

PERMIT BOOK

STATE OF MISSOURI



DEPARTMENT OF NATURAL RESOURCES

MISSOURI AIR CONSERVATION COMMISSION

PERMIT TO CONSTRUCT

Under the authority of RSMo 643 and the Federal Clean Air Act the applicant is authorized to construct the air contaminant source(s) described below, in accordance with the laws, rules and conditions as set forth herein.

Permit Number: **082010-003** Project Number: 2008-09-024

Parent Company: Noranda, Inc.

Parent Company Address: 1 Brentwood Commons, Suite 175-250 Old Hickory Road, Brentwood, TN 37027

Installation Name: Noranda Aluminum, Inc.

Installation Address: #1 Robbins Road, St. Jude Industrial Park, P.O. Box 70, New Madrid, MO 63869

Location Information: New Madrid County, S32, T22N, R14E

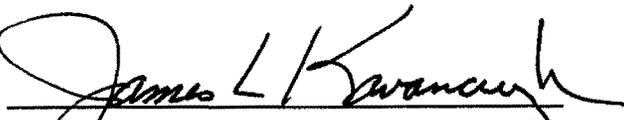
Application for Authority to Construct was made for:
Increase aluminum production to 650,000,000 pounds per year at an existing primary aluminum reduction plant in New Madrid, Missouri. This review was conducted in accordance with Section (8), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*.

Standard Conditions (on reverse) are applicable to this permit.

Standard Conditions (on reverse) and Special Conditions are applicable to this permit.

AUG - 4 2010

EFFECTIVE DATE



DIRECTOR OR DESIGNEE
DEPARTMENT OF NATURAL RESOURCES

STANDARD CONDITIONS:

Permission to construct may be revoked if you fail to begin construction or modification within 18 months from the effective date of this permit. Permittee should notify the Air Pollution Control Program if construction or modification is not started within 18 months after the effective date of this permit, or if construction or modification is suspended for one year or more.

You will be in violation of 10 CSR 10-6.060 if you fail to adhere to the specifications and conditions listed in your application, this permit and the project review. In the event that there is a discrepancy between the permit application and this permit, the conditions of this permit shall take precedence. Specifically, all air contaminant control devices shall be operated and maintained as specified in the application, associated plans and specifications.

You must notify the departments' Air Pollution Control Program of the anticipated date of start up of this (these) air contaminant source(s). The information must be made available not more than 60 days but at least 30 days in advance of this date. Also, you must notify the Department of Natural Resources Regional office responsible for the area within which you are located within 15 days after the actual start up of this (these) air contaminant source(s).

A copy of this permit and permit review shall be kept at the installation address and shall be made available to Department of Natural Resources' personnel upon request.

You may appeal this permit or any of the listed special conditions to the Administrative Hearing Commission (AHC), P.O. Box 1557, Jefferson City, MO 65102, as provided in RSMo 643.075.6 and 621.250.3. If you choose to appeal, you must file a petition with the AHC within 30 days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed. If it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the AHC.

If you choose not to appeal, this certificate, the project review and your application and associated correspondence constitutes your permit to construct. The permit allows you to construct and operate your air contaminant source(s), but in no way relieves you of your obligation to comply with all applicable provisions of the Missouri Air Conservation Law, regulations of the Missouri Department of Natural Resources and other applicable federal, state and local laws and ordinances.

The Air Pollution Control Program invites your questions regarding this air pollution permit. Please contact the Construction Permit Unit at (573) 751-4817. If you prefer to write, please address your correspondence to the Missouri Department of Natural Resources, Air Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102-0176, attention: Construction Permit Unit.

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SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

The special conditions listed in this permit were included based on the authority granted the Missouri Air Pollution Control Program by the Missouri Air Conservation Law (specifically 643.075) and by the Missouri Rules listed in Title 10, Division 10 of the Code of State Regulations (specifically 10 CSR 10-6.060). For specific details regarding conditions, see 10 CSR 10-6.060 paragraph (12)(A)10. "Conditions required by permitting authority."

Noranda Aluminum, Inc.
New Madrid County, S32, T22N, R14E

1. **Superseding Condition**
The conditions of this permit supersede all special conditions found in the previously issued construction permit (Permit Number 102004-001) and associated amendments from the Air Pollution Control Program if the project authorized by this permit goes forward. If the project authorized by this permit is cancelled or otherwise does not go forward then the provisions of Permit Number 102004-001 (as amended) shall continue to apply.
2. **Best Available Control Technology (BACT) Emission Limitation for Sulfur Oxide (SO_x)**
 - A. Noranda Aluminum, Inc. shall not discharge SO_x emissions into the atmosphere in excess of 6,077 tons per year from the entire installation (refer to Appendix E for a list of emission units) in any consecutive 12-month period.
 - B. Noranda Aluminum, Inc. shall not exceed the following SO_x limitations:
 - i) 405.17 pound per hour for all three Carbon Bake Furnaces, combined
 - ii) 428.6 pound per hour for the Potline 1
 - iii) 430.1 pound per hour for the Potline 2
 - iv) 256.0 pound per hour for the Potline 3 East
 - v) 256.0 pound per hour for the Potline 3 West
 - C. Noranda Aluminum, Inc. shall not use coke with a sulfur content greater than 3.0% or pitch with a sulfur content greater than 0.8%
 - D. Noranda Aluminum, Inc. shall maintain a record of the sulfur content of the alumina, pitch and coke used as raw materials, and the baked anode produced from the carbon bake furnaces. The sulfur contents must be tested according to Special Condition 15. The sulfur contents must be used in determining SO_x emissions from the carbon bake furnaces and potlines.

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The permittee is authorized to construct and operate subject to the following special conditions:

- E. Noranda Aluminum, Inc. shall determine compliance with the limit established in Special Condition 2.A. using the mass balance methodology found in Appendix A.
 - F. Attachment A and Attachment B or equivalent forms approved by the Air Pollution Control Program shall be used to demonstrate compliance with Special Conditions 2(A) and 2(B). A copy of any sulfur content verification documentation shall be kept with Attachment A.
3. BACT Emission Limitation for Potline 1 and Potline 2
- A. Particulate Matter (PM) and Particulate Matter less than 10 microns in diameter (PM₁₀) (filterable and condensable) [BACT]
 - i) Noranda Aluminum, Inc. shall not exceed the following PM grain loading annual rates:
 - a) 0.0018 grains per dry standard cubic feet (gr/dscf) for Potline 1 Monitor (EP59),
 - b) 0.0018 gr/dscf for Potline 2 Monitor (EP60), and
 - c) 0.01 gr/dscf for Potline 1 & 2 Stack (EP61).
 - ii) Noranda Aluminum, Inc. shall not exceed the following BACT limitations for PM₁₀ (filterable and condensable):
 - a) 52.68 pounds per hour and 4.59 pound per ton Al produced for Potline 1 Monitor (EP59),
 - b) 33.54 pounds per hour and 2.71 pound per ton Al produced for Potline 2 Monitor (EP60), and
 - c) 56.69 pounds per hour and 2.01 pound per ton Al produced for Potline 1 & 2 Stack (EP61).
 - iii) Noranda Aluminum, Inc. shall not exceed the following annual PM₁₀ (filterable and condensable) limitations:
 - a) 136.3 tons per any 12-month consecutive period for Potline 2 Monitor (EP60), and
 - b) 202.5 tons per any 12-month consecutive period for Potline 1 & 2 Stack (EP61)
 - c) Noranda Aluminum, Inc. shall develop an emission factor (pound/ton aluminum) that shall be used in conjunction with Attachment C or equivalent forms approved by the Air Pollution Control Program to demonstrate compliance with Special Conditions 3(A)(iii)(a) and (b).
 - d) An annual average of results from all testing required in Special Condition 16 during a 12-month calendar period shall be used to establish the emission factor.
 - B. Particulate Matter less than 2.5 microns in diameter (PM_{2.5}) [BACT]

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SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

- i) Potline 1 Monitor (EP59) emissions shall not exceed the BACT limitation for PM_{2.5} of 25.43 pounds per hour.
 - ii) Potline 2 Monitor (EP60) emissions shall not exceed the BACT limitation for PM_{2.5} of 16.19 pounds per hour.
 - iii) Potline 1 & 2 Stack (EP61) emissions shall not exceed the BACT limitation for PM_{2.5} of 27.37 pounds per hour.

- C. Carbon Monoxide (CO) [BACT]
 - i) Potline 1 Monitor (EP59) emissions shall not exceed the BACT limitation for CO of 110 pounds per hour and 9.58 pound per ton Al produced.
 - ii) Potline 2 Monitor (EP60) emissions shall not exceed the BACT limitation for CO of 110 pounds per hour and 9.58 pound per ton Al produced.
 - iii) Noranda Aluminum, Inc. shall not exceed the BACT limitation for CO of 5,520 pounds per hour and 240.4 pound per ton Al produced from Potline 1 & 2 Stack (EP61).

- D. Fluorides [BACT]
 - i) Noranda Aluminum, Inc. shall not exceed the BACT limitation for combined fluorides of 1.9 pounds per ton of aluminum produced from Potline 1 Monitor (EP59) and Potline 1 & 2 Stack (EP61).
 - ii) Noranda Aluminum, Inc. shall not exceed the BACT limitation for combined fluorides of 1.9 pounds per tons of aluminum produced from Potline 2 Monitor (EP60) and Potline 1 & 2 Stack (EP61).

- 4. BACT Emission Limitation for Potline 3 (East and West)
 - A. PM/PM₁₀ (filterable and condensable) [BACT]
 - i) Noranda Aluminum, Inc. shall not exceed the following PM grain loading annual rates:
 - a) 0.00075 gr/dscf for Potline 3 Monitor (EP64)
 - b) 0.01 gr/dscf for Potline 3 East Stack (EP62), and
 - c) 0.01 gr/dscf for Potline 3 West Stack (EP63).
 - ii) Noranda Aluminum, Inc. shall not exceed the following BACT limitations for PM₁₀(filterable and condensable):
 - a) 25.77 pounds per hour and 1.82 pound per ton Al produced for Potline 3 Monitor (EP64),
 - b) 16.59 pounds per hour and 2.04 pound per ton Al produced from Potline 3 East Stack (EP62), and
 - c) 16.59 pounds per hour and 2.04 pound per ton Al produced from Potline 3 West Stack (EP63).
 - iii) Noranda Aluminum, Inc. shall not exceed the following annual PM₁₀

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SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

(filterable and condensable) limitations:

- a) 63.1 tons per any 12-month consecutive period from Potline 3 East Stack (EP62), and
- b) 63.1 tons per any 12-month consecutive period from Potline 3 West Stack (EP63).
- c) Noranda Aluminum, Inc. shall develop an emission factor (pound/ton aluminum) that shall be used in conjunction with Attachment C or equivalent forms approved by the Air Pollution Control Program to demonstrate compliance with Special Conditions 4(A)(iii)(a) and (b).
- d) An annual average of results from all testing required in Special Condition 16 during a 12-month calendar period shall be used to establish the emission factor.

B. PM_{2.5} [BACT]

- i) Potline 3 Monitor (EP64) emissions shall not exceed the BACT limitation for PM_{2.5} of 12.44 pounds per hour.
- ii) Potline 3 East Stack (EP62) emissions shall not exceed the BACT limitation for PM_{2.5} of 8.01 pounds per hour.
- iii) Potline 3 West Stack (EP63) emissions shall not exceed the BACT limitation for PM_{2.5} of 8.01 pounds per hour.

C. CO [BACT]

- i) Potline 3 Monitor (EP64) emissions shall not exceed the BACT limitation for CO of 131 pounds per hour and 9.27 pound per ton Al produced.
- ii) Noranda Aluminum, Inc. shall not exceed the BACT limitation for CO of 1,642 pounds per hour and 232.5 pound per ton Al produced from Potline 3 East Stack (EP62)
- iii) Noranda Aluminum, Inc. shall not exceed the BACT limitation for CO of 1,642 pounds per hour and 232.5 pound per ton Al produced from Potline 3 West Stack (EP63).

D. Fluorides [BACT]

- i) Noranda Aluminum, Inc. shall not exceed the BACT limitation for combined fluorides of 1.9 pounds per tons of aluminum produced from Potline 3 East Stack (EP62), Potline 3 West Stack (EP63), and Potline 3 Monitor (EP64).

5. Emission Limitations for Carbon Bake Furnaces

A. BACT

- i) PM grain loading annual rate shall not exceed 0.03 gr/dscf for

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The permittee is authorized to construct and operate subject to the following special conditions:

- ii) Carbon Bake Furnaces (EP-AAA).
Carbon Bake Furnaces (EP-AAA) emissions shall not exceed the BACT limitation for PM₁₀ (filterable and condensable) of 80.00 pounds per hour and 2.33 pound per ton green anode.
 - iii) Carbon Bake Furnaces (EP-AAA) emissions shall not exceed the BACT limitation for PM₁₀ (filterable and condensable) of 253.8 tons per any 12-month consecutive period.
 - a) Noranda Aluminum, Inc. shall develop an emission factor (pound/ton aluminum) that shall be used in conjunction with Attachment C or equivalent forms approved by the Air Pollution Control Program to demonstrate compliance with Special Conditions 5(A)(iii).
 - b) An annual average of results from all testing required in Special Condition 16 during a 12-month calendar period shall be used to establish the emission factor.
 - iv) Carbon Bake Furnaces (EP-AAA) emissions shall not exceed the BACT limitation for PM_{2.5} of 66.9 pounds per hour.
 - v) Carbon Bake Furnaces (EP-AAA) emissions shall not exceed the BACT limitation for CO of 270.69 pounds per hour and 10.9 pound per ton green anode.
 - vi) Noranda Aluminum, Inc. shall not exceed the BACT limitation for combined fluorides of 0.2 pounds per tons of green anode produced from Carbon Bake Furnaces (EP-AAA).
- B. Non-BACT**
- i) Noranda Aluminum, Inc. shall develop an emission factor for H₂SO₄ from the carbon bake furnaces (EP-AAA).
 - a) If the developed emission factor is greater than 0.11 pound of H₂SO₄ per ton of baked anode produced, Noranda will be required to submit an amendment application within 60 days of testing.
 - b) Noranda Aluminum, Inc. shall not exceed the throughput levels outlined in Appendix C and shall not start construction of projects listed in Appendix D until the amendment required by Special Condition 5(B)(i)(a) has been issued.
 - ii) Carbon Bake Furnaces (EP-AAA) emissions shall not exceed 11.33 tons per year of Polycyclic Organic Matter (POM) from the entire installation in any consecutive 12-month period.
 - iii) Attachment D or equivalent forms approved by the Air Pollution Control Program shall be used to demonstrate compliance with Special Conditions 5(B)(ii).

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SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

6. Non-BACT Emission Limits for Carbon Bake Furnaces and Potlines
 - A. Noranda Aluminum, Inc. shall develop an emission factor for VOC and NO_x from the Carbon Bake Furnaces and the Potlines.
 - i) Noranda Aluminum, Inc. shall submit a comparison of the tested emission factors to the emission factors submitted in the application within 60 days of testing for approval.
 - ii) If the developed emission factor results in emission rates greater than those submitted in the original application, Noranda will be required to submit an amendment application within 60 days of submitting the comparison report.
 - iii) Noranda Aluminum, Inc. shall not exceed the throughput levels outlined in Appendix C and shall not start construction of projects listed in Appendix D until the amendment has been issued.
 - B. Noranda Aluminum, Inc. shall determine the conversion of SO₂ into Carbonyl Sulfide (COS) and develop an emission factor for COS through testing required in Special Condition 16.
 - C. Noranda Aluminum, Inc. shall not discharge COS emissions into the atmosphere in excess of 219.4 tons per year from the entire installation (refer to Appendix E for a list of emission units) in any consecutive 12-month period.
 - D. Attachment E or equivalent forms approved by the Air Pollution Control Program shall be used to demonstrate compliance with Special Conditions 6(C).
 - E. Noranda Aluminum, Inc. shall verify the beryllium, manganese, and nickel content of coke and alumina by testing:
 - i) The beryllium concentration in alumina shall not exceed 4 parts per million (ppm);
 - ii) The manganese content in alumina shall not exceed 0.001% by weight;
 - iii) The nickel concentration in coke shall not exceed 0.023 ppm; and
 - iv) The nickel content in alumina shall not exceed 0.002% by weight.
 - F. The testing required in Special Condition 6(E) shall be conducted on a sample of coke and alumina at least once every year. Noranda Aluminum, Inc. shall maintain a record of all test results.
7. BACT Control Equipment Requirements – PM₁₀, PM_{2.5} and Fluoride Emissions
 - A. Noranda Aluminum, Inc. shall control emissions from Potlines 1, 2 & 3 and

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The permittee is authorized to construct and operate subject to the following special conditions:

all three carbon bake furnaces using a dry alumina scrubber connected to baghouses as specified in the permit application to achieve BACT.

- B. The dry alumina scrubbers and baghouses must be in use at all times when the aluminum potlines or the carbon bake furnaces are in operation. The dry alumina scrubber and baghouse shall be operated and maintained in accordance with the manufacturer's specifications.
- C. The baghouses associated with the dry alumina scrubber shall be equipped with a gauge or meter, which indicates the pressure drop across the control device. These gauges or meters shall be located such that the DNR employees may easily observe them. Replacement filters for the baghouses shall be kept on hand at all times. The bags shall be made of fibers appropriate for operating conditions expected to occur (i.e. temperature limits, acidic and alkali resistance, and abrasion resistance).
- D. Each dry alumina scrubber shall be equipped with a flow meter that indicates the fresh alumina flow through the scrubber. These gauges and meters shall be located in such a way they may be easily observed by Department of Natural Resources' personnel
- E. Noranda Aluminum, Inc. shall monitor and record the pressure drop through the baghouse and the fresh alumina flow rate through the scrubber at least once every twenty-four (24) hours. The pressure drop through the baghouse and the fresh alumina flow rate shall be maintained within the design conditions specified by the manufacturer's performance warranty and/or testing conditions.
- F. Noranda Aluminum, Inc. shall maintain an operating and maintenance log for the control systems (scrubber with baghouse) for a period of (60) sixty months which shall include the following:
 - i) Incidents of malfunction, with impact on emissions, duration of event, probable cause, and corrective actions; and
 - ii) Maintenance activities, with inspection schedule, repair actions, and replacements, etc.
 - iii) A written record of regular inspection schedule, the date and results of all inspections including any actions or maintenance activities that result from that inspection.

8. BACT Capture Equipment Requirements – Potline PM₁₀, PM_{2.5} and Fluoride

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SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

Emissions

- A. Noranda Aluminum, Inc. shall capture emissions from Potlines 1, 2 & 3 using capture hoods over each pot for a capture efficiency of at least 96 percent to achieve BACT.
- B. Noranda Aluminum, Inc. shall repair or replace damaged hooding immediately upon inspection of damaged hooding.
- C. The capture hoods must be in use at all times when the aluminum potlines are in operation.
- D. Noranda Aluminum, Inc. shall develop and maintain a monitoring plan that:
 - i) Identifies the operating conditions to assure 96 percent capture efficiency. Operating conditions include but are not limited to the number, duration, and frequency of open cells; the ability to increase the draft on open cells; temperature; bath ratio; frequency of anode effects; changing of anodes; degree of automation; method of crust breaking; and housekeeping,
 - ii) Explains why this practice is appropriate for demonstrating ongoing compliance,
 - iii) Identifies the specific monitoring procedures for demonstrating the effectiveness of each operating condition,
 - iv) Specifies the monitoring parameter value or range of values (or the procedures for establishing the values) that shall be maintained to demonstrate capture efficiency is being maintained, and
 - v) Complies with all operating and maintenance requirements established in all consent agreements.
- E. The capture efficiency operating parameter(s) identified in Special Condition 8(D) shall be monitored when the aluminum potlines are in operation. Noranda Aluminum, Inc. shall submit a schedule for monitoring within 180 days of permit issuance for approval. The frequency of the monitoring shall be performed sufficiently to ensure compliance with the efficiency stated in Special Conditions 8.A and 8.D.
- F. Noranda Aluminum, Inc. shall maintain an operating and maintenance log for the capture systems (capture hoods) for a period of (60) sixty months which shall include the following:
 - i) Incidents of malfunction, with impact on emissions, duration of event, probable cause, and corrective actions; and

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The permittee is authorized to construct and operate subject to the following special conditions:

- ii) Maintenance activities, with inspection schedule, repair actions, and replacements, etc.
 - iii) A written record of regular inspection schedule, the date and results of all inspections including any actions or maintenance activities that result from that inspection.
9. BACT Control Requirements – CO Emissions
- A. Noranda Aluminum, Inc. shall use good design and operation practices at all times in order to meet BACT for the aluminum potlines.
 - B. Noranda Aluminum, Inc. shall use low energy burner technology at all times in order to meet BACT for the carbon bake furnaces.
10. Non-BACT Capture Equipment Requirements
- A. The material storage, handling and process equipment, listed in Appendix E, shall be enclosed by ductwork or located in a building. The enclosures/buildings shall be maintained under negative pressure and exhausted to baghouses.
 - B. Noranda Aluminum, Inc. shall demonstrate negative pressure by using visual indicators, such as negative pressure gauges, at each openings of the enclosure. Visual indicators other than a negative pressure gauge must be approved prior to use.
 - C. Noranda Aluminum, Inc. shall perform a visual indicator check for each emission point at least once in every 24-hour period while the material handling, storage, and processing equipment are in operation.
 - D. Noranda Aluminum, Inc. shall maintain an operating and maintenance log for the material storage, handling equipment and process equipment which shall include the following:
 - i) Incidents of malfunction, with impact on emissions, duration of event, probable cause, and corrective actions.
 - ii) Maintenance activities, with inspection schedule, repair actions, and replacements, etc.
 - iii) A record of regular inspection schedule, the date and results of all inspections, including any actions or maintenance activities that result from the inspections. Either paper copy or electronic formats are acceptable.

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SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

11. Fuel Usage Restrictions

- A. Noranda Aluminum, Inc. shall not combust natural gas in an amount greater than 832 million cubic feet (MMCF) from the entire installation (refer to Appendix E for a list of emission units) less the carbon bake furnaces during any 12-month consecutive period.
- B. Attachment G or equivalent forms approved by the Air Pollution Control Program shall be used to demonstrate compliance with Special Conditions 11(A).
- C. Noranda Aluminum, Inc. shall combust propane only during times of natural gas curtailment.
- D. A report must be submitted to the Air Pollution Control Program within 15 days of the use of propane. The report shall included at a minimum:
 - i) Reasons for the natural gas curtailment,
 - ii) Duration of propane usage,
 - iii) Amount of propane used, and
 - iv) Emissions calculations associated with the combustion of the propane.

12. Haul Road Requirements

- A. Noranda Aluminum, Inc. shall limit its daily haul road emissions to 38.8 pounds per day and annual haul road emissions to 2.9 tons per any 12-month consecutive period.
- B. Noranda Aluminum, Inc. shall submit a compliance demonstration plan within 90 days of issuance of this construction permit. The plan will contain at the least:
 - i) daily recordkeeping of the weight (tons) of materials received and shipped by truck per day, and number of trucks. In determining actual emissions, an average truck weight may be used in determining compliance. Attachment F, or equivalent form(s), shall be used for this purpose.
 - ii) silt loading of the haul road
 - iii) the emissions equation from AP-42 used in calculating actual emissions
 - iv) length of the haul road
 - v) a Fugitive Dust Control Plan (FDCCP) to control emissions from haul roads. Noranda Aluminum, Inc. must also provide details on how the plan will be maintained and implemented.

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The permittee is authorized to construct and operate subject to the following special conditions:

- C. Noranda Aluminum, Inc. shall conduct a series of silt loading performance tests conducted at least once per quarter of the first year after issuance of this construction permit and once every 6 months thereafter. The silt loading tests shall be conducted in accordance with ASTM-C-136 method.

A summary of this method is found in Appendix C of AP-42. The results shall be used in the compliance demonstration plan required by Special Condition 12.B.

- D. For each day of operation, the owner or operator shall conduct a survey of the plant property and haul roads to determine if visible fugitive emissions are being generated and leaving plant property. Documentation of all corrective actions and daily surveys shall be maintained in a log. Noranda Aluminum, Inc. shall water haul roads whenever conditions exist which would cause visible fugitive emissions to enter the ambient air beyond the property boundary.

13. Truck Limitations

Noranda Aluminum, Inc. shall ensure that all trucks transporting any material on/off property shall be at least 20 feet in height. If smaller vehicles are used to transport product, Noranda Aluminum, Inc. shall provide an updated air quality analysis in order to ensure continued compliance with the air quality standards.

14. Baghouse Requirements

- A. Noranda Aluminum, Inc. shall modify the existing baghouses on the existing equipment listed in Appendix B to control the PM₁₀ emissions from these sources as specified in the permit application. The outlet grain loading for each baghouse listed in Appendix B shall be reduced to 0.005 gr/dscf.

- B. Noranda Aluminum, Inc. shall install baghouses on the existing equipment listed below (also listed in Appendix B) for the control of PM₁₀ emissions from these sources as specified in the permit application. The outlet grain loading shall be 0.005 gr/dscf.

<u>No.</u>	<u>Stack ID</u>	<u>Stack Description</u>
1.	BA	Stack for Rod Mill #1 Melter
2.	BB	Stack for Rod Mill #3 Holder
3.	<u>BC</u>	<u>Stack for Rod Mill #2 Melter</u>
4.	BD	Stack for Rod Mill #4 Holder
5.	BH	Stack for Rod Mill #5 Holder

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The permittee is authorized to construct and operate subject to the following special conditions:

- C. The baghouses specified by Special Condition 14.A, and 14.B. must be in use at all times when the associated piece of equipment is in operation, and shall be operated and maintained in accordance with the manufacturer's specifications. These baghouses shall be equipped with a gauge or meter, which indicates the pressure drop across the control device. These gauges or meters shall be located such that the Department of Natural Resources' employees may easily observe them.
 - D. Noranda Aluminum, Inc. shall monitor and record the operating pressure drop across the baghouses specified by Special Condition 14.A, and 14.B. at least once in every 24-hour period when the associated equipment is in operation.
 - E. Appropriate replacement filters identified in the Baghouse Compliance Plan in Special Condition 20 for each baghouse specified by Special Condition 14.A, and 14.B. shall be kept on hand at all times. These replacement filters shall be made of fibers appropriate for operating conditions expected to occur (i.e. temperature limits, acidic and alkali resistance, and abrasion resistance).
 - F. Noranda Aluminum, Inc. shall maintain an operating and maintenance log for each baghouse indicated by Special Condition 14.A, and 14.B. which shall include the following:
 - i) Incidents of malfunction(s) including the date(s) and duration of the event, the probable cause, any corrective actions taken and the impact on emissions due to the malfunction,
 - ii) Any maintenance activities conducted on the unit, such as parts replacement, replacement of equipment, etc., and
 - iii) A written record of regular inspection schedule, the date and results of all inspections including any actions or maintenance activities that result from that inspection.
15. Determination of Sulfur Content
- A. Alumina (raw alumina and reacted alumina) and Baked Anode
 - i) Alumina and baked anode sulfur content shall be determined by daily alumina and baked anode sampling. The alumina sample shall be taken from the conveyor immediately preceding the entrance to and upon exiting the carbon bake scrubbers.
 - a) Testing of the daily samples must be performed individually within 7 days of collection.
 - b) If a sample cannot be collected on Saturday and/or Sunday, Noranda Aluminum, Inc. may substitute the highest sulfur

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content test results from another sample collected during the same collection week. For Saturday, the substitute sample must be the sample with the highest sulfur content collected within the previous 5 days. For Sunday, the substitute sample must be the sample with the highest sulfur content collected within the following 5 days.

- ii) After twelve months of operation, Noranda Aluminum, Inc. may submit a variability analysis on the sulfur content to Director of the Air Pollution Control Program. Substituted samples may not be removed from the analysis. Upon approval by the Director, periodic sampling may be used in place of daily sampling. Periodic sample will consist of a single sample taken to represent a seven-day or less interval.
 - iii) For this special condition, a deviation is considered to be two consecutive samples whose alumina or baked anode sulfur analysis reveals percent-by-weight data that differ by more than plus or minus 0.1%. In the event of a deviation, periodic sampling will be replaced by daily samples until there are 30 days of sampling with no deviations.
 - iv) For daily and periodic (i.e. 1 sample for every 7 days) sampling, the facility will report any changes from the required sampling frequency. Noranda Aluminum, Inc. shall not have a sampling database of less than 80% of valid samples for each running 30-day average.
 - v) Invalid samples are daily samples that are missed, lost, or otherwise corrupted during testing. These samples will be substituted with the average of the previous quality assured daily sample and the following quality assured daily sample.
 - vi) Periodic samples that are missed, lost, or otherwise corrupted during testing will be re-sampled and tested in duplicate within the 7 day period.
- B. Pitch and Coke
Noranda Aluminum, Inc. shall analyze the sulfur content of the pitch and coke by taking a weekly representative sample of pitch and coke from the storage tanks or by using analytical results for each shipment from the fuel vendor.
16. Compliance Testing Requirements
- A. Stack tests shall be performed to verify that the emission limitations set in Special Conditions 2, 3, 4, 5, 6 and 14 are not exceeded. These tests shall

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SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

- be performed as specified in the Stack Test Procedures outlined in Special Condition 17.
- B. The potlines will be tested to determine the ratio of emissions between the roof monitors and the potline stacks. In order to determine the ratio of emissions between the roof monitors and the potline stacks, Noranda will be required to test the stacks and roof monitors from each potline group.
- C. Noranda Aluminum, Inc. shall conduct performance testing on the equipment listed in Appendix B sufficient to quantify the emission rates of PM₁₀ from these sources as specified in Special Condition 14. In addition, Noranda Aluminum, Inc. shall quantify the emission rates of PM_{2.5} from these sources. This testing may be limited to conducting tests on a representative piece(s) of each type of equipment upon approval by the Director.
- D. An alternate method(s) of quantifying the emission rates of PM₁₀ and PM_{2.5} from these sources may be used in place of the above testing requirement if requested by Noranda Aluminum, Inc. and approved by the Director. Noranda Aluminum, Inc. shall test a minimum of 20% of the baghouses with at least one test performed on each flow rate range, baghouse type, and process type.
- i) Noranda Aluminum, Inc. must submit a list of all baghouses separated into appropriate flow rate ranges, baghouse types, and process types. Justification for the proposed listing must accompany the submittal for approval.
- ii) After initial testing, each subsequent testing may not be performed on the same baghouse used in the previous year's test, unless approved by the Air Pollution Control Program.
- E. Performance tests shall be performed within 180 days after issuance of this construction permit. For equipment subject to Special Condition 20, performance tests shall be performed within 180 days after completion of changes required by the plan. For equipment subject to Special Condition 21, performance tests shall be performed within 180 days after completion of changes required by that condition. Performance tests shall be performed once every subsequent calendar year.
- F. These tests shall be performed according to the requirements found at 40 CFR Part 63 Subpart LL and Subpart RRR and 40 CFR Part 60 Subpart S, as applicable. These performance testing will be supplemented with the appropriate PM_{2.5}, PM₁₀, CO, SO_x, COS, H₂SO₄, POM, VOC, NO_x and

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SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

fluoride test methods to demonstrate compliance with Special Conditions 2, 3, 4, 5, 6 and 14. These performance tests shall comply with Special Condition 17.

- G. In lieu of performance testing every year as required per Special Condition 16.E, Noranda Aluminum, Inc. may reduce testing to once every five years for SO_x, CO, COS, H₂SO₄, POM, VOC and NO_x, if at least 3 consecutive years of test results demonstrate that emissions are less than 75% of the associated limit(s). If subsequent testing results do not remain below 75% of the associated limit(s), Noranda Aluminum, Inc. shall return to the annual testing schedule until 3 consecutive years of test results demonstrate that emissions are less than 75% of the associated limit(s).

17. Proposed Test Plan

- A. The date on which the initial performance tests are conducted must be pre-arranged with the Air Pollution Control Program a minimum of 30-days prior to the proposed test date so that this Program may arrange a pretest meeting, if necessary, and assure that the test date is acceptable for an observer to be present. A completed Proposed Test Plan form (copy enclosed) may serve the purpose of notification and must be approved by the Air Pollution Control Program prior to conducting the required emission testing.
- B. Two copies of a written report of the performance test results shall be submitted to the Director of the Air Pollution Control Program within 30-days of completion of any required testing. The report must include legible copies of the raw data sheets, analytical instrument laboratory data and complete sample calculations from the required EPA Method for at least one sample run.
- C. The test report is to fully account for all operational and emission parameters addressed both in the permit conditions as well as in any other applicable state or federal rules or regulations.
- D. If the performance testing required by Special Conditions 16 of this permit indicate that any of the emission rates or control efficiencies specified in Special Conditions 2, 3, 4, 5, 6 and 14 are being exceeded, Noranda Aluminum, Inc. must propose a plan to the Air Pollution Control Program within thirty (30) days of submitting the performance test results. This plan must demonstrate how Noranda Aluminum, Inc. will reduce the emission rates below those stated in Special Condition 2, 3, 4, 5, 6 and 14. Noranda

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SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

Aluminum, Inc. shall implement any such plan immediately upon its approval by the Director.

18. **PM₁₀, Fluoride and SO_x Monitoring Requirements**
 - A. Noranda Aluminum, Inc. shall install, operate and maintain a system of ambient air monitoring stations for PM₁₀, PM_{2.5}, Fluoride and SO_x. Noranda Aluminum, Inc. shall submit a Quality Assurance Project Plan (QAPP) for PM₁₀, PM_{2.5}, Fluoride and SO_x within 180 days of issuance of this construction permit. Noranda Aluminum, Inc. shall install, operate and maintain these ambient PM₁₀, PM_{2.5}, Fluoride and SO_x monitoring networks within 360 days of issuance of this construction permit, according to the following specifications.
 - B. The initial PM₁₀, PM_{2.5}, and SO_x monitoring network approved under this permit shall consist of up to three (3) continuous SO_x monitors, two (2) continuous PM₁₀ monitors and one (1) continuous PM_{2.5} monitor.
 - C. The initial Fluoride monitoring network approved under this permit shall consist of up to seven (7) monitors.
 - D. Noranda Aluminum, Inc. will conduct meteorological monitoring in conjunction with the PM₁₀, PM_{2.5}, Fluoride and SO_x monitoring plan. This meteorological monitoring will occur at a minimum of one (1) site as described by an approved Quality Assurance Project Plan (QAPP) for meteorological data and continue for the duration of the PM₁₀, PM_{2.5}, Fluoride or SO_x monitoring.
 - E. Noranda Aluminum, Inc. shall locate all PM₁₀, PM_{2.5}, Fluoride and SO_x monitors such that the monitors will measure ambient air quality for each pollutant in all areas of maximum impact, as approved by the department.
 - F. Noranda Aluminum, Inc. shall report the data collected in accord with this special condition to the department on a quarterly basis.
 - G. If concentrations are monitored that exceed a National Ambient Air Quality Standard (NAAQS), Noranda Aluminum, Inc. shall report the monitored information (the beginning and ending date and time, and the value for the applicable standard time period) within seven (7) days of the event.
 - H. Concentrations resulting from this monitoring greater than the NAAQS or RAL and attributed to operations permitted herein represent cause for reopening this permit. Noranda Aluminum, Inc. shall:

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SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

- i) conduct a comprehensive review of the results and develop a correction plan;
 - ii) submit the corrective action plan to the permitting authority for approval; and,
 - iii) implement the corrective action plan immediately upon department approval.

 - I. Noranda Aluminum, Inc. shall submit a QAPP for PM₁₀, PM_{2.5}, Fluoride and SO_x for department approval within 180 days of issuance of this construction permit. The QAPP will contain the specifications of the monitoring program noted above and include:
 - i) the conditions under which the monitoring may be discontinued;
 - ii) date sampling will commence. Sampling will begin no later than the commencing of operation; and,
 - iii) the nature of the information to be reported (e.g. hourly concentrations).

 - J. In conjunction with the PM₁₀, PM_{2.5}, Fluoride and SO_x monitoring program above, Noranda Aluminum, Inc. shall keep records of the daily hours of operation, the amount of raw materials received and aluminum produced by plant operations. This includes road activity associated with the plant. Noranda Aluminum, Inc. shall record this information for the duration of the PM₁₀, PM_{2.5}, Fluoride and SO_x monitoring program. Noranda Aluminum, Inc. shall submit this information quarterly to the department.
19. Restriction of Public Access
- A. Noranda Aluminum, Inc. shall preclude all public access to property that is considered within the non-ambient air zone, according to U.S. EPA's definitions of ambient air (40 CFR 50.1(e)) and later related EPA determinations, with respect to the air quality impact analysis conducted for this permit. This area would include the railroad right-of-way. Installation and maintenance of a fence or other physical barrier shall be the means to preclude public access. A map showing property boundary (precluded areas) can be found Ambient Air Quality Impact Analysis (AAQIA) for Noranda Aluminum, Inc. (Noranda)-Prevention of Significant Deterioration (PSD) Modeling—September 9, 2008 Submittal.

 - B. Noranda Aluminum, Inc. shall complete construction of the physical barrier to enclose the area prior to increasing the throughput of any equipment contained in this permit.

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SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

20. Requirement for Baghouse Compliance Plan

- A. Noranda Aluminum, Inc. shall submit a complete plan to the Air Pollution Control Program detailing the actions Noranda Aluminum, Inc. will take to reduce the outlet grain loading to 0.005 gr/dscf in the baghouses listed in Appendix B. Noranda Aluminum, Inc. must provide specific details on the type of bags being used, the flow rate through the baghouse, etc.
- B. Noranda Aluminum, Inc. shall submit the plan within 120 days of issuance of this construction permit.
- C. The Air Pollution Control Program will have 30 days from receipt of the plan to evaluate the effects, if any, of the plan on the permit review of this construction permit. The Air Pollution Control Program may require an amendment to this construction permit if the permit review is affected.
- D. The changes outlined in the plan must be complete within 180 days of exceeding the associated throughputs listed in Appendix C.

21. Stack Requirements

- A. Noranda Aluminum, Inc. shall increase the stack heights of the stacks according to Table 2. All remaining stack parameters must be maintained at the values indicated in the permit application.

Table 2: Modeled Stack Parameters

Emission Point	Description	Stack Height m (ft)	Temperature °C (°F)	Exit Velocity m/s (ft/s)	Diameter m (ft)
EP-62	Potline 3E	65 (213.25)	85 (184.4)	11.73 (38.48)	4.36 (14.3)
EP-63	Potline 3W	65 (213.25)	86 (187.4)	11.73 (38.48)	4.36 (14.3)
EP-13	Reacted Ore Material Handling Baghouse	30 (98.43)	25 (77)	12.82 (42.06)	0.67 (2.2)
EP-46	Electrolyte Recovery Baghouse	65 (213.25)	25 (77)	14.67 (48.13)	1.13 (3.7)
EP-48	Electrolyte Recovery Baghouse	65 (213.25)	25 (77)	18.5 (60.69)	1.52 (5.0)
EP-70	Tertiary Crusher Baghouse	30 (98.43)	25 (77)	16.33 (53.58)	0.70 (2.3)

- B. The three existing carbon bake furnaces shall be exhausted through a new stack (EP-AAA). The stack height shall be 233 feet and the inside diameter shall be 7.15 feet. The three existing carbon bake furnace stacks (EP-98, EP-99 and EP-AA) must be decommissioned upon the completion of stack EP-AAA.

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SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

C. Noranda Aluminum, Inc. may not increase throughput of the equipment above current levels as outlined in Attachment C until the stack parameters are increased or removed as dictated by this construction permit.

22. Requirements for Rendering Equipment Inoperable
 Noranda Aluminum, Inc. shall render inoperable the following equipment listed in Table 3 prior to increasing throughput above current levels as outlined in Attachment C. Operation of these equipment shall not occur for any reason without prior review and approval by the Air Pollution Control Program.

Table 3: Equipment being shut down

Emission Point	Description
EP-47	Electrolyte Recovery
EP-83	Cathode Casting Station
EP-84	Anode Stem Cleaning
EP-86	Welding Fume Exhaust for Anode Repair

23. Throughput Recordkeeping Requirements

A. Noranda Aluminum, Inc. shall maintain systems to determine the daily weight of aluminum produced, green anode feed rates, baked anode production rates, raw material feed rates, and cell or potline voltage.

B. Noranda Aluminum, Inc. shall maintain a record of the throughput of the equipment associated with the emission points listed in Appendix C until the date when the requirements of Special Conditions 19, 21 and 22 are fulfilled.

C. Noranda Aluminum, Inc. shall notify the AIR POLLUTION CONTROL PROGRAM's Enforcement Section, P.O. Box 176, Jefferson City, MO 65102, no later than 15 days after the following events occur:

- i) The date the restriction of public access listed in Special Condition 19 is complete,
- ii) The date the stack parameters listed in Special Condition 21 are met, and
- iii) The date the final equipment listed in Special Condition 22 is rendered inoperable.

24. Prohibition of Construction
 Noranda Aluminum, Inc. shall not construct the emission units associated with Permit #032008-009 without prior review and approval by the Air Pollution Control Program.

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SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

25. Operational Limitations

- A. Noranda Aluminum, Inc. shall limit the daily hours of operation as listed in Table 4.

Table 4: Daily Hourly Restrictions

Emission Point	Description	Daily Hours of Operation
EP-46	Electrolyte Recovery	18
EP-48	Electrolyte Recovery	18
EP-50	Electrolyte Recovery	18
EP-58	Electrolyte Recovery	18
EP-68	Primary Crusher (North)	16
EP-69	Primary Crusher (South)	12
EP-70	Tertiary Crusher	16
EP-82	Anode Stem Cleaning (Phase I)	10
EP-DW	Potline Crusher	12

- B. To show compliance with Special Condition 25.A. Noranda Aluminum, Inc. shall keep a written or electronic daily record of the number of hours of operation of the equipment listed in Table 4. Attachment H, or equivalent form(s), shall be used for daily record keeping.

26. Reporting Requirements

Noranda Aluminum, Inc. shall report to the Air Pollution Control Program's Compliance/Enforcement Section (P. O. Box 176, Jefferson City, MO 65102) no later than ten (10) days after the end of the month during which the records required by the special conditions of this construction permit show that the limitations of this permit have been exceeded.

27. Record Keeping Requirements

All records required by this construction permit shall be kept onsite for no less than five (5) years and shall be made available to any Department of Natural Resources' personnel upon request.

REVIEW OF APPLICATION FOR AUTHORITY TO CONSTRUCT AND OPERATE
SECTION (8) REVIEW

Project Number: 2008-09-024
Installation ID Number: 143-0008
Permit Number:

Noranda Aluminum, Inc.
#1 Robbins Road
St. Jude Industrial Park
P.O. Box 70
New Madrid, MO 63869

Complete: February 2, 2010

Parent Company:
Noranda, Inc.
1 Brentwood Commons
Suite 175-250 Old Hickory Road
Brentwood, TN 37027

New Madrid County, S32, T22N, R14E

REVIEW SUMMARY

- Noranda Aluminum, Inc. has applied for authority to increase aluminum production to 650,000,000 pounds per year at an existing primary aluminum reduction plant in New Madrid, MO.
- Hazardous Air Pollutant (HAP) emissions are expected from the proposed equipment. HAPs of concern from this process are hydrogen fluoride, carbonyl sulfide, and beryllium.
- Subpart S of the New Source Performance Standards (NSPS) applies to potroom groups and anode bake plants at this primary aluminum reduction plant.
- The Maximum Achievable Control Technology (MACT) standard, 40 CFR Part 63, Subpart LL, National Emission Standards for Primary Aluminum Reduction Plants, and Subpart RRR, National Emission Standards for Secondary Aluminum Production applies to the installation.
- The National Emission Standards for Hazardous Air Pollutants: Area Source Standards for Aluminum, Copper, and Other Nonferrous Foundries, Subpart ZZZZZZ, does not apply to this installation. The definition of aluminum foundries does not include primary or secondary metal producers that cast molten aluminum to produce simple shapes such as sows, ingots, bars, rods, or billets.
- Baghouses are being used to control PM₁₀ emissions from the material handling operations.

- Dry alumina scrubbers are used to control PM₁₀ and fluoride emissions from the carbon bake furnaces.
- PM₁₀ and fluoride emissions from the aluminum reduction process are controlled by enclosed hoods exhausted to dry alumina scrubbers.
- The Best Available Control Technology (BACT) requirements apply to SO_x, CO, PM₁₀, PM_{2.5} and fluoride.
- BACT requirements include the following:
 - Emission limits for PM₁₀, PM_{2.5}, fluorides and CO on the potline and carbon bake furnace operations;
 - Operational procedures and work practices for the reduction of overall emissions; and
 - Good design and operating techniques for CO.
- The increase in the potential emissions of SO_x, CO, PM₁₀, PM_{2.5} and fluoride are above de minimis levels, and the existing installation is considered to be a major source. Therefore, this review was conducted in accordance with Section (8) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*.
- This installation is located in New Madrid County, an attainment area for all criteria air pollutants.
- This installation is on the List of Named Installations [10 CSR 10-6.020(3)(B), Table 2, Number 6 *Primary Aluminum Ore Reduction Plants*].
- Ambient air quality modeling was performed to determine the ambient impact of SO_x, CO, PM₁₀, fluoride, and HAPs.
- Emissions testing is required for the source.
- Revision to Noranda's Part 70 Operating Permit renewal application is required for this installation within 1 year of permit issuance.
- Approval of this permit is recommended with special conditions.

INSTALLATION DESCRIPTION

Noranda Aluminum, Inc. operates a primary aluminum reduction plant in New Madrid County. The company is an existing primary aluminum reduction installation with existing secondary aluminum production operations. Alumina (Al₂O₃) is received at the plant and undergoes electrolytic reduction, known as the Hall-Heroult process, to produce aluminum. The electrolytic reduction takes place in shallow carbon-lined steel shells called pots. The anodes are carbon electrodes extending into the pot, and the cathode is the carbon lining within the pot.

Noranda's pots are housed in six potrooms, four of Kaiser pot technology and two of

Alcoa technology. There are 348 Kaiser pots divided equally among four rooms (i.e. 87 pots per room). These are named Potline 1 and Potline 2 (i.e. two potrooms per potline). Potline 3 contains 160 Alcoa pots in the remaining two potrooms.

Aluminum originates as an oxide called alumina. Deposits of bauxite ore are mined and refined into alumina for processing into aluminum metal. Alumina is combined in a pot with a molten electrolyte called cryolite, and direct current electricity is applied to the consumable carbon anode, dividing the aluminum oxide into molten aluminum metal and carbon-dioxide.

In the reduction of alumina, carbon, in the form of an anode, is negatively charged to react with the alumina. The anode, also called green anode, is continuously depleted until it is a stub. Anodes are large carbon blocks which act as electrical conductors, allowing the smelting process to take place. These anodes are prepared with calcined petroleum coke mixed with coal tar pitch binder to make a paste. Anode butts returned from the smelting process are also recycled in the process. The coke is crushed, ground, and screened before being mixed with the pitch binder. The paste is heated, then vibrated and compacted into anode blocks of two sizes: the Kaiser anode and the Alcoa anode.

The “green blocks” are baked in the carbon bake furnace to a temperature of 1150 degrees Celsius over 28 hours. The baking process bakes the pitch in the mix to form a solid block of carbon that can withstand the extreme conditions inside the smelting pots. Because the crushed, recycled anode component of a new anode has taken up fluorides during its life in the pot environment, this gives rise to a potential emission of fluorides to air during the baking process. Scrubbing equipment traps these additional fluorides for return to the smelting process.

The baked anodes are cooled, cleaned and conveyed to the rodding area where they are secured to steel rod assemblies with molten cast iron before being transported to the potrooms. The carbon anodes have a life span of approximately 22-24 days in the reduction pots.

The electrolyte used in the pots is molten cryolite (Na_3AlF_6), which also serves as the solvent for alumina. The electrolytic reduction of alumina by the carbon from the electrode forms elemental aluminum and carbon dioxide (CO_2). The aluminum is deposited around the carbon-lined steel shell, where it remains as a molten metal below the surface of the cryolitic bath. Using a vacuum siphon, the molten aluminum is removed from the pots every 24 to 48 hours and transferred to crucibles. From there, the crucibles of molten aluminum are transported to reverberatory holding furnaces called melters and holders where the aluminum is alloyed and processed into rods, billets or ingots. The secondary aluminum operations include aluminum alloying, casting and auxiliary operations.

Noranda Aluminum, Inc. is considered a major source under construction and operating permits. An operating permit renewal application has been submitted and is currently under review. The following permits have been issued to Noranda Aluminum, Inc. from the Air Pollution Control Program.

Table 5: Air permits issued to Noranda

Permit Number	Description
0679-008	Potline I
0679-009	Alumina handling facilities associated with potline III
0679-010	Potline III
0679-011	Carbon baking furnace for potline III
1282-007A	Dross cooling system
1288-003A	Dross cooling system
0990-013	Additional melting furnace
0194-008	Reverberatory melting furnace
0894-022	Filtered exhaust system
OP2001-066	Part 70 Operating Permit Primary Aluminum Reduction Facility
OP2001-032	Part 70 Operating Permit Primary Aluminum Reduction Facility
OP2001-062	Part 70 Operating Permit Primary Aluminum Reduction Facility
OP2001-033	Part 70 Operating Permit Primary Aluminum Reduction Facility
0298-001	Replacement of existing batch mixers for anode paste with continuous mixer and the replacement of the existing hydraulic press anode mold with a turntable vibratory anode former to produce a larger single piece anode
0799-017	Addition of a downdraft welding table
082001-005	Installation of two 80,000 pound holding furnaces, 20 MMBTU per hour each
102004-001	PSD permit for the increase in aluminum production
122007-005	Installation of two (2) additional 80,000 pound rectangular holding furnaces in the rod mill department, to supply the Number 2 Rod Mill (Properzi)
032008-009	Installation of a new 125 ton alumina storage bin (EP-115) and activation of shut down equipment which includes delivery systems and four 19 ton day tanks (EP-51, 52, 53 and 54). These tanks will sit on top of each pot room for storage of cover material that has an approximate composition of 56% alumina and 44% bath.
OP2000-033A	Responsible Official Change
OP2001-066A	Responsible Official Change
OP2001-062A	Responsible Official Change
OP2001-032A	Responsible Official Change

The equipment associated with Permit 032008-009 was not constructed prior to issuance of this construction permit. Noranda does not anticipate constructing these emission units within the allowable time limits of the permit. Therefore, these emission points were not included in the final modeling exercise provided with this new source review. If Noranda decides to proceed with the construction of these equipment, Noranda must submit a new permit application for review and approval by the Air Pollution Control Program.

PROJECT DESCRIPTION

Noranda Aluminum, Inc. has applied for authority to increase aluminum production at their existing installation from 588 MMlbs/yr (294,000 tpy) to 650 MMlbs/yr (325,000 tpy). To increase the production of aluminum, Noranda is proposing a series of projects that will increase the amperage to the aluminum production pots and increase the overall efficiency of the aluminum production process.

The following is a list of projects associated with this construction permit:

- Increased Rectification Capacity
- External Cell Resistance Reduction
- Cathode BUSS leaf Addition

Off-Line Reduction Cell Building
 Anode Cover
 Anode Rod/Stub/Yoke Assembly
 Green Anode Density
 Cell Thermal Insulation
 Additional Cells in Pot Lines

A description of these projects can be seen in Appendix D.

Subsequently, associated equipment used in anode production such as the carbon bake furnaces, boilers for the hot oil system, anode repair operations, and roof vents and fans in these areas will experience a production increase as will equipment related to secondary aluminum production such as the equipment associated with pig melters, holders, homogenizing furnaces, and roof vents and fans in the area.

Equipment being modified to accomplish the increase in aluminum production are listed in Table 6.

Table 6: Modified Emission Units Associated with the Increase in Production

Emission Point	Emission Point Description	Maximum Hourly Design Rate	
		Previously	New
EP-59	Monitor – Potline 1	10.4 tons of molten Al Produced	11.48 tons of molten Al Produced
EP-60	Monitor – Potline 2	10.4 tons of molten Al Produced	11.48 tons of molten Al Produced
EP-61	Stack for Potline 1 & 2	20.8 tons of molten Al Produced	22.96 tons of molten Al Produced
EP-62	Stack for Potline 3E	6.4 tons of molten Al Produced	7.06 tons of molten Al Produced
EP-63	Stack for Potline 3W	6.4 tons of molten Al Produced	7.06 tons of molten Al Produced
EP-64	Monitor – Potline 3	12.8 tons of molten Al Produced	14.13 tons of molten Al Produced
EP-AAA	Carbon Bake Furnaces	22.5 tons of green anode production	24.8 tons of green anode produced (23.5 tons of baked anode)

Table 6 also represents the emission units included in the BACT analysis for PM₁₀, PM_{2.5}, SO_x, CO and fluorides. Although the throughput of other emission units is increasing due to the increased production of aluminum, no modification is occurring at any of the other emission units at this installation. Therefore, a BACT analysis was required for equipment included only in Table 6.

EMISSIONS/CONTROLS EVALUATION

Emissions from the aluminum reduction process are primarily gaseous fluorides and particulate fluorides, alumina, carbon monoxide (CO), carbon dioxide (CO₂), VOC, polycyclic organic matter (POM) and SO₂ from the reduction cells. Gaseous fluorides are emitted in the form of hydrogen fluorides. The source of fluoride emissions from reduction cells is the fluoride electrolyte, which contains cryolite, aluminum fluoride (AlF₃), and fluorspar (CaF₂). The dissociation of the molten cryolite is the source of the

perfluorinated carbon compounds tetrafluoromethane (CF₄) and hexafluoroethane (C₂F₆), which are produced as a result of an anode effect. Particulate emissions occur from the reduction cells and include alumina and carbon from anode dusting, cryolite, aluminum fluoride, calcium fluoride, and ferric oxide. The primary source of the CO and CO₂ emissions is the carbon in the anodes from the petroleum coke.

PM/PM₁₀/PM_{2.5} Emissions

The annual baseline emissions were determined using EIQ data for the years 2001-2002, unless otherwise stated.

Potline Monitor

Particulate emissions from the potlines include alumina and carbon from anode dusting, and cryolite, aluminum fluoride, calcium fluoride and ferric oxide. Representative size distributions for particulate emissions were taken from AP-42 Section 12.1 Primary Aluminum Production (2/98) Table 12.1-2.

PM₁₀ emissions from potline monitors can be determined by assuming 58% of the PM emissions are PM₁₀. Similarly, PM_{2.5} emissions from potline monitors can be determined by assuming 28% of the PM emissions are PM_{2.5}.

The short-term future actual PM₁₀ emissions are based on BACT limits proposed by Noranda. On an annual basis the emission rate for Potline 2 Monitor (EP-60) is lower than the annual rate using the short-term hourly limits and 8760 hours of operation. Therefore, annual limits were applied to this emission point. A PM_{2.5} limit was extrapolated using the ratios described above.

The annual baseline emissions were determined using EIQ data for the years 2001-2002. The annual emission rate on an hourly basis for Potline Monitor 1 (EP-59) exceeded the 2004 PSD limit for this emission point. Therefore the 2004 PSD limit was used as the hourly emission rate for determining the annual baseline emissions in lieu of the value stated in the EIQs for those years.

The short-term baseline emissions were determined using the average emission rates as determined by stack tests from the baseline period of 2001-2002. The test results were expressed as PM emission, and when converted to PM₁₀, the emission rates were higher than the 2004 PSD limit for Potline Monitor 1 (EP-59) and Potline Monitor 2 (EP-60). Therefore the 2004 PSD limit was used as the baseline short-term emission rates for these emission points.

Potline Stack

PM₁₀ emissions from potline stacks can be determined by assuming 58% of the PM emissions are PM₁₀. Similarly, PM_{2.5} emissions from potline monitors can be determined by assuming 28% of the PM emissions are PM_{2.5}.

The annual future actual emissions were based on the grain loading determined by BACT. The Potline 1 and 2 stack maximum flow rate is based on a maximum of 40 Line 1&2 scrubbers operating. Since Noranda typically operates 36 scrubbers at an annual average flow rate of 836,888 scfm, this flow rate was scaled up by 40/36 to account for

the operation of all scrubbers. The Potline 3E and 3W stacks maximum flow rates are based on a maximum of 8 scrubbers operating (8 on 3E and 8 on 3W). Since Noranda typically operates 7 scrubbers on 3E and 7 scrubbers on 3W at an annual average flow rate of 253,661 scfm, this flow rate was scaled up by 8/7 to account for the operation of all scrubbers. On an annual basis the emission rate for the potline stacks is lower than the annual rate using the short-term hourly limits and 8760 hours of operation. Therefore, annual limits were applied to these emission points. The annual future actual PM_{2.5} emissions limit was extrapolated from the PM₁₀ limit using the ratios discussed above.

Carbon Bake Furnaces

The EPA document, *AIRS Facility Subsystem Source Classification Codes and Emission Factor Listing for Criteria Air Pollutants, March 1990*, provides an emission factor for PM and PM₁₀ from anode baking furnaces. Based on the ratio of these emission factors, Noranda concluded that PM₁₀ emissions from the carbon bake furnaces could be determined by taking 93.33% of the PM emissions. However, this document does not address PM_{2.5} emissions. Therefore, the particle distribution tables found in AP-42 Table B.2-1 and B.2.2 were used to determine the percentage attributed to PM_{2.5} emissions. Based on the category listing for anode baking furnaces at primary aluminum production plants, 78% of total particulate emissions are considered to be PM_{2.5} emissions.

The short-term future actual PM₁₀ emissions are based on BACT limits proposed by Noranda. On an annual basis the emission rate for the carbon bake furnaces is lower than the annual rate using the short-term hourly limits and 8760 hours of operation. Therefore, annual limits were applied to this emission point. The annual future actual PM_{2.5} emissions limit was extrapolated from the PM₁₀ limit using the ratios discussed above.

The short-term baseline PM₁₀ emissions were determined using the average emission rates as determined by stack tests from the baseline period of 2001-2002. The tests produced PM data, which was converted to PM₁₀ and PM_{2.5} data.

Melter and Holder

The melters and holders have emissions due to the aluminum refining process itself and emissions from the combustion of natural gas for the operation of the equipment. These emissions were calculated separately and only the process emissions are discussed in this section. Future actual emissions from the process were based on PM emissions determined during testing of the equipment at the maximum hourly design rate of the equipment. To determine PM₁₀ emissions from the melter and holders, 60% of the PM emissions was used as stated in AP-42 Section 12.8 Secondary Aluminum Operations for refining. For PM_{2.5} emissions, 50% of the PM emissions were taken.

Raw Material Handling

There are several handling operations for various materials such as raw alumina, reacted alumina, electrolytes, petroleum coke, and pitch. The pollutant from these emission units is PM₁₀, and each emission unit is controlled by an existing baghouse. Particle distributions are not available for these emission units, therefore, all PM₁₀

emissions are assumed to also be PM_{2.5} emissions.

As a part of this project, Noranda is proposing to improve the efficiency of the baghouses by decreasing the outlet grain loading of the baghouses from 0.01 gr/dscf to 0.005 gr/dscf. At the time of permit issuance, Noranda was unclear on what changes to the baghouses would be needed to decrease the outlet grain loading. Therefore, a special condition has been included with this construction permit that requires a documentation of compliance with the new outlet grain loading within 120 days of the issuance of this construction permit. Since this information was relied upon to estimate the potential emissions for the project, Special Condition 14 has been included that sets an emissions limitation on all material handling operations. Noranda Aluminum, Inc. is required to demonstrate compliance with the limitations by periodically testing emissions from these operations.

Testing of these baghouses will be categorized into flow rate range, baghouse type, and process type. Noranda will be required to submit a listing of the baghouses in each category for approval prior to testing. Baghouse types may include reverse air baghouses, mechanical shakers, pulse jet, etc. Process types may be separated based on the type of material being processed or what kind of process equipment is being controlled. An example of how the baghouses may be listed is presented in Appendix F. It is not the intention of the condition to allow one baghouse to represent more than one category. If a baghouse is chosen to represent a particular flow rate range, it cannot also be used to represent a process type. In addition, each subsequent testing event must use a different baghouse than the previous testing event to represent each category listing.

Haul Roads

The emissions from the haul roads are PM₁₀, which were calculated using the Paved Haul Road equations. Particle distributions are not available for these emission units, therefore, all PM₁₀ emissions are assumed to also be PM_{2.5} emissions.

Pitch and coke are not typically hauled in by trucks. However, the aluminum product is shipped by truck. In the past, it was thought that the silt loading on the paved haul road at Noranda's facility was zero based on the material being hauled in the trucks (i.e. no spillage from the aluminum product). However, according to AP-42 Section 13.2.1, particulate emissions from the paved haul roads originate from vehicles in the form of exhaust, brake wear and tire wear emissions and resuspension of loose material on the road surface. Therefore, Noranda was required to calculate haul road emissions as part of this project. Baseline emissions for the haul roads were calculated assuming a silt loading of 2.5%. The future amount hauled was estimated by Noranda based on future production proposals. Future actual emissions were calculated based on a lower silt loading as a result of sweeping the roads and a controlled number of trucks traveling on the roads. Consequently, a special condition limiting the amount of truck traffic is included with this construction permit. In addition, the silt loading of the haul road will be tested to demonstrate compliance with the silt loading requirements of the haul road.

SO_x Emissions

As part of this project's application, Noranda proposed the use of a new calculation methodology to determine SO_x emissions from the carbon bake furnaces and potlines.

This new calculation methodology affected the emission rates submitted in previous EIQs, including those used in the determination of the SO_x limit in the previously issued construction permit. As a result (upon request by the Air Pollution Control Program), Noranda has amended the SO_x emission limit in Permit #102004-001 to reflect the newly proposed calculation methodology.

The request for revision to the SO_x calculations for the third time in five years brings the validity of the calculation method into question. Based on past SO_x modeling exercises in the area, there is concern over the possibility of exceedances of the NAAQS standard. Therefore, additional information on the SO₂ emissions from the plant is necessary to obtain an accurate portrayal of Noranda's impact on the NAAQS standard. Since the bulk of the SO₂ emissions originate with the coke and pitch, and subsequently the baked anode, determining the sulfur content of these materials is essential to assessing final emissions. In addition, the presence of sulfur in reacted alumina has been indicated as a significant contributor of sulfur emissions at primary aluminum plants in other states. Therefore testing the sulfur content of the alumina has also been determined to be necessary. Additional stack testing is required to verify hourly emission rates are not being exceeded.

The project emissions are based on the potential of the project minus the baseline SO₂ actual emissions. In this case the baseline years are 2002 and 2003.

Carbon Bake Furnaces

The total amount of sulfur from fresh pitch and coke and recycled scraps from the process is calculated as the amount processed into the carbon bake furnaces. The total amount of sulfur emissions from the carbon bake process is determined using the percent reduction in the bake furnace and the percent sulfur of the baked anodes. The baseline emissions were recalculated using this new method. However, since the carbon bake stacks will be combined into a common stack as part of this project, there was no need to determine the distribution of emissions among the three existing carbon bake stacks. Future actual emissions were calculated in a similar manner using 2.3% sulfur content for coke.

Potline Stacks and Monitors

The total amount of sulfur processed into the potlines is determined by accounting for any baked blocks, scraps or butts removed from or added to the potlines. The sulfur content of the baked anodes is determined through testing at the facility. It is assumed that all sulfur into the process is emitted as SO_x. The baseline emissions were also recalculated using the new method. The emissions were distributed among the three lines (Potline 1& 2, Potline 3E and Potline 3W) using the production data for each line and applying the production ratio to the emission rates.

When the new methodology was approved for the use in the 2004 PSD construction permit, Noranda used the new methodology to demonstrate compliance with an installation wide limitation. At the time, there was no need to evaluate the fluctuation in emissions from the carbon bake furnaces and potlines. The limitation only applied to the total amount of sulfur emitted from the entire installation.

The current project requires an ambient air quality analysis for SO_x. Since a mass

balance approach can result in a high degree of variation in the amount of emissions emitted from the carbon bake furnaces versus the potline, the emission rates used in the modeling analysis reflected several possible scenarios on a short-term and long-term basis. The different scenarios were based on two observations. The first observation was that the percentage of SO_x emissions from the different processes was variable. The second observation was that within the potlines, there was not enough evidence to determine how the emissions were distributed between the stacks and the roof monitors. To determine how these observations would affect the modeling analysis, two sets of scenarios were evaluated. One scenario set looked at the worst case emission rates for both the potlines and the carbon bake furnaces. The second set of scenarios is a subset of the first set, which looks at the worst case split between the potline stacks and roof monitors. The final scenario assumes worst case emissions from the potlines and carbon bake furnaces occur at the same time. Although this scenario is impossible due to the annual SO_x limit, it was necessary to consider this option to increase flexibility in permit emission limits. An itemization of the scenarios and the percent emissions distribution can be seen in Table 7.

Table 7: Description of the scenarios for the SO_x air quality analysis

	Percent of total SO _x emissions				
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Potlines	98.8%	98.8%	70.8%	70.8%	98.8%
Potline Stacks	96.17%	99.01%	96.17%	99.01%	99.01%
Potline Monitors	3.83%	0.99%	3.83%	0.99%	0.99%
Carbon Bake Furnace	1.2%	1.2%	29.2%	29.2%	29.2%

The future actual emissions for each scenario were determined using the new calculation methodology. The allocation of emissions between the potlines and the carbon bake furnaces was based on an examination of historical emissions from the plant using the same method. Between the years 2000 and 2007, the highest percent of SO_x emissions from the potlines was 98.8%, which occurred in 2007. In contrast the highest percent of SO_x emissions from the carbon bake furnaces was 29.2%, which occurred in 2001. Although it is difficult to accurately predict where the emissions will be emitted, the historical data was used as the basis for developing a representative model.

The percent emissions distribution between the potline stacks and roof monitors was based on fluoride test data for Potline 3 stack and roof monitor, submitted by Noranda. Fluoride testing is required by the primary aluminum reduction MACT, Subpart LL and was reported as an emission rate in pounds per hour and an emission factor in pounds per ton of aluminum. Comparing the (inlet) stack emission rate with the roof monitor results in the split seen in Scenario 1 and 3. However, the emission factor is based on production, which would better represent the emissions over a variety of production rates. Therefore, comparing the emission factors of the stack and the roof monitors results in the split seen in Scenario 2, 4 and 5.

For baseline emissions, the new mass balance approach was used along with existing data on the amount of material received, recycled and shipped and production data during the designated year to determine the actual emissions from the potlines and the carbon bake furnaces. Therefore, the potline and carbon bake furnace emissions did

not change in each of the scenarios. However, since the percent emissions distribution between the potline stacks and roof monitors is unverified, the baseline emissions for the potline stacks and roof monitors varied dependent upon the scenario. The percent emissions distribution is expected to remain constant during normal operation.

The potlines will be tested to determine the ratio of emissions between the roof monitors and the potline stacks. In order to determine the ratio of emissions between the roof monitors and the potline stacks, Noranda will be required to test the stacks and roof monitors from each potline group.

Natural Gas

Noranda is proposing a limit on the future actual natural gas usage to an amount equivalent to the 2002-2003 natural gas usage. Therefore, a natural gas limit has been set forth in this construction permit that will limit the installation-wide use of natural gas. However, although the carbon bake furnaces use natural gas, natural gas combustion emissions from the carbon bake furnaces are not included in these calculations. It is assumed that they are regulated by limits set forth on the carbon bake furnace emissions.

For SO_x, there is no increase in emissions based on the SO_x baseline year 2002-3. For PM₁₀, however, since the natural gas usage for the PM₁₀ baseline years, 2001-2, is lower than the 2002-3 natural gas usage, the PM₁₀ emissions increase was set to zero instead of indicating a negative emissions increase.

Natural gas emissions were based on a maximum future usage of 832 mmcf per year. To determine the future actual usage of each piece of equipment on an annual basis, the total future actual usage was divided among all of the combustion equipment at the facility based on the percent usage of the equipment. Some equipment, such as space heaters, were not assigned individual emission descriptions, but were grouped into one category labeled "miscellaneous". These miscellaneous sources were treated as one combustion unit per department and modeled similar to other combustion sources in their same departments. On a short-term basis, the maximum hourly design rate of the combustion equipment was used to determine the worst-case hourly emission rates.

Propane was discussed as back-up fuel for the equipment at the installation. Noranda does not anticipate using the propane unless natural gas becomes unavailable. Therefore, the potential emissions of propane combustion were not evaluated for this project. A special condition has been added to this construction permit that will restrict the combustion of propane to those periods of natural gas curtailment.

CO Emissions

The annual baseline emissions for CO were determined from the EIQ data for the years 2006-2007.

CO emissions are generated by the carbon bake furnaces due to the incomplete combustion of volatile organic compounds contained in the coal tar pitch. The emission factor that has been used to estimate CO emissions from the carbon bake furnaces was 66 pounds CO per ton aluminum produced and was obtained from the EPA document, *AIRS Facility Subsystem Source Classification Codes and Emission Factor Listing for*

Criteria Air Pollutants, March 1990. Based on stack testing with a portable flue gas monitor, Noranda proposed to use an emission factor of 6 pounds CO per ton aluminum to estimate the baseline actual emissions. Noranda updated the EIQs for the years 2000-2007 to account for the change in the emission factor. However, the future actual emissions were based on a more conservative emission factor of 7.3 pounds per ton because only a single test had been performed to characterize the CO emissions. Testing will be required to verify the change in the emission factor.

CO emissions from the potlines are generated in a reaction between aluminum and carbon dioxide resulting in oxidized aluminum and CO. This reaction reduces aluminum production efficiency which is an undesirable outcome. Therefore, Noranda is able to minimize the CO emissions from the potlines by maximizing aluminum production efficiency. The emission factor used to estimate emissions of CO was determined through stack testing. The future actual emissions of CO were determined by scaling up the BACT limits from the amendment to the 2004 PSD permit based on the proportionate increase in aluminum production.

The emission factors for natural gas combustion were taken from AP-42.

Fluorides

Fluoride emissions occur from the reaction of cryolite in the pots. The dry alumina scrubbers remove a portion of the fluorides by adsorbing the fluoride to the alumina, and the reacted alumina is recycled into the smelting process. Used anode butts are crushed and recycled into the production of new anodes. This recycled component carries fluorides taken up during its life in the pot environment and gives rise to a potential emission of fluorides to air during the baking process.

The definition of the PSD regulated pollutant fluoride specifically excludes hydrogen fluoride from consideration. However, Noranda has conservatively estimated fluoride emission using total fluoride emission data. Since hydrogen fluorides are considered HAPS, a separate analysis was performed for hydrogen fluorides.

NO_x, VOC

The emissions of NO_x are attributed to two sources: the combustion of natural gas and the potlines. The emission factors for natural gas combustion were taken from AP-42. The potline emissions were calculated based on an emission factor taken from EPA's WebFIRE program under the SCC 30300101. This emission factor (0.0030 pound NO_x per ton aluminum produced) was rated as "Unrated" under the emission factor rating system. No other emission factors were found that identified NO_x as emissions from the carbon bake and potline processes. However, based on a permit issued in Kentucky, NO_x emissions may be emitted from both the potline and carbon bake furnaces. Therefore, emission testing is required to verify the emissions of NO_x from the carbon bake and potline processes and preclude the applicability of PSD.

The emissions of VOC occur at the potlines and carbon bake furnaces, and from natural gas combustion and the tanks. The VOC emission factor for the potlines (0.1 pound VOC per ton aluminum produced) and the carbon bake furnaces (1 pound

VOC per ton aluminum produced) was found in EPA document *AIRS Facility Subsystem Source Classification Codes and Emission Factor Listing for Criteria Air Pollutants*. VOC emission limits in the Kentucky permit mentioned above were higher than those using the AIRs emission factors. Therefore, emission testing is required to verify the emissions of VOC from the carbon bake and potline processes and preclude the applicability of PSD. VOC emissions from the combustion of natural gas were taken from AP-42. VOC emissions from the tanks were calculated using the emission factors from the FIRE database.

Sulfuric Acid Mist

The emission of sulfuric acid (H_2SO_4) from primary or secondary aluminum operations is not discussed in AP-42 or AIRS. However, at a primary aluminum plant in Kentucky, stack testing was conducted in June 2006 that demonstrated sulfuric acid as being a pollutant of concern from the carbon bake furnaces. The resulting emission factor was 0.11 pounds of H_2SO_4 per ton anode produced. Noranda will be required to test the carbon bake furnace emissions to verify the emission factor used in this analysis is accurate.

HAPs

The HAPs of concern from the proposed project are nickel, manganese, beryllium, polycyclic organic matter (POM), hydrogen chloride, carbonyl sulfide (COS), and hydrogen fluoride. Beryllium and manganese are trace metals that occur in the alumina. Nickel occurs in both the alumina and coke. The quantity of these trace metals were based on a composition analysis of the coke and alumina. It was assumed that these metals were completely emitted into the atmosphere.

POM emissions are a result of the calcinations of the pitch in the carbon bake furnaces. Noranda is taking a self-imposed annual limit on the emissions of POM from the carbon bake furnaces to demonstrate that there is no increase in POM emissions. Therefore, a limit equivalent to the baseline emission rate is set forth in this construction permit. Noranda currently operates under the MACT Subpart LL limit of 0.18 pounds per ton of green anode produced.

Hydrogen chloride emissions are a result of the metal fluxing that occurs in the metal products holders and the rod mill melters and holders.

Although COS has not been considered a HAP of concern from this plant in previous permits, there have been indications at primary aluminum plants in other states that SO_2 further reacts to form COS. In order to determine the rate of conversion, Noranda will be required to test the conversion rate of SO_2 to COS. In addition, an annual limit is being imposed to ensure the ambient air quality is not being affected.

Hydrogen fluoride is the gaseous component of the total fluoride emissions that occur at the potlines and the carbon bake furnaces. Gaseous fluoride emissions can vary considerably based on the process as seen in testing results for total fluorides submitted by Noranda. Using these results, the average percent that is gaseous was determined for each emission process to calculate future actual emissions. The average percentages varied between 49% and 72%.

Gaseous HAPs, such as hydrogen fluoride and polycyclic organic matter, are limited under the MACT standard Subpart LL and are not subject to the requirements of 10 CSR 10-6.060(9).

Potential emissions of the application represent the potential of the new equipment, assuming continuous operation (8760 hours per year). Existing actual emissions were taken from the installation's 2008 Emissions Inventory Questionnaire (EIQ). The following table provides an emissions summary for this project.

Table 8: Emissions Summary (tons per year)

Pollutant	Regulatory De Minimis Levels*	Existing Potential Emissions	Existing Actual Emissions (2008 EIQ)	Potential Emissions of the Application	New Installation Conditioned Potential
PM ₁₀	15.0	major	567.8	501	1,141.4
PM _{2.5}	25.0	N/D	257.0	322	722.7
SO _x	40.0	major	4688.1	573	6,077.7
NO _x	40.0	major	36.2	0.89	42.1
VOC	40.0	major	239.4	34	262.5
CO	100.0	major	24770.8	2841	22,351.5
Fluorides	3.0	major	N/D	177	344.6
Beryllium	10.0	N/D	N/D	0.02	0.12
Carbonyl Sulfide	10.0	N/D	N/D	25.83	219
Hydrogen Chloride	10.0	N/D	N/D	2.17	2.74
Hydrogen Fluoride	10.0	N/D	N/D	99.37	
Manganese	10.0	N/D	N/D	0.04	0.30
Nickel	10.0	N/D	N/D	0.08	0.6
Polycyclic Organic Matter	10.0	N/D	N/D	0.0	11.3

N/A = Not Applicable; N/D = Not Determined

BACT ANALYSIS

Any source subject to Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*, Section (8) must conduct a Best Available Control Technology (BACT) analysis on any pollutant emitted in greater than de minimis levels. The BACT requirement is detailed in Section 165(a)(4) of the Clean Air Act, at 40 CFR 52.21 and 10 CSR 10-0.60(8)(A).

The proposed construction is subject to the PSD regulations, which mandate that case-by-case BACT analyses be performed. As a consequence, BACT demonstrations are presented for SO_x, CO, PM₁₀, PM_{2.5} and fluoride. The general principles of the top-down approach were used in the selection of BACT.

Emission sources considered in the BACT analysis include the carbon bake furnaces,

and potlines 1, 2 and 3. The BACT analysis was based on the U.S. EPA RACT/BACT/LAER Clearinghouse (RBLC) database, vendor information and guarantees, and previous permits for primary aluminum plants issued in the State of Missouri and elsewhere. Since the potlines are subject to 40 CFR 63 Subpart LL and 40 CFR 60 Subpart S, the BACT determination will be at least as stringent as these standards.

Control of PM₁₀ and Fluoride Emissions

The emissions increase of PM₁₀ and fluoride due to the proposed modification are significant and trigger major review for each pollutant. Particulate emissions from the potlines include alumina and carbon from anode dusting, and cryolite, aluminum fluoride, calcium fluoride and ferric oxide.

Fluoride emissions occur in the form of gaseous and particulate fluorides. The gaseous fluorides are mainly hydrogen fluoride which is not a regulated PSD pollutant and not included in the BACT analysis. For more on gaseous fluorides, please see the Ambient Air Quality Impact Analysis section. Particulate fluorides are considered a regulated PSD pollutant and do require further review. Since particulate fluorides are a category of particulate matter, the control device technology used for particulate matter is also effective for the control of particulate fluorides. Therefore, PM is being used to account for filterable PM₁₀ and PM_{2.5} and fluorides for this BACT analysis.

Potline emissions are separated into primary and secondary emissions. Primary emissions are the emissions captured by the hood for release through the potline stacks. Secondary emissions are emissions that are not captured by the hood and vented through roof vents. For the carbon bake furnaces, all emissions are considered primary.

Table 9 lists all control technologies identified in the RBLC database for the potlines and carbon bake furnaces with control efficiencies. All the technologies listed are technically feasible for primary emissions. However, only the wet scrubber and work practices are identified as technically feasible control technologies for secondary emissions. Secondary emissions exhaust through roof vents that span the length of a potroom which would obstruct the capture and control of these emissions. In addition, no other technology has been demonstrated as technically feasible for secondary emissions.

Table 9: PM control technologies

Control Technology	Control Efficiency
Capture Hoods and Dry Alumina Scrubber with Baghouse (primary emissions)	98%
Electrostatic Precipitators (ESPs) (primary emission)	66-98%
Wet Scrubber (primary and secondary emissions)	95% (primary) 50-80% (secondary)
Multicyclones (primary emissions)	78%
Operating Procedures and Work Practices (secondary emissions)	1-10%

Evaluation of Control Options for PM₁₀, and Fluoride Emissions

Primary Emissions

Capture Hood and Dry Alumina Scrubber with Baghouse

Dry alumina scrubbers allow potline or carbon bake furnace exhaust gases to contact

alumina ore. The gaseous pollutants adsorb onto the alumina allowing the gaseous pollutants to be treated as particulate matter. The spent alumina along with particulate fluorides are then removed from the exhaust stream through a baghouse.

Noranda currently utilizes a capture hood over each pot which directs primary emissions to a fluidized bed dry alumina scrubber. Gases are passed through an expanded bed of alumina, fluidizing the bed and removing the gaseous pollutants. The reacted alumina is returned to the potline feed system for processing in the potlines. Similarly, the carbon bake furnace emissions are vented through a fluidized bed dry alumina scrubber prior to entering the atmosphere.

The applicant has chosen the top control alternative. Therefore, no further analysis was conducted for the remaining primary emissions control options.

Secondary Emissions

Wet Scrubbers

Wet scrubbers are considered the most effective control technology for control of secondary emissions. Wet scrubbers are in use at primary aluminum facilities in the United States making this option technically feasible. Subsequently, an economic evaluation must be performed to determine if this option is economically feasible.

An economic evaluation of this technology is based on data reported in the EPA document *Basis and Purpose Document for the Development of Proposed Standards for the Primary Aluminum Industry*, Appendix C, where the economic viability of wet roof scrubbers is evaluated. The data did not include costs for retrofitting a prebake facility so the average total annualized cost for the installation and operation of a wet roof scrubber was estimated at \$27.60 per ton of annual capacity. Based on this estimate and Noranda's increased aluminum production rate, the cost would total \$9,067,500 per year. At a removal rate of 55%, as stated in the document, this is equivalent to:

- \$41,441/ton PM removed for Roof Monitor 1,
- \$70,149/ton PM removed for Roof Monitor 2, and
- \$84,716/ton PM removed for Roof Monitor 3.

For fluorides, the removal efficiency increases to 80%, but the removal cost increases using the same values as above:

- \$132,537/ton total fluoride removed for Roof Monitor 1,
- \$132,537/ton total fluoride removed for Roof Monitor 2, and
- \$107,702/ton total fluoride removed for Roof Monitor 3.

Based on the cost per ton of pollutant removed for either PM or fluorides, wet roof scrubbers are not economically feasible.

Operating Procedures and Work Practices

By improving operating procedures, secondary emissions are reduced as a direct result of the decrease in primary emissions.

Suppression of Anode Effects

Anode effects are believed to occur when the alumina content of the bath falls and a film of carbon tetrafluoride (CF₄) gas collects under the anode, causing a high electrical

resistance which increases the power input to the cell. The power increase is converted into heat thus raising the temperature of the cell. At the higher cell temperature, fluorine evolution is increased. Replenishing the alumina content of the electrolyte before it creates an anode effect can reduce the frequency of the events.

Bath Temperature and Bath Ratio

At higher the bath temperatures, bath salts will vaporize and become part of the emissions. Under normal operating conditions, operators monitor bath temperatures and bath ratios (ratio of sodium fluoride to aluminum fluoride) to prevent the cell from becoming too cold or too hot. When a cell is not crusted over, the molten electrolyte is exposed to the air and there is a large increase in fluoride in the cell off-gases. Operating conditions that destroy the ability of the bath to crust over and carry a cover of alumina may result in a net increase in cell emissions. The alumina cover prevents the escape of fluoride from the molten bath.

Hood Maintenance and Operation

100% hooding efficiency is not achievable under the present design due to the requirement of opening for cell working, for anode replacement and for metal tapping. In order to improve pollution control, operators must pay careful attention to keeping shields in good condition and open or remove them no more than necessary. The number of hoods or shields completely or partially open and the duration of opening greatly affect the capture efficiency and the quantity of secondary emissions that eventually escape through the roof. These factors can for the most part be controlled by the plant operator. Some potlines are equipped with the means of increasing the air flow into a primary collection system at individual cells when hoods need to be opened. This contributes to higher collection efficiencies thus reducing secondary emissions.

Work practice programs, inspection procedures, and maintenance programs for the repair or replacement of damaged hoods and seals are viable control options for secondary emissions. Improving the control program for secondary emissions increases the capture of the primary system, thus reducing overall emissions. The improved or enhanced program for secondary emissions includes optimizing work practices and following written procedures; inspections to assess equipment condition and adherence to work practices; and repair of hoods, seals, and other parts of the primary collection system as needed. The range for capture for this type of equipment is 90-99%.

Noranda's current operations include capture hoods over each pot. In the current permit application, Noranda has indicated a 96% capture efficiency for these capture hoods. In order to obtain this amount of capture, Noranda will be required to maintain an inspection and maintenance program to repair or replace damaged hoods and seals. In addition, Noranda will be required to maintain operating procedures and work practices used at the plant to reduce overall cell emissions.

Selection PM₁₀ and Fluoride Control Technology

In conclusion, for the primary emissions of the aluminum potlines, BACT for the control of PM₁₀ and fluoride is the use of capture hoods, with a capture efficiency of 96%, vented to dry alumina scrubbers connected to a baghouse. For secondary emissions of the potlines, BACT for the control of PM₁₀ and fluoride is good work practices. For the carbon bake furnaces, BACT for the control of PM₁₀ and fluoride is dry alumina

scrubbers connected to a baghouse.

Table 10 outlines the emission rates associated with this BACT analysis.

Unit ID	Emission Unit Description	PM ₁₀	Fluorides
EP-59	Potline 1 Monitor	0.0018 gr/dscf (annual average) 52.68 lb/hr 4.59 lb/ton Al produced	1.9 lb/ton Al produced
EP-60	Potline 2 Monitor	0.0018 gr/dscf (annual average) 33.54 lb/hr 2.71 lb/ton Al produced	1.9 lb/ton Al produced
EP-61	Potline 1&2 Stack	0.01 gr/dscf (annual average) 56.69 lb/hr 2.01 lb/ton Al produced	1.9 lb/ton Al produced
EP-62	Potline 3 East Stack	0.01 gr/dscf (annual average) 16.59 lb/hr 2.04 lb/ton Al produced	1.9 lb/ton Al produced
EP-63	Potline 3 West Stack	0.01 gr/dscf (annual average) 16.59 lb/hr 2.04 lb/ton Al produced	1.9 lb/ton Al produced
EP-64	Potline 3 Monitor	0.00075 gr/dscf (annual average) 25.77 lb/hr 1.82 lb/ton Al produced	1.9 lb/ton Al produced
EP-AAA	Carbon Bake Furnaces	0.03 gr/dscf (annual average) 80.0 lb/hr 2.33 lb/ton green anode	0.2 lb/ton green anode

Control of PM_{2.5} Emissions

The emissions increase of PM_{2.5} due to the proposed modification are significant and trigger major review. As stated in the previous section, particulate emissions from the potlines include alumina and carbon from anode dusting, and cryolite, aluminum fluoride, calcium fluoride and ferric oxide. PM_{2.5} emissions consist of condensable and filterable components. In the evaluation of filterable PM_{2.5} emissions, the selected BACT for PM₁₀ and fluorides was evaluated to determine the effectiveness of a dry scrubber with baghouse on filterable PM_{2.5} emissions. Based on the control efficiencies listed in AP-42, Appendix B.2, a fabric filter is as effective for controlling PM₁₀ and as it is for controlling PM_{2.5}, with both control efficiencies at 99% or higher. This indicates that the baghouse determined to be BACT for PM₁₀ and fluorides in the previous analysis should be as effective for controlling filterable PM_{2.5} emissions. Therefore, the conclusion reached in the BACT analysis for PM₁₀ and fluorides should serve as the most effective control for filterable PM_{2.5} emissions.

Condensable PM_{2.5} emissions include condensable inorganic particulate matter and POM. Condensable inorganic particulate matter in this case is thought to be mainly sulfates occurring from the aluminum and anode production process. In the potline, there are very little VOC or NO_x emissions and no sulfuric acid emissions to contribute to the condensable emissions. In the carbon bake furnace, however, there are considerably more VOC and sulfuric acid emissions, which may be considered condensable.

When evaluating the potline emissions, only primary emissions were considered. According to Noranda, potline roof vents are emitted at ambient temperatures. By the nature of condensable emissions any condensable matter should condense by the time

it is emitted from the vents, rendering the condensable matter filterable. Since the BACT for PM₁₀ and fluoride includes filterable matter, secondary PM_{2.5} emissions are not discussed further in this section. Primary potline and carbon bake furnace emissions were the focus of this PM_{2.5} BACT analysis.

Several databases including the RBLC database were searched to identify control technologies for condensable PM_{2.5}. However, PM_{2.5} was not addressed in any of these databases. Noranda has compiled a list of possible control technologies based on their knowledge of control equipment applications. A cursory search of the internet did not provide any additional controls. Control technologies that were identified for condensable PM_{2.5} emissions from the potlines and carbon bake furnaces are listed in Table 11.

Table 11: PM_{2.5} control technologies for potlines and carbon bake furnace

Control Technology
Dry Alumina Scrubber with Baghouse
Exhaust Cooling with Dry ESPs
Quench Cooling with Wet ESPs
Quench Cooling with Wet Scrubbers
Thermal Oxidation
Catalytic Oxidation

Evaluation of Control Options for PM_{2.5} Emissions

There is no current data that has accurately quantified control efficiencies for these control technologies. Therefore, the effectiveness of each of these control technologies can only be evaluated on the basis of technical and economical feasibility.

Dry alumina scrubber with baghouse

This technology is currently being applied for the control of fluoride, POM and PM₁₀ emissions from the potlines and carbon bake furnaces at Noranda. Although a control efficiency is not defined, this control technology is expected to provide some control of condensable emissions. The alumina serves as a condensation point for condensable compounds as they adsorb to the alumina for removal in the baghouse.

Exhaust Cooling with dry ESPs

This control technology consists of two parts: the cooling of the exhaust air and the collection of the condensed matter. The first part would require the use of a large heat exchanger to reduce the temperature of the exhaust stream and drop out the condensable matter. Acid gases in the exhaust stream could result in corrosion issues. Fouling of the heat exchanger is likely as the condensable matter sticks to the heat exchanger surfaces. Similarly condensable matter may stick to the ESP collection plates, reducing the efficiency of the ESP and causing a fire hazard for both components. Based on the possibility of a diminishing control efficiency and fire hazard issues with this control technology, this method of control was eliminated from further review.

Quench cooling with wet ESPs

Quench cooling consists of spraying the gases with excess water until evaporation cools

the gas stream to saturation. Similar to exhaust cooling, acid gases in the exhaust stream could result in corrosion issues. The wet ESP uses high voltage electrodes to negatively charge particles which are then attracted and deposited onto the positively charged collecting surface. However, since a water mist is used to periodically clean the ESP surfaces, the voltage used to charge the particles is lowered, and the wet ESP has a lower removal efficiency than the dry ESP. In addition, similar to the dry ESP, fouling of the collection plates is likely and will reduce the efficiency of the control device and cause a fire hazard. Based on the possibility of a diminishing control efficiency and fire hazard issues with this control technology, this method of control was eliminated from further review.

Quench cooling with wet scrubbers

Wet scrubbers are considered an effective control method for sulfur emissions (see Control of SO_x Emissions), which are considered a component of condensable PM_{2.5} emissions. As such, it is considered a technically feasible option. However, an economic evaluation of wet scrubber use resulted in a cost per ton of removal exceeding \$50,000 per ton removal, assuming the complete removal of PM_{2.5}. This analysis is based on the cost estimates found in the economic evaluation for SO_x emissions. Therefore, wet scrubbers were rejected due to economic infeasibility.

Thermal oxidation

Regenerative Thermal Oxidizers (RTO) are designed to use warm ceramic beds to pre-heat exhaust gases prior to their entry into a combustion chamber. Once in the combustion chamber, natural gas burners are used to combust exhaust streams in the temperature range of 1,400 to 2,000 °F. The heat from the combusted exhaust stream is recovered by additional ceramic beds used to start the cycle for preheating the entry exhaust gas stream.

RTO is not a demonstrated technology for controlling PM_{2.5} emissions from aluminum potlines because the PM in the exhaust gas may coat the ceramic beds and interfere with the pre-heat operation. For regenerative thermal oxidizers, the ceramic bed used to recover waste gas energy is comprised primarily of alumina and silica. The alumina and silica would be susceptible to corrosion by HF present in the potline and carbon bake furnace exhaust streams. In addition, inorganic materials in the exhaust stream will not be oxidized and would reduce the efficiency of the recovery beds. Lastly, the exhaust stream exits at a temperature much lower than required for a RTO. Additional fuel would be required to heat the combustion chamber to the desired temperature, creating additional criteria pollutants. For these processes, the burning of additional fuel for the control of PM_{2.5} emissions alone is considered counterproductive as the increased fuel combustion would result in the undesirable increase in other products of combustion; including NO_x and SO_x. Therefore, this method of control was eliminated from further review.

Catalytic oxidation

Similar to thermal oxidation, catalytic oxidation requires an exhaust temperature that is greater than the exiting temperature of the potlines and carbon bake furnaces. As a result, the exhaust streams would require heating through the combustion of additional fuel, creating additional emissions. Furthermore, due to the sulfur and fluoride

emissions from the potlines and carbon bake furnaces, the oxidation catalyst would be subject to a higher degree of catalyst poisoning or deactivation, reducing the efficiency of this control method. As such, this method of control was eliminated from further review.

Selection PM_{2.5} Control Technology

In conclusion, dry alumina scrubbers and baghouses are selected as BACT for PM_{2.5} emissions from the potlines and carbon bake furnaces. Table 12 outlines the emission rates associated with this BACT conclusion.

Table 12 outlines the emission rates associated with this BACT analysis.

Unit ID	Emission Unit Description	PM _{2.5}
EP-59	Potline 1 Monitor	25.43 lb/hr
EP-60	Potline 2 Monitor	16.19 lb/hr
EP-61	Potline 1&2 Stack	22.37 lb/hr
EP-62	Potline 3 East Stack	8.01 lb/hr
EP-63	Potline 3 West Stack	8.01 lb/hr
EP-64	Potline 3 Monitor	12.44 lb/hr
EP-AAA	Carbon Bake Furnaces	66.86 lb/hr

Control of SO_x Emissions

The net emissions increase of SO_x due to the proposed modification is significant and triggers major review for SO_x. The oxidation of the sulfur in both the petroleum coke and pitch, used as raw materials in the formation of anodes, generate sulfur oxides. The anode baking processes result in SO₂ emissions as the coke and pitch are heated. Sulfur oxide emissions originating in the potlines are a result of the release of sulfur during the consumption of anodes in the electrolytic reduction of alumina to aluminum. In both processes, the quantity of SO₂ emitted is a direct function of the sulfur content in the coal tar pitch and the coke.

It should be noted that dry alumina scrubbers are currently installed as control devices for the carbon bake furnaces and potlines. A dry alumina scrubber is a common pollution control device applied at aluminum production facilities for the control of fluoride compounds and POM. In the primary aluminum industry, alumina is used as the sorbent in dry scrubbers for the elimination of fluoride and POM emissions. While it is possible for SO₂ to be removed in a dry scrubber using alumina as the sorbent, it provides little or no control of SO₂ emissions. The reacted alumina from the scrubbers is recycled into the aluminum reduction process, therefore, re-releasing the sulfur emissions into air at the potline cells. No reduction of the overall SO₂ emissions from the plant is accomplished.

Table 13 lists all potential control technologies identified in the RBL database for the potlines and carbon bake furnaces with control efficiencies.

Table 13: SO_x control technologies

Control Technology	Control Efficiency
Wet Scrubbers	93%
Dry or Semi-Dry Scrubbers	50-90%
Low Sulfur Content and Good Operating Procedures and Work Practices	Undefined
Low Coke and Pitch Sulfur Content	Undefined

Evaluation of Control Options for SO_x Emissions

Pot hooding is connected to a central fume processing system where control technology can centrally treat SO₂ emissions.

Wet Scrubbers

Flue Gas Desulfurization (FGD) is a common control technology used in a variety of industrial applications for the removal of SO₂. The three types of FGD are wet, semi-dry and dry scrubbers. In a wet scrubber system an aqueous slurry of reagent is sprayed into the flue gas stream in an absorber. A portion of the water in the slurry is evaporated and the waste gas stream becomes saturated with water vapor. The SO₂ portion of the flue gas dissolves into the slurry and reacts with the alkaline particulates. The slurry drops to the bottom of the absorber where it is collected and sent to a reaction tank where the reaction is completed to form a neutral salt. The slurry can be recycled or de-watered for disposal or used as a by-product.

There are four known potentially applicable wet scrubbing technologies that are commercially available for use in primary aluminum facility processes. The four potentially applicable scrubbing technologies are calcium, sodium, calcium and sodium, and sea water. Use of sea water is not technically feasible since the facility is not located near any seas or oceans. Between calcium and sodium reagents, calcium is eliminated from review based on the high oxygen content of the potline and carbon bake furnace exhaust stream, which will cause the calcium sulfite to convert to gypsum and build up on the spray nozzles and mist eliminators. For this reason, both calcium and calcium and sodium scrubbing options are eliminated from this review.

Though treatment of the waste stream is difficult, wet scrubbers are considered a technically feasible option for removing SO₂. Wet scrubbers are further evaluated in this document.

The estimated annualized cost of the wet scrubber system was calculated using a cost quotation from Fives Solios for the installation on each of the potlines and the carbon bake furnaces. Based on the EPA document *Office of Air Quality Planning and Standards Control Cost Manual*, the direct and indirect costs were estimated. Additional information on utilities costs were obtained from local utilities companies. The economic analysis for the cost of a wet scrubber in 2009 is listed in Table 14.

Table 14: Summary of Cost Analysis for the Installation of a Wet Scrubber System

Unit Description	Total Annualized Cost	SO ₂ Emission Rate (tpy)	SO ₂ Removal Rate (tpy)	Cost Effectiveness (\$/ton removed)
Potlines 1 & 2	\$25,597,571	3,724	3,463	\$7,391
Potline 3E or 3W	\$17,951,411	1,110	1,032	\$17,390
Carbon Bake Furnaces 1,2 or 3	\$7,036,740	592	550	\$12,788
Carbon Bake Furnaces Combined	\$17,951,411	1,775	1,651	\$10,875

The units described in Table 13 are segregated based on stack configurations. Potline 1 and 2 are currently exhausted to one stack, and the cost of installation is based on the stack parameters of that particular stack. For the carbon bake furnaces, each carbon bake is vented to a separate stack. As a part of this project, all three carbon bakes are

being vented to one stack. However, for purposes of this cost analysis, both the separate stack and single stack scenarios were evaluated. The emission rates for each unit were based on the worst case emissions expected from each process. For example, the SO₂ emission rate listed for Potlines 1 & 2 assumes 98.8% of the SO₂ emissions are attributed to the potline process and 99.01% of those emissions were emitted through the stacks (Scenario 2). The resulting cost effectiveness for each case was \$7,000-\$17,000 per ton of SO₂ removed. Based on this economic analysis, the wet scrubber was eliminated from further review.

Dry or Semi-Dry Scrubbers

Dry scrubbing for SO₂ control typically involves the injection of a powdered sorbent, which is usually a calcium or sodium based alkaline reagent, into the flue gas. There, it reacts with SO₂ to form calcium or sodium sulfate solids. The dry by-product is then removed in a particulate collection device located downstream, typically a baghouse. Semi-dry scrubbing involves the injection of an aqueous slurry into the hot flue gas. The aqueous sorbent is released as an atomized spray directly into the flue gas exhaust stream where it absorbs SO₂ and dries. The dried particulates are collected downstream in the exhaust by an ESP or baghouse.

Dry scrubbing systems are typically less efficient than wet scrubbing systems focused on SO₂ removal. Additionally, the temperature of the exhaust stream for both the dry and semi-dry systems must be at least 300 degrees Fahrenheit in order for the SO₂ emissions to adsorb to the reagent. For the semi-dry system especially, the exhaust temperature must be high enough to allow the wet spray to be completely dried before being captured downstream in the exhaust as a particulate. The temperature of the exhaust stream for the potlines and carbon bake furnaces is below this absorption reaction temperature making the absorbent ineffective. Given that the temperature of the exhaust is too cool for effective use of an SO₂ scrubber sorbent, and, as noted in earlier BACT analysis, heating the exhaust gas to the appropriate temperature would require combustion of additional fuel, creating additional pollutants. As such, this method of control was eliminated from further review.

Low Sulfur Content and Good Operating Procedures and Work Practices

As mentioned previously, sulfur oxides originate from sulfur in the petroleum coke and coal tar pitch used in the formation of carbon anodes. By reducing the quantity of sulfur in the anode coke and pitch, the overall generation of SO₂ in all areas of the process is reduced. Noranda currently obtains these raw materials from outside vendors. Although Noranda is unable to directly control the sulfur content of the raw materials, they are able to control which vendor will supply them with the raw materials. The coke and pitch supplies must have needed fuel characteristics while also being consistently available and economically reasonable to obtain. Utilizing low sulfur content anode coke and pitch is a technically feasible option for reducing SO₂ levels.

Similar to the work practice and operating procedures control option discussed in the PM₁₀ BACT analysis section, overall SO_x emissions can also be reduced by optimizing operating procedures and work practices, such as the suppression of anode effects, monitoring bath temperatures and bath ratios, and proper hood maintenance.

The utilization of these control techniques in combination will have increased control effectiveness than individually. Therefore, this control method is considered BACT for SO_x.

Selection SO_x Control Technology

In conclusion, BACT for the control of SO_x is low sulfur content, and good operating procedures and work practices. Noranda shall not exceed 6,078 tons per year from the entire installation in any consecutive 12-month period. In addition, the sulfur content of coke shall not exceed 3.0% and sulfur content of pitch shall not exceed 0.8%.

Control of CO Emissions

The emissions increase of CO due to the proposed modification of the potlines and the carbon bake furnaces is significant and triggers major review. As with the BACT analysis for PM_{2.5}, several databases including the RBLC database were searched to identify control technologies for CO. However, no technically feasible add-on control technologies for the potlines or the carbon bake furnaces were identified. The only control strategy for CO emissions currently employed by other primary aluminum production facilities is Pollution Prevention through Good Design and Operation. Noranda has compiled a list of possible control technologies based on potential control equipment in other industrial applications. Control technologies that were identified for CO emissions from the potlines and carbon bake furnaces are listed in Table 15.

Table 15: CO control technologies for potlines and carbon bake furnace

Control Technology
Thermal Oxidation
Catalytic Oxidation
Low-Energy Burner Technology*
Good Operating Practices

*Carbon bake furnace only

Evaluation of Control Options for CO Emissions

The PM_{2.5} BACT analysis presented earlier in this document discusses both the thermal oxidation and catalytic oxidation control technologies as they pertain to the reduction of PM_{2.5} emissions. Those same arguments of technical feasibility are also applicable for the determination of BACT for CO emissions. The alumina and silica ceramic beds, typically used in an RTO, are susceptible to corrosion by hydrogen fluoride emissions present in the exhaust from the potlines and the carbon bake furnaces. Catalyst poisoning and catalyst de-activation is a concern in catalytic oxidation since both the potlines and the carbon bake furnaces have high concentrations of particulate matter, sulfur oxides, fluorides and metals in the exhaust streams. In both control options, the exhaust temperatures from the potlines and the carbon bake furnaces are too low for proper oxidation. Both of these options are not considered further as viable CO control technologies.

Low Energy Burner Technology

For Noranda’s carbon bake furnaces, an advanced firing system, referred to as a low energy burner, has been identified as BACT. A low energy burner requires less fuel (coke) to achieve the desired pitch burn rate which results in reduced CO emissions. As Noranda already utilizes an advanced firing system in the Carbon Bake Furnaces 1, 2, and 3, Noranda’s CO emissions from the combined stack (EP-AAA) should be less than 271 pounds per hour.

Good Design and Operation

According to the RBLC database, no other primary aluminum production facility has employed add-on controls for the reduction of CO emissions. For Noranda's potlines, good design and operation resulting in maximum operating efficiencies has been identified as BACT. Noranda has installed electronic monitoring and controls to achieve optimal efficiency. Therefore, CO emissions from Noranda's Potline stacks should be less than 5,520 pounds per hour from Potline 1 & 2 Stack (EP-61) and less than 1,642 pounds per hour each from Potline 3 East Stack (EP-62) and Potline 3 West Stack (EP-63). The fugitive CO emissions from Noranda's Potline roof vents should be less than 110 pounds per hour from Potline 1 & 2 roof vents (EP-59 and EP-60) and less than 131 pounds per hour from Potline 3 roof vents (EP-64).

Selection CO Control Technology

In conclusion, BACT for the control of CO from the aluminum potlines is the use of good design and operation and BACT for the control of CO from the carbon bake furnaces is the use of low energy burner technology. Therefore, Noranda is required to meet the emission rates indicated in Table 16 below.

Table 16: Summary of the BACT Emission Rates for CO

Emission Point	Description	Emission Rate
EP-59	Potline 1 Roof Vent	110.0 lb/hr 9.58 lb/ton Al produced
EP-60	Potline 2 Roof Vent	110.0 lb/hr 9.58 lb/ton Al produced
EP-61	Potlines 1 & 2 Stack	5,520.0 lb/hr 240.4 lb/ton Al produced
EP-62	Potline 3 East Stack	1,642.0 lb/hr 232.5 lb/ton Al produced
EP-63	Potline 3 West Stack	1,642.0 lb/hr 232.5 lb/ton Al produced
EP-64	Potline 3 Roof Vent	131.0 lb/hr 9.27 lb/ton Al produced
EP-AAA	Carbon Bake Furnaces 1, 2, & 3 (Combined) Stack	271.0 lb/hr 10.9 lb/ton green anode produced

PERMIT RULE APPLICABILITY

This review was conducted in accordance with Section (8) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential emissions of SO_x, CO, PM₁₀, PM_{2.5} and fluoride are above significance levels.

APPLICABLE REQUIREMENTS

Noranda Aluminum, Inc. shall comply with the following applicable requirements. The Missouri Air Conservation Laws and Regulations should be consulted for specific record keeping, monitoring, and reporting requirements. Compliance with these emission standards, based on information submitted in the application, has been verified at the time this application was approved. For a complete list of applicable requirements for your installation, please consult your operating permit.

GENERAL REQUIREMENTS

- *Submission of Emission Data, Emission Fees and Process Information*, 10 CSR 10-6.110
The emission fee is the amount established by the Missouri Air Conservation Commission annually under Missouri Air Law 643.079(1). Submission of an Emissions Inventory Questionnaire (EIQ) is required June 1 for the previous year's emissions.
- *Operating Permits*, 10 CSR 10-6.065
- *Restriction of Particulate Matter to the Ambient Air Beyond the Premises of Origin*, 10 CSR 10-6.170
- *Restriction of Emission of Visible Air Contaminants*, 10 CSR 10-6.220
- *Restriction of Emission of Odors*, 10 CSR 10-3.090

SPECIFIC REQUIREMENTS

- *Restriction of Emission of Particulate Matter From Industrial Processes*, 10 CSR 10-6.400
- *New Source Performance Regulations*, 10 CSR 10-6.070 – *New Source Performance Standards (NSPS) for Primary Aluminum Reduction Plants*, 40 CFR Part 60, Subpart S
- *Maximum Achievable Control Technology (MACT) Regulations*, 10 CSR 10-6.075, *National Emission Standards for Primary Aluminum Reduction Plants*, 40 CFR Part 63, Subpart LL
- *Maximum Achievable Control Technology (MACT) Regulations*, 10 CSR 10-6.075, *National Emission Standards for Secondary Aluminum Production*, 40 CFR Part 63, Subpart RRR
- *Restriction of Emission of Sulfur Compounds*, 10 CSR 10-6.260
- *Maximum Allowable Emissions of Particulate Matter From Fuel Burning Equipment Used for Indirect Heating*, 10 CSR 10-3.060

AMBIENT AIR QUALITY IMPACT ANALYSIS

An ambient air quality impact analysis (AAQIA) was performed to determine the impact of PM₁₀, SO₂, CO, fluorides and HAP emissions at or beyond the property boundary of the Noranda Aluminum, Inc. facility. Additional impacts on visibility, growth, soils, plants and animals were also evaluated within the Class II area surrounding the facility. For complete modeling information refer to the February 5, 2010 memorandum from Dawn Froning entitled, "Ambient Air Quality Impact Analysis (AAQIA) for Noranda Aluminum, Inc. (Noranda)-Prevention of Significant Deterioration (PSD) Modeling—September 9, 2008 Submittal".

Each PSD applicant must demonstrate that the proposed emissions will not cause or contribute to a violation of any NAAQS or PSD increment standards for PM₁₀, and SO₂. In addition to evaluating impacts within the Class II area, the AAQIA included a detailed evaluation of Noranda Aluminum, Inc.'s predicted impact on the Mingo National Wilderness Area, and Hercules Glades Wilderness, designated as mandatory federal Class I areas. The Class I analysis requires the applicant to demonstrate that it will not have adverse impact on visibility or the Class I increments and will not lead to excessive sulfur or nitrogen deposition within the Class I area.

The HAPs of concern from the proposed project are nickel, manganese, polycyclic organic matter (POM), hydrogen chloride, hydrogen fluoride, carbonyl sulfide, and beryllium. Table 17 summarizes the determinations of whether further HAP modeling is necessary for each HAP. For the complete modeling analysis, refer to memorandum from Dawn Froning entitled, "Ambient Air Quality Impact Analysis (AAQIA) for Noranda Aluminum, Inc. (Noranda)-Prevention of Significant Deterioration (PSD) Modeling—September 9, 2008 Submittal".

Table 17: Comparison of Project HAPs to Modeling Requirements

Air Contaminant	Modeling Trigger Level tpy	Project Emission Rate tpy	Modeling Required
Beryllium	0.008	0.12	Yes
Carbonyl Sulfide	5	25.83	Yes
Hydrogen Chloride	10	2.17	No
Hydrogen Fluoride	0.1	99.37	Yes
Manganese	0.8	0.30	No
Nickel	1	0.60	No
Polycyclic Organic Matter	0.01	0	No

Based upon the model reviewed by the Air Pollution Control Program staff, the study submitted by Noranda demonstrates that Noranda will not contribute to any violation of the National Ambient Air Quality Standards (NAAQS) or available increment.

The modeling relied on certain aspects of the installation that were not the result of the BACT analysis. As such, special conditions have been included in this construction permit that account for these modeled parameters including haul road requirements; truck limitations; PM₁₀, fluoride and SO_x monitoring; restriction of public access; stack requirements; and operational limitations.

STAFF RECOMMENDATION

On the basis of this review conducted in accordance with Section (8), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*, I recommend this permit be granted with special conditions.

Emily Wilbur
Environmental Engineer

Date

PERMIT DOCUMENTS

The following documents are incorporated by reference into this permit:

- The Application for Authority to Construct form, dated September 3, 2008, received September 12, 2008, designating Noranda, Inc. as the owner and operator of the installation.
- U.S. EPA document AP-42, *Compilation of Air Pollutant Emission Factors*, Fifth Edition.
- Southeast Regional Office Site Survey, dated October 16, 2008.
- PM_{2.5} BACT analysis submitted by Trinity Consultants through email November 13, 2009
- EPA document *Basis and Purpose Document for the Development of Proposed Standards for the Primary Aluminum Industry* dated July 19, 1996
- EPA document *Primary Aluminum Industry: Technical Support Document for Proposed MACT Standards* dated July 1996
- EPA document *Air Pollution Control Technology Fact Sheet* EPA-452/F-03-034
- EPA document *Office of Air Quality Planning and Standards Control cost Manual 6th Edition* EPA/452/B-02-001
- EPA document, *AIRS Facility Subsystem Source Classification Codes and Emission Factor Listing for Criteria Air Pollutants*, EPA 450/4-09-003 dated March 1990
- WebFIRE Last updated on Tuesday, December 22nd, 2009
<http://cfpub.epa.gov/oarweb/index.cfm?action=fire.main>
- Internal Memo from Dawn Froning, *Ambient Air Quality Impact Analysis (AAQIA) for Noranda Aluminum, Inc. (Noranda)-Prevention of Significant Deterioration (PSD) Modeling—September 9, 2008 Submittal*
- Test results for gaseous fluorides received via email November 4, 2008
- Letter from Trinity titled SO₂ Emissions Explanation for PSD Application, received via email December 15, 2008
- Supplemental project descriptions received via email January 7, 2009
- SO₂ calculation discussions received via email January 14, 2009
- PM₁₀ BACT limit discussions received via email February 26, 2009
- Carbon monoxide BACT limit discussions received via email April 13, 2009
- Discussions on natural gas usage and the proposed limit received via email September 29, 2009
- Trace element composition of coke and pitch document and material handling baghouse stack testing results received via email October 29, 2009
- Proposed changes to existing equipment required to show compliance with modeling, received via email November 23, 2009

- Responses to questions on proposed changes to existing equipment required to show compliance with modeling, received via email December 2, 2009
- Responses to questions regarding haul roads received via email December 4, 2009
- Discussions on emission points not included in the original application and modeling via email received January 7, 2010 and via conference call on January 7, 2010
- Responses to questions on emission points not included in the original application and modeling via email received January 14, 2010
- Correction to POM emission rates received via email January 22, 2010
- Culpability analysis discussions for HF received via email January 28, 2010 and February 1, 2010
- Capture efficiency discussions received via email February 1, 2010 and February 2, 2010

Appendix A: Sample SO2 Calculations for Year 2006

Noranda Aluminum, Inc.
 New Madrid County, S29, T22N, R14E
 Project Number: 2008-09-024
 Installation ID Number: 143-0008
 Permit Number:

Incoming Materials to Carbon Bake Furnaces:	% S Pitch	0.53	
	% S Coke	2.11	
	%Pitch in Green Mix	14.26	
	Pitch Received	24,446	
	Coke Received	112,557	
	Total S in Pitch and Coke Received	2,506	
	Coke Used from Tanks*	118	
	Pitch Used from Tanks*	3	
	Coke Used in Green Blocks*	1,435	*These values may be added or subtracted from received value based on increase or decrease in inventory
	Pitch Used in Green Blocks*	238	
	Coke in Green Scrap*	295	
	Pitch in Green Scrap*	49	
	Coke in Green Scrap Shipped*	0	
Pitch in Green Scrap Shipped*	0		
Total Weight of Material going into Carbon Bake Furnaces		138,899	
Incoming S to Carbon Bake Furnaces	%S going into Carbon Bakes	1.83%	
	Total S Processed (Into Carbon Bake Furnaces)	2,542	
Outgoing S from Carbon Bake Furnaces:	Average % Reduction in Material Weight During Baking:	5.05%	
	Estimated Weight of Baked Anodes Outgoing from Carbon Bakes (using weight baked vs. weight green)	131,885	
	%S in Baked Anodes	1.64	
	Total S Outgoing from Carbon Bake Furnaces	2,166	
	Difference between Total S going into Carbon Bakes and Total Outgoing from Carbon Bakes	376	
SO2 Emissions from all 3 Carbon Bakes		750	

Incoming Materials to Potlines:	Coke in Addt'l Baked Blocks*	252	
	Pitch in Addt'l Baked Blocks*	Assume no pitch here	
	Coke in Butts,Rodding&Baked Scrap*	794	*These values may be added or subtracted from incoming value based on increase or decrease in inventory
	Pitch in Butts,Rodding&Baked Scrap*	Assume no pitch here	
	Coke in Butts&Carbon Shipped*	5,383	
	Pitch in Butts&Carbon Shipped*	Assume no pitch here	
<hr/>			
	Sulfur in fresh alumina		This item will be based on testing results
<hr/>			
	Sulfur in reacted alumina		This item will be based on testing results
<hr/>			
Outgoing S from Potlines:	Weight of Baked Anodes into Potlines	125,960	
	Total Weight of S Anodes Processed into Potlines	2,041	
	SO2 Emissions from all 3 Potlines	4,078	
	<hr/>		
	SO2 Emissions from Natural Gas Sources	0.26	
<hr/>			
	Total SO2 Emissions from Entire Installation*	4,829	

*For a list of all emission points associated with the entire installation, see Table A.1

Table A.1: List of SOx emission sources

Emission Point ID	Description	Emission Point ID	Description	Emission Point ID	Description
EP-59	Monitor - Potline 1	EP-AAA	Combined Carbon Bake Furnaces 1, 2, and 3 Stack	EP-AL	Stack for Homogenizing Furnace #3
EP-60	Monitor - Potline 2	EP-AB	Stack for Old Pig Melter	EP-AN	Stack for New Pig Melter
EP-61	Potline I & II Stack	EP-AD	Stack for #1MP&S Melter	EP-BA	Stack for Rod Mill #1 Melter
EP-62	161 Unit Stack	EP-AE	Stack for #1 MP&S Holder	EP-BB	Stack for Rod Mill #3 Holder
EP-63	162 Unit Stack	EP-AF	Stack for #2 MP&S Melter	EP-BC	Stack for Rod Mill #2 Melter
EP-64	Monitor - Potline 3	EP-AG	Stack for #2 MP&S Holder	EP-BD	Stack for Rod Mill #4 Holder
EP-94	Natural Gas Fired Boiler for Hot Oil System	EP-AH	Stack for #4 MP&S Melter	EP-BH	Stack for Rod Mill #5 Holder
EP-95	Natural Gas Fired Boiler for Hot Oil System	EP-AI	Stack for #4 MP&S Holder	EP-BI	Natural Gas Fired Boiler for Office Heat
EP-96	Natural Gas Fired Boiler for Hot Oil System	EP-AJ	Stack for Homogenizing Furnace #1	EP-BJ	Natural Gas Fired Boiler for Locker Room Heat
EP-97	Carbon Rodding Aluminum Spray Furnace	EP-AK	Stack for Homogenizing Furnace #2	EP-BK	Natural Gas Fired Boiler for Locker Room Heat
EP-Misc. 97	Miscellaneous Sources in EP-97 Department	EP-Misc. BI, BJ, BK	Miscellaneous Sources in BI, BJ, BK Department		

Appendix B: List of New and Existing Baghouses and their Operating Parameters

Noranda Aluminum, Inc.
 New Madrid County, S32, T22N, R14E
 Project Number: 2008-09-024
 Installation ID Number: 143-0008
 Permit Number: _____

Existing Baghouses					
Emission Point Number	Control Device ID	Description	Flow Rate (dscfm)	gr/dscf	PM-10 (lb/hr)
EP-01	CD-1	River Unloading	4,250	0.005	0.18
EP-02	CD-2	River Unloading	4,250	0.005	0.18
EP-03	CD-3	River Unloading	4,005	0.005	0.17
EP-04	CD-4	Railcar Unloading	24,000	0.005	1.03
EP-05	CD-5	Fresh Ore Material Handling	6,000	0.005	0.26
EP-06	CD-6	Fresh Ore Material Handling	2,400	0.005	0.10
EP-07	CD-7	Fresh Ore Material Handling	5,759	0.005	0.25
EP-08	CD-8	Fresh Ore Material Handling	9,400	0.005	0.40
EP-09	CD-9	Reacted Ore Material Handling	3,000	0.005	0.13
EP-10	CD-10	Reacted Ore Material Handling	4,500	0.005	0.19
EP-11	CD-11	Fresh Ore Material Handling	2,575	0.005	0.11
EP-12	CD-12	Reacted Ore Material Handling	6,200	0.005	0.27
EP-13	CD-13	Reacted Ore Material Handling	9,465	0.005	0.41
EP-14	CD-14	Fresh Ore Material Handling	10,650	0.005	0.46
EP-15	CD-15	Fresh Ore Material Handling	4,750	0.005	0.20
EP-16	CD-16	Fresh Ore Material Handling	1,200	0.005	0.05
EP-17	CD-17	Fresh Ore Material Handling	1,200	0.005	0.05
EP-18	CD-18	Fresh Ore Material Handling	1,200	0.005	0.05
EP-19	CD-19	Fresh Ore Material Handling	1,200	0.005	0.05
EP-20	CD-20	Fresh Ore Material Handling	1,200	0.005	0.05
EP-21	CD-21	Fresh Ore Material Handling	4,750	0.005	0.20
EP-22	CD-22	Fresh Ore Material Handling	3,500	0.005	0.15
EP-23	CD-23	Fresh Ore Material Handling	3,500	0.005	0.15
EP-24	CD-24	Fresh Ore Material Handling	7,000	0.005	0.30
EP-25	CD-25	Fresh Ore Material Handling	4,000	0.005	0.17
EP-26	CD-26	Reacted Ore Material Handling	4,000	0.005	0.17
EP-27	CD-27	Reacted Ore Material Handling	800	0.005	0.03
EP-28	CD-28	Reacted Ore Material Handling	800	0.005	0.03
EP-29	CD-29	Reacted Ore Material Handling	800	0.005	0.03
EP-30	CD-30	Reacted Ore Material Handling	800	0.005	0.03
EP-31	CD-31	Reacted Ore Material Handling	800	0.005	0.03
EP-32	CD-32	Reacted Ore Material Handling	800	0.005	0.03
EP-33	CD-33	Reacted Ore Material Handling	800	0.005	0.03
EP-34	CD-34	Reacted Ore Material Handling	800	0.005	0.03
EP-35	CD-35	Reacted Ore Material Handling	1,700	0.005	0.07
EP-36	CD-36	Reacted Ore Material Handling	4,000	0.005	0.17
EP-37	CD-37	Reacted Ore Material Handling	800	0.005	0.03
EP-38	CD-38	Reacted Ore Material Handling	800	0.005	0.03

EP-39	CD-39	Reacted Ore Material Handling	800	0.005	0.03
EP-40	CD-40	Reacted Ore Material Handling	800	0.005	0.03
EP-41	CD-41	Reacted Ore Material Handling	800	0.005	0.03
EP-42	CD-42	Reacted Ore Material Handling	800	0.005	0.03
EP-43	CD-43	Reacted Ore Material Handling	800	0.005	0.03
EP-44	CD-44	Reacted Ore Material Handling	800	0.005	0.03
EP-45	CD-45	Reacted Ore Material Handling	1,700	0.005	0.07
EP-46	CD-46/A	Electrolyte Recovery	30,500	0.005	0.98
EP-47	CD-47	Electrolyte Recovery	150,000	0.005	0.00
EP-48	CD-48	Electrolyte Recovery	71,500	0.005	2.30
EP-49	CD-49	Electrolyte Recovery	2,800	0.005	0.12
EP-50	CD-50	Electrolyte Recovery	23,000	0.005	0.74
EP-55	CD-55	Electrolyte Recovery	2,800	0.005	0.12
EP-56	CD-56	Electrolyte Recovery	2,800	0.005	0.12
EP-57	CD-57	Fresh Ore Material Handling	6,000	0.005	0.26
EP-58	CD-58	Electrolyte Recovery	12,000	0.005	0.39
EP-65	CD-65	Petroleum Coke Handling	4,000	0.005	0.17
EP-66	CD-66	Petroleum Coke Handling	4,000	0.005	0.17
EP-67	CD-67	Petroleum Coke Handling	1,500	0.005	0.06
EP-68	CD-68	Primary Crusher (North)	10,000	0.005	0.29
EP-69	CD-69	Primary Crusher (South)	16,000	0.005	0.34
EP-70	CD-70	Tertiary Crusher	13,950	0.005	0.40
EP-71	CD-71	Anode Paste Production	1,500	0.005	0.06
EP-72	CD-72	Anode Paste Production	4,000	0.005	0.17
EP-73	CD-73	Anode Paste Production	17,620	0.005	0.76
EP-74	CD-74	Anode Paste Production	2,600	0.005	0.11
EP-79	CD-79	Anode Cleaning System	5,000	0.005	0.21
EP-80	CD-80	Fresh Ore Handling	2,400	0.005	0.10
EP-81	CD-81	Fresh Ore Handling	325	0.005	0.01
EP-82	CD-82	Anode Stem Cleaning (Phase I)	8,960	0.005	0.16
EP-83	CD-83	Cathode Casting Station	6,050	0.005	0.00
EP-84	CD-84	Anode Stem Cleaning	5,390	0.005	0.00
EP-DW	CD-DW	Potline Crusher	43,800	0.005	0.94
EP-100	CD-100	Carbon Dry Scrubber	12,000	0.005	0.51
EP-101	CD-101	Fraction Handling	7,000	0.005	0.30
EP-102	CD-102	Proportioning System	4,700	0.005	0.20
EP-108	CD-108	Brush Station	1,000	0.005	0.04
EP-109	CD-109	Brush Station	1,000	0.005	0.04
EP-110	CD-110	KHD ANODE CRUSHER	60,000	0.005	2.57
EP-111	CD-111	Grooved Anode Saw Dust Collector	10,000	0.005	0.43
New Baghouses					
Emission Point Number	Control Device ID	Description	Flow Rate (dscfm)	gr/scf	PM-10 (lb/hr)
EP-BA	CD-BA	Stack for Rod Mill #1 Melter	387 (1,126 acfm)	0.005	0.0166
EP-BB	CD-BB	Stack for Rod Mill #3 Holder	151 (382 acfm)	0.005	0.0065
EP-BC	CD-BC	Stack for Rod Mill #2 Melter	387 (1,126 acfm)	0.005	0.0166
EP-BD	CD-BD	Stack for Rod Mill #4 Holder	151 (382 acfm)	0.005	0.0065
EP-BH	CD-BH	Stack for Rod Mill #5 Holder	6 (18.6 acfm)	0.005	0.0003

Appendix C: Existing Throughput of Emission Units

Noranda Aluminum, Inc.
 New Madrid County, S32, T22N, R14E
 Project Number: 2008-09-024
 Installation ID Number: 143-0008
 Permit Number: _____

Emission Point Number	Description	Throughput (tpy)
EP-01	RIVER UNLOADING	26,091.61
EP-02	RIVER UNLOADING	26,091.61
EP-03	RIVER UNLOADING	24,587.50
EP-04	RIVER UNLOADING	5,781.80
EP-05	FRESH ORE MATERIAL HANDLING	36,835.21
EP-06	FRESH ORE MATERIAL HANDLING	14,734.09
EP-07	FRESH ORE MATERIAL HANDLING	35,355.67
EP-08	FRESH ORE MATERIAL HANDLING	57,708.50
EP-09	REACTED ORE MATERIAL HANDLING	35,334.78
EP-10	REACTED ORE MATERIAL HANDLING	53,002.16
EP-11	FRESH ORE MATERIAL HANDLING	15,808.45
EP-12	REACTED ORE MATERIAL HANDLING	73,025.20
EP-13	REACTED ORE MATERIAL HANDLING	115,426.94
EP-14	FRESH ORE MATERIAL HANDLING	65,382.50
EP-15	FRESH ORE MATERIAL HANDLING	29,161.21
EP-16	FRESH ORE MATERIAL HANDLING	7,367.04
EP-17	FRESH ORE MATERIAL HANDLING	7,367.04
EP-18	FRESH ORE MATERIAL HANDLING	7,367.04
EP-19	FRESH ORE MATERIAL HANDLING	7,367.04
EP-20	FRESH ORE MATERIAL HANDLING	7,367.04
EP-21	FRESH ORE MATERIAL HANDLING	29,161.21
EP-22	FRESH ORE MATERIAL HANDLING	21,487.21
EP-23	FRESH ORE MATERIAL HANDLING	21,487.21
EP-24	FRESH ORE MATERIAL HANDLING	42,974.41
EP-25	FRESH ORE MATERIAL HANDLING	24,556.81
EP-26	REACTED ORE MATERIAL HANDLING	47,113.04
EP-27	REACTED ORE MATERIAL HANDLING	9,422.61
EP-28	REACTED ORE MATERIAL HANDLING	9,422.61
EP-29	REACTED ORE MATERIAL HANDLING	9,422.61
EP-30	REACTED ORE MATERIAL HANDLING	9,422.61
EP-31	REACTED ORE MATERIAL HANDLING	9,422.61
EP-32	REACTED ORE MATERIAL HANDLING	9,422.61
EP-33	REACTED ORE MATERIAL HANDLING	9,422.61
EP-34	REACTED ORE MATERIAL HANDLING	9,422.61
EP-35	REACTED ORE MATERIAL HANDLING	20,023.04
EP-36	REACTED ORE MATERIAL HANDLING	47,113.04
EP-37	REACTED ORE MATERIAL HANDLING	9,422.61
EP-38	REACTED ORE MATERIAL HANDLING	9,422.61
EP-39	REACTED ORE MATERIAL HANDLING	9,422.61
EP-40	REACTED ORE MATERIAL HANDLING	9,422.61
EP-41	REACTED ORE MATERIAL HANDLING	9,422.61
EP-42	REACTED ORE MATERIAL HANDLING	9,422.61
EP-43	REACTED ORE MATERIAL HANDLING	9,422.61

EP-44	REACTED ORE MATERIAL HANDLING	9,422.61
EP-45	REACTED ORE MATERIAL HANDLING	20,023.04
EP-46	Electrolyte Recovery	60,306.19
EP-48	Electrolyte Recovery	141,373.52
EP-49	Electrolyte Recovery	5,536.31
EP-50	Electrolyte Recovery	45,476.80
EP-55	Electrolyte Recovery	5,536.31
EP-56	Electrolyte Recovery	5,536.31
EP-57	Electrolyte Recovery	36,835.21
EP-58	Electrolyte Recovery	23,727.02
EP-59	POTLINE 1 ROOF VENT - FUGITIVE EMISSIONS	90,649.00
EP-60	POTLINE 2 ROOF VENT - FUGITIVE EMISSIONS	90,468.00
EP-61	POTLINE I & II STACK	181,117.57
EP-62	161 UNIT STACK	53,187.00
EP-63	162 UNIT STACK	53,187.00
EP-64	POTLINE 3 ROOF VENT - FUGITIVE EMISSIONS	106,375.00
EP-65	PETROLEUM COKE HANDLING	120,566.49
EP-66	PETROLEUM COKE HANDLING	80,779.55
EP-67	PETROLEUM COKE HANDLING	39,786.84
EP-68	PRIMARY CRUSHER (NORTH)	60,283.25
EP-69	PRIMARY CRUSHER (SOUTH)	60,283.25
EP-70	TERTIARY CRUSHER	120,566.49
EP-71	ANODE PASTE PRODUCTION	120,566.49
EP-72	ANODE PASTE PRODUCTION	120,566.49
EP-73	ANODE PASTE PRODUCTION	120,566.49
EP-74	ANODE PASTE PRODUCTION	120,566.49
EP-79	ANODE CLEANING STATION	287,492.00
EP-80	FRESH ORE HANDLING	14,734.09
EP-81	FRESH ORE HANDLING	1,995.24
EP-82	ANODE STEM CLEANING (PHASE I)	0.00
EP-100	COKE DRY SCRUBBER	114,023.47
EP-101	FRACTION HANDLING	114,023.47
EP-102	PROPORTIONING SYSTEM	114,023.47
EP-108	PHASE 1 & 2 BRUSH STATION	114,023.47
EP-109	PHASE 3 BRUSH STATION	114,023.47
EP-110	KHD ANODE CRUSHER	112,712.00
EP-111	Grooved Anode Saw Dust Collector	112,712.00
EP-AAA	CARBON BAKE STACK	95,830.80
EP-AB	STACK FOR PIG MELTER	14,028.40
EP-AD	STACK FOR #1 MELTER	74,832.00
EP-AE	STACK FOR #1 HOLDER	74,832.00
EP-AF	STACK FOR #2 MELTER	73,690.00
EP-AG	STACK FOR #2 HOLDER	73,690.00
EP-AH	STACK FOR #4 MELTER	1,839.00
EP-AI	STACK FOR #4 HOLDER	1,839.00
EP-AJ	STACK FOR HOMOGENIZING FURNACE #1	43.77
EP-AK	STACK FOR HOMOGENIZING FURNACE #2	49.87
EP-AL	STACK FOR HOMOGENIZING FURNACE #3	49.53
EP-AN	STACK FOR PIG MELTER #2	14,028.40
EP-BA	STACK FOR ROD MILL #1 MELTER	51,115.00
EP-BB	STACK FOR ROD MILL #1 HOLDER	25,558.00
EP-BC	STACK FOR ROD MILL #2 MELTER	31,416.00
EP-BD	STACK FOR ROD MILL #2 HOLDER	25,558.00
EP-BH	#5 ROD MILL HOLDER	31,416.00

EP-DW	POTLINE CRUSHING	5,895.00
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Appendix D: Project Descriptions

Noranda Aluminum, Inc.
New Madrid County, S32, T22N, R14E
Project Number: 2008-09-024
Installation ID Number: 143-0008
Permit Number: _____

Increased Rectification Capacity

Install one additional rectifier/transformer for each line to allow operation at increased amperages at N-1 operation. Currently Lines 1 & 2 each have 7 rectifiers, Line 3 has 6 rectifiers. The current substation equipment is only capable of supporting production at 588 million pounds per year if ALL rectification equipment remains in operation at full capacity, meaning "N" operation. However, if a rectifier is taken off-line for preventive maintenance or breakdown reasons, the remaining rectifiers (N-1 operation) will not be able to support the operating rate.

External Cell Resistance Reduction

Replace 32,000 steel stubs on anode rods with larger diameter stubs. The larger diameter stubs reduce electrical resistance allowing operation at higher current efficiencies (CE) and lower voltages. Higher CE operation produces more aluminum per operation cell, and lower voltages allow more cells to operate at the same power consumption rates.

Cathode BUSS leaf Addition

Install an additional aluminum buss bar leaf to the downstream side buss bar on all 348 cells in Lines 1 and 2. The additional leaf increases the effective cross-sectional area of the buss, reducing its electrical resistance. The lower resistance reduces voltage, allowing operation of the cells at higher amperages at the same power consumption rates.

Off-Line Reduction Cell Building

Install crane to allow removal of out pots without digging and building cells off-line. Current crane limitations in the pot room prevent removing out cells or installing completely rebuilt cells. This project would result in a quicker turnaround time for a cell, from the time it went out until anew pot was started, increasing average number of operating pots.

Anode Cover

This project provides an alumina-bath mix for anode cover to all lines which will improve protection of the anode from air burn, improve pot stability, and increase heat loss from the top of the anode. The anode cover will occur in the pots and any additional emissions due to the alumina-bath mix will be incorporated into the potline emissions and governed by BACT limits and requirements.

Anode Rod/Stub/Yoke Assembly

Install Rod Straighten Equipment to maintain the straightness of anode assemblies. This will reduce rework of assemblies in the Rodding Department and reduce voltage drop in the pot room, improving pot stability and production. No additional emissions are expected from this equipment.

Green Anode Density

“Dry” anode ingredients (petroleum coke, recycled scrap anodes, and spent anode butts) are first prepared by crushing and screening. They are segregated into size fractions (fine, medium and coarse) which are then blended together in a certain ratio. The dry blend is heated and mixed with the “wet” liquid coal tar pitch to make the final anode paste that will be formed into an anode block. Those blending ratios, along with temperatures of the various material streams, cycle times of equipment, forming pressures and anode block dimensions, are a few of the categories of parameters that will be optimized. One of the more critical parameters involves the size distribution of the fines fraction of the dry material. The fines fraction is produced when some of the dry material is passed through a special grinding circuit that utilizes a ball mill. Determining the optimum size distribution of this fines fraction and the best blend ratio of this fraction to the other dry carbon fractions will be a major focus for the process improvement team.

Knowing the optimum parameters is not sufficient for increased, optimized production. The process equipment must operate both consistently and reliably. A second major emphasis for the improvement team is eliminating unexpected process excursions and downtimes. Although the entire Green Mill operations are included in the scope of the reliability initiative, a special area of emphasis will be the ball mill circuit. The team will need to improve the operation of the ball mill circuit to allow it to reliably produce the optimum fines fraction.

The expectation for both of these efforts is to achieve them through improvement of operating and maintenance procedures, rather than through a process redesign program. It is believed the current equipment will be capable once optimized for the higher production level. The only new equipment expected under this project is the installation of a granulation scale (a Blaine machine) for measurement of the fines fraction sample. No additional emissions are expected from this equipment.

Cell Thermal Insulation

Modify the cell cathode design package including the use of 100% graphite cathodes and forced convection cooling. Currently, cathodes are 70% carbon and 30% graphite. This modification will not include the installation of new equipment.

Additional Cells in Pot Lines

Construction of 4 additional cells (Pots) in each pot line. The cells would be subject to the same requirements as the existing cells in each potline (i.e. BACT limits and control requirements). Currently, Lines 1 & 2 each have 174 cells, Line 3 has 160 cells.

Appendix E: Capture Equipment listed by Emission Units

Noranda Aluminum, Inc.
 New Madrid County, S32, T22N, R14E
 Project Number: 2008-09-024
 Installation ID Number: 143-0008
 Permit Number: _____

Emission Point ID	Emission Point Description	Emission Unit ID	Emission Unit Description	Capture Equipment	Control Device ID
EP-01	River Unloading	EU0010	Vacuum Unloader	Enclosed/Aspiration	CD-1
EP-02	River Unloading	EU0020	Vacuum Unloader	Enclosed/Aspiration	CD-2
EP-03	River Unloading	EU0030	Airslide	Enclosed/Aspiration	CD-3
		EU0040	Airslide	Enclosed/Aspiration	
		EU0050	Airslide	Enclosed/Aspiration	
		EU0060	Airslide	Enclosed/Aspiration	
		EU0070	Airslide	Enclosed/Aspiration	
		EU0080	Airslide	Enclosed/Aspiration	
		EU0090	Airslide	Enclosed/Aspiration	
		EU0100	Airslide	Enclosed/Aspiration	
EP-04	Railcar Unloading	EU0110	Vibrating Feeder	Enclosed/Aspiration	CD-4
		EU0120	Vibrating Feeder	Enclosed/Aspiration	
		EU0130	Vibrating Feeder	Enclosed/Aspiration	
		EU0140	Screw Conveyor	Enclosed/Aspiration	
		EU0150	Car Shaker	Enclosed/Aspiration	
EP-05	Fresh Ore Material Handling	EU0160	Bucket Elevator	Enclosed/Aspiration	CD-5
		EU0170	Bucket Elevator	Enclosed/Aspiration	
		EU0180	Airslide	Enclosed/Aspiration	
		EU0190	Airslide	Enclosed/Aspiration	
		EU0200	Airslide	Enclosed/Aspiration	
		EU0210	Airslide	Enclosed/Aspiration	
		EU0220	Airslide	Enclosed/Aspiration	
		EU0230	Airslide	Enclosed/Aspiration	
		EU0240	Airslide	Enclosed/Aspiration	
EU0250	Airslide	Enclosed/Aspiration			
EP-06	Fresh Ore Material Handling	EU0260	Airslide	Enclosed/Aspiration	CD-6
EP-07	Fresh Ore Material Handling	EU0270	Belt Conveyor	Enclosed/Aspiration	CD-7
		EU0280	Screening Machine	Enclosed/Aspiration	
		EU0290	Air Gravity Conveyor	Enclosed/Aspiration	
		EU0300	Air Gravity Conveyor	Enclosed/Aspiration	
		EU0310	Air Gravity Conveyor	Enclosed/Aspiration	
		EU0320	Air Gravity Conveyor	Enclosed/Aspiration	
		EU0330	Air Gravity Conveyor	Enclosed/Aspiration	
		EU0350	Fan	Enclosed/Aspiration	
		EU0360	Fan	Enclosed/Aspiration	
EU0370	Lift Tower	Enclosed/Aspiration			

Emission Point ID	Emission Point Description	Emission Unit ID	Emission Unit Description	Capture Equipment	Control Device ID
		EU0380	Lift Tower	Enclosed/Aspiration	
		EU0390	Blower with filters and Motor	Enclosed/Aspiration	
		EU0400	Blower with filters and Motor	Enclosed/Aspiration	
		EU0410	Blower with filters and Motor	Enclosed/Aspiration	
		EU0430	Airslide	Enclosed/Aspiration	
EP-08	Fresh Ore Material Handling	EU0440	Lift Tower	Enclosed/Aspiration	CD-8
		EU0450	Lift Tower	Enclosed/Aspiration	
		EU0460	Airslide	Enclosed/Aspiration	
		EU0480	Blower with filters and Motor	Enclosed/Aspiration	
		EU0490	Blower with filters and Motor	Enclosed/Aspiration	
		EU0500	Blower with filters and Motor	Enclosed/Aspiration	
		EU0510	Fan	Enclosed/Aspiration	
		EU0520	Fan	Enclosed/Aspiration	
		EU0530	Air Gravity Conveyor	Enclosed/Aspiration	
		EU0540	Air Gravity Conveyor	Enclosed/Aspiration	
		EU0550	Air Gravity Conveyor	Enclosed/Aspiration	
		EU0560	Air Gravity Conveyor	Enclosed/Aspiration	
		EU0570	Air Gravity Conveyor	Enclosed/Aspiration	
		EU0580	Screening Machine	Enclosed/Aspiration	
EU0590	Belt Conveyor	Enclosed/Aspiration			
EP-09	Reacted Ore Material Handling	EU0600	Airslide	Enclosed/Aspiration	CD-9
		EU0610	Airslide	Enclosed/Aspiration	
		EU0620	Airslide	Enclosed/Aspiration	
		EU0630	Airslide	Enclosed/Aspiration	
		EU0640	Belt Conveyor	Enclosed/Aspiration	
EP-10	Reacted Ore Material Handling	EU0650	Belt Conveyor	Enclosed/Aspiration	CD-10
EP-11	Fresh Ore Material Handling	EU0660	Belt Conveyor	Enclosed/Aspiration	CD-11
		EU0670	Flow Control Gate	Enclosed/Aspiration	
		EU0680	Flow Control Gate	Enclosed/Aspiration	
		EU0690	Flow Control Gate	Enclosed/Aspiration	
		EU0700	Airslide	Enclosed/Aspiration	
		EU0710	Airslide	Enclosed/Aspiration	
		EU0720	Airslide	Enclosed/Aspiration	
		EU0730	Airslide	Enclosed/Aspiration	
		EU0740	Airslide	Enclosed/Aspiration	
		EU0750	Airslide	Enclosed/Aspiration	
		EU0760	Airslide	Enclosed/Aspiration	
		EU0770	Airslide	Enclosed/Aspiration	
EU0780	Airslide	Enclosed/Aspiration			
EP-12	Reacted Ore Material	EU0790	Belt Conveyor	Enclosed/Aspiration	CD-12

Emission Point ID	Emission Point Description	Emission Unit ID	Emission Unit Description	Capture Equipment	Control Device ID
	Handling	EU0800	Airslide	Enclosed/Aspiration	
		EU0810	Airslide	Enclosed/Aspiration	
EP-13	Reacted Ore Material Handling	EU0820	Side Discharge Gate	Enclosed/Aspiration	CD-13
		EU0830	Belt Conveyor	Enclosed/Aspiration	
		EU0840	Belt Conveyor	Enclosed/Aspiration	
		EU0850	Airslide	Enclosed/Aspiration	
		EU0860	Airslide	Enclosed/Aspiration	
		EU0870	Airslide	Enclosed/Aspiration	
		EU0880	Bucket Elevator	Enclosed/Aspiration	
EP-14	Fresh Ore Material Handling	EU0890	Belt Conveyor	Enclosed/Aspiration	CD-14
		EU0900	Airslide	Enclosed/Aspiration	
		EU0910	Airslide	Enclosed/Aspiration	
EP-15	Fresh Ore Material Handling	EU0920	Blower with filters and Motor	Enclosed/Aspiration	CD-15
		EU0950	Air Gravity Conveyor	Enclosed/Aspiration	
		EU0960	Air Gravity Conveyor	Enclosed/Aspiration	
		EU0970	Air Gravity Conveyor	Enclosed/Aspiration	
		EU0980	Air Gravity Conveyor	Enclosed/Aspiration	
		EU0990	Air Gravity Conveyor	Enclosed/Aspiration	
		EU1000	Air Gravity Conveyor	Enclosed/Aspiration	
		EU1010	Air Gravity Conveyor	Enclosed/Aspiration	
		EU1020	Airslide	Enclosed/Aspiration	
		EU1030	Airslide	Enclosed/Aspiration	
		EU1040	Airslide	Enclosed/Aspiration	
EU1050	Airslide	Enclosed/Aspiration			
EP-16	Fresh Ore Material Handling	EU1060	Air Gravity Conveyor	Enclosed/Aspiration	CD-16
EP-17	Fresh Ore Material Handling	EU1070	Air Gravity Conveyor	Enclosed/Aspiration	CD-17
EP-18	Fresh Ore Material Handling	EU1080	Air Gravity Conveyor	Enclosed/Aspiration	CD-18
EP-19	Fresh Ore Material Handling	EU1090	Air Gravity Conveyor	Enclosed/Aspiration	CD-19
EP-20	Fresh Ore Material Handling	EU1100	Air Gravity Conveyor	Enclosed/Aspiration	CD-20
EP-21	Fresh Ore Material Handling	EU1110	Air Gravity Conveyor	Enclosed/Aspiration	CD-21
EP-22	Fresh Ore Material Handling	EU1120	Air Gravity Conveyor	Enclosed/Aspiration	CD-22
		EU1130	Air Gravity Conveyor	Enclosed/Aspiration	
		EU1140	Air Gravity Conveyor	Enclosed/Aspiration	
		EU1150	Air Gravity Conveyor	Enclosed/Aspiration	
		EU1160	Air Gravity Conveyor	Enclosed/Aspiration	
		EU1170	Air Gravity Conveyor	Enclosed/Aspiration	
		EU1180	Air Gravity Conveyor	Enclosed/Aspiration	
EU1190	Air Gravity Conveyor	Enclosed/Aspiration			
EP-23	Fresh Ore Material Handling	EU1200	Screw Conveyor	Enclosed/Aspiration	CD-23
		EU1210	Screw Conveyor	Enclosed/Aspiration	

Emission Point ID	Emission Point Description	Emission Unit ID	Emission Unit Description	Capture Equipment	Control Device ID
		EU1220	Air Gravity Conveyor	Enclosed/Aspiration	
		EU1230	Air Gravity Conveyor	Enclosed/Aspiration	
		EU1240	Air Gravity Conveyor	Enclosed/Aspiration	
		EU1250	Air Gravity Conveyor	Enclosed/Aspiration	
		EU1260	Air Gravity Conveyor	Enclosed/Aspiration	
		EU1270	Air Gravity Conveyor	Enclosed/Aspiration	
		EU1280	Air Gravity Conveyor	Enclosed/Aspiration	
EP-24	Fresh Ore Material Handling	EU1300	Bucket Elevator	Enclosed/Aspiration	CD-24
EP-25	Fresh Ore Material Handling	EU1310	Air-Float Conveyor	Enclosed/Aspiration	CD-25
EP-26	Reacted Ore Material Handling	EU1320	Airslide	Enclosed/Aspiration	CD-26
EP-27	Reacted Ore Material Handling	EU1330	Air Gravity Conveyor	Enclosed/Aspiration	CD-27
EP-28	Reacted Ore Material Handling	EU1340	Air Gravity Conveyor	Enclosed/Aspiration	CD-28
EP-29	Reacted Ore Material Handling	EU1350	Air Gravity Conveyor	Enclosed/Aspiration	CD-29
EP-30	Reacted Ore Material Handling	EU1360	Air Gravity Conveyor	Enclosed/Aspiration	CD-30
EP-31	Reacted Ore Material Handling	EU1370	Air Gravity Conveyor	Enclosed/Aspiration	CD-31
EP-32	Reacted Ore Material Handling	EU1380	Air Gravity Conveyor	Enclosed/Aspiration	CD-32
EP-33	Reacted Ore Material Handling	EU1390		Enclosed/Aspiration	CD-33
EP-34	Reacted Ore Material Handling	EU1400	Air Gravity Conveyor	Enclosed/Aspiration	CD-34
EP-35	Reacted Ore Material Handling	EU1420	Air Gravity Conveyor	Enclosed/Aspiration	CD-35
		EU1430	Air Gravity Conveyor	Enclosed/Aspiration	
		EU1440	Air Gravity Conveyor	Enclosed/Aspiration	
		EU1450	Air Gravity Conveyor	Enclosed/Aspiration	
		EU1460	Air Gravity Conveyor	Enclosed/Aspiration	
		EU1470	Air Gravity Conveyor	Enclosed/Aspiration	
		EU1480	Air Gravity Conveyor	Enclosed/Aspiration	
EP-36	Reacted Ore Material Handling	EU1500	Air Gravity Conveyor	Enclosed/Aspiration	CD-36
		EU1510	Air Gravity Conveyor	Enclosed/Aspiration	
		EU1520	Air Gravity Conveyor	Enclosed/Aspiration	
		EU1530	Air Gravity Conveyor	Enclosed/Aspiration	
		EU1540	Air Gravity Conveyor	Enclosed/Aspiration	
		EU1550	Air Gravity Conveyor	Enclosed/Aspiration	
		EU1560	Air Gravity Conveyor	Enclosed/Aspiration	
EP-37	Reacted Ore Material Handling	EU1570	Air Gravity Conveyor	Enclosed/Aspiration	CD-37
EP-38	Reacted Ore Material Handling	EU1580	Air Gravity Conveyor	Enclosed/Aspiration	CD-38
EP-39	Reacted Ore Material Handling	EU1590	Air Gravity Conveyor	Enclosed/Aspiration	CD-39

Emission Point ID	Emission Point Description	Emission Unit ID	Emission Unit Description	Capture Equipment	Control Device ID
EP-40	Reacted Ore Material Handling	EU1600	Air Gravity Conveyor	Enclosed/Aspiration	CD-40
EP-41	Reacted Ore Material Handling	EU1610	Air Gravity Conveyor	Enclosed/Aspiration	CD-41
EP-42	Reacted Ore Material Handling	EU1620	Air Gravity Conveyor	Enclosed/Aspiration	CD-42
EP-43	Reacted Ore Material Handling	EU1630	Air Gravity Conveyor	Enclosed/Aspiration	CD-43
EP-44	Reacted Ore Material Handling	EU1640	Air Gravity Conveyor	Enclosed/Aspiration	CD-44
EP-45	Reacted Ore Material Handling	EU1650	Air Gravity Conveyor	Enclosed/Aspiration	CD-45
EP-46	Electrolyte Recovery	EU1660	Power and Free	Enclosed/Aspiration	CD-46/46A
		EU1670	Bath Chipping Station	Capture Hood/Building	CD-46/46A
		EU1680	Butt Blowoff Cabinet	Enclosed/Aspiration	CD-46/46A
EP-47	<i>Electrolyte Recovery</i>	<i>EU1690</i>	<i>Butt Cooling Bays</i>	<i>Removed Per S.C.</i>	
EP-48	Electrolyte Recovery	EU1700	Vibrating Screen	Enclosed/Aspiration	CD-48
EP-49	Electrolyte Recovery	EU1710	Belt Conveyor	Enclosed/Aspiration	CD-49
		EU1720	Roll Crusher	Enclosed/Aspiration	
		EU1730	Bucket Elevator	Enclosed/Aspiration	
		EU1740	Bucket Elevator	Enclosed/Aspiration	
		EU1750	Screw Conveyor	Enclosed/Aspiration	
		EU1760	Screw Conveyor	Enclosed/Aspiration	
		EU1770	Screw Conveyor	Enclosed/Aspiration	
		EU1780	Screw Conveyor	Enclosed/Aspiration	
		EU1790	Screw Conveyor	Enclosed/Aspiration	
		EU1800	Screw Feeder	Enclosed/Aspiration	
		EU1810	Screw Feeder	Enclosed/Aspiration	
		EU1820	Vibrating Screen	Enclosed/Aspiration	
		EU1830	Bath, Dense Phase Pump	Enclosed/Aspiration	
		EU1840	Bath, Dense Phase Pump	Enclosed/Aspiration	
EU1850	Crucible Cleaning Machine	Capture Hood/Building			
EP-50	Electrolyte Recovery	EU1860	Vibrating Feeder	Enclosed/Aspiration	CD-50
		EU1870	Magnetic Separator	Enclosed/Aspiration	
		EU1880	Rotary Breaker	Capture Hood/Building	
EP-55	Electrolyte Recovery	EU1930	Air Slide	Enclosed/Aspiration	CD-55
EP-56	Electrolyte Recovery	EU1940	Air Slide	Enclosed/Aspiration	CD-56
EP-57	Fresh Ore Material Handling	EU1950	Air Receiver	Enclosed/Aspiration	CD-57
EP-58	Electrolyte Recovery	EU1960	Butt Blast Cleaning Machine	Enclosed/Aspiration	CD-58
EP-59	Monitor - Potline 1	EU1970	Potline 1 (secondary emissions-roof vents)	N/A	
EP-60	Monitor - Potline 2	EU1980	Potline 2 (secondary emissions-roof vents)	N/A	

Emission Point ID	Emission Point Description	Emission Unit ID	Emission Unit Description	Capture Equipment	Control Device ID
EP-61	Potline I & II Stack	EU1990	Potline 1 (primary emissions - stack)	Capture Hoods	20 of CD-61/61A
		EU2000	Potline 2 (primary emissions - stack)	Capture Hoods	20 of CD-61/61A
EP-62	161 Unit Stack	EU2010	Potline 3 (primary emissions-161 unit stack)	Capture Hoods	8 of CD-62
		EU1690	Butt Cooling Bays	Enclosed/Aspiration	
EP-63	162 Unit Stack	EU2030	Potline 3 (primary emissions-162 unit stack)	Capture Hoods	8 of CD-63
		EU1690	Butt Cooling Bays	Enclosed/Aspiration	
EP-64	Monitor - Potline 3	EU2050	Potline 3 (secondary emissions-roof vent fugitives)	N/A	
EP-65	Petroleum Coke Handling	EU2060	Belt Conveyor	Enclosed/Aspiration	CD-65
		EU2070	Belt Conveyor	Enclosed/Aspiration	
		EU2080	Belt Conveyor	Enclosed/Aspiration	
		EU2090	Belt Conveyor	Enclosed/Aspiration	
		EU2100	Belt Conveyor	Enclosed/Aspiration	
EP-66	Petroleum Coke Handling	EU2110	Belt Conveyor	Enclosed/Aspiration	CD-66
		EU2120	Screw Conveyor	Enclosed/Aspiration	
		EU2130	Screw Conveyor	Enclosed/Aspiration	
EP-67	Petroleum Coke Handling	EU2140	Screw Conveyor	Enclosed/Aspiration	CD-67
		EU2150	Screw Conveyor	Enclosed/Aspiration	
		EU2160	Screw Conveyor	Enclosed/Aspiration	
EP-68	Primary Crusher (North)	EU2220	Harley Station 34047 & 34048	Capture Hood/Building	CD-68
		EU2210	Vibrating Feeder	Enclosed/Aspiration	
		ND	52 Belt 34052	Enclosed/Aspiration	
EP-69	Primary Crusher (South)	EU2260	Phase 3 West Stripper 34212 (EU2260)	Capture Hood/Building	CD-69
		EU2260	Phase 3 East Stripper 34215 (EU2260)	Capture Hood/Building	
		EU2230	Feeder 34161 (EU2230)	Enclosed/Aspiration	
		EU2240	Feeder 34163 (EU2240)	Enclosed/Aspiration	
		EU2300	Feeder 34177 (EU2300)	Enclosed/Aspiration	
		EU2310	Feeder 34179 (EU2310)	Enclosed/Aspiration	
		EU2280	291 Reverse Belt 34291 (EU2280)	Enclosed/Aspiration	
		EU2190	Phase 3 Primary Williams Crusher 34224 (EU2190)	Capture Hood/Building	
		ND	Phase 3 240 Feeder 34240	Enclosed/Aspiration	

Emission Point ID	Emission Point Description	Emission Unit ID	Emission Unit Description	Capture Equipment	Control Device ID
		ND	Belt 34227	Enclosed/Aspiration	
EP-70	Tertiary Crusher	EU2320	Ball Mill	Capture Hood/Building	CD-70
		EU2330	Tertiary Butts Crusher	Capture Hood/Building	
		EU2340	Bucket Elevator	Enclosed/Aspiration	
		EU2350	Vibrating Feeder	Enclosed/Aspiration	
EP-71	Anode Paste Production	EU2400	Bucket Elevator	Enclosed/Aspiration	CD-71
		EU2410	Bucket Elevator	Enclosed/Aspiration	
		EU2450	Screw Conveyor	Enclosed/Aspiration	
		EU2460	Screw Conveyor	Enclosed/Aspiration	
		EU2470	Screw Conveyor	Enclosed/Aspiration	
		EU2560	Vibratory Feeder	Enclosed/Aspiration	
		EU2630	Vibratory Feeder	Enclosed/Aspiration	
		EU2640	Vibratory Feeder	Enclosed/Aspiration	
		EU2650	Vibratory Feeder	Enclosed/Aspiration	
		EU2660	Vibratory Feeder	Enclosed/Aspiration	
		EU2670	Vibratory Feeder	Enclosed/Aspiration	
		EU2680	Vibratory Feeder	Enclosed/Aspiration	
		EU2690	Vibratory Feeder	Enclosed/Aspiration	
		EU2980	Screw Conveyor	Enclosed/Aspiration	
		EU3000	Screw Conveyor	Enclosed/Aspiration	
		EU5010	Screw Conveyor	Enclosed/Aspiration	
		EU5020	Screw Conveyor	Enclosed/Aspiration	
		EP-72	Anode Paste Production	EU2600	
EU2390	Bucket Elevator			Enclosed/Aspiration	
EU2480	Screw Conveyor			Enclosed/Aspiration	
EU2490	Rotary Vane Feeder			Enclosed/Aspiration	
EU2500	Rotary Vane Feeder			Enclosed/Aspiration	
EU2510	Rotary Vane Feeder			Enclosed/Aspiration	
EU2520	Rotary Vane Feeder			Enclosed/Aspiration	
EU2530	Rotary Vane Feeder			Enclosed/Aspiration	
EU2880	Screw Feeder			Enclosed/Aspiration	
EU2940	Screw Feeder			Enclosed/Aspiration	
EU3200	Screw Conveyor			Enclosed/Aspiration	
EU5070	Tramp Iron Separator			Enclosed/Aspiration	
EP-73	Anode Paste Production	EU3060	Vibratory Feeder	Enclosed/Aspiration	CD-73
		EU3070	Vibratory Feeder	Enclosed/Aspiration	
		EU3080	Vibratory Feeder	Enclosed/Aspiration	
		EU3090	Vibratory Feeder	Enclosed/Aspiration	
		EU3100	Conveyor / Bucket Elevator	Enclosed/Aspiration	
		EU3110	Paste Mixer	Enclosed/Aspiration	
		EU3120	Belt Conveyor	Enclosed/Aspiration	

Emission Point ID	Emission Point Description	Emission Unit ID	Emission Unit Description	Capture Equipment	Control Device ID
EP-74	Anode Paste Production	EU3130	Apron Conveyor	Enclosed/Aspiration	CD-74
		EU3140	Screw Conveyor	Enclosed/Aspiration	
		EU3150	Screw Conveyor	Enclosed/Aspiration	
		EU3160	Screw Conveyor	Enclosed/Aspiration	
		EU3170	Screw Conveyor	Enclosed/Aspiration	
		EU3180	Screw Conveyor	Enclosed/Aspiration	
		EU3190	Screw Conveyor	Enclosed/Aspiration	
		EU3210	Screw Conveyor	Enclosed/Aspiration	
		EU3220	Screw Conveyor	Enclosed/Aspiration	
EU3230	Screw Conveyor	Enclosed/Aspiration			
EP-79	Anode Cleaning System	EU3620	Anode Cleaning Station	Enclosed/Aspiration	CD-79
EP-80	Fresh Ore Handling	EU3630	Air-Float Conveyor	Enclosed/Aspiration	CD-80
EP-81	Fresh Ore Handling	EU3640	Air-Float Conveyor	Enclosed/Aspiration	CD-81
EP-82	Anode Stem Cleaning (Phase I)	EU3650	Stub and Rod Cleaner	Enclosed/Aspiration	CD-82
EP-83	Cathode Casting Station	EU3660	Collector Bar Cleaner	Removed per S.C.	
EP-84	Anode Stem Cleaning	EU3670	Rod and Stub Cleaner	Removed per S.C.	
EP-86	Welding Fume Exhaust for Anode Repair	EU3680	Electric Welder	Removed per S.C.	
EP-87	Welding Fume Exhaust for Shield Repair	ND		N/A	
EP-91	Vent for Pitch Day Tank	ND		N/A	
EP-94	Natural Gas Fired Boiler for Hot Oil System	EU3730	Natural Gas Fired Boiler for Hot Oil System	N/A	
EP-95	Natural Gas Fired Boiler for Hot Oil System	EU3740	Natural Gas Fired Boiler for Hot Oil System	N/A	
EP-96	Natural Gas Fired Boiler for Hot Oil System	EU3750	Natural Gas Fired Boiler for Hot Oil System	N/A	
EP-97	Carbon Rodding Aluminum Spray Furnace	EU3760	Carbon Rodding Aluminum Spray Furnace	N/A	
EP-100	Anode Paste Process	EU5100	Rotary Lobe Blower	Enclosed/Aspiration	CD-100
		EU5110	Air Veyor	Enclosed/Aspiration	
		EU5120	Turntable Vibrating Compactor	Enclosed/Aspiration	
		EU5130	Kneader	Enclosed/Aspiration	
		EU5140	Pitch Weigh Pot	Enclosed/Aspiration	

Emission Point ID	Emission Point Description	Emission Unit ID	Emission Unit Description	Capture Equipment	Control Device ID
		EU5150	Pitch Pump	Enclosed/Aspiration	
		EU5160	Pitch Pump	Enclosed/Aspiration	
EP-101	Fraction Handling	EU5200	Slide Gate	Enclosed/Aspiration	CD-101
		EU5210	Screw Conveyor	Enclosed/Aspiration	
		EU5220	Screw Conveyor	Enclosed/Aspiration	
		EU5230	Screw Conveyor	Enclosed/Aspiration	
		EU5240	Screw Conveyor	Enclosed/Aspiration	
		EU5250	Screw Conveyor	Enclosed/Aspiration	
		EU5260	Screw Conveyor	Enclosed/Aspiration	
		EU5270	Air Veyor	Enclosed/Aspiration	
		EP-102	Proportioning System	EU5300	
EU5310	Screw Conveyor			Enclosed/Aspiration	
EU5320	Bucket Elevator			Enclosed/Aspiration	
EU5330	Preheating Screw Conveyor			Enclosed/Aspiration	
EP-108	Phase 1 & 2 Rod Brush Station	EU5400	Rod Brush Station	Capture Hood/Building	CD-108
EP-109	Phase 3 Rod Brush Station	EU5410	Rod Brush Station	Capture Hood/Building	CD-109
EP110		EU2180	Phase 1 West Stripper 345001 (EU2180)	Capture Hood/Building	CD-110
		EU2180	Phase 1 East Stripper 345002 (EU2180)	Capture Hood/Building	
		ND	21 Belt 345021	Enclosed/Aspiration	
		ND	22 Belt 345022	Enclosed/Aspiration	
		ND	Flop Gate 34.20.06	Enclosed/Aspiration	
		ND	23 Belt 345023	Enclosed/Aspiration	
		ND	24 Belt 345024	Enclosed/Aspiration	
		ND	P1 KHD Crusher 345110	Capture Hood/Building	
		ND	Manual Scrap Charging Vibrating Feeder 345030	Capture Hood/Building	
		ND	25 Belt 345025	Enclosed/Aspiration	
ND	29 Belt 345029	Enclosed/Aspiration			
EP-AAA	Carbon Bake Furnaces	EU3760	Roll Conveyor (carbon bake)	Enclosed/Aspiration	4 OF CD-AAA
		EU3770	Roll Conveyor (carbon bake)	Enclosed/Aspiration	
		EU3780	Roll Conveyor (carbon bake)	Enclosed/Aspiration	
		EU3790	Roll Conveyor (carbon bake)	Enclosed/Aspiration	
		EU3800	Roller Flight Conveyor (carbon bake)	Enclosed/Aspiration	
		EU3810	Belt Conveyor (carbon bake)	Enclosed/Aspiration	
		EU3820	Belt Conveyor (carbon bake)	Enclosed/Aspiration	

Emission Point ID	Emission Point Description	Emission Unit ID	Emission Unit Description	Capture Equipment	Control Device ID
		EU3830	Power Roll Conveyor (carbon bake)	Enclosed/Aspiration	
		EU3840	Power Roll Conveyor (carbon bake)	Enclosed/Aspiration	
		EU3850	Power Roll Conveyor (carbon bake)	Enclosed/Aspiration	
		EU3860	Power Roll Conveyor (carbon bake)	Enclosed/Aspiration	
		EU3870	Power Roll Conveyor (carbon bake)	Enclosed/Aspiration	
		EU3880	Power Roll Conveyor (carbon bake)	Enclosed/Aspiration	
		EU3890	Pusher (carbon bake)	Enclosed/Aspiration	
		EU3900	Screw Conveyor	Enclosed/Aspiration	
		EU3910	Screw Conveyor	Enclosed/Aspiration	
		EU3920	Conveyor, Chain Drive (carbon bake)	Enclosed/Aspiration	
		EU3930	Conveyor, Chain Drive (carbon bake)	Enclosed/Aspiration	
		EU3940	Vertical Reciprocating Lift (carbon bake)	Enclosed/Aspiration	
		EU3950	Air/Material Manifold	Enclosed/Aspiration	
		EU3960	Burner Manifold (carbon bake)	Enclosed/Aspiration	
		EU3970	Burner Manifold (carbon bake)	Enclosed/Aspiration	
		EU3980	Burner Manifold (carbon bake)	Enclosed/Aspiration	
		EU3990	Burner Manifold (carbon bake)	Enclosed/Aspiration	
		EU4000	Burner Manifold (carbon bake)	Enclosed/Aspiration	
		EU4010	Conveyors (carbon bake)	Enclosed/Aspiration	
		EU4020	Conveyors (carbon bake)	Enclosed/Aspiration	
		EU4030	Conveyors (carbon bake)	Enclosed/Aspiration	
		EU4040	Conveyors (carbon bake)	Enclosed/Aspiration	
		EU4050	Conveyors (carbon bake)	Enclosed/Aspiration	
		EU4060	Conveyors (carbon bake)	Enclosed/Aspiration	
		EU4070	Conveyors (carbon bake)	Enclosed/Aspiration	
		EU4080	Conveyors (carbon bake)	Enclosed/Aspiration	
		EU4090	Conveyors (carbon bake)	Enclosed/Aspiration	
		EU4100	Conveyors (carbon	Enclosed/Aspiration	

Emission Point ID	Emission Point Description	Emission Unit ID	Emission Unit Description	Capture Equipment	Control Device ID
			bake)		
		EU4110	Power Roll, Gravity Rolls (carbon bake)	Enclosed/Aspiration	
		EU4120	Bar Flight (carbon bake)	Enclosed/Aspiration	
		EU4130	Screw Conveyor (carbon bake)	Enclosed/Aspiration	
		EU4140	Screw Conveyor (carbon bake)	Enclosed/Aspiration	
		EU4150	Screw Conveyor (carbon bake)	Enclosed/Aspiration	
		EU4160	Conveyor, Chain Driven (carbon bake)	Enclosed/Aspiration	
		EU4170	Conveyor, Chain Driven (carbon bake)	Enclosed/Aspiration	
		EU4180	Conveyor, Chain Driven (carbon bake)	Enclosed/Aspiration	
		EU4190	Conveyor, Chain Driven (carbon bake)	Enclosed/Aspiration	
		EU4200	Conveyor, Chain Driven (carbon bake)	Enclosed/Aspiration	
		EU4210	Conveyor, Chain Driven (carbon bake)	Enclosed/Aspiration	
		EU4220	Conveyor, Chain Driven (carbon bake)	Enclosed/Aspiration	
		EU4230	Conveyor, Chain Driven (carbon bake)	Enclosed/Aspiration	
		EU4240	Conveyor, Chain Driven (carbon bake)	Enclosed/Aspiration	
		EU4250	Conveyor, Chain Driven (carbon bake)	Enclosed/Aspiration	
		EU4260	Conveyor, Chain Driven (carbon bake)	Enclosed/Aspiration	
		EU4270	Conveyor, Chain Driven (carbon bake)	Enclosed/Aspiration	
		EU4280	Conveyor, Chain Driven (carbon bake)	Enclosed/Aspiration	
		EU4290	Conveyor, Chain Driven (carbon bake)	Enclosed/Aspiration	
		EU4300	Green Anode Stacker (carbon bake)	Enclosed/Aspiration	
		EU4310	Burner Manifold (carbon bake)	Enclosed/Aspiration	
		EU4320	Burner Manifold (carbon bake)	Enclosed/Aspiration	
		EU4330	Burner Manifold (carbon bake)	Enclosed/Aspiration	
		EU4340	Burner Manifold (carbon bake)	Enclosed/Aspiration	
		EU4350	Burner Manifold (carbon bake)	Enclosed/Aspiration	

Emission Point ID	Emission Point Description	Emission Unit ID	Emission Unit Description	Capture Equipment	Control Device ID
		EU4360	Power Roll Conveyor (carbon bake)	Enclosed/Aspiration	
		EU4370	Power Roll Conveyor (carbon bake)	Enclosed/Aspiration	
		EU4380	Power Roll Conveyor (carbon bake)	Enclosed/Aspiration	
		EU4390	Power Roll Conveyor (carbon bake)	Enclosed/Aspiration	
		EU4400	Power Roll Conveyor (carbon bake)	Enclosed/Aspiration	
		EU4410	Power Roll Conveyor (carbon bake)	Enclosed/Aspiration	
		EU4420	Roller Conveyor (carbon bake)	Enclosed/Aspiration	
		EU4430	Roller Conveyor (carbon bake)	Enclosed/Aspiration	
		EU4440	Roller Conveyor (carbon bake)	Enclosed/Aspiration	
		EU4450	Roller Conveyor (carbon bake)	Enclosed/Aspiration	
		EU4460	Accumulative Conveyor (carbon bake)	Enclosed/Aspiration	
		EU4470	Bar Flight Conveyor (carbon bake)	Enclosed/Aspiration	
		EU4480	Conveyor (carbon bake)	Enclosed/Aspiration	
		EU4490	Conveyor (carbon bake)	Enclosed/Aspiration	
		EU4500	Conveyor (carbon bake)	Enclosed/Aspiration	
		EU4510	Screw Conveyor (carbon bake)	Enclosed/Aspiration	
		EU4520	Conveyor, Chain Driven (carbon bake)	Enclosed/Aspiration	
		EU4530	Conveyor, Chain Driven (carbon bake)	Enclosed/Aspiration	
		EU4540	Conveyor, Chain Driven (carbon bake)	Enclosed/Aspiration	
		EU4550	Conveyor, Chain Driven (carbon bake)	Enclosed/Aspiration	
		EU4560	Conveyor, Chain Driven (carbon bake)	Enclosed/Aspiration	
		EU4570	Conveyor, Chain Driven (carbon bake)	Enclosed/Aspiration	
		EU4580	Conveyor, Chain Driven (carbon bake)	Enclosed/Aspiration	
		EU4590	Conveyor, Chain Driven (carbon bake)	Enclosed/Aspiration	
		EU4600	Conveyor, Chain Driven (carbon bake)	Enclosed/Aspiration	

Emission Point ID	Emission Point Description	Emission Unit ID	Emission Unit Description	Capture Equipment	Control Device ID
		EU4610	Conveyor, Chain Driven (carbon bake)	Enclosed/Aspiration	
		EU4620	Conveyor, Chain Driven (carbon bake)	Enclosed/Aspiration	
		EU4630	Conveyor, Chain Driven (carbon bake)	Enclosed/Aspiration	
		EU4640	Conveyor, Chain Driven (carbon bake)	Enclosed/Aspiration	
		EU4650	Burner Manifold (carbon bake)	Enclosed/Aspiration	
		EU4660	Burner Manifold (carbon bake)	Enclosed/Aspiration	
		EU4670	Burner Manifold (carbon bake)	Enclosed/Aspiration	
		EU4680	Burner Manifold (carbon bake)	Enclosed/Aspiration	
		EU4690	Burner Manifold (carbon bake)	Enclosed/Aspiration	
		EU4700	Burner Manifold (carbon bake)	Enclosed/Aspiration	
EP-AB	Stack for Pig Melter	EU4710	#3 Melting Furnace-Pig (Metal Products)	N/A	
EP-AD	Stack for #1 Melter	EU4730	#1 Melting Furnace (Metal Products)	N/A	
EP-AE	Stack for #1 Holder	EU4740	#1 Holding Furnace (Metal Products)	N/A	
EP-AF	Stack for #2 Melter	EU4750	#2 Melting Furnace (Metal Products)	N/A	
EP-AG	Stack for #2 Holder	EU4760	#2 Holding Furnace (Metal Products)	N/A	
EP-AH	Stack for #4 Melter	EU4770	#4 Melting Furnace (Metal Products)	N/A	
EP-AI	Stack for #4 Holder	EU4780	#4 Holding Furnace (Metal Products)	N/A	
EP-AJ	Stack for Homogenizing Furnace #1	EU4790	Homogenizing Furnace #1	N/A	
EP-AK	Stack for Homogenizing Furnace #2	EU4800	Homogenizing Furnace #2	N/A	
EP-AL	Stack for Homogenizing Furnace #3	EU4810	Homogenizing Furnace #3	N/A	
EP-AN	Stack for Pig Melter #2	EU4830	#5 Pig Melter (Metal Products)	N/A	
EP-BA	Stack for Rod Mill #1 Melter	EU4840	#1 Charge Furnace (Rod Mill)	N/A	
EP-BB	Stack for Rod Mill #1 Holder	EU4850	#3 Holding Furnace (Rod Mill)	N/A	
EP-BC	Stack for Rod Mill #2 Melter	EU4860	#2 Charge Furnace (Rod Mill)	N/A	

Emission Point ID	Emission Point Description	Emission Unit ID	Emission Unit Description	Capture Equipment	Control Device ID
EP-BD	Stack for Rod Mill #2 Holder	EU4870	#4 Holding Furnace (Rod Mill)	N/A	
EP-BH	#5 Rod Mill Holder	EU4890	Cone Casting Furnace	N/A	
EP-BI	Natural Gas Fired Boiler for Office Heat	EU4900	Natural Gas Fired Boiler for Office Heat	N/A	
EP-BJ	Natural Gas Fired Boiler for Locker Room Heat	EU4910	Natural Gas Fired Boiler for Locker Room Heat	N/A	
EP-BK	Natural Gas Fired Boiler for Locker Room Heat	EU4920	Natural Gas Fired Boiler for Locker Room Heat	N/A	
EP-BL	#2 Diesel Fuel Storage Tank	ND	#2 Diesel Fuel Storage Tank	N/A	
EP-BM	#2 Diesel Fuel Storage Tank	ND	#2 Diesel Fuel Storage Tank	N/A	
EP-BN	Gasoline Storage Tank	ND	Gasoline Storage Tank	N/A	
EP-DW	Potline Crusher	EU5000	Potline Crusher	Capture Hood/Building	CD-DW

Appendix F: Example of Flow Rate Categories for Special Condition 16.D.

	Emission Point Number	Description	Flow Rate (dscfm)
Group 1	EP-81	Fresh Ore Handling	325
	EP-27	Reacted Ore Material Handling	800
	EP-28	Reacted Ore Material Handling	800
	EP-29	Reacted Ore Material Handling	800
	EP-30	Reacted Ore Material Handling	800
	EP-31	Reacted Ore Material Handling	800
	EP-32	Reacted Ore Material Handling	800
	EP-33	Reacted Ore Material Handling	800
	EP-34	Reacted Ore Material Handling	800
	EP-37	Reacted Ore Material Handling	800
	EP-38	Reacted Ore Material Handling	800
	EP-39	Reacted Ore Material Handling	800
	EP-40	Reacted Ore Material Handling	800
	EP-41	Reacted Ore Material Handling	800
	EP-42	Reacted Ore Material Handling	800
	EP-43	Reacted Ore Material Handling	800
	EP-44	Reacted Ore Material Handling	800

	Emission Point Number	Description	Flow Rate (dscfm)
Group 2	EP-108	Brush Station	1,000
	EP-109	Brush Station	1,000
	EP-16	Fresh Ore Material Handling	1,200
	EP-17	Fresh Ore Material Handling	1,200
	EP-18	Fresh Ore Material Handling	1,200
	EP-19	Fresh Ore Material Handling	1,200
	EP-20	Fresh Ore Material Handling	1,200
	EP-67	Petroleum Coke Handling	1,500
	EP-71	Anode Paste Production	1,500
	EP-35	Reacted Ore Material Handling	1,700
EP-45	Reacted Ore Material Handling	1,700	
Group 3	EP-06	Fresh Ore Material Handling	2,400
	EP-80	Fresh Ore Handling	2,400
	EP-11	Fresh Ore Material Handling	2,575
	EP-74	Anode Paste Production	2,600
	EP-49	Electrolyte Recovery	2,800
	EP-55	Electrolyte Recovery	2,800

	Emission Point Number	Description	Flow Rate (dscfm)
Group 3	EP-56	Electrolyte Recovery	2,800
	EP-09	Reacted Ore Material Handling	3,000
	EP-22	Fresh Ore Material Handling	3,500
	EP-23	Fresh Ore Material Handling	3,500
Group 4	EP-25	Fresh Ore Material Handling	4,000
	EP-26	Reacted Ore Material Handling	4,000
	EP-36	Reacted Ore Material Handling	4,000
	EP-65	Petroleum Coke Handling	4,000
	EP-66	Petroleum Coke Handling	4,000
	EP-72	Anode Paste Production	4,000
	EP-03	River Unloading	4,005
	EP-01	River Unloading	4,250
	EP-02	River Unloading	4,250
	EP-10	Reacted Ore Material Handling	4,500
	EP-102	Proportioning System	4,700
EP-15	Fresh Ore Material Handling	4,750	
EP-21	Fresh Ore Material Handling	4,750	

Attachment A: SO2 Compliance Worksheet

Noranda Aluminum, Inc.
 New Madrid County, S29, T22N, R14E
 Project Number: 2008-09-024
 Installation ID Number: 143-0008
 Permit Number:

This sheet covers the period of _____
 (month, year)

		Item		
Incoming Materials to Carbon Bake Furnaces:	1	% S Pitch		*%S less than 0.8% is in compliance
	2	% S Coke		*%S less than 3.0% is in compliance
	3	%Pitch in Green Mix		
	4	Pitch Received		
	5	Coke Received		
	6	Total S in Pitch and Coke Received		
	7	Coke Used from Tanks*		
	8	Pitch Used from Tanks*		
	9	Coke Used in Green Blocks*		
	10	Pitch Used in Green Blocks*		*These values may be added or subtracted from received value based on increase or decrease in inventory
	11	Coke in Green Scrap*		
	12	Pitch in Green Scrap*		
	13	Coke in Green Scrap Shipped*		
	14	Pitch in Green Scrap Shipped*		
	15	Total Weight of Material going into Carbon Bake Furnaces		Total of Item 4, 5, 7, 8, 9, 10, 11, 12, 13, an 14
Incoming S to Carbon Bake Furnaces	16	%S going into Carbon Bakes		
	17	Total S Processed (Into Carbon Bake Furnaces)		Item 6 plus sulfur in Coke inventory (Items 7, 9, 11, 13) and sulfur Pitch inventory (Items 8, 10, 12, 14)
Outgoing S from Carbon Bake Furnaces:	18	Average % Reduction in Material Weight During Baking:		
	19	Esimated Weight of Baked Anodes Outgoing from Carbon Bakes (using weight baked vs. weight green)		Item 15 multiplied by Item 18
	20	%S in Baked Anodes		
	21	Total S Outgoing from Carbon Bake Furnaces		Item 19 multiplied by Item 20
	22	Difference between Total S going into Carbon Bakes and Total Outgoing from Carbon Bakes		Item 17 minus Item 21

	23	SO2 Emissions from all 3 Carbon Bakes	Item 22 multiplied by 2
Incoming Materials to Potlines:	24	Coke in Addt'l Baked Blocks*	
	25	Pitch in Addt'l Baked Blocks*	
	26	Coke in Butts,Rodding&Baked Scrap*	*These values may be added or subtracted from incoming value based on increase or decrease in inventory
	27	Pitch in Butts,Rodding&Baked Scrap*	
	28	Coke in Butts&Carbon Shipped*	
	29	Pitch in Butts&Carbon Shipped*	
	30	Sulfur in fresh alumina	Based on testing results
	31	Sulfur in reacted alumina	Based on testing results
Outgoing S from Potlines:	32	Weight of Baked Anodes into Potlines	Total of Items 19, 24, 26, 28
	33	Total Weight of S Anodes Processed into Potlines	Item 19 multiplied by Item 20 plus sulfur in Coke inventory (Item 24, 26, 28) plus sulfur in fresh and reacted alumina (Item 30 and 31)
	34	SO2 Emissions from all 3 Potlines	Item 33 multiplied by 2
	35	SO2 Emissions from Natural Gas Sources	Based on amount natural gas combusted
36	Monthly Total SO2 Emissions from Entire Installation		Total of Item 23, 34 and 35
37	12-Month SO2 Emissions Total from Previous Month's Worksheet		Item 39 from previous month's worksheet
38	Monthly SO2 Emissions Total from Previous Year's Worksheet		Item 36 from the previous year's worksheet for the same month
39	Current 12-Month Total SO2 Emissions**		Item 36 + Item 37 – Item 38
	** A total of less than 6077 tpy demonstrates compliance		

Attachment B – Hourly SO_x Emission Worksheet

Noranda Aluminum, Inc.
 New Madrid County, S32, T22N, R14E
 Project Number: 2008-09-024
 Installation ID Number: 143-0008
 Permit Number: _____

This sheet covers the period of _____ for _____.
(month, year) (Emission Point Description)

1	SO2 Emissions from all 3 Potlines		Item 32 from Attachment A
2	Total Aluminum Production from all 3 Potlines		
3	Potline 1 Production Rate		
4	Percent of Total Attributed to Potline 1		Item 3 divided by Item 2
5	SO2 Emission from Potline 1		Item 4 multiplied by Item 1
6	Hour of Operation of Potline 1		
7	Total Hourly SO2 Emissions from Potline 1 *An emission rate less than 428.6 lb/hr demonstrates compliance.		Item 5 divided by Item 6
8	Potline 2 Production Rate		
9	Percent of Total Attributed to Potline 2		Item 8 divided by Item 2
10	SO2 Emission from Potline 2		Item 9 multiplied by Item 1
11	Hour of Operation of Potline 2		
12	Total Hourly SO2 Emissions from Potline 2 *An emission rate less than 430.1 lb/hr demonstrates compliance.		Item 10 divided by Item 11
13	Potline 3 East Production Rate		
14	Percent of Total Attributed to Potline 3 East		Item 13 divided by Item 2
15	SO2 Emission from Potline 3 East		Item 14 multiplied by Item 1
16	Hour of Operation of Potline 3 East		
17	Total Hourly SO2 Emissions from Potline 3 East *An emission rate less than 256.0 lb/hr demonstrates compliance.		Item 15 divided by Item 16
18	Potline 3 West Production Rate		
19	Percent of Total Attributed to Potline 3 West		Item 18 divided by Item 2
20	SO2 Emission from Potline 3 West		Item 19 multiplied by Item 1
21	Hour of Operation of Potline 3 West		
22	Total Hourly SO2 Emissions from Potline 3 West *An emission rate less than 256.0 lb/hr demonstrates compliance.		Item 20 divided by Item 21
23	SO2 Emissions from all 3 Carbon Bakes		Item 23 from Attachment A
24	Hours of Operation		
25	Total Hourly SO2 Emissions from Carbon Bakes *An emission rate less than 405.2 lb/hr demonstrates compliance.		Item 23 divided by Item 24

Attachment F: Haul Road Compliance Worksheet

Noranda Aluminum, Inc.
 New Madrid County, S29, T22N, R14E
 Project Number: 2008-09-024
 Installation ID Number: 143-0008
 Permit Number:

This sheet covers the period from _____ to _____.

Date*	Weight of Hauled Material	Number of Trucks**	Silt Loading***	Emission Factor**** (lb/VMT)	Haul Road Emissions (pounds)
Total Haul Road Emissions Calculated for this Month					
12-Month Haul Road Emissions Total from Previous Month's Worksheet					
Monthly Haul Road Emissions Total from Previous Year's Worksheet					
Current 12-Month Total Haul Road Emissions*****					

* A daily emission rate of 38.8 pounds per day is in compliance.
 ** Trucks traveled and weight of material will be used in the emission factor equation
 *** Silt loading is determined through testing.
 **** Emission factor based on AP-42 haul road equation

**** A 12 month Total less than 2.9 tons demonstrates compliance

Attachment H: Hours of Operation Compliance Worksheet

Noranda Aluminum, Inc.
 New Madrid County, S29, T22N, R14E
 Project Number: 2008-09-024
 Installation ID Number: 143-0008
 Permit Number:

Date	Emission Point	Actual Hours of Operation (hours)	Limit on Hours of Operation (hours)
	EP-46 Electrolyte Recovery		18
	EP-48 Electrolyte Recovery		18
	EP-50 Electrolyte Recovery		18
	EP-58 Electrolyte Recovery		18
	EP-68 Primary Crusher (North)		16
	EP-69 Primary Crusher (South)		12
	EP-70 Tertiary Crusher		16
	EP-82 Anode Stem Cleaning (Phase I)		10
	EP-DW Potline Crusher		12