■ W. ☐ E.

Well Installed By: (Person's Name and Firm)
Jim Hackney
Amas Construction Co

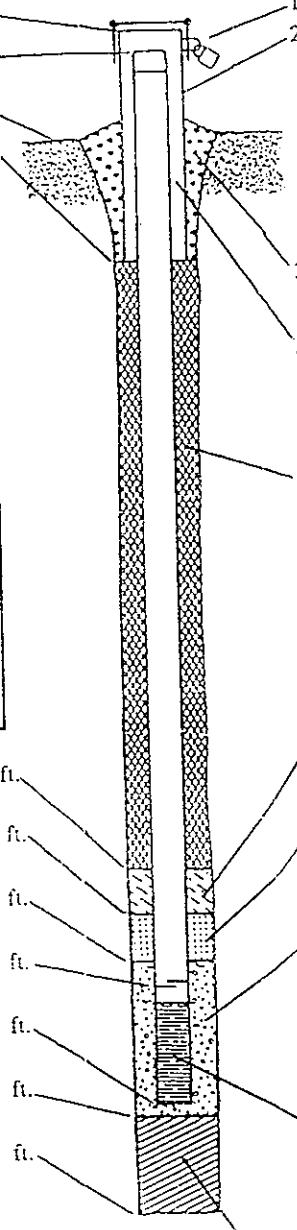
ise, Permit or Monitoring Number: 03180

of Well: Water Table Observation Well ■ 11; Piezometer ☐ 12

nce Well Is From Waste/Source Boundary: ____ ft.

ell A Point of Enforcement Std. Application? ☐ Yes ☐ No

Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known



rotective pipe, top elevation ____ ft. MSL

Well casing, top elevation 1045.29 ft. MSL

and surface elevation 1041.2 ft. MSL

urface seal, bottom ____ ft. MSL or ____ ft.

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

. Sieve analysis attached? ☐ Yes ■ No

Drilling method used: Rotary ☐ 50; Hollow Stem Auger ☐ 41; Percussion; Other ■

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

. ☐ additives used? ☐ Yes ■ No

Describe NA

. Source of water (attach analysis):
NA

Bentonite seal, top ____ ft. MSL or ____ ft.

Fine sand, top ____ ft. MSL or ____ ft.

. Filter pack, top ____ ft. MSL or ____ ft.

. Screen joint, top ____ ft. MSL or ____ ft.

Well bottom ____ ft. MSL or 36.0 ft.

Filter pack, bottom ____ ft. MSL or 36.0 ft.

. Borehole, bottom ____ ft. MSL or 36.0 ft.

. Borehole, diameter 3.5 in.

. O.D. well casing 2.37 in.

. ell casing 2.02 in.

1. Cap and lock? Capped ■ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: ____ in.
b. Length: ____ ft.
c. Material: NONE — 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:
Entire Hole — Bentonite ☐ 30
0.25" Washed Pea Gravel — 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. ____ Other ☐ __

7. Fine sand material: Manufacturer, product name & mesh size
a. ____
b. Volume added ____ ft^3

8. Filter pack material: Manufacturer, product name and mesh size
a. ____
b. Volume added ____ 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; 0.25" Hole drilled every 4" — Other ■
b. Manufacturer ____
c. Slot size: 0.___ in.
d. Slotted length: ____ ft.

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

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

Signature: Edwards R. May. Firm: Consulting Mining Geologist.

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 may result 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 result in a forfeiture of not more than $10,000 for each . See instructions for more information including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT
Form 4400-113B Rev. 4-90

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

Facility/Project Name	County Name	Well Name
Flambeau Mine	Rusk	104 -11
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
031 80 __	55	___ ___ ___ / ___ ___

	Before Development	After Development
1. Can this well be purged dry?	☐ Yes ■ No	
11. Depth to Water (from top of well casing)	a. 12.00 ft.	0.00 ft.
Date	b. 08/23/94 (m m d d y y)	__/__/__ (m m d d y y)
Time	c. __:__ ☐ a.m. ☐ p.m.	__:__ ☐ a.m. ☐ p.m.
12. Sediment in well bottom	___ inches	___ inches
13. Water clarity	Clear ■ 10 Turbid ☐ 15 (Describe)	Clear ☐ 20 Turbid ☐ 25 (Describe)

2. Well development method

surged with bailer and bailed	☐ 41
surged with bailer and pumped	☐ 61
surged with block and bailed	☐ 42
surged with block and pumped	☐ 62
surged with block, bailed and pumped	☐ 70
compressed air	☐ 20
bailed only	☐ 10
pumped only	☐ 51
pumped slowly	☐ 50
Other _____	☐

3. Time spent developing well ___0___ min.

4. Depth of well (from top of well casisng) 36.0 ft.

5. Inside diameter of well 2.02 in.

6. Volume of water in filter pack and well casing ___0___ gal.

7. Volume of water removed from well ___0___ gal.

8. Volume of water added (if any) ___0___ gal.

9. Source of water added NA

10. Analysis performed on water added? ☐ Yes ■ No
(If yes, attach results)

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

16. Additional comments on development:
Artesian ≃ 0.1 gpm visual estimate. Collared into "B" Lens.
Hit "B" FW @ ≃ 12'

Well developed by: Person's Name and Firm

Name Jim Hackney

Firm: Ames Construction Co

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

Signature: Rhonda R. May

Print Initials: E R M

Firm: Consulting Mining Geologist

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

: of Wisconsin
artment 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

lity/Project Name: Flambeau Mine

ii ense, Permit or Monitoring Number: 031 80 ___

e of Well: Water Table Observation Well ■ 11; Piezometer ☐ 12

ance Well Is From Waste/Source Boundary: ___ ft.

Well A Point of Enforcement Std. Application? ☐ Yes ☐ No

Local Grid Location of Well: 39769.1 ft. ■ N. ☐ S. 38997.4 ft. ■ E. ☐ W.

Grid Origin Location: Lat. _____ Long. _____ or St. Plane _____ ft. N. _____ ft. E.

Section Location of Waste/Source: ☐ E. ■ W. SW 1/4 of SE 1/4 of Sec. 9, T. 34 N, R. 6

Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known

Well Name: 104 - 12

Wis. Unique Well Number: ___ DNR Well Number: ___

Date Well Installed: 08/23/94 (m m / d d / y y)

Well Installed By: (Person's Name and Firm)
Jim Hackney
Ames Construction Co

Protective pipe, top elevation _____ ft. MSL

Well casing, top elevation 1045.27 ft. MSL

Land surface elevation 1041.3 ft. MSL

Surface seal, bottom ___ ft. MSL or ___ ft.

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

. Sieve analysis attached? ☐ Yes ■ No

. Drilling method used: Rotary ☐ 50; Hollow Stem Auger ☐ 41; Other ■ ___
Percussion

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

5 g additives used? ☐ Yes ■ No
Describe NA

7. Source of water (attach analysis):
NA

. Bentonite seal, top ___ ft. MSL or ___ ft.

. Fine sand, top ___ ft. MSL or ___ ft.

. Filter pack, top ___ ft. MSL or ___ ft.

. Screen joint, top ___ ft. MSL or ___ ft.

. Well bottom ___ ft. MSL or 36.0 ft.

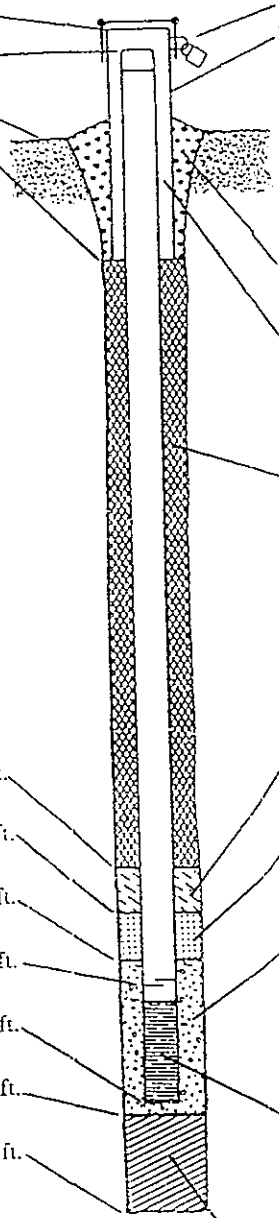
. Filter pack, bottom ___ ft. MSL or 36.0 ft.

. Borehole, bottom ___ ft. MSL or 36.0 ft.

. Borehole, diameter 3.5 in.

M. O.D. well casing 2.37 in.

N. ell casing 2.02 in.



1. Cap and lock? Capped ■ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: ___ in.
b. Length: ___ ft.
c. Material: NONE — 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:
Entire Hole — Bentonite ☐ 30; Annular space seal ☐ ___
0.25" Washed Pea Gravel — 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. _____ Other ☐ ___

7. Fine sand material: Manufacturer, product name & mesh size
a. _____
b. Volume added _____ ft^3

8. Filter pack material: Manufacturer, product name and mesh size
a. _____
b. Volume added _____ ft^3

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

10. Screen material: _____
a. Screen type: Factory cut ☐ 11; Continuous slot ☐ 01; 0.25" Hole Drilled every 4" Other ■
b. Manufacturer _____
c. Slot size: 0.___ in.
d. Slotted length: ___ 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: Edwards R. May. Firm: Consulting Mining Geologist

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 may result in a forfeiture of not less than $10, nor more than $10,000 for each $5000 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. See instructions for more information including where the completed form should be sent.

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Flambeau Mining Company 1994 Annual Report

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT
Form 4400-113B Rev. 4-90

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

Facility/Project Name	County Name	Well Name	
Flambeau Mine	Rusk	104 - 12	
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number**	**DNR Well Number**
031BO__	55		

	Before Development	After Development
1. Can this well be purged dry?	☐ Yes ☐ No	
2. Well development method		
surged with bailer and bailed	☐ 41	
surged with bailer and pumped	☐ 61	
surged with block and bailed	☐ 42	
surged with block and pumped	☐ 62	
surged with block, bailed and pumped	☐ 70	
compressed air	☐ 20	
bailed only	☐ 10	
pumped only	☐ 51	
pumped slowly	☐ 50	
Other _____	☐	
3. Time spent developing well	0 min.	
4. Depth of well (from top of well casisng)	36.0 ft.	
5. Inside diameter of well	2.02 in.	
6. Volume of water in filter pack and well casing	0 gal.	
7. Volume of water removed from well	0 gal.	
8 Volume of water added (if any)	0 gal.	
9 Source of water added	NA	
10. Analysis performed on water added? (If yes, attach results)	☐ Yes ☒ No	
11. Depth to Water (from top of well casing)	a. 0.0 ft.	0.0 ft.
Date	b. 08 / 23 / 94 (m m d d y y)	__ / __ / __ (m m d d y y)
Time	c. ____ ☐ a.m. ☐ p.m.	__ : __ ☐ a.m. ☐ p.m.
12. Sediment in well bottom	___.__ inches	___.__ inches
13. Water clarity	Clear ☒ 10 Turbid ☐ 15 (Describe)	Clear ☐ 20 Turbid ☐ 25 (Describe)
Fill in if drilling fluids were used and well is at solid waste facility:		
14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

16. Additional comments on development:
Artesian ≈ 1.5 gpm. Cased in PSS; hit top of "B" sand at ≈ 2'.

Well developed by: Person's Name and Firm	I hereby certify that the above information is true and correct to the best of my knowledge.
Name: Jim Hackney.	Signature: Brooke R. May.
Firm: Ames Construction Co	Print Initials: E R M
	Firm: Consulting Mining Geologist.

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

e of Wisconsin
artment 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

ility/Project Name: Flambeau Mine

License, Permit or Monitoring Number: 03180

Well Name: 104 - 13

Local Grid Location of Well: 39780.4 ft. ■ N. ☐ S. 38985.7 ft. ■ E. ☐ W.

Wis. Unique Well Number / DNR Well Number

Grid Origin Location: Lat. _____ Long. _____ or St. Plane _____ ft. N, _____ ft. E.

Date Well Installed: 08/23/94 (m m / d d / y y)

Type of Well: Water Table Observation Well ■ 11; Piezometer ☐ 12

Section Location of Waste/Source: ☐ E. ■ W. SW 1/4 of SE 1/4 of Sec. 9, T. 34 N, R. 6

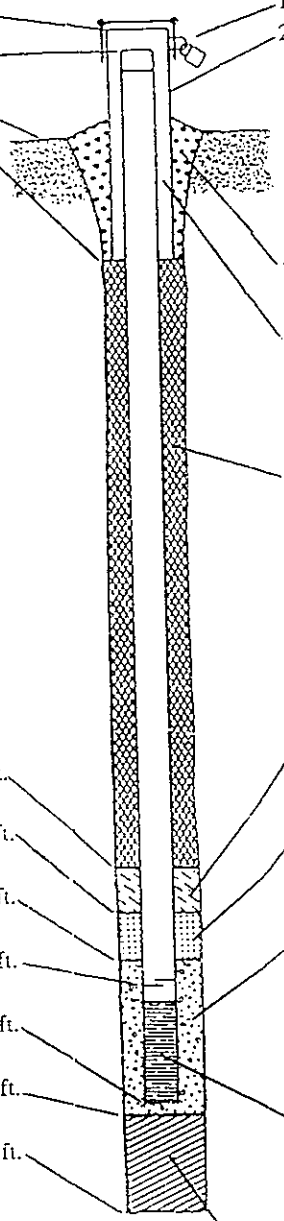
Well Installed By: (Person's Name and Firm)
Jim Hackney
Ames Construction Co

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 A Point of Enforcement Std. Application? ☐ Yes ☐ No

Protective pipe, top elevation _____ ft. MSL
Well casing, top elevation 1042.23 ft. MSL
Land surface elevation 1041.2 ft. MSL
Surface seal, bottom _____ ft. MSL or _____ ft.



1. Cap and lock? Capped ■ Yes ☐ No
2. Protective cover pipe:
   a. Inside diameter: _____ in.
   b. Length: _____ ft.
   c. Material: NONE — 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:
   Entire Hole — Bentonite ☐ 30; Annular space seal ☐ __
   0.25" Washed Pea Gravel — 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. _____ Other ☐ __
7. Fine sand material: Manufacturer, product name & mesh size
   a. _____ __
   b. Volume added _____ ft^3
8. Filter pack material: Manufacturer, product name and mesh size
   a. _____ __
   b. Volume added _____ 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
    0.25" Hole Drilled every 4" — Other ■
    b. Manufacturer _____
    c. Slot size: 0.___ in.
    d. Slotted length: ___.__ ft.
11. Backfill material (below filter pack): None ■ 14
    _____ Other ☐ __

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 ■ __
Percussion

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

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

17. Source of water (attach analysis):
NA

E. Bentonite seal, top _____ ft. MSL or _____ ft.
F. Fine sand, top _____ ft. MSL or _____ ft.
G. Filter pack, top _____ ft. MSL or _____ ft.
H. Screen joint, top _____ ft. MSL or _____ ft.
I. Well bottom _____ ft. MSL or 32.0 ft.
J. Filter pack, bottom _____ ft. MSL or 32.0 ft.
K. Borehole, bottom _____ ft. MSL or 32.0 ft.
L. Borehole, diameter 2.5 in.
M. O.D. well casing 2.37 in.
N. I.D. well casing 2.02 in.

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

Signature: Duane R. May
Firm: Consulting Mining Geologist

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 may result 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 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

MONITORING WELL DEVELOPMENT
Form 4400-113B Rev. 4-90

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

Facility/Project Name	County Name	Well Name
Flambeau Mine	Rusk	104-13
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
03180	55	

	Before Development	After Development
1. Can this well be purged dry?	☐ Yes ☐ No	
11. Depth to Water (from top of well casing)	a. ____ ft.	____ ft.
Date	b. ____/____/____ m m d d y y	____/____/____ m m d d y y
Time	c. ____:____ ☐ a.m. ☐ p.m.	____:____ ☐ a.m. ☐ p.m.
12. Sediment in well bottom	____ inches	____ inches
13. Water clarity	Clear ☐ 10 Turbid ☐ 15 (Describe)	Clear ☐ 20 Turbid ☐ 25 (Describe)

2. Well development method

surged with bailer and bailed	☐	41
surged with bailer and pumped	☐	61
surged with block and bailed	☐	42
surged with block and pumped	☐	62
surged with block, bailed and pumped	☐	70
compressed air	☐	20
bailed only	☐	10
pumped only	☐	51
pumped slowly	☐	50
Other _____	☐	

3. Time spent developing well ____0____ min.

4. Depth of well (from top of well casisng) ___32.0___ ft.

5. Inside diameter of well ___2.02___ in.

6. Volume of water in filter pack and well casing ____0____ gal.

7 Volume of water removed from well ____0____ gal.

8 Volume of water added (if any) ____0____ gal.

9 Source of water added NA

10. Analysis performed on water added? ☐ Yes ■ No
(If yes, attach results)

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

16. Additional comments on development:
Collared in QSS. Hit "B" Hanging wall at 22-28'
This zone contained chert, MS & water.

Well developed by: Person's Name and Firm

Name Jim Hackney

Firm: Ames Construction Co

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

Signature: Brooke R. May

Print Initials: E R M

Firm: Consulting Mining Geologist

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

of Wisconsin
rtment 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

ity/Project Name: Flambeau Mine

License, Permit or Monitoring Number: 03180

Local Grid Location of Well: 39,786.2 ft. ■ N. ☐ S. 38,978.1 ft. ■ E. ☐ W.

Grid Origin Location: Lat. _____ Long. _____ or St. Plane _____ ft. N, _____ ft. E.

Well Name: 104 - 14

Wis. Unique Well Number: _____ DNR Well Number: _____

Date Well Installed: 08/23/94 (m m d d y y)

Well Installed By: (Person's Name and Firm)
Jim Hackney
Ames Construction Co

Type of Well: Water Table Observation Well ■ 11; Piezometer ☐ 12

Section Location of Waste/Source: SW 1/4 of SE 1/4 of Sec. 9, T. 34 N, R. 6 ■ W. ☐ E.

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 A Point of Enforcement Std. Application? ☐ Yes ☐ No

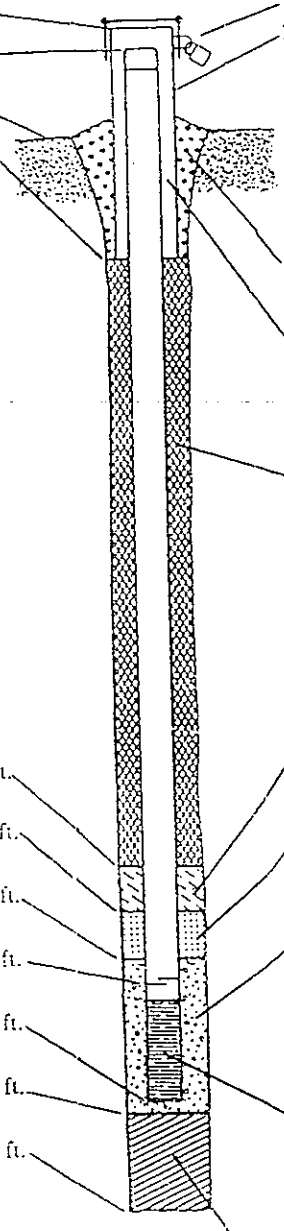
Protective pipe, top elevation _____ ft. MSL
Well casing, top elevation 1044.63 ft. MSL
Land surface elevation 1041.0 ft. MSL
Surface seal, bottom _____ ft. MSL or _____ ft.

1. Cap and lock? Capped ■ Yes ☐ No
2. Protective cover pipe:
   a. Inside diameter: _____ in.
   b. Length: _____ ft.
   c. Material: NONE — 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: Entire Hole — Bentonite ☐ 30; Annular space seal ☐ __; Other ■ __
5. Annular space seal: 0.25" Washed Pea Gravel
   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. _____ Other ☐ __
7. Fine sand material: Manufacturer, product name & mesh size
   a. _____ __
   b. Volume added _____ ft^3
8. Filter pack material: Manufacturer, product name and mesh size
   a. _____ __
   b. Volume added _____ 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; 0.25" Hole drilled every 4" Other ■
    b. Manufacturer _____
    c. Slot size: 0.___ in.
    d. Slotted length: ____ ft.
11. Backfill material (below filter pack): None ■ 14; _____ Other ☐ __

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 ■ __
    Percussion
15. Drilling fluid used: Water ☐ 02; Air ■ 01; Drilling Mud ☐ 03; None ☐ 99
16. Drilling additives used? ☐ Yes ■ No
    Describe NA
17. Source of water (attach analysis):
    NA

18. Bentonite seal, top _____ ft. MSL or _____ ft.
19. Fine sand, top _____ ft. MSL or _____ ft.
20. Filter pack, top _____ ft. MSL or _____ ft.
21. Screen joint, top _____ ft. MSL or _____ ft.
22. Well bottom _____ ft. MSL or 36.0 ft.
23. Filter pack, bottom _____ ft. MSL or 36.0 ft.
24. Borehole, bottom _____ ft. MSL or 36.0 ft.
25. Borehole, diameter 3.5 in.
26. O.D. well casing 2.37 in.
27. I.D. well casing 2.02 in.



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

Signature: Frank R. May
Firm: Consulting Mining Geologist

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 may result 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 result in a forfeiture of not more than $10,000 for each

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT
Form 4400-113B Rev. 4-90

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

Facility/Project Name	County Name	Well Name
Flambeau Mine	Rusk	04 - 14
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number**	**DNR Well Number**
03180	55		

	Before Development	After Development
1. Can this well be purged dry?	☐ Yes ☐ No	
11. Depth to Water (from top of well casing)	a. ___/___ ft.	___.___ ft.
Date	b. m m / d d / y y	m m / d d / y y
Time	c. ___:___ ☐ a.m. ☐ p.m.	___:___ ☐ a.m. ☐ p.m.
12. Sediment in well bottom	___.___ inches	___.___ inches
13. Water clarity	Clear ☐ 10 Turbid ☑ 15 (Describe)	Clear ☐ 20 Turbid ☐ 25 (Describe)

2. Well development method

surged with bailer and bailed	☐ 41
surged with bailer and pumped	☐ 61
surged with block and bailed	☐ 42
surged with block and pumped	☐ 62
surged with block, bailed and pumped	☐ 70
compressed air	☐ 20
bailed only	☐ 10
pumped only	☐ 51
pumped slowly	☐ 50
Other _____	☐

3. Time spent developing well ___0___ min.

4. Depth of well (from top of well casisng) 36.0 ft.

5. Inside diameter of well 2.02 in.

6. Volume of water in filter pack and well casing ___0___ gal.

7 Volume of water removed from well ___0___ gal.

8 Volume of water added (if any) ___0___ gal.

9 Source of water added NA

10. Analysis performed on water added? ☐ Yes ■ No
(If yes, attach results)

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	___.___ mg/l	___.___ mg/l
15. COD	___.___ mg/l	___.___ mg/l

16. Additional comments on development:
Drilled into QSS

Well developed by: Person's Name and Firm

Name Jim Hackney

Firm: Ames Construction CO

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

Signature: Edwards R. May

Print Initials: E R M

Firm: Consulting Mining Geologist

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

of Wisconsin
rtment 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

ity/Project Name: Flambeau Mine

License, Permit or Monitoring Number: 03180__

Type of Well: Water Table Observation Well ■ 11; Piezometer ☐ 12

Distance Well Is From Waste/Source Boundary: _____ ft.

Well A Point of Enforcement Std. Application? ☐ Yes ☐ No

Local Grid Location of Well: 39791.8 ft. ■ N. ☐ S. 38972.8 ft. ■ E. ☐ W.

Grid Origin Location: Lat. _____ Long. _____ or

St. Plane _____ ft. N, _____ ft. E.

Section Location of Waste/Source: ☐ E. ■ W.
SW 1/4 of SE 1/4 of Sec. 9, T. 34 N, R. 6

Location of Well Relative to Waste/Source:
u ☐ Upgradient s ☐ Sidegradient
d ☐ Downgradient n ☐ Not Known

Well Name: 104-15

Wis. Unique Well Number: _____ DNR Well Number: _____

Date Well Installed: 08/23/94 (m m / d d / y y)

Well Installed By: (Person's Name and Firm)
Jim Hackney
Ames Construction Co

Protective pipe, top elevation _____ ft. MSL

Well casing, top elevation 1043.46 ft. MSL

Land surface elevation 1041.5 ft. MSL

Surface seal, bottom ___ ft. MSL or ___ ft.

1. Cap and lock? Capped ■ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: ___ in.
b. Length: ___ ft.
c. Material: NONE — 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:
Entire Hole — Bentonite ☐ 30; Annular space seal ☐ __
0.25" Washed Pea Gravel — 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. _____ Other ☐ __

7. Fine sand material: Manufacturer, product name & mesh size
a. _____ __
b. Volume added _____ ft^3

8. Filter pack material: Manufacturer, product name and mesh size
a. _____ __
b. Volume added _____ 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; 0.25" Hole Drilled over 4" Other ■
b. Manufacturer _____
c. Slot size: ___ in.
d. Slotted length: ___ ft.

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

12. Bentonite seal, top ___ ft. MSL or ___ ft.

13. Fine sand, top ___ ft. MSL or ___ ft.

14. Filter pack, top ___ ft. MSL or ___ ft.

15. Screen joint, top ___ ft. MSL or ___ ft.

16. Well bottom ___ ft. MSL or 32.0 ft.

17. Filter pack, bottom ___ ft. MSL or 32.0 ft.

18. Borehole, bottom ___ ft. MSL or 37.0 ft.

19. Borehole, diameter 3.5 in.

20. O.D. well casing 2.37 in.

21. I.D. well casing 2.02 in.

22. Sampling additives used? ☐ Yes ■ No
Describe NA

23. Drilling method used: Rotary ☐ 50; Hollow Stem Auger ☐ 41; Other ■ ▒
Percussion

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

25. Drilling additives used? ☐ Yes ■ No
Describe NA

26. Source of water (attach analysis):
NA

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

28. Sieve analysis attached? ☐ Yes ■ No

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

Signature: Ghrade R. May. Firm: Consulting Mining Geologist.

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 may result 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 result in a forfeiture of not more than $10,000 for each day of violation. See instructions for more information including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 4-90

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

Facility/Project Name	County Name	Well Name
Flambeau Mine	Rusk	104 - 15
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number**	**DNR Well Number**
03180__	55		

	Before Development	After Development
1. Can this well be purged dry?	☐ Yes ☐ No	
11. Depth to Water (from top of well casing)	a. ____.__ ft.	____.__ ft.
Date	b. __/__/__ m m d d y y	__/__/__ m m d d y y
Time	c. __:__ ☐ a.m. ☐ p.m.	__:__ ☐ a.m. ☐ p.m.
12. Sediment in well bottom	____.__ inches	____.__ inches
13. Water clarity	Clear ☐ 10 Turbid ☐ 15 (Describe)	Clear ☐ 20 Turbid ☐ 25 (Describe)

2. Well development method

surged with bailer and bailed	☐	41
surged with bailer and pumped	☐	61
surged with block and bailed	☐	42
surged with block and pumped	☐	62
surged with block, bailed and pumped	☐	70
compressed air	☐	20
bailed only	☐	10
pumped only	☐	51
pumped slowly	☐	50
Other _____	☐	

3. Time spent developing well ___0___ min.

4. Depth of well (from top of well casisng) __320__ ft.

5. Inside diameter of well __2.02__ in.

6. Volume of water in filter pack and well casing ___0___ gal.

7 Volume of water removed from well ___0___ gal.

8 Volume of water added (if any) ___0___ gal.

9 Source of water added NA

10. Analysis performed on water added? ☐ Yes ■ No
(If yes, attach results)

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

16. Additional comments on development:
Collared into F.W. of the "A" Lens.

Well developed by: Person's Name and Firm

Name _____

Firm: _____

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

Signature: Rhonda R. May

Print Initials: ERM

Firm: Consulting Mining Geologist

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

of Wisconsin
rtment 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

ity/Project Name: Flambeau Mine

Local Grid Location of Well: 39828.5 ft. ■ N. ☐ S. 38,929.6 ft. ■ E. ☐ W.

Well Name: 104 - 16

Wis. Unique Well Number / DNR Well Number:

Grid Origin Location: Lat. _____ Long. _____ or St. Plane _____ ft. N, _____ ft. E.

Date Well Installed: 08/23/94 (m m d d y y)

Section Location of Waste/Source: SW 1/4 of SE 1/4 of Sec. 9, T. 34 N, R. 6 ■ W. ☐ E.

Well Installed By: (Person's Name and Firm)
Jim Hackney
Ames Construction Co

Cl/Permit or Monitoring Number: 03180

of Well: Water Table Observation Well ■ 11; Piezometer ☐ 12

nce Well Is From Waste/Source Boundary: _____ ft.

ell A Point of Enforcement Std. Application? ☐ Yes ☐ No

Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known

rotective pipe, top elevation _____ ft. MSL

Well casing, top elevation 1045.39 ft. MSL

and surface elevation 1041.1 ft. MSL

urface seal, bottom _____ ft. MSL or _____ ft.

1. Cap and lock? Capped ■ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: _____ in.
b. Length: _____ ft.
c. Material: NONE — 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: Entire Hole — Bentonite ☐ 30; Annular space seal ☐ _____; Other ■ 0.25" Washed Pea Gravel

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. _____ Other ☐ _____

7. Fine sand material: Manufacturer, product name & mesh size
a. _____
b. Volume added _____ ft^3

8. Filter pack material: Manufacturer, product name and mesh size
a. _____
b. Volume added _____ 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; 0.25" Hole Drilled every 4" — Other ■
b. Manufacturer _____
c. Slot size: 0.___ in
d. Slotted length: ___ ft

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

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

. Sieve analysis attached? ☐ Yes ■ No

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

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

g additives used? ☐ Yes ■ No

Describe NA

7. Source of water (attach analysis):
NA

. Bentonite seal, top _____ ft. MSL or _____ ft.

Fine sand, top _____ ft. MSL or _____ ft.

. Filter pack, top _____ ft. MSL or _____ ft.

. Screen joint, top _____ ft. MSL or _____ ft.

Well bottom _____ ft. MSL or 36.0 ft.

. Filter pack, bottom _____ ft. MSL or 36.0 ft.

. Borehole, bottom _____ ft. MSL or 36.0 ft.

. Borehole, diameter 3.5 in.

M. O.D. well casing 2.37 in.

N. ell casing 2.02 in.

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

Signature: Brooke R. May — Firm: Consulting Mining Geologist

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 may result 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 result in a forfeiture of not more than $10,000 for each day of violation. See instructions for more information including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT
Form 4400-113B Rev. 4-90

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

Facility/Project Name	County Name	Well Name
Flambeau Mine	Rusk	104-16
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number**	**DNR Well Number**
03180	55		

	Before Development	After Development
1. Can this well be purged dry?	☐ Yes ☐ No	
11. Depth to Water (from top of well casing)	a. ___/___.___ ft.	___.___ ft.
Date	b. m m d d y y	m m d d y y
Time	c. ___:___ ☐ a.m. ☐ p.m.	___:___ ☐ a.m. ☐ p.m.
12. Sediment in well bottom	___.___ inches	___.___ inches
13. Water clarity	Clear ☐ 10 Turbid ☑ 15 (Describe)	Clear ☐ 20 Turbid ☐ 25 (Describe)

2. Well development method

surged with bailer and bailed	☐	41
surged with bailer and pumped	☐	61
surged with block and bailed	☐	42
surged with block and pumped	☐	62
surged with block, bailed and pumped	☐	70
compressed air	☐	20
bailed only	☐	10
pumped only	☐	51
pumped slowly	☐	50
Other _____	☐	

3. Time spent developing well ___0___ min.

4. Depth of well (from top of well casisng) ___36.0___ ft.

5. Inside diameter of well ___2.02___ in.

6. Volume of water in filter pack and well casing ___/___.___ gal.

7 Volume of water removed from well ___/___.___ gal.

8 Volume of water added (if any) ___/___.___ gal.

9 Source of water added NA

10. Analysis performed on water added? ☐ Yes ■ No
(If yes, attach results)

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	___/___.___ mg/l	___.___ mg/l
15. COD	___/___.___ mg/l	___.___ mg/l

16. Additional comments on development:
Collared into massive sulfide "A" Lens

Well developed by: Person's Name and Firm

Name _____

Firm: _____

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

Signature: Edward R. Marx

Print Initials: E R M

Firm: Consulting Mining Geologist

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

of Wisconsin
rtment of Natural Resources

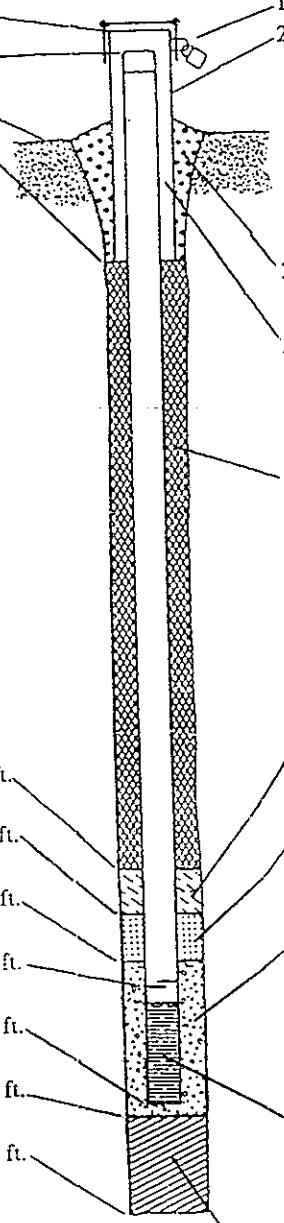
Route to: Solid Waste ☐ Haz. Waste ☐ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

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

ity/Project Name: Flambeau Mine
ense, Permit or Monitoring Number: 03180___
e of Well: Water Table Observation Well ■ 11; Piezometer ☐ 12
ance Well Is From Waste/Source Boundary: ___ ft.
Well A Point of Enforcement Std. Application? ☐ Yes ☐ No

Local Grid Location of Well: 39834.1 ft. ■ N ☐ S, 38923.1 ft. ■ E ☐ W
Grid Origin Location: Lat. ___ Long. ___ or; St. Plane ___ ft. N, ___ ft. E.
Section Location of Waste/Source: ☐ E ☐ W; ___1/4 of ___ 1/4 of Sec. ___, T. ___ N, R. ___
Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known

Well Name: 104 - 17
Wis. Unique Well Number / DNR Well Number: ___ / ___
Date Well Installed: m m / d d / y y
Well Installed By: (Person's Name and Firm)



Protective pipe, top elevation ___ ft. MSL
Well casing, top elevation 1041.09 ft. MSL
Land surface elevation 1040.5 ft. MSL
Surface seal, bottom ___ ft. MSL or ___ ft.

1. Cap and lock? Capped ■ Yes ☐ No
2. Protective cover pipe:
   a. Inside diameter: ___ in.
   b. Length: ___ ft.
   c. Material: NONE — 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: Entire Hole — Bentonite ☐ 30; Annular space seal ☐ ___; 0.25" Washed Pea Gravel 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. ___ Other ☐ ___
7. Fine sand material: Manufacturer, product name & mesh size
   a. ___
   b. Volume added ___ ft^3
8. Filter pack material: Manufacturer, product name and mesh size
   a. ___
   b. Volume added ___ 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; 0.25" Holes Drilled every 4' Other ■ ___
    b. Manufacturer ___
    c. Slot size: 0.___ in.
    d. Slotted length: ___ ft.
11. Backfill material (below filter pack): ___ None ■ 14; Other ☐ ___

. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ■
. Sieve analysis attached? ☐ Yes ■ No
. Drilling method used: Rotary ☐ 50; Hollow Stem Auger ☐ 41; Other ■ ___
Percussion
. Drilling fluid used: Water ☐ 02; Air ■ 01; Drilling Mud ☐ 03; None ☐ 99
. Drilling additives used? ☐ Yes ■ No
Describe NA
7. Source of water (attach analysis):
NA

. Bentonite seal, top ___ ft. MSL or ___ ft.
. Fine sand, top ___ ft. MSL or ___ ft.
. Filter pack, top ___ ft. MSL or ___ ft.
. Screen joint, top ___ ft. MSL or ___ ft.
. Well bottom ___ ft. MSL or 36.0 ft.
. Filter pack, bottom ___ ft. MSL or 36.0 ft.
. Borehole, bottom ___ ft. MSL or 36.0 ft.
. Borehole, diameter 3.5 in.
M. O.D. well casing 2.37 in.
N. ell casing 2.02 in.

I hereby certify that the information on this form is true and correct to the best of my knowledge.
Signature: Shwade R. Mgr. Firm: Consulting Mining Geologist

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 may result 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 result in a forfeiture of not more than $10,000 for each ___ for more information including where the completed form should be sent.

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Flambeau Mining Company 1994 Annual Report

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT
Form 4400-113B Rev. 4-90

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

Facility/Project Name	County Name	Well Name
Flambeau Mine	Rusk	104 - 17
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
03180	55	

	Before Development	After Development
1. Can this well be purged dry?	☐ Yes ☐ No	
11. Depth to Water (from top of well casing)	a. ___.___ ft.	___.___ ft.
Date	b. m m / d d / y y	m m / d d / y y
Time	c. ___:___ ☐ a.m. ☐ p.m.	___:___ ☐ a.m. ☐ p.m.
12. Sediment in well bottom	___.___ inches	___.___ inches
13. Water clarity	Clear ☐ 10 Turbid ☐ 15 (Describe)	Clear ☐ 20 Turbid ☐ 25 (Describe)

2. Well development method

surged with bailer and bailed	☐ 41
surged with bailer and pumped	☐ 61
surged with block and bailed	☐ 42
surged with block and pumped	☐ 62
surged with block, bailed and pumped	☐ 70
compressed air	☐ 20
bailed only	☐ 10
pumped only	☐ 51
pumped slowly	☐ 50
Other _____	☐

3. Time spent developing well ____ min.

4. Depth of well (from top of well casisng) 36.0 ft.

5. Inside diameter of well ___.___ in.

6. Volume of water in filter pack and well casing ___.___ gal.

7 Volume of water removed from well ___.___ gal.

8 Volume of water added (if any) ___.___ gal.

9 Source of water added _____

10. Analysis performed on water added? ☐ Yes ☐ No
(If yes, attach results)

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	___.___ mg/l	___.___ mg/l
15. COD	___.___ mg/l	___.___ mg/l

16. Additional comments on development:
Collared in Cherty H.W. rock.

Well developed by: Person's Name and Firm

Name _____

Firm: _____

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

Signature: Shrade R. May.

Print Initials: E R M

Firm: Consulting Mining Geologist

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

of Wisconsin
artment 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

lity/Project Name: Flambeau Mine

License, Permit or Monitoring Number: 03180

e of Well: Water Table Observation Well ☐ 11; Piezometer ■ 12

ance Well Is From Waste/Source Boundary: _____ ft.

Well A Point of Enforcement Std. Application? ☐ Yes ☐ No

Local Grid Location of Well: 39717.5 ft. ■ N. ☐ S. 38937.4 ft. ■ E. ☐ W.

Grid Origin Location: Lat. _____ Long. _____ or St. Plane _____ ft. N, _____ ft. E.

Section Location of Waste/Source: SW 1/4 of SE 1/4 of Sec. 9, T. 34 N, R. 6 ■ W. ☐ E.

Location of Well Relative to Waste/Source: u ■ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known

Well Name: WW-3

Wis. Unique Well Number: _____ DNR Well Number: _____

Date Well Installed: 05/20/94 (m m / d d / y y)

Well Installed By: (Person's Name and Firm)
Richard Kastner
Kramer Well Drilling, Inc

Protective pipe, top elevation: 1102.54 ft. MSL

Well casing, top elevation: 1102.48 ft. MSL

Land surface elevation: 1100.1 ft. MSL

Surface seal, bottom: 1098.0 ft. MSL or 2.1 ft.

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

2. Sieve analysis attached? ☐ Yes ■ No

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

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

5. Drilling additives used? ☐ Yes ■ No
Describe NA

6. Source of water (attach analysis):

Bentonite seal, top: 1095.0 ft. MSL or _____ ft.

Fine sand, top: _____ ft. MSL or _____ ft.

Filter pack, top: 1042.0 ft. MSL or _____ ft.

Screen joint, top: 1040.0 ft. MSL or _____ ft.

Well bottom: 1035.0 ft. MSL or _____ ft.

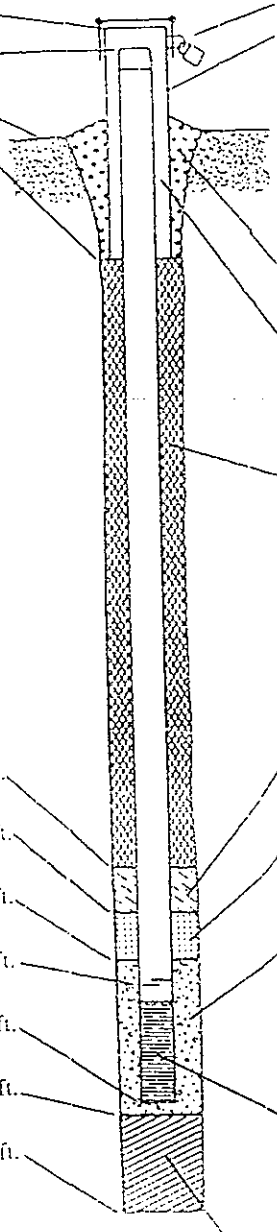
Filter pack, bottom: _____ ft. MSL or _____ ft.

Borehole, bottom: 1035.0 ft. MSL or _____ ft.

Borehole, diameter: 7.0 in.

O.D. well casing: 2.37 in.

I.D. well casing: 2.02 in.



1. Cap and lock? ☐ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: 6.0 in.
b. Length: 5.0 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. Annular space seal: a. Granular Bentonite ☐ 35
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: Manufacturer, product name & mesh size
a. Badger Silica #20-#40
b. Volume added _____ ft³

8. Filter pack material: Manufacturer, product name and mesh size
a. 0.25" Washed Pea Gravel
b. Volume added _____ ft³

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 _____
c. Slot size: 0.010 in.
d. Slotted length: 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: Wade R. May
Firm: Consulting Mining Geologist

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 may result 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 result in a forfeiture of not more than $10,000 for each

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Flambeau Mining Company 1994 Annual Report

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 4-90

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

Facility/Project Name	County Name	Well Name
Flambeau Mine	Rusk	MW-3
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
03180	55	

	Before Development	After Development
1. Can this well be purged dry?	☐ Yes ■ No	
2. Well development method		
surged with bailer and bailed	☐ 41	
surged with bailer and pumped	☐ 61	
surged with block and bailed	☐ 42	
surged with block and pumped	☐ 62	
surged with block, bailed and pumped	☐ 70	
compressed air	■ 20	
bailed only	☐ 10	
pumped only	☐ 51	
pumped slowly	☐ 50	
Other _____	☐ 99	
11. Depth to Water (from top of well casing)	a. 28.00 ft.	31.80 ft.
Date	b. 05/19/94 (m m d d y y)	05/20/94 (m m d d y y)
Time	c. 3:30 ☐ a.m. ■ p.m.	9:00 ■ a.m. ☐ p.m.
12. Sediment in well bottom	___ inches	___ inches
13. Water clarity	Clear ☐ 10 Turbid ■ 15 (Describe) muddy	Clear ☐ 20 Turbid ■ 25 (Describe) muddy
3. Time spent developing well	30 min.	
4. Depth of well (from top of well casisng)	67.5 ft.	
5. Inside diameter of well	2.02 in.	
6. Volume of water in filter pack and well casing	0.0 gal.	
7. Volume of water removed from well	225.0 gal.	
8. Volume of water added (if any)	0.0 gal.	
9. Source of water added	NA	
10. Analysis performed on water added? (If yes, attach results)	☐ Yes ■ No	
Fill in if drilling fluids were used and well is at solid waste facility:		
14. Total suspended solids	___ mg/l	___ mg/l
15. COD	___ mg/l	___ mg/l

16. Additional comments on development:

Well developer's Person's Name and Firm

Name: Richard Kastner

Firm: Kramer Well Drilling Inc

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

Signature: Brooke R. May

Print initials: ERM

Title: Consulting Mining Geologist

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

of Wisconsin
rtment 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

ity/Project Name: Flambeau Mine

License, Permit or Monitoring Number: 03180

Local Grid Location of Well: 39,722.4 ft. ■ N. ☐ S. 38931.9 ft. ■ E. ☐ W.

Well Name: WW-4

Wis. Unique Well Number: _____ DNR Well Number: _____

Grid Origin Location: Lat. _____ Long. _____ or St. Plane _____ ft. N, _____ ft. E.

Date Well Installed: 05/20/94 (m m / d d / y y)

e of Well: Water Table Observation Well ☐ 11; Piezometer ■ 12

Section Location of Waste/Source: SW 1/4 of SE 1/4 of Sec. 9, T. 34 N, R. 6 ■ W. ☐ E.

Well Installed By: (Person's Name and Firm)
Richard Kastner
Kramer Well Drilling, Inc

ance Well Is From Waste/Source Boundary: _____ ft.

Location of Well Relative to Waste/Source: u ■ Upgradient; s ☐ Sidegradient; d ☐ Downgradient; n ☐ Not Known

Well A Point of Enforcement Std. Application? ☐ Yes ☐ No

Protective pipe, top elevation: 1102.55 ft. MSL
Well casing, top elevation: 1102.41 ft. MSL
and surface elevation: 1100.1 ft. MSL
Surface seal, bottom: 1098.1 ft. MSL or 2.0 ft.

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

. Sieve analysis attached? ☐ Yes ■ No

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

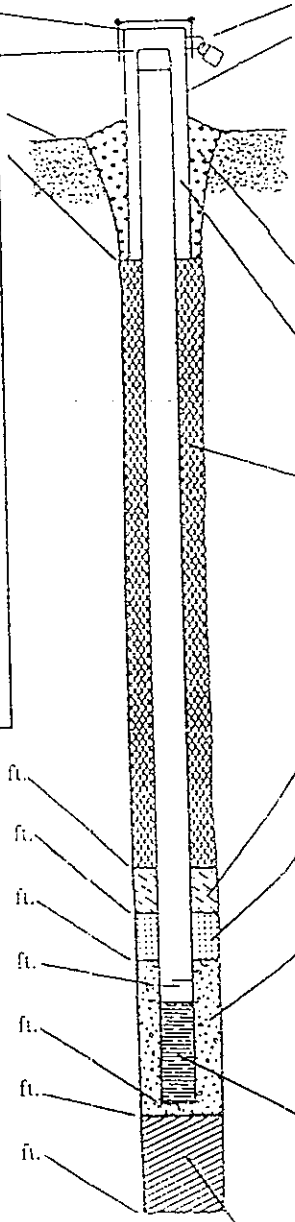
. Drilling fluid used: Water ☐ 02; Air ■ 01; Drilling Mud ☐ 03; None ☐ 99

. ng additives used? ☐ Yes ■ No

Describe _____

7. Source of water (attach analysis):

. Bentonite seal, top: 1055.0 ft. MSL or _____ ft.
. Fine sand, top: 1053.0 ft. MSL or _____ ft.
. Filter pack, top: 1052.0 ft. MSL or _____ ft.
. Screen joint, top: 1050.0 ft. MSL or _____ ft.
. Well bottom: 1045.0 ft. MSL or _____ ft.
. Filter pack, bottom: _____ ft. MSL or _____ ft.
. Borehole, bottom: 1045.0 ft. MSL or _____ ft.
. Borehole, diameter: 7.0 in.
M. O.D. well casing: 2.37 in.
N. ell casing: 2.02 in.



1. Cap and lock? ■ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 6.0 in.
b. Length: 5.0 ft.
c. Material: Steel ■ 02; 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. _____ Other ☐ __
7. Fine sand material: Manufacturer, product name & mesh size
a. Badger Silica #20-#40
b. Volume added _____ ft^3
8. Filter pack material: Manufacturer, product name and mesh size
a. 0.25" Washed Pea Gravel
b. Volume added _____ 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 ☐ __; Other ☐
b. Manufacturer
c. Slot size: 0.010
d. Slotted length: 5.0
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: Edwards R May
Firm: Consulting Mining Geologist

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 may result 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 result in a forfeiture of not more than $10,000 for each [illegible] including where the completed form should be sent.

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Flambeau Mining Company 1994 Annual Report

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 4-90

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

Facility/Project Name	County Name	Well Name
Flambeau mine	Rusk	WW-4
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
03180	55	

	Before Development	After Development
1. Can this well be purged dry?	☐ Yes ■ No	
11. Depth to Water (from top of well casing)	a. 22.0 ft.	30.4 ft.
Date	b. 05/20/94 m m d d y y	05/20/94 m m d d y y
Time	c. 10 : 10 30 ■ a.m. ☐ p.m.	☐ a.m. 1 : 00 ■ p.m.
12. Sediment in well bottom	inches	inches
13. Water clarity	Clear ☐ 10 Turbid ■ 15 (Describe) Muddy	Clear ☐ 20 Turbid ■ 25 (Describe) Muddy.

2. Well development method

surged with bailer and bailed	☐ 41
surged with bailer and pumped	☐ 61
surged with block and bailed	☐ 42
surged with block and pumped	☐ 62
surged with block, bailed and pumped	☐ 70
compressed air	■ 20
bailed only	☐ 10
pumped only	☐ 51
pumped slowly	☐ 50
Other _____	☐ __

3. Time spent developing well 30 min.

4. Depth of well (from top of well casisng) 57.4 ft.

5. Inside diameter of well 2.02 in.

6. Volume of water in filter pack and well casing 0.0 gal.

7. Volume of water removed from well 90.0 gal.

8. Volume of water added (if any) 0.0 gal.

9. Source of water added NA

10. Analysis performed on water added? ☐ Yes ■ No
(If yes, attach results)

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	mg/l	mg/l
15. COD	mg/l	mg/l

16. Additional comments on development:

Well developer or Person's Name and Firm

Name: Richard Kastner

Firm: Kramer Well Drilling, Inc

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

Signature: Richard R. May

Print Initials: E R M

Title: Consulting Mining Geologist

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

e of Wisconsin
artment 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

lity/Project Name: Flambeau Mine

Local Grid Location of Well: 39,721.6 ft. ■ N. ☐ S. 38,937.0 ft. ■ E. ☐ W.

Well Name: WW-5

ense, Permit or Monitoring Number: 03180

Grid Origin Location
Lat. ____ Long. ____ or
St. Plane ____ ft. N, ____ ft. E.

Wis. Unique Well Number | DNR Well Number

Date Well Installed: 05/20/94 (m m / d d / y y)

e of Well: Water Table Observation Well ☐ 11; Piezometer ■ 12

Section Location of Waste/Source: SW 1/4 of SE 1/4 of Sec. 9, T. 34 N, R. 6 ■ W. ☐ E.

Well Installed By: (Person's Name and Firm)
Richard Kastner
Kramer Well Drilling, Inc

tance Well Is From Waste/Source Boundary: ____ ft.

Location of Well Relative to Waste/Source
u ■ Upgradient s ☐ Sidegradient
d ☐ Downgradient n ☐ Not Known

Well A Point of Enforcement Std. Application? ☐ Yes ☐ No

Protective pipe, top elevation: 1102.86 ft. MSL
Well casing, top elevation: 1102.52 ft. MSL
Land surface elevation: 1100.1 ft. MSL
Surface seal, bottom: 1098.1 ft. MSL or 2.0 ft.

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

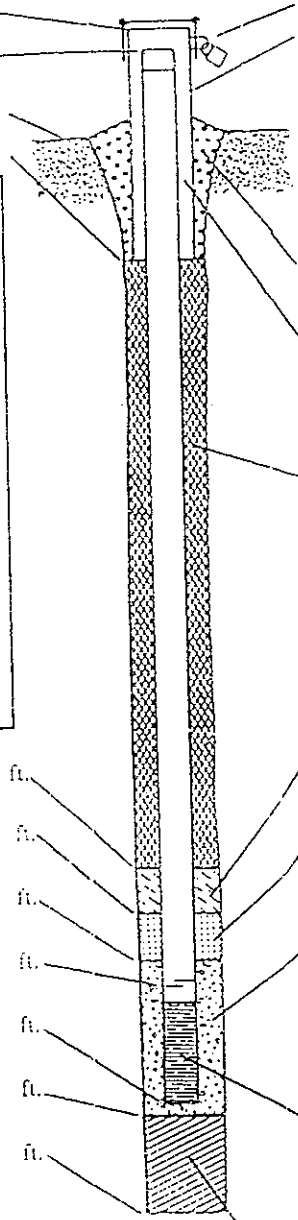
3. Sieve analysis attached? ☐ Yes ■ No

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

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

6. [illegible]g additives used? ☐ Yes ■ No
Describe NA

7. Source of water (attach analysis):
NA



1. Cap and lock? ■ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: 6.0 in.
b. Length: 5.0 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. 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. ____ Other ☐ __

7. Fine sand material: Manufacturer, product name & mesh size
a. Badger Silica #20-#40
b. Volume added ____ ft^3

8. Filter pack material: Manufacturer, product name and mesh size
a. 0.25" Washed Pea Gravel
b. Volume added ____ 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
c. Slot size: 0.010 in.
d. Slotted length: 5.0 ft.

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

J. Bentonite seal, top: 1069.0 ft. MSL or ____ ft.
K. Fine sand, top: 1067.0 ft. MSL or ____ ft.
L. Filter pack, top: 1066.0 ft. MSL or ____ ft.
M. Screen joint, top: 1064.0 ft. MSL or ____ ft.
N. Well bottom: 1059.0 ft. MSL or ____ ft.
O. Filter pack, bottom: ____ ft. MSL or ____ ft.
P. Borehole, bottom: 1059.0 ft. MSL or ____ ft.
Q. Borehole, diameter: 7.0 in.
R. O.D. well casing: 2.37 in.
S. [illegible] well casing: 2.02 in.

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

Signature: Edward R. May
Firm: Consulting Mining Geologist

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 may result 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 result in a forfeiture of not more than $10,000 for each [illegible] for more information including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT
Form 4400-113B Rev. 4-90

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

Facility/Project Name	County Name	Well Name
Flambeau Mine	Rusk	MW-5
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
03180	55	

		Before Development	After Development
1. Can this well be purged dry?	☐ Yes ■ No		
2. Well development method			
surged with bailer and bailed	☐ 41		
surged with bailer and pumped	☐ 61		
surged with block and bailed	☐ 42		
surged with block and pumped	☐ 62		
surged with block, bailed and pumped	☐ 70		
compressed air	■ 20		
bailed only	☐ 10		
pumped only	☐ 51		
pumped slowly	☐ 50		
Other _____	☐		
3. Time spent developing well	30 min.		
4. Depth of well (from top of well casisng)	43.5 ft.		
5. Inside diameter of well	2.02 in.		
6. Volume of water in filter pack and well casing	0.0 gal.		
7 Volume of water removed from well	180.0 gal.		
8 Volume of water added (if any)	0.0 gal.		
9 Source of water added	NA		
10. Analysis performed on water added? (If yes, attach results)	☐ Yes ■ No		
11. Depth to Water (from top of well casing)	a.	22.00 ft.	23.93 ft.
	b. Date m m d d y y	05/20/94	05/20/94
	c. Time	4:30 ☐ a.m. ■ p.m.	5:30 ☐ a.m. ■ p.m.
12. Sediment in well bottom		/ inches	/ inches
13. Water clarity		Clear ☐ 10 Turbid ■ 15 (Describe) muddy	Clear ☐ 20 Turbid ■ 25 (Describe) muddy.
Fill in if drilling fluids were used and well is at solid waste facility:			
14. Total suspended solids		/. mg/l	/. mg/l
15. COD		/. mg/l	/. mg/l

16. Additional comments on development:

Well Developer See Person's Name and Firm

Name: Richard Kastner

Firm: Kramer Well Drilling, Inc

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

Signature: Richard R. May

Print Initials: ERM

Title: Consulting Mining Geologist

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

of Wisconsin
rtment of Natural Resources

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

MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 3 90

ty/Project Name: mbeau Mine

License, Permit or Monitoring Number: 03180

of Well: Water Table Observation Well ☐ 11 Piezometer ■ 12

nce Well Is From Waste/Source Boundary: ft.

ell A Point of Enforcement Std. Application? ☐ Yes ☐ No

Local Grid Location of Well: 39,755.0 ft. ■ N. ☐ S. 38913.0 ft. ■ E. ☐ W.

Grid Origin Location: Lat. _____ Long. _____ or

St. Plane _____ ft. N, _____ ft. E.

Section Location of Waste/Source: ☐ E. ■ W.
SW1/4 of SE 1/4 of Sec. 9, T. 34 N, R. 6

Location of Well Relative to Waste/Source: u ■ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known

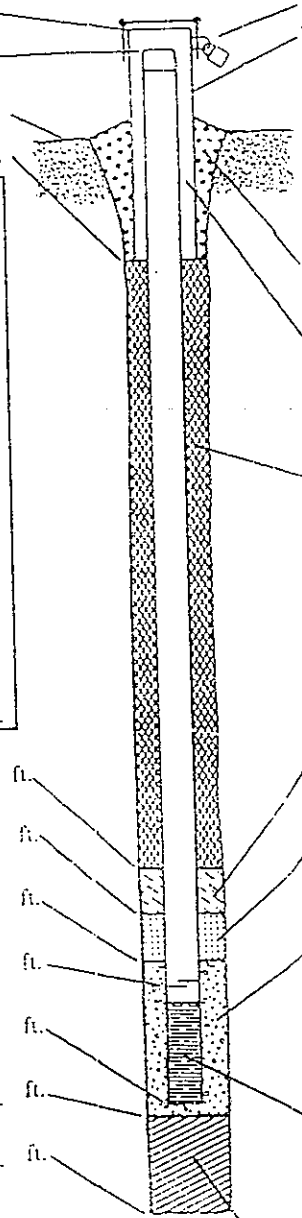
Well Name: WW-6

Wis. Unique Well Number: _____ DNR Well Number: _____

Date Well Installed: 05/23/94 (m m d d y y)

Well Installed By: (Person's Name and Firm)
Richard Kastner
Kramer Well Drilling, Inc

■ Yes ☐ No



rotective pipe, top elevation	1102.62	ft. MSL
/ell casing, top elevation	1102.52	ft. MSL
and surface elevation	1100.1	ft. MSL
urface seal, bottom	_____	ft. MSL or _____ ft.
Bentonite seal, top	1069.0	ft. MSL or _____ ft.
ine sand, top	1067.0	ft. MSL or _____ ft.
Filter pack, top	1066.0	ft. MSL or _____ ft.
Screen joint, top	1064.0	ft. MSL or _____ ft.
Well bottom	1059.0	ft. MSL or _____ ft.
Filter pack, bottom	_____	ft. MSL or _____ ft.
. Borehole, bottom	1059.0	ft. MSL or _____ ft.
. Borehole, diameter	7.0	in.
4. O.D. well casing	2.37	in.
5. ell casing	2.02	in.

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

Sieve analysis attached? ☐ Yes ☐ No

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

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

. ing additives used? ☐ Yes ☐ No

Describe _____

. Source of water (attach analysis): _____

1. Cap and lock?
2. Protective cover pipe:
   a. Inside diameter: 6.0 in.
   b. Length: 5.0 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. 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. _____ Other ☐ _____
7. Fine sand material: Manufacturer, product name & mesh size
   a. Badger Silica #20-#40
   b. Volume added _____ ft^3
8. Filter pack material: Manufacturer, product name and mesh size
   a. 0.25" Washed Pea Gravel
   b. Volume added _____ 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 _____
    c. Slot size: 0.010 in.
    d. Slotted length: 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: Edwards R. May. Firm: Consulting Mining Geologist

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 may result 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 result in a forfeiture of not more than $10,000 for each . See instructions for more information including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT
Form 4400-113B Rev. 4-90

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

Facility/Project Name	County Name	Well Name
Flambeau Mine	Rusk	MW-6
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
03180	55	

		Before Development	After Development
1. Can this well be purged dry?	☐ Yes ■ No		
2. Well development method			
surged with bailer and bailed	☐ 41		
surged with bailer and pumped	☐ 61		
surged with block and bailed	☐ 42		
surged with block and pumped	☐ 62		
surged with block, bailed and pumped	☐ 70		
compressed air	■ 20		
bailed only	☐ 10		
pumped only	☐ 51		
pumped slowly	☐ 50		
Other _____	☐		
11. Depth to Water (from top of well casing)		a. 24.3 ft.	33.34 ft.
Date		b. 05/23/94 (m m d d y y)	05/23/94 (m m d d y y)
Time		c. 10:30 ■ a.m. ☐ p.m.	11:00 ■ a.m. ☐ p.m.
12. Sediment in well bottom		___ inches	___ inches
13. Water clarity		Clear ☐ 10 Turbid ■ 15 (Describe) Muddy	Clear ☐ 20 Turbid ■ 25 (Describe) Muddy
3. Time spent developing well	30 min.		
4. Depth of well (from top of well casisng)	435 ft.		
5. Inside diameter of well	2.02 in.		
6. Volume of water in filter pack and well casing	0.0 gal.		
7 Volume of water removed from well	90.0 gal.		
8 Volume of water added (if any)	0.0 gal.		
9 Source of water added	NA		
Fill in if drilling fluids were used and well is at solid waste facility:			
14. Total suspended solids		___ mg/l	___ mg/l
15. COD		___ mg/l	___ mg/l

10. Analysis performed on water added? ☐ Yes ■ No
(If yes, attach results)

16. Additional comments on development:

Well developer's Person's Name and Firm

Name: Richard Kastner

Firm: Kramer Well Drilling, Inc

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

Signature: Edwards R. May

Print Initials: E R M

Firm: Consulting Mining Geologist

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

: of Wisconsin
rtment 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

lity/Project Name: Flambeau Mine

License, Permit or Monitoring Number: 03180

e of Well: Water Table Observation Well ☐ 11; Piezometer ■ 12

ance Well Is From Waste/Source Boundary: _____ ft.

Well A Point of Enforcement Std. Application? ☐ Yes ☐ No

Local Grid Location of Well: 39,755.0 ft. ■ N. ☐ S. 38916.1 ft. ■ E. ☐ W.

Grid Origin Location: Lat. _____ Long. _____ or St. Plane _____ ft. N. _____ ft. E.

Section Location of Waste/Source: SW 1/4 of SE 1/4 of Sec. 9 T. 34 N. R. 6 ☐ E. ■ W.

Location of Well Relative to Waste/Source: u ■ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known

Well Name: WW-7

Wis. Unique Well Number: _____ DNR Well Number: _____

Date Well Installed: 05/23/94 (m m / d d / y y)

Well Installed By: (Person's Name and Firm)
Richard Kastner
Kramer Well Drilling, Inc

Protective pipe, top elevation: 1102.81 ft. MSL

Well casing, top elevation: 1102.57 ft. MSL

Land surface elevation: 1100.0 ft. MSL

Surface seal, bottom: 1098.0 ft. MSL or 2.0 ft.

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

2. Sieve analysis attached? ☐ Yes ■ No

3. Drilling method used: Rotary ☐ 50; Hollow Stem Auger ☐ 41; Air Hammer; Other ■ _____

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

5. Drilling additives used? ☐ Yes ■ No
Describe: NA

6. Source of water (attach analysis):
NA

Bentonite seal, top: 1074.7 ft. MSL or _____ ft.

Fine sand, top: 1072.7 ft. MSL or _____ ft.

Filter pack, top: 1071.7 ft. MSL or _____ ft.

Screen joint, top: 1069.7 ft. MSL or _____ ft.

Well bottom: 1064.7 ft. MSL or _____ ft.

Filter pack, bottom: _____ ft. MSL or _____ ft.

Borehole, bottom: 1064.7 ft. MSL or _____ ft.

Borehole, diameter: 7.0 in.

O.D. well casing: 2.37 in.

I.D. well casing: 2.07 in.

1. Cap and lock? ■ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: 6.0 in.
b. Length: 5.0 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. 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. _____ Other ☐ _____

7. Fine sand material: Manufacturer, product name & mesh size
a. Badger Silica # 20 - #40
b. Volume added _____ ft^3

8. Filter pack material: Manufacturer, product name and mesh size
a. 0.25" Washed Pea Gravel
b. Volume added _____ 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 ☐ 09; Other ☐
b. Manufacturer _____
c. Slot size: 0.010
d. Slotted length: 5.0

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: Edwards R. May. Firm: Consulting Mining Geologist

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 may result 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 result in a forfeiture of not more than $10,000 for each

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Flambeau Mining Company 1994 Annual Report

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 4-90

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

Facility/Project Name	County Name	Well Name
Flambeau Mine	Rusk	WW-7
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
03180	55	

		Before Development	After Development
1. Can this well be purged dry?	☐ Yes ■ No		
2. Well development method			
surged with bailer and bailed	☐ 41		
surged with bailer and pumped	☐ 61		
surged with block and bailed	☐ 42		
surged with block and pumped	☐ 62		
surged with block, bailed and pumped	☐ 70		
compressed air	■ 20		
bailed only	☐ 10		
pumped only	☐ 51		
pumped slowly	☐ 50		
Other _____	☐		
11. Depth to Water (from top of well casing)	a.	24.3 ft.	33.32 ft.
	b. Date (m m d d y y)	05/23/94	05/23/94
	c. Time	2:30 ☐ a.m. ■ p.m.	4:00 ☐ a.m. ■ p.m.
12. Sediment in well bottom		___ inches	___ inches
13. Water clarity		Clear ☐ 10 Turbid ■ 15 (Describe) Muddy	Clear ☐ 20 Turbid ■ 25 (Describe) Muddy
3. Time spent developing well		30 min.	
4. Depth of well (from top of well casisng)		37.9 ft.	
5. Inside diameter of well		2.02 in.	
6. Volume of water in filter pack and well casing		0.0 gal.	
7 Volume of water removed from well		210.0 gal.	
8 Volume of water added (if any)		0.0 gal.	
9 Source of water added		NA	
Fill in if drilling fluids were used and well is at solid waste facility:			
14. Total suspended solids		___ mg/l	___ mg/l
15. COD		___ mg/l	___ mg/l

10. Analysis performed on water added? ☐ Yes ■ No
(If yes, attach results)

16. Additional comments on development:

Well developer: Person's Name and Firm

Name: Richard Kastner

Firm: Kramer Well Drilling, Inc

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

Signature: Richard R. May

Print Initials: ERM

Firm: Consulting Mining Geologist

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

Department of Natural Resources — Env. Response & Repair ☐ Underground Tanks ☐ Other ■ Mine — Similar to Form 4400-113A Rev 4-9

Facility/Project Name	Local Grid Location of Well	Well Name
Flambeau Mine	40902.9 ft. ■ N. ☐ S. 39,520.2 ft. ■ E. ☐ W.	WW8
Facility License, Permit or Monitoring Number	**Grid Origin Location**	**Wis. Unique Well Number / DNR Well Number**
03180	Lat. ___ Long. ___ or St. Plane ___ ft. N. ___ ft. E.	
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** 07/13/94 (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)** Brad Davis, Huntingdon Engineering & Environmental, Inc.
Is Well A Point of Enforcement Std. Application? ☐ Yes ☐ No		

A. Protective pipe, top elevation 1118.24 ft. MSL

B. Well casing, top elevation 1118.07 ft. MSL

C. Land surface elevation 1116.0 ft. MSL

D. Surface seal, bottom 1114.0 ft. MSL or 2.0 ft.

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

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 NA

17. Source of water (attach analysis):
NA

E. Bentonite seal, top ____.__ ft. MSL or 2.0 ft.

F. Fine sand, top ____.__ ft. MSL or 15.3 ft.

G. Filter pack, top ____.__ ft. MSL or 17.3 ft.

H. Screen joint, top ____.__ ft. MSL or 19.3 ft.

I. Well bottom ____.__ ft. MSL or 29.3 ft.

J. Filter pack, bottom ____.__ ft. MSL or 29.8 ft.

K. Borehole, bottom ____.__ ft. MSL or 29.8 ft.

L. Borehole, diameter 8.0 in.

M. O.D. well casing 2.37 in.

N. I.D. well casing 2.02 in.

1. Cap and lock? ■ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 4.0 in.
b. Length: 7.0 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. 4.2 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. Chips Other ☐ ___
7. Fine sand material: mfr, product name & mesh size
a. Badger Mining, Silica #20-#40
b. Volume added 0.6 ft³
8. Filter pack material: mfr, product name and mesh size
a. American Materials, Red Flint #30
b. Volume added 9.5 ft³
9. Well casing: Flush threaded PVC schedule 40 ■ 23; Flush threaded PVC schedule 80 ☐ 24; Other ☐ ___
10. Screen material: SAME
a. Screen type: Factory cut ■ 11; Continuous slot ☐ 01; Other ☐ ___
b. Manufacturer Certainteed Pipe Co.
c. Slot size: 0.010 in.
d. Slotted length: 10.0 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: Huntingdon Engineering & Environmental, Inc.

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.

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Flambeau Mining Company 1994 Annual Report

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT
Form 4400-113B Rev. 4-90

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

Facility/Project Name	County Name	Well Name
Flambeau Mine	Rusk	WW 8
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
_____	__	_____ / _____

	Before Development	After Development
1. Can this well be purged dry?	☐ Yes ☒ No	
11. Depth to Water (from top of well casing)	a. 23.40 ft.	23.49 ft.
Date	b. 01/06/95 (m m d d y y)	01/09/95 (m m d d y y)
Time	c. 9:35 ☒ a.m. ☐ p.m.	10:02 ☒ a.m. ☐ p.m.
12. Sediment in well bottom	___.__ inches	___.__ inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15	Clear ☐ 20 Turbid ☐ 25
(Describe)	Very Blk Br to Dk Br	Very Slight to Clear

2. Well development method

surged with bailer and bailed	☐	41
surged with bailer and pumped	☒	61
surged with block and bailed	☐	42
surged with block and pumped	☐	62
surged with block, bailed and pumped	☐	70
compressed air	☐	20
bailed only	☐	10
pumped only	☐	51
pumped slowly	☐	50
Other _____	☐	☒

3. Time spent developing well 144 min.

4. Depth of well (from top of well casisng) 31.9 ft.

5. Inside diameter of well 2.00 in.

6. Volume of water in filter pack and well casing 12.4 gal.

7 Volume of water removed from well 138.0 gal.

8 Volume of water added (if any) ___.__ gal.

9 Source of water added _____

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

16. Additional comments on development:

Well developed by: Person's Name and Firm

Name: Jack Christman

Firm: Flambeau Mine

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

Signature: [signature]

Print Initials: _____

Date: Flambeau Mine

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

Department of Natural Resources — Env. Response & Repair ☐ Underground Tanks ☐ Other ■ Mine — Similar to Form 4400-113A — Rev 4-90

Facility/Project Name: Flambeau Mine	Local Grid Location of Well: ■ N. 40,591.3 ft. ☐ S. ■ E. 39160.0 ft. ☐ W.	Well Name: WW9
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 ■ W. ☐ E.	Date Well Installed: 07/13/94 (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): Brad Davis, Huntingdon Engineering & Environmental, Inc.
Is Well A Point of Enforcement Std. Application? ☐ Yes ☐ No		

A. Protective pipe, top elevation 1118.58 ft. MSL

B. Well casing, top elevation 1118.47 ft. MSL

C. Land surface elevation 1116.19 ft. MSL

D. Surface seal, bottom 1114.2 ft. MSL or 2.0 ft.

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

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 NA

17. Source of water (attach analysis): NA

E. Bentonite seal, top ____.__ ft. MSL or 2.0 ft.

F. Fine sand, top ____.__ ft. MSL or 19.0 ft.

G. Filter pack, top ____.__ ft. MSL or 21.0 ft.

H. Screen joint, top ____.__ ft. MSL or 23.0 ft.

I. Well bottom ____.__ ft. MSL or 33.0 ft.

J. Filter pack, bottom ____.__ ft. MSL or 33.5 ft.

K. Borehole, bottom ____.__ ft. MSL or 33.5 ft.

L. Borehole, diameter 8.0 in.

M. O.D. well casing 2.37 in.

N. I.D. well casing 2.02 in.

1. Cap and lock? ■ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: 4.0 in.
b. Length: 7.0 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. 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. 5.4 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. Chips Other ☐ ___

7. Fine sand material: mfr, product name & mesh size
a. Badger Mining, Silica #20-#40
b. Volume added 0.6 ft³

8. Filter pack material: mfr, product name and mesh size
a. American Materials, Red Flint #30
b. Volume added 3.9 ft³

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

10. Screen material: SAME
a. Screen type: Factory cut ■ 11; Continuous slot ☐ 01; Other ☐ ___
b. Manufacturer Certainteed Pipe Co.
c. Slot size: 0.010 in.
d. Slotted length: 10.0 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: Huntingdon Engineering & Environmental, Inc.

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.

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Flambeau Mining Company 1994 Annual Report

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 4-90

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

Facility/Project Name	County Name	Well Name
Flambeau Mine	Rusk	WW-9
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
_____	__	_____ / _____

	Before Development	After Development
1. Can this well be purged dry?	☒ Yes ☐ No	
11. Depth to Water (from top of well casing) a.	27.17 ft.	27.17 ft.
Date b. (m m d d y y)	01 / 06 / 95	01 / 12 / 95
Time c.	10:07 ☒ a.m. ☐ p.m.	1:05 ☐ a.m. ☒ p.m.
12. Sediment in well bottom	0.0 inches	0.0 inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15 (Describe) Lt Br to Lt Br	Clear ☐ 20 Turbid ☐ 25 (Describe) Very slight to Clear

2. Well development method

surged with bailer and bailed	☐ 41
surged with bailer and pumped	☐ 61
surged with block and bailed	☐ 42
surged with block and pumped	☐ 62
surged with block, bailed and pumped	☐ 70
compressed air	☐ 20
bailed only	☐ 10
pumped only	☐ 51
pumped slowly	☒ 50
Other _____	☐

3. Time spent developing well 24 min.

4. Depth of well (from top of well casisng) 35.8 ft.

5. Inside diameter of well 2.00 in.

6. Volume of water in filter pack and well casing 12.4 gal.

7. Volume of water removed from well 13.7 gal.

8 Volume of water added (if any) ____.__ gal.

9 Source of water added _____

10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

16. Additional comments on development:

Page I-20

Well developed by: Person's Name and Firm

Name: Jack Christensen

Firm: Flambeau Mining

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

Signature: _____

Print Initials: _____

Firm: Flambeau Mining

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

...of Wisconsin
Department of Natural Resources

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

MONITORING WELL CONSTRUCTION

Similar to Form 4400-113A Rev 4-90

Facility/Project Name Flambeau Mine	Local Grid Location of Well ■ N. 40,505.3 ft. ☐ S. ■ E. 38,986.4 ft. ☐ W.	Well Name WW10
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 ☐ E. ■ W. NW 1/4 of SE 1/4 of Sec. 9, T. 34 N, R. 6	Date Well Installed 07/14/94 (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) Brad Davis Huntingdon Engineering & Environmental, Inc.
Is Well A Point of Enforcement Std. Application? ☐ Yes ☐ No		

A. Protective pipe, top elevation 1116.46 ft. MSL

B. Well casing, top elevation 1116.31 ft. MSL

C. Land surface elevation 1114.00 ft. MSL

D. Surface seal, bottom 1112.0 ft. MSL or 2.0 ft.

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

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 NA

17. Source of water (attach analysis):
NA

E. Bentonite seal, top ____.__ ft. MSL or 2.0 ft.

F. Fine sand, top ____.__ ft. MSL or 22.7 ft.

G. Filter pack, top ____.__ ft. MSL or 24.7 ft.

H. Screen joint, top ____.__ ft. MSL or 26.7 ft.

I. Well bottom ____.__ ft. MSL or 36.7 ft.

J. Filter pack, bottom ____.__ ft. MSL or 37.5 ft.

K. Borehole, bottom ____.__ ft. MSL or 37.5 ft.

L. Borehole, diameter 8.0 in.

M. O.D. well casing 2.37 in.

N. I.D. well casing 2.02 in.

1. Cap and lock? ■ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: 4.0 in.
b. Length: 7.0 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. 6.6 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. Chips Other ☐ ___

7. Fine sand material: mfr, product name & mesh size
a. Badger Mining, Silica #20-#40
b. Volume added 0.6 ft³

8. Filter pack material: mfr, product name and mesh size
a. American Materials, Red Flint #30
b. Volume added 4.1 ft³

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

10. Screen material: SAME
a. Screen type: Factory cut ■ 11; Continuous slot ☐ 01; Other ☐ ___
b. Manufacturer Certainteed Pipe Co.
c. Slot size: 0.010 in.
d. Slotted length: 10.0 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: Huntingdon Engineering & Environmental, Inc.

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

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 4-90

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

City/Project Name	County Name	Well Name
Flambeau Mine	Rusk	WW-10
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
_ _ _ _ _ _ _	_ _	_ _ _ _ _ _ _ _ / _ _ _ _

		Before Development	After Development
1. Can this well be purged dry?	☐ Yes ■ No		
2. Well development method			
surged with bailer and bailed	☐ 41		
surged with bailer and pumped	■ 61		
surged with block and bailed	☐ 42		
surged with block and pumped	☐ 62		
surged with block, bailed and pumped	☐ 70		
compressed air	☐ 20		
bailed only	☐ 10		
pumped only	☐ 51		
pumped slowly	☐ 50		
Other _____	☐ _ _		
11. Depth to Water (from top of well casing)	a.	26.50 ft.	26.50 ft.
	Date b.	1/6/95 (m m d d y y)	1/9/95 (m m d d y y)
	Time c.	10:22 ■ a.m. ☐ p.m.	10:45 ■ a.m. ☐ p.m.
12. Sediment in well bottom		.5 inches	_ _ . _ inches
13. Water clarity		Clear ☐ 10 / Turbid ■ 15	Clear ☐ 20 / Turbid ☐ 25
	(Describe)	Dk Br To Br	Slight to Clear
3. Time spent developing well		150 min.	
4. Depth of well (from top of well casisng)		39.8 ft.	
5. Inside diameter of well		2.00 in.	
6. Volume of water in filter pack and well casing		13.6 gal.	
7 Volume of water removed from well		134.0 gal.	
8 Volume of water added (if any)		_ _ _ . _ gal.	
9 Source of water added		_____	

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	_ _ _ _ . _ mg/l	_ _ _ _ _ . _ mg/l
15. COD	_ _ _ _ . _ mg/l	_ _ _ _ . _ mg/l

10. Analysis performed on water added? ☐ Yes ☐ No
(If yes, attach results)

16. Additional comments on development:

Well developed by: Person's Name and Firm

Name _____

Firm: _____

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

Signature: _____

Print Initials: _ _ _

Date: _____

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

Department of Natural Resources — Env. Response & Repair ☐ Underground Tanks ☐ Other ■ Mine — Similar to Form 4400-113A — Rev 4-90

Facility/Project Name	Local Grid Location of Well	Well Name
Flambeau Mine	40, 550.5 ft. ☐ N. ■ S. 38824.8 ft. ■ E. ☐ W.	WW11
Facility License, Permit or Monitoring Number	**Grid Origin Location**	**Wis. Unique Well Number / DNR Well Number**
03180	Lat. ___ ___ ___ Long. ___ ___ ___ or St. Plane ___ ft. N. ___ ft. E.	
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. 34N, R. 6 ☐ E. ■ W.	**Date Well Installed** 07/14/94 (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)** Brad Davis, Huntingdon Engineering & Environmental, Inc.
Is Well A Point of Enforcement Std. Application? ☐ Yes ☐ No		

A. Protective pipe, top elevation 1111.17 ft. MSL

B. Well casing, top elevation 1111.02 ft. MSL

C. Land surface elevation 1108.96 ft. MSL

D. Surface seal, bottom 1106.9 ft. MSL or 2.0 ft.

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

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 NA

17. Source of water (attach analysis):
NA

E. Bentonite seal, top ____.__ ft. MSL or 2.0 ft.

F. Fine sand, top ____.__ ft. MSL or 26.0 ft.

G. Filter pack, top ____.__ ft. MSL or 28.0 ft.

H. Screen joint, top ____.__ ft. MSL or 30.0 ft.

I. Well bottom ____.__ ft. MSL or 40.0 ft.

J. Filter pack, bottom ____.__ ft. MSL or 42.0 ft.

K. Borehole, bottom ____.__ ft. MSL or 42.0 ft.

L. Borehole, diameter 8.0 in.

M. O.D. well casing 3.37 in.

N. I.D. well casing 2.02 in.

1. Cap and lock? ■ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: 4.0 in.
b. Length: 7.0 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. 7.6 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. Chips Other ☐ ___

7. Fine sand material: mfr, product name & mesh size
a. Badger Mining, Silica #20-#40
b. Volume added 0.6 ft³

8. Filter pack material: mfr, product name and mesh size
a. American Materials, Red Flint #30
b. Volume added 4.5 ft³

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

10. Screen material: SAME
a. Screen type: Factory cut ■ 11; Continuous slot ☐ 01; Other ☐ ___
b. Manufacturer Certainteed Pipe Co.
c. Slot size: 0.010 in.
d. Slotted length: 10.0 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
	Huntingdon Engineering & Environmental, Inc.

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.

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Flambeau Mining Company 1994 Annual Report

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 4-90

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

City/Project Name	County Name	Well Name
Flambeau Mine	Rusk	WW-11
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
_____	__	

		Before Development	After Development
1. Can this well be purged dry?	☐ Yes ■ No		
11. Depth to Water (from top of well casing)	a.	21.33 ft.	21.32 ft.
Date	b. m m d d y y	1/6/95	1/9/95
Time	c.	2:14 ☐ a.m. ■ p.m.	11:25 ☐ a.m. ☐ p.m.
12. Sediment in well bottom		4.5 inches	__.__ inches
13. Water clarity		Clear ☐ 10 Turbid ■ 15 (Describe) Brown Brc	Clear ☐ 20 Turbid ☐ 25 (Describe) very slight to Clear

2. Well development method

surged with bailer and bailed	☐	41
surged with bailer and pumped	■	61
surged with block and bailed	☐	42
surged with block and pumped	☐	62
surged with block, bailed and pumped	☐	70
compressed air	☐	20
bailed only	☐	10
pumped only	☐	51
pumped slowly	☐	50
Other _____	☐	

3. Time spent developing well	150 min.
4. Depth of well (from top of well casisng)	44.6 ft.
5. Inside diameter of well	2.00 in.
Volume of water in filter pack and well casing	14.2 gal.
7. Volume of water removed from well	143.7 gal.
8 Volume of water added (if any)	___.__ gal.
9 Source of water added	_____

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

10. Analysis performed on water added? ☐ Yes ☐ No
(If yes, attach results)

16. Additional comments on development:

Page 1-24

Well developed by: Person's Name and Firm

Name: Jack Christman

Firm: Flambeau Mining

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

Signature: [signature]

Print Initials: J A C

Firm: Flambeau Mining

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

Flambeau Mining Company 1994 Annual Report

e of Wisconsin
artment 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

lity ct Name
Flambeau Mine

Well Name
WW-15

lity License, Permit or Monitoring Number
03180

Wis. Unique Well Number | DNR Well Number

e of Well Water Table Observation Well ☐ 11
Piezometer ■ 12

Date Well Installed 08 / 11 / 94 (m m d d y y)

ance Well Is From Waste/Source Boundary
ft.

Well Installed By: (Person's Name and Firm)
Jim Hackney
Ames Construction Co

Well A Point of Enforcement Std. Application?
☐ Yes ☐ No

Local Grid Location of Well
39748.1 ft. ☒ N. ☐ S. 38,963.5 ft. ☒ E. ☐ W.

Grid Origin Location
Lat. _____ Long. _____ or
St. Plane _____ ft. N, _____ ft. E.

Section Location of Waste/Source ☐ E. ☐ W.
SW 1/4 of SE 1/4 of Sec. 9, T. 34 N, R. 6 ■ W.

Location of Well Relative to Waste/Source
u ☐ Upgradient s ☐ Sidegradient
d ☐ Downgradient n ☐ Not Known

Protective pipe, top elevation 1084.84 ft. MSL
Well casing, top elevation 1083.70 ft. MSL
Land surface elevation 1081.7 ft. MSL
Surface seal, bottom 1076.7 ft. MSL or 4.0 ft.

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

2. Sieve analysis attached? ☐ Yes ☐ No

3. Drilling method used:
Rotary ☐ 50
Hollow Stem Auger ☐ 41
Other ■ 70
Percussion

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

5. ing additives used? ☐ Yes ■ No
Describe _____

6. Source of water (attach analysis):
NA

1. Cap and lock? capped ■ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: 4.0 in.
b. Length: 5.5 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 ☐ __
Drill Cuttings Other ■ 70

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. _____ Other ☐ __

7. Fine sand material: Manufacturer, product name & mesh size
a. Clean Cambrian Sand
b. Volume added _____ ft^3

8. Filter pack material: Manufacturer, product name and mesh size
a. 0.25" washed pea gravel
b. Volume added _____ ft^3

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

10. Screen material:
a. Screen type:
Factory cut ■ 11
Continuous slot ☐ 09
Other ☐ __
b. Manufacturer _____
c. Slot size: 0.010 in.
d. Slotted length: 5.0 ft.

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

2. Bentonite seal, top 1070.5 ft. MSL or ____ ft.
3. Fine sand, top 1068.0 ft. MSL or ____ ft.
3. Filter pack, top 1064.0 ft. MSL or ____ ft.
4. Screen joint, top 1062.0 ft. MSL or ____ ft.
5. Well bottom 1057.0 ft. MSL or ____ ft.
6. Filter pack, bottom 1056.5 ft. MSL or ____ ft.
7. Borehole, bottom 1056.5 ft. MSL or ____ ft.
8. Borehole, diameter 5.0 in.
9. O.D. well casing 2.37 in.
0. well casing 2.02 in.

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

Signature: Frank R. May. Firm: Consulting Mining Geologist

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 may result in a forfeiture of not less than $10, nor more than

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Flambeau Mining Company 1994 Annual Report

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 4-90

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

Facility/Project Name	County Name	Well Name
Flambeau Mine	Rusk	MW-15
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
03180	55	

		Before Development	After Development
1. Can this well be purged dry?		☐ Yes ■ No	
2. Well development method			
surged with bailer and bailed	☐ 41		
surged with bailer and pumped	☐ 61		
surged with block and bailed	☐ 42		
surged with block and pumped	☐ 62		
surged with block, bailed and pumped	☐ 70		
compressed air	■ 20		
bailed only	☐ 10		
pumped only	☐ 51		
pumped slowly	☐ 50		
Other _____	☐ __		
3. Time spent developing well		30 min.	
4. Depth of well (from top of well casisng)		26.7 ft.	
5. Inside diameter of well		2.02 in.	
6. Volume of water in filter pack and well casing		0. gal.	
7 Volume of water removed from well		10. gal.	
8 Volume of water added (if any)		0. gal.	
9 Source of water added		N/A	
10. Analysis performed on water added? (If yes, attach results)		☐ Yes ■ No	
11. Depth to Water (from top of well casing)	a.	15.40 ft.	14.61 ft.
Date	b.	08/11/94 (m m d d y y)	08/11/94 (m m d d y y)
Time	c.	12:50 ☐ a.m. ☒ p.m.	1:16 ☐ a.m. ☒ p.m.
12. Sediment in well bottom		___ inches	___ inches
13. Water clarity		Clear ☐ 10 Turbid ■ 15 (Describe) Muddy	Clear ☐ 20 Turbid ■ 25 (Describe) Muddy.

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____ mg/l	____ mg/l
15. COD	____ mg/l	____ mg/l

16. Additional comments on development:

Well developer certification: Person's Name and Firm

Name: Jim Hackney

Firm: Ames Construction Co

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

Signature: Edwards R. May

Print Initials: E R M

Firm: Consulting Mining Geologist

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

of Wisconsin
rtment 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

ity/Project Name: Flambeau Mine

License, Permit or Monitoring Number: 03180

Well Name: WW - 16

Wis. Unique Well Number / DNR Well Number:

Date Well Installed: 08/11/94 (m m / d d / y y)

Local Grid Location of Well: 39751.6 ft. ☒ N. ☐ S. 38962.0 ft. ☒ E. ☐ W.

Grid Origin Location: Lat. _____ Long. _____ or St. Plane _____ ft. N, _____ ft. E.

Section Location of Waste/Source: ☐ E. ☐ W. SW 1/4 of SE 1/4 of Sec. 9, T. 34 N, R. 6 ■ W.

Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known

Well Installed By: (Person's Name and Firm)
Jim Hackney
Ames Construction Co

ance Well Is From Waste/Source Boundary: _____ ft.

Well A Point of Enforcement Std. Application? ☐ Yes ☐ No

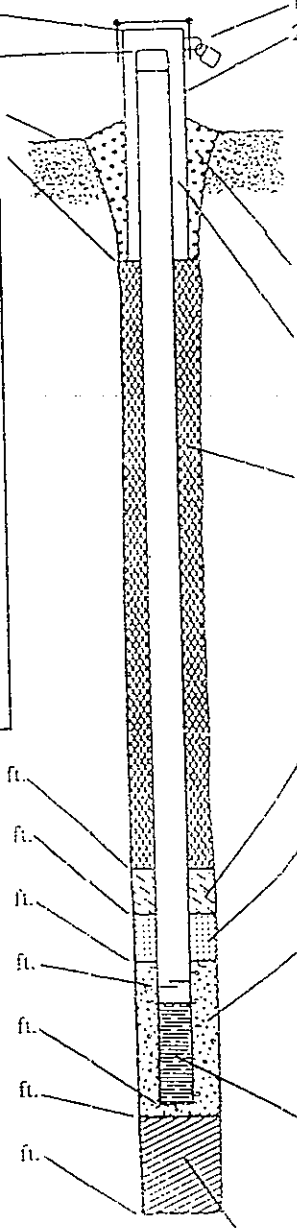
e of Well: Water Table Observation Well ☐ 11; Piezometer ■ 12

Protective pipe, top elevation 1084.49 ft. MSL
Well casing, top elevation 1084.36 ft. MSL
and surface elevation 1081.6 ft. MSL
Surface seal, bottom 1076.6 ft. MSL or 4.0 ft.

1. Cap and lock? Capped ■ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 4.0 in.
b. Length: 5.5 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 ☐ __; Drill Cuttings 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. _____ Other ☐ __
7. Fine sand material: Manufacturer, product name & mesh size
a. Clean Cambrian Sand
b. Volume added _____ ft^3
8. Filter pack material: Manufacturer, product name and mesh size
a. 0.25" Washed Pea Gravel
b. Volume added _____ 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 ☐ 09; _____ Other ☐
b. Manufacturer _____
c. Slot size: 0.010 in.
d. Slotted length: 5.0 ft.
11. Backfill material (below filter pack): None ■ 14; _____ Other ☐ __

. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ■
. Sieve analysis attached? ☐ Yes ☐ No
. Drilling method used: Rotary ☐ 50; Hollow Stem Auger ☐ 41; Other ■ __
Percussion
. Drilling fluid used: Water ☐ 02; Air ■ 01; Drilling Mud ☐ 03; None ☐ 99
. ng additives used? ☐ Yes ■ No
Describe _____
7. Source of water (attach analysis):
NA

. Bentonite seal, top 1044.7 ft. MSL or ____ ft.
. Fine sand, top 1039.7 ft. MSL or ____ ft.
. Filter pack, top 1038.2 ft. MSL or ____ ft.
. Screen joint, top 1036.2 ft. MSL or ____ ft.
. Well bottom 1031.2 ft. MSL or ____ ft.
. Filter pack, bottom 1030.7 ft. MSL or ____ ft.
. Borehole, bottom 1030.7 ft. MSL or ____ ft.
. Borehole, diameter 5.0 in.
. O.D. well casing 2.37 in.
. ell casing 2.02 in.



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

Signature: Rhode R. May
Firm: Consulting Mining Geologist

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 may result in a forfeiture of not less than $10, nor more than $5,000 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

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 4-90

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

Facility/Project Name	County Name	Well Name
Flambeau Mine	Rusk	WW-16
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
03180	55	

		Before Development	After Development
1. Can this well be purged dry?	☐ Yes ■ No		
2. Well development method			
surged with bailer and bailed	☐ 41		
surged with bailer and pumped	☐ 61		
surged with block and bailed	☐ 42		
surged with block and pumped	☐ 62		
surged with block, bailed and pumped	☐ 70		
compressed air	■ 20		
bailed only	☐ 10		
pumped only	☐ 51		
pumped slowly	☐ 50		
Other _____	☐ __		
11. Depth to Water (from top of well casing)		a. 15.50 ft.	15.81 ft.
Date		b. 08/11/94 (m m d d y y)	08/11/94 (m m d d y y)
Time		c. 1:44 ☐ a.m. ☒ p.m.	2:30 ☐ a.m. ☒ p.m.
12. Sediment in well bottom		___ inches	___ inches
13. Water clarity		Clear ☐ 10 / Turbid ■ 15	Clear ☐ 20 / Turbid ■ 25
		(Describe) Muddy	(Describe) Muddy
3. Time spent developing well		30 min.	
4. Depth of well (from top of well casisng)		53.2 ft.	
5. Inside diameter of well		2.02 in.	
6. Volume of water in filter pack and well casing		0. gal.	
7 Volume of water removed from well		15.0 gal.	
8 Volume of water added (if any)		0.0 gal.	
9 Source of water added		NA	
10. Analysis performed on water added? (If yes, attach results)	☐ Yes ■ No		
Fill in if drilling fluids were used and well is at solid waste facility:			
14. Total suspended solids		___ mg/l	___ mg/l
15. COD		___ mg/l	___ mg/l

16. Additional comments on development:

Well developed by: Person's Name and Firm

Name: Jim Hackney

Firm: Amos Construction Co

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

Signature: Rhonda R. May

Print Initials: ERM

Title: Consulting Mining Geologist

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

of Wisconsin
rtment 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

ty/ t Name: Winsdan Mine

Local Grid Location of Well: 39794.8 ft. ☒ N. ☐ S. 38914.0 ft. ☒ E. ☐ W.

Well Name: WW-17

ty 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

of Well: Water Table Observation Well ☐ 11; Piezometer ■ 12

Date Well Installed: 08/11/94 (m m d d y y)

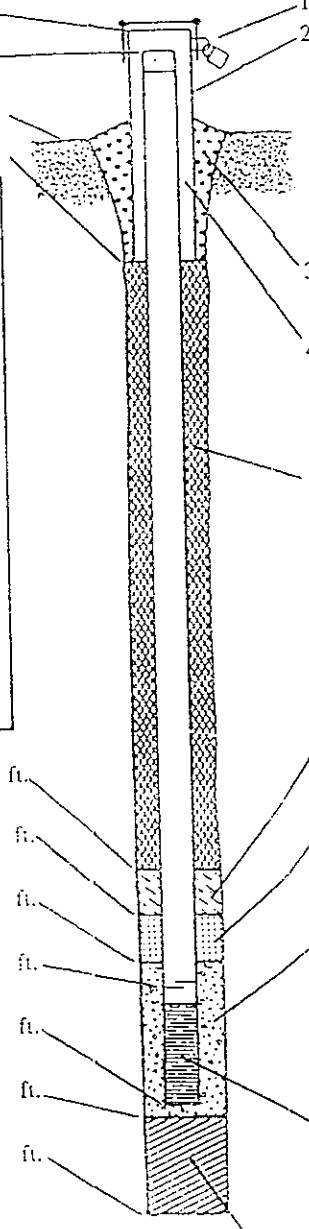
nce Well Is From Waste/Source Boundary: ____ ft.

Section Location of Waste/Source: ☐ E. ☒ W. SW 1/4 of SE 1/4 of Sec. 9, T. 34 N, R. 6

Well Installed By: (Person's Name and Firm): Jim Hackney / Ames Construction Co

ell A Point of Enforcement Std. Application? ☐ Yes ☐ No

Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known



rotective pipe, top elevation: 1083.19 ft. MSL
/ell casing, top elevation: 1083.14 ft. MSL
and surface elevation: 1081.0 ft. MSL
urface seal, bottom: 1077.0 ft. MSL or 4.0 ft.

1. Cap and lock? capped ■ Yes ☐ No
2. Protective cover pipe:
   a. Inside diameter: 4.0 in.
   b. Length: 5.5 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 ■ __ (Drill Cuttings)
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. ____ 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: Manufacturer, product name & mesh size
   a. Clean Cambrian Sand
   b. Volume added _____ ft³
8. Filter pack material: Manufacturer, product name and mesh size
   a. 0.25" washed pea gravel
   b. Volume added _____ ft³
9. Well casing: Flush threaded PVC schedule 40 ■ 23; Flush threaded PVC schedule 80 ☐ 24; Other ☐ __ (PVC)
10. Screen material:
   a. Screen type: Factory cut ■ 11; Continuous slot ☐ 01; Other ☐ __
   b. Manufacturer _____
   c. Slot size: 0.010 in.
   d. Slotted length: 5.0 ft.
11. Backfill material (below filter pack): None ■ 14; Other ☐ __

Bentonite seal, top: 1071.4 ft. MSL or ____ ft.
Fine sand, top: 1066.9 ft. MSL or ____ ft.
Filter pack, top: 1064.9 ft. MSL or ____ ft.
Screen joint, top: 1062.9 ft. MSL or ____ ft.
Well bottom: 1057.9 ft. MSL or ____ ft.
Filter pack, bottom: 1057.4 ft. MSL or ____ ft.
. Borehole, bottom: 1053.9 ft. MSL or ____ ft.
. Borehole, diameter: 5.0 in.
1. O.D. well casing: 2.37 in.
I. ell casing: 2.02 in.

. Drilling fluid used: Water ☐ 02; Air ■ 01; Drilling Mud ☐ 03; None ☐ 99
. ng additives used? ☐ Yes ■ No
Describe _____
. Source of water (attach analysis): NA

USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ■
Sieve analysis attached? ☐ Yes ☐ No
Drilling method used: Rotary ☐ 50; Hollow Stem Auger ☐ 41; Other ■ __ (Percussion)

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

ignature: Lorraine R. May. Firm: Consulting Mining Geologist

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., nd 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 $1000 for each

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Flambeau Mining Company 1994 Annual Report

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 4-90

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

Facility/Project Name	County Name	Well Name
Flambeau Mine	Rusk	WW-17
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
03180	53	

		Before Development	After Development
1. Can this well be purged dry?	☐ Yes ■ No		
2. Well development method			
surged with bailer and bailed	☐ 41		
surged with bailer and pumped	☐ 61		
surged with block and bailed	☐ 42		
surged with block and pumped	☐ 62		
surged with block, bailed and pumped	☐ 70		
compressed air	■ 20		
bailed only	☐ 10		
pumped only	☐ 51		
pumped slowly	☐ 50		
Other _____	☐		
3. Time spent developing well	30 min.		
4. Depth of well (from top of well casisng)	25.2 ft.		
5. Inside diameter of well	5.0 in.		
6. Volume of water in filter pack and well casing	0.0 gal.		
7. Volume of water removed from well	18.0 gal.		
8. Volume of water added (if any)	0.0 gal.		
9. Source of water added	NA		
10. Analysis performed on water added? (If yes, attach results)	☐ Yes ■ No		
11. Depth to Water (from top of well casing)	a.	15.82 ft.	16.03 ft.
Date	b.	08/11/94 (m m d d y y)	08/11/94 (m m d d y y)
Time	c.	3:37 ☐ a.m. ☒ p.m.	4:40 ☐ a.m. ☒ p.m.
12. Sediment in well bottom		___ inches	___ inches
13. Water clarity		Clear ☐ 10 Turbid ■ 15 (Describe) Muddy	Clear ☐ 20 Turbid ■ 25 (Describe) Muddy
Fill in if drilling fluids were used and well is at solid waste facility:			
14. Total suspended solids		____ mg/l	____ mg/l
15. COD		____ mg/l	____ mg/l

16. Additional comments on development:

Well developed by: Person's Name and Firm

Name: Jim Hackney

Firm: Ames Construction Co

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

Signature: Jerrold R. May

Print Initials: E R M

Firm: Consulting Mining Geologist

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

of Wisconsin
artment 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

lity/Project Name: Flambeau Mine

lity License, Permit or Monitoring Number: 03180

e of Well: Water Table Observation Well ☐ 11; Piezometer ■ 12

ance Well Is From Waste/Source Boundary: _____ ft.

Well A Point of Enforcement Std. Application? ☐ Yes ☐ No

Local Grid Location of Well: 39798.3 ft. ■ N. ☐ S. 3891.9 ft. ■ E. ☐ W.

Grid Origin Location: Lat. _____ Long. _____ or St. Plane _____ ft. N. _____ ft. E.

Section Location of Waste/Source: SW 1/4 of SE 1/4 of Sec. 9, T. 34 N, R. 6 ■ W. ☐ E.

Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known

Well Name: WW-18

Wis. Unique Well Number: _____ DNR Well Number: _____

Date Well Installed: 08/11/94 (m m / d d / y y)

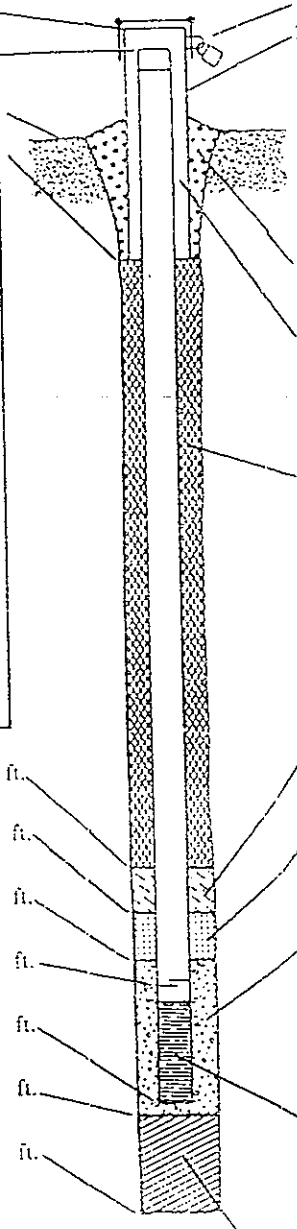
Well Installed By: (Person's Name and Firm)
Jim Mackney
Ames Construction Co

Protective pipe, top elevation: 1083.40 ft. MSL
Well casing, top elevation: 1083.38 ft. MSL
Land surface elevation: 1081.4 ft. MSL
Surface seal, bottom: 1077.4 ft. MSL or _____ ft.

1. Cap and lock? capped ■ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 4.0 in.
b. Length: 5.5 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 ☐ _____; Drill cuttings 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. _____ Other ☐ _____
7. Fine sand material: Manufacturer, product name & mesh size
a. Clean Cambrian Sand
b. Volume added _____ ft^3
8. Filter pack material: Manufacturer, product name and mesh size
a. 0.25" Washed Pea Gravel
b. Volume added _____ 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 _____
c. Slot size: 0.010 in.
d. Slotted length: 5.0 ft.
11. Backfill material (below filter pack): None ☐ 14; Massive Sulfides Other ■ _____

. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ■
. Sieve analysis attached? ☐ Yes ■ No
. Drilling method used: Rotary ☐ 50; Hollow Stem Auger ☐ 41; Other ■ Percussion
. Drilling fluid used: Water ☐ 02; Air ■ 01; Drilling Mud ☐ 03; None ☐ 99
. ing additives used? ☐ Yes ■ No
Describe _____
7. Source of water (attach analysis): NA

. Bentonite seal, top: 1054.1 ft. MSL or _____ ft.
. Fine sand, top: 1050.1 ft. MSL or _____ ft.
. Filter pack, top: 1048.1 ft. MSL or _____ ft.
. Screen joint, top: 1046.1 ft. MSL or _____ ft.
. Well bottom: 1041.1 ft. MSL or _____ ft.
. Filter pack, bottom: 1040.6 ft. MSL or _____ ft.
. Borehole, bottom: 1025.1 ft. MSL or _____ ft.
. Borehole diameter: 5.0 in.
. O.D. well casing: 2.37 in.
. ell casing: 2.02 in.



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

Signature: Wade R. May. Firm: Consulting Mining Geologist

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 may result 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 result in a forfeiture of not more than $10,000 for each

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Flambeau Mining Company 1994 Annual Report

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 4-90

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

Facility/Project Name	County Name	Well Name
Flambeau Mine	Rusk	WW-18
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
03180	55	

		Before Development	After Development
1. Can this well be purged dry?		☐ Yes ■ No	
2. Well development method			
surged with bailer and bailed	☐ 41		
surged with bailer and pumped	☐ 61		
surged with block and bailed	☐ 42		
surged with block and pumped	☐ 62		
surged with block, bailed and pumped	☐ 70		
compressed air	■ 20		
bailed only	☐ 10		
pumped only	☐ 51		
pumped slowly	☐ 50		
Other _____	☐		
3. Time spent developing well	90 min.		
4. Depth of well (from top of well casisng)	42.3 ft.		
5. Inside diameter of well	5.0 in.		
6. Volume of water in filter pack and well casing	0.0 gal.		
7 Volume of water removed from well	100.0 gal.		
8 Volume of water added (if any)	0.0 gal.		
9 Source of water added	NA		
10. Analysis performed on water added? (If yes, attach results)	☐ Yes ■ No		
11. Depth to Water (from top of well casing)	a.	17.86 ft.	18.05 ft.
Date	b.	08/11/94 (m m d d y y)	08/11/94 (m m d d y y)
Time	c.	5:10 ☐ a.m. ■ p.m.	6:35 ☐ a.m. ■ p.m.
12. Sediment in well bottom		15.5 ~~inches~~ ft	___.__ inches
13. Water clarity		Clear ☐ 10 Turbid ■ 15 (Describe) Muddy	Clear ☐ 20 Turbid ■ 25 (Describe) Muddy.

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____ mg/l	____ mg/l
15. COD	____ mg/l	____ mg/l

16. Additional comments on development:

Well development Person's Name and Firm

Name: Jim Hackney

Firm: Ames Construction Co

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

Signature: Charles R May

Print Initials: ERM

Title: Consulting Mining Geologist

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

of Wisconsin
rtment 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

ty/Project Name: Flambeau Mine

Local Grid Location of Well: 39779.6 ft. ■ N. ☐ S. 38989.3 ft. ■ E. ☐ W.

Well Name: 104-18

se, Permit or Monitoring Number: 03180__

Grid Origin Location: Lat. _____ Long. _____ or St. Plane _____ ft. N, _____ ft. E.

Wis. Unique Well Number: _____ DNR Well Number: _____

Date Well Installed: 09/09/94 (m m / d d / y y)

of Well: Water Table Observation Well ☐ 11; Piezometer ■ 12

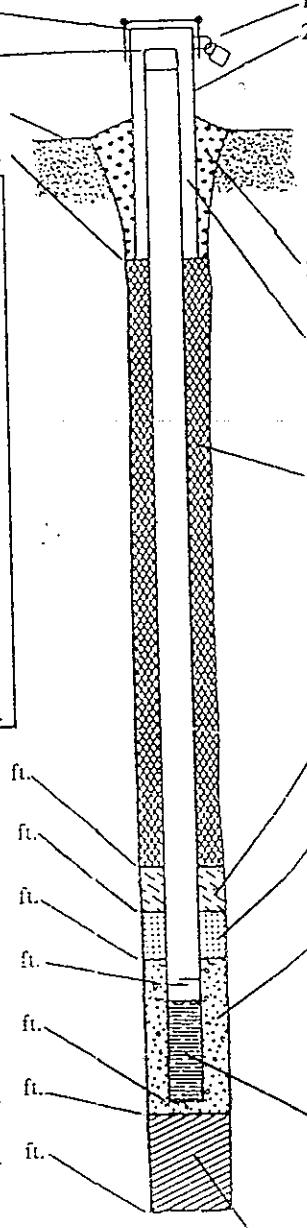
Section Location of Waste/Source: SW 1/4 of SE 1/4 of Sec. 9, T. 34 N, R. 6 ■ W. ☐ E.

Well Installed By: (Person's Name and Firm): Jim Hackney; Ames Construction Co

nce Well Is From Waste/Source Boundary: _____ ft.

Location of Well Relative to Waste/Source: u ☐ Upgradient; s ☐ Sidegradient; d ☐ Downgradient; n ☐ Not Known

ell A Point of Enforcement Std. Application? ☐ Yes ☐ No



rotective pipe, top elevation _____ ft. MSL

Well casing, top elevation 1043.73 ft. MSL

and surface elevation 1041.7 ft. MSL

urface seal, bottom _____ ft. MSL or _____ ft.

1. Cap and lock? capped ☐ Yes ■ No

2. Protective cover pipe:
a. Inside diameter: _____ in.
b. Length: _____ 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 ☐ __; Drill hole cuttings; 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. _____ Other ☐ __

7. Fine sand material: Manufacturer, product name & mesh size
a. Clean Cambrian Sand __
b. Volume added _____ ft^3

8. Filter pack material: Manufacturer, product name and mesh size
a. _____ __
b. Volume added _____ 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 _____
c. Slot size: .010 in.
d. Slotted length: 5.0 ft.

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

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

Sieve analysis attached? ☐ Yes ■ No

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

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

additives used? ☐ Yes ☐ No

Describe _____

Source of water (attach analysis): _____

Bentonite seal, top 1007.1 ft. MSL or _____ ft.

Fine sand, top 1005.1 ft. MSL or _____ ft.

Filter pack, top 1004.1 ft. MSL or _____ ft.

Screen joint, top _____ ft. MSL or _____ ft.

Well bottom 998.1 ft. MSL or 45.6 ft.

Filter pack, bottom _____ ft. MSL or _____ ft.

Borehole, bottom _____ ft. MSL or _____ ft.

Borehole, diameter 8.0 in.

O.D. well casing 2.37 in.

well casing 2.02 in.

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

Signature: Edwards R. May. Firm: Consulting Mining Geologist

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 may result 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 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

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 4-90

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

Facility/Project Name	County Name	Well Name
Flambeau Mine	Rusk	104-18
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
03180	55	

	Before Development	After Development
1. Can this well be purged dry?	☐ Yes ■ No	
11. Depth to Water (from top of well casing)	a. 0.00 ft.	0.00 ft.
Date	b. 09/09/94 (m m d d y y)	09/09/94 (m m d d y y)
Time	c. 10:00 ■ a.m. ☐ p.m.	10:30 ■ a.m. ☐ p.m.
12. Sediment in well bottom	___ inches	___ inches
13. Water clarity	Clear ■ 10 Turbid ☐ 15 (Describe)	Clear ■ 20 Turbid ☐ 25 (Describe)

2. Well development method

surged with bailer and bailed	☐	41
surged with bailer and pumped	☐	61
surged with block and bailed	☐	42
surged with block and pumped	☐	62
surged with block, bailed and pumped	☐	70
compressed air	■	20
bailed only	☐	10
pumped only	☐	51
pumped slowly	☐	50
Other _____	☐	

3. Time spent developing well 10 min.

4. Depth of well (from top of well casisng) 45.6 ft.

5. Inside diameter of well 2.02 in.

6. Volume of water in filter pack and well casing 0 gal.

7 Volume of water removed from well 40.0 gal.

8 Volume of water added (if any) 0 gal.

9 Source of water added NA

10. Analysis performed on water added? ☐ Yes ■ No
(If yes, attach results)

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	___ mg/l	___ mg/l
15. COD	___ mg/l	___ mg/l

16. Additional comments on development:
Artesian < 2 gpm. Protector cap on order to be installed in Spring. 10/1/95

Well developed by: Person's Name and Firm

Name Jim Hackney

Firm: Ames construction co

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

Signature: Rhode R. May

Print Initials: E R M

Firm: Consulting Mining Geologist

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

of Wisconsin
rtment of Natural Resources

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

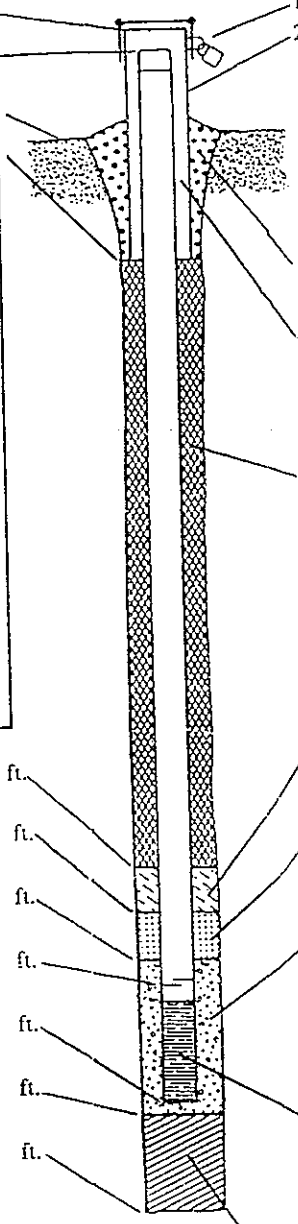
MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 4-90

lity/Project Name: Flambeau Mine
E[illegible]se, Permit or Monitoring Number: _____

Local Grid Location of Well: 39790.8 ft. ■ N. ☐ S. 38976.6 ft. ■ E. ☐ W.
Grid Origin Location: Lat. _____ Long. _____ or
St. Plane _____ ft. N, _____ ft. E.
Section Location of Waste/Source: ☐ E. ■ W.
SW 1/4 of SE 1/4 of Sec. 9, T. 34 N, R. 6

Well Name: 104 - 19
Wis. Unique Well Number: _____ DNR Well Number: _____
Date Well Installed: 09/26/94 (m m d d y y)
Well Installed By: (Person's Name and Firm)
Jim Hackney
Ames Construction Co

[illegible] of Well: Water Table Observation Well ☐ 11
Piezometer ■ 12
ance Well Is From Waste/Source Boundary: _____ ft.
/ell A Point of Enforcement Std. Application? ☐ Yes ☐ No
Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known



rotective pipe, top elevation _____ ft. MSL
Well casing, top elevation 1043.91 ft. MSL
and surface elevation 1040.6 ft. MSL
Surface seal, bottom _____ ft. MSL or _____ ft.

1. Cap and lock? capped ☐ Yes ■ No
2. Protective cover pipe:
a. Inside diameter: _____ in.
b. Length: _____ 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 ■ Drill cuttings
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. _____ Other ☐ __
7. Fine sand material: Manufacturer, product name & mesh size
a. Clean Cambrian Sand
b. Volume added _____ ft^3
8. Filter pack material: Manufacturer, product name and mesh size
a. _____
b. Volume added _____ 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 _____
c. Slot size: 0.010 in.
d. Slotted length: 5.0 ft.
11. Backfill material (below filter pack): None ■ 14 Other ☐ __

. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ■
. Sieve analysis attached? ☐ Yes ■ No
. Drilling method used: Rotary ☐ 50 Hollow Stem Auger ☐ 41
Percussion Other ■
5. Drilling fluid used: Water ☐ 02 Air ■ 01 Drilling Mud ☐ 03 None ☐ 99
6. [illegible] additives used? ☐ Yes ■ No
Describe NA
7. Source of water (attach analysis):
NA

. Bentonite seal, top 1008.3 ft. MSL or _____ ft.
. Fine sand, top 1005.3 ft. MSL or _____ ft.
. Filter pack, top 1003.3 ft. MSL or _____ ft.
. Screen joint, top _____ ft. MSL or _____ ft.
. Well bottom 996.3 ft. MSL or 47.6 ft.
. Filter pack, bottom _____ ft. MSL or _____ ft.
K. Borehole, bottom _____ ft. MSL or _____ ft.
. Borehole, diameter 8.5 in.
M. O.D. well casing 2.37 in.
N. I.D. well casing 2.07 in.

I hereby certify that the information on this form is true and correct to the best of my knowledge.
Signature: Rhode R. May. Firm: Consulting Mining Geologist

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 may result 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 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

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 4-90

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

Facility/Project Name	County Name	Well Name
Flambeau Mine	Rusk	104-19
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
03180	55	_____ / _____

		Before Development	After Development
1. Can this well be purged dry?	☐ Yes ■ No		
11. Depth to Water (from top of well casing)	a.	3.00 ft.	3.50 ft.
	Date b. (m m d d y y)	09/26/94	09/26/94
	Time c.	9:30 ■ a.m. ☐ p.m.	10:00 ■ a.m. ☐ p.m.
12. Sediment in well bottom		___.__ inches	___.__ inches
13. Water clarity		Clear ☐ 10 Turbid ■ 15 (Describe) Muddy	Clear ■ 20 Turbid ☐ 25 (Describe) Almost clear.

2. Well development method

surged with bailer and bailed	☐	41
surged with bailer and pumped	☐	61
surged with block and bailed	☐	42
surged with block and pumped	☐	62
surged with block, bailed and pumped	☐	70
compressed air	■	20
bailed only	☐	10
pumped only	☐	51
pumped slowly	☐	50
Other _____	☐	

3. Time spent developing well ___10___ min.

4. Depth of well (from top of well casisng) ___47.6___ ft.

5. Inside diameter of well ___2.02___ in.

6. Volume of water in filter pack and well casing ___0.___ gal.

7 Volume of water removed from well ___55.5___ gal.

8 Volume of water added (if any) ___0.___ gal.

9 Source of water added NA

10. Analysis performed on water added? ☐ Yes ■ No
(If yes, attach results)

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

16. Additional comments on development:
Protector Cap on order for installation 16/1/95

Well developed by: Person's Name and Firm

Name Jim Hackney

Firm: Ames Construction Co

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

Signature: Edwards R. Mayo

Print Initials: ERM

Firm: Consulting Mining Geologist

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

te of Wisconsin
partment 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

ility/Project Name
Flambeau Mining Company

Local Grid Location of Well
39827.8 ft. ☒ N. ☐ S. 38934.0 ft. ☒ E. ☐ W.

Well Name
104-20

ense, Permit or Monitoring Number
03180

Wis. Unique Well Number | DNR Well Number

Grid Origin Location
Lat. _____ Long. _____ or
St. Plane _____ ft. N, _____ ft. E.

Date Well Installed
09/26/94 (m m / d d / y y)

pe 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 ☒ W.

Well Installed By: (Person's Name and Firm)
Jim Hackney
Ames Construction Co

stance Well Is From Waste/Source Boundary
ft.

Location of Well Relative to Waste/Source
u ☒ Upgradient s ☐ Sidegradient
d ☐ Downgradient n ☐ Not Known

Well A Point of Enforcement Std. Application?
☐ Yes ☒ No

Protective pipe, top elevation _____ ft. MSL
Well casing, top elevation 1042.99 ft. MSL
Land surface elevation 1041.2 ft. MSL
Surface seal, bottom _____ ft. MSL or _____ ft.

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

3. Sieve analysis attached? ☐ Yes ■ No

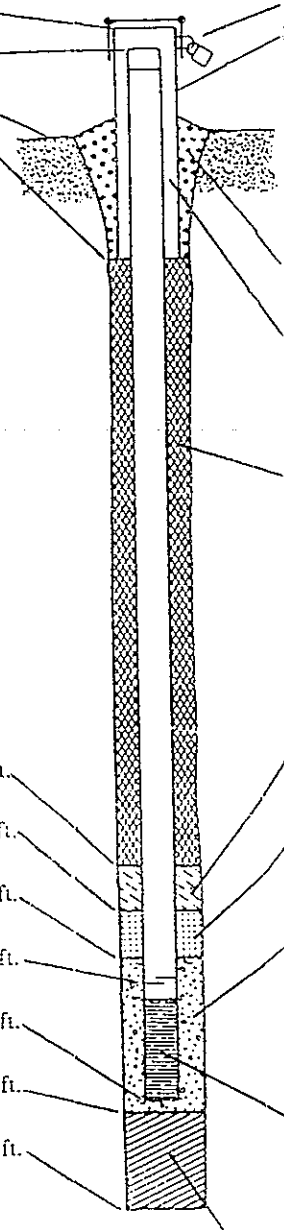
4. Drilling method used:
Rotary ☐ 50
Hollow Stem Auger ☐ 41
Percussion Other ■ __

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

6. Drilling additives used? ☐ Yes ■ No
Describe NA

7. Source of water (attach analysis):
NA

E. Bentonite seal, top 1007.6 ft. MSL or _____ ft.
F. Fine sand, top 1005.6 ft. MSL or _____ ft.
G. Filter pack, top 1003.6 ft. MSL or _____ ft.
H. Screen joint, top 1001.6 ft. MSL or _____ ft.
I. Well bottom 996.6 ft. MSL or 45.5 ft.
J. Filter pack, bottom _____ ft. MSL or _____ ft.
K. Borehole, bottom _____ ft. MSL or _____ ft.
L. Borehole, diameter 5.0 in.
M. O.D. well casing 2.37 in.
N. I.D. well casing 2.02 in.



1. Cap and lock? Capped ☐ Yes ■ No
2. Protective cover pipe:
a. Inside diameter: __ in.
b. Length: __ 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 ☐ __
Drill Cuttings 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. _____ Other ☐ __
7. Fine sand material: Manufacturer, product name & mesh size
a. Cambrian Sand __
b. Volume added _____ ft^3
8. Filter pack material: Manufacturer, product name and mesh size
a. _____ __
b. Volume added _____ ft^3
9. Well casing:
Flush threaded PVC schedule 40 ■ 23
Flush threaded PVC schedule 80 ☐ 24
Other ☐ __
10. Screen material: PVC 2" Class 40 __
a. Screen type:
Factory cut ■ 11
Continuous slot ☐ 01
Other ☐ __
b. Manufacturer _____
c. Slot size: 0.010 in.
d. Slotted length: 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 Gwendolyn R. May. Firm Consulting Mining Geologist

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 may result 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 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

MONITORING WELL DEVELOPMENT
Form 4400-113B Rev. 4-90

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

Facility/Project Name	County Name	Well Name
Flambeau Mining Company	Rusk	104-20
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
03180	55	

		Before Development	After Development
1. Can this well be purged dry?	☐ Yes ☒ No		
2. Well development method			
surged with bailer and bailed	☐ 41		
surged with bailer and pumped	☐ 61		
surged with block and bailed	☐ 42		
surged with block and pumped	☐ 62		
surged with block, bailed and pumped	☐ 70		
compressed air	■ 20		
bailed only	☐ 10		
pumped only	☐ 51		
pumped slowly	☐ 50		
Other NONE	☐		
11. Depth to Water (from top of well casing)		a. 6.38 ft.	6.21 ft.
Date		b. 09/26/94 (m m d d y y)	09/26/94 (m m d d y y)
Time		c. 11:30 ■ a.m. ☐ p.m.	12:00 ■ a.m. ☐ p.m.
12. Sediment in well bottom		___ inches	___ inches
13. Water clarity		Clear ☐ 10 Turbid ■ 15 (Describe) muddy	Clear ☐ 20 Turbid ■ 25 (Describe) Cloudy.
3. Time spent developing well		10 min.	
4. Depth of well (from top of well casisng)		45.5 ft.	
5. Inside diameter of well		2.02 in.	
6. Volume of water in filter pack and well casing		2. gal.	
7 Volume of water removed from well		30.0 gal.	
8 Volume of water added (if any)		0. gal.	
9 Source of water added		NA	
10. Analysis performed on water added? (If yes, attach results)	☐ Yes ■ No		
Fill in if drilling fluids were used and well is at solid waste facility:			
14. Total suspended solids		____ mg/l	____ mg/l
15. COD		____ mg/l	____ mg/l

16. Additional comments on development:
Protector pipe on order. 10/1/95

Well developed by: Person's Name and Firm

Name: Jim Hackney

Firm: Ames Construction Co

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

Signature: Rhonda R. May

Print Initials: E R M

Firm: Consulting Mining Geologist

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

Appendix J

Liner Repair Documentation

July 13, 1994

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

Re: Geomembrane Liner Repair Documentation, Type II Stockpile (Phase 1), Flambeau Mine, Ladysmith, Wisconsin -- STS Project No. 20961XF

Dear Ms. Murphy:

As you requested, STS Consultants, Ltd., (STS) was at the above referenced site to observe the repair of two geomembrane panels damaged during operations at Flambeau Mine's Type II Stockpile (Phase 1). We understand that the 60 mil high density polyethylene (HDPE) geomembrane liner (panels P-224 and P-225) was damaged due to inappropriate use of the area for traffic by Flambeau contractors.

Damage to the panels consisted of numerous tears, deep scratches, and holes in the geomembrane. The damaged area had been uncovered by Flambeau Mine personnel prior to STS' arrival on site.

Geo-Synthetics Construction, Inc. (GSCI) of Waukesha, Wisconsin, extrusion welded a 6-foot by 12-foot 60 mil HDPE permanent patch over the damaged portion of panel P-225. Vacuum testing of the permanent patch was performed by GSCI and indicated an acceptable weld.

Due to lack of available HDPE, GSCI heat tacked smaller scrap pieces of HDPE as temporary patches over the remaining area of major damage. When additional material for the Phase 2 liner construction arrives at the site, permanent repairs will be performed in these areas. The area of temporary repairs does not receive runoff from the Type II Stockpile or the crushing operations.

Prior to performance of welding of the patches, GSCI performed trial welding to evaluate the performance of their extrusion welding machines and welding personnel. Four peel tests and three shear tests were performed on the trial weld samples and all test samples met the minimum test requirements. Criteria for acceptance of an extrusion welded seam tested in peel was defined as: a) failure by film tear bond (FTB), and b) the yield seam strength for the seam being at least 90 pounds per inch (ppi). Criteria for acceptance of an extrusion welded seam tested in shear was defined as: a) failure by FTB, and b) the yield seam strength for the seam being at least 120 ppi. Refer to the attached Trial Weld Information Form for additional information.

STS Consultants Ltd.
Consulting Engineers

1035 Kepler Drive
Green Bay, Wisconsin 54311
414.468.1978/Fax 414.468.3312

Flambeau Mining Company supplied the 60 mil geomembrane material and extrusion rod for the repairs. The material was leftover from the Phase 1 liner construction.

Please refer to the attached Liner Repair Form for details regarding the repairs.

Sincerely,

STS CONSULTANTS LTD.

Michael J. Pfetti, P.E.
Project Engineer

Dean A. Sylla, P.E.
Principal

MJP/lmh

Enclosures:
Liner Repair Form
Trial Weld Summary
June 23, 1994, Field Technician Report
Drawing No. 20961XF-1

PROJECT NAME: FLAMBEAU MINE: TYPE II STOCKPILE, PHASE I

PROJECT NO: 20961XF

QA MONITOR: Mike Moran

STS Consultants Ltd.

TRIAL WELD SUMMARY

Test No.	Date	Time	Weather	Welder ID	Machine Number	Temp. Setting/ Speed	Amb. Temp.	Weld Type	PEEL (PPI) Outside Weld 1	Outside Weld 2	Outside Weld 3	Outside Weld 4	Inside Weld 1	Inside Weld 2	Inside Weld 3	Inside Weld 4	SHEAR (PPI) 1	SHEAR (PPI) 2	Test (P/F)	Comments
1	6-23-94	13:15	Cloudy 70°	RB	EXT 7539	230°C	70	EXT	117	142	126	160	NA	NA	NA	NA	142 138	154	P	

PROJECT NAME: FLAMBEAU MINE: TYPE II STOCKPILE, PH 1

PROJECT NO. 20961XF

QA MONITOR: MIKE MORONE

Date: 6-23-94

STS Consultants, Ltd.

LINER REPAIR FORM

Repair Number	Date Repaired	Time	Oper./Mach.	Repair Location	Description	Size of Repair	Date Vacuum Tested	Vac. Test Results (P/F)
6-23-H	6-23-94		RB	SOUTH OF 1 HOY WEST OF ANCHOR TRENCH	HOLES & SCRATCHES FROM VEHICLE TRAFFIC	6'X12'	6-23-94	P
				ON PANEL P-225				

STS Construction Technology Group
Field Report

NOTE: The responsibilities and authority of STS and STS' Field Personnel include neither the responsibilities nor the authority of the "Competent Person" for the Project Site as defined by OSHA Regulations: 29 CFR 1926 Subpart P.

Project No. _____

Project FLAMBEAU MINING COMPANY - ~~WASTE~~ TYPE II STOCKPILE Day/Date THURSDAY, JUNE 23, 1994

Location LADYSMITH, WI Weather/Temp. CLOUDY, 74°

Contractor GSI Client FMC

(1 of 3 REPORTS for 6.23)

Project Competent Person per 29 CFR Part 1926 (Subpart P)

NAME: _____

FIRM: _____

FIRM ADDRESS: _____

PHONE: _____

Present on Site ☐ YES ☐ NO

Equipment Rental _____

Tolls $ _____

Parking $ _____

Mileage _____

Arrive Job 3:30 5:00

Depart Job 4:00 6:30

Total Hours on Job 2.*

Travel Time _____

Project Preparation Time _____

TOTAL CHARGEABLE HOURS ~~4 HOUR MINIMUM~~

2.*

Summary of Technical and/or Engineering Services Performed, including Field Test Data. Locations, Elevations and Depth are Estimated.

THE DAMAGE DUE TO TRAFFIC IS ON THE SOUTHWEST SIDE OF TYPE II STOCKPILE AREA ON PANELS 224 & 225. THE DAMAGE IS EXTENSIVE, WITH MANY RIPS, DEEP SCRATCHES, AND HOLES. FLAMBEAU MINE EMPLOYEES UNCOVERED THE LINER & EXPOSED THE DAMAGED AREAS.

GSI PLACED 1 LARGE PERMANENT PATCH ~~AND~~ 6'x 12' IN DIMENSION ON P-224 & 5, & WELDED TO THE LINER.

GSI ALSO HEAT TACKED SOME SMALLER SCRAP PIECES OF 60 MIL HDPE OVER OTHER MAJOR HOLES. THIS WAS DONE DUE TO THE LACK OF ENOUGH MATERIAL TO COVER THE ENTIRE DAMAGED AREA. MATERIAL (HDPE) WILL BE ARRIVING SOON FOR PHASE II CONSTRUCTION & REPAIRS WILL ~~GO~~ BE COMPLETED AT THAT TIME. THE AREA WE IS IN AN AREA THAT DOES NOT RELIEVE ANY PRECIPITATION RUN OFF FROM THE ~~TYPE~~ PHASE II STOCKPILE OR THE CRUSHING OPERATIONS.

GSI VACUUM TESTED THE PERMANENT REPAIR & FOUND NO LEAKS.

* ☐ Field Test Data is Estimated Pending Final Laboratory Test Results.

Site Sketch: Indicate North

Representative Jana E. Murphy

Position ENV. SUPERVISOR

Company Flambeau Mining Co.

By M J Moroni

Title SR. ENG. TECH

STS Consultants, Ltd.

2 WHITE – Office YELLOW – Time Card WHITE – Field

8/92PP15K

EDGE OF LINER/LOCATION OF ANCHOR TRENCH

MATCH LINE SEE DRAWING No. 18904-5

CRUSHER AREA

AREA OF REPAIRS

EDGE OF DIKE

EDGE OF LINER/
LOCATION OF ANCHOR TRENCH

TOE OF SLOPE
(TYP.)

TYPE II STOCKPILE AREA

LEGEND

P319	PANEL NUMBER
S-286	SEAM NUMBER
XS-24	CROSS SEAM NUMBER
	TOP OF BERM

NOTE: APPROXIMATE DIKE LOCATIONS TAKEN FROM DESIGN DRAWINGS

SCALE 1" = 50' (50 0 50 FEET)

N

Scale 0 25' 50' 75' 100' 125'

REVISION	BY	DATE

DRAWN BY J.R.L. DATE 11-3-92
CHECKED BY D.A.D. DATE 11-16-92
APPROVED BY R.K.L. DATE 11-18-92
CADFILE C:\DJM\FLAM\F1.DWG

FLAMBEAU MINING COMPANY
LADYSMITH, WISCONSIN

TYPE II STOCKPILES AND CRUSHER AREA GEOMEMBRANE REPAIR LOCATIONS

STS Consultants Ltd.
Consulting Engineers

STS PROJECT NUMBER 20961XF
STS PROJECT FILE
SCALE 1" =50'
SHEET NUMBER 20961XF-1

J-6
1994

July 13, 1994

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

Re: Surge and Runoff Ponds Repairs, Type II Stockpile (Phase 1), Flambeau Mine, Ladysmith, Wisconsin -- STS Project No. 20961XF

Dear Ms. Murphy:

As you requested, STS Consultants, Ltd., (STS) was at the above referenced site on June 23, 1994, to document repairs performed for the surge and runoff ponds. This correspondence briefly summarizes the repairs made to the geomembrane liner in these areas.

Sloughing of the surge pond subgrade soil supporting the pipe and liner on the north slope, west portion in panel P-48, 19 feet north of the anchor trench was being repaired by Cooper Engineering and Flambeau Mining personnel upon STS' arrival at the site. The geomembrane liner had broken away from the pipe collar weld. Cooper personnel had cut a hole in the liner to facilitate backfilling of the sloughed area.

A dry sand-bentonite soil mixture was used to backfill the washout area. We understand the soil work portion of this repair will be documented by Cooper personnel under separate correspondence.

Additional areas of the geomembrane liner requiring repair included:

- Surge Pond: panel P-36 at the 36-inch diameter outlet pipe. The weld collar beneath the liner had curled and tensioned the liner. Additionally, the liner broke away from the weld collar for a length of approximately 9 inches. See Figure 1.

- Surge Pond: panel P-49, 3 feet south of the anchor trench and 5 feet east of seam 45. A deep scratch was observed in the geomembrane liner. See Figure 1.

- Runoff Pond: panel P-339 in the southwest corner. A puncture and small, heavy crease were observed in the liner. See Figure 2.

STS Consultants Ltd.
Consulting Engineers

1035 Kepler Drive
Green Bay, Wisconsin 54311
414.468.1978/Fax 414.468.3312

Geo-Synthetics Construction, Inc. (GSCI) of Waukesha, Wisconsin extrusion welded 60 mil HDPE permanent patches over the holes in P-48 and the other damaged areas mentioned above. Vacuum testing of the patches was performed by GSCI and indicated acceptable welds.

Prior to performance of welding of the patches, GSCI performed trial welding to evaluate the performance of their extrusion welding machines and welding personnel. Four peel tests and three shear tests were performed on the trial weld samples and all test samples met the minimum test requirements. Criteria for acceptance of an extrusion welded seam tested in peel was defined as: a) failure by film tear bond (FTB), and b) the yield seam strength for the seam being at least 90 pounds per inch (ppi). Criteria for acceptance of an extrusion welded seam tested in shear was defined as: a) failure by FTB, and b) the yield seam strength for the seam being at least 120 ppi. Refer to the attached Trial Weld Information Form for additional information.

Flambeau Mining Company supplied the 60 mil geomembrane material and extrusion rod for the repairs. The material was leftover from the Phase 1 liner construction.

Please refer to the attached Liner Repair Form and copies of the STS technician's field reports for details regarding the repairs. If you have any questions or comment, please contact us.

Sincerely,

STS CONSULTANTS LTD.

Michael J. Pretti, P.E.
Project Engineer

Dean A. Sylla, P.E.
Principal

MJP/lmh

Enclosure:
Liner Repair Form
Trial Weld Information Sheet
Figures 1 and 2
Drawing No. 20961XF-1

PROJECT NAME: FLAMBEAU MINE: TYPE II STOCKPILE, PHA[illegible]I

Page 1 of 1

PROJECT NO. 20961XF

QA MONITOR: Mike Moroni

Date: 6/23/94

STS Consultants, Ltd.

LINER REPAIR FORM

Repair Number	Date Repaired	Time	Oper./Mach.	Repair Location	Description	Size of Repair	Date Vacuum Tested	Vac. Test Results (P/F)**
6-23-A	6-23-94		RB	Surge Pond. Panel P-48 20' South of N. Anchor Trench, 3' E. of S-46	Hole cut by Cooper Eng. to Repair Soil Washout	3'X3'	6-23-94	P
6-23-B	"		"	Surge Pond. Panel P-48, 14' of N. Anchor Trench, 4' E of S-46	Liner broke away from Weld Collar at Weld => Reweld	Reweld	" *	P
6-23-C	"		"	Surge Pond. Panel P-49. 3' S. of N. Anchor Trench. 5' E. of S-45.	Deep Scratch	1'X2'	"	P
6-23-D	"		"	Surge Pond. Panel P-36. 14' S. of N. Anchor Trench. 6' E. of S-36	Pipe Weld Collar Curled and cracked liner	1'X3'	"	P
6-23-E	"		"	Surge Pond. Panel P-36. 14' S. of N. Anchor Trench. 9' E. of S-36	Liner Broke off of Pipe Weld Collar @ Weld	Reweld	" *	P
6-23-F	"		"	Runoff Pond. Panel P-339. 30' E. of W. Anchor Trench, 3' South of S-295	Hole	2'X4'	"	P
6-23-G	"		"	Runoff Pond. Panel P-339. 5' E. of W. Anchor Trench 7' S. of S-295	Grease	1'X1'	"	P

* Spark Tested. ** (P/F) = Pass / Fail

PROJECT NAME: FLAMBEAU MINE: TYPE II STOCKPILE, PHASE 1

PROJECT NO: 20961XF

QA MONITOR: Mike Moroni

STS Consultants Ltd.

TRIAL WELD SUMMARY

Test No.	Date	Time	Weather	Welder ID	Machine Number	Temp. Setting/ Speed	Amb. Temp.	Weld Type	PEEL(PPI) Outside Weld 1	Outside Weld 2	Outside Weld 3	Outside Weld 4	Inside Weld 1	Inside Weld 2	Inside Weld 3	Inside Weld 4	SHEAR (PPI) 1	SHEAR (PPI) 2	Test (P/F)	Comments
1	6-23-94	13:15	Cloudy 70°	RB	EXT 7539	230°C	70	EXT	117	142	126	160	NA	NA	NA	NA	142 138	154	P	Required: Peel 90 PPI Shear 120 PPI

STS Construction Technology Group
Field Report

PAGE 1 OF 3

The responsibilities and authority of STS and STS' Field Personnel include neither the responsibilities nor the authority of the "Competent Person" for the Project Site as defined by OSHA Regulations: 29 CFR 1926 Subpart P.

Project No. _____

Project FLAMBEAU MINING COMPANY - SURGE POND. Day/Date THURSDAY, JUNE 23, 1994

Location LADYSMITH, WI Weather/Temp. CLOUDY, 74°

Contractor GSI Client FMC

(1 OF 3 REPORTS FOR 6.23)

Project Competent Person per 29 CFR Part 1926 (Subpart P)

NAME: _____

FIRM: _____

FIRM ADDRESS: _____

PHONE: _____

Present on Site ☐ YES ☐ NO

Equipment Rental —

Tolls $ _____

Parking $ _____

Mileage 210

Arrive Job 11:00 12:50

Depart Job 12:00 3:30

Total Hours on Job 9.0

Travel Time 4.5

Project Preparation Time .5

TOTAL CHARGEABLE HOURS
4 HOUR MINIMUM

9.0

Summary of Technical and/or Engineering Services Performed, including Field Test Data. Locations, Elevations and Depth are Estimated.

I MET WITH JANA MURPHY & VON SHANKS OF FMC UPON ARRIVAL. WE WENT TO THE SURGE POND FACILITY TO OBSERVE THE EXTENT OF THE LINER DAMAGE. COOPER ENGINEERING & FMC EMPLOYEES WERE REPAIRING THE UNSUPPORTED AREAS AROUND THE PIPE TO SUPPORT THE LINER FOR REPAIR. THE LOCATION IS THE NORTH SLOPE, WEST PORTION, IN PANEL 48, 19' SOUTH OF THE ANCHOR TRENCH. THE LINER HAS BROKEN AWAY FROM THE WELD ON THE PIPE COLLAR. COOPER ENG. CUT A HOLE BELOW THE PIPE OUTLET TO FACILITATE BACKFILLING THE UNSUPPORTED AREA.

COOPER ENG. USED A DRY SAND-BENTONITE MIXTURE FOR BACKFILLING THE UNSUPPORTED AREA. SEE COOPER REPORT FOR SOILS DETAILS.

ALSO, AT THE 36" OUTLET, A HARD SPOT IN THE LINER WAS OBSERVED BY COOPER & CUT OPEN BY COOPER TO FIND THE WELD COLLAR UNDER THE LINER HAD CURLED & TENSIONED THE LINER. ALSO, THE LINER HAD BROKEN AWAY (LENGTH 9") FROM THE WELD COLLAR. (CONT. PAGE 2)

☐ Field Test Data is Estimated
☐ Pending Final Laboratory Test Results.

Site Sketch: Indicate North

Field Representative Jana E. Murphy

Position ENV. SUPERVISOR

Company Flambeau Mining Co.

By M J Moroni

Title SR. ENG. TECH.

STS Consultants, Ltd.

2 WHITE – Office YELLOW – Time Card WHITE – Field

8/92PP15K

TS Construction Technology Group
ield Report

PAGE 2 of 3

The responsibilities and authority of STS and STS' Field Personnel include neither the responsibilities nor the authority of the "Competent Person" for the roject Site as defined by OSHA Regulations: 29 CFR 1926 Subpart P.

Project No. _____

oject FLAMBEAU MINING CO. Day/Date THURSDAY, JUNE 23, 1994

ation _____ Weather/Temp. _____

..tractor _____ Client _____

roject Competent Person per
3 CFR Part 1926 (Subpart P)

NAME: _____

IRM: _____

FIRM ADDRESS: _____

PHONE: _____

esent on Site ☐ YES ☐ NO

Equipment Rental _____ Arrive Job _____

Tolls $ _____ Depart Job _____

Parking $ _____ Total Hours on Job _____

Mileage _____ Travel Time _____

Project Preparation Time _____

TOTAL CHARGEABLE HOURS
4 HOUR MINIMUM

SEE PAGE 1

ummary of Technical and/or Engineering Services Performed, including Field Test Data. Locations, Elevations and Depth are Estimated.

A DEEP SCRATCH WAS ALSO OBSERVED IN PANEL 49, 3' SOUTH OF THE ANCHOR TRENCH & 5' EAST OF SEAM 45. OTHER MINOR SURFACE SCRATCHES SCRATCHES ARE NOTED IN THIS AREA, WHICH ADJACENT TO THE ACCESS GATE FOR THE POND. THE SCRATCH WAS REPAIRED BY GSI BY WELDING A PATCH OVER THE AREA.

GSI ALSO REPAIR THE EARLIER MENTIONED DAMAGE AREAS BY WELDING PATCHES OVER THE CUTS AND & GRINDING & REWELDING THE LINERS TO THE PIPE COLLARS. SEE TRIAL WELD FORM & REPAIR DATA FORM FOR SPECIFIC ~~INFO~~ INFORMATION ON THE REPAIRS. GSI & VACUUM TESTED THE PATCHES & SPARK TESTED THE PIPE CONNECTIONS & FOUND NO LEAKS.

I ALSO OBSERVED THE PATCH IN THE 36" PIPE & IT APPEARED TO BE IN GOOD CONDITION.

THE ~~SIDE~~ CONDITION BENEATH THE PIPES DOES NOT SHOW ANY SLOUGHING OF SOILS, EXCEPT FOR THE PIPE OUTFLOW ~~AREA~~ AREA ~~OF~~ REPAIRED TODAY.

☐ Field Test Data is Estimated
☐ Pending Final Laboratory Test Results.

Site Sketch: Indicate North

(CONT. PAGE 3).

epresentative _____

tion _____

Company _____

By M J Marone

Title SR. ENG. TECH.

STS Consultants, Ltd.

2 WHITE – Office YELLOW – Time Card WHITE – Field

STS Construction Technology Group
Field Report

PAGE 3 of 3

The responsibilities and authority of STS and STS' Field Personnel include neither the responsibilities nor the authority of the "Competent Person" for the Project Site as defined by OSHA Regulations: 29 CFR 1926 Subpart P.

Project No. _____

Project FLAMBEAU MINING CO - SURGE POND. Day/Date THURSDAY, JUNE 23, 1994.

Location _____ Weather/Temp. _____

Contractor _____ Client _____

Project Competent Person per 29 CFR Part 1926 (Subpart P)

NAME: _____

FIRM: _____

FIRM ADDRESS: _____

PHONE: _____

Present on Site ☐ YES ☐ NO

Equipment Rental _____ Arrive Job _____

Tolls $ _____ Depart Job _____

Parking $ _____ Total Hours on Job _____

Mileage _____ Travel Time _____

Project Preparation Time _____

TOTAL CHARGEABLE HOURS
4 HOUR MINIMUM

SEE PAGE 1

Summary of Technical and/or Engineering Services Performed, including Field Test Data. Locations, Elevations and Depth are Estimated.

THE SCUFF SHEET BELOW THE 36" PIPE IS IN GOOD CONDITION. HOWEVER, I DID NOTICE A SMALL TEAR IN THE SCUFF SHEET NEAR THE HIGH WATER MARK. THE LINER ITSELF IS NOT DAMAGED. THE TEAR QUITE POSSIBLY COULD HAVE BEEN CAUSED BY ICE ACTION ONE THE WINTER.

IT WOULD BE A GOOD IDEA TO PLACE SCUFF STRIPS UNDER THE CORRUGATED PIPES THAT ARE LAYING ON THE LINER. SOME MINOR SCRATCH WAS OBSERVED IN THESE AREAS, AND A SCUFF STRIP WOULD PREVENT ANY SCRATCHING DAMAGE TO THE LINER.

THE 60 MIL HDPE MATERIAL & EXTRUSION ROD WAS SUPPLIED BY FLAMBEAU MINING FOR REPAIRS MADE. MATERIAL CERTS. AVAILABLE FROM FMC. MATERIAL WAS CLEAN & DRY. ITS IS MATERIAL LEFT OVER FROM PREVIOUS LINER CONSTRUCTION.

☐ Field Test Data is Estimated Pending Final Laboratory Test Results.

Site Sketch: Indicate North

Field Representative _____

Position _____

Company _____

By _____

Title SR. ENG. TECH.

STS Consultants, Ltd.

8/92PP15K

WHITE - Office YELLOW - Time Card WHITE - Field

STS Construction Technology Group
Field Report

NOTE: The responsibilities and authority of STS and STS' Field Personnel include neither the responsibilities nor the authority of the "Competent Person" for the Project Site as defined by OSHA Regulations: 29 CFR 1926 Subpart P.

Project No. _____

Project FLAMBEAU MINING COMPANY - RUNOFF POND. Day/Date THURSDAY, JUNE 23, 1994

Location LADYSMITH, WI Weather/Temp. CLOUDY, 74°

Contractor GSI Client FMC.

Project Competent Person per 29 CFR Part 1926 (Subpart P)

NAME: _____

FIRM: _____

FIRM ADDRESS: _____

PHONE: _____

Present on Site ☐ YES ☐ NO

Equipment Rental _____

Tolls $ _____

Parking $ _____

Mileage _____

Arrive Job 12:00 4:00

Depart Job 12:30 5:00

Total Hours on Job 1.5

Travel Time —

—

Project Preparation Time _____

TOTAL CHARGEABLE HOURS 4 HOUR MINIMUM

1.5

Summary of Technical and/or Engineering Services Performed, including Field Test Data. Locations, Elevations and Depth are Estimated.

I MADE AN OBSERVATION TOUR OF THE RUN OFF POND TO OBSERVE THE PERFORMANCE OF THE LINER.

I FOUND A PUNCTURE IN THE LINER & A SMALL ~~HEAVY~~ CREASE IN THE LINER IN THE SOUTH WEST CORNER. (P.339) GSI PATCHED BOTH OF THESE LOCATIONS WITH 60 mil HDPE & EXTRUSION ROD SUPPLIED BY FLAMBEAU MINING. SEE TRIAL WELD LOG & REPAIR SUMMARY FOR SPECIFIC WELDING DATA. GSI VACUUM TESTED THE REPAIRS & FOUND NO LEAKS.

I NOTICED THAT THE SOILS UNDER THE 32" PIPE ON THE WEST SIDE OF THE POND HAVE SLOUGHED DOWN & CREATED A VOID IN THE AREA IMMEDIATELY BELOW THE PIPE. HOWEVER, AT LOW WATER, THERE WAS NO VISIBLE STRESS ON THE LINER AT THIS TIME.

ALSO, SCUFF STRIPS ARE RECOMMENDED UNDER EACH OF THE CORRUGATED PIPES TO PREVENT SCRATCHING THE LINER. SOME MINOR SCEATHING IS EVIDENT AT EACH PIPE LOCATION.

☐ Field Test Data is Estimated Pending Final Laboratory Test Results.

Site Sketch: Indicate North

Field Representative Jana E. Murphy

Position ENV. SUPERVISOR

Company Flambeau Mining Co.

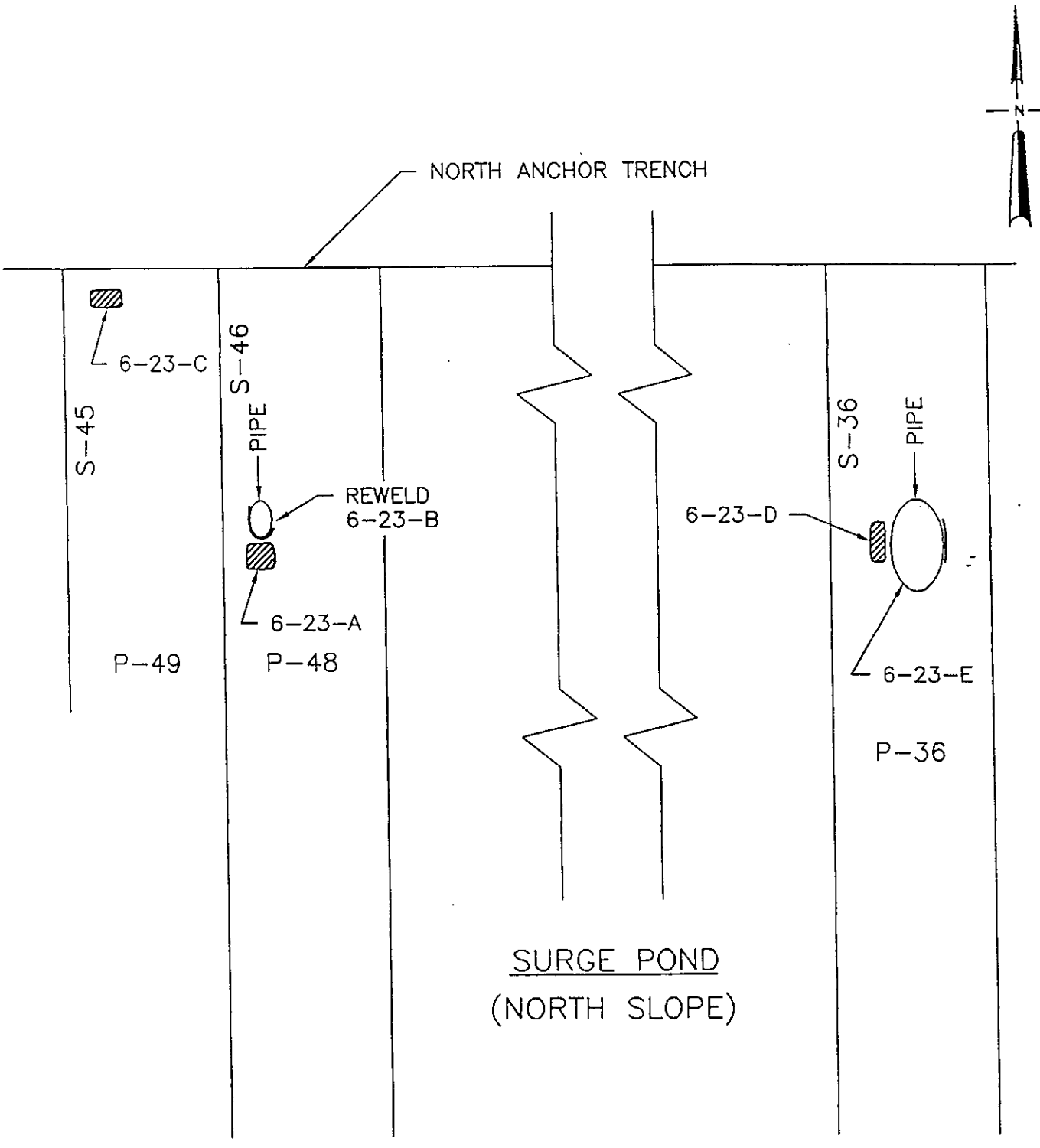
By M J Morrow

Title SR. ENG. TECH.

STS Consultants, Ltd.

2 WHITE – Office YELLOW – Time Card WHITE – Field

8/92PP1



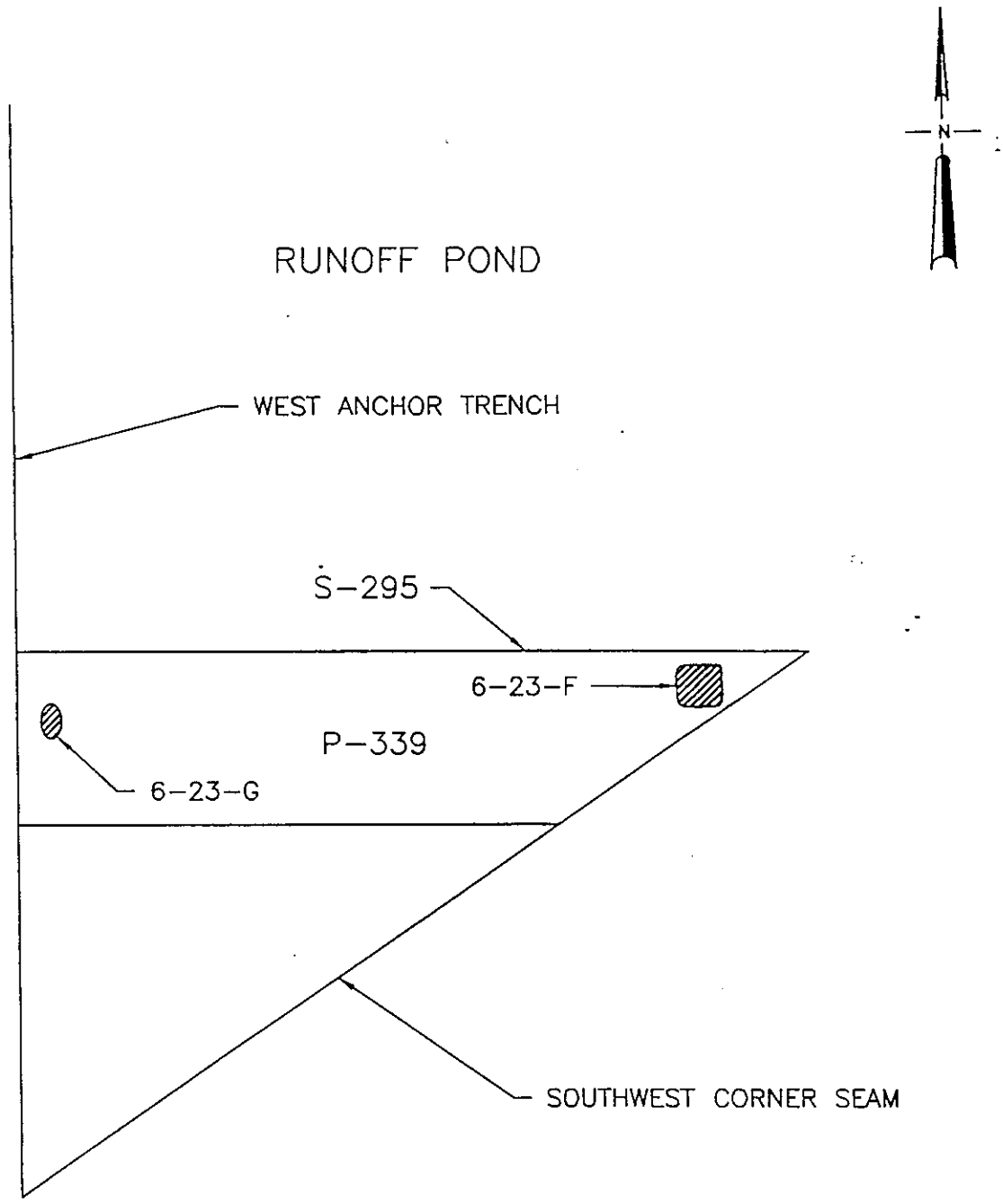
STS Consultants Ltd.
Consulting Engineers

PROJECT/CLIENT

FLAMBEAU MINING COMPANY
LADYSMITH, WISCONSIN

GEOMEMBRANE REPAIR LOCATIONS

DRAWN BY	JDS	
CHECKED BY		
APPROVED BY		
SCALE	FIGURE NO. 1	
STS DRAWING NO. C:\20961ZF\FIG1		



LEGEND

6-23-F LOCATION OF GEOMEMBRANE REPAIR

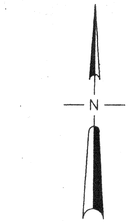
STS Consultants Ltd.
Consulting Engineers

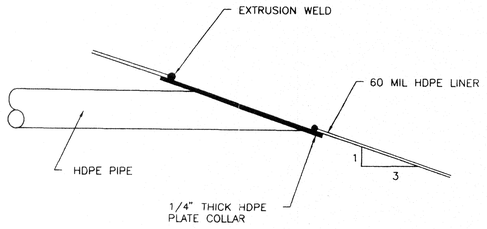
PROJECT/CLIENT

FLAMBEAU MINING COMPANY
LADYSMITH, WISCONSIN

GEOMEMBRANE REPAIR LOCATIONS

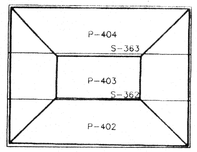
DRAWN BY	JDS	
CHECKED BY		
APPROVED BY		
SCALE	FIGURE NO. 2	
STS DRAWING NO. C:\20961ZF\FIG2		





TYPICAL PIPE PENETRATION DETAIL

NOT TO SCALE

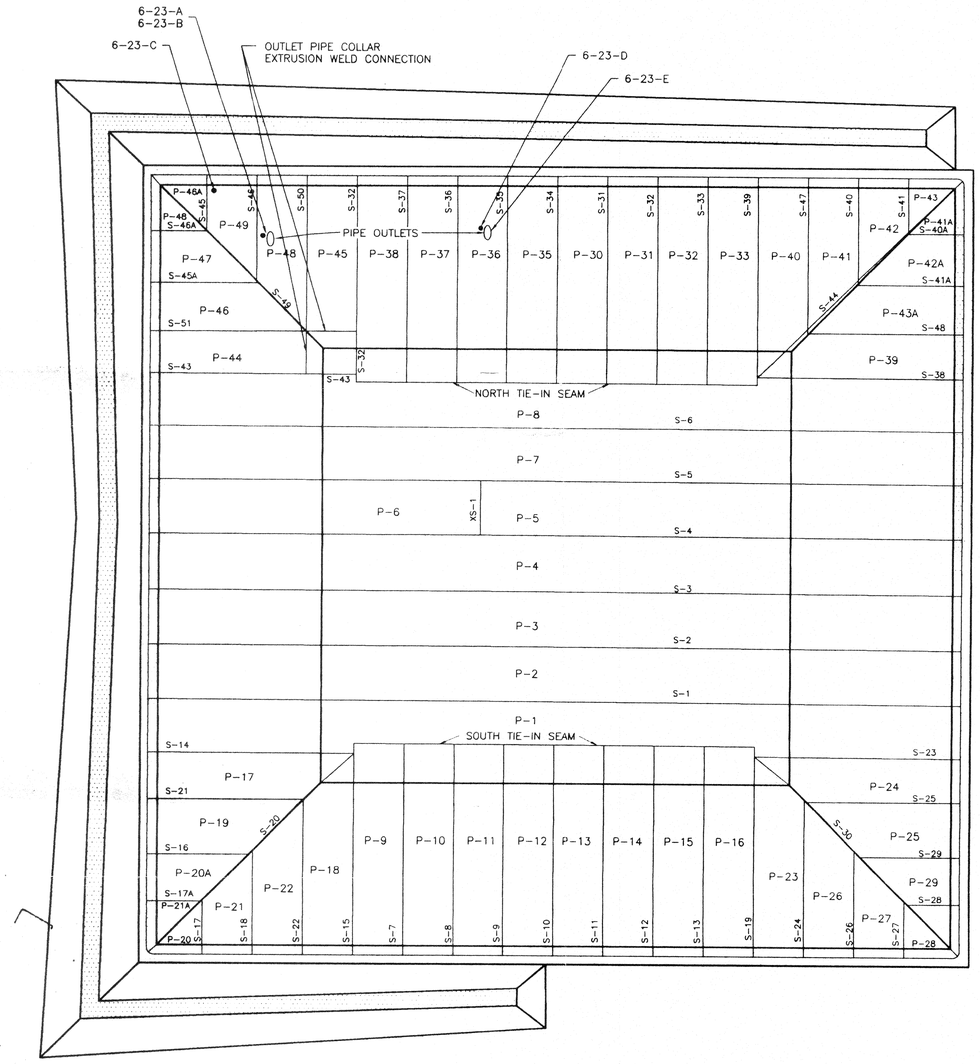


LYSIMETER

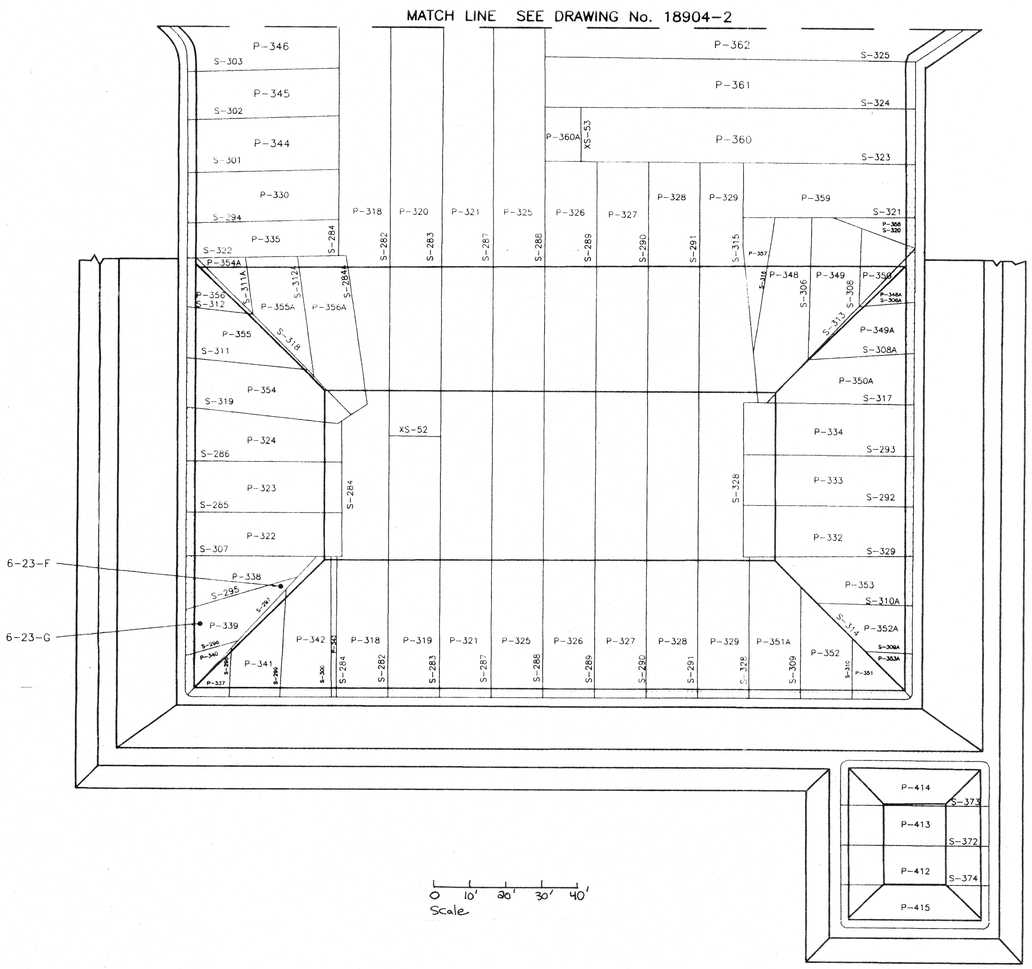
LEGEND

P-319	PANEL NUMBER
S-286	SEAM NUMBER
	TOP OF BERM
6-23-A	GEOMEMBRANE REPAIR LOCATION

NOTE: APPROXIMATE DIKE LOCATIONS TAKEN FROM DESIGN DRAWINGS



SURGE POND



RUN-OFF POND AND FUEL STORAGE AREA

REVISION	BY	DATE

DRAWN BY D.J.M. DATE 10-29-92
CHECKED BY D.A.D. DATE 11-16-92
APPROVED BY R.K.L. DATE 11-18-92
CADFILE C:\20961XF\POND.DWG

FLAMBEAU MINING COMPANY
LADYSMITH, WISCONSIN

SURGE POND, RUNOFF POND, LYSIMETER, AND FUEL STORAGE AREA REPAIR LOCATION DIAGRAM

STS Consultants Ltd.
Consulting Engineers

STS PROJECT NUMBER 20961XF
STS PROJECT FILE
SCALE 1" = 20'
SHEET NUMBER 20961XF-1

J-17
1994

Cooper Engineering Company, Inc.

310 WEST SOUTH STREET • RICE LAKE, WI 54868-2420

TELEPHONE (715) 234-7008 FAX (715) 234-1025

July 27, 1994

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

RE: Liner Repairs

Dear Jana:

SURGE POND

Per your request, Craig Walkey, Cooper Engineering Company, arrived at the mine at 7:00 a.m., June 23, 1994 to investigate and coordinate repairs to the liner failure at the discharge pipe in the surge pond. Our goal was to complete adequate repairs with minimal shut-down time.

We met with Von Shanks at the surge pond and with other Flambeau employees associated with the pond operation to listen to their opinions and history of the possible conditions that may have caused the failure. We investigated the liner failure in detail (see attached photos).

We believe that the liner failure at the discharge pipe was caused by the following:

1. The 300± GPM (200,000± GPD) flow from the discharge pipe produces dynamic forces below the discharge that may have caused soil settlement and/or erosion immediately below the liner.

2. The liner material sagged into the downstream depression and caused a stress point at the fixed pipe location.

3. The stress point failed causing separation of the liner material at the pipe.

The repair method we chose was to cut open the liner material below the discharge pipe and pack the subsoil void with a dry bentonite/sand mixture.

Approximately 1/4 c.y. of material was hand placed into the void by Flambeau employees.

The bentonite/sand mix was chosen because it was readily available, it was easy to place, it will absorb any soil moisture and continue to expand into the void space, it is stable and will remain in place, and it will remain elastic to absorb the dynamic discharge forces.

We have reviewed the July 13, 1994 STS report on the liner patch and weld repair and agree with their description.

STOCKPILE II PHASE I

We worked with the Flambeau crew to expose the boundaries of the vehicle damaged liner material. The remaining quantity of surplus liner material owned by the mine was not large enough to repair the area damaged. We decided not to locate and ship patch material that was not certified for this project. The damaged area is not at a critical location for contaminate containment. Also, Stockpile II Phase II liner installation was expected to begin in July 1994. Sufficient certified liner material would be available to complete a permanent patch.

The damaged liner was tacked patched with the remaining liner material where the greatest damage was apparent. The damaged area remains exposed and the area is barricaded from entry. The upgradient soil was bermed to direct any runoff from the damaged area. See also STS July 13, 1994 report.

OTHER

Cooper, STS, and Flambeau employees inspected the surge and runoff ponds for any other damage that could be repaired by the GSCI crew. These repairs are discussed in the STS repair reports.

We agree with the STS recommendation to add scuff patches under corrugated pipe locations.

Some of the damaged liner (punctures and cuts) are the result of moving equipment on the exposed liner surfaces. This should be avoided or planned with protection in mind.

In our opinion, the Flambeau Mining Company employees are doing a very good job of routine liner inspection and protection.

Sincerely,

Craig Walkey

br:CS94048

cc Dan Willenbring

FLAMBEAU MINING CO.
LADYSMITH, WISCONSIN

SURGE POND LINER REPAIR
JUNE 23, 1994

#1 LINER SEPARATION AT DISCHARGE PIPE

#2 SUBSOIL EXPOSED BY COOPER ENGINEERING CO.

COOPER ENGINEERING

#3 PROFILE AT AREA TO BE REPAIRED

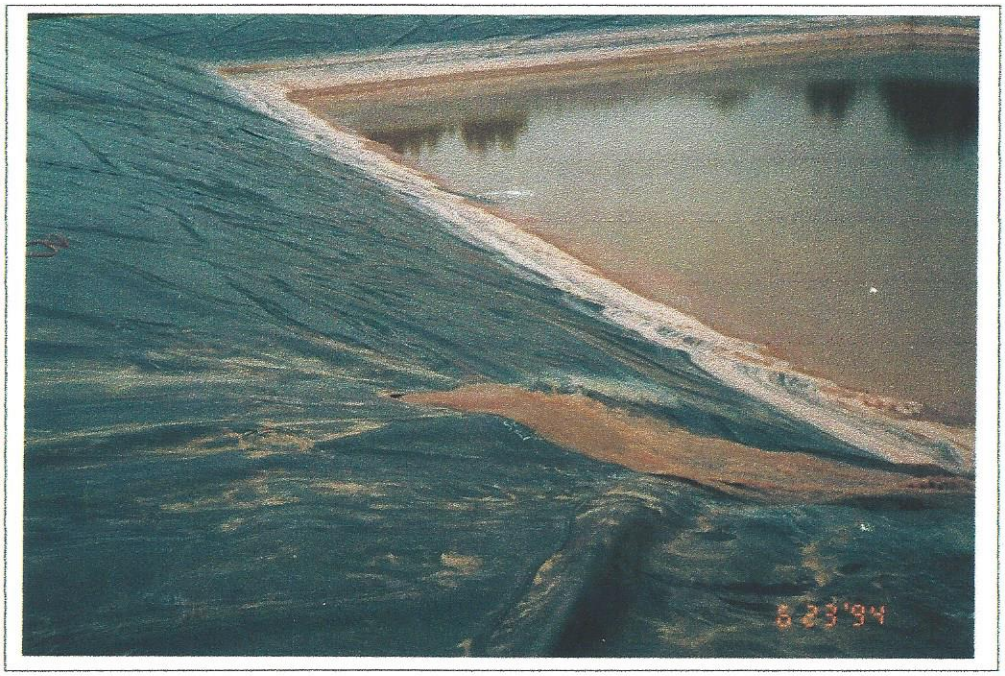
#4 VOID PACKED WITH DRY BENTONITE/SAND

#5 PATCHING AND TESTING

#6 COMPLETED REPAIR

COOPER ENGINEERING

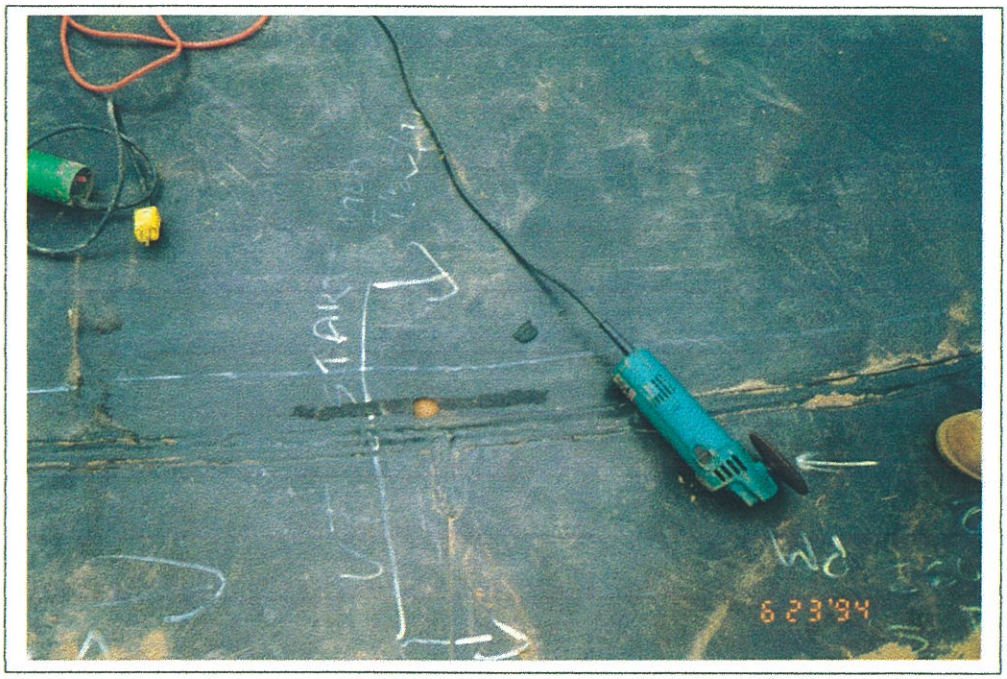
#7 PROFILE OF COMPLETED REPAIR



#8 RETURN TO OPERATION

FLAMBEAU MINING CO.
LADYSMITH, WISCONSIN

SURGE POND REPAIR
JUNE 23, 1994



#1 TYPICAL PUNCTURE REPAIR

#2 TYPICAL PUNCTURE PATCH

#3 TYPICAL REPAIR TEST

FLAMBEAU MINING CO.
LADYSMITH, WISCONSIN

STOCKPILE II PHASE I
JUNE 23, 1994

#1 BERM LINER DAMAGE

#2 EXPOSING LINER DAMAGE

#3 EXPOSING LINER DAMAGE

#4 EXPOSING LINER DAMAGE

#5 TEMPORARY PATCH OVER AREA MOST DAMAGED

Cooper Engineering Company, Inc.

310 WEST SOUTH STREET • RICE LAKE, WI 54868-2420

TELEPHONE (715) 234-7008 FAX (715) 234-1025

October 26, 1994

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

RE: Liner Repairs

Dear Jana:

During the period of August 16-29, 1994, repairs were made to the existing HDPE liner systems as Stockpile II, Phase 2 was under construction. The repairs were made by GSCI, Inc. under the direction of Craig Walkey, P.E., Cooper Engineering Company, Inc. The repairs and repair tests were monitored by Jeff Gahen, STS Consultants, Ltd. A summary of the repairs are provided below.

STOCKPILE II, PHASE 1

During the construction of Stockpile II, Phase 2 the existing HDPE liner was exposed to construct the liner tie-in seam between Phase 1 and 2. The liner was exposed using a backhoe bucket to within six inches of the liner material and completed using shovels and broom.

Three damaged areas were exposed that were confirmed to have occurred prior to the Phase 2 project. The locations are shown in the following photographs. The coordinates of the repairs are given in the STS liner repair forms and plan sheet attached.

The repairs to the damaged areas were patched using the approved Phase 2 HDPE liner material. The areas were cleaned with water before seaming by extrusion welding. The patches were tested using the vacuum chamber method.

PHASE 1 SOUTH BERM

The Phase 1 south berm repair described in the July 29, 1994 Cooper Engineering report was a temporary repair until a sufficient quantity of certified HDPE liner could complete the repair. The repair was completed using the approved Phase 2 HDPE liner material. The area was cleaned with water before seaming by extrusion welding. The patch was tested using the vacuum chamber method.

SCUFF PADS

The STS report of July 13, 1994 recommends that scuff pads be constructed under corrugated pipe entrances to the surge and runoff ponds. These modifications were completed by constructing a patch using the approved Phase 2 HDPE liner material. The patches were placed under the corrugated pipes and welded to the existing liner material by extrusion welding. The patches were tested using the vacuum chamber method. The scuff pads create a double HDPE lined system under the pipes entrances. The location and description of the scuff pads are attached.

SURGE POND DISCHARGE PIPE

The repair to the surge pond discharge pipe described in the July 29, 1994, Cooper Engineering report was successful. However, subsoil erosion continued below the repair. Under the direction of Craig Walkey, the liner below the repair was cut open and the subsoil was replaced using the same 50/50 mixture of course sand and bentonite pellets that was successful for the June 1994 repair. The soil mixture was shaped to form a flume for the discharge water.

The liner was capped using the approved Phase 2 HDPE liner material and extrusion weld seam. The seam was tested using the vacuum chamber method. See attached photographs.

Sincerely,

Craig Walkey

br:CE94081

PROJECT NAME: FLAMBEAU MINE: TYPE II STOCKPILE, PHASE 2

PROJECT NO. 20961XF

QA MONITOR: JSG **Date:** _____ STS Consultants, Ltd.

#1

LINER REPAIR FORM

Repair Number	Date Repaired	Time	Oper./Mach.	Repair Location	Description	Size of Repair	Date Vacuum Tested	Vac. Test Results (P/F)
35A	8/16/94	AM	SC/6751	Sta. 406+96 N 3' West of West Tie In Seam	2 Creases / 2 Beads	3" ea	8/23/94	P
36A	8/16	AM	SC/6751	Station N406+90 3' West of West Tie In Seam	2 Knots / 2 Beads	3" ea	8/23	P
37A	8/16	PM	RS/9246	Station N406+85 3' West of West Tie In Seam	Hole / Patch	1.0x1.0	8/23	P
38A	8/16	PM	SC/6751	Station N 406+80 - 406+84 0-3.5' West of West Tie In	Hole / Patch	2.5x2.5	8/23	P
39A	8/16	PM	RS/9246	Station N 406+77 - 406+79 3' West of West Tie In Seam	Hole / Patch	2.0x2.0	8/23	P
40A	8/16	PM	RS/9246	Station N 406+75 4' West of West Tie In Seam	Hole / Patch	1.5x1.5	8/23	P
41A	8/16	PM	RS/9246	Station N 406+71 - 406+76 2.5-3.5' West of West Tie In	Hole / Patch	2.0x2.0	8/23	P
42A	8/16	PM	SC/6751	Station N 406+68 - 406+76 2-6' West of West Tie In Seam	Crease w/Hole / Patch	1.2x1.0	8/23	P
43A	8/16	PM	SC/6751	Station N 406+68 4' West of West Tie In Seam	Hole / Patch	1.5x1.5	8/23	P
44A	8/16	PM	S.C/6751	Station N 406+66 Along West Tie In Seam	Hole / Patch	1.0x1.0	8/23	P
45A	8/16	PM	SC/6751	Station N 406+55 - 406+58 0.5-2.5' West of West Tie In	Hole / Patch	1.0x2.5	8/23	P
46A	8/16	PM	S.C/6751	Station N 406+51 2.5' West of West Tie In	Hole	0.8x0.8	8/23	P
47A	8/16	PM	S.C/6751	Station N 406+49 2.5' West of West Tie In Seam	Hole	0.8x0.8	8/23	P
48A	8/16	PM	S.C/6751	Station N 406+49 5' West of West T.I.S.	Hole	0.8x0.8	8/23	P
49A	8/16	PM	S.C./6751	Station N 406+45 3' West of West T.I.S.	Hole	0.8x0.8	8/23	P
50A	8/16	PM	S.C/6751	Station N 406+45 5' West of West T.I.S.	Hole	0.8x0.8	8/23	P
51A	8/16	PM	RS/9246	Station N 406+41 - 406+43 0-2' West of West T.I.S.	Hole	2.0x2.0	8/23	P

PROJECT NAME: FLAMBEAU MINE: TYPE II STOCKPILE, PHASE 2
PROJECT NO.: 20961XF
QA MONITOR: JSG Date: _____ STS Consultants, Ltd.

LINER REPAIR FORM

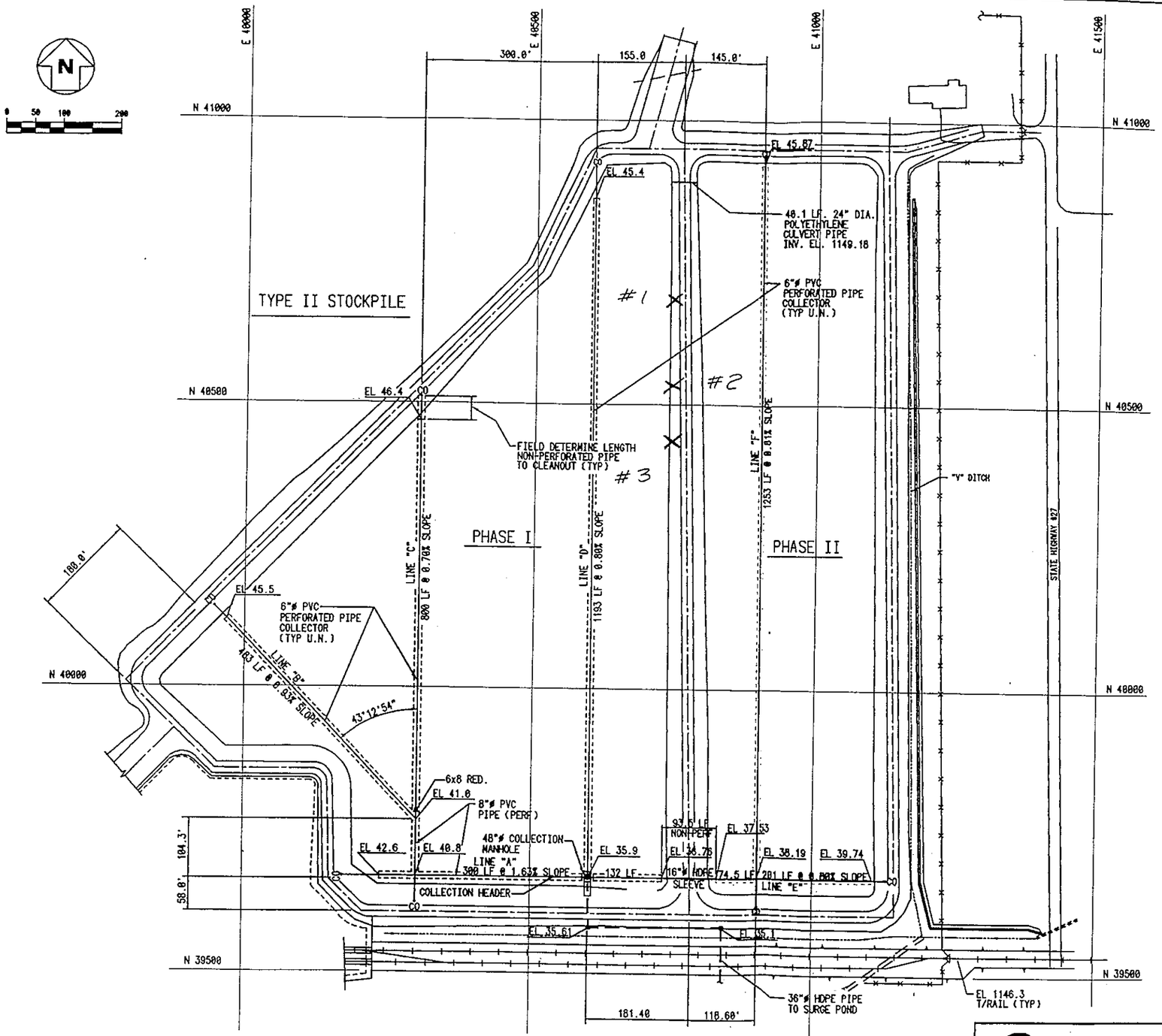
Repair Number	Date Repaired	Time	Oper./Mach.	Repair Location	Description	Size of Repair	Date Vacuum Tested	Vac. Test Results (P/F)
52A	8/16/94	PM	RS/9246	Station N 406+35 2' West of West Tie In Seam	Hole / Patch	0.8×0.8	8/23/94	P
53A	8/16	PM	RS/9246	Station N 406+32 - 406+34 3'-6' West of West T.I.S.	Hole / Patch	2.0×3.0	8/23	P
54A	8/16	PM	RS/9246	Station N 406+29 3' West of West T.I.S.	Hole / Patch	0.8×0.8	8/23	P
55A	8/16	PM	RS/9246	Station N 406+28 3' West of West T.I.S.	Hole / Patch	0.8×0.8	8/23	P
56A	8/16	PM	RS/9246	Station N 406+23 4' West of West T.I.S.	Hole / Patch	0.8×0.8	8/23	P
57A	8/16	PM	S.C./6751	Station N 406+11 - 406+15 0'-3' West of West T.I.S.	Crease with Holes/Patch	1.0×5.0	8/23	P
58A	8/16	PM	S.C./6751	Station N 406+9 2' West of West T.I.S.	Hole / Patch	0.8×0.8	8/23	P
59A	8/16	PM	S.C./6751	Station N 406+6 2' West of West T.I.S.	Hole / Patch	0.8×0.8	8/23	P
60A	8/16	PM	S.C./6751	Station N 405+99 1.5' West of West T.I.S.	Hole / Patch	0.8×0.8	8/23	P
61A	8/16	PM	S.C./6751	Station N 405+99 3' West of West T.I.S.	Hole / Patch	0.8×0.8	8/23	P
62A	8/16	PM	S.C./6751	Station N 405+96 - 405+98 0-2.5' West of West T.I.S.	Hole / Patch	1.5×3.0	8/23	P
63A	8/16	PM	S.C./6751	Station N 405+94 3.5' West of West T.I.S.	Hole / Patch	0.8×0.8	8/23	P
64A	8/16	PM	S.C./6751	Station N 405+92 3.5' West of West T.I.S.	Hole / Patch	0.8×0.8	8/23	P
65A	8/16	PM	S.C./6751	Station N 405+90 1.5 West of West T.I.S.	Hole / Patch	0.8×0.8	8/23	P
66A	8/16	PM	S.C./6751	Station N 405+87 - 405+89 2'-4' West of West Tie In Seam	Hole / Patch	1.5×2.0	8/23	P
67A	8/16	PM	S.C./6751	Station N 405+87 1.0' West of West T.I.S.	Hole / Patch	0.8×0.8	8/23	P
68A	8/16	PM	S.C./6751	Station N 405+74 - 405+81 1.0-10.0 West of West T.I.S.	Holes / Patch	7.0×9.0	8/23	P

PROJ NAME: FLAMBEAU MINE: TYPE II STOCKPILE, ASE 2
PROJECT NO.: 20961XF
QA MONITOR: JSG **Date:** _____ STS Consultants, Ltd.

LINER REPAIR FORM

Repair Number	Date Repaired	Time	Oper./Mach.	Repair Location	Description	Size of Repair	Date Vacuum Tested	Vac. Test Results (P/F)
69A	8/16/94	PM	S.C./6751	Station 405+74 N 1.5' West of West Tie In Seam	Hole	0.8×0.8	8/23/94	P
70A	8/16	PM	S.C/6751	Station N 405+69 - 405+73 0-2' West of W.T.I.S.	Crease	1.0×5.0	8/23	P
71A	8/16	PM	S.C/6751	Station N 405+71 1.5 and 2.5 West of T.I.S.	Scrape / 2 Beads	4" each	8/23	P
72A	8/16	PM	S.C/6751	Station N 405+64 3.5' West of W.T.I.S.	Scrape / 2 Beads	4" each	8/23	P
73A	8/16	PM	R.S./9246	Station N 405+55 - 405+63 1.5-3.0' West of W.T.I.S.	Scrape w/ Holes	1.8×8.0	8/23	P
74A	8/16	PM	R.S./9246	Station N 405+44 1.5 West of W.T.I.S.	Hole	1.0×1.0	8/23	P
75A	8/16	PM	S.C/6751	Station N 405+11 0-1.0 West of W.T.I.S.	Hole	1.0×1.5	8/23	P
76A	8/17	PM	RS/9246	Station N 404+96 0.8' West of W.T.I.S.	Hole	1.0×1.0	8/23	P
77A	8/17	PM	RS/9246	Station N 404+79 2.5' West of W.T.I.S.	Scrape / Bead	4"	8/23	P
78A	8/17	PM	RS/9246	Station N 404+75 2.5' West of W.T.I.S.	Hole	0.8×0.8	8/23	P
79A	8/17	PM	RS/9246	Station N 404+74 1.0' West of W.T.I.S.	Hole	0.8×0.8	8/23	P
80A	8/17	PM	RS/9246	Station N 404+55 2.0' West of W.T.I.S.	Scrape / Bead	Bead 1.5'	8/23	P
81A	8/17	2:30 PM	RS/9246	Station N 404+50 - 404+57 4' West of W.T.I.S.	Hole	0.8×1.8	8/23	P
82A	8/17	11:30 AM	RS/9246	Station N 404+44 - 404+50 0-5' West of W.T.I.S.	Crease	1.5×7.0	8/23	P
83A	8/17	11:40 AM	RS/9246	Station N 404+43 2' West of W.T.I.S.	Hole	0.8×0.8	8/23	P
84A	8/17	11:20	RS/9246	Station N 404+35 - 404+44 3'-11' West of W.T.I.S.	Hole	6.0×9.0	8/23	P
85A	8/17	AM	RS/9246	Station N 404+37 4' West of W.T.I.S.	Scrape / Bead	4"	8/23	P

#3
Page 33



REPAIR LOCATIONS TO PHASE 1 HDPE LINER

LEGEND

8—— DENOTES CLEANOUT

NOTE:

1- PHASE I CONSTRUCTION NOT IN THIS CONTRACT, FOR LIMITS OF PHASE II CONSTRUCTION REFER TO PROJECT SCOPE OF WORK.

PROJECT RECORD DRAWING : COMPILED FROM CONSTRUCTION DATA FURNISHED TO THE ENGINEER BY THE CONTRACTOR, OWNER AND/OR ENGINEERS FIELD REPRESENTATIVE. INFORMATION SHOWN ON THESE DRAWINGS SHOULD BE FIELD VERIFIED BEFORE USING SAME.
REVISED BY M.R.E. 10/10/94 ADDED TYPE II PHASE II STOCKPILE PROJECT RECORD DRAWING DATA.
PREPARED BY COOPER ENGINEERING CO. INC. RICE LAKE, WISC.
NOTE: DRAWING SHALL NOT BE SCALED.

REFERENCES

DWG. NO	DESCRIPTION
210-C-010	DRAINAGE DETAILS
210-C-004	SITE GRADING PLAN
210-C-009	SECTIONS & DETAILS
210-C-014	SECTIONS & DETAILS
210-C-028	UNDERGROUND PIPING PLAN

NO	DATE	REVISIONS	BY	CHK'D	ENG'R	APPR'D
A	6-1-91	FOR QUOTE-EARTHWORK	GLT			
A	6-21-91	FOR PERMIT-LINER	GLT			
B	6-28-91	FOR QUOTE - EARTHWORK	GLT			
B	7-11-91	FOR CONSTRUCTION	GLT			
1	8-2-91	REMOVE 8"-CW487.	GLT	JP		

NO	DATE	REVISIONS
2	1-7-93	ADDED PROJECT RECORD DWG. DATA TYPE II PHASE I
3	10-10-94	ADDED PROJECT RECORD DWG. DATA TYPE II PHASE II

COOPER ENGINEERING COMPANY
2ND WEST SOUTH STREET RICE LAKE, WISCONSIN
TELEPHONE 715-234-7082

FLAMBEAU PROJECT
LADYSMITH, WISCONSIN

FLAMBEAU MINING COMPANY
LADYSMITH, WISCONSIN 54848

TYPE II STOCKPILE
PHASE II
LEACHATE COLLECTION SYSTEM PLAN

MICROFILM | JOB
DRAWING NO. | REV.
DIVISION DRAWING NO.
SCALE

C:\ASSC MRE\DWG\TYPEIIPHASEIIDRAWING

PROJECT NAME: FLAMBEAU MINE: TYPE II STOCKPILE, PHASE 2

PROJECT NO. 20961XF

QA MONITOR:

Date:_____

STS Consultants, Ltd.

LINER REPAIR FORM

Repair Number	Date Repaired	Time	Oper./Mach.	Repair Location	Description	Size of Repair	Date Vacuum Tested	Vac. Test Results (P/F)
R-1	8/23/94	8:45-9:45	RS/9246	South end Phase I	Holes & Gouges	13.5×15	8-31-94	P
R-2	8/23/94	9:50-10:10	RS/9246	South end Phase I	Holes & Gouges	4×12.5	8-31-94	P
RP-1	8/23	11:10-11:25	RS/9246	Runoff Pond	Scuff Pad	3'×6'	8-31-94	P
RP-12	8/23	11:35-11:50	RS/9246	Runoff Pond	Scuff Pad	3'×6'	8-31-94	P
RP-11	8/23	1:55-2:05	RS/9246	Runoff Pond	Scuff Pad	3'×6'	8-31-94	P
RP-10	8/23	2:15-2:25	RS/9246	Runoff Pond	Scuff Pad	3'×6'	8-31-94	P
RP-2	8/23	2:40-2:50	RS/9246	Runoff Pond	Scuff Pad	3'×6'	8-31-94	P
RP-3	8/23	3:30-3:40	RS/9246	Runoff Pond	Scuff Pad	3×6'	8-31-94	P
RP-4	8/23	4:00-4:10	RS/9246	Runoff Pond	Scuff Pad	3'×6'	8-31-94	P
RP-5	8/23	4:25-4:35	RS/9246	Runoff Pond	Scuff Pad	3'×6'	8-31-94	P
RP-7	8/23	4:50-500	RS/9246	Runoff Pond	Scuff Pad	3'×6'	8-31-94	P
RP-8	8/26/94	11:40-11:50	RS/9246	Runoff Pond	Scuff Pad	3'×6'	8-31-94	P
RP-9	8/26	12:10-12:20	RS/9246	Runoff Pond	Scuff Pad	3'×6'	8-31-94	P
RP-6	8/26	11:10-11:20	RS/9246	Runoff Pond	Scuff Pad	3'×6'	8-31-94	P

PROJECT NAME: FLAMBEAU MINE: TYPE II STOCKPILE, PHASE 2

PROJECT NO. 20961XF

QA MONITOR: CAW

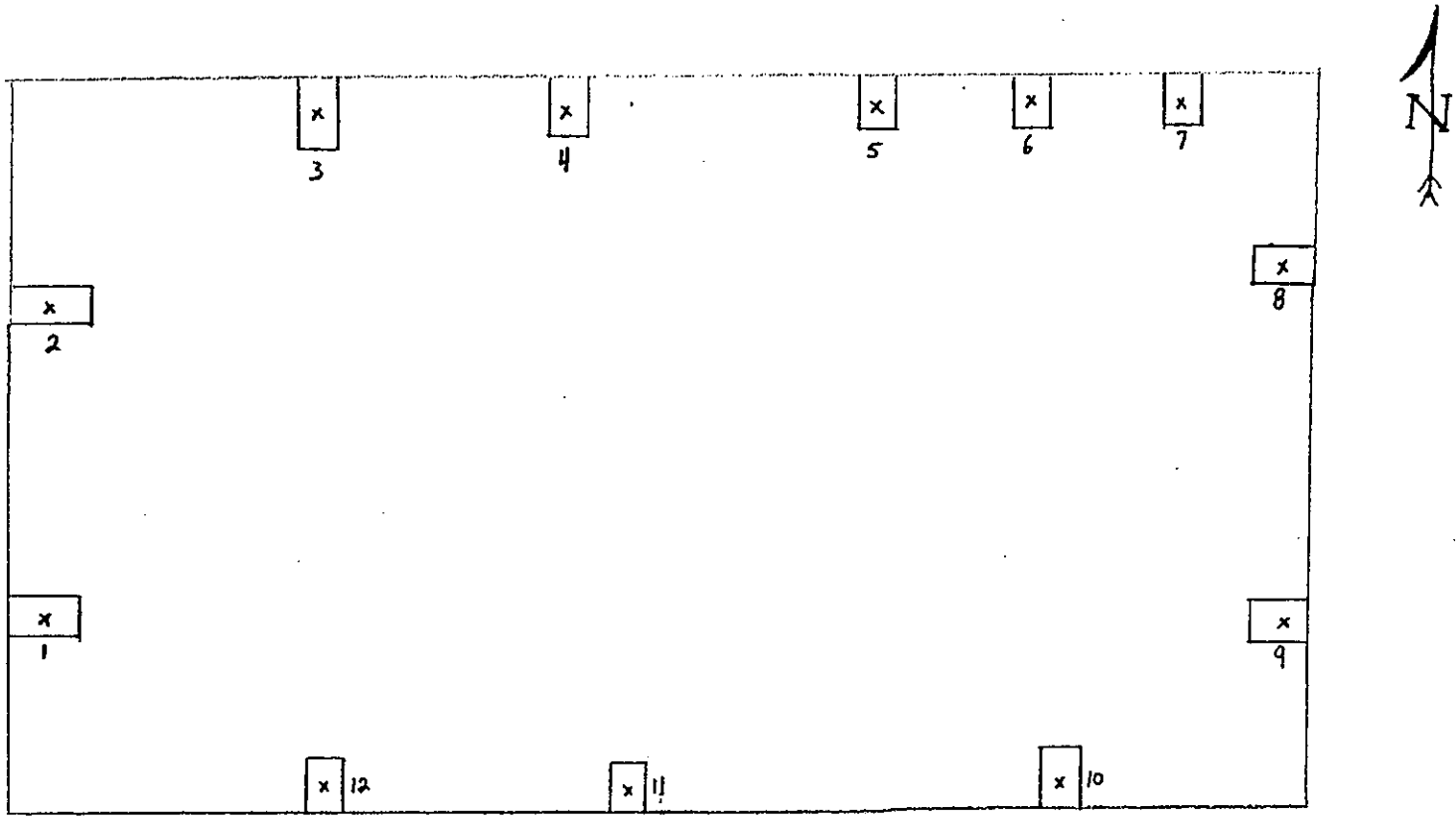
Date:_____

Page____of____

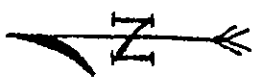
STS Consultants, Ltd.

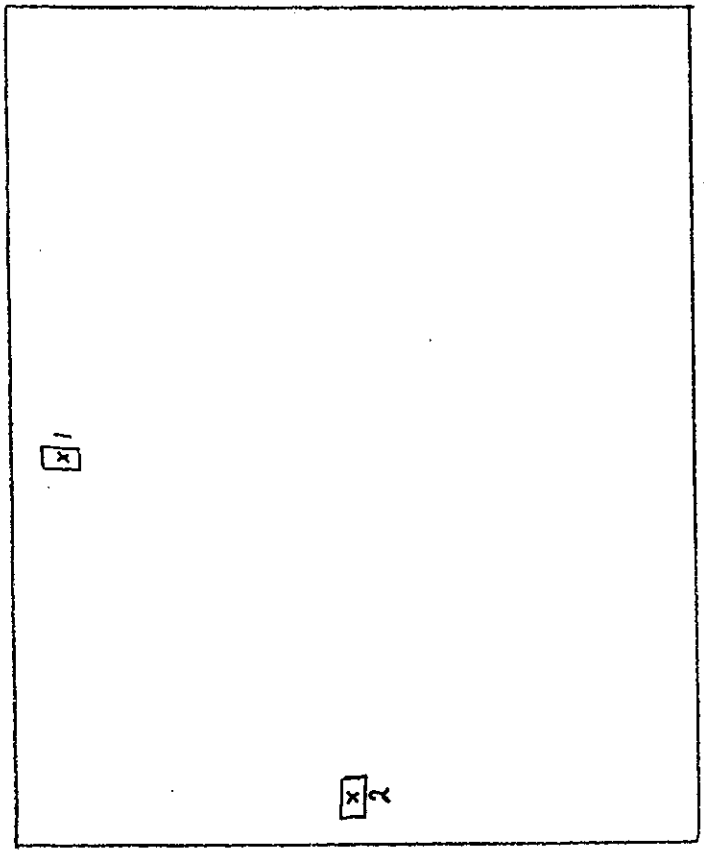
LINER REPAIR FORM

Repair Number	Date Repaired	Time	Oper./Mach.	Repair Location	Description	Size of Repair	Date Vacuum Tested	Vac. Test Results (P/F)
SP-1	8-26-94	9:50-10:00	RS/9246	middle of North Berm Surge Pond	Scuff Pad	6.0x3.0	8-31	P
SP-2	8-26-94	10:20-10:30	RS/9246	middle of West Berm Surge Pond	Scuff Pad	3.0x6.0	8-31	P
SP-3	8/29	11:30-11:45	RS/9246	Northwest corner pipe spillway	Patch	2.5x4	8/29	P
SP-4	8/29	11:45-12:00	RS/9246	N.W. corner pipe spillway	Patch	1.5x5	8/29	P
SP-5	8/29	12:00-12:15	RS/9246	N.W. corner pipe spillway	Patch	2x3	8/29	P



STS PROJECT NO. 20961XF	STS Consultants Ltd. Consulting Engineers	Flambeau Mine Runoff Pond Scuff Pad Repaires	DRAWN BY SOB / DATE 9-13-94
STS PROJECT FILE			CHECKED BY / DATE
SCALE			APPROVED BY / DATE
SHEET NO.			CADFILE





DRAWN BY SOB	DATE 9-13-94	
CHECKED BY	DATE	
APPROVED BY	DATE	
CADFILE		

Flambeau Mine Surge Pond
Scuff Pad Repairs

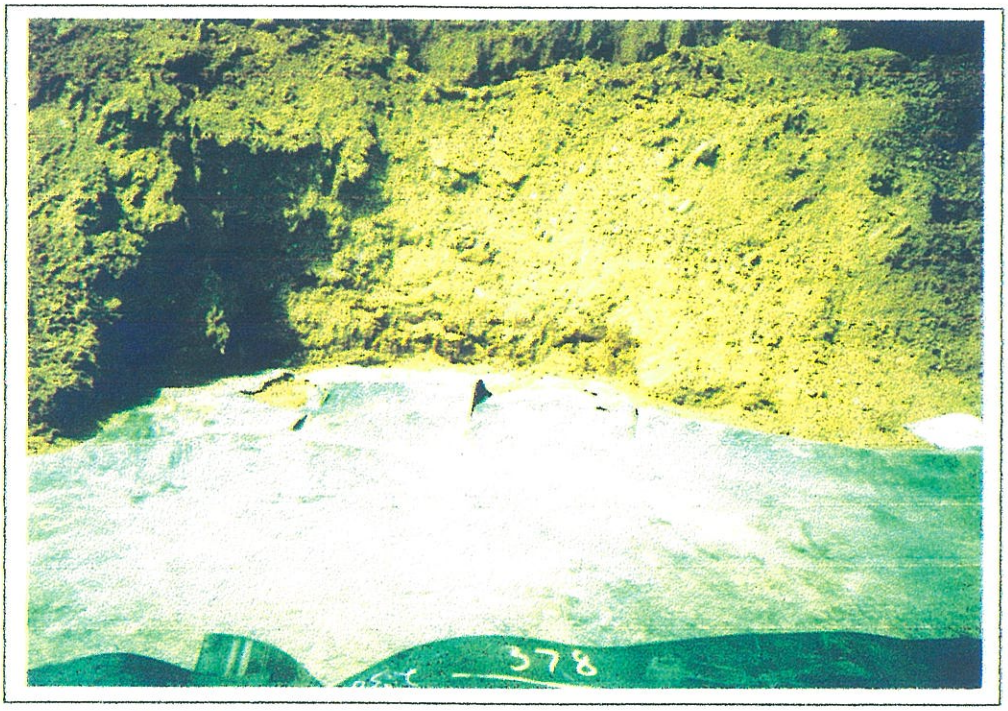
STS Consultants Ltd.
Consulting Engineers

STS PROJECT NO. 20961XF
STS PROJECT FILE
SCALE
SHEET NO.

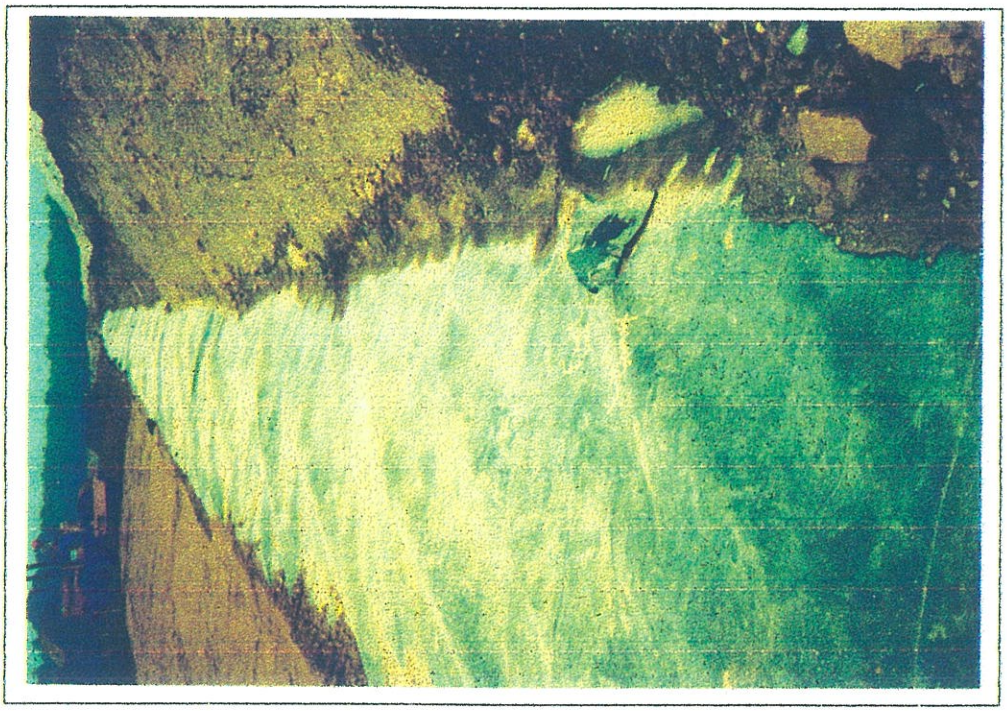
BRUNING, 544370

FLAMBEAU MINING CO.
LADYSMITH, WISCONSIN

STOCKPILE II PHASE I
AUGUST, 1994



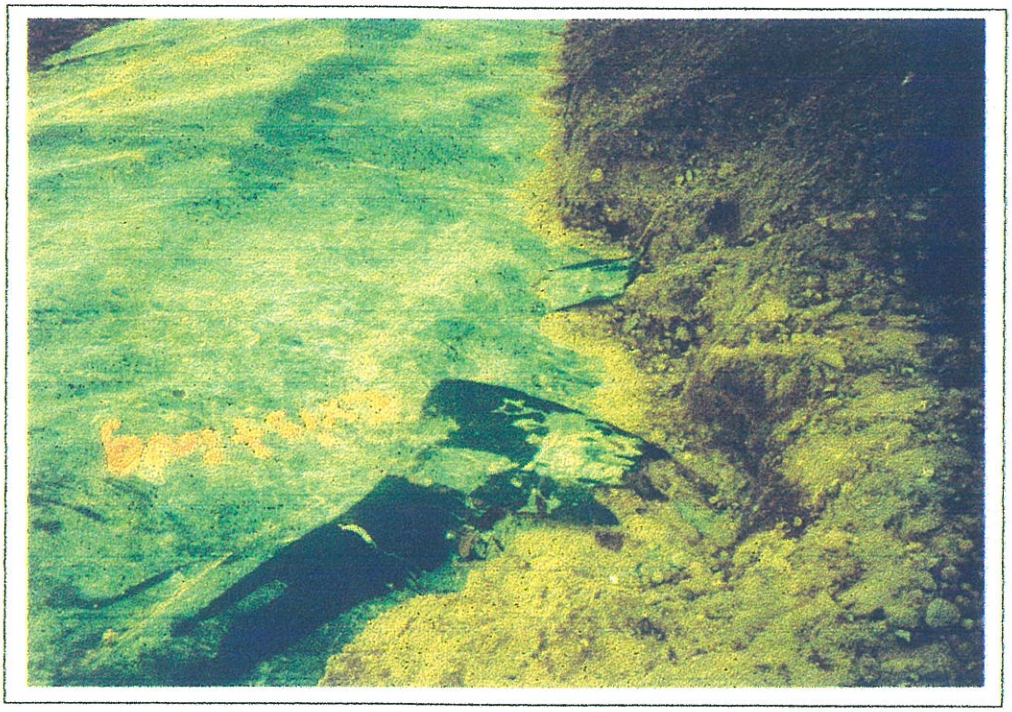
STOCKPILE II PHASE I HDPE LINER
LOCATION 1 OF 3 DAMAGE



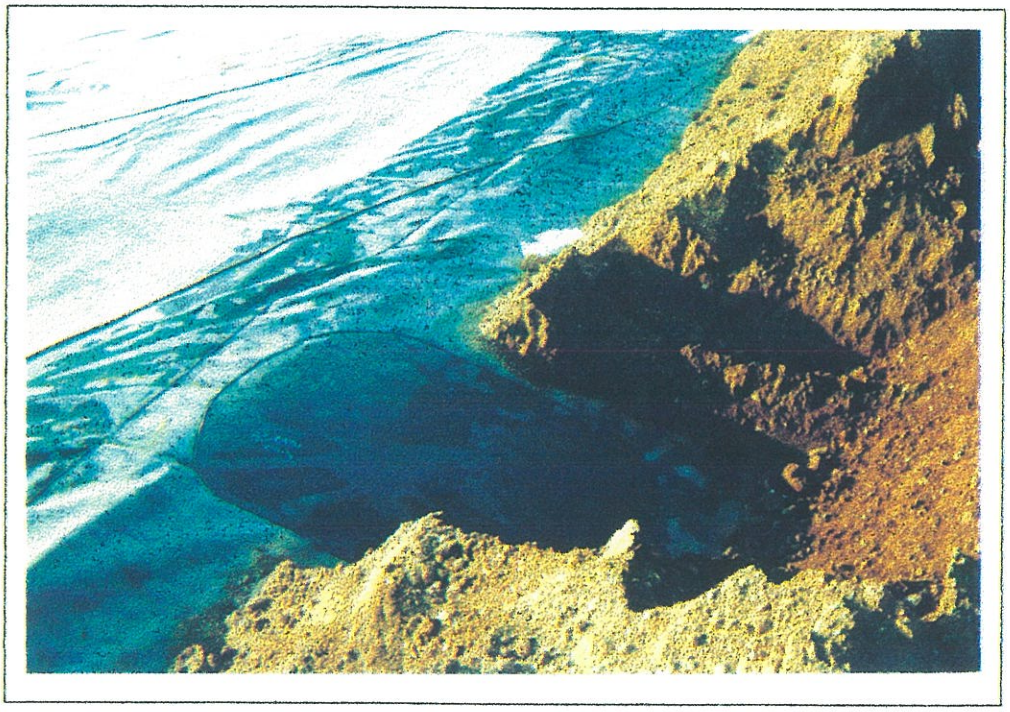
STOCKPILE II PHASE I HDPE LINER
LOCATION 2 OF 3 DAMAGE

FLAMBEAU MINING CO.
LADYSMITH, WISCONSIN

STOCKPILE II PHASE I
AUGUST, 1994



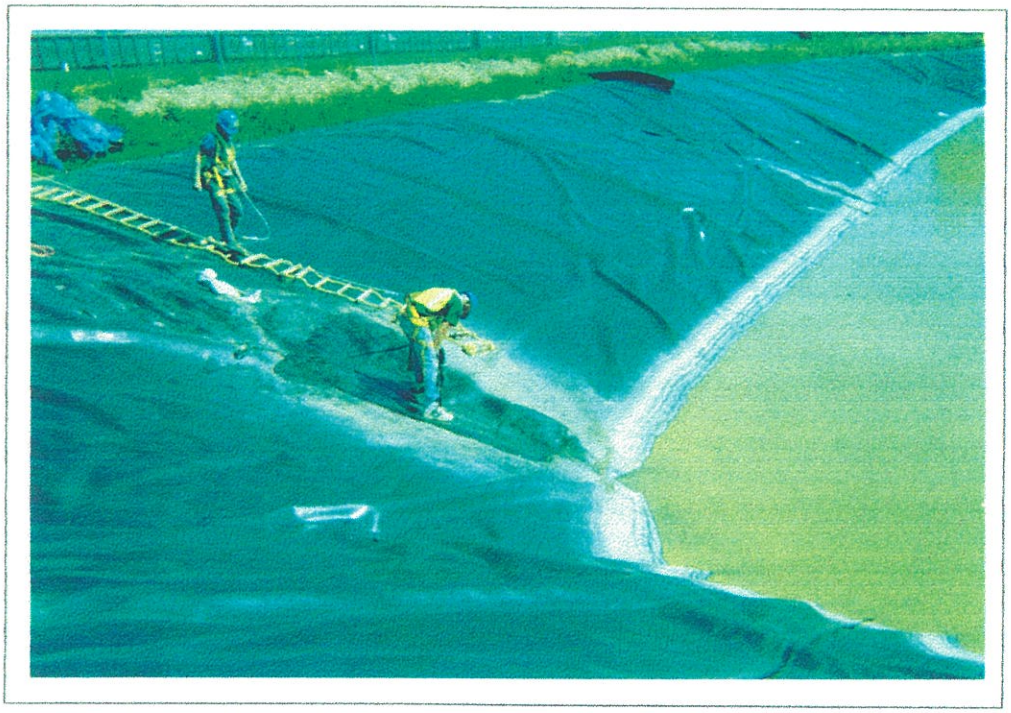
STOCKPILE II PHASE I HDPE LINER
LOCATION 3 OF 3 DAMAGE



STOCKPILE II PHASE I HDPE LINER
LOCATION 2 OF 3 REPAIR (TYPICAL)

FLAMBEAU MINING CO.
LADYSMITH, WISCONSIN

STOCKPILE II PHASE I
AUGUST, 1994



SURGEPOND DISCHARGE PIPE
HDPE LINER MODIFICATION

SURGE POND DISCHARGE PIPE
HDPE LINER MODIFICATION SEAM TESTING

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

December 13, 1994

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

RE: Runoff Pond Liner Repairs

Dear Ms. Murphy:

Per your request, Craig Walkey, Cooper Engineering Company arrived at the mine at 8:30 a.m., November 21, 1994 to inspect HDPE liner damage and the repairs made by GSI, Inc. The repairs began at approximately 10:00 a.m., November 21 and were completed by 12 noon on November 22. The repairs are documented in the attached sketch and photographs.

DESCRIPTION
Flambeau Mining Company employees discovered and paint located five damaged areas on the runoff pond HDPE liner system. Upon further investigation of the liner, a total of ten damaged areas were identified.

It appears the damage was manmade. There is no evidence to suspect that the damage was the result of the runoff pond operation or weather conditions. At the time of the last inspection on 8-25-94, the damaged areas were not evident.

Close inspection of the damaged areas indicate punctures except for #5. Four of the punctures tore through the liner material #3, #6, #7, and #10. The remaining were stressed dents. Damage #5 was caused when pressure was applied to the liner immediately over a sharp rock. The rock was removed before the repair was completed.

There is no pattern to the damage that would describe a single cause or event.

There is insufficient evidence to draw a conclusion as to the cause of the HDPE liner damage.

REPAIR

Repairs were made by extrusion welded patches over the holes and extrusion weld fillets in the dents. The patches were made from surplus certified Phase 2 HDPE liner material stored in the building at H&H gate.

The patches were tested using the vacuum box method. Test weld strips were tested for peel strength using a field tensiometer apparatus before the repairs were made.

Craig Walkey inspected the emptied pond for any other damage that needed repair. The pond bottom is covered with a layer of mud and could not be inspected. It is our opinion that the exposed HDPE liner is in adequate condition for continued operation.

RECOMMENDATION

It is recommended that Flambeau Mine Company lock all passage gates into the surge and runoff ponds and that no unauthorized personnel be allowed access without supervision.

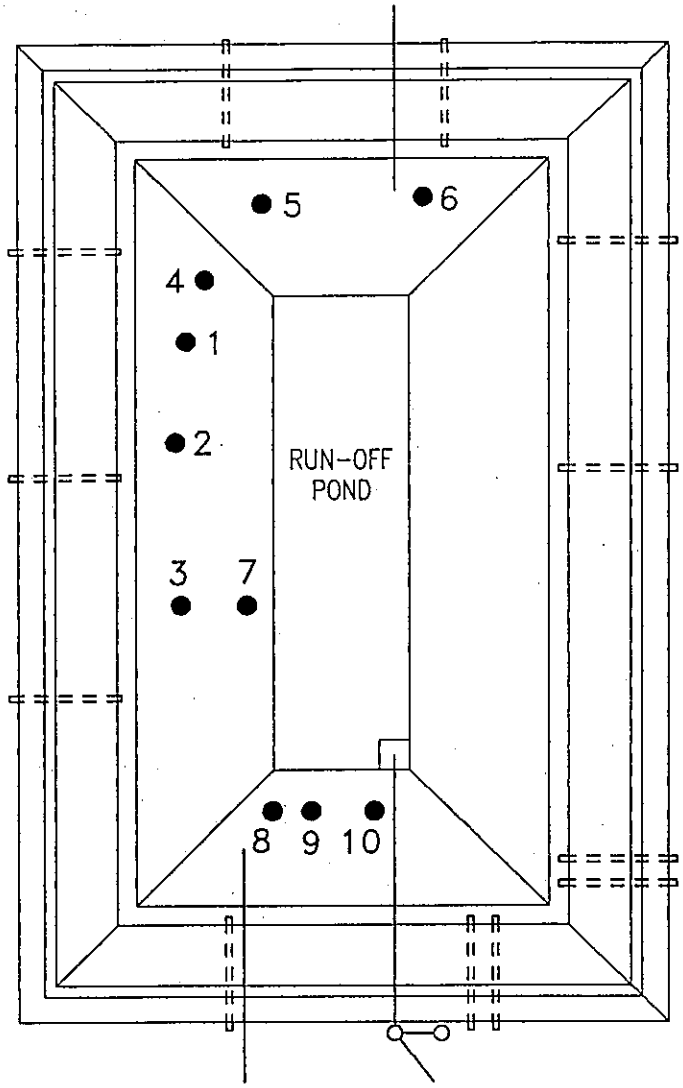
It is our opinion that Flambeau Mine Company employees are continuing to do a good job of liner systems inspection.

Sincerely,

Craig Walkey, P.E.

br:CE94081

SCALE 1"=50'



LEGEND

● REPAIR LOCATION

NOTE:
REPAIR NUMBERS ARE IDENTIFIED
IN REPORT AND PHOTOGRAPHS

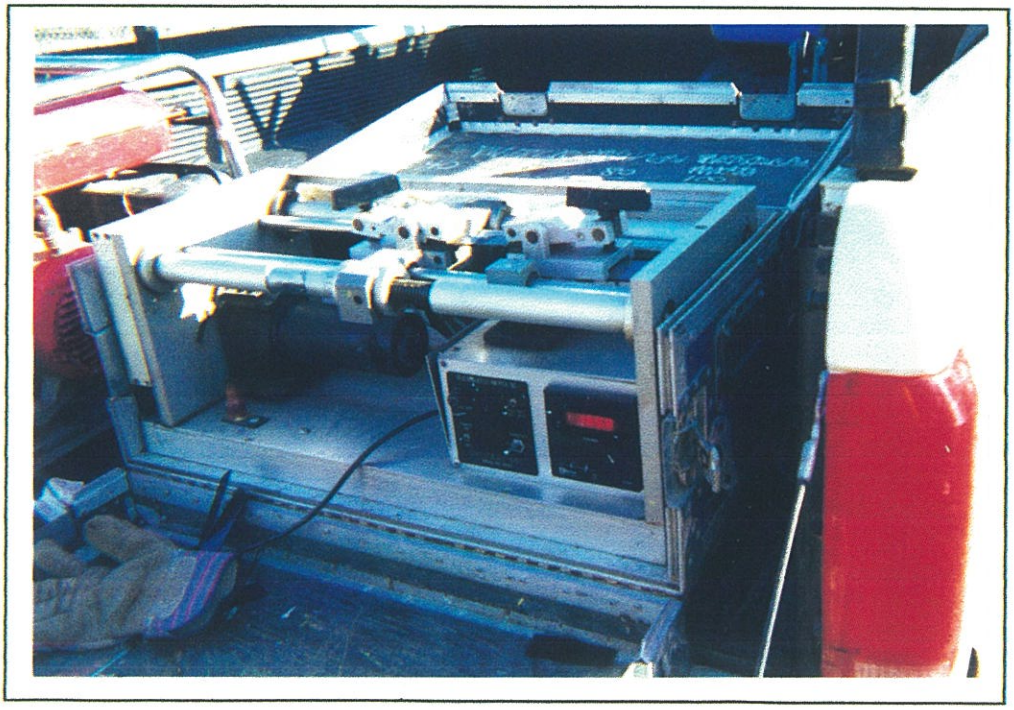
RUN-OFF POND REPAIRS
FLAMBEAU MINING COMPANY
NOVEMBER 21-22, 1994

COOPER ENGINEERING COMPANY
310 WEST SOUTH STREET RICE LAKE, WISCONSIN
TELEPHONE 715-234-7008
RUNOFF.DWG 12-8-94 MRE

FLAMBEAU MINING CO.
LADYSMITH, WISCONSIN

RUNOFF POND LINER REPAIR
NOVEMBER, 1994

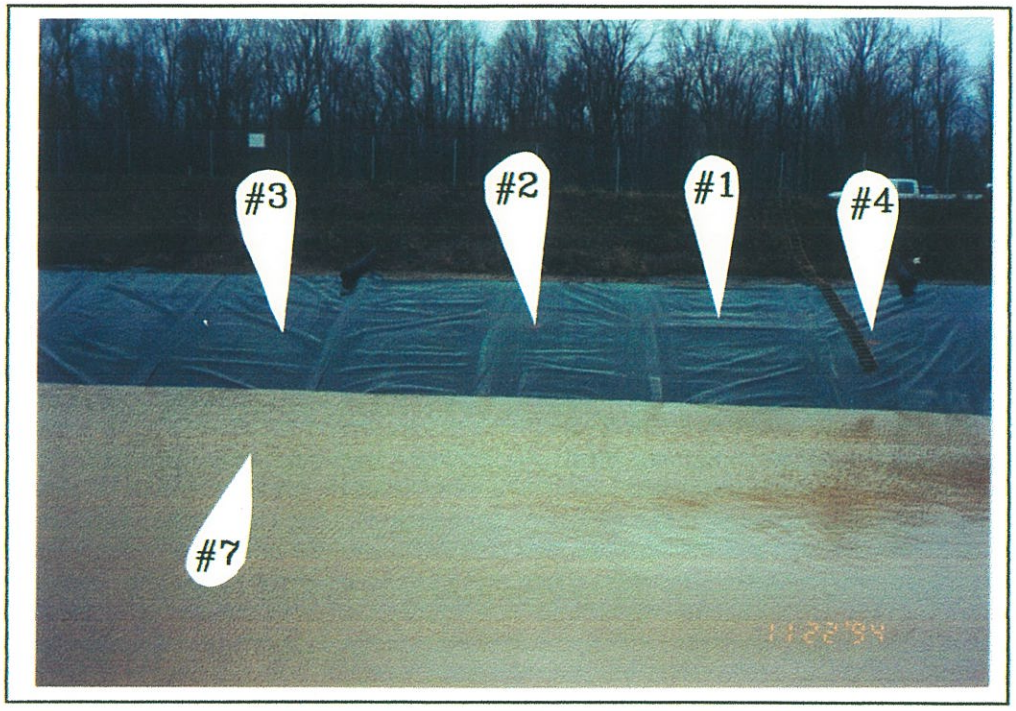
TEST WELD



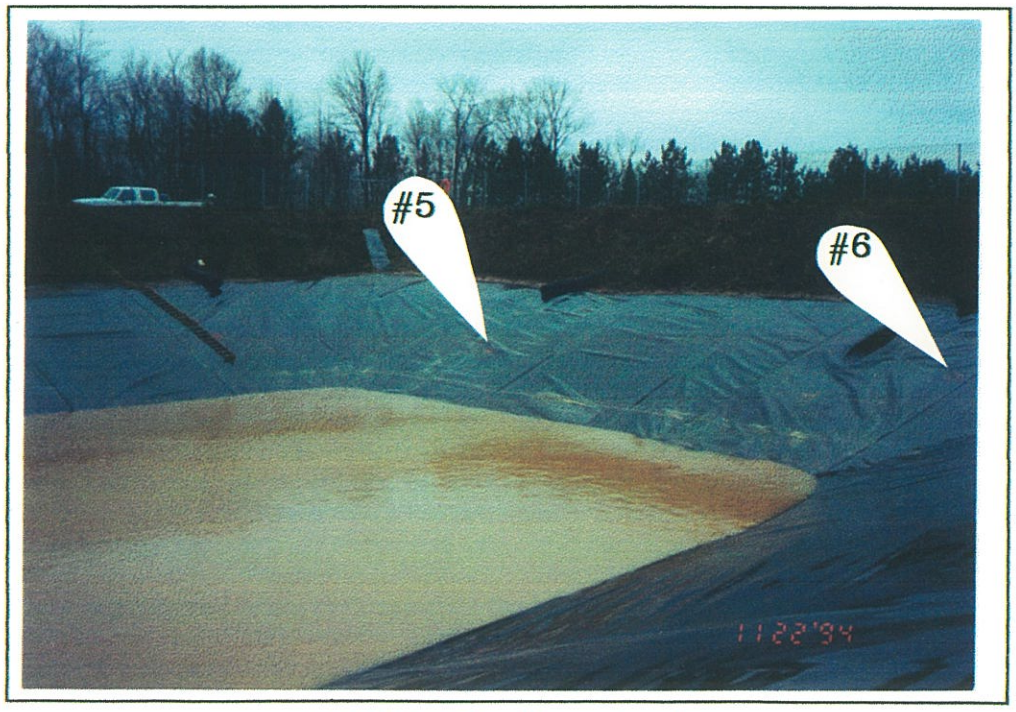
TEST WELD STRETCH
USING FIELD TENSIOMETER

FLAMBEAU MINING CO.
LADYSMITH, WISCONSIN

RUNOFF POND LINER REPAIR
NOVEMBER, 1994



DAMAGE #1, #2, #3, #4 & #7
11/20/94

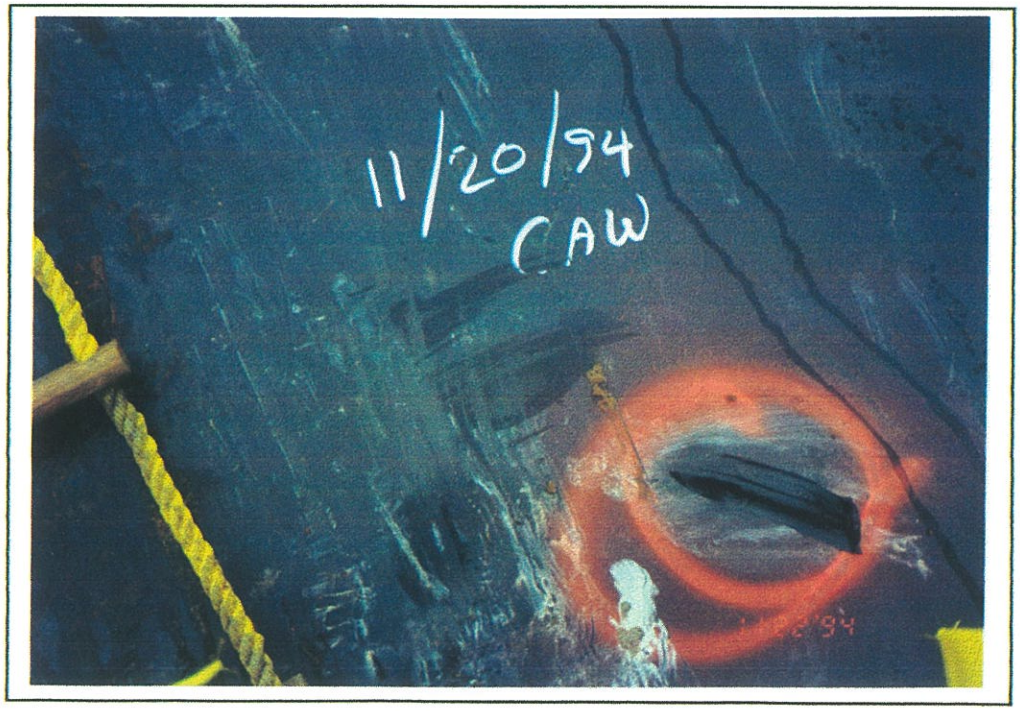


DAMAGE #5 & #6
11/20/94

FLAMBEAU MINING CO.
LADYSMITH, WISCONSIN

RUNOFF POND LINER REPAIR
NOVEMBER, 1994

DAMAGE #1
11/20/94

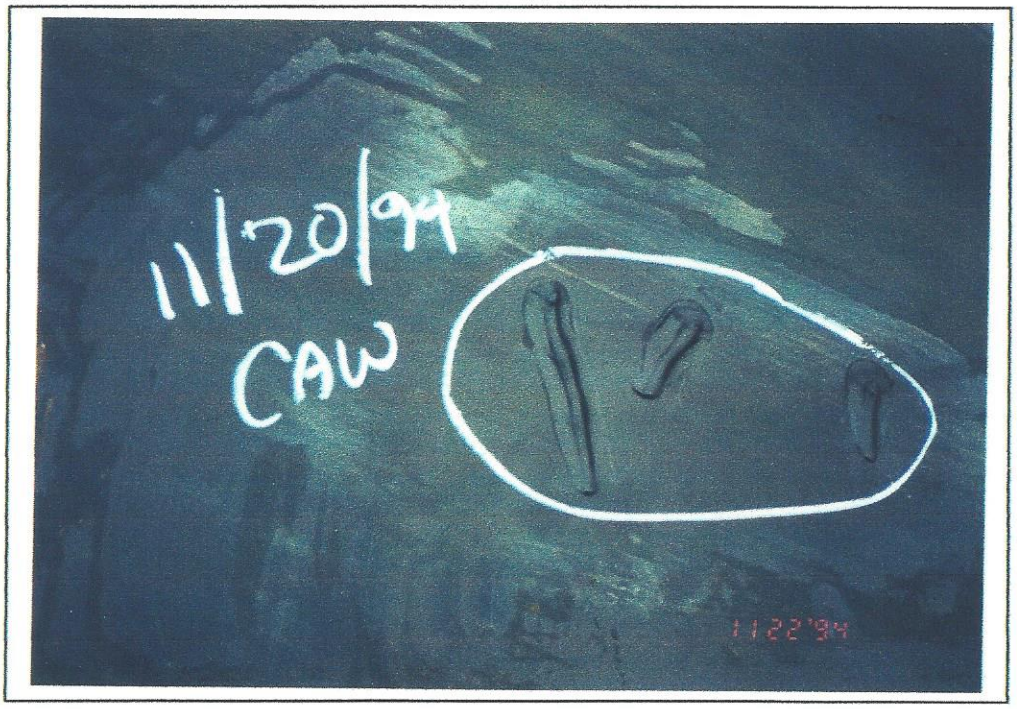


REPAIR #1
11/20/94

FLAMBEAU MINING CO.
LADYSMITH, WISCONSIN

RUNOFF POND LINER REPAIR
NOVEMBER, 1994

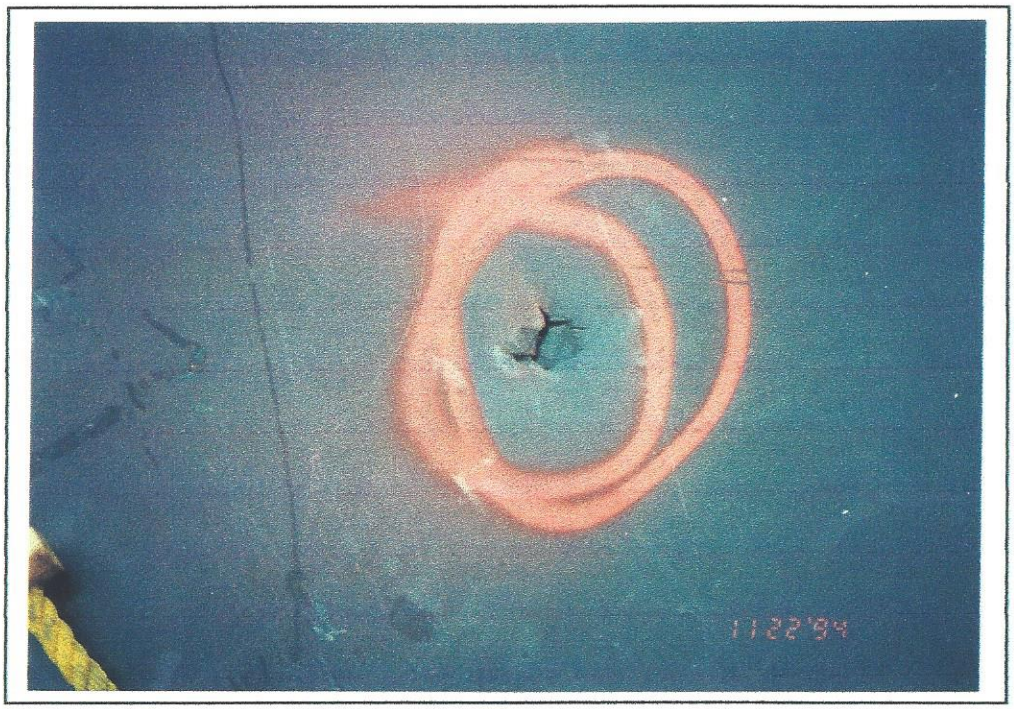
DAMAGE #2
11/20/94



REPAIR #2
11/20/94

FLAMBEAU MINING CO.
LADYSMITH, WISCONSIN

RUNOFF POND LINER REPAIR
NOVEMBER, 1994



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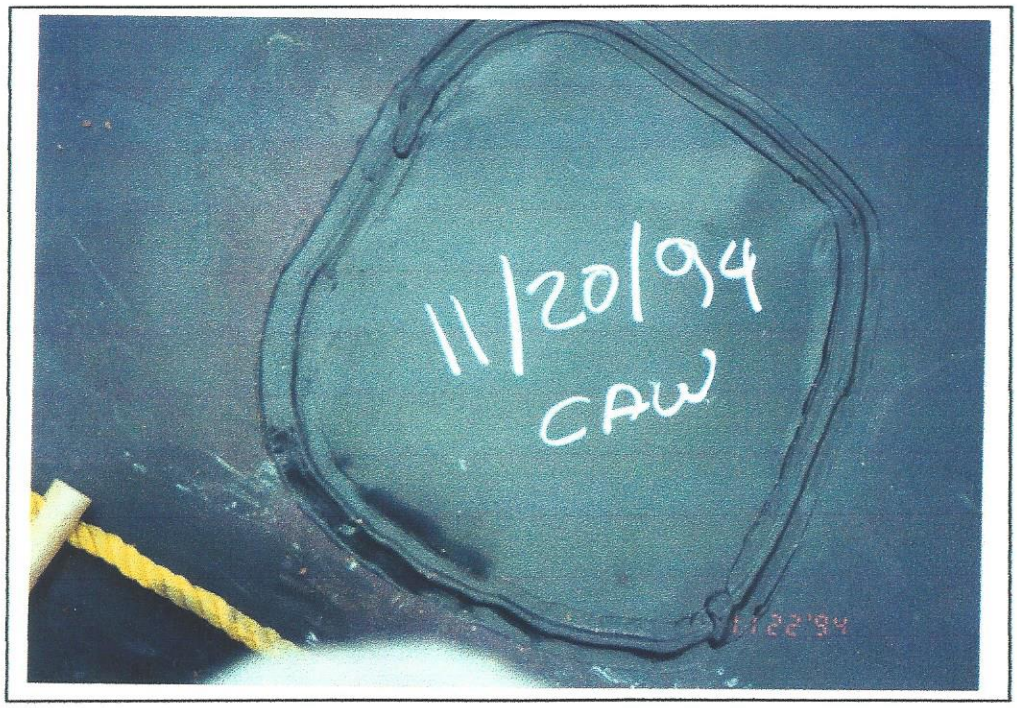
11/20/94

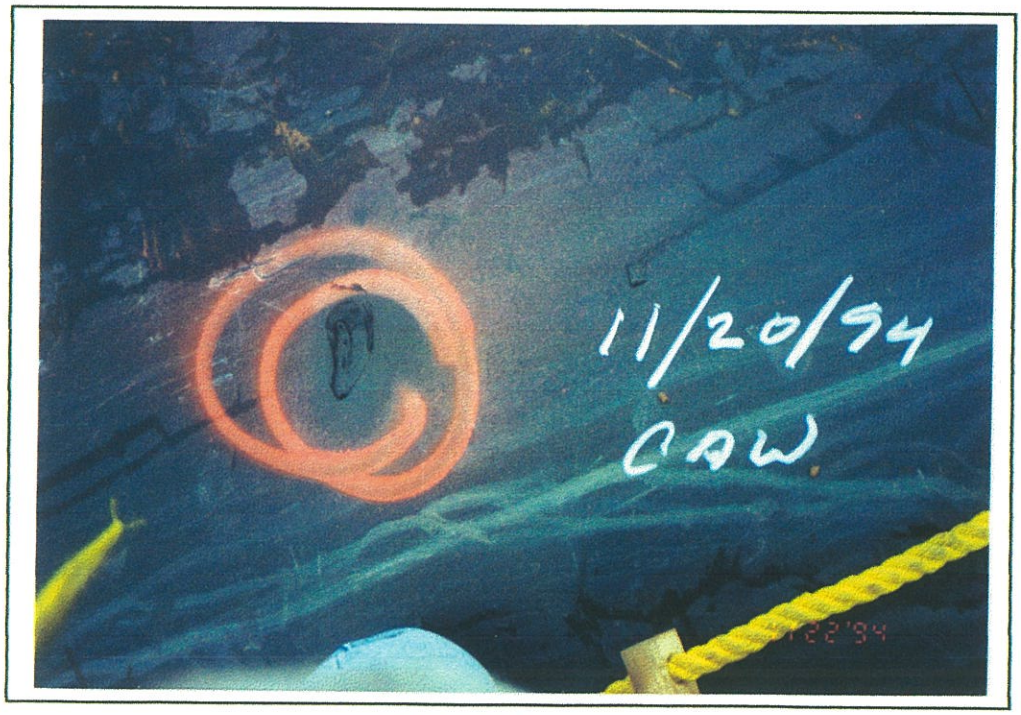


REPAIR #3
11/20/94

FLAMBEAU MINING CO.
LADYSMITH, WISCONSIN

RUNOFF POND LINER REPAIR
NOVEMBER, 1994

DAMAGE #4
11/20/94



REPAIR #4
11/20/94

FLAMBEAU MINING CO.
LADYSMITH, WISCONSIN

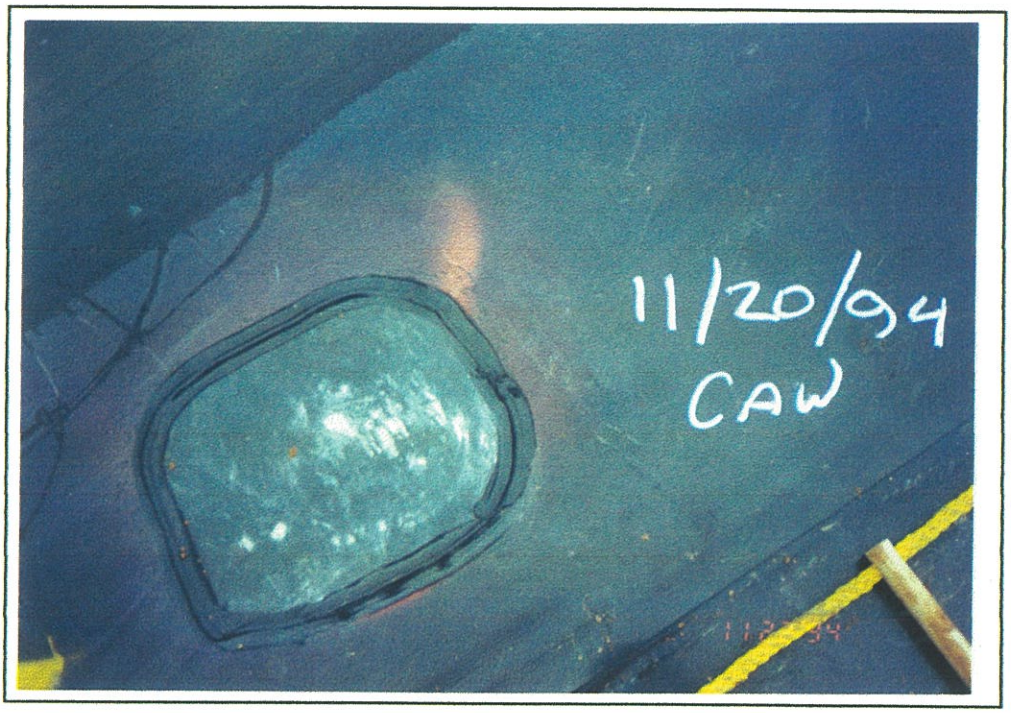
RUNOFF POND LINER REPAIR
NOVEMBER, 1994

REPAIR #5
11/20/94

DAMAGE #6
11/20/94

FLAMBEAU MINING CO.
LADYSMITH, WISCONSIN

RUNOFF POND LINER REPAIR
NOVEMBER, 1994



REPAIR #6
11/20/94

TYPICAL VACUUM BOX TEST
REPAIRS #1–#6 11/20/94

FLAMBEAU MINING CO.
LADYSMITH, WISCONSIN

RUNOFF POND LINER REPAIR
NOVEMBER, 1994

DAMAGE #7
11/21/94

FLAMBEAU MINING CO.
LADYSMITH, WISCONSIN

RUNOFF POND LINER REPAIR
NOVEMBER, 1994

DAMAGE #8
11/21/94

REPAIR #8
11/21/94

FLAMBEAU MINING CO.
LADYSMITH, WISCONSIN

RUNOFF POND LINER REPAIR
NOVEMBER, 1994

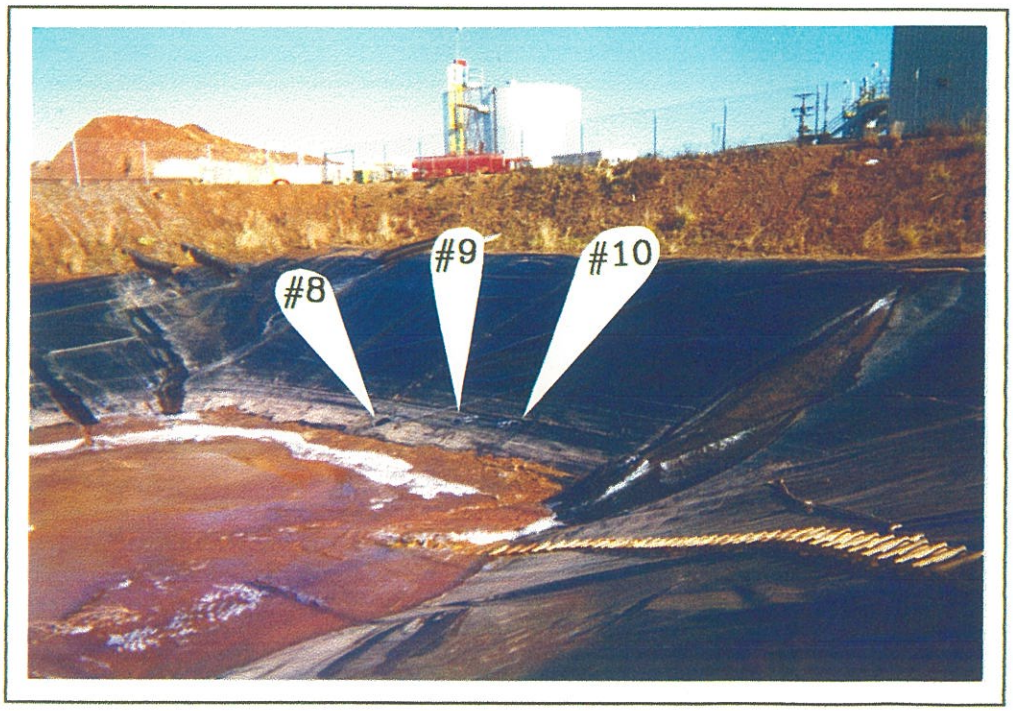
DAMAGE #10
11/21/94

REPAIR #10
11/21/94

FLAMBEAU MINING CO.
LADYSMITH, WISCONSIN

RUNOFF POND LINER REPAIR
NOVEMBER, 1994

TYPICAL VACUUM BOX TEST
REPAIRS #7–#10 11/21/94



REPAIRS #8, #9 & #10
11/21/94