
**OPERATION & MAINTENANCE MANUAL
002 OUTFALL**

FOR

**FLAMBEAU MINING COMPANY
LADYSMITH, WISCONSIN**

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Chapter I - General

A. Purpose and Use of This Manual

This Operation and Maintenance (O&M) Manual is written to provide the operator and his assistants with a comprehensive source of information and instruction on the various aspects involved in operating and maintaining the settling ponds. In order for the system to be operated as designed, and maintained for its design life, the O&M Manual along with accumulated operating experience should be utilized extensively for guidance in day to day operation.

Although each chapter in this O&M Manual contains valuable information which is necessary for the efficient, orderly, and safe operation of the settling ponds, Chapters II and III should be considered the most important in normal day to day operation. Chapter II contains the detailed instructions for operating the settling ponds in conformance with the design of the system. Chapter III contains important information regarding safety and first aid. Therefore, the operator must become familiar with these chapters in order to safely and satisfactorily operate the system and to achieve maximum treatment.

Other chapters in the O&M Manual contain information regarding record keeping, laboratory requirements, emergency procedures and maintenance procedures. Each of these chapters must also be read and thoroughly understood by the operator and the information and instructions should be integrated into the daily routine of the system.

B. A Word of Caution

The system operators should understand at the outset that there are always certain potential safety and health hazards with any job. The daily operation and maintenance of the settling ponds is no exception.

While the manual is intended to aid in system operation and maintenance, it is no substitute for actual operating experience. In putting together this manual, significant effort was made to provide accurate and useful information on the operation and maintenance of the settling ponds. However, the system operator must use common sense and good judgement when performing the various tasks involved in the day to day operation of the system.

If procedures and/or modes of operation outlined herein do not prove successful then it is the operator's responsibility, with help from the engineer, to correct or modify them as operating experience dictates.

C. Description of the Project and System

1. Background

Two settling ponds are located at the southwest end of the Type I stockpile. These two settling ponds each have a surface area of 1.4 acres and are approximately 17.5 feet deep. Both settling ponds are unlined. The dikes of the ponds are constructed from materials excavated from the site. The side slopes of the berms are constructed at 3:1 slopes.

2. Facility Flow Diagram

Facility flow diagrams for the settling ponds are provided in the Appendix B.

Three water sources can be directed to the settling ponds for removal of sediments before discharge to the Flambeau River. Runoff from the Type I storage pile, groundwater which is generated during preproduction stripping in Phase I of the open pit and stripping of overburden in Phase II of the open pit, and precipitation that falls on the open pit during Phase I and II stripping will be treated in the settling ponds.

The water will enter the settling ponds via an inlet structure located adjacent to settling pond no. 1. Two gates located in the influent structure control the flow to the settling ponds. Typically, one settling pond will handle the anticipated flow. The water enters the settling pond(s) and any suspended particles are allowed to settle out prior to discharge through the 002 outfall. Lime and/or polymer may be added to enhance settling.

Treated water from the settling ponds is discharged through 30" diameter vertical outlet structures (standpipes) designed to dewater the settling ponds from the top down. Four manually operated flap gates on 2'-6" vertical spacings are provided on each standpipe that can be opened to allow stored water to be removed from the ponds.

Treated water will flow through the outlet structures and into a common 18" diameter corrugated metal pipe that will discharge the water to the effluent channel which discharges to the effluent control structure. At the effluent control structure, effluent flow is monitored by a 90° V-notch weir. Effluent flow is then discharged to an effluent channel lined with riprap which directs the flow to the 002 Outfall and final discharge to the Flambeau River.

Effluent flow is continuously monitored by a battery powered flow meter located at the effluent control structure. Time-based composite samples will also be collected to represent the discharge from the settling ponds.

3. Design Criteria

Runoff from the Type I stockpile and water from the pit during Phase I and Phase II stripping will be directed to the settling ponds. Each pond has a 1.4-acre surface area and will be 17.5 feet deep. Of this depth, 12.5 feet will be provided for live storage, with three feet for sediment storage and two feet for freeboard. The unlined ponds will have a combined live storage capacity of approximately seven million gallons. The volume of runoff expected from a 25-year, 24-hour storm totals about five million gallons. This is a very conservative figure because no inflow reduction has been incorporated for infiltration or evaporation at the stockpile site. Such a storm would utilize about 70 percent of the ponds storage capacity, leaving a 1.39 safety factor. The ponds are sized so that, even if full, a detention time of approximately 34 hours can be expected if a 25-year, 24-hour storm event occurred, with an average inflow of 7.6 cfs (cubic feet/second).

During Phase I and II stripping operations at the open pit, water from the open pit will also be delivered to the settling ponds. The ponds will have sufficient capacity to store over 1.9 million gallons of water from this source even if they contain all the runoff from the Type I stockpile for a 25-year storm event.

D. Staffing

1. General

To operate and maintain the settling ponds properly for its design life, adequate and qualified staffing is a must. This system is designed to require a minimum of operation and maintenance manpower. The Flambeau Mining Company has made a commitment to properly staff the facility so that it is operated correctly and adequately maintained. The wastewater treatment plant operators will have the responsibility of operating the settling ponds.

General staffing recommendations for the wastewater treatment facility and settling ponds have been based upon the U.S. EPA publication, "Estimating Staffing for Municipal Wastewater Treatment Facilities". These estimates are provided in the Engineering Report dated December, 1989 and indicate that 2.4 people are required

to operate the treatment facility and settling ponds. Certain maintenance procedures may require additional manpower for short periods.

E. Discussion of Applicable Wisconsin Administrative Code Chapters (WDNR) and Permit

1. Discharge Permit Effluent Limits

Effluent limits for the Flambeau Mining Company settling ponds are provided in the Wisconsin Pollution Discharge Elimination System (WPDES) Permit located in Appendix A.

2. Applicable Wisconsin Administrative Code Chapters

The Flambeau Mining Company settling ponds fall under the regulatory control of the Wisconsin Department of Natural Resources (WDNR). The WDNR was involved with this project from the beginning and will continue to be involved as the regulatory agency responsible for maintaining the quality of surface waters within the State of Wisconsin.

WDNR involvement includes requirements for system design, design approvals, discharge permits, system monitoring, and operator training.

Following is a partial listing and brief description of the Wisconsin Administrative Code Chapters related to the settling ponds and how they affect their operation.

NR 102 "Water Quality Standards for Wisconsin Surface Waters"

Establishes water quality standards for surface waters.

NR 105 "Surface Water Quality Criteria for Toxic Substances"

Establishes water quality criteria and methods for developing criteria for toxic substances. Used for deriving WPDES effluent limits.

NR 106 "Procedures for Calculating Water Quality Based Effluent Limitations for Toxic and Organoleptic Substances Discharged to Surface Waters"

Specifies methodology for calculating water quality based effluent limitations for toxic and organoleptic substances and whole effluent toxicity.

NR 149 "Laboratory Certification and Registration"

Establishes a program to certify or register analytical laboratories who conduct analyses for certain types of programs in Wisconsin.

NR 200 "Application for Discharge Permits - Wisconsin Pollution Discharge Elimination System (WPDES)"

Discharge permit requirements

NR 201 "Fact Sheet for Proposed Permits (WPDES)"

Discharge of over 500,000 gal/day

NR 205 "General Provisions WPDES"

Legal authority for discharge permit requirements.

NR 207 "Water Quality Antidegradation"

Establish implementation procedures for antidegradation policies.

NR 218 "Method and Manner of Sampling"

Sampling requirements

NR 219 "Analytical Test Methods and Procedures"

Testing requirements

Refer to Wisconsin Administrative Code for details.

The receiving stream for the setting ponds is the Flambeau River. It is classified as "Full Fish and Aquatic Life" by the WDNR and the WPDES Discharge Permit effluent limits are set accordingly.

Following are reprints of Wisconsin Administrative Code Chapters NR 105, NR 106 and NR 207. These provide information pertaining to the certification requirements and how the WPDES discharge permit limits were derived.

Chapter II - Settling Pond Operation

A. General

1. Operational Goals

The system operator's goal is to maintain proper operation of the settling pond system. Proper operation of the settling ponds is defined as the degree of treatment required to produce an effluent that meets all of the WPDES Discharge Permit limits.

2. Hydraulic Profile

Examination of the hydraulic profile reveals that runoff water enters the influent diversion structure from the perimeter ditch inside the berm around the stockpile. During Phase I and Phase II preproduction stripping of the mine, non-contact water will be pumped from the pit via a temporary pipeline and discharged into the drainage swale at the base of the stockpile for diversion to the settling ponds. After entering the influent diversion structure, the water flows by gravity through the settling ponds and is discharged through 30-inch diameter vertical outlet structures located in each settling pond. Treated water flows through the outlet structures and into a common 18" diameter corrugated metal pipe and effluent channel for discharge to the effluent control structure. From the effluent control structure, the flow continues by gravity through the 90° V-notch and is discharged to the effluent channel that is lined with riprap. The effluent channel directs the flow to the 002 Outfall and final discharge to the Flambeau River.

3. General Start-Up Precautions

During the start-up of the settling ponds and associated equipment, the following general procedures are suggested:

- a. Check for the proper installation of all equipment.
- b. Make a final check for debris and obstructions in the settling ponds, channels and piping.
- c. Close all system gates and valves.

- d. Refer to mechanical equipment (valves, gates and monitoring equipment) Manufacturer O&M Manuals for recommended equipment start-up and operational procedures.

B. Process Control and Start-Up Procedures

1. General

There are two primary objectives of system start-up. One is to make certain all equipment is operating properly. The other is to make certain that all safety precautions have been taken to ensure safe operation.

In the following sections, start-up procedures are given for the settling ponds, including proper flow routing and gate and valve settings. The start-up guidelines are provided for normal operation of the system. Assume all valves and gates are closed in the system unless they are mentioned in the start-up procedure.

For valve and gate numbering, descriptions and locations, refer to the valve and gate inventory sheets and diagrams located in Appendix B.

2. Influent Diversion Structure

a. Description

Influent flow control takes place in the influent diversion structure. The influent diversion structure is a 12'-0" x 12'-0" x 7'-0" deep concrete structure that receives flow from the perimeter ditch inside the berm around the Type I stockpile. The flow is diverted to the settling ponds through 24" diameter pipes by opening and closing sluice gates GT-01 and GT-02.

b. Purpose

The influent diversion structure controls the flow to the settling ponds by the opening and closing of gates GT-01 and GT-02. The inlet structure can also be used as the location for the addition of lime and/or polymer, if required. This will ensure complete mixing with the incoming water before it enters the settling ponds.

c. Start-Up

- (1) Check the settling ponds for any debris or obstructions in the discharge piping.
- (2) Check the influent diversion structure for any debris or obstructions.
- (3) Select which settling pond(s) will receive the flow.
 - (a) Open sluice gate GT-01 to direct flow to settling pond no. 1.
 - (b) Open sluice gate GT-02 to direct flow to settling pond no. 2.
 - (c) Open sluice gates GT-01 and GT-02 to direct flow to settling pond nos. 1 and 2.
- (4) Prepare the settling ponds for operation. Refer to Chapter II.B.3.
- (5) Monitor operation and make adjustments as necessary.

d. Normal Operation

Runoff from the Type I stockpile and water from the open pit during Phase I and Phase II stripping will be directed to the settling ponds through the influent diversion structure. During normal operation, one settling pond will be enough to handle the anticipated flow. The system operator will select which settling pond is in operation and open the corresponding sluice gate.

The influent diversion structure will be the location for the addition of lime and/or polymer addition. If lime or polymer is required to aid in settling out the sediments, it will be manually introduced by the system operator.

3. Settling Ponds

a. Description

Runoff from the Type I stockpile and water from the open pit during Phase I and Phase II stripping are directed to the two settling ponds. Each pond has a 1.4-acre surface area and is 17.5 feet deep. Of this depth, 12.5 feet is provided for live storage, with three feet for sediment storage and two feet of freeboard. The settling ponds are unlined and have a combined live storage capacity of

approximately 7 million gallons. The volume of runoff expected from a 25-year, 24-hour storm totals about five million gallons. Such a storm would utilize about 70 percent of the ponds storage capacity, leaving a safety factor of 1.39. The ponds are sized so that even if full, a retention time of approximately 34 hours can be expected if a 25-year, 24-hour storm event occurred with an average inflow of 7.6 cfs.

During Phase I and Phase II stripping operations at the open pit, water from the open pit will also be delivered to the settling ponds. The ponds have sufficient capacity to store over 1.9 million gallons of water from this source even if they contain all the runoff from the Type I stockpile for a 25-year storm event.

b. Purpose

The purpose of the settling ponds is to settle out any sediments contained in the runoff from the Type I stockpile and water from the pit during Phase I and Phase II stripping to acceptable levels for discharge to the Flambeau River.

c. Start-Up

- (1) Check the settling ponds for debris or obstructions in the discharge piping. If the settling ponds are partially filled with water, look for floating debris.
- (2) Settling pond No. 1 start-up is as follows:
 - (a) At the vertical outfall structure, close flap gates GT-03, GT-04, GT-05 and GT-06.
 - (b) At the influent diversion structure, open gate GT-01 to allow influent flow into settling pond no. 1.
 - (c) After the settling pond has filled with water or if the water in the pond is clear and the operator wants to discharge, close gate GT-01 to stop the influent flow to pond no. 1. If required, open gate GT-02 to allow influent flow to pond no. 2.
 - (d) Allow the sediments to settle out by gravity. Lime and/or polymer addition may be required to aid in settling. Lime and/or polymer

will be added to the influent diversion structure and a portable pump will be used to recirculate the flow from settling pond no. 1 back to the influent diversion structure.

- (e) To begin discharging from the settling pond, slowly open the flap gate at the outfall structure that corresponds with the water level in pond. The gate should be opened in increments to minimize the amount turbulence created in the pond.

IMPORTANT

The settling pond is designed to be drained from the top down so as to minimize the release of any sediments in the effluent. Therefore, it is very important that the effluent is slowly discharged through the effluent diversion structure to keep the amount of turbulence in the pond to a minimum.

- (f) As the water level in the settling pond decreases, slowly open the next flap gate to continue draining the pond.
 - (g) After the settling pond has been drained, close the effluent flap gates.
- (3) Settling pond No. 2 start-up is as follows:
- (a) At the vertical outfall structure, close flap gates GT-07, GT-08, GT-09 and GT-10.
 - (b) At the influent diversion structure, open gate GT-02 to allow influent flow into settling pond no. 2.
 - (c) After the settling pond has filled with water or if the water in the pond is clear and the operator wants to discharge, close gate GT-02 to stop the influent flow to pond no. 2. If required, open gate GT-01 to allow influent flow to pond no. 1.
 - (d) Allow the sediments to settle out by gravity. Lime and/or polymer addition may be required to aid in settling. Lime and/or polymer

will be added to the influent diversion structure and a portable pump will be used to recirculate the flow from settling pond no. 2 back to the influent diversion structure.

- (e) To begin discharging from the settling pond, slowly open the flap gate at the outfall structure that corresponds with the water level in pond. The gate should be opened in increments to minimize the amount turbulence created in the pond.

IMPORTANT

The settling pond is designed to be drained from the top down so as to minimize the release of any sediments in the effluent. Therefore, it is very important that the effluent is slowly discharged through the effluent diversion structure to keep the amount of turbulence in the pond to a minimum.

- (f) As the water level in the settling pond decreases, slowly open the next flap gate to continue draining the pond.
 - (g) After the settling pond has been drained, close the effluent flap gates.
- (4) Normally, one settling pond will handle the anticipated runoff. If required, the ponds can be operated in series or parallel.
 - (5) Settling Pond No. 1 and Settling Pond No. 2 operating in series start-up is as follows:
 - (a) At the vertical outfall structures, close flap gates GT-03 through GT-10.
 - (b) At the influent diversion structure, open gate GT-01 to allow influent flow to settling pond no. 1.
 - (c) Allow the sediments to settle out by gravity. Lime and/or polymer addition may be required to aid in settling. Lime and/or polymer will be added to the influent diversion structure and a portable

pump will be used to recirculate the flow from settling pond no. 1 back to the influent diversion structure.

- (d) After the settling pond no. 1 has filled with treated water, it will flow over the emergency spillway and into settling pond no. 2.
- (e) Effluent will be discharged from settling pond no. 2. To begin discharging from the pond no. 2, slowly open the flap gate at the outfall structure that corresponds with the water level in pond. The gate should be opened in increments to minimize the amount turbulence created in the pond.

IMPORTANT

The settling pond is designed to be drained from the top down so as to minimize the release of any sediments in the effluent. Therefore, it is very important that the effluent is slowly discharged through the effluent diversion structure to keep the amount of turbulence in the pond to a minimum.

- (f) As the water level in the settling pond decreases, slowly open the next flap gate to continue draining the pond.
 - (g) When the flows decrease and only one pond is required, close gate GT-01 or GT-02 and drain the pond that is not being used.
- (6) Settling Pond No. 1 and Settling Pond No. 2 operating in parallel start-up is as follows:
- (a) At the vertical outfall structure, close flap gates GT-03 through GT-10.
 - (b) At the influent diversion structure, open gates GT-01 and GT-02 to allow influent flow into both settling ponds.
 - (c) After the settling ponds have filled with water or if the water in the ponds is clear and the operator wants to discharge, partially close gates GT-01 and GT-02 to decrease the influent flow to the ponds.

- (d) Allow the sediments to settle out by gravity. Lime and/or polymer addition may be required to aid in settling. Lime and/or polymer will be added to the influent diversion structure and a portable pump will be used to recirculate the flow back to the settling ponds.
- (e) To begin discharging from the settling ponds, slowly open the flap gates at the outfall structures that correspond with the water level in pond. The gates should be opened in increments to minimize the amount turbulence created in the ponds.

IMPORTANT

The settling ponds are designed to be drained from the top down so as to minimize the release of any sediments in the effluent. Therefore, it is very important that the effluent is slowly discharged through the effluent diversion structures to keep the amount of turbulence in the pond to a minimum.

- (f) As the water level in the settling ponds decrease, slowly open the next flap gate to continue draining the ponds and begin opening influent gates GT-01 and GT-02 to increase the amount of influent flow to the ponds.
- (7) During winter operation of the settling ponds, a layer of ice will cover the pond(s) that is in service.
- (a) To drain the pond(s), the operator should open the flap gates on the effluent outfall structures that he feels corresponds with the water level in the ponds.
 - (b) The operator will have to visually inspect the effluent flow and make adjustments accordingly.

d. Normal Operation

Normally, one settling pond will be able to handle the anticipated runoff. The operator will select which settling pond to operate by opening sluice gate GT-01 or GT-02 at the influent diversion structure.

The settling ponds can be operated as either detention or retention basins. In the detention mode of operation, sediment removal would primarily be achieved by decreasing water velocity while still allowing some flow through during high runoff periods. In the retention mode, the runoff would be captured in one or both of the ponds and released slowly through the outlet structure. Some of the water is anticipated to percolate through the bottom of the ponds.

Lime and/or polymer can also be added to the influent diversion structure to enhance settling and quality of the final effluent. The operator will use a portable pump to recirculate the flow to ensure proper mixing of the lime and/or polymer. Operator experience will dictate when lime and/or polymer addition is required.

e. Alternate/Emergency Operation

- (1) Sediments can be periodically removed from the settling ponds by a front-end loader after an individual pond has been drained and allowed to dry out. During the cleaning period, run-off will be directed to the settling pond not being cleaned. Any removed sediments will be placed on the Type I stockpile. If required, this work should be scheduled during period of expected low precipitation.

4. Emergency Spillways

a. Description

In the event of prolonged periods of precipitation and runoff, each settling pond has a spillway overflow. The first settling pond can overflow to the second, and the second settling pond to the drainage channel leading to the Flambeau River. The spillway structures are constructed of riprap lined flared inlet aprons and flat discharge flumes. The flumes spillway have low side sloping riprap lined

embankments to contain the overflow and direct it to the bottom of the berm slopes. Energy dissipation riprap is placed at the bottom of each flume to prevent erosion. The spillway outlet elevations are two feet below the top of the berm.

5. Effluent Flow Monitoring

a. Description

The effluent flow meter consists of a bubble tube flow sensor (transducer) mounted at the 90° V-notch weir plate in the effluent control structure. The transducer senses the water depth over the weir and relays that information to a transmitter flow integrator.

b. Purpose

Effluent flow monitoring detects, records, and totalizes effluent flow in accordance with requirements of the WPDES Discharge Permit.

c. Start-Up

- (1) Check that the effluent diversion structure is free of debris and that the flow meter is properly installed.
- (2) The flow meter is operated continuously (24 hours) when it is necessary to conduct flow monitoring. The flow meter may be shut off when no flow is being discharged from the settling ponds.
- (3) Refer to the manufacturer's instruction manual for operation and calibration procedures for the effluent flow meter.
- (4) Energize the flow meter.

d. Normal Operation

The effluent flow meter is operated continuously (24 hours) when flow is being discharged from the settling ponds. The flow meter may be shut off when no flow is being discharged from the settling ponds.

e. **Alternate/Emergency Operation**

If the flow sensor and transmitter are out of service for any reason, the flow rate can be determined by measuring the water depth over the weir and determining the flow rate from a standard table for a 90° V-notch weir. Refer to the weir tables at the end of this chapter.

C. Sampling and Laboratory Requirements

Laboratory testing will be handled by a certified or registered laboratory as defined under the Wisconsin Administrative Code chapter NR 149.

Samples from the 002 Outfall will be collected by a stationary refrigerated composite sampler located downstream from the settling ponds but prior to discharge to the Flambeau River. The probable sample location will be located at the effluent control structure prior to the 90° V-notch weir.

For a detailed description of the sampling procedures and requirements, refer to Chapter V, Laboratory Testing and the Quality Assurance/Quality Control Biomonitoring Study Plan located in the Appendix.

D. Routine Maintenance Procedures

The Operator is responsible for periodic maintenance in order to keep the system running smoothly and efficiently.

Mechanical maintenance is of prime importance because the equipment must be kept in good operating condition for the system to maintain peak performance. Operation and maintenance manuals provided by the equipment manufacturers provide information on the maintenance of their equipment. The Operator should thoroughly read these O&M manuals and develop a knowledge of the procedures used. The Operator should follow the manual instructions very carefully when performing maintenance procedures. If questions arise, contact the manufacturer or the manufacturer's local representative. The operator should also recognize maintenance and/or repair tasks that are beyond his capabilities and request assistance before more serious complications arise.

The settling pond maintenance will be performed by the mining facility maintenance department or through an outside contractor. The Operator will draw from this pool of people to complete both routine and non-scheduled maintenance.

DISCHARGE OF 90° V-NOTCH WEIR

FORMULAS: CFS=2.500H^{2.5} GS=CFS X 7.481 MGD=CFS X 0.6463

HEAD FT.	CFS	GS	MGD	HEAD FT.	CFS	GS	MGD	HEAD FT.	CFS	GS	MGD	HEAD FT.	CFS	GS	MGD	HEAD FT.	CFS	GS	MGD
0.01	.0000	.0002	.0000	0.26	.0862	.6447	.0557	0.51	.4644	3.474	.3001	0.76	1.259	9.417	.8136	1.01	2.563	19.17	1.656
0.02	.0001	.0011	.0001	0.27	.0947	.7085	.0612	0.52	.4875	3.647	.3151	0.77	1.301	9.730	.8406	1.02	2.627	19.65	1.698
0.03	.0004	.0029	.0003	0.28	.1037	.7759	.0670	0.53	.5112	3.825	.3304	0.78	1.343	10.05	.8682	1.03	2.692	20.14	1.740
0.04	.0008	.0060	.0005	0.29	.1132	.8470	.0732	0.54	.5357	4.008	.3462	0.79	1.387	10.37	.8963	1.04	2.758	20.63	1.782
0.05	.0014	.0105	.0009	0.30	.1232	.9219	.0796	0.55	.5608	4.196	.3625	0.80	1.431	10.71	.9249	1.05	2.824	21.13	1.825
0.06	.0022	.0165	.0014	0.31	.1338	1.001	.0865	0.56	.5867	4.389	.3792	0.81	1.476	11.04	.9541	1.06	2.892	21.64	1.869
0.07	.0032	.0242	.0021	0.32	.1448	1.083	.0936	0.57	.6132	4.588	.3963	0.82	1.522	11.39	.9838	1.07	2.961	22.15	1.914
0.08	.0045	.0339	.0029	0.33	.1564	1.170	.1011	0.58	.6405	4.791	.4139	0.83	1.569	11.74	1.014	1.08	3.030	22.67	1.959
0.09	.0061	.0454	.0039	0.34	.1685	1.261	.1089	0.59	.6685	5.001	.4320	0.84	1.617	12.09	1.045	1.09	3.101	23.20	2.004
0.10	.0079	.0591	.0051	0.35	.1812	1.355	.1171	0.60	.6971	5.215	.4506	0.85	1.665	12.46	1.076	1.10	3.173	23.73	2.050
0.11	.0100	.0751	.0065	0.36	.1944	1.454	.1256	0.61	.7265	5.435	.4696	0.86	1.715	12.83	1.108	1.11	3.245	24.28	2.097
0.12	.0125	.0933	.0081	0.37	.2082	1.557	.1345	0.62	.7567	5.661	.4891	0.87	1.765	13.20	1.141	1.12	3.319	24.83	2.145
0.13	.0152	.1140	.0098	0.38	.2225	1.665	.1438	0.63	.7876	5.892	.5090	0.88	1.816	13.59	1.174	1.13	3.393	25.39	2.193
0.14	.0183	.1372	.0118	0.39	.2375	1.776	.1535	0.64	.8192	6.128	.5294	0.89	1.868	13.98	1.207	1.14	3.469	25.95	2.242
0.15	.0218	.1630	.0141	0.40	.2530	1.893	.1635	0.65	.8516	6.371	.5504	0.90	1.921	14.37	1.242	1.15	3.546	26.52	2.291
0.16	.0256	.1915	.0165	0.41	.2691	2.013	.1739	0.66	.8847	6.619	.5718	0.91	1.975	14.77	1.276	1.16	3.623	27.10	2.342
0.17	.0298	.2229	.0193	0.42	.2858	2.138	.1847	0.67	.9186	6.872	.5937	0.92	2.030	15.18	1.312	1.17	3.702	27.69	2.392
0.18	.0344	.2571	.0222	0.43	.3031	2.268	.1959	0.68	.9533	7.131	.6161	0.93	2.085	15.60	1.348	1.18	3.781	28.29	2.444
0.19	.0393	.2943	.0254	0.44	.3210	2.402	.2075	0.69	.9887	7.396	.6390	0.94	2.142	16.02	1.384	1.19	3.862	28.89	2.496
0.20	.0447	.3346	.0289	0.45	.3396	2.541	.2195	0.70	1.025	7.667	.6624	0.95	2.199	16.45	1.421	1.20	3.944	29.50	2.549
0.21	.0505	.3780	.0327	0.46	.3588	2.684	.2319	0.71	1.062	7.944	.6863	0.96	2.257	16.89	1.459	1.21	4.026	30.12	2.602
0.22	.0568	.4246	.0367	0.47	.3786	2.832	.2447	0.72	1.100	8.227	.7107	0.97	2.317	17.33	1.497	1.22	4.110	30.75	2.656
0.23	.0634	.4745	.0410	0.48	.3991	2.985	.2579	0.73	1.138	8.515	.7357	0.98	2.377	17.78	1.536	1.23	4.195	31.38	2.711
0.24	.0705	.5277	.0456	0.49	.4202	3.143	.2716	0.74	1.178	8.810	.7611	0.99	2.438	18.24	1.576	1.24	4.280	32.02	2.766
0.25	.0781	.5845	.0505	0.50	.4419	3.306	.2856	0.75	1.218	9.111	.7871	1.00	2.500	18.70	1.616	1.25	4.367	32.67	2.823

DISCHARGE OF 90° V-NOTCH WEIR

HEAD FT.	CFS	GS	MGD	HEAD FT.	CFS	GS	MGD	HEAD FT.	CFS	GS	MGD	HEAD FT.	CFS	GS	MGD	HEAD FT.	CFS	GS	MGD
1.26	4.455	33.33	2.879	1.61	8.223	61.51	5.314	1.96	13.45	100.6	8.690	2.31	20.28	151.7	13.10	2.66	28.85	215.8	18.65
1.27	4.544	33.99	2.937	1.62	8.351	62.47	5.397	1.97	13.62	101.9	8.801	2.32	20.50	153.3	13.25	2.67	29.12	217.9	18.82
1.28	4.634	34.67	2.995	1.63	8.480	63.44	5.481	1.98	13.79	103.2	8.913	2.33	20.72	155.0	13.39	2.68	29.40	219.9	19.00
1.29	4.725	35.35	3.054	1.64	8.611	64.42	5.565	1.99	13.97	104.5	9.026	2.34	20.94	156.7	13.53	2.69	29.67	222.0	19.18
1.30	4.817	36.04	3.113	1.65	8.743	65.40	5.650	2.00	14.14	105.8	9.140	2.35	21.16	158.3	13.68	2.70	29.95	224.0	19.35
1.31	4.910	36.73	3.174	1.66	8.876	66.40	5.736	2.01	14.32	107.1	9.255	2.36	21.39	160.0	13.82	2.71	30.22	226.1	19.53
1.32	5.005	37.44	3.235	1.67	9.010	67.40	5.823	2.02	14.50	108.5	9.370	2.37	21.62	161.7	13.97	2.72	30.50	228.2	19.71
1.33	5.100	38.15	3.296	1.68	9.146	68.42	5.911	2.03	14.68	109.8	9.487	2.38	21.85	163.4	14.12	2.73	30.79	230.3	19.90
1.34	5.196	38.87	3.358	1.69	9.282	69.44	5.999	2.04	14.86	111.2	9.604	2.39	22.08	165.2	14.27	2.74	31.07	232.4	20.08
1.35	5.294	39.60	3.421	1.70	9.420	70.47	6.088	2.05	15.04	112.5	9.722	2.40	22.31	166.9	14.42	2.75	31.35	234.5	20.26
1.36	5.392	40.34	3.485	1.71	9.559	71.51	6.178	2.06	15.23	113.9	9.841	2.41	22.54	168.6	14.57	2.76	31.64	236.7	20.45
1.37	5.492	41.09	3.550	1.72	9.700	72.56	6.269	2.07	15.41	115.3	9.961	2.42	22.78	170.4	14.72	2.77	31.93	238.8	20.63
1.38	5.593	41.84	3.615	1.73	9.841	73.62	6.360	2.08	15.60	116.7	10.08	2.43	23.01	172.2	14.87	2.78	32.21	241.0	20.82
1.39	5.695	42.60	3.681	1.74	9.984	74.69	6.453	2.09	15.79	118.1	10.20	2.44	23.25	173.9	15.03	2.79	32.50	243.2	21.01
1.40	5.798	43.37	3.747	1.75	10.13	75.77	6.546	2.10	15.98	119.5	10.33	2.45	23.49	175.7	15.18	2.80	32.80	245.4	21.20
1.41	5.902	44.15	3.814	1.76	10.27	76.86	6.640	2.11	16.17	120.9	10.45	2.46	23.73	177.5	15.34	2.81	33.09	247.6	21.39
1.42	6.007	44.94	3.882	1.77	10.42	77.95	6.735	2.12	16.36	122.4	10.57	2.47	23.97	179.3	15.49	2.82	33.39	249.8	21.58
1.43	6.113	45.73	3.951	1.78	10.57	79.06	6.830	2.13	16.55	123.8	10.70	2.48	24.21	181.1	15.65	2.83	33.68	252.0	21.77
1.44	6.221	46.54	4.020	1.79	10.72	80.17	6.926	2.14	16.75	125.3	10.82	2.49	24.46	183.0	15.81	2.84	33.98	254.2	21.96
1.45	6.329	47.35	4.091	1.80	10.87	81.30	7.024	2.15	16.94	126.8	10.95	2.50	24.71	184.8	15.97	2.85	34.28	256.5	22.16
1.46	6.439	48.17	4.162	1.81	11.02	82.43	7.121	2.16	17.14	128.2	11.08	2.51	24.95	186.7	16.13	2.86	34.58	258.7	22.35
1.47	6.550	49.00	4.233	1.82	11.17	83.58	7.220	2.17	17.34	129.7	11.21	2.52	25.20	188.5	16.29	2.87	34.89	261.0	22.55
1.48	6.662	49.84	4.306	1.83	11.33	84.73	7.320	2.18	17.54	131.2	11.34	2.53	25.45	190.4	16.45	2.88	35.19	263.3	22.74
1.49	6.775	50.68	4.379	1.84	11.48	85.89	7.420	2.19	17.74	132.7	11.47	2.54	25.71	192.3	16.61	2.89	35.50	265.5	22.94
1.50	6.889	51.54	4.452	1.85	11.64	87.06	7.521	2.20	17.95	134.3	11.60	2.55	25.96	194.2	16.78	2.90	35.80	267.9	23.14
1.51	7.005	52.40	4.527	1.86	11.80	88.24	7.624	2.21	18.15	135.8	11.73	2.56	26.21	196.1	16.94	2.91	36.11	270.2	23.34
1.52	7.121	53.27	4.602	1.87	11.95	89.43	7.726	2.22	18.36	137.3	11.86	2.57	26.47	198.0	17.11	2.92	36.42	272.5	23.54
1.53	7.239	54.15	4.678	1.88	12.12	90.63	7.830	2.23	18.57	138.9	12.00	2.58	26.73	200.0	17.28	2.93	36.74	274.8	23.74
1.54	7.358	55.04	4.755	1.89	12.28	91.84	7.935	2.24	18.77	140.4	12.13	2.59	26.99	201.9	17.44	2.94	37.05	277.2	23.95
1.55	7.478	55.94	4.833	1.90	12.44	93.06	8.040	2.25	18.98	142.0	12.27	2.60	27.25	203.9	17.61	2.95	37.37	279.5	24.15
1.56	7.599	56.85	4.911	1.91	12.60	94.29	8.146	2.26	19.20	143.6	12.41	2.61	27.51	205.8	17.78	2.96	37.68	281.9	24.36
1.57	7.721	57.76	4.990	1.92	12.77	95.53	8.253	2.27	19.41	145.2	12.54	2.62	27.78	207.8	17.95	2.97	38.00	284.3	24.56
1.58	7.845	58.69	5.070	1.93	12.94	96.78	8.361	2.28	19.62	146.8	12.68	2.63	28.04	209.8	18.12	2.98	38.32	286.7	24.77
1.59	7.970	59.62	5.151	1.94	13.11	98.04	8.470	2.29	19.84	148.4	12.82	2.64	28.31	211.8	18.30	2.99	38.65	289.1	24.98
1.60	8.095	60.56	5.232	1.95	13.27	99.31	8.579	2.30	20.06	150.0	12.96	2.65							

Chapter III - Records

A. Importance and Use of Records

Records are needed for the following reasons:

1. Operating records can indicate the overall efficiency of the settling ponds and can point up any tendencies of certain units to cause problems.
2. Records show the type and frequency of required maintenance conducted on operating units and help to evaluate its effectiveness.
3. Records of past performance and of operational procedures help the operator to evaluate present performance and serve as a basis for future operating conditions.
4. Records are used to support budget requests for personnel, additional facilities and equipment.
5. Records are helpful if an accident occurs and will be needed if lawsuits are brought against the company. As soon as possible after an accident, someone should record the chain of events leading to the accident, exactly what happened, and any preventive or corrective action taken to prevent a similar occurrence.
6. Regulatory agencies require records.
7. Records provide the actual data for the preparation of weekly, monthly, or annual reports to administrative officials, the public and regulatory agencies.

For records to serve their functions, they must be kept and handled properly. Good records must be:

- regular
- permanent
- complete
- accurate
- neat
- well-documented
- categorized as active or inactive

Updating records regularly helps to keep them accurate, neat, and organized and is less time-consuming than trying to update them all at once.

B. General Instructions for Good Record-keeping

1. Write entries on data sheets in ink or with an indelible pencil. A lead pencil should never be used because notations can become smudged or can be altered or erased. This destroys their legal chronology.
 2. Follow specific instructions for keeping each form explained in the next section, Section C, Types of Records and Operating Logs.
 3. Fill in records at the recommended time periods that apply to the form, whether daily or less frequent.
 4. Prepare a separate file for recording emergency situations and permit noncompliance events, as recommended by the Wisconsin Department of Natural Resources (WDNR). This file contains information on the cause and duration of each occurrence and a description of the corrective actions taken. Such a file can help to prevent or minimize violations.
 5. Keep essential records, maps and inventories readily available for maintenance crews and service vehicles to use during an emergency. These items should be protected so that they can be reproduced or used immediately. Essential records can be preserved one of two ways:
 - a. Keep essential records in a vault not subject to fire.
 - b. Keep copies of all essential records at two separate locations. This alternative requires more work, but offers two advantages: Records are more accessible, and it is unlikely that an emergency situation will affect both locations simultaneously.
- Regardless of which program is chosen, it is absolutely necessary that essential records be accessible and readable without delay. This cannot be overemphasized.
6. Periodically, records no longer useful on a day-to-day basis should be placed in storage.

Some compromise is necessary between collecting useless records and preventing the frustration of not being able to find needed information.

C. Types of Records and Operating Logs

The types of records to be kept depend on the size, complexity, and type of the systems. The settling ponds will generally require the following types of records. A brief description of each follows:

- Daily, Monthly, Quarterly and Annual Operating Logs
- Record Drawings
- Maintenance Scheduling/Records System
- Inventory Records
- Safety Records (Refer to Chapter V)

1. The purpose of the Daily, Monthly, Quarterly and Annual Operating Logs are to give the operator a comprehensive checklist of items to monitor. They also provide a convenient format to list visual observations, maintenance activities, etc. Any work done or notable events occurring that day should be listed. This, then, becomes a recorded source for future reference.

The Daily, Monthly, Quarterly and Annual Operating Logs format should be continuously updated as operating experience, changing facility conditions, or changing regulatory requirements dictate.

2. A complete set of record drawings of the facility should be readily available for use by the operator. The operator should record on these plans all changes made in facility piping and equipment. The original drawings should be updated regularly according to the changes.
3. Maintenance Scheduling/Record System

The best way for maintenance personnel to maintain the preventive maintenance program is through good record-keeping. The maintenance scheduling/record system should be kept up-to-date daily and the maintenance procedures listed should be continuously reviewed and modified as operating experience dictates.

The failure of maintenance personnel to record work in a timely manner is a frequent occurrence in a preventive maintenance program. When this happens, the personnel

must rely on memory to know when to perform each preventive maintenance function. As days become weeks and months, the preventive maintenance program is lost in the turmoil of everyday operation.

The suggested maintenance scheduling/record system is a three-card system designed to simplify the scheduling of preventive maintenance and to ensure that required maintenance work is recorded.

The three maintenance cards are:

- a. Equipment Data Card
- b. Maintenance Scheduling Card
- c. Maintenance Work Record

An Equipment Data Card should be completed for each item that requires scheduled maintenance. The card lists the name of unit or component, operating data and capacities, identifying numbers, manufacturer/supplier, contractor, special tools required, lubricants, recommended spare parts and other pertinent data.

A corresponding Maintenance Scheduling Card should be completed for each Equipment Data Card. This scheduling card lists:

- a. Each maintenance procedure (work to be done) with an item number.
- b. Each maintenance procedure in order of performance frequency. (For instance, daily service might be items 1, 2 and 3; weekly items 4 and 5; monthly items 6, 7 and 8; quarterly; semi-annually; annually).
- c. The time each procedure is to be done (month and week). Daily procedures are typically covered in the Daily Log to simplify the maintenance scheduling system.

The top of the Maintenance Scheduling Card lists the 12 months broken down into four weeks each. The month and week the procedure is to be done is circled. (For example, during the fourth week of August, all of the Maintenance Scheduling Cards with August 4 circled are pulled and those maintenance procedures with August 4 listed under "Time" are done).

Finally, the Maintenance Work Record is filled out showing date, work done and by whom (signed). Nonscheduled maintenance (other than that listed on the

Maintenance Scheduling Card) is also listed on this form. In this way, the operator has a permanent record of all maintenance and repair work done and dates accomplished.

The three card system may be replaced with a computerized maintenance system. It takes many hours to input the data for the maintenance program but tracking maintenance by computer is an extremely efficient management tool. Be sure to back up all computer records with copies stored in a secure location.

The maintenance scheduling/record system should be reviewed and revised periodically as experience and/or equipment manufacturer's recommendations dictate. The maintenance foreman should confirm the completeness and correctness of the information listed on the maintenance cards. All modifications or additions to equipment should be recorded and maintenance data revised accordingly.

4. An Inventory Records System is used to maintain a sufficient quantity of essential supplies and repair parts. Setting up the inventory system and purchasing the items to be stocked will take time, money, and effort initially, but will eliminate the aggravation and costs involved in not having the items when they are needed. This system can be managed by computer.

The list of items to be stocked should be updated as operating experience dictates. Some items may be deleted or quantities reduced while others may have to be added or quantities increased.

5. Official Safety Records seek to document causes for illness or injury. These records may be utilized in many ways:
 - a. As legal documents in case of dispute or litigation.
 - b. As justification for modifying safety rules or work procedures.
 - c. As documentation for insurance and other compensation requirements.

An "Employers First Record of Injury or Disease" should be filled out and filed anytime a serious injury or job-related disease occurs. The report must be submitted to WDILHR if the injury or disease results in a death or more than a three-day disability.

In addition, many safety-related incidents do not result in injury or disease but should be noted (Operating Log) and corrective measures taken.

Settling Pond Monitoring Form

Chapter V - Laboratory Testing

A. General

Laboratory testing will be handled by a certified or registered laboratory as defined under the Wisconsin Administrative Code chapter NR 149.

Samples from the 002 Outfall will be collected by a stationary refrigerated composite sampler located downstream from the settling ponds but prior to discharge to the Flambeau River. The probable sample location will be located at the effluent control structure prior to the 90° V-notch weir.

B. Effluent Sampling Specifics

The Flambeau Mining Co. (Flambeau) will be responsible for effluent and receiving water sampling, handling and transportation to Northern Lakes Laboratory for testing. The actual services will be provided either by Flambeau personnel or their designated representative. Field operations will generally consist of flow measurement, sample procurement measurement of sample characteristics, sample preservation, sample documentation and record-keeping, as well as shipment to the laboratory for analysis.

1. Sample Type

The receiving water sample will be a grab sample. The sample from outfall 002 will be a time-proportional composite sample collected over a 24-hour period.

2. Sample Location

The sample from outfall 002 will be collected from a composite wastewater sampler located at the effluent control structure. Samples will be drawn from the flow prior to the 90° V-notch weir.

3. Sample Containers and Shipping Coolers

The commercial laboratory will provide Flambeau with sample containers (new containers) and shipping coolers for the samples. Flambeau will notify the laboratory in advance of the anticipated testing in order that the containers and coolers can be shipped in a reasonable time frame.

4. Sample Labeling

Each sample collected will contain a label with the following minimum information:

- Client identification
- Individual collecting the sample
- Sample identification
- Date and time of sampling
- Sample type (grab or composite)

Care will be taken when labeling samples such that the label cannot be washed off or smeared when ice is added to the cooler.

5. Sample Preservation

The samples will be refrigerated during the 24 hours they are being composited. The temperature of the refrigerators will be maintained at 4°C. A thermometer will be placed in each unit to ensure that the 4°C temperature is maintained.

Upon completion of the 24 sample collection period, the samples will be transferred from the polyethylene sample container inside the refrigerator to the labeled sample containers provided by the laboratory. These samples, along with the grab sample from the receiving water, will be placed inside the coolers for shipment. The coolers will then be filled with a sufficient amount of wet ice to maintain the temperature of the samples at, or less than, 10°C until receipt by the laboratory the following day.

6. Chain-of-Custody Record and Custody Seal

A chain-of-custody record will be completed for all samples to be shipped to the laboratory. At a minimum, the chain-of-custody record will include the following information:

- Client identification
- Samplers signature
- Sample identification
- Number of containers
- Sample type (grab or composite)
- Date and time of sampling
- Initial temperature and pH of sample (if known)

- Carrier identification (UPS, Federal Express, etc.)
- Shippers signature, date and time

The shipper will keep a copy of the completed chain-of-custody record for Flambeau files in order to demonstrate sample custody. The shipper will place the completed chain-of-custody record inside a sealed plastic bag and place the sealed bag inside the cooler with the samples. The cooler will then be securely fastened for shipment to the laboratory. A custody seal will be placed around the cooler to ensure that no tampering of the samples takes place.

7. Sample Transportation

Flambeau will select a common carrier, who will guarantee delivery by 10:30 a.m. the next day, to transport the samples to the laboratory. The samples will be collected, shipped and delivered according to the laboratory overnight delivery schedule. Flambeau will retain a copy of the shipping documents for their files to demonstrate sample custody. Flambeau will also notify the laboratory in advance of the shipment. In return, the laboratory should be requested to notify Flambeau upon receipt of the samples.

As an alternate, Flambeau may also choose to hand deliver the samples to the laboratory by 10:30 a.m. on the day of sample collection. In this case, the samples will be collected and delivered according to the laboratory hand delivery schedule. Upon delivery of the samples, Flambeau will receive a signed copy of the chain-of-custody record from sample receiving personnel at the laboratory.

C. Sampling Procedures

Water samples will be collected at the effluent control structure prior to the 90° V-notch weir. The following provides the effluent limitations and monitoring requirements for the 002 outfall.

1. Until September 30, 1995, Flambeau is authorized to discharge: 1) water from the open pit mine before the exposure of Type II waste rock, 2) runoff from the Type I waste rock storage area (low sulfur), and 3) runoff from other areas that has not contacted either the high sulfur waste rock or the ore, through Outfall 002 (settling pond effluent).

2. This discharge shall be limited and monitored by Flambeau as specified below.
 - a. There shall be no discharge of floating solids or visible foam in other than trace amounts.
 - b. Samples taken in compliance with the monitoring requirements specified below shall be taken at the following location: Outfall 002 (settling pond effluent), prior to discharge to the Flambeau River.
3. If the monitoring frequency is insufficient to allow calculation of a weekly average, this limitation shall be considered a daily maximum. If Flambeau monitors this or any pollutant more frequently than required by this permit, the results shall be recorded and reported in accordance with Part II, 15 of the WPDES permit.
4. A representative composite sample shall be collected during the hours of discharge. If the sample is not collected throughout the entire time of discharge, the sample type and the hours of discharge shall be recorded on the Discharge Monitoring Report (DMR).
5. Measurement in the "total recoverable" form is acceptable where such a test is available.
6. In the permit application, the effluent was not analyzed for the substances listed in Table 5-1. Under the WPDES permit, the first 12 analyses shall be collected on no less than a monthly basis over a minimum of nine months. The results will be used to determine the need for continuing monitoring and effluent limitations at this outfall. If the substance is consistently not detected using the analytical method specified below, or is consistently detected at a concentration at or below the level of concern listed below, no additional monitoring for the substance will be required under Part I, A. In addition, the effluent limitation for that substance contained in Part I, A, listed above will not be in effect. If the substance is consistently detected at a concentration exceeding the level of concern, the effluent limitation shown above will become effective. Monitoring shall continue on no less than a monthly frequency. If the parameter is subject to mass limits, additional sampling may be required as described in 7 below:

Table 5-1

Effluent Characteristic	Effluent Limitations				Monitoring Requirements	
	Daily Maximum	Monthly Average	Weekly Average (3)	--Mass Limit	Sample Frequency	Sample Type
Flow - (MGD)	--	--	--	--	Daily	Continuous
Total Suspended Solids	30 mg/L	20 mg/L	--	--	Daily	Composite (4)
Aluminum ⁶	1500 ug/L	--	--	--	(6)	Composite (4)
Arsenic	730 ug/L	--	--	--	(6)	Composite (4)
Beryllium	--	0.67 lb/day ⁷	--	--	(6)	Composite (4)
Cadmium ^{5,8}	95 ug/L	50 ug/L	7.1 ug/L	0.046 lb/day ⁷	(9)	Composite (4)
Chromium, total (or +3) ^{5,8}	5400 ug/L	--	980 ug/L	6.4 lb/day ⁷	(6)(9)	Composite (4)
Chromium (+6) ⁵	28 ug/L	--	--	--	(6)	Composite (4)
Copper ^{5,8}	50 ug/L	--	--	--	(9)	Composite (4)
Lead ^{3,8}	590 ug/L	--	140 ug/L	0.89 lb/day ⁷	(9)	Composite (4)
Mercury ¹⁰	--	0.002 ug/L	--	--	(9)	Composite (4)
Nickel ^{5,8}	3100 ug/L	--	1200 ug/L	7.6 lb/day ⁷	(6)(9)	Composite (4)
Selenium ⁵	120 ug/L	--	--	--	(6)	Composite (4)
Silver ^{5,8}	6.6 ug/L	--	--	--	(6)	Composite (4)
Zinc ^{5,8}	300 ug/L	--	--	--	(6)	Composite (4)
pH (standard units)	(11)	--	--	--	Daily	Grab
Hardness, mg/L as CaCO ₃	--	--	--	--	Quarterly	Composite (4)
Effluent Toxicity	--	--	--	--	(12)	Grab Comp
Water Treatment Additives (lbs or gallons)	--	--	--	--	Monthly	Record of Addition (13)

Table 5-2

Substance*	Level of Concern**	Analytical Method***
Aluminum	300 ug/l	202.2
Arsenic	146 ug/l	206.2, 206.3
Beryllium	20 ug/l	210.2
Chromium Total (or +3)	1072 ug/l	218.1, 218.2, or 200.7
Chromium (+6)	7 ug/l	218.4
Nickel	624 ug/l	249.1, 279.2
Selenium	23 ug/l	270.2, 270.3
Silver	1.3 ug/l	272.2
Zinc	60 ug/l	289.1, 289.2

* Measurement in the "total recoverable" form is acceptable where such a test is available.

** As listed in the table or "non detected", if the value in the table is exceeded by the limit of detection of the analytical method.

*** Suggested EPA test method.

7. Flambeau shall report both the concentration and the mass of this substance at this outfall for this parameter calculated by the following formula:

$$\text{Mass loading (lb/day)} = \text{concentration (ug/l)} \times \text{flow (MGD)} \times 8340 \text{ (lb-L/ug-MG)}$$

The mass limits shall be reported as a monthly average, and shall be applied to the sum of the loadings to the Flambeau River through Outfalls 001 and 002. This mass limitation is based on the weekly average concentration limit for this metal, except for beryllium, which is based on the monthly average concentration, at the design flow of the wastewater treatment facility of 780,000 gallons per day, or 0.78 MGD. Once discharge begins at Outfall 001, if a discharge occurs concurrently at both outfalls

during the same 24-hour period, a sample shall be collected at both outfalls to determine the total mass for this metal in the combined discharge.

8. The limitation is based on a proposed effluent hardness of 152 ppm (as CaCO₃). If the measured hardness is substantially different, the WPDES permit may be modified to reflect the changes in the effluent limitation for this metal.
9. The sample frequency for this parameter shall be no less than monthly until the effluent sample is collected at Outfall 1 for completion of the 2C NPDES Application, after which the frequency shall be no less than twice a month and subject to sampling whenever both outfalls discharge during the same 24-hour period, as described in condition 7 above.
10. Additional instructions for the determination of compliance with the limitations for this substance are contained in Part I, D of the WPDES permit.
11. The range for pH shall be 6.0 to 9.0 standard units.
12. Effluent toxicity and evaluation shall be conducted according to the requirements contained in Part I, E of WPDES permit.
13. Flambeau shall report the total amount of each water treatment additive used for the month and furnish a record of daily addition.
14. Additional treatment shall be provided for the effluent at this outfall if the limitations listed in Part I, A of the WPDES permit, cannot be met.
15. If an analysis of effluent data indicates a trend of increasing effluent concentrations for copper, cadmium, lead or chromium, the permittee shall conduct tests of the solubility of solids or other tests determined to be appropriate following discussions with the permittee and the Department.
16. Runoff from the lined Type II (high sulfur) waste rock storage area shall not be discharged at Outfall 002.
17. Flambeau shall notify the Department when the storage of Type II waste rock begins and when ore shipping begins.

Quality Assurance/Quality Control Biomonitoring Study Plan

10th Edition

Quality Assurance/Quality Control
Biomonitoring Study Plan

Lambert
Ladysmith

Quality Assurance/Quality Control

Foth & Van Dyke

R E P O R T

**Quality Assurance/Quality Control
Biomonitoring Study Plan**

Scope ID: 91F6

*Flambeau Mining Company
Ladysmith, Wisconsin*

October 1992

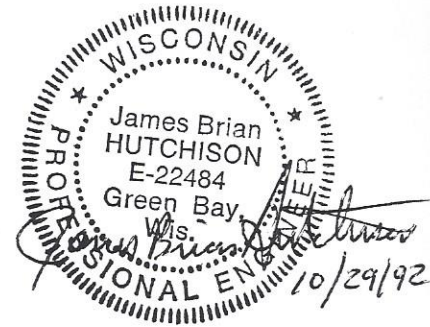
**Quality Assurance/Quality Control
Biomonitoring Study Plan**

Scope ID: 91F6

Prepared for
Flambeau Mining Company
Ladysmith, Wisconsin

Prepared by
Foth & Van Dyke and Associates Inc.

October 1992



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Quality Assurance/Quality Control Biomonitoring Study Plan

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Appendix A	Acute/Chronic Bioassay Plan	
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1 Description of Activities

The Quality Assurance/Quality Control Biomonitoring Study Plan is being submitted in accordance with the requirements of Section E(4) of Part I of the WPDES Permit No. WI-0047376-1 for the Flambeau Mining Co. Section E(4) requires Flambeau Mining Co. (Flambeau) to perform effluent toxicity test batteries. All toxicity tests required by the permit shall be conducted according to the QA/QC plan.

Flambeau is required to perform the effluent toxicity test batteries as follows:

- a. Flambeau shall conduct an acute toxicity test battery using the procedure described in the QA/QC plan twice each year following commencement of discharging effluent from outfall 001 (wastewater treatment plant effluent). Flambeau will conduct these tests between the months of May-September and November-April.
- b. Flambeau shall conduct an acute toxicity test battery using the procedure described in the QA/QC plan once during the first year of permit issuance and twice each year thereafter for effluent discharged from outfall 002 (settling pond effluent). Flambeau will conduct these tests between the months of May-September and November-April.
- c. Flambeau shall conduct a chronic toxicity test battery using the procedure described in the QA/QC plan once each year between the months of June-September upon commencement of discharging effluent from outfall 001.

2 Acute/Chronic Bioassay Study Plan

Flambeau has selected Integrated Paper Services, Inc. (IPS) as the laboratory to perform this effluent toxicity testing. A copy of the IPS Study Plan for Flambeau is found in Appendix A. The plan and use schedules for hand delivery and overnight delivery are found in Tables 2-1 and 2-2 respectively. IPS standard operating procedures (SOP) and quality assurance practices are incorporated in the plan by reference to their SOP document which is approved and on file with the Wisconsin Department of Natural Resources.

Table 2-1

Sample Acquisition/Hand Delivery/
Use Schedules for Flambeau Mining Co.

Sample	Sample Type	Volume (gal)	Delivery ^a	Test Use
Acute(s):				
River: Tuesday	Grab	3.5	Tuesday	Ac(1-4)
Effluent: Monday-Tuesday	001 Comp.	2	Tuesday	Ac(1-2)
	002 Comp.	2	Tuesday	Ac(1-2)
Effluent: Wednesday- Thursday	001 Comp.	2	Thursday	Ac(3-4)
	002 Comp.	2	Thursday	Ac(3-4)
Chronic:				
River: Tuesday	Grab	6	Tuesday	Ch(1-7)
Effluent: Monday-Tuesday	001 Comp.	1	Tuesday	Ch(1-2)
	001 Comp.	1	Thursday	Ch(3-4)
Effluent: Wednesday- Thursday	001 Comp.	1	Thursday	Ch(3-4)
	001 Comp.	2	Friday	Ch(5-7)
Acute/Chronic:				
River: Tuesday	Grab	10	Tuesday	Ac(1-4)/Ch(1-7)
Effluent: Monday-Tuesday	001 Comp.	2.5	Tuesday	Ac(1-2)/Ch(1-2)
	002 Comp.	2	Tuesday	Ac(1-2)
Effluent: Wednesday- Thursday	001 Comp.	2.5	Thursday	Ac(3-4)/Ch(3-4)
	002 Comp.	2	Thursday	Ac(3-4)
Effluent: Thursday-Friday	001 Comp.	2	Friday	Ch(5-7)

^a Delivery by 10:30 a.m.

Table 2-2

**Sample Acquisition/Overnight Delivery/
Use Schedules for Flambeau Mining Co.**

Sample	Sample Type	Volume (gal)	Delivery ^a	Test Use
Acute(s):				
River: Monday	Grab	3.5	Monday/Tuesday	Ac(1-4)
Effluent: Sunday-Monday	001 Comp.	2	Monday/Tuesday	Ac(1-2)
	002 Comp.	2	Monday/Tuesday	Ac(1-2)
Effluent: Tuesday- Wednesday	001 Comp.	2	Wednesday/Thursday	Ac(3-4)
	002 Comp.	2	Wednesday/Thursday	Ac(3-4)
Chronic:				
River: Monday	Grab	6	Monday/Tuesday	Ch(1-7)
Effluent: Sunday-Monday	001 Comp.	1	Monday/Tuesday	Ch(1-2)
	001 Comp.	1	Wednesday/Thursday	Ch(3-4)
Effluent: Thursday-Friday	001 Comp.	2	Friday/Saturday	Ch(5-7)
Acute/Chronic:				
River: Monday	Grab	10	Monday/Tuesday	Ac(1-4)/Ch(1-7)
Effluent: Sunday-Monday	001 Comp.	2.5	Monday/Tuesday	Ac(1-2)/Ch(1-2)
	002 Comp.	2	Monday/Tuesday	Ac(1-2)
Effluent: Tuesday- Wednesday	001 Comp.	2.5	Wednesday/Thursday	Ac(3-4)/Ch(3-4)
	002 Comp.	2	Wednesday/Thursday	Ac(3-4)
Effluent: Thursday-Friday	001 Comp.	2	Friday/Saturday	Ch(5-7)

^a Delivery by 10:30 a.m.

3 Statement of Effluent Sampling Specifics

Flambeau will be responsible for effluent and receiving water sampling, handling and transportation to IPS for testing. Samples to be collected for toxicity testing include the receiving water (Flambeau River), Outfall 001 (wastewater treatment plant effluent) and Outfall 002 (settling pond effluent).

3.1 Sample Type

The receiving water sample will be a grab sample. The sample from Outfall 001 will be a flow-proportional composite sample collected over a 24-hour period. The sample from Outfall 002 will be a time-proportional composite sample collected over a 24-hour period.

3.2 Sample Volume and Frequency

The sample volume and frequency of collection will be as shown in the Plan and Use Schedules (Tables 2-1 and 2-2).

3.3 Sample Location

The receiving water sample will be collected from the Flambeau River at the west end of Blackberry Lane. This location is upstream from and out of contact with Outfalls 001 and 002. The sample will be collected by inverting the sample containers and submerging them below the water surface to about mid-depth. The sample bottles will then be turned upright and allowed to fill. Care will be taken not to disturb the river bottom sediments.

The sample from Outfall 001 will be collected from a stationary refrigerated composite sampler (ISCO Model 2910R or equal) located downstream from the wastewater treatment plant process but prior to discharge to the Flambeau River.

The sample from Outfall 002 will be collected from a similar composite wastewater sampler located downstream from the settling ponds but prior to discharge to the Flambeau River.

3.4 Sample Containers and Shipping Coolers

IPS will provide Flambeau with sample containers (new cubitainers) and shipping coolers for the toxicity testing. Flambeau will notify IPS several weeks in advance of the anticipated testing in order that the containers and coolers can be shipped in a reasonable time frame.

3.5 Sample Labeling

Each sample collected will contain a label with the following minimum information:

- Client identification
- Individual collecting the sample
- Sample identification (001, 002 or receiving water)
- Date and time of sampling
- Sample type (grab or composite)

Care will be taken when labeling samples such that the label cannot be washed off or smeared when ice is added to the cooler.

3.6 Sample Preservation

The samples from Outfalls 001 and 002 will be refrigerated during the 24 hours they are being composited. The temperature of the refrigerators will be maintained at 4°C. A thermometer will be placed in each unit to ensure that the 4°C temperature is maintained.

Upon completion of the 24-hour sample collection period, the samples will be transferred from the polyethylene sample container inside the refrigerator to the labeled sample containers provided by IPS. These samples, along with the grab sample from the receiving water, will be placed inside the IPS coolers for shipment. The coolers will then be filled with a sufficient amount of wet ice to maintain the temperature of the samples at, or less than, 10°C until receipt by IPS the following day.

3.7 Chain-of-Custody Record and Custody Seal

An IPS chain-of-custody record will be completed for all samples to be shipped to IPS. See Figure 3-1. At a minimum, the chain-of-custody record will include the following information:

- Client identification
- Samplers signature
- Sample identification (001, 002 or receiving water)
- Number of containers
- Sample type (grab or composite)
- Date and time of sampling
- Initial temperature and pH of sample (if known)
- Carrier identification (UPS, Federal Express, etc.)
- Shippers signature, date and time

The shipper will keep a copy of the completed chain-of-custody record for Flambeau files in order to demonstrate sample custody. The shipper will place the completed chain-of-custody record inside a sealed plastic bag and place the sealed bag inside the cooler with the samples. The cooler will then be securely fastened for shipment to IPS. An IPS custody seal will be placed around the cooler to ensure that no tampering of the samples takes place.

3.8 Sample Transportation

Flambeau will select a common carrier, who will guarantee delivery by 10:30 a.m. the next day, to transport the samples to IPS. The samples will be collected, shipped and delivered to IPS according to the IPS overnight delivery schedule found in Table 2-2. Flambeau will retain a copy of the shipping documents for their files to demonstrate sample custody. Flambeau will also notify IPS in advance of the shipment. In return, IPS will notify Flambeau upon receipt of the samples.

FIGURE 3.1

Chain-of-Custody Record



Environmental and Analytical Services

Integrated Paper Services, Inc.
 Aquatic Toxicology Lab
 101 W. Edison Ave., Suite 250
 Appleton, WI 54915

Client _____

Return Samples To: _____

Sampled by: _____
 (signature)

Sample Identification	Containers	Grab Date/Time	Composite		Collection				Receipt								
			Start Date/Time	End Date/Time	Temp. (°C)	pH	NH ₃ -N	Cl ₂	Temp. (°C)	pH	DO	Cl ₂	NH ₃ -N				
①																	
②																	
③																	
④																	
⑤																	

Remarks: _____

Laboratory ID: ③ _____
 ④ _____
 ⑤ _____

Custody Seal: OK / Broken

Relinquished by: _____ Date/Time _____
 (to carrier)

Relinquished by: _____ Date/Time _____
 Received for lab: _____ Date/Time _____
 Carrier Identification (UPS, Fed-Ex, etc.) _____

As an alternate, Flambeau may also choose to hand deliver the samples to IPS by 10:30 a.m. on the day of sample collection. In this case, the samples will be collected and delivered according to the IPS hand delivery schedule found in Table 2-1. Upon delivery of the samples to IPS, Flambeau will receive a signed copy of the chain-of-custody record from sample receiving personnel at IPS.

Appendix A

Acute/Chronic Bioassay Study Plan for Flambeau Mining Co.

Acute/Chronic Bioassay Study Plan for Flambeau Mining Co.

This plan, when accompanied by a detailed description of methods for effluent and receiving water sampling, handling, and transportation to the IPS laboratory comprises the QA/QC biomonitoring study plan required as per Section E(4)(a) of WPDES Permit No. WI-0047376-1. This plan is intended for submission to the Wisconsin Department of Natural Resources.

Prescreen Tests

Date: Within two weeks prior to definitive tests.

Samples: 0.5 gallon Flambeau River water (grab sample from upstream and outside of all influence of the outfall) and/or 0.25 gallon effluent (grab sample)

Definitive Tests

Type: Acute tests using fathead minnows (96 hour), Daphnia magna, and Daphnia pulex (48 hour)

Seven-day fathead minnow and C. dubia chronic tests

Date: Acute - Outfall 001 effluent twice annually (November-April and May-September) following commencement of discharge for term of permit; Outfall 002 effluent once during year of permit issuance and twice annually (November-April and May-September) following commencement of discharge for term of permit.

Chronic - Outfall 001 effluent once annually (June-September) following commencement of discharge for term of permit

Test Organisms: Acute - Fathead minnows (20-40 days old), Daphnia magna and Daphnia pulex (<24 hours old at test initiation)

Chronic - Fathead minnows (<24 hours old at test initiation) and Ceriodaphnia dubia (<24 hours old and within 8 hour window at test initiation)

Treatments: Acute - 100% (v:v) Outfall 001 and Outfall 002 effluents, Flambeau River water (primary control/diluent), and laboratory water (secondary control/diluent)

Chronic - 1% (IWC) and 100% (v:v) Outfall 001 effluent, Flambeau River water (primary control/diluent), and laboratory water (secondary control/diluent)

Samples: See Tables 2 and 3

Reporting: Formal report issued within ten business days after completion of the test

Laboratory Identification: Integrated Paper Services, Inc.
P.O. Box 446
101 W. Edison Avenue, Suite 250
Appleton, WI 54912-0446

Applicable SOP Documentation: Sections 4, 5.2, 5.3, 5.4.1, 5.4.3, 5.5.1, 5.5.2, 6 and 7 of, and amendments to, Standard Operational Procedures document dated February 1, 1990.

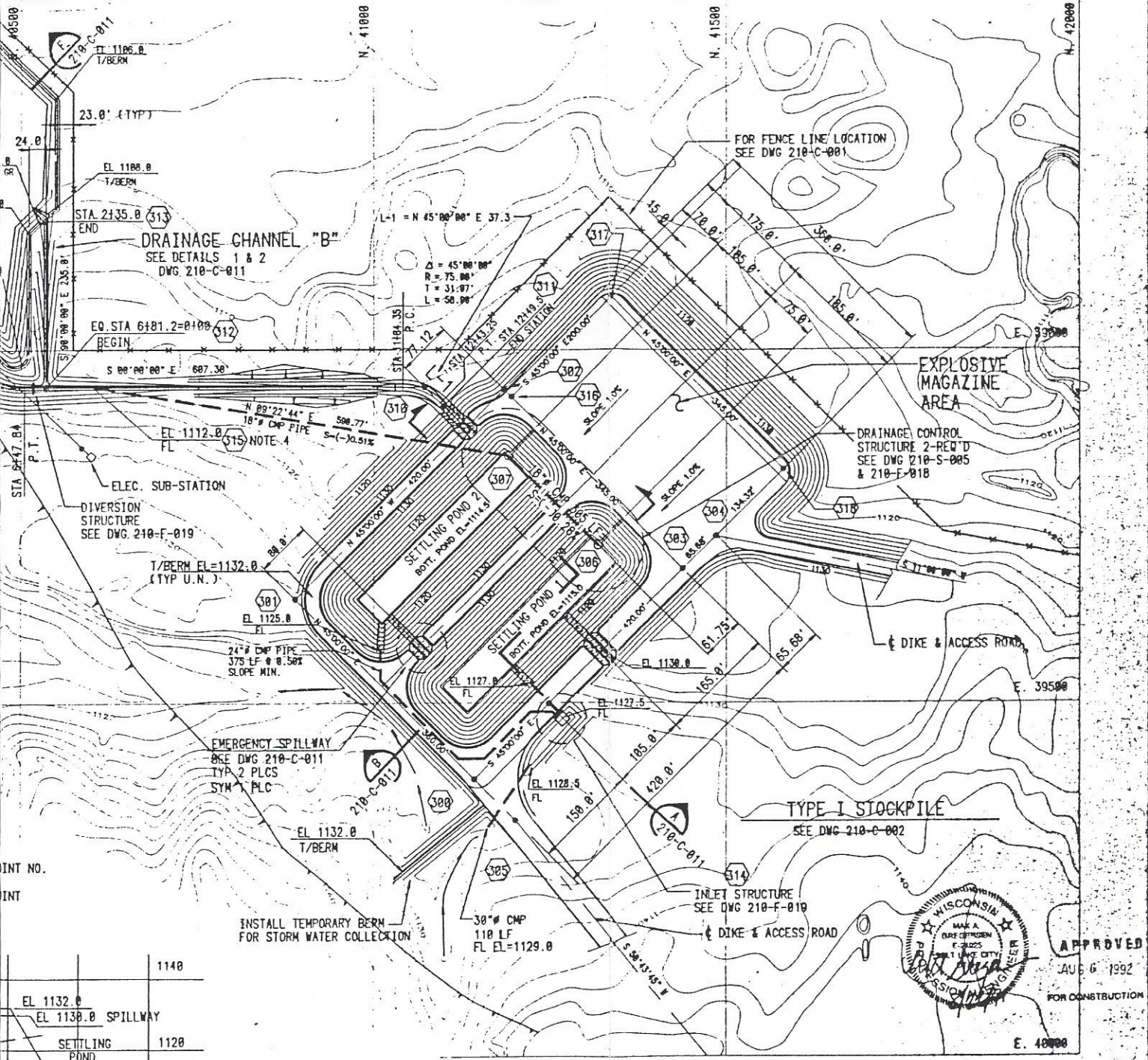
B. Valve Inventory and Diagrams

Valve Inventory Sheets

Valve No.	Function	Size	Type	Diagram No's.	Location	Method of Control
GT-01	Controls influent flow to settling pond no. 1	24"	Sluice Gate	3	Influent Diversion Structure	Manual
GT-02	Controls influent flow to settling pond no. 2	24"	Sluice Gate	3	Influent Diversion Structure	Manual
GT-03	Controls effluent flow from settling pond no. 1	16"	Flap Gate	4,5	Outfall Structure Settling Pond No. 1	Manual
GT-04	Controls effluent flow from settling pond no. 1	16"	Flap Gate	4,5	Outfall Structure Settling Pond No. 1	Manual
GT-05	Controls effluent flow from settling pond no. 1	16"	Flap Gate	4,5	Outfall Structure Settling Pond No. 1	Manual
GT-06	Controls effluent flow from settling pond no. 1	16"	Flap Gate	4,5	Outfall Structure Settling Pond No. 1	Manual
GT-07	Controls effluent flow from settling pond no. 2	16"	Flap Gate	4,5	Outfall Structure Settling Pond No. 2	Manual
GT-08	Controls effluent flow from settling pond no. 2	16"	Flap Gate	4,5	Outfall Structure Settling Pond No. 2	Manual
GT-09	Controls effluent flow from settling pond no. 2	16"	Flap Gate	4,5	Outfall Structure Settling Pond No. 2	Manual
GT-10	Controls effluent flow from settling pond no. 2	16"	Flap Gate	4,5	Outfall Structure Settling Pond No. 2	Manual

Diagrams

E. 38500



1140
EL 1132.0 EL 1130.0 SPILLWAY
SETTLING POND
1120
S = (-) 12.55%
1100
1080
3400 14100

NOTES:

- 1- FOR DETAILS AND GENERAL NOTES FOR 002 OUTFALL CONSTRUCTION SEE DWG 210-C-011.
- 2- FOR ADDITIONAL COORDINATES AND BASIS FOR COORDINATE CONTROL SEE DWG 210-C-001.
- 3- CMP DENOTES CORRUGATED METAL PIPE.
- 4- RIP-RAP TRENCH AT PIPE OUTLET FOR EROSION PROTECTION.
- 5- FOR PAD AND ROADWAY FINISH GRADE SURFACING LIMITS SEE DWG. 210-C-011.

- 6- ELEVATIONS GIVEN AT COORDINATE CONTROL POINT PI'S SHALL BE CONSIDERED AT THE CENTER OF THE ADJACENT ROAD/BERM MID POINT ON THE CURVE.
- 7- MINIMUM RADIUS OF BERM OR ROAD FILLET SHALL BE 50 FT. UNLESS NOTED.
- 8- MINIMUM RADIUS AT EDGE OF PAD FILLET SHALL BE 25 FT. UNLESS NOTED.
- 9- CONSTRUCT FLOOD CONTROL DIKE FINISH GRADE TO AN ELEVATION ONE FOOT ABOVE THAT SHOWN IN SECTION C, DWG 210-C-011 TO ALLOW FOR SETTLEMENT.



APPROVED
AUG 6 1992
FOR CONSTRUCTION

Bacon & Davis Utah, Inc.
ENGINEERS - CONSTRUCTORS
CHIPETA WAY SALT LAKE CITY, UTAH



CURRENT DRAWING STATUS		BY	DATE
PRELIMINARY OR PLANNING			
APPROVED FOR FINAL DESIGN			
IN FINAL DESIGN			
APPROVED FOR QUOTE/PURCH	RR	6-27-91	
APPROVED FOR CONSTRUCTION	RR	7-17-91	

FLAMBEAU PROJECT
LADYSMITH, WISCONSIN

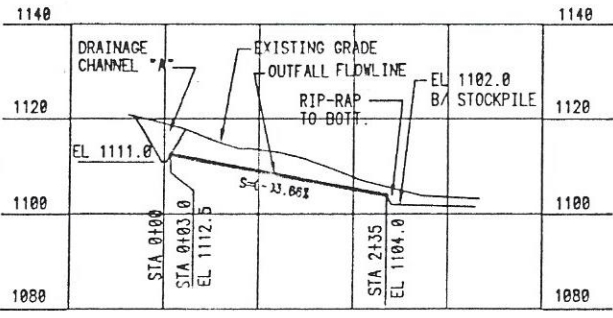
FLAMBEAU MINING COMPANY
LADYSMITH WISCONSIN 54848

FLAMBEAU MINE	
SETTLING PONDS AND OUTFALL 002	
PLAN & PROFILE	

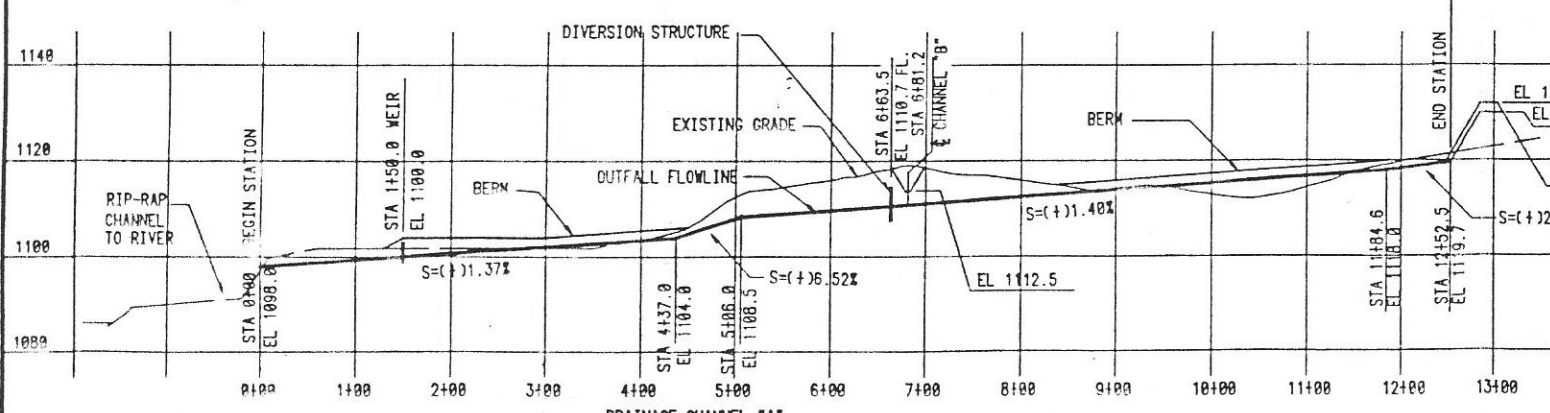
MICROFILM	JOB
	10182
DRAWING NO.	REV.
210-C-005	2
DIVISION DRAWING NO.	
SCALE	1"=100'

CONTROL COORDINATES

PT	COORDINATE (N/E)	ELEV	DESCRIPTION
300	N 41142.3500 E 39608.2191	1137.0	SETTLING POND P.I.
301	N 40887.7915 E 39353.6608	1132.0	SETTLING POND P.I.
302	N 41184.7784 E 39058.8758	1132.0	SETTLING POND P.I.
303	N 41439.3348 E 39311.2342	1132.0	SETTLING POND P.I.
304	N 41485.7790 E 39284.7900	1132.0	DIKE & ROAD P.I.
305	N 41700.8084 E 39488.8798	1132.0	DIKE & ROAD P.I.
306	N 41317.8892 E 39277.1183	1115.0	WP DRAINAGE CONTROL STRUCT.
307	N 41190.8100 E 39149.8371	1114.5	WP DRAINAGE CONTROL STRUCT.
308	N 40020.2327 E 39833.5945	1098.0	CHANNEL "A" P.O.B.
309	N 40485.2970 E 39053.5827	1114.0	CHANNEL "A" P.I.
310	N 41072.9015 E 39053.5827	1112.0	CHANNEL "A" P.I.
311	N 41098.9879 E 39079.8491	1119.7	CHANNEL "A" END
312	N 40533.4288 E 39053.5827	1110.95	CHANNEL "A" & "B" INTERSECTION
313	N 40533.4288 E 39018.5670	1104.0	CHANNEL "B" END
314	N 41248.4180 E 39502.1531	1112.0	WP @ INLET STRUCTURE & ROAD CL.
315	N 40807.7355 E 39053.5827	1112.0	WP @ END OF DRAIN PIPE
316	N 41195.3830 E 39087.2824	1132.0	ROAD CL.
317	N 41338.8043 E 39925.8810	1134.0	CORNER PAD
318	N 41580.7582 E 39168.8129	1134.0	CORNER PAD



DRAINAGE CHANNEL "B" PROFILE
SCALE 1"=100' (HORIZ)
1"=20' (VERT)



DRAINAGE CHANNEL "A" PROFILE
SCALE 1"=100' (HORIZ)
1"=20' (VERT)

DWG. NO	DESCRIPTION	NO	DATE	REVISIONS	BY	CHKD	DATE	NO	DATE	REVISIONS	BY	CHKD	DATE
210-C-001	PLOT PLAN	A	5/13/91	FOR QUOTE	JP			1	5/31/91	ADD NOTES 6,7,8, LEGEND	JP	GLT	6/1/91
210-C-003	TYPE I STOCKPILE PLAN	B	6/14/91	FOR FATHWORK QUOTE	JP			2	8/28/91	FLOOD CONTROL DIKE MODIFICATION	JP	GLT	9/1/91
210-C-011	SETTLING PONDS SECTIONS & DETAILS	C	16-17-91	ADD EXPLOSIVE MAGAZINE AREA PAD	JP	GLT							
210-S-005	DRAINAGE CONTROL STRUCTURE	D	7/19/91	ADD HYDRIC SOIL STOCKPILE BERM	JP	GLT							
210-F-019	DRAINAGE DIVERSION STRUCTURE	E	7-12-91	FOR CONSTRUCTION	GLT	TOR	GB	PR					

Ford, Ba
ENG
375 CHIPET

04/83