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1515 Mineral Square
P.O. Box 11248
Salt Lake City, Utah 84147
Telephone (801) 322-8460
FAX (801) 583-3129

March 29, 1989

Kennecott

87K10-57

Mr. Dan Johnston
Bureau of Air Management
Wisconsin Department of Natural Resources
101 South Webster Street, GEF II
P. O. Box 7921
Madison, WI 53707

Dear Mr. Johnston:

RE: Submittal of Air Pollution Control Permit
Application for the Kennecott Flambeau Project

The Kennecott Minerals Company (Kennecott) has proposed to establish an open pit mine south of Ladysmith, Wisconsin. The mine has a scheduled life of approximately nine years including preproduction and reclamation.

The mine will be located in an attainment area. Environmental impacts of the mining operation are anticipated to be minimal as Kennecott plans to employ only primary ore crushing and established dust suppression techniques for the project.

The United States Environmental Protection Agency, Region V (USEPA) concurred with Kennecott's preliminary determination of particulate emissions in a letter dated January 6, 1988. In that letter USEPA agreed, based on published emission data (Table 8.23-1, AP-92) that the estimated fugitive emissions from the crushing operation would be 80 tons per year. In support of the attached application, Kennecott has performed more detailed calculations based on the proposed mine plan. Our results indicate that fugitive emissions will actually be no more than 46 tons per year, which is significantly less than originally projected. Projected emissions from the mining operation are not anticipated to exceed the values (TSP $\geq$ 250 tons per year) designating a "major new source" under Prevention of Significant Deterioration (PSD) Regulations (40 CFR 51.24). Therefore, the Flambeau mine is not considered a major new source.

Enclosed are four copies of the Air Pollution Control Permit Application for the Kennecott Flambeau Project. The permit application includes:

1. Form 4500-1A Facility and Project Identification
2. Form 4500-1F Facility Plot Plan
3. Form 4500-1S Wastewater Treatment Plant Stack Identification - Exhaust Vent - Lime Silo
4. Form 4500-1C Wastewater Treatment Plant Control Equipment - Lime Silo
5. Form 4500-1P Wastewater Treatment Plant Miscellaneous Process - Lime Silo
6. Form 4500-1P Miscellaneous Process - Fugitive Dust Generation
7. A check in the Amount of \$500.00 to cover Application Fee.

In addition, the mine will include several sources which are exempt from permit requirements. In accordance with discussions between representatives of the Department and Kennecott, we have provided information describing these sources to assist the WDNR in its understanding of the project and its processing of the permit. The exempt sources include:

- Space heaters (laboratory, office, truck shop and wastewater treatment plant). All units incorporated into the project will burn natural gas and have a heat output less than 30 MM Btu/hr (NR 406.04(a)(5)). See Section 6.0 of this application.
- Laboratory fume hood (NR 406.04 1.(i)).
- Exhaust emissions from equipment which is capable of emitting an air contaminant while moving (Wis. Stat. s. 144.30 (30) and NR406). See Section 6.0 of this application.
- Diesel fuel tank (capacity <40,000 gallons) (NR 406.04 1.(e)).

We are requesting that the Wisconsin Department of Natural Resources review this application as expeditiously as possible such that permitting activities associated with the project can continue in a timely manner.

Mr. Dan Johnston
Wisconsin Department of Natural Resources
March 29, 1989
Page 3

As per an agreement developed with the Department, it is our understanding that the WDNR will distribute this report to all appropriate state and federal agencies. Kennecott will distribute the document to appropriate local public officials.

Should you have any questions regarding the application, please feel free to contact us at your convenience.

Sincerely,

Lawrence E. Mercando

Lawrence E. Mercando
Director, Process Development

LEM:psl

Enclosures

DISTRIBUTION LIST

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1	Norm Arndt Rusk County Zoning Administrator 311 E. Miner Avenue Ladysmith, WI 54848
1	William G. Thiel Jordan, Herrell and Thiel 2600 Stein Boulevard Eau Claire, WI 54701
1	Master File

AIR POLLUTION CONTROL
PERMIT APPLICATION
FOR THE
KENNECOTT FLAMBEAU PROJECT



Gerald W. Sevik
3/29/89

Prepared for:
KENNECOTT MINERALS COMPANY

Prepared by:
FOTH & VAN DYKE and Associates Inc.
2737 S. Ridge Road
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Green Bay, Wisconsin 54307-9012

MARCH 1989

Foth & Van Dyke

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1.0 DESCRIPTION OF THE PROPOSED PROJECT

1.1 Introduction

The project facilities will consist of an open pit mine; an unlined (Type I) stockpile for storage of overburden, saprolite, sandstone, and waste rock containing very low levels of sulfide mineralization; a lined (Type II) stockpile for storage of saprolite and waste rock containing slightly higher levels of sulfide mineralization; a topsoil stockpile; water control features; a wastewater treatment plant; and ancillary facilities such as an office, railroad spur line, and maintenance building.

Figure No. 1 has been prepared to graphically illustrate the proposed project. The figure is a plan view of the mine area showing the location and relative size of key project elements.

1.2 Geology

1.2.1 Description of Site Geology

Precambrian volcanic rock, Cambrian sandstone, and Quaternary glacial and fluvial sediments are present beneath the project area. The geology has been defined from hundreds of soil borings and core samples drilled on site and from scattered outcrops along the banks of Meadowbrook Creek.

The steeply dipping Precambrian rock has been highly altered during mountain building processes to schist, which was later weathered and further altered. The top ten to 20 feet of

37000 E

38000 E

39000 E

40000 E

41000 E

42000 E

43000 E

44000 E

45000 E



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	STATE PLANE COORDINATES
CONTROL MONUMENT F-1	
40000 N =	587,357.8887 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.

5. MINE FACILITIES DESIGN BY FORD, BACON & DAVIS, INCORPORATED, SALT LAKE CITY, UTAH AND PINCOCK, ALLEN & HOLT, INCORPORATED, LAKEWOOD, COLORADO.

LEGEND

- | | |
|--------|-------------------------------|
| —1100— | EXISTING CONTOUR |
| ===== | EXISTING PAVED ROADWAY |
| ----- | EXISTING TRAIL/GRAVEL SURFACE |
| | TREES AND/OR BRUSH |
| *** | FENCE |
| ● F-1 | CONTROL MONUMENT |



FOTH & VAN DYKE

GEOSCIENCES & ENVIRONMENTAL MANAGEMENT DIVISION
GREEN BAY, WISCONSIN

FLAMBEAU PROJECT
LADYSMITH, WISCONSIN

KENNECOTT
MINERALS
COMPANY

1515 MINERAL SQUARE
SALT LAKE CITY, UTAH
84119

FIGURE NO. 1
SITE PLOT PLAN

MICROFILM	JOB
DRAWING NO.	REV.
DIVISION DRAWING NO.	
SCALE	SEE BAR SCALE

REV.	DWG. NO.	DESCRIPTION	REV.	DWG. NO.	DESCRIPTION	NO.	DATE	REVISIONS	BY	CHK'D	ENGR	ENGR	NO.	DATE	REVISIONS	BY	CHK'D	ENGR	ENGR

PROJ. ENGR
MR. PROCESS
ENGR. MR.

DESIGN
DRAWN
CHK'D
DES. ENGR
SECT. ENGR

BY DATE
MJD 3/89
RLP 3/97

Precambrian waste rock has been weathered to a silty-clay rock termed saprolite.

Small amounts of disseminated pyrite have been oxidized below the saprolite to several tens of feet in depth. This rock is termed Type I waste rock and contains less than one percent sulfur. Type I material has been leach column-tested and found to produce water of quality that can be discharged without treatment. Type II waste rock occurs in the lower levels of the proposed open pit. Because this material contains greater than one percent sulfur, it will be stored on a lined stockpile area.

The Precambrian rock is overlain by Cambrian sandstone which consists of a poorly cemented, fine to coarse-grained quartz sand. Thickness of the sandstone varies from zero to greater than 30 feet within the proposed pit perimeter.

Near-surface materials consist of unconsolidated Quaternary glacial-fluvial sediments. Most of the deposit is covered by a dense, silty-sand glacial till. Glacial-fluvial sand and gravel generally occur in the northwest part of the project area in the vicinity of the abandoned gravel pit.

1.2.2 Deposit Description

The Flambeau deposit is tabular in shape, strikes in a northeast direction, and dips steeply to the northwest. The upper portion of the sulfide mineralization has been enriched in copper as a result of ancient fluctuating groundwater tables to about 225 feet below the present land surface. The deposit to be mined is 2,600 feet long, averages 50 feet wide, and contains approximately 1.9 million tons of material. The upper part of the deposit consists of zero to 30 feet of iron oxide-rich gossan. Below the gossan are varying proportions of chalcocite and bornite (copper sulfide minerals) in a matrix of chert (crypto-crystalline quartz) and pyrite (iron sulfide). No significant or

economic amounts of sulfide mineralization have been found by drilling in either direction from the deposit. Sulfide mineralization occurring beneath the proposed pit has been determined by Kennecott to be uneconomical based upon projected metal prices.

1.3 Description of Key Project Elements

1.3.1 General Mine Plan

Enriched ore will be mined from an oval-shaped open pit designed to cover approximately 32 acres to a maximum pit depth of 225 feet. All excavated materials will be hauled to the surface, which is at about 1,140 feet Mean Sea Level. Ore will be transported by truck to a crushing facility adjacent to the pit and crushed to minus 12 inches for rail shipment to an out-of-state processing facility.

Two open pit mining phases will be used. The first will mine the southwest half of the deposit to the 970-foot elevation. The second mines the balance of the pit to its final lateral limits and extends the pit bottom to the 900-foot elevation. Due to variation in the orebody grades, two ore-mining faces will be available at all times. Hydraulic shovels will operate from 20-foot high benches. The next bench is prepared as soon as working room becomes available to allow for construction of a sump to handle in-pit water flows and for emergency storage during heavy precipitation.

Waste material will be classified in the pit by sulfur content and stored on either lined or unlined storage sites adjacent to the pit. Eventually waste materials from the separate stockpiles will be returned to the pit as backfill. Upon completion of the mining operation, the project site will be

contoured and reclaimed. Land owned by Kennecott but not included in the project area will mostly remain in its current use.

1.3.2 Mining Operation

Preproduction activities will take approximately 10 months to develop the open pit, the waste rock stockpiles, and plant facility. Chief tasks will be clearing the site; preproduction stripping; construction of access roads, the railroad spur, powerline, wastewater treatment plant, storage areas, etc. Disturbed soil areas will be stabilized and water control measures installed at that time.

The Flambeau orebody will be mined from the open pit over a period of approximately six years. The pit area at the end of the mine life will embrace an oval-shaped area of approximately 32 acres. The pit will be 2,600 feet long and average about 550 feet wide. Open pit mining will take place five to six days a week, eight hours per day, to produce approximately 320,000 dry short tons of ore per year.

The steeply dipping rocks will accommodate a pit, with slopes at 36° for the glacial till and 50° interramp for rock sections. Twenty-seven-foot wide catch benches will be left at 60-foot intervals for safety considerations. The access ramp has a design width of 60 feet and a gradient of ten percent.

Overburden, ore, and waste rock will be excavated from 20-foot high benches using conventional mining equipment. The excavated overburden will be transported to the Type I stockpile or to construction areas elsewhere on the project site.

It is anticipated that most of the Cambrian sandstone, all of the saprolite and some of the oxidized waste rock (Type I) can be broken by using a dozer with a ripper blade. However,

certain areas of the deposit, such as those portions of the orebody that contain quartz or hard waste rock, will require drilling and blasting. Fresher and harder rock and ore can be expected as the open pit deepens during the first year of full production. Therefore, blasting during preproduction and into the first year of production will likely be performed only on an infrequent basis.

Controlled blasting procedures will be used to minimize the generation of seismic waves and noise. Due to the small scale of the mining method and operations, ore blasts will be relatively small. Blasting is anticipated to occur from one to five times per week. A set of blasting standards will be carefully followed to keep risks of flyrock, ground vibrations, and noise to a minimum.

Two four-cubic yard shovels and a seven-cubic yard loader will be used to load the broken ore and other materials into 35-ton or 50-ton trucks. At first, only four trucks will be required. The truck fleet will be increased to a maximum of seven trucks as the pit deepens and haul distance increases. A 4,000-gallon water truck will wet haul roads and truck unloading areas for dust control.

Anticipated production and operation schedules are found in Table No. 1-1. The tonnages shown in the table are averages since ore and spoils production vary from year to year.

TABLE NO. 1-1

Anticipated Production and Operation Data

Preproduction Stripping	1,500,000 tons
Daily Ore Production	1,300 tons
Annual Ore Production	320,000 tons
Total Ore Production	1,900,000 tons
Total Overburden & Waste Rock	8,000,000 tons
Total Material Moved (Includes Backfill)	17,500,000 tons
Open Pit Size	32 acres
Project Area	300 acres
Total Project Life	8 to 9 years
Preproduction and Construction	1 year
Mining	6 years
Rehabilitation & Backfilling	1 to 2 years
Open Pit Operating Schedule	5 to 6 days/week 8 hours/day, 1 shift
Crushing Plant	5 to 6 days/week 8 hours/day, 1 shift
Employment During Operations	
Initial	56
Peak	61
Average	55

1.3.3 Water Inflow Controls

When topsoil is stripped and excavation begins, control methods will be provided for surface water and groundwater that could flow into the open pit. Hydrologic studies indicate that a simple system of grading and ditching to a series of sumps can capture and control most of the water expected to inflow. The water will then be diverted to settling ponds or to the wastewater treatment plant. A slurry wall of either grout or

bentonite clay will be constructed at the end of the pit adjacent to the river to minimize potential inflow from that direction. Detailed geologic mapping will be routinely conducted to identify, monitor, and control any areas of significant water inflow which might develop.

Two water collection systems are planned for the pit. During preproduction stripping, an upper sump will catch surface and groundwater inflows from the glacial overburden and Cambrian sandstone. This water, which will not come into contact with sulfide mineralization, but which could carry suspended solids such as clays, will be pumped to settling ponds to remove suspended materials and colloids. The clear overflow will be used to provide water to an adjacent wetland or be discharged to the Flambeau River. A lower sump will collect all groundwater inflow and precipitation that comes into contact with ore and waste rock. Water from the lower sump will be pumped to the wastewater treatment plant, treated, and then separately discharged to the Flambeau River or an adjacent wetland.

A flood control dike will be constructed at the west end of the open pit to prevent overflow of the river into the pit during potential severe flooding conditions (100-year flood). The dike will be constructed using specially selected materials overlying the orebody. Rip rap protection will be installed on the river side of the dike. The west toe of the flood-control dike would be approximately 70 to 90 feet from the east edge of the current Flambeau River channel. The edge of the open pit will be no closer than 140 feet from the east edge of the river channel.

1.3.4 Crushing Facilities

The crushing facility consisting of a crusher, crushed ore stockpile, and railcar loading area will be built on the southwest side of the Type II waste rock stockpile. The crusher will be separated from the Type II stockpile by a retaining wall

to contain rock and runoff water. The proximity of the crusher facility and stockpile to the pit minimizes haul distances. The crushing and ore loading areas will be contoured and underlain with a 60-mil HDPE liner to direct water to a runoff catchment pond for transfer to the wastewater treatment plant. All crushing will occur during daylight operations. The crusher will be oriented in a southwest direction to direct noise away from populated areas. The crusher is designed to crush coarse ore to minus 12 inches. A dust suppression spray system will control dust generated by the crusher and conveyor belt discharge point.

The crushing facility is designed for 250 tons per hour and allows for production variations and maintenance. Crushed and bypassed ore will be discharged onto a conveyor belt and transported to the crushed ore stockpile, where a front-end loader will load railroad cars at the rate of up to 20 to 24 cars per working day. It is planned to ship 15 to 24 loaded cars every other operating day.

1.3.5 Infrastructure

1.3.5.1 General

Several buildings will be erected to support the open pit operation and crushing plant. Chief infrastructure components will consist of a wastewater treatment plant, railroad spur, utilities, administrative building and shop, storage tanks, and explosives magazine. Most of these ancillary facilities will be clustered east of the crushing plant.

1.3.5.2 Wastewater Collection and Treatment Plant

The wastewater treatment plant, located southeast of the crushing facility, will be designed to treat water from four sources: 1) pit contact water, 2) ore haul road drainage, 3)

Type II material storage pad drainage and runoff, and 4) site runoff from the crushing and loadout facilities and other ancillary facilities. Water from these combined sources will average approximately 617 gallons per minute on an annual basis.

A uniform feed of untreated wastewater to the treatment plant aids optimum plant performance. It is important, though, to consider surge capacity in its design, since water volume and metal loading can change with the seasons. Therefore, the wastewater treatment plant design provides for water storage in both a lined runoff catchment pond and a lined wastewater treatment surge reservoir. The open pit will also be used for emergency water storage. A 25-year rainfall event has been used as the design basis for the wastewater treatment system.

The wastewater treatment plant has been designed to process wastewater for acid neutralization and metal removal in a three-stage process. The process consists of lime treatment, sulfide precipitation, and mixed media filtration.

Sludge handling and treated water disposal make up the final components of the wastewater treatment system. Some of the treated water will be recycled for plant operations, makeup water, washdowns, and dust control with the balance discharged to the Flambeau River or an adjacent wetland. Sludge at approximately 25 percent solids will be trucked from the treatment plant to the Type II stockpile where it will be mixed with the stored waste rock.

1.3.5.3 Access Roads and Railroad Spur

Two access roads and a railroad spur will be constructed for the project. A new, paved plant site access road will be built from State Highway 27 into the project site. The road will be constructed opposite the intersection of Jansen Road and State Highway 27. A second access road to a visitors' observation

platform is planned to be constructed approximately 2,700 feet north of the plant access road.

A single line railroad spur approximately 6,500 feet long will be constructed from the Wisconsin Central Ltd. railroad line southwesterly to the crusher plant site to provide access to railroad cars used for shipping ore. The spur line at the crusher plant site will consist of two parallel tracks for ease in loading and switching railroad cars. The primary route for the railroad spur is north of Jansen Road along a location which avoids as much of existing wetlands as possible.

1.3.5.4 Utilities

The electrical power supply for the Flambeau Project will be delivered at 13.8 Kv from the Northern States Power Company power grid to a main substation adjacent to the wastewater treatment plant. Natural gas will be extended to the site for space heating needs.

A low capacity potable water well will be drilled to supply water to field offices and shops.

1.3.5.5 Buildings and Shops

A maintenance shop, office building, and guard house will be erected south and east of the crushing plant. The existing utility building east of the pit will be used to house a limited inventory of equipment and supplies. A peripheral security fence will be constructed around the entire plant site and open pit.

1.3.5.6 Mining Materials and Storage Tanks

Two portable magazines will be located in a remote bunkered area north of the Type I stockpile settling ponds. A blasting cap

storage building will also be located in the same general area, but separated from the magazines. A 15,000-gallon diesel fuel tank and associated piping will be installed to provide fuel for mining equipment.

1.3.6 Solid Materials Stockpiles

Topsoil, overburden and Type I and Type II material will be removed and segregated in accordance with their characteristics, then stockpiled in the appropriate location for use in reclamation following the completion of mining.

1.3.6.1 Topsoil Stockpile

The top 12 to 18 inches of soil will be removed from all construction sites and placed in the topsoil stockpile. In some areas, such as the railroad spur cut and fill banks, access road slopes, and exposed berms, the topsoil will be moved to one side and then returned to stabilize and support temporary revegetation of these areas upon completion of construction. Topsoil from the open pit, crusher plant and excess topsoil from the storage areas will be removed and stockpiled. The topsoil stockpile area will be located east of the pit. This stockpile will serve as a visitors' viewing area. Stockpiled topsoil will be used to reclaim the site after mining activities are completed. The topsoil stockpile area will cover approximately seven acres.

1.3.6.2 Overburden/Type I Stockpile

Overburden and Type I material (less than one percent sulfur) will be stored on an unlined area located between the open pit and Blackberry Lane. A bermed swale at the base of the stockpile will contain internal runoff and direct it to the settling ponds. The stockpile will occupy about 40 acres, reach

a height of about 60 feet, and have a design capacity of approximately 2.8 million cubic yards.

1.3.6.3 Type II Stockpile

Type II material (more than one percent sulfur) will be stockpiled separately in a lined area located southeast of the open pit and northeast of the crushing plant site. Approximately 27 acres will be required for this stockpile, which has been designed with a capacity of approximately 2.2 million cubic yards. The Type II stockpile will be built with an impervious liner and leachate collection system at its base. A lined berm and runoff containment swale will encircle the area to collect all precipitation that comes into contact with this material. Collected leachate and runoff will ultimately be directed via piping to the surge reservoir and then to the wastewater treatment plant.

Perimeter berms for the Type II stockpile will be constructed using overburden or soil excavated during base grade preparation. A protective layer of coarse-grained soils will be placed over the HDPE liner to protect the liner as waste rock is hauled onto the stockpile. The projected height of the stockpile is approximately 70 feet. The outside of the perimeter berm will be topsoiled and vegetated.

1.3.7 Surface Water Controls

As previously discussed, precipitation falling within the limits of the open pit, Type I and II storage piles, and plant area will be collected and directed to either the settling ponds or the wastewater treatment plant. Some of the surface water drainage originating from outside the active mine area will be intercepted by a series of drainage swales and directed to existing natural drainage features.

1.3.8 Reclamation

Disturbed soil areas will be revegetated and woodlands maintained during the life of the mining project. The open pit will be backfilled once mining is complete. The plan is to return the project site to as close to approximate original contours, such that it will be suitable for other land uses. Stockpiled Type II material will be placed at the bottom of the pit, with Type I waste rock placed over it and compacted as part of normal traffic of equipment used for backfilling. Saprolite, followed by sandstone and till will then be placed within the pit over the Type I waste rock. Finally, the pit site covered with topsoil and the area revegetated. Surface facilities, including the railroad spur, will be dismantled at the end of mine operations unless a beneficial plan for keeping all or some of the facilities is developed by Kennecott, the WDNR, and local residents.

Section 2.0 - Facility and Project Identification

1. Facility Mailing Address: Name Kennecott Minerals Company Street or Route P. O. Box 166 City, State, Zip Code Ladysmith, WI 54848	2. Facility Location: Street or Route State Highway 27 City Ladysmith County Rusk	
3. Nature of Business, SIC Code, and Facility Identification Number Copper Mining, SIC Code 1021, Facility I.D. NA		
4. Parent Corporation: Name Kennecott Minerals Company Street 1515 Mineral Square City, State, Zip Code Salt Lake City, Utah 84112	5. Air Pollution Contact at Facility: Name Lawrence E. Mercado Title Director, Process Development Telephone Number (Include Area Code and Extension) 801/322-8460	
6. Individual to whom the permit(s) should be issued — Name Lawrence E. Mercado, Director Title Process Development Telephone Number (Include Extension and Area Code) 801/322-8460	7. Attach a plot plan of this facility which identifies the location of surrounding streets, facility property boundaries, the air pollution source(s) to be permitted and any stacks or vents exhausting the source(s), facility buildings and their respective exterior dimensions. Include any roads, parking lots or outdoor storage piles associated with the source(s) to be permitted. Use Form 4500-1F, Facility Plot Plan, or an equivalent format for this purpose.	
8. Type of Air Permit Desired (check ☒ one) ☒ Construction of a new source ☐ Modification of an existing source ☐ Reconstruction of an existing source ☐ Relocation of an existing source ☐ Replacement of an existing source ☐ Existing source mandatory operation permit ☐ Alteration of an existing permit ☐ Elective operation permit		
9. Briefly describe proposed project or existing source(s) to be permitted: See section 1.0 for project description.		
10. Anticipated Date of Construction 5/1/90		
11. I, the undersigned, certify that the information submitted in this application is to the best of my knowledge both true and accurate.		
Signature <i>Lawrence E. Mercado</i>	Title Director, Process Development	Date Signed 3-6-89

INSTRUCTIONS FOR COMPLETING AN AIR POLLUTION CONTROL PERMIT APPLICATION

Nine forms are provided for use when applying for an Air Pollution Control Permit. These are as follows:

Air Pollution Control Permit Application Form 4500-1

- A. Facility and Project Identification
- B. Fuel Burning Equipment
- C. Air Pollution Control Equipment
- D. Printing, Painting and Coating Operations
- F. Facility Plot Plan
- I. Incineration
- P. Miscellaneous Processes
- T. Storage Tanks
- S. Stack Identification

General — All applications should include a Form 4500-1A and Form 4500-1F identifying the applicant and the air pollution sources for which Air Pollution Control Permits are required. For each air pollution source, the appropriate Form 4500-1B, 1D, 1I, 1P or 1T should be completed to describe the source. For each stack exhausting the air pollution source(s), Form 4500-1S should be completed to provide stack parameters and emissions data, if available. Finally, for each piece of control equipment used to reduce air pollution emissions, Form 4500-1C should be completed.

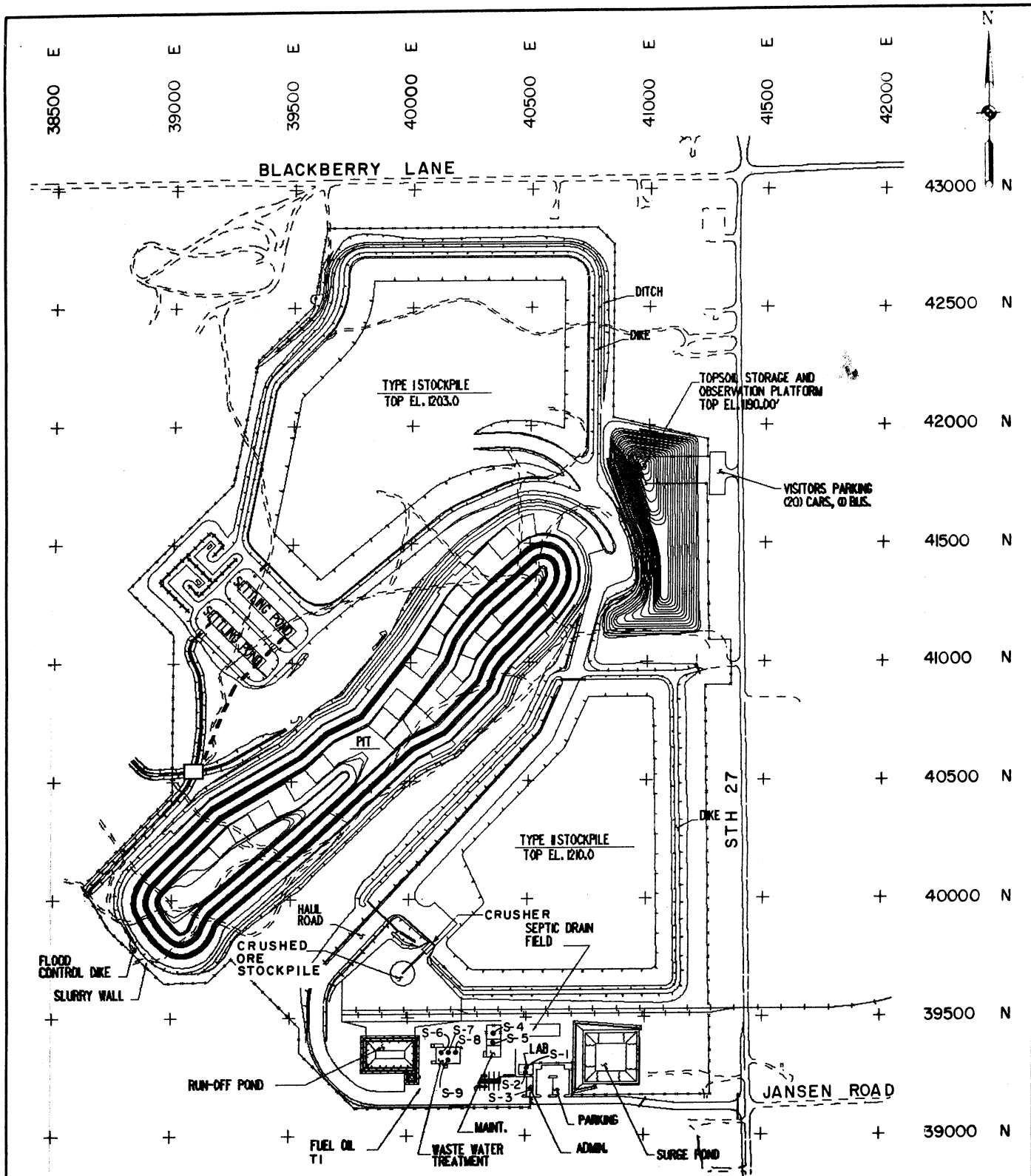
All forms, except the Facility and Project Identification Form, request an identification number for each source, stack, and control device included in the application. These identification numbers should be arbitrarily assigned by the applicant, but should remain consistent throughout the application. For example, a coal-fired boiler equipped with a baghouse fabric filter collector could be assigned an identification number B-1. This number will appear on Form 4500-1B: Fuel Burning Equipment, Form 4500-1S: Stack Identification, and Form 4500-1C: Air Pollution Control Equipment completed for this boiler. The collector could be assigned the identification number C-1, which should then appear on the same forms 1B, 1C, and 1S. The stack venting the boiler and baghouse could then be assigned the identification number S-1 which would then appear on all three forms 1B, 1C, and 1S completed as well for this boiler, stack, and control device.

AIR POLLUTION CONTROL PERMIT APPLICATION FORM 4500-1A: SOURCE AND PROJECT IDENTIFICATION

One Form 4500-1A should be included with each application.

- Item 1 — Provide full business name and address of corporation, company, association, society, firm, partnership, individual, or political subdivision of the state submitting the application.
- Item 2 — Street address where the air pollution sources are or will be located.
- Item 3 — Provide a short statement such as, "lead-acid battery manufacture", or "sulfite paper mill," the standard industrial classification (SIC) code for the facility where the source will be located, and the Facility Identification (FID) Number which appears on the annual DNR NR 101 emissions inventory reports.
- Item 4 — Self explanatory.
- Item 5 — Individual to contact for additional information concerning the air pollution sources during the permitting process.
- Item 6 — Individual legally responsible for operation of the permitted air pollution sources.
- Item 7 — This plot plan should be provided on paper appropriate for the detail required.
- Item 8 — Self explanatory.
- Item 9 — This description should be concise and qualitative. More specific design or operation parameters should be provided on the appropriate application forms. Include the cost of any new projects.
- Item 10 — Self explanatory.
- Item 11 — Self explanatory.

Section 3.0 - Site Plot Plan



LEGEND

- S-6 STACK LOCATION
- TI TANK LOCATION

NOTE: SEE TABLE NO. 3-0 FOR
KEY TO STACK IDENTIFICATION

FOTH & VAN DYKE GEOSCIENCES & ENVIRONMENTAL MANAGEMENT DIVISION GREEN BAY, WISCONSIN			KENNECOTT MINERALS COMPANY FLAMBEAU PROJECT LADYSMITH, WISCONSIN		
NOTES	APPROVAL	DATE	FIGURE NO. 4500-IF FACILITY PLOT PLAN		
	DESIGNED BY				
	DRAWN BY SJL	2/89			
	CHECKED BY RLP	3/89			
	APPROVED BY				
	CAD No.	SCALE 1" = 600'	Job No	Dwg No	REV

TABLE NO. 3-1

Key to Stack Identification on Figure No. 4500-IF

S1	Laboratory Space Heater Exhaust Stack*
S2	Laboratory Fume Hood Exhaust Stack*
S3	Office Space Heater Exhaust Stack*
S4	Truck Shop Space Heater Exhaust Stack*
S5	Truck Shop Space Heater Exhaust Stack*
S6	Wastewater Treatment Plant Space Heater Exhaust Stack*
S7	Wastewater Treatment Plant Space Heater Exhaust Stack*
S8	Wastewater Treatment Plant Space Heater Exhaust Stack*
S9	Wastewater Treatment Plant Lime Silo Exhaust Stack

*Exempt per NR 406.04 (a) 5.

Section 4.0 - Wastewater Treatment Plant

STACK IDENTIFICATION
AIR POLLUTION CONTROL PERMIT APPLICATION
Section 144.391, Wisconsin Statutes
Form 4500-1S

State of Wisconsin
Department of Natural Resources

Rev. 12-86

1. Facility Name
Wastewater Treatment Plant Lime Silo

2. This data is for stack #S 9

3. Exhausting Source(s) (Use # from appropriate Form 4500-1B, 1C, 1D, 1I, 1P, and/or 1T.)
#B _____ #D _____ #P 9
#C _____ #I _____ #T _____

4. Discharge height above ground level _____ 7 _____ (feet)

5. Inside dimensions at outlet (check ☒ one and complete)
☐ Circular diameter _____ (feet)
☒ Rectangular 3 1/2 L. (feet) 4 W. (feet)

6. Exhaust Flow Rate
Normal 450 (ACFM) Maximum 600 (ACFM)

7. Exhaust Gas Temperature
Normal 70 (°F) Maximum 70 (°F)

8. Moisture Content
Normal _____ (%) Maximum _____ (%)

9. Discharge Direction (check ☒ one)
☒ Up ☐ Down ☐ Horizontal

10. Identify this stack on the plot plan required on Form 4500-1A.

11. Material from which this stack is constructed (e.g. carbon steel, stainless steel, masonry, fiberglass, etc.) and its thickness. carbon steel _____

12. Is this stack equipped with a rainhat or any obstruction to the free flow of the exhaust gases from the stack? (check ☒ one)
☐ Yes ☒ No

13. Is this stack equipped with sampling ports for stack testing purposes? (check ☒ one)
☐ Yes ☒ No

14. Is this stack equipped with continuous monitoring equipment? (check ☒ one)
☐ Yes ☒ No
If yes, what pollutant(s) does this equipment monitor (e.g. TRS, NO_x, SO₂, O₂, Opacity, etc.). _____

Attach a description of this equipment, including the manufacturer, model number, and a diagram showing its location on the stack.

15. Complete the following emissions table if adequate data is available, by:

A. Indicating the source(s) exhausting to this stack; (use numbers from appropriate Forms 4500-1B, 4500-1C, 4500-1D, 4500-1I, 4500-1P, or 4500-1T.)

B. Checking the emission units used for each pollutant, lbs/hr, or actual ppm;

C. Providing the emissions for each source operating at maximum capacity;

D. Providing % of total stack gas flow rate contributed by each source;

E. And attaching sufficient documentation to verify the stated emissions data, such as references used, stack tests on similar sources, or supporting calculations including any emission factors used to estimate emissions.

Pollutant	Check Emission Units	Source	Source	Source
Particulates	☐ lbs/hr ☐ ppm		C9	
Sulfur Dioxide	☐ lbs/hr ☐ ppm			
Nitrogen Oxides	☐ lbs/hr ☐ ppm			
Carbon Monoxide	☐ lbs/hr ☐ ppm			
Organic Compounds	☐ lbs/hr ☐ ppm			
Lead	☐ lbs/hr ☐ ppm			
Other (specify) CaCO ₃	☒ lbs/hr ☐ ppm		0.14*	
Other (specify)	☐ lbs/hr ☐ ppm			
% of total stack gas flow rate from this source				

*Batch operation, 4 times/wk for 3/4 hr.

16. Complete the appropriate Air Permit Application Form(s) 4500-1B, 4500-1C, 4500-1D, 4500-1I, 4500-1P, or 4500-1T for each source exhausting through this stack.

AIR POLLUTION CONTROL PERMIT APPLICATION
FORM 4500-1S: STACK IDENTIFICATION

One form should be completed for each stack or release point (e.g., roof vent, wall vent, etc.) from which the air pollution source(s) to be permitted will vent its emissions.

- Item 1 — Provide the facility name.
- Item 2 — Assign an identification number for this stack or release point (e.g., S-1, S-2, etc.). This number should also appear on the appropriate Form 4500-1B, 1C, 1D, 1I, 1P, and 1T completed for the air pollution source(s) and control device(s) which will vent through this stack or release point.
- Item 3 — Provide an identification for the source(s) which will vent its emissions through this stack or release point. This number should also appear on the appropriate Form 4500-1B, 1C, 1D, 1I, 1P, and 1T completed for this source(s).
- Item 4 — Provide the height at which the stack or release point discharges above ground level in units or feet.
- Item 5 — Check appropriate shape of the stack or release point. For circular shapes provide the diameter in units of feet, and for rectangular shapes provide the length (L) and width (W) in units of feet.
- Item 6 — Provide the normal exhaust flow rate in units of actual cubic feet per minute (ACFM) and the maximum exhaust flow rate expected in ACFM.
- Item 7 — Provide the normal and maximum exhaust gas temperatures in °F.
- Item 8 — Self explanatory.
- Item 9 — Check appropriate discharge direction. If the direction of discharge is at an angle, check the nearest direction.
- Item 10 — Identify this stack or emission release point on the plot plan required for Item 7 of Form 4500-1A: Facility and Project Identification.
- Item 11 — For stacks constructed of more than one material, attach a cross-sectional diagram of the stack identifying these materials and their thicknesses.
- Item 12 — Self explanatory.
- Item 13 — Self explanatory.
- Item 14 — If the stack is equipped with continuous monitoring equipment identify the pollutant monitored such as TRS (Total Reduced Sulfur), NO_x, SO₂, O₂, CO₂, or Opacity. For each pollutant monitored, provide the equipment manufacturer and model number and a diagram indicating its location on the stack.
- Item 15 — Complete the table with air pollution emissions data for the sources to be permitted if data is available. If data is not available, or estimates cannot be made, a stack test may be required of this source to quantify the emissions.
 - A. For each column identify each source exhausting its emissions through this stack. Use the appropriate source identification number (e.g., B-1, C-1, P-1, etc.).
 - B. Check the units used for each pollutant, either pounds per hour (lbs./hr.) or actual parts per million (ppm). If ppm are used, indicate if the units are on a weight or volume basis.
 - C. Provide the emission rate of particulates, sulfur dioxide, nitrogen oxides, carbon monoxide, hydrocarbons, and/or lead from each source exhausting through this stack. Provide the emission rate of any hazardous pollutant emitted in significant quantities.
 - D. If more than one source will exhaust through this stack, provide the percentage (%) of total stack gas flow contributed by each source under normal operation.
 - E. Self explanatory.
- Item 16 — Complete the appropriate Form 4500-1B, 1C, 1D, 1I, 1P, and 1T for each source which exhausts its emissions through this stack.

1. Facility Name
Wastewater Treatment Plant Lime Silo

2. This data is for control equipment #C 9

3. Which will exhaust through stack(s) #S 9, (Use # from appropriate Form 4500-1S.)

4. And will reduce emissions from source(s) (Use # from appropriate Form 4500-1B, 1D, 1I, 1P, or 1T.)

#B _____

#I _____

#T _____

#D _____

#P 9

5. Type of control equipment (check ☒ appropriate item and provide the specification identified in the instructions on the back).

- ☐ Settling Chamber
- ☐ Cyclone
- ☐ Multiple-Cyclone
- ☐ Filter(s)
- ☐ Electrostatic Precipitator
- ☒ Baghouse

- ☐ Scrubber (specify) _____
- ☐ Adsorption
- ☐ Condensation (specify) _____
- ☐ Incineration
- ☐ Water Wall
- ☐ Other (specify) _____

6. Attach a blueprint or diagram of this equipment. Not yet available from manufacturer

7. Manufacturer and model number
180-42 Whirl Air Flow

8. Operating pressure drop range (inches w.g.)
3-6

9. Maximum inlet gas flow rate (ACFM)
600

10. Maximum inlet gas temperature (°F)
100 (summer)

11. List pollutant(s) to be controlled by this equipment and the expected control efficiency for each pollutant.

Pollutant	Inlet Pollutant Concentration (gr/acf or ppm)	Hood Capture Efficiency (%), if appropriate	Efficiency (%)
CaCO ₃	35.52 gr/acf		99.9

12. Attach sufficient documentation to verify the stated capture and control efficiency for this equipment. This may include actual design calculations or emission tests verifying the effectiveness of this equipment for this specific air pollution control application. Provide equipment performance guarantees, if available.

13. Attach a malfunction prevention and abatement plan for this control equipment.

This plan should include:

- A. An identification of the individual(s), by name and title, responsible for inspecting, maintaining and repairing the air pollution control device.
- B. The maximum intervals for inspection and routine maintenance.
- C. A description of the items or conditions that will be inspected.
- D. A listing of materials and spare parts that will be maintained in inventory.
- E. An identification of the source and air pollution control equipment operation variables that will be monitored in order to detect a malfunction or failure; the correct operating range of these variables; and a description of the method of monitoring or surveillance procedures or a reference to specific pages containing this information in manuals or other documents kept by the owner or operator.

14. Discuss how collected effluent will be handled for reuse or disposal.

NA

AIR POLLUTION CONTROL PERMIT APPLICATION FORM 4500-1C: AIR POLLUTION CONTROL EQUIPMENT

Complete one form for each control device used to reduce air pollution emissions from the air pollution sources to be permitted.

Item 1 — Provide the facility name.

Item 2 — Assign an identification number to this control equipment (e.g. C-1, C-2, etc.). This number should appear on the appropriate source description Form 4500-1B, 1D, 1I, 1P, or 1T completed for the air pollution source which will have its emissions reduced by this equipment. This number should also appear on the appropriate stack identification Form 4500-1S completed for stack exhausting this control equipment.

Item 3 — Provide an identification number for the stack which exhausts this equipment. This number should also appear on the appropriate Form 4500-1S completed for this stack.

Item 4 — Provide the identification number from the appropriate source Form 4500-1B, 1D, 1I, 1P, or 1T completed for the source which will have its emissions reduced by this control equipment.

Item 5 — Check the appropriate type of control equipment and provide the specifications listed below:

Control Equipment Specifications

Settling Chamber: Interior dimensions; mean particle diameter (inches) and density (pounds per cubic foot).

Cyclones and multicyclone: Stack test results verifying the effectiveness of this cyclone/multicyclone for this usage; or a fractional efficiency curve and design particle size distribution.

Filters: Filter medium (e.g. paper, cotton, felt, etc.); operating pressure drop range (inches w.g.); stack tests verifying the effectiveness of this filter for this usage, or a fractional efficiency curve and design particle size distribution.

Electrostatic precipitator: Number of fields or stages; collection area per field (ft^2); distance between collection plates or collection tube diameter (inches); length, height, and width of each field (ft); design particle migration velocity (ft/sec); number and rating of transformer — rectifier sets (kilovolts and milliamperes); expected operating voltage and current for each field; cleaning method (e.g. mechanical rapping, magnetic impulse rappers, etc.); location where precipitator will be located (inside or outside) — if outside, indicate extent of insulation.

Baghouse: Fabric material (e.g. cotton, fiberglass, Nomex, etc.). Indicate if felted or woven fabric; number of bags and their dimensions; total collection filter area (ft^2); operating pressure drop range (inches w.g.); cleaning method (e.g. reverse air off-line, pulse jet on-line, etc.); location where baghouse will be located (inside or outside) — if outside, indicate extent of insulation.

Scrubbers: Scrubbing medium (e.g. water, sodium hydroxide slurry, etc.) and flow rate (pounds per hour); scrubbing chemicals usage (pounds per hour); weight percent of scrubbing medium recycled; operating pressure drop range (inches w.g.); scrubbing medium distribution system (e.g. spray bars, nozzles, rotary atomizer, etc.); mist elimination method (e.g. cyclonic separator, chevrons, etc.); for venturi scrubbers indicate if throat is fixed or variable; for packed bed scrubbers provide bed material (e.g. saddles, rings, Tellerettes, etc.).

Absorption: Adsorption medium; length, height, and width of absorption bed (ft); bed operating temperature ($^{\circ}\text{F}$); chemical composition of treated gas; gas pretreatment methods (e.g. cooling, heating, dust collection, etc.); tests verifying the effectiveness of this equipment for this usage, or the bed void space (ft^3) and porosity (%); indicate if adsorbent is disposable, if not, provide frequency of regeneration.

Condenser: Inlet and outlet temperatures of treated gas and condensing medium; condensing medium flow rate (pounds per hour); chemical composition of treated gas; heat transfer area (ft^2); overall heat transfer coefficient ($\text{BTU}/\text{ft}^2 \text{ hr } ^{\circ}\text{F}$).

Incineration: Length, height, or width of the incinerator (ft^3); type of catalyst, if used, and dimensions of catalyst bed; expected average temperature in each combustion chamber, fuels and expected hourly usage; chemical composition of treated gas.

Waterwall: Water flow rate (gallons per minute); working pressure drop range (inches w.g.).

Other: A description how this equipment operates to control air pollution; discuss parameters affecting equipment performance and the expected operating range for these parameters.

Item 6 — This blueprint or diagram should clearly show all equipment parts necessary for successful operation. Manufacturers literature may be used.

Item 7 — Provide the manufacturer and model number of the control equipment.

Item 8 — Self explanatory.

Item 9 — Self explanatory.

Item 10 — Self explanatory.

Item 11 — Average control efficiency during typical operating conditions for those pollutants which will be controlled. If it is necessary to use a hooding system, indicate the average pollutant capture efficiency for this system. The inlet pollutant concentration should be in units of grains per actual cubic foot (gr/acf) for solid and liquid pollutants and units of actual parts per million (ppm) for gaseous pollutants.

Item 12 — Self explanatory.

Item 13 — Self explanatory.

Item 14 — Discuss how collected effluent will be contained, transported, and the ultimate destination such as the local wastewater treatment plant or sanitary landfill.

KENNECOTT FLAMBEAU AIR POLLUTION CONTROL PERMIT APPLICATION

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13. Should a malfunction of the bin vent filter occur, pneumatic feeding of the silo would be curtailed until the malfunction is corrected.

Corrective action will entail contacting the nearest Whirl Air Flow representative (Minneapolis) and requesting assistance.

- A. The mine maintenance manager will be responsible for the inspection, maintenance, and repair of equipment. Should the problem be of such magnitude to be beyond the manager's expertise, Whirl-A-Flow will be contacted.
- B. Intervals of inspection would be consistent with those specified in the equipment literature and recommended by the local representative.
- C. Items that will be inspected include:
 - (i) Fabric filter
 - (ii) Seals/gaskets
 - (iii) Pneumatic lines and activators for back flow pulsing
 - (iv) Compressed air lines
 - (v) Compressor
- D. Spare parts will include additional filters, gaskets, and solenoids.
- E. A visual inspection of the bin vent outlet will be conducted during silo filling. Should a visible emission be observed, filling will cease. In addition, a gauge monitoring the compressed air pressure to the pulse system will be monitored to assure proper line pressure.

1. Facility Name Wastewater Treatment Plant Lime Silo	2. This data is for process form #P <u>9</u>
3. which exhausts through stack(s) #S <u>9</u> (Use # from appropriate Form 4500-1S.)	4. and has its emissions reduced by control device #C <u>9</u> (Use # from appropriate Form 4500-1C.)
5. Describe this process Pneumatic filling of 46-ton lime silo four times per week	6. Attach a flow diagram of this process identifying major pieces of equipment, pick-up points for dusts, fumes and vapors, emissions control devices, exhaust stacks or vents, where raw materials will enter the process and finished product will exit. If an existing process is being modified, indicate any new components which will augment this process.
8. Provide the approximate amounts of raw materials consumed by this process, describing storage and handling procedures. 12 tons per day of lime requires filling silo four times per week	7. Normal operating schedule of this process _____ hrs/day <u>4</u> days/week _____ days/yr
10. Process Flow Rate (check ☒ appropriate item) A. ☒ Batch Process <u>46 ton</u> Maximum lbs raw materials/batch _____ Maximum lbs finished product/batch _____ Maximum batches/hr <u>4</u> Maximum batches/ ~~day~~ week B. ☐ Continuous Process _____ Maximum lbs raw materials/hr _____ Maximum lbs finished product/hr	9. Describe the finished product(s) including storage and handling procedures See Exhibit 9.1 _____ _____ _____ _____ _____ _____ 11. Process Fuel Usage A. Specify all fuels used by this process and the expected daily and annual usage of each fuel. N/A _____ B. Maximum heat input _____ (Million BTU per hour) C. For fuels other than natural gas, propane, or #2 fuel oil, provide the information required under Items 10, 11, and 12 on Form 4500-1B, as appropriate.
13. Complete Form(s) 4500-1S for all stacks exhausting this process.	12. Describe the size and location of any sources of fugitive emissions which will serve this process such as outdoor storage piles, unpaved roads, open conveyors, etc. N/A _____ _____ _____ _____ 14. Complete Form(s) 4500-1C for all control devices reducing emissions from this process.

KENNECOTT FLAMBEAU AIR POLLUTION CONTROL PERMIT APPLICATION

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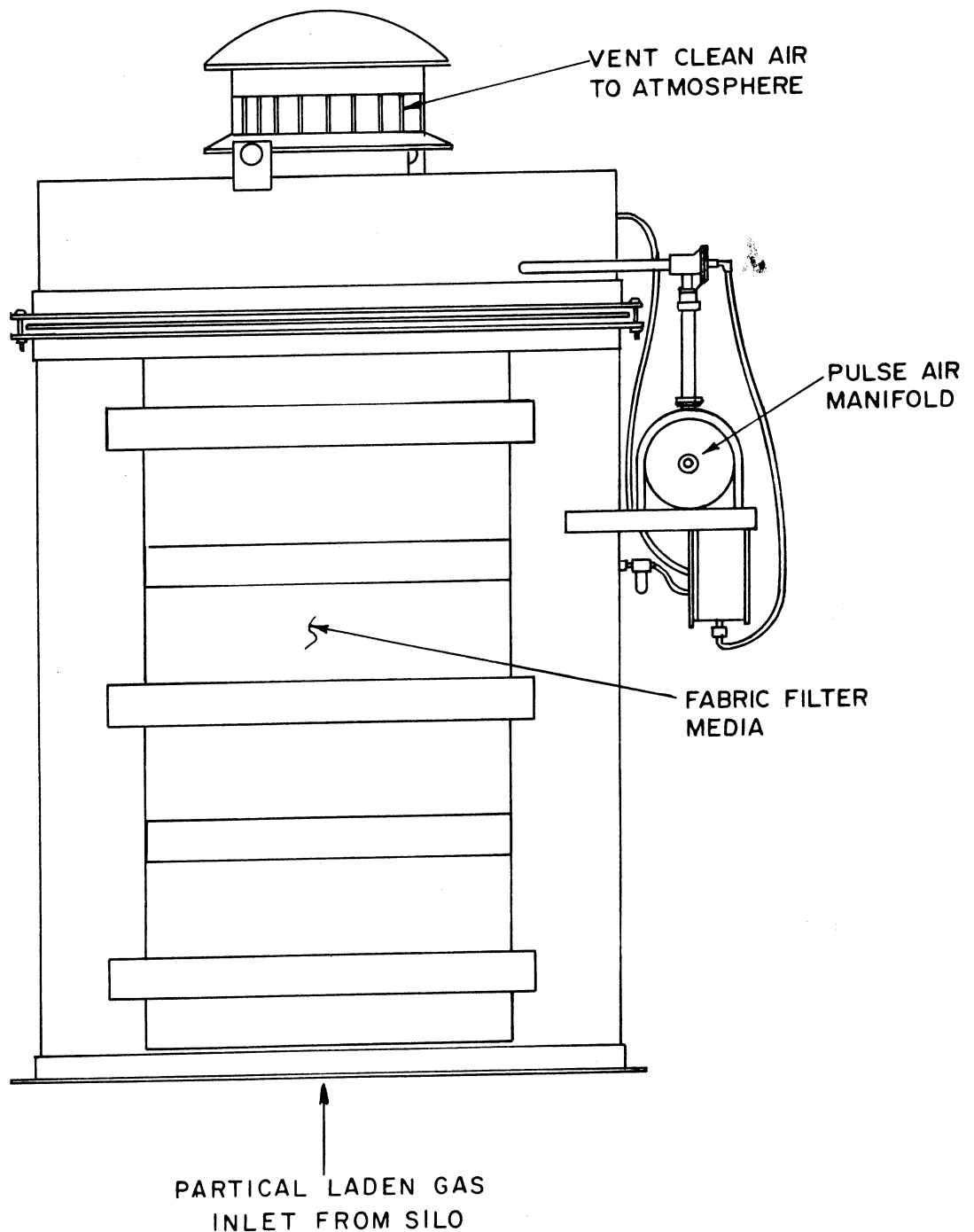
Exhibit 9.1

Lime is used in the wastewater treatment process for acid neutralization. Approximately 12 tons per day of lime is required. Therefore, the lime silo requires filling four times per week. Filling of the silo takes between three-quarters to one hour.

The silo is fed by a pneumatic conveying system. Exhaust leaving the silo passes through a bin vent equipped with a fabric filter. The bin vent filter is rated at 99.9 percent removal efficiency for powdered lime.

To determine the fugitive lime release per filling:

$$\text{TSP} = 600 \text{ cfm} \times 60 \text{ min./hr.} \times 35.52 \text{ gr/cf} \times 1/7,000 \text{ gr/lb} \times (\text{fugitive lime}) 0.75 \text{ hr.} \times (1-.999) = 0.14 \text{ lb/filling}$$



FOTH & VAN DYKE GEOSCIENCES & ENVIRONMENTAL MANAGEMENT DIVISION GREEN BAY, WISCONSIN			KENNECOTT MINERALS COMPANY FLAMBEAU PROJECT LADYSMITH, WISCONSIN		
NOTES	APPROVAL	DATE	EXHIBIT 6A C9 SUPPLEMENT WHIRL A FLOW MODEL 180-42 BIN VENT FILTER		
	DESIGNED BY				
	DRAWN BY R.M.H.	3/89			
	CHECKED BY RLP	3/89			
	APPROVED BY				
CAD No.	SCALE N.T.S.	Job No	Dwg No	REV	

Section 5.0 - Mine Operation

1. Facility Name Fugitive Dust from Mining Operation	2. This data is for process form #P <u>1</u>
3. which exhausts through stack(s) #S <u>N/A</u> (Use # from appropriate Form 4500-1S.)	4. and has its emissions reduced by control device #C <u>2</u> (Use # from appropriate Form 4500-1C.)
5. Describe this process Open pit mine in which soil, waste rock, and ore is mined, transported, and segregated. The ore undergoes primary crushing and transportation via rail.	6. Attach a flow diagram of this process identifying major pieces of equipment, pick-up points for dusts, fumes and vapors, emissions control devices, exhaust stacks or vents, where raw materials will enter the process and finished product will exit. If an existing process is being modified, indicate any new components which will augment this process. 7. Normal operating schedule of this process See Table 8.1 _____ hrs/day _____ days/week _____ days/yr
8. Provide the approximate amounts of raw materials consumed by this process, describing storage and handling procedures. See attached Table 8.1	9. Describe the finished product(s) including storage and handling procedures See attached Attachment 9.1
10. Process Flow Rate (check ☒ appropriate item) A. ☐ Batch Process See attached Table 10.1 _____ Maximum lbs raw materials/batch _____ Maximum lbs finished product/batch _____ Maximum batches/hr _____ Maximum batches/day B. ☐ Continuous Process _____ Maximum lbs raw materials/hr _____ Maximum lbs finished product/hr	11. Process Fuel Usage A. Specify all fuels used by this process and the expected daily and annual usage of each fuel. _____ B. Maximum heat input _____ (Million BTU per hour) C. For fuels other than natural gas, propane, or #2 fuel oil, provide the information required under Items 10, 11, and 12 on Form 4500-1B, as appropriate. 12. Describe the size and location of any sources of fugitive emissions which will serve this process such as outdoor storage piles, unpaved roads, open conveyors, etc. See attached Table 12.1
13. Complete Form(s) 4500-1S for all stacks exhausting this process.	14. Complete Form(s) 4500-1C for all control devices reducing emissions from this process.

AIR POLLUTION CONTROL PERMIT APPLICATION
FORM 4500-1P: MISCELLANEOUS PROCESSES

Complete one form for each process for which an Air Pollution Control Permit is required. If the information requested does not adequately describe the process, additional equipment specifications and descriptions should be submitted as necessary.

- Item 1 — Provide the facility name.**
- Item 2 — Assign an identification number for this process (e.g., P-1, P-2, etc.). This number should also appear on the appropriate Form 4500-1S: Stack Identification and Form 4500-1C: Air Pollution Control Equipment completed for this process.**
- Item 3 — Provide an identification number for the stack exhausting this process. This number should also appear on the appropriate Form 4500-1S: Stack Identification completed for this stack.**
- Item 4 — Provide an identification number for the control device, if any, reducing the emissions from this process. This number should also appear on the appropriate Form 4500-1C: Air Pollution Control Equipment completed for this control device.**
- Item 5 — Describe the process in general terms. Include the types of operations involved, the end products of this process and uses of the product.**
- Item 6 — Attach a flow diagram preferably drawn on 8½" X 11" or 8½" X 14" size paper. Clearly identify significant pieces of equipment, pick-up points and exhaust hooding for dusts, fumes and vapors, emission control equipment and stacks or vents which exhaust this process to the ambient air. Identify the points at which raw materials enter and finished products exit the process. For existing processes which are being modified, identify which components of the process are existing and which are new.**
- Item 7 — Self explanatory.**
- Item 8 — Self explanatory.**
- Item 9 — Self explanatory.**
- Item 10 — Check appropriate item and provide the data requested.**
- Item 11 — If the heat from the flue gases resulting from the fuel combustion do not directly contact the raw materials or end product and the fuel burning equipment is large enough to require an Air Pollution Control Permit, then this fuel burning equipment should be identified on a Form 4500-1B, Fuel Burning Installations. If any fuels are burned to provide direct heat to the raw materials or end product, list these fuels and their usage under Item 11A. Provide the maximum heat input to the burner of these fuels in million BTU per hour under Item 11B. Under Item 11C, if fuels other than natural gas, propane, or #2 fuel oil are to be burned, submit the information required under Items 10, 11, and 12 on Form 4500-1B, Fuel Burning Equipment. For each fuel, Item 10 requires the higher heating value (BTU per pound), the average and maximum ash and sulfur contents (percent by weight), the average and maximum hourly fuel usage, expected yearly consumption, moisture contents of solid fuels (percent by weight), if ash reinjection is used, fuel charging method, fuel charging measurement method, and excess combustion air (%). Item 11 requires that a proximate and ultimate analysis be provided for each solid or waste fuel. Item 12 requires that for all waste fuels (e.g. sludges, refuse derived fuels, waste oils, etc.), an analysis be submitted for arsenic, cadmium, chromium, lead, mercury, nickel, chlorine, and total halogens.**
- Item 12 — Include the typical height, width, length and composition of these storage piles.**
- Item 13 — Complete one Form 4500-1S: Stack Identification for each stack exhausting this operation.**
- Item 14 — Complete one Form 4500-1C: Air Pollution Control Equipment for each control device reducing emissions from this process.**

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TABLE 8.1
Yearly Estimated Materials Movement From Mining*

Materials (Ktons)	PP	1	2	Year			4	5	6	R1	R2
				3							
Topsoil	180	0	0	0			0	0	0		
Overburden	1,444	935	1,053	792			13	0	0		
Type I Material	0	212	133	154			436	133	11		
Type II Material	16	333	294	434			831	417	127		
Ore	42	320	320	308			320	320	210		
<u>Reclamation</u>											
Type II Material	0	0	0	0			0	0	1,226	1,226	0
Type I Material	0	0	0	0			0	0	0	1,079	0
Overburden	0	0	0	0			0	0	0	2,119	2,119
Topsoil	0	0	0	0			0	0	0	0	180
TOTALS	1,642	1,800	1,800	1,688			1,600	870	1,574	4,424	2,299
Hours/day operation	24	8	8	8			8	8	8	24	24
PP = Preproduction											
R1 = Reclamation 1.											
R2 = Reclamation 2.											

*Assumptions used for calculations. The production/removal rates are estimates and may change slightly. Minor changes will not significantly affect emissions from the operation.

P1 Supplement

ATTACHMENT 9.1

Solid Material Stockpile

Material to be removed and stockpiled during operations will be evaluated and designated for storage in one of the stockpile areas. Waste rock and overburden will be segregated in accordance with its characteristics. Topsoil will be stockpiled into one area and will act as an observation site. This stockpile will be vegetated.

Topsoil

Topsoil will be removed, stockpiled, and vegetated during construction. The total quantity of topsoil to be handled in this operation will be 225,000 cubic yards. All topsoil will be stabilized to minimize fugitive dust generation.

Overburden/Type I Material

Overburden and Type I material will be hauled by truck to the Type I stockpile area. During production operations, rock hauling will be done during one eight-hour shift; however, during preproduction, provision will be made to haul waste rock during three shifts. Material delivered to the stockpile will be dumped and placed by dozer in one to three foot lifts. Compaction of the material will be done by normal operation of the equipment. Watering of the pile to control dust will be done by the plant water truck on an as-needed basis. Some of the overburden will be hauled for use in the construction of berms for ponds and roads.

Type II Material

Type II material haulage will begin in conjunction with ore production. The waste rock will be hauled by mine truck to the Type II stockpile. During production, rock haulage will be done during an eight-hour shift.

Material delivered to the stockpile will be placed by dozer in lifts of one to three feet. Watering of the pile for dust control will be done on an as-needed basis.

Crushing Operations

The crusher facility will be operated during daylight hours to a maximum of eight hours per day. An operator will be stationed in the crusher area to start the crusher when it is needed and to operate the feeder as required to feed the coarse ore from the feed hopper to the crusher. The operator stationed in the area will insure that the equipment is being maintained and operating properly. The dust suppression sprays and the discharge conveyor belt will operate when rocks are being fed to the crusher.

Coarse ore will be delivered to the crusher feed hopper by the mine trucks. When maintenance requires the crusher to be out of service during the normal mine shift, the ore will be stockpiled near the crusher feed hopper. When the crusher is put into operation, a front end loader will be utilized to transport the stockpiled ore to the feed hopper.

Ore Haul Road

Based on normal mine operations, traffic will consist of mine trucks carrying mined materials, as well as operations vehicles for maintenance, supervision, and transporting of employees to mining equipment. To control the dust generated by the traffic on the haul roads, watering and chemical stabilization will be done as needed. Berms and slopes will be vegetated as part of construction to control dust and to prevent erosion.

Ore Transport

Twenty to 24 loaded railroad cars will be shipped from the plant approximately every other day during normal production. The cars will be loaded with a front end loader. Ore which has been loaded into the railcars will be scheduled to be picked up by a locomotive from the Ladysmith railyard for movement to an out-of-state processing plant.

TABLE 10.1
ESTIMATED EMISSIONS

KENNECOTT FLAMBEAU AIR POLLUTION CONTROL PERMIT APPLICATION
P1 SUPPLEMENT

YEAR		PP	1	2	3	4	5	6	R1	R2
	DUST CTRL.									
			GENERATED TSP (LB)							
TOPSOIL	BULLDOZER	6933	0	0	0	0	0	0	0	0
	GRADER SPRAY SUP.	693	0	0	0	0	0	0	0	0
	LOADER	232	0	0	0	0	0	0	0	0
	TRUCK SPRAY SUP.	4381	0	0	0	0	0	0	0	0
	DUMP	278	0	0	0	0	0	0	0	0
	TRUCK SPRAY SUP.	3875	0	0	0	0	0	0	0	0
	BULL PILE	6933	0	0	0	0	0	0	0	0
	TOTAL	23325	0	0	0	0	0	0	0	0
OVERBURDEN										
	LOADER	688	446	502	378	6	0	0	0	0
	TRUCK SPRAY SUP.	9853	6699	7547	5675	93	0	0	0	0
	DUMP	514	337	379	285	5	0	0	0	0
	TRUCK SPRAY SUP.	8685	5939	6689	5031	83	0	0	0	0
	TOTAL	19740	13421	15117	11369	187	0	0	0	0
BULLDOZER1	SPRAY SUP.	2424	856	856	856	856	856	856	2567	2567
BULLDOZER2	SPRAY SUP.	2567	856	856	856	856	856	856	2567	2567
GRADER	SPRAY SUP.	2424	856	856	856	856	856	856	2567	2567
MINE LOADER	SPRAY SUP.	720	720	720	720	720	720	720	720	720
WATER TRUCK 1	SPRAY SUP.	7556	7556	7556	7556	7556	7556	7556	7556	7556
WATER TRUCK 2	SPRAY SUP.	7556	7556	7556	7556	7556	7556	7556	7556	7556
MAINT. TRUCK	SPRAY SUP.	9101	9101	9101	9101	9101	9101	9101	9101	9101
DRILLING		735	735	735	735	1109	735	735	0	0
									0	0
BLASTING		92	92	92	92	130	92	92	0	0
TYPE I										
MATERIAL	LOADER	0	68	43	49	140	43	4	0	0
	TRUCK SPRAY SUP.	0	1509	953	1104	3123	953	79	0	0
	DUMP	0	51	32	37	105	32	3	0	0
	TRUCK SPRAY SUP.	0	1347	845	979	2769	845	70	0	0
	TOTAL	0	2975	1873	2169	6137	1873	155	0	0
TYPE II										
MATERIAL	LOADER	5	107	94	139	266	133	41	0	0
	TRUCK SPRAY SUP.	88	1835	1620	2392	4560	2298	700	0	0
	DUMP	4	80	71	104	199	100	30	0	0
	TRUCK SPRAY SUP.	78	1627	1436	2121	4061	2037	621	0	0
	TOTAL	175	3649	3221	4756	9106	4568	1392	0	0
WIND EROSION										
	SOIL	0	302	302	302	302	302	302	0	0
	TYPE I	0	552	552	552	552	552	552	0	0
	TYPE II	0	388	388	388	388	388	388	0	0

KENNECOTT FLAMBEAU AIR POLLUTION PERMIT APPLICATION
P1 SUPPLEMENT
PAGE 2.

ORE	LOADER		0	103	102	99	102	102	74	0	0
	TRUCK	SPRAY SUP.	0	3372	3351	3225	3351	3351	2409	0	0
	CRUSH	SPRAY SUP.	0	1610	1600	1540	1600	1600	1150	0	0
	DROP	SPRAY SUP.	0	314	312	301	312	312	225	0	0
	CATAPIL	SPRAY SUP.	0	311	309	297	309	309	222	0	0
	CATAPIL	SPRAY SUP.	0	257	256	246	256	256	184	0	0
	DUMP		0	85	84	81	84	84	61	0	0
	TRUCK	SPRAY SUP.	0	2985	2971	2860	2971	2971	2135	0	0
	TOTAL		0	9037	8985	8649	8985	8985	6460	0	0
RECLAMATION TYPE II ROCK	LOADER		0	0	0	0	0	0	393	393	0
	TRUCK	SPRAY SUP.	0	0	0	0	0	0	6757	6757	0
	DUMP		0	0	0	0	0	0	294	294	0
	TRUCK	SPRAY SUP.	0	0	0	0	0	0	5991	5991	0
	TOTAL		0	0	0	0	0	0	13434	13434	0
TYPE I ROCK	LOADER		0	0	0	0	0	0	0	345	0
	TRUCK	SPRAY SUP.	0	0	0	0	0	0	0	7731	0
	DUMP		0	0	0	0	0	0	0	259	0
	TRUCK	SPRAY SUP.	0	0	0	0	0	0	0	6854	0
	TOTAL		0	0	0	0	0	0	0	15189	0
OVERBURDEN	LOADER		0	0	0	0	0	0	0	1011	1011
	TRUCK	SPRAY SUP.	0	0	0	0	0	0	0	15179	15179
	DUMP		0	0	0	0	0	0	0	763	763
	TRUCK	SPRAY SUP.	0	0	0	0	0	0	0	13457	13457
	TOTAL		0	0	0	0	0	0	0	30409	30409
TOPSOIL	LOADER		0	0	0	0	0	0	0	0	281
	TRUCK	SPRAY SUP.	0	0	0	0	0	0	0	0	1466
	DUMP		0	0	0	0	0	0	0	0	277
	TRUCK	SPRAY SUP.	0	0	0	0	0	0	0	0	1300
	TOTAL		0	0	0	0	0	0	0	0	3324
LB/YR			76416	58651	58765	56511	54396	44995	51011	91666	66366
TONS/YR			38	29	29	28	27	22	26	46	33

KENNECOTT FLAMBEAU AIR POLLUTION CONTROL PERMIT APPLICATION

Attachment to Table No. 10.1 - P1 Supplement Sequence of Operations Involved in Estimating Emissions

To enable the estimation of the fugitive emissions generated by the operations at the Flambeau mine, each phase of mining was broken into segments or unit operations. Segments include:

1. Removing the topsoil from the pit area
2. Removing the overburden from the pit area
3. Wet drilling blast holes in the rock material
4. Blasting the rock using a slurry explosive
5. Removing the Type I material from the pit
6. Removing the Type II material from the pit
7. Removing the ore from the pit
8. Crushing the ore
9. Transporting the crushed ore to rail cars
10. Replacing the Type II material in the pit
11. Replacing the Type I material in the pit
12. Replacing the overburden in the pit
13. Replacing the topsoil on the pit surface

In addition, potential TSP generated during the mining years as a result of wind erosion, mine vehicle movement, and stockpile maintenance were included in the determination of the estimated total particulate emission that could be released to the atmosphere.

Removing the topsoil, overburden, and waste rock from the area in which the ore is to be mined will involve seven separate operations. Bulldozers and a grader will push the material into piles. A loader will then place the material into mine trucks which will transport the material to the appropriate stockpile area. Once there, the trucks will dump the material, and a bulldozer will distribute it onto the pile. The empty trucks

will then return to the pit area to be refilled. Figure No. 1 depicts a flow chart of the removal sequence.

Fugitive dust generation during the removal and transfer of the topsoil, overburden, and waste rock will be minimized through use of water sprays from a water tank truck. These water trucks will be dispatched as often as necessary for dust suppression.

Hardrock material is to be wet drilled and blasted. Emission rates for this process were determined using emission factors presented in Table No. 8.19.2-2 of AP-42 and the projected volume of material to be removed during that specific year.

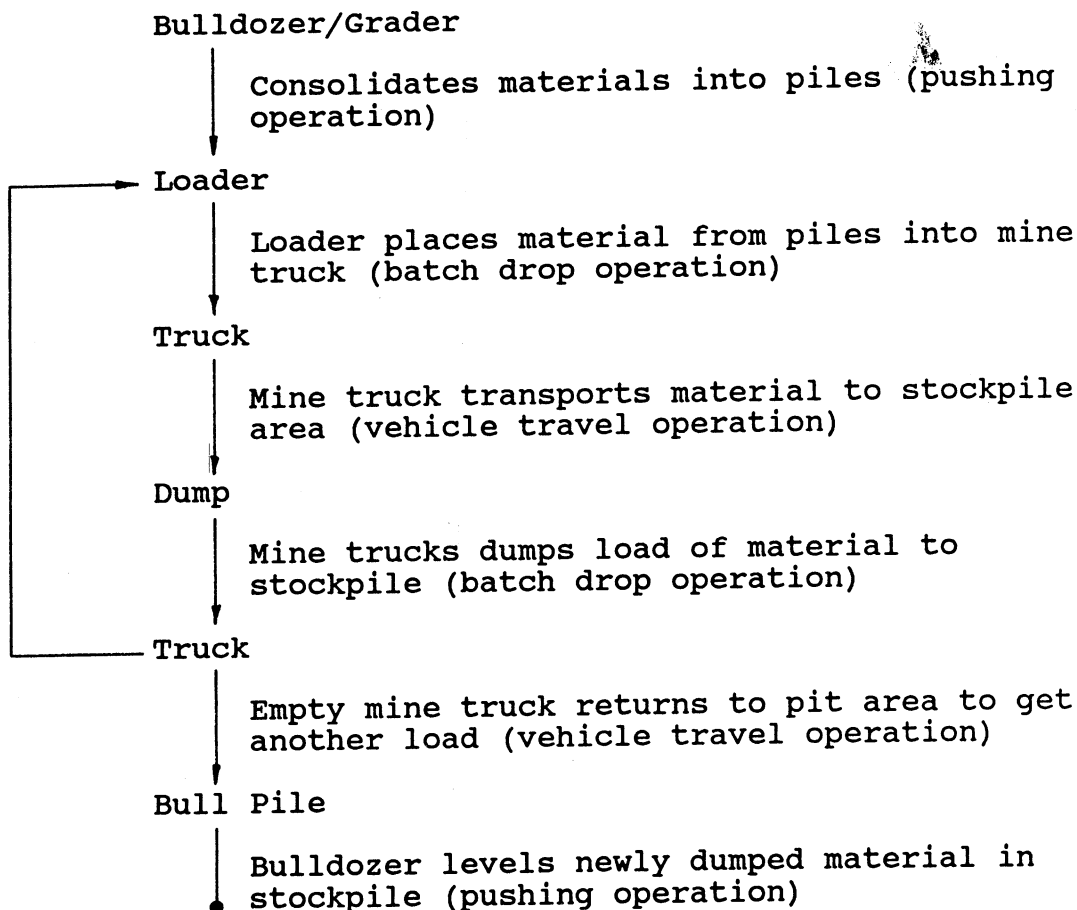
Ore once removed from the pit is to be transported to a primary crushing facility. Here the material will be transferred to the crusher by a seven cubic yard front end loader. After crushing, the processed ore will be moved via a conveyor to a drop site where a loader will transport it to waiting rail cars. The loader will then return empty to the drop site for another load. The processed ore will ultimately be carried by rail to the main siding for final transport. Figure No. 2 illustrates the processing events in a flow chart. Water sprays and water trucks will be used to minimize particulate entrainment during the processing operations.

Beginning with the Type II material, the stockpiled rock, overburden, and finally topsoil will be replaced in the pit area. The sequence of events necessary to accomplish reclamation will be essentially the same as those for removal. One exception should be emphasized, there will be no need for drilling or blasting. Materials returned to the pit area will be leveled by bulldozers and/or the grader. As is the case with the removal process, a water truck will be used for dust suppression.

Attachment to Supplement P1

FIGURE NO. 1

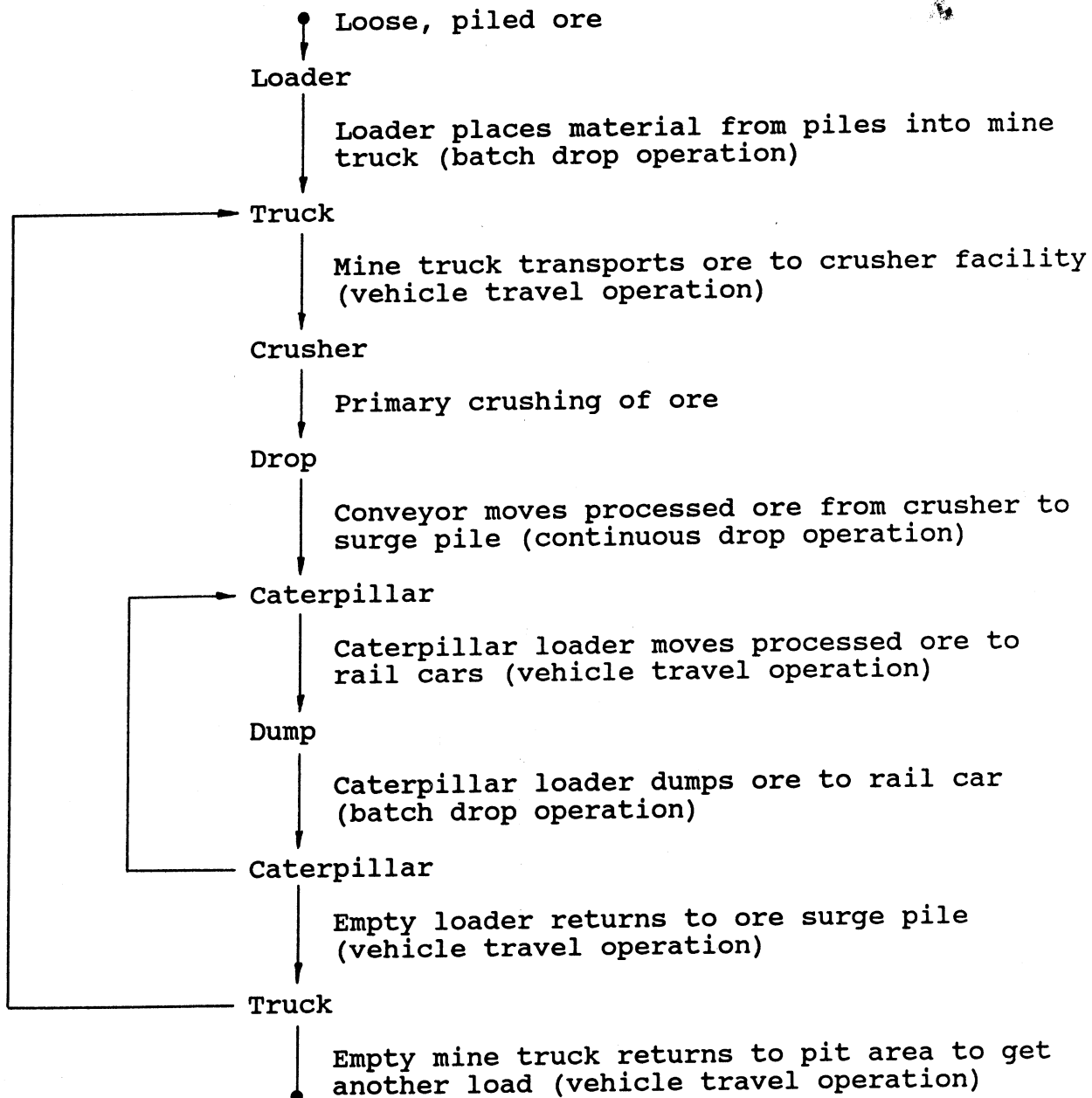
Flow Chart for Material Movement from Pit to Storage Piles



Attachment to Supplement P1

FIGURE NO. 2

Flow Chart for Ore Processing Operation



P1 Supplement

TABLE NO. 12.1
Potential Sources Of Fugitive DustRoads

Distance from pit to Type I pile	1,300 ft.
Distance from pit to Type II pile	1,000 ft.
Distance of haul road	1,900 ft.

Crusher (primary)

250 TPD capacity

Storage Piles

Topsoil	7 acres
Type I	40 acres
Type II	27 acres
Coarse ore	15,000 ft ²

For locations - see Figure No. 4500-1F in Section 3.0

KENNECOTT FLAMBEAU AIR POLLUTION CONTROL PERMIT APPLICATION

P1 Supplement

Example Calculations

As most of the fugitive and process TSP calculations followed the same format, only representative calculations are presented:

Topsoil

Volume = 180,000 tons

Initially, equipment will travel on soil roadways, physical properties of the road bed were determined to be.

% silt = 15 (Table 11.2.3-1, AP 42)

% moisture = 3.4 (Table 11.2.3-1, AP 42)

Bulldozer

To determine entrained TSP as a result of dozing topsoil into piles prior to transport:

$$PM_{10} = \frac{0.45 S^{1.5}}{M^{1.4}} \quad [5-3, 5-5, EPA 450/3-88-008]$$

where:

PM₁₀ = emission rate (<10 um) (kg/h)

S = silt content (%)

M = moisture content (%)

Assume TSP = 2PM₁₀

$$\begin{aligned} TSP &= \frac{0.45 S^{1.5}}{M^{1.4}} \times 2 \times 1 \text{ lb}/.454 \text{ kg} \\ &= \frac{0.45(15)^{1.5}}{(3.4)^{1.4}} \times 2 \times 1 \text{ lb}/.454 \text{ kg} \\ &= 20.8 \text{ lb/h of operation} \end{aligned}$$

Truck To Storage Pile

$$\begin{aligned}\text{No. of truck trips} &= \frac{\text{Volume of Material}}{\text{Capacity of Truck}} \\ &= \frac{180,000 \times 1.034}{35} \\ &= 5,318 \text{ trips}\end{aligned}$$

The factor of 1.034 accounts for the 3.4% moisture in the trucked material.

Distance to storage pile = 1,500 ft

$$\text{VMT full} = 5,318 \text{ trips} \times 1,500 \text{ ft/trip} \times \frac{1 \text{ mile}}{5,280 \text{ ft}} = 1,511 \text{ miles}$$

$$\text{E.F. full} = \frac{s}{12} \frac{S}{30} \frac{W}{4} .7 \frac{w}{3} .5 \frac{365-p}{365} (k) (5.9)$$

(11.2.1-1, AP 42)

where: K = multiplier = 0.80
s = percent road silt = 15.0 (11.2.1-1)
S = mean speed (mph) = 20.0
w = no. of wheels = 6
W = weight of truck = 69 tons
p = no. days >0.01 inches precipitation = 120

$$\text{E.F.} = (0.80) (5.9) \left(\frac{15.0}{12} \right) \left(\frac{69}{3} \right) .7 \left(\frac{6}{4} \right) .5 \frac{365-120}{365} \frac{20}{30} =$$

29.0 lb/mile

Similar calculations were performed for empty, return trips for the trucks.

$$\begin{aligned}\text{TSP} &= \text{VMT} \times \text{E.F.} \\ &= 1,511 \text{ miles} \times 29.0 \text{ lb/mile} \\ &= 43,813 \text{ lb}\end{aligned}$$

Reduction due to watering (assumed 90%)

$$\begin{aligned}\text{TSP} &= (1-0.90) (43813) \\ &= 4381 \text{ lb}\end{aligned}$$

Dump From Truck To Pile

$$\text{E.F.} = k \frac{(0.0018) \frac{s}{2}}{\frac{u}{5} \frac{H}{5}} \frac{Y}{6} .33 \quad (11.2.3-1, \text{eqn (1), AP-42})$$

where: k = multiplier = 0.73
 s = percent silt = 15.0
 u = wind speed (mph) = 11.0
 H = dump height (ft) = 4.0
 M = percent moisture = 3.4
 Y = capacity of unit (yd^3) = 22.8

$$\text{E.F.} = \frac{(0.73) \frac{(0.0018)}{\frac{3.4}{2}} \frac{15}{5} \frac{11}{5} \frac{4}{5}}{\frac{22.8}{6} 0.33}$$

$$= 0.00154 \text{ lb/ton}$$

$$\begin{aligned} \text{TSP} &= 180,000 \text{ tons} \times 0.00154 \text{ lb/ton} \\ &= 277 \text{ lb} \end{aligned}$$

Wind Erosion

$$\text{E.F.} = 1.7 \frac{s}{1.5} \frac{365-p}{235} \frac{f}{15} \text{ lb/day} \cdot \text{acre} \quad ((3), 11.2.3-5, \text{AP-42})$$

where: s = percent silt = 15.0
 p = no. of days with rainfall > 0.01 inch
 f = 0.10
 acres = 8.0

$$\text{E.F.} = 1.7 \frac{15}{1.5} \frac{365-120}{235} \frac{0.10}{15}$$

$$= 0.118 \text{ lb/acre} \cdot \text{day}$$

$$\begin{aligned} \text{TSP} &= 0.118 \text{ lb/acre} \cdot \text{day} \times 8 \text{ acres} \times 365 \text{ days/year} \\ &= 345 \text{ lb/year} \end{aligned}$$

Drilling

Assume wet drilling
 Drilled rock = 919,000 tons/year
 $\text{E.F.} = 0.0008 \text{ lb/ton}$ (Table 8.19.2-2)

$$\begin{aligned} \text{TSP} &= 0.0008 \text{ lb/ton} \times 919,000 \text{ tons/year} \\ &= 735 \text{ lb/year} \end{aligned}$$

Blasting

Assume traprock
 Blasted rock = 919,000 tons/year
 $\text{E.F.} = 0.0001 \text{ lb/ton}$ (Table 8.19.2-2, AP-42)

$$\begin{aligned} \text{TSP} &= 0.0001 \text{ lb/ton} \times 919,000 \text{ ton/year} \\ &= 92 \text{ lb/year} \end{aligned}$$

Crusher (primary)

Ore production = 322,000 tons/year
E.F. = 0.02 lb/ton (Table 8.23-1, AP-42)

TSP = 0.02 lb/ton x 322,000 tons/year
= 6,440 lb/year

Spray Dust Suppression = 75% reduction

TSP = (1-0.75) 6,440
= 1,610 lb/year

Conveyor (Continuous Drop)

$$\text{E.F.} = \frac{k (0.0018) \frac{s}{5} \frac{u}{5} \frac{H}{10}}{\frac{M}{2}^2} \quad ((2), 11.2.3-4, \text{AP-42})$$

where: k = particle size mult. = 0.77
s = percent silt = 5.0 (rock material)
u = wind speed (mph) = 11.0
H = drop height (ft) = 20.0 (average fall dist.)
M = percent moisture = 5.0

$$\text{E.F.} = \frac{(0.77) (0.0018) \frac{5}{5} \frac{11}{5} \frac{20}{10}}{\frac{5}{2}^2}$$

= 0.001 lb/ton

TSP = 322,000 tons/year x 0.001 lb/ton
= 314 lb/year

Spray Dust Suppression = 50% reduction

TSP = (1-0.50) 628
= 157 lb/year

Similar methods were employed throughout the particulate emission rate calculations. Critical data used in the TSP determination included:

Overburden

% silt = 7.5 (Table 11.2.3-1, AP-42)
% moisture = 5.0

Type I Materials

% silt = 5.0 (in-house data)
% moisture = 5.0 (in-house data)

Type II Materials

% silt = 5.0 (in-house data)
% moisture = 5.0 (in-house data)

Dust suppression on roadways = 90%
Dust suppression on conveyor = 50%
Dust suppression on crusher = 75%

Section 6.0 - Supplemental Emission Sources

KENNECOTT FLAMBEAU AIR POLLUTION CONTROL PERMIT APPLICATION

TABLE NO. 6-1

Yearly Estimated Number of Vehicles Used in Operation

Proposed Equipment	PP	Year							R1	R2
		1	2	3	4	5	6			
400-HP dozer	1	1	1	1	1	1	1		1	1
Mine truck	5	6	6	7	7	6	3		7	7
7-yard loader	1	2	2	2	2	2	2		2	2
300-HP dozer	1	1	1	1	1	1	1		1	1
14-foot grader	1	1	1	1	1	1	1		1	1
Water wagon	2	2	2	2	2	2	2		2	2
15-yard truck	0	1	1	1	1	1	1		1	1
Operating hours/day	24	8	8	8	8	8	8		24	24

PP = Preproduction
R1 = Reclamation 1.
R2 = Reclamation 2.

TABLE NO. 6-2

Off-Gases Generated From Building Space Heaters

Building	No. of Units	Unit Heat Release (Btu/hr)	Total Heat Input (Btu/hr)
Laboratory	1	1,466,000	1,466,000
Office	1	80,000	80,000
Truck Shop	2	300,000	600,000
Wastewater Treatment Plant	3	300,000	900,000